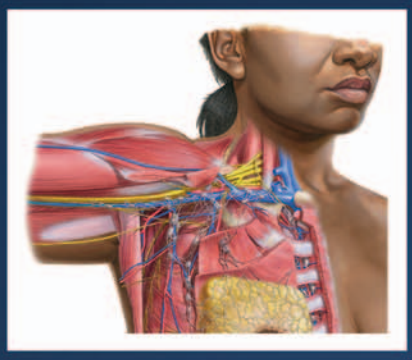

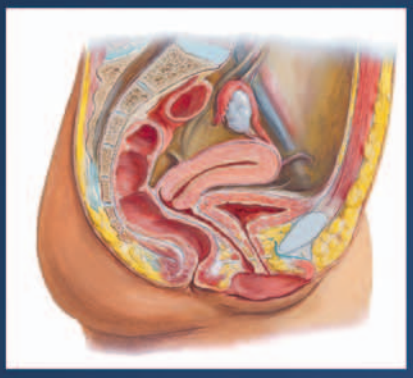

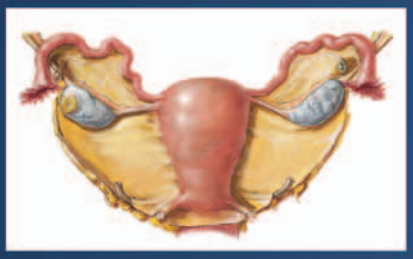

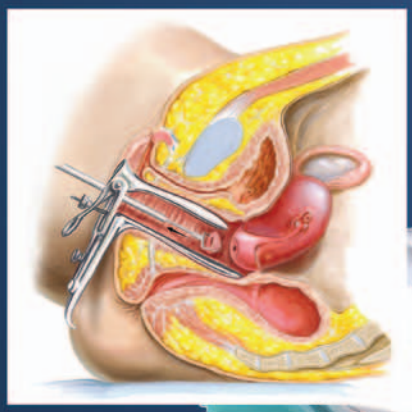

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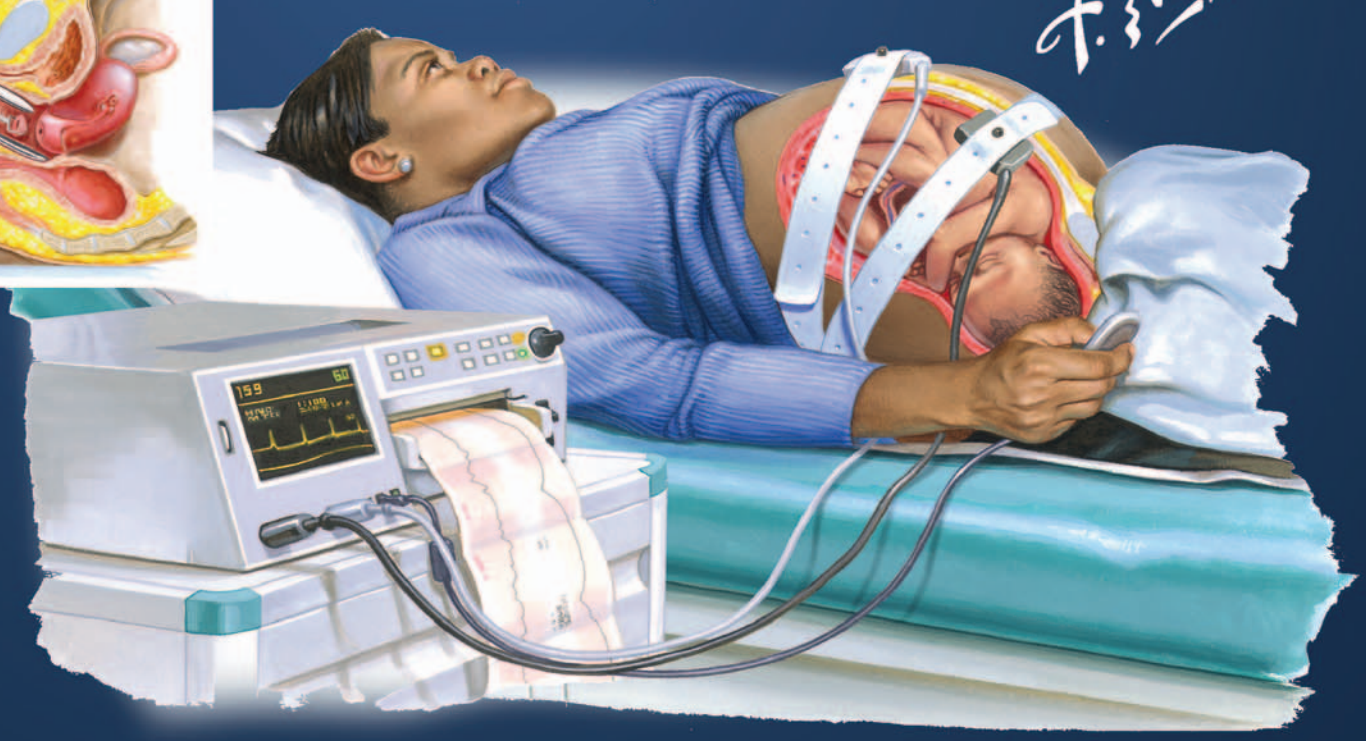

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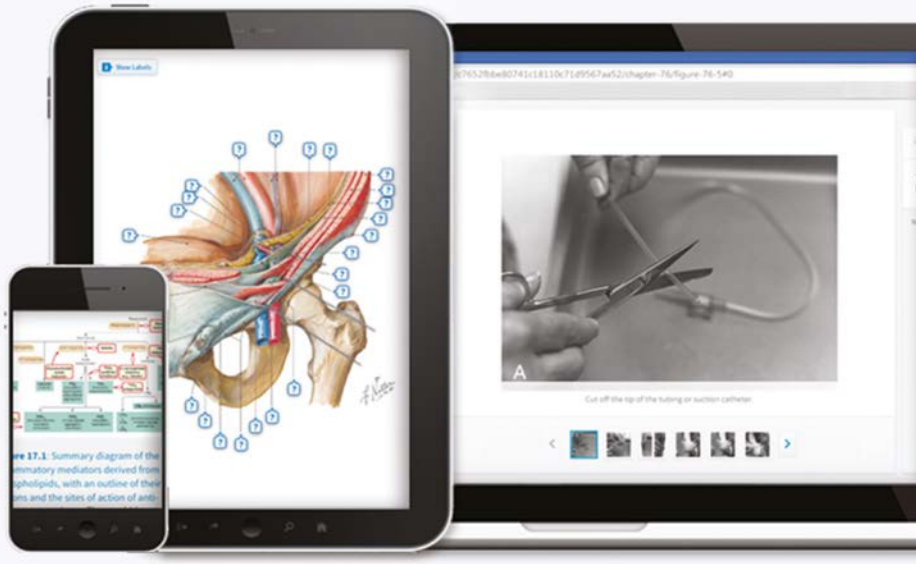

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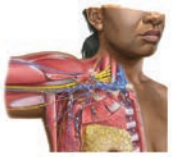
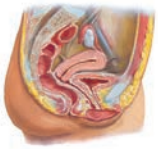
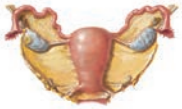
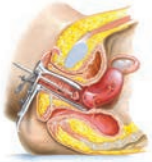


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PREFACE

No student of medicine, past or present, is unaware of the extraordinary series of medical illustrations created by Dr. Frank Netter. It is an incredible body of work that has been carried forward by the talented Carlos Machado, MD, John Craig, MD, and others since Dr. Netter's passing. Older physicians have looked with envy at these images, wishing they had been available when they were learning; established physicians return to them as comfortable sources of information; and young physicians seek them out for the wealth of information they contain and their ability to make clear difficult clinical concepts. This spirit of concise reference and resource is the premise of this text.

This fourth edition maintains the same consistent format in presenting topics to facilitate rapid access—the same information is in the same location—that was so well received in the first three editions. Chapters have been organized to provide a quick, concise resource for the diagnosis and treatment of common conditions encountered by anyone who provides care for women. In producing this fourth edition, more than 15 new topics have been added, terminology has been updated, evolving therapies have been incorporated, new artwork has been developed, all references have been updated, and subtle enhancements have been made throughout the work.

It is the hope of all who contributed to this work that it will be both a useful resource and a celebration of the artistic richness that is clinical medicine.

Roger P. Smith, MD

ABOUT THE AUTHOR

Although Roger P. Smith, MD, has spent much of his 50-year career in academic medicine and has a curriculum vitae that is appropriately long, he regards himself as a clinician. Dr. Smith received his undergraduate education at Purdue University and his medical education, internship (in General Surgery), and residency at Northwestern University in Chicago. He then spent almost 10 years in a multidisciplinary group practice at the Carle Clinic in Urbana, Illinois, before moving to the Medical College of Georgia in 1985, where he was Chief of the Section of General Obstetrics and Gynecology. In 1999 Dr. Smith joined the University of Missouri–Kansas City, where he served as Vice Chair and Residency Program Director until 2008. In 2011 he became the Robert A. Munsick Professor of Clinical Obstetrics and Gynecology and Director of the Division of General Obstetrics and Gynecology at Indiana University. Beginning in 2016, he served as the Assistant Dean for Graduate Medical Education, Faculty Affairs, and Faculty Development and as Professor of Clinical Biologic Sciences at the Charles E. Schmidt College of Medicine, Florida Atlantic University, in Boca Raton, Florida. In 2019 to 2020, he spent 15 months as an Accreditation Field Representative (site visitor) for the Accreditation Council for Graduate Medical Education (ACGME) before COVID-19 restricted travel. Although he retired from clinical practice in 2021, he continues to be active in medical education through his appointment as Adjunct Professor at the Virginia Tech Carilion School of Medicine. He is a past President of the Association of Professors of Gynecology and Obstetrics (APGO) and the Central Association of Obstetricians and Gynecologists (CAOG) and was the recipient of the 2020 Lifetime Achievement Award from the Association of Professors of Gynecology and Obstetrics.

ABOUT THE ARTISTS

FRANK H. NETTER, MD

Frank H. Netter was born in 1906 in New York City. He studied art at the Art Students League and the National Academy of Design before entering medical school at New York University, where he received his MD degree in 1931. During his student years, Dr. Netter's notebook sketches attracted the attention of the medical faculty and other physicians, allowing him to augment his income by illustrating articles and textbooks. He continued illustrating as a sideline after establishing a surgical practice in 1933, but he ultimately opted to give up his practice in favor of a full-time commitment to art. After service in the United States Army during World War II, Dr. Netter began his long collaboration with the CIBA Pharmaceutical Company (now Novartis Pharmaceuticals). This 45-year partnership resulted in the production of the extraordinary collection of medical art so familiar to physicians and other medical professionals worldwide.

In 2005, Elsevier purchased the Netter Collection and all publications from Icon Learning Systems. There are now over 50 publications featuring the art of Dr. Netter available through Elsevier, Inc. (in the United States: https://www.us.elsevierhealth.com/Netter; outside the United States: https://www.elsevierhealth.com).

Dr. Netter's works are among the finest examples of the use of illustration in the teaching of medical concepts. The 13-book *Netter Collection of Medical Illustrations,* which includes the greater part of the more than 20,000 paintings created by Dr. Netter, became and remains one of the most famous medical works ever published. The Netter *Atlas of Human Anatomy,* first published in 1989, presents the anatomic paintings from the Netter Collection. Now translated into 16 languages, it is the anatomy atlas of choice among medical and health professions students the world over.

The Netter illustrations are appreciated not only for their aesthetic qualities, but, more importantly, for their intellectual content. As Dr. Netter wrote in 1949, "Clarification of a subject is the aim and goal of illustration. No matter how beautifully painted, how delicately and subtly rendered a subject may be, it is of little value as a *medical illustration* if it does not serve to make clear some medical point." Dr. Netter's planning, conception, point of view, and approach are what inform his paintings and what make them so intellectually valuable.

Frank H. Netter, MD, physician and artist, died in 1991.

Learn more about the physician-artist whose work has inspired the Netter Reference collection:
https://www.netterimages.com/artist-frank-h-netter.html.

CARLOS MACHADO, MD

Carlos Machado was chosen by Novartis to be Dr. Netter's successor. He continues to be the main artist who contributes to the Netter collection of medical illustrations.

Self-taught in medical illustration, cardiologist Carlos Machado has contributed meticulous updates to some of Dr. Netter's original plates and has created many paintings of his own in the style of Netter as an extension of the Netter collection. Dr. Machado's photorealistic expertise and his keen insight into the health care provider-patient relationship inform his vivid and unforgettable visual style. His dedication to researching each topic and subject he paints places him among the premier medical illustrators at work today.

Learn more about his background and see more of his art at https://www.netterimages.com/artist-carlos-a-g-machado.html.

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SEXUAL DIFFERENTIATION

Genetic sex is determined by the complement and function of sex chromosomes (X and Y) that are present at the time of conception. A Y chromosome carrying specific genes is necessary for the development of testes. The testes are responsible for the organization of the sexual duct system into a male configuration and for the suppression of the paramesonephric (Müllerian) system responsible for female anatomic structures. In the absence of a Y chromosome, specifically required genes, or a functioning gonad, the development will be female. General phenotypic development of the female is viewed as a default event, although evidence of a more complex process is emerging.

Sexual differentiation genes are located on the Y chromosome, the primary of which is the *SRY* gene, also called the testis-determining factor. The *SRY* gene is found on the short arm of the Y chromosome and influences Sertoli cell differentiation, mesonephric ridge cell development, and male architectural development of the gonad, including blood vessels and other structures of the testes. Several other genes, including those that express steroidogenic factor-1, WT1, and DAX1, on other chromosomes, are also necessary for normal testicular development. To date, multiple mutations of the *SRY* gene have been reported and all are associated with sex reversals (female phenotype).

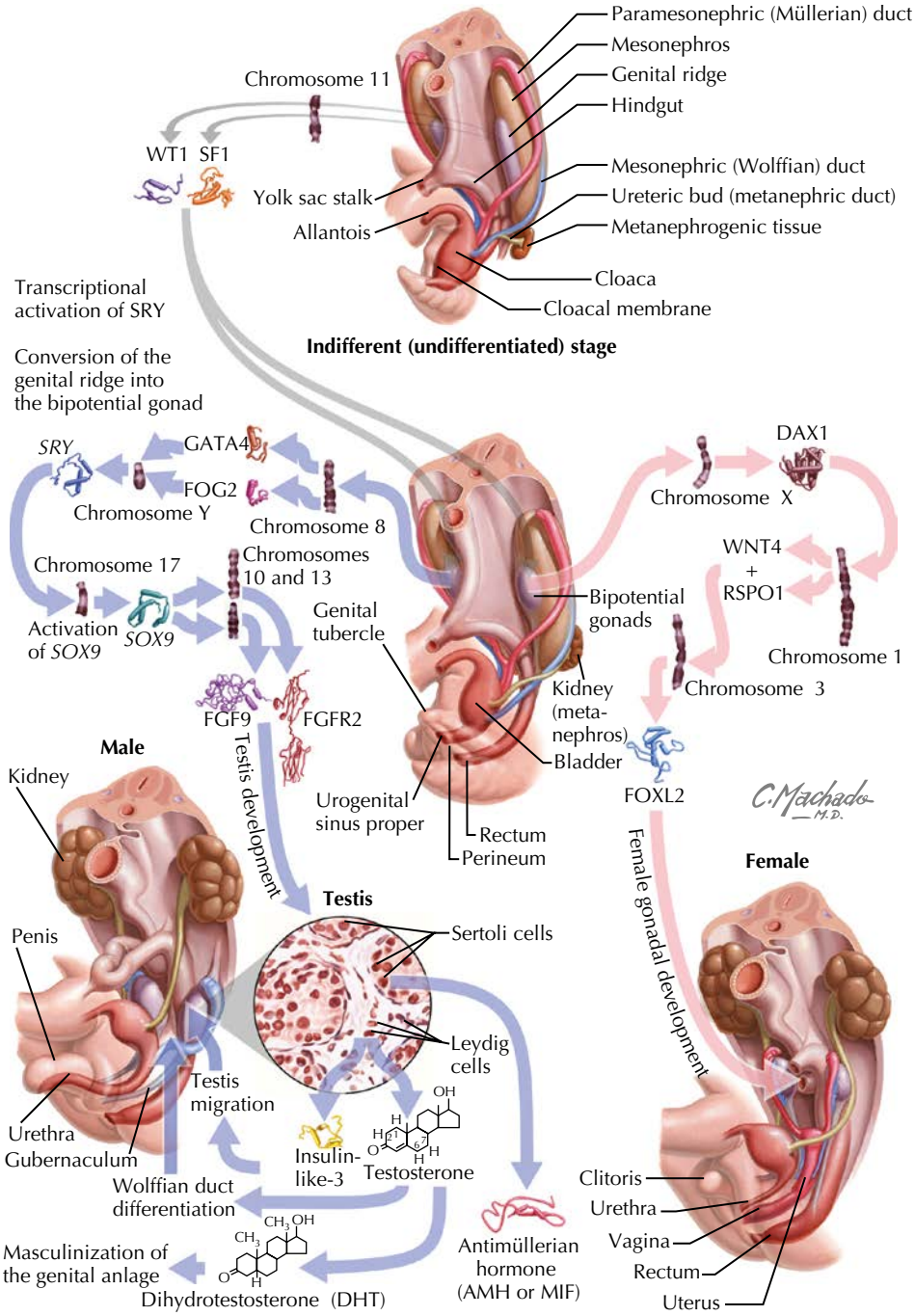


Figure 1.1 Genetics and biology of early reproductive tract development

Genes in other locations are also important for complete male sexual differentiation. DAX1, a nuclear hormone receptor, can alter *SRY* activity during development by suppressing genes downstream to *SRY* that would normally induce testicular differentiation. A second gene, *WNT4,* largely confined to the adult ovary, may also serve as an "antitestis" gene. In very rare male individuals, a Y chromosome may be absent, but the *SRY* gene may be present on another chromosome, most commonly the X chromosome, resulting in a male phenotype. It is becoming apparent that genes such as *WNT4* and *NR0B1* can proactively induce female gonadal development even in the presence of *SRY,* thereby further complicating the picture. This may account for individuals who are exceptions to the normal sexual dichotomy (eg, males with a uterus or females with an XY karyotype) or who exhibit biologic and/or behavioral characteristics of both sexes.

Male gonadal development precedes female development, and the early secretion of testosterone and antimüllerian hormone (AMH) steers the further development of the genital tracts away from the default female phenotype. At a critical point, AMH, produced by Sertoli cells, and testosterone, secreted by Leydig cells, must be produced in sufficient amounts. AMH acts locally, suppressing the Müllerian duct system. Testosterone acts systemically, causing the differentiation of the mesonephric duct system and male phenotype of the urogenital tubercle, urogenital sinus, and urogenital folds. Enzymes involved in testosterone biosynthesis and conversion to dihydrotestosterones are regulated by genes located on autosomes. The ability to secrete AMH is a recessive trait coded on either an autosome or the X chromosome, and genes for the development of cytoplasmic receptors of androgens seem to be coded on the X chromosome.

The development of the ovary occurs at approximately the 11th or 12th week of gestation, although the primordial germ cells migrate several weeks earlier to the germinal ridge. Two functional X chromosomes are necessary for the optimal development of the ovary. Thus, in 45,X and 46,XY females the ovaries are almost invariably devoid of oocytes. In contrast, germ cells in the testes do best when only one X chromosome is present; rarely do they survive in the XX or XXY condition.

When non-Y-bearing oocytes enter the differentiating gonad, the primary sex cords break up and encircle the oocytes in the cortex of the gonad (in contrast to the structure of the XY gonad). This occurs at approximately 16 weeks of gestation, and the isolated cell clusters are called primordial follicles. No new oogonia form after birth, and many of them degenerate well before birth. Those that remain grow and become primary follicles to be stimulated following puberty.

2 UPPER GENITAL TRACT DEVELOPMENT

Phenotypic gender is determined by a complex tissue differentiation process that begins in the medial genital thickening or ridges on the posterior surface of the embryonic body cavity. Once gonadal sexual differentiation has begun, several other events must occur for normal male or female phenotypic differentiation to occur. During the fifth week after conception, coelomic epithelium, later known as germinal epithelium, thickens in the area of the medial aspect of the mesonephros. As germinal epithelial cells proliferate, they invade the underlying mesenchyme, producing the gonadal ridge. In the sixth week after conception, the primordial germ cells, which formed at approximately the fourth week after conception, in the wall of the yolk sac, migrate up the dorsal mesentery of the hindgut and enter the undifferentiated gonad. These cells will differentiate into testes or ovaries based on the gene functions noted in Chapter 1, Sexual Differentiation.

Signaled by the arrival of primordial germ cells in the fifth week after conception, two sets of paired genital ducts, the mesonephric or nephric (Wolffian) ducts and the paramesonephric (Müllerian) ducts, develop. The mesonephric system is the precursor to the male genital system and the paramesonephric to the female reproductive structures. The mesonephros is a prominent excretory structure that consists of a series of mesonephric tubules. The tubules connect with the elongating mesonephric (Wolffian) ducts as the latter extend caudally, terminating in the urogenital sinus on each side of the midline. Derived from the evagination of the coelomic epithelium, the paramesonephric ducts develop lateral to each of the mesonephric ducts. The cephalward ends of these ducts open directly into the peritoneal cavity, whereas the distal ends grow caudally, fuse in the lower midline, and form the uterovaginal primordium. They join the urogenital sinus as an elevation, known as the Müllerian tubercle, which separates the urogenital area from the more posterior gut. Under the influence of the *SRY* gene in the prototestis the mesonephric (Wolffian) ducts are maintained during development. As the developing male Sertoli cells begin to differentiate in response to *SRY*, they secrete a glycoprotein hormone, Müllerian-inhibiting substance (MIS) or antimüllerian hormone (AMH), which causes the paramesonephric (Müllerian) ducts to regress rapidly between the 8th and 10th fetal weeks. Without testosterone and AMH, the mesonephric ducts degenerate and disappear, and the paramesonephric ducts develop into a uterus, Fallopian tubes, and upper vagina. Leydig cells synthesize insulin-like-3 (coded by the *INSL3* gene) to promote transabdominal testicular descent into the scrotum. Mutations in this gene may lead to cryptorchidism. In females, a structure similar to the gubernaculum develops in the inguinal canal, giving rise to the round ligaments that suspend the uterus in the adult.

Primary sex cords condense and extend to the medullary portion of the developing testes. They branch and join to form the rete testis. The testis therefore is primarily a medullary organ. Eventually, the rete testis connects with the tubules of the mesonephric system and joins the developing epididymal duct. Müllerian duct remnants in males include the appendix testis (hydatid of Morgagni) and the prostatic utricle. In females, MIS is not present, so Müllerian ducts remain and the mesonephric tubules and ducts degenerate in the absence of androgens. This often results in remnant epoöphoron and paroöphoron cystic structures within the ovarian mesentery and Gartner duct cysts within the anterolateral vaginal wall. These structures are clinically important because they may develop into sizable and symptomatic cysts (see Chapter 112, Vaginal Cysts).

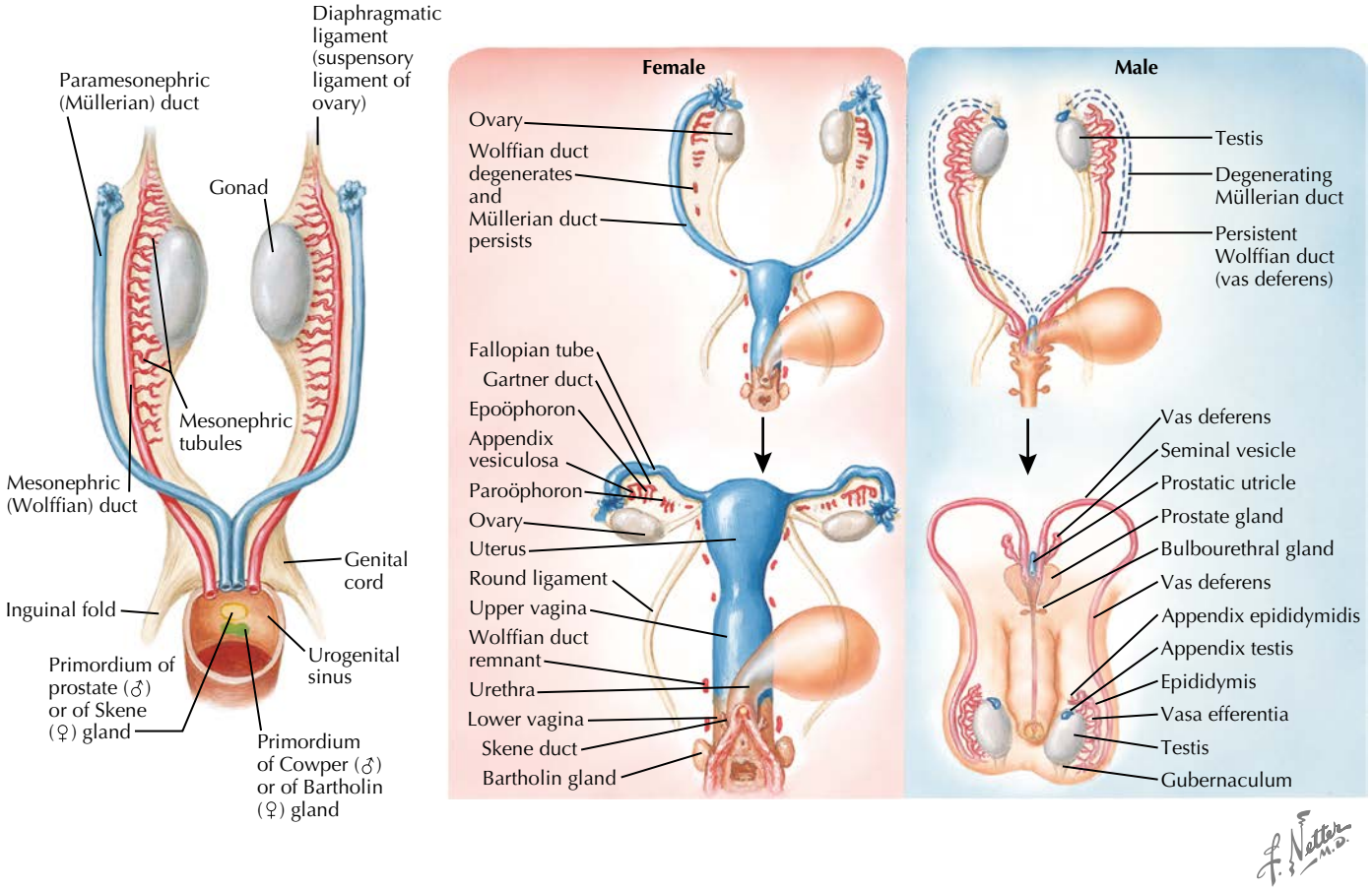


Figure 2.1 Homologs of the internal genitalia

The process of development and loss of the Müllerian and Wolffian systems begins at approximately the sixth week after conception and proceeds in a cephalad to caudal fashion. The more cephalad portions of the paramesonephric ducts, which open directly into the peritoneal cavity, form the Fallopian tubes. The fused portion or uterovaginal primordium gives rise to the epithelium and glands of the uterus and cervix. Endometrial stroma and myometrium are derived from adjacent mesenchyme. Failure of the development of the paramesonephric ducts leads to agenesis of the cervix and uterus. Failure of fusion of the caudal portion of these ducts may lead to a variety of uterine anomalies, including complete duplication of the uterus and cervix or partial duplication of a variety of types (see Chapter 143, Uterine Anomalies: Bicornuate, Septate, and Unicornuate Uterus). Peritoneal reflections in the area adjacent to the fusion of the two paramesonephric ducts give rise to the broad ligaments. Mesenchymal tissue here develops into the parametria.

The remnants of the mesonephric duct in females include a small structure called the appendix vesiculosa, a few blind tubules in the broad ligaments (the epoöphoron), and a few blind tubules adjacent to the uterus (collectively called the paroöphoron). Remnants of the mesonephric duct system are often present in the broad ligaments or may be present adjacent to the uterus and/or vagina as Gartner duct cysts. The epoöphoron or paroöphoron may develop into cysts. Cysts of the epoöphoron are known as paraovarian cysts.

LOWER GENITAL TRACT DEVELOPMENT

3

The vagina develops from paired solid endoderm outgrowths of the urogenital sinus, the sinovaginal bulbs. These grow caudally as a solid core toward the end of the uterovaginal primordium. This core constitutes the fibromuscular portion of the vagina. The distal vagina develops as a diverticulum of the urogenital sinus near the Müllerian tubercle, becoming contiguous with the distal end of the Müllerian ducts. The sinovaginal bulbs then canalize to form the vagina. Roughly four-fifths of the vagina originates from the urogenital sinus, and one-fifth is of Müllerian origin. Abnormalities in this process may lead to either transverse or horizontal vaginal septa. The junction of the sinovaginal bulbs and the urogenital sinus remains as the vaginal plate, which forms the hymen. This remains imperforate until late in the embryonic life. However, occasionally, perforation does not completely occur (imperforate hymen). Failure

of the sinovaginal bulbs to form leads to agenesis of the vagina. The precise boundary between the paramesonephric and urogenital sinus portions of the vagina has not been established.

Beginning in the fourth week after conception, the genital tubercle develops at the ventral tip of the cloacal membrane, with the labioscrotal swellings and urogenital folds developing soon after on either side of the cloacal membrane. In both sexes the genital tubercle subsequently elongates to form a phallus. By the end of the sixth week, the cloacal membrane is joined by the urorectal septum. This septum separates the cloaca into the urogenital sinus ventrally and the anal canal and rectum dorsally. The point on the cloacal membrane where the urorectal septum fuses will become the site of the perineal body. The cloacal membrane, now in two parts, then ruptures, opening the vulva and anal canal. Failure of the anal membrane to rupture results in an imperforate anus. With the opening of the urogenital membrane, a urethral groove forms on the undersurface of the phallus, completing the undifferentiated portion of external genital development. Differences between male and female embryos can be observed as early as the ninth week, but the distinct final forms are not found until 12 weeks of gestation.

Feminization of the undifferentiated external genitalia occurs in the absence of androgenic stimulation, augmented by specific gene functions. The embryonic phallus remains quiescent and becomes the clitoris. The urogenital folds remain unfused except in front of the anus, forming the posterior fourchette. The unfused urogenital folds form the labia minora, and the labioscrotal folds remain as the labia majora. The labioscrotal folds fuse anteriorly to form the mons pubis. A portion of the urogenital sinus between the level of the hymen and the labia develops into the vestibule of the vagina, into which the urethra, the vagina, and the ducts of Bartholin glands enter. Beyond 12 weeks of gestation, the labioscrotal folds will no longer fuse when exposed to androgens, although other manifestations of masculinization may occur.

In contrast to the long-held belief that the development of the female genitalia was passive and occurred in the absence of androgens, the large number of estrogen receptors found in the genital tissues suggests that there is a role for maternal estrogens in the development of the female external genitalia. Female external genital structures also contain androgen receptors. The distribution of androgen receptors resembles that of males, which explains why the

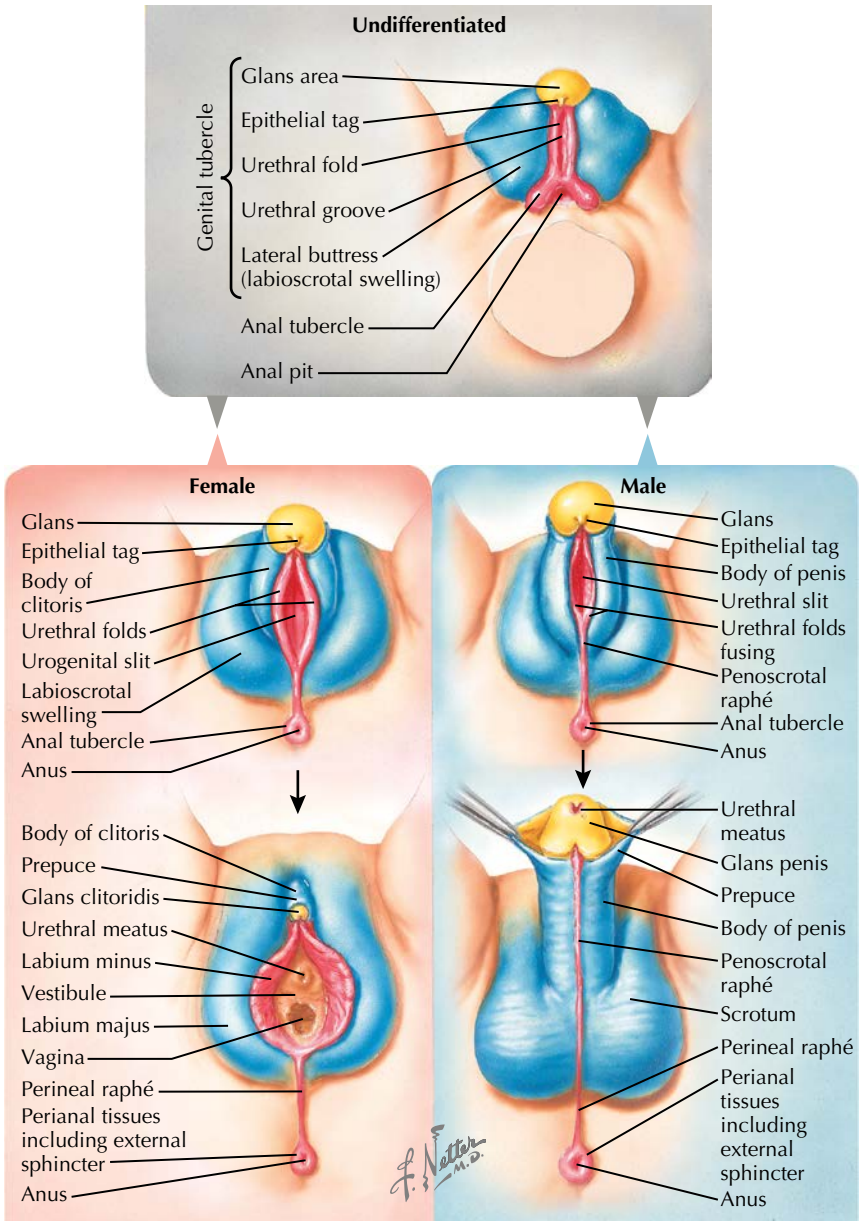


Figure 3.1 Homologs of external genitalia

female genitalia can be masculinized if exposed to high androgen levels early in gestation.

The auxiliary genital glands of the female genitalia form from buds that grow out of the urethra. These buds come from the surrounding mesenchyme and form the urethral and paraurethral glands (Skene glands). These glands correspond to the prostate gland in males. Similar outgrowths of the urogenital sinus form the vestibular glands (Bartholin glands), which are homologous to the bulbourethral glands in males.

DEVELOPMENT OF THE BREAST

4

The breast begins development early in the embryonic life and only completes its evolution during the postpartum lactation of the adult female. The earliest stages of embryogenesis are largely hormone independent; therefore, they occur in the same manner in both sexes. Hormones and regulatory factors become important for development in the second trimester.

During the fourth week of gestation, paired ectodermal thickenings, known as the mammary ridges or milk lines, form on the ventral surface of the embryo and extend in a curvilinear fashion from the axillae to the medial thigh. These ridges eventually disappear except at the level of the fourth intercostal space on the anterior chest wall, where the mammary gland subsequently develops.

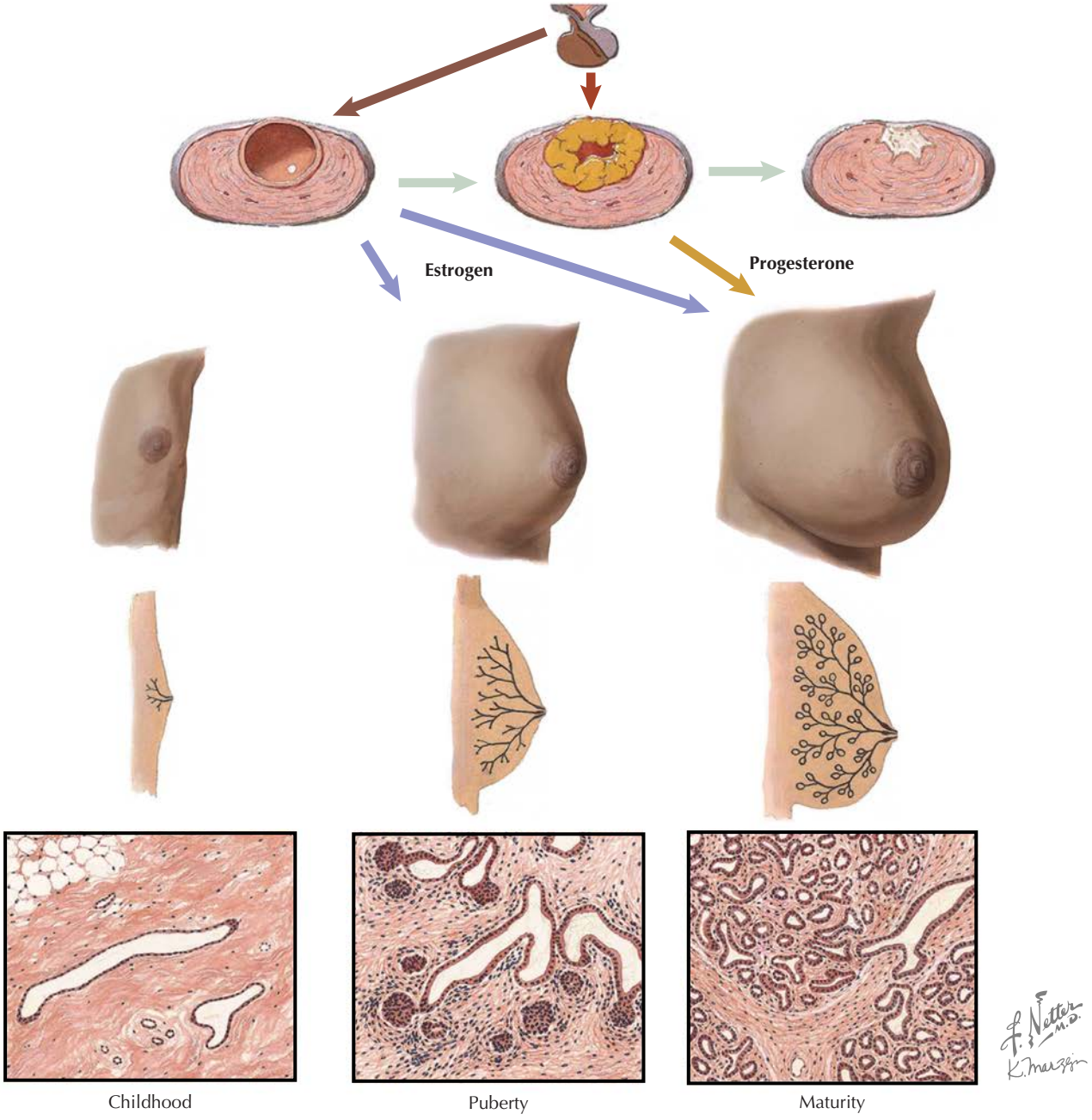
During the fifth week of gestation, the remnant of the mammary ridge ectoderm begins to proliferate, forming the primary mammary bud. This subsequently begins growth downward as a solid diverticulum into the underlying dermis. By the 10th week, the primary bud begins to branch, yielding secondary buds by the 12th week, which eventually form the mammary lobules of the adult breast. The fatty tissues in the underlying mesoderm are considered to produce hormones and growth factors, which promote and regulate the growth of the developing mammary gland.

During the remainder of gestation, the mammary buds continue lengthening and branching. By the 20th week, small lumina develop within the buds, which coalesce and elongate to form the lactiferous ducts. The canalization of the mammary buds is induced by progesterone, growth hormone, insulin-like growth factor, estrogen, prolactin, adrenal corticoids, and triiodothyronine. Approximately 15–20 lobes of glandular tissue are formed, each containing a lactiferous duct. The ducts drain into the retroareolar ampullae that converge into a depressed pit in the overlying skin. Stimulated by the inward growth of the ectoderm, the mesoderm surrounding this area proliferates, creating the nipple with circular and longitudinal smooth muscle fibers. The surrounding areola is formed by the ectoderm during the fifth month of gestation. The areola also contains other epidermal glands, including the glands of Montgomery (sebaceous glands that lubricate the areola).

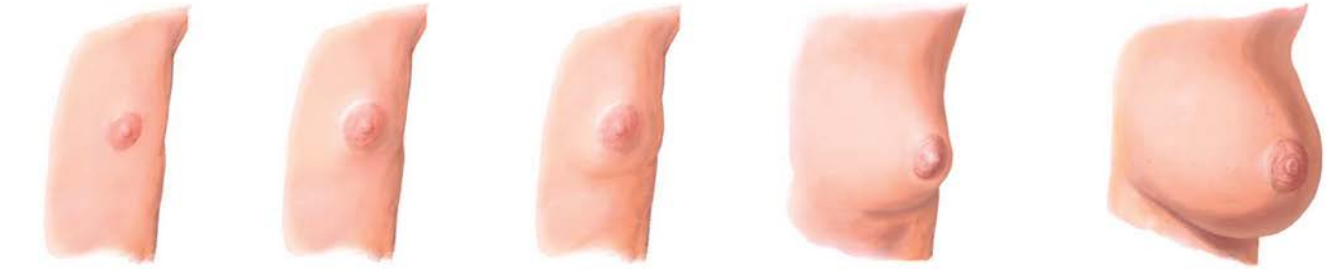
At birth, the mammary glands have developed sufficiently in both sexes that they appear as distinct hemispheroidal elevations and are palpable as movable soft masses. This is especially prominent in postterm infants. Histologically, a number of branching channels with the layers of lining cells and plugs of basal cells at their ends (the future milk ducts and glandular lobules, respectively) can be easily recognized. In a great number of infants an everted nipple is observed, and in approximately 10% a greatly enlarged gland can be palpated. This condition has the unfortunate name of mastitis neonatorum, although no signs of inflammation exist. These early glandular structures may produce a milk-like secretion, the "witch's milk," starting 2 or 3 days after birth. All these neonatal phenomena in the breast are the result of the very intensive maternal estrogen-driven developmental processes in the last stages of intrauterine life. The changes subside within the first 2–3 weeks of life. It is during this period that the breast undergoes marked involutional changes leading to the quiescent stage, which is characteristic of infancy and childhood. During these periods the male and female glands consist of a few branching rudimentary ducts lined by flattened epithelium, surrounded by collagenous connective tissue.

For most girls the first sign of puberty is the appearance of breast budding. In the United States, this early breast change begins at an average age of 10.8 (±1.1) years of age. At the onset of puberty and during adolescence, ovarian follicles ripen in response to follicle-stimulating hormone (FSH) of the anterior pituitary gland and estrogen output increases. In response to the latter, the mammary ducts elongate and the lining epithelium reduplicates and proliferates at the ends of the mammary tubules, forming the sprouts of the future lobules. This growth of ductal epithelium is accompanied by growth of periductal fibrous tissue, which is largely responsible for the increasing size and firmness of the adolescent female gland. During this period, the areola and nipple also grow and become more pigmented.

With the onset of maturity, that is, when ovulation occurs and the progesterone-secreting corpora lutea are formed, the second stage of mammary development occurs. It is essentially concerned with the formation of the lobules and acinar structures. While in the adult woman, progesterone always asserts its influence when estrogen is simultaneously present, overwhelming experimental evidence indicates that the initial unfolding of the lobules is a specific effect of progesterone. This gives the mammary gland the characteristic lobular structure found during the childbearing years. This differentiation into a lobular gland is finished approximately 1–1.5 years after the first menstruation, but further acinar development continues in proportion to the intensity of the hormonal stimuli during each menstrual cycle and especially during pregnancies. Fat deposition and formation of fibrous stroma contribute to the increasing size of the gland in the adolescent period.



Tanner Stages of Breast Development



Stage 1
Elevation of papilla only

Stage 2
Breast bud: elevation of breast and papilla as a small mound and enlargement of areolar diameter

Stage 3
Additional enlargement of breast and areola with no separation of their contours

Stage 4
Areola and papilla project from surface of breast to form secondary mound

Stage 5
Mature stage with projection of papilla only with recession of the areola to the general contour of the breast

Figure 4.1 Developmental stages of the breast

SECTION II

Anatomy

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EXTERNAL GENITALIA

5

The perineum is bound in front by the mons veneris, behind by the buttocks, and laterally by the thighs. More deeply it is limited by the margins of the pelvic outlet, namely, the pubic symphysis and arcuate ligament, ischiopubic rami, ischial tuberosities, sacrotuberous ligaments, sacrum, and coccyx. The vulva includes the portions of the female genital tract that are externally visible in the perineal region.

The mons veneris is a fatty prominence that overlies the symphysis pubis. It is covered by curly sexual (pubic) hair that functions as a dry lubricant during intercourse. From the mons veneris the labia majora extend in elliptical fashion to enclose the vulval cleft. They contain an abundance of adipose tissue and sebaceous and sweat glands and are covered by hair on their upper outer surfaces. Posteriorly a slightly raised connecting ridge, the posterior commissure or fourchette, joins them. Between the fourchette and the vaginal orifice, a shallow, boat-shaped depression, the fossa navicularis, is evident. The labia minora are thin, firm, pigmented, redundant folds of skin, which split anteriorly to enclose the clitoris. Laterally, they bound the vestibule and diminish gradually as they extend posteriorly. The skin of the small labia is devoid of hair follicles, poor in sweat glands, and rich in sebaceous glands.

The clitoris, a small, cylindrical, erectile organ situated at the lower border of the symphysis, is composed of two crura, a body and a glans. The crura lie deeply in close apposition with the periosteum of the ischiopubic rami. They join to form the body of the clitoris, which extends downward beneath a loose prepuce and is capped by the acorn-shaped glans. Generally, only the glans of the clitoris is externally visible between the two folds formed by the bifurcation of the labia minora.

The vestibule becomes apparent on separation of the labia. Within it are found the hymen, the vaginal orifice, the urethral meatus, and the opening of Skene and Bartholin ducts. The external

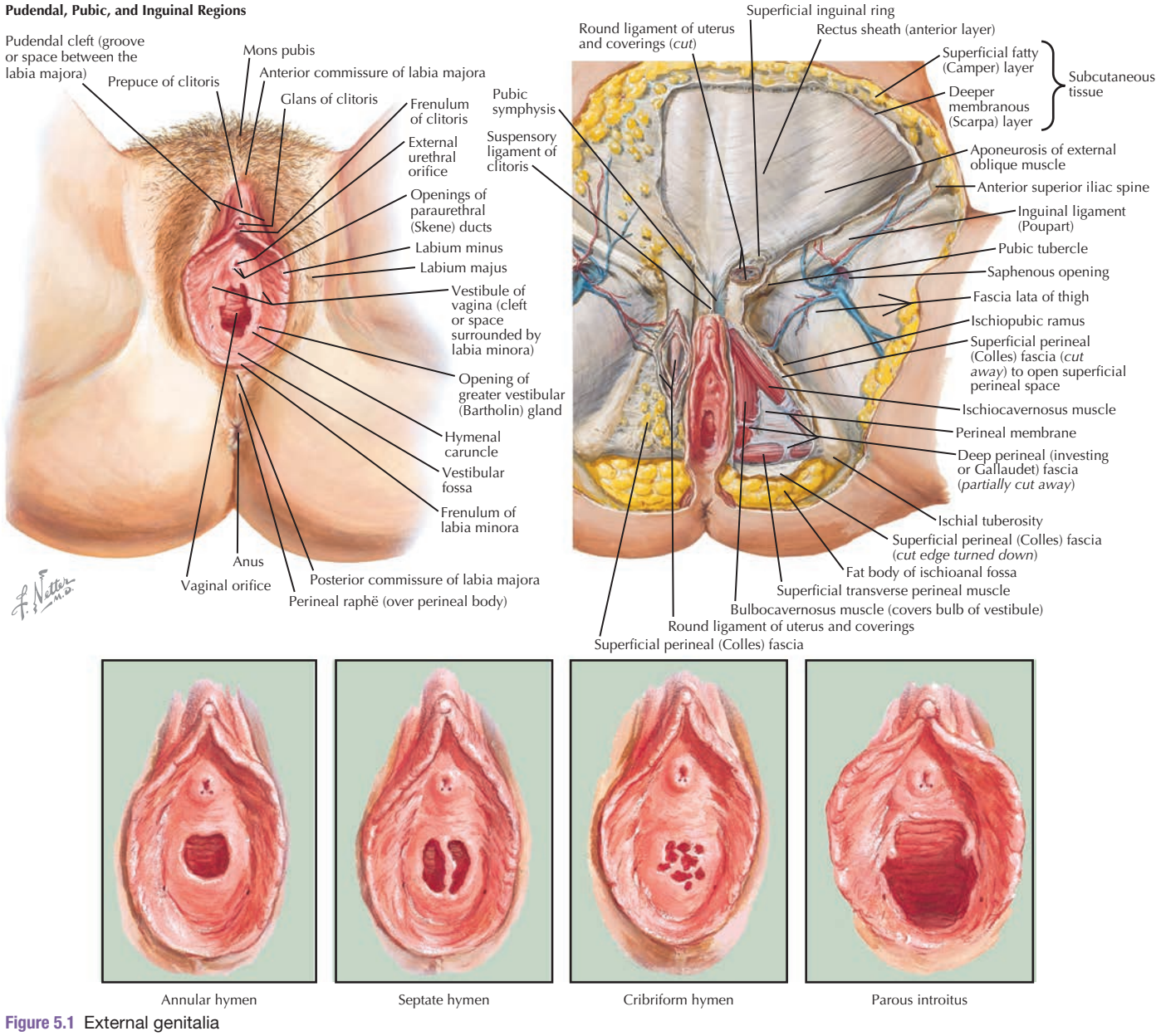


Figure 5.1 External genitalia

urethral meatus is situated on a slight papilla-like elevation, approximately 2 cm below the clitoris. In the posterolateral aspect of the urinary orifice lie the openings of Skene ducts. They run below and parallel to the urethra for a distance of 1–1.5 cm. Bartholin ducts are visible on each side of the vestibule, in the groove between the hymen and the labia minora, at about the junction of the middle and posterior thirds of the lateral boundary of the vaginal orifice. Each duct, approximately 1.5 cm in length, passes inward and lateral to the deeply situated vulvovaginal glands. The Bartholin glands are situated posterior to the 3 and 9 o'clock locations, which is important clinically when a Bartholin gland abscess is considered in patients with labial swelling.

The hymen is a thin, vascularized membrane or its remnants (the hymenal ring), which separates the vagina from the vestibule. It is covered on both sides by stratified squamous epithelium. As a rule, it shows great variation in thickness and in the size and shape of the hymenal openings (annular, septate, cribriform, crescentic, fimbriate, etc.). After tampon usage, coitus, and childbirth, the shrunken remnants of the hymen are known as carunculae hymenales, or hymenal caruncles. The presence or absence of the hymen is insufficient to determine the presence or absence of past sexual activity.

6 PERINEUM

The perineal floor is composed of skin and two layers of superficial fascia—a superficial fatty stratum and a deeper membranous one. The former is continuous anteriorly with the superficial fatty layer of the abdomen (Camper fascia) and posteriorly with the ischiorectal fat. The deeper, membranous layer of the superficial perineal fascia (Colles fascia) is limited to the anterior half of the perineum. Laterally, it is attached to the ischiopubic rami. Posteriorly, it blends with the base of the urogenital diaphragm. Anteriorly, it is continuous with the deep layer of the superficial abdominal fascia (Scarpa fascia).

The urogenital diaphragm is a strong, musculomembranous partition that is stretched across the anterior half of the pelvic outlet between the ischiopubic rami. The urogenital diaphragm is composed of superior and inferior fascial layers between which are located the deep perineal muscles, the sphincter of the membranous urethra, and the pudendal vessels and nerves. It is pierced by the urethra and vagina.

A network of lymphatic anastomoses drains the external genitalia, lower third of the vagina, and perineum. Bilateral or crossed extension and drainage are common. The superficial femoral nodes are reached through the superficial external pudendal lymphatic vessels, although the superficial external epigastrics may also play a role. From the region of the clitoris, deeper lymphatic vessels may directly pass to the deep femoral nodes, particularly to the Cloquet node in the femoral canal, or through the inguinal canal to the external iliac nodes. This complex network of lymph nodes is clinically important as these are the nodes to which cutaneous and vulvovaginal gland malignancies may drain. Superficial nodes in the groin may also become enlarged when significant inflammation is present in the vulvar structures (eg, Bartholin gland infections).

The perineum and vulva are richly supplied with blood vessels, which become clinically significant during childbirth and surgical procedures. The internal pudendal artery is a far smaller vessel in females than in males, although its course is generally the same in both sexes. The branches of the internal pudendal artery include small ones to the gluteal region, inferior hemorrhoidal artery, perineal artery, and artery of the clitoris. The pudendal artery (and vein) is closely associated with the pudendal nerve as it passes the ischial spine near the insertion of the sacrospinous ligament on the dorsal aspect of the coccygeal muscle, placing it at risk when sacrospinous colpopexy is performed. The inferior hemorrhoidal artery pierces the wall of the Alcock canal and passes medially through the ischiorectal fat to supply the anal canal, anus, and perineal area. The perineal artery pierces the base of the urogenital diaphragm to enter the superficial perineal compartment, where it supplies the ischiocavernosus, bulbocavernosus, and transverse perineal muscles. A constant transverse perineal branch runs along the superficial transverse perineal muscle to the central point of the perineum. The terminal branches of the perineal artery, the posterior labial arteries, pierce the deep layer of the superficial perineal fascia (Colles fascia) to the labia.

The musculature and integument of the perineum are innervated mainly by the pudendal nerve. The pudendal nerve divides into three branches. (1) The inferior hemorrhoidal nerve pierces the medial wall of the Alcock canal and supplies the external anal sphincter and perianal skin. (2) The perineal nerve runs for a short distance in the Alcock canal and divides into a deep and a superficial branch. The deep branch sends filaments to the external anal sphincter and levator ani muscles, the superficial and deep perineal muscles, the ischiocavernosus and bulbocavernosus muscles, and the membranous urethral sphincter. The superficial branch innervates the labium majus. (3) The dorsal nerve of the clitoris passes through the urogenital diaphragm to the glans of the clitoris.

The anterior labial branches of the ilioinguinal nerve (L1) emerge from the external inguinal ring to be distributed to the mons veneris and upper portion of the labium majus. The external spermatic branch of the genitofemoral nerve (L1, 2) accompanies the round ligament through the inguinal canal and sends twigs to the labium. The perineal branches of the posterior femoral cutaneous nerve (S1, 2, 3) run forward and medialward in front of the ischial tuberosity to the lateral margin of the perineum and labium majus. Branches of the perineal nerve (S2, 3, 4) include the dorsal nerve of the clitoris and the medial and lateral posterior labial branches to the labium majus. The inferior hemorrhoidal branch of the pudendal nerve (S2, 3, 4) contributes to the supply of the perianal skin and accounts for the sensory portion of the "anal wink" reflex. The perforating cutaneous branches of the second and third sacral nerves perforate the sacrotuberous ligament and turn around the inferior border of the gluteus maximus to supply the buttocks and contiguous perineum. The anococcygeal nerves (S4, 5, and coccygeal nerve) unite along the coccyx and then pierce the sacrotuberous ligaments to supply the anococcygeal area.

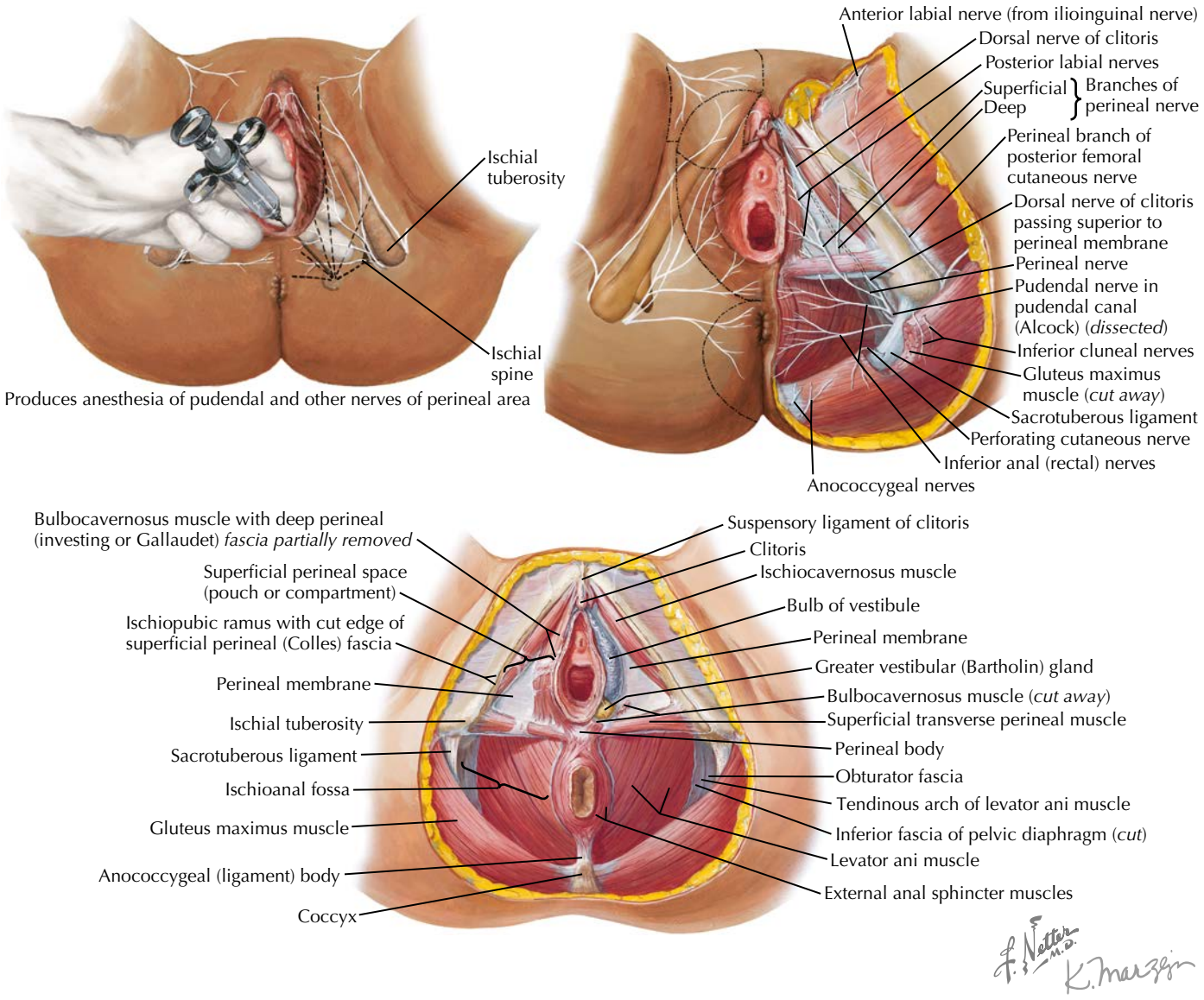


Figure 6.1 Innervation of external genitalia and perineum

VAGINA

7

The vagina (from Latin, literally "sheath" or "scabbard") serves as the portal to the internal female reproductive tract and a route of egress for the fetus during delivery. The viscera contained within the female pelvis minor include the pelvic colon, urinary bladder and urethra, uterus, uterine tubes, ovaries, and vagina. These structures surround the vagina and interact with it in the clinical setting.

The vagina is a thin-walled, distensible, fibromuscular canal, covered by specialized epithelium, which extends from the vulva inward to the cervix and uterus. Under normal circumstances, the vagina is a potential space that is larger in the middle and upper thirds, giving it an inverted pear- or T-shape when viewed perpendicular to its long axis. The walls of the vagina are normally flattened in the anteroposterior diameter, giving the appearance of the letter H in a cross-section.

The vagina is lined by squamous epithelium and is capable of dilatation and constriction as a result of the action of its supporting muscles and erectile tissue. The three principal layers are easily recognized in the cross-section of the vaginal wall. The epithelial surface is composed of stratified squamous epithelium divided into basal cell, transitional cell, and spinal or prickle cell layers, also referred to as basalis, intraepithelial, and functionalis, respectively. The superficial cells contain keratin but normally show no gross cornification in

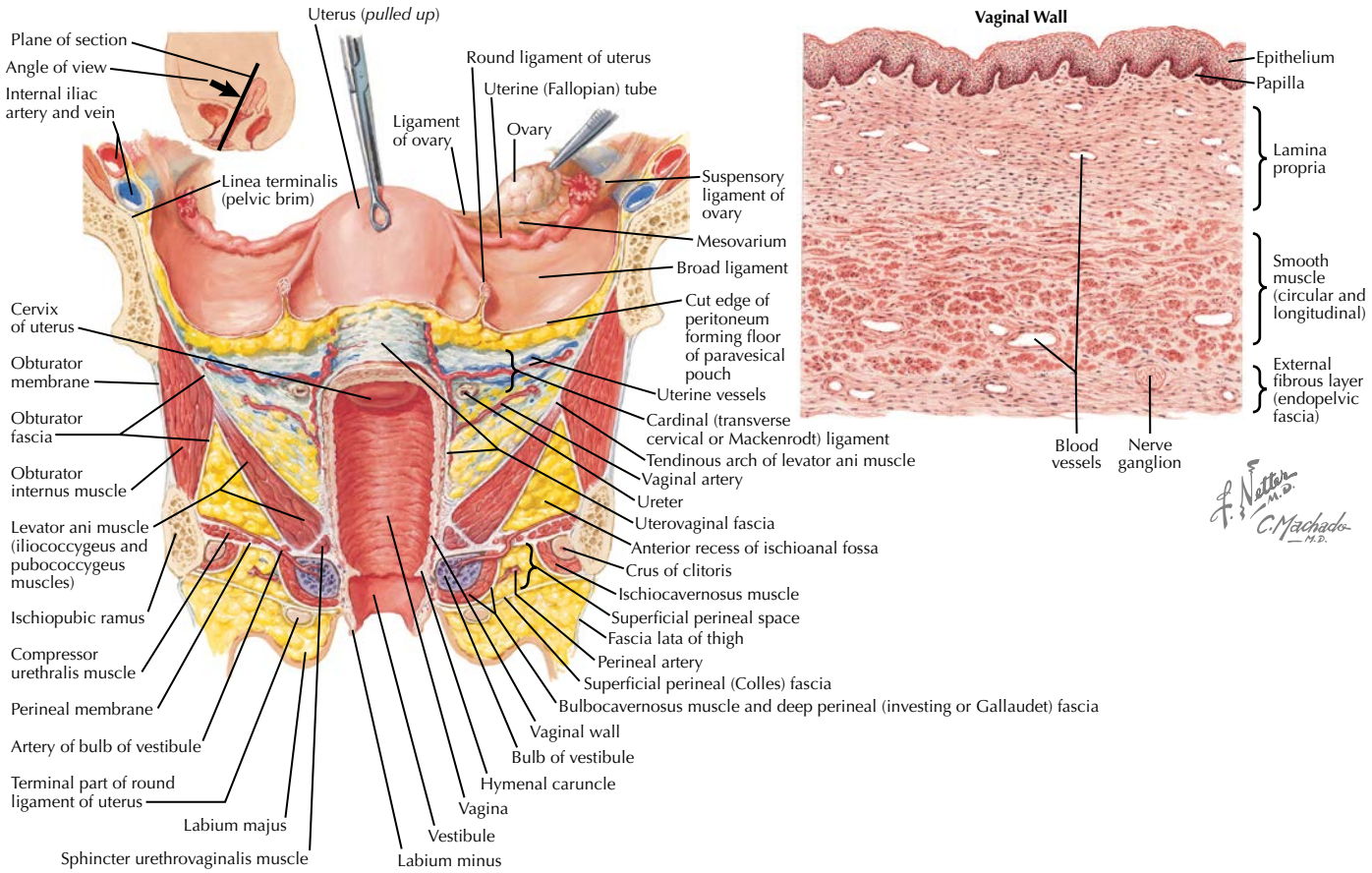


Figure 7.1 Support of pelvic viscera

women of reproductive age. The epithelium is slightly thicker than the corresponding structure in the cervix and sends more and larger papillae into the underlying connective tissue, giving the basement membrane an undulating outline. These papillae are more numerous on the posterior wall and near the vaginal orifice. Beneath the epithelium, which has a thickness of 150–200 μm, a dense connective tissue layer known as the lamina propria is supported by elastic fibers crossing from the epithelium to the underlying muscle. These elastic fibers, here and throughout the pelvis, are critical for pelvic support and function. The lamina propria becomes less dense as it approaches the muscle, and in this area, it contains a network of large, thin-walled veins, giving it the appearance of erectile tissues. The smooth muscle beneath this layer is divided into internal circular and external longitudinal groups, the latter being thicker, stronger, and continuous with superficial muscle bundles of the uterus. No dividing membrane or fascia separates these two interlacing muscle groups. The adventitial coat of the vagina is a thin, firm, fibrous layer arising from the visceral or endopelvic fascia. In this fascia and in the connective tissue between the fascia and the muscle runs another large network of veins and a rich nerve supply.

In its distal extreme, the vagina opens to the vulva at the hymenal ring, opening at the caudal end of the vulva, behind the opening of the urethra. When upright the vaginal tube points in an upward–backward direction with the axis of the upper portion of the vagina close to the horizontal plane and curving toward the hollow of the sacrum. In most women an angle of at least 90 degrees is formed between the vagina and uterus. The cervix is directed downward and backward to rest against the posterior vaginal wall. The spaces between the cervix and attachment of the vagina are called fornices, with the posterior fornix considerably larger than the anterior fornix.

Although there is wide variation, the length of the vagina is approximately 6–9 cm (2.5–3.5 in.) along the anterior wall and 8–12 cm (3–4.5 in.) along the posterior wall. During sexual arousal, the upper portion of the vagina elongates and widens through a relative upward movement of the uterus and cervix. This is considered to facilitate capture and retention of sperm to improve the chance of conception.

Throughout most of its length the vagina lies directly on top of the descending rectum, separated by the rectovaginal septum. The upper one-fourth of the vagina is separated from the rectum by the rectouterine pouch (posterior cul-de-sac). The urethra and base of the urinary bladder lie above the anterior vaginal wall, separated by the thin layers of endopelvic fascia. As they enter the bladder, the ureters pass forward and medialward close to the lateral fornices.

The vagina is held in position by the surrounding endopelvic fascia and ligaments. The lower third of the vagina is surrounded and supported by the urogenital and pelvic diaphragms. The levator ani muscles, and the lower portion of the cardinal ligaments, support the middle third of the vagina, while the portions of the cardinal ligaments and parametria support the upper third.

The vagina is supplied with an extensive anastomotic network of vessels that surround its length. The vaginal artery originates either directly from the uterine artery or as a branch of the internal iliac artery arising posterior to the origin of the uterine and inferior vesical arteries. There is an anastomosis with the descending cervical branch of the uterine artery to form the azygos arteries. Branches of the internal pudendal, inferior vesical, and middle hemorrhoidal arteries also contribute to the interconnecting network from below. These can be a significant source of bleeding with obstetric lacerations. They are also important in the development of vaginal transudate during sexual arousal, when the vagina produces lubrication to aid in penetration.

PELVIC VISCERA

While the muscular hammock of the levator plate provides the caudal (inferior) floor for the pelvic viscera, the organs of the pelvis have their own mechanisms of support. When either or both of these two support systems fail, it can result in clinical dysfunctions, including urinary incontinence, fecal retention, and dyspareunia. The viscera contained in the female pelvis minor include the pelvic colon, urinary bladder and urethra, uterus, uterine tubes, ovaries, and vagina.

The term endopelvic fascia (actually a pseudofascia) refers to the reflections of the superior fascia of the pelvic diaphragm on the pelvic viscera. At the points where these hollow organs pierce the pelvic floor, tubular fibrous investments are carried upward from the superior fascia as tightly fitting collars, which blend with and may even become inseparable from their outer muscle coat. Thus, three tubes of fascia are present, encasing the urethra and bladder, the vagina and lower uterus, and the rectum. These fascial envelopes, with interwoven muscle fibers, are utilized in the repair of cystoceles and rectoceles anteriorly and posteriorly. It is also within this fibrous tube investing the lower uterine segment that the so-called intrafascial hysterectomy is performed in an effort to protect the support of the remaining vaginal cuff. The vesical, uterine, and rectal layers of endopelvic fascia are continuous with the superior fascia of the pelvic diaphragm, obturator fascia, iliac fascia, and transversalis fascia.

Uterine support is maintained directly and indirectly by a number of peritoneal, ligamentous, fibrous, and fibromuscular structures. Of these the most important are the cardinal ligaments and pelvic diaphragm with its endopelvic fascial extensions. The vesicouterine peritoneal reflection is sometimes referred to as the anterior ligament of the uterus and the rectouterine peritoneal reflection as the posterior ligament. These are not true ligaments, and they provide only limited additional support. The round ligaments are flattened bands of fibromuscular tissue invested with visceral peritoneum that extend from the angles of the uterus downward, laterally, and forward, through the inguinal canal to terminate in the labia majora. These are analogous to the gubernaculum in males.

The sacrouterine (uterosacral) ligaments are true ligaments of musculofascial consistency that run from the upper part of the cervix to the sides of the sacrum. At the uterine end, they merge with the adjacent posterior aspect of the cardinal ligaments and endopelvic fascial tube. The broad ligaments consist of wing-like double folds of peritoneum reflected from the lateral walls of the uterus to the lateral pelvic walls. Their superior margins encase the uterine tube and round ligaments. They then continue as the infundibulopelvic ligaments as they progress laterally and superiorly. Inferiorly the ensheathed uterine vessels and cardinal ligaments may be felt. Within the two peritoneal layers are found loose areolar tissue and fat, the Fallopian tube, the round ligament, the ovarian ligament, the parametrium, the epoöphoron, the paroöphoron and Gartner duct, the uterine and ovarian vessels, the lymphatics, and the nerves.

The cardinal or transverse cervical ligaments (of Mackenrodt) are composed of condensed fibrous tissue and some smooth muscle fibers. They extend from the lateral aspect of the uterine isthmus in a tent-like fashion toward the pelvic wall, to become inserted, fan-shaped, into the obturator and superior fasciae of the pelvic diaphragm. This triangular septum of heavy fibrous tissue includes the thick connective tissue sheath, which invests the uterine vessels. Mesially and inferiorly the cardinal ligaments merge with the uterovaginal and vesical endopelvic fascial envelopes. Posteriorly, they are integrated with the uterosacral ligaments.

The vesical and rectal endopelvic fasciae maintain bladder and rectum support, respectively.

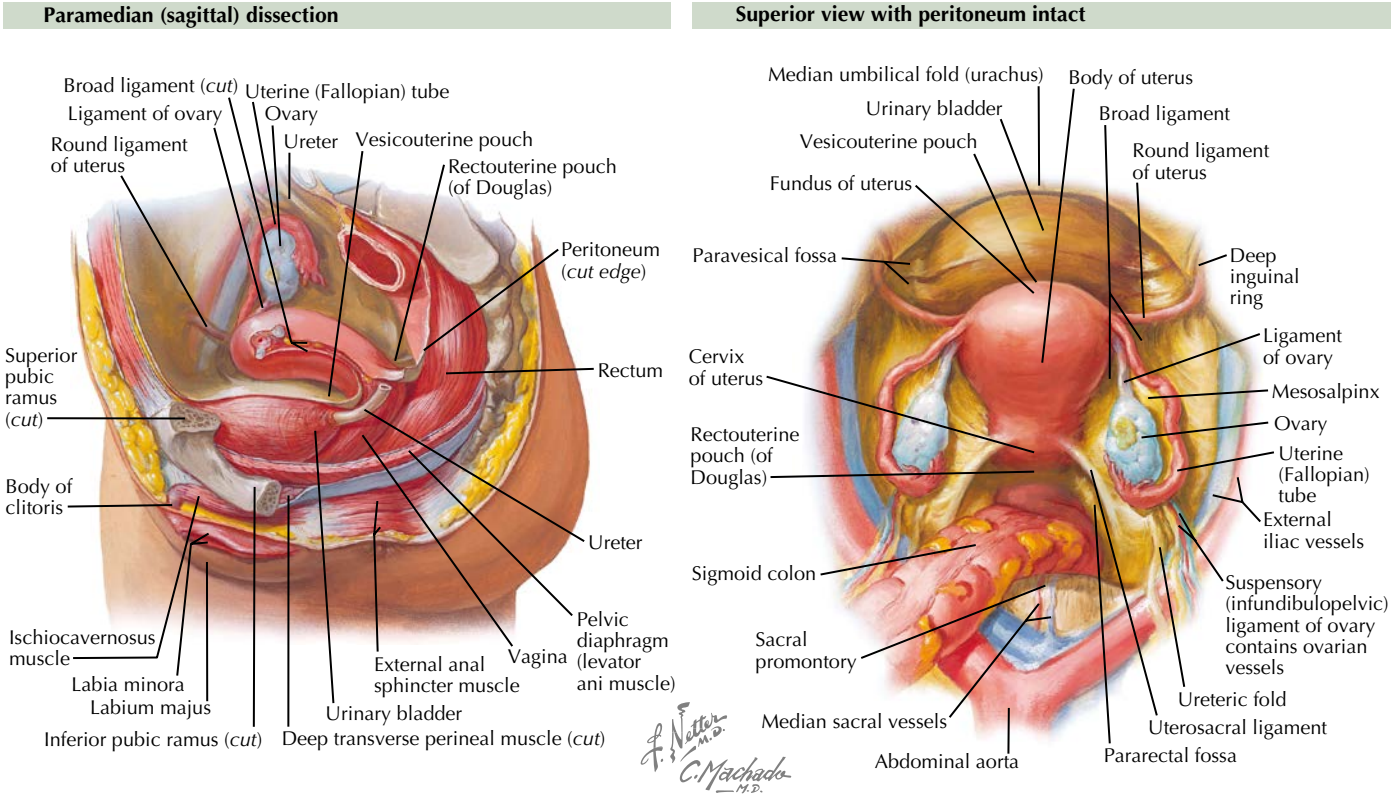


Figure 8.1 Paramedian dissection and super views of pelvic viscera

With the exception of the ovarian, superior hemorrhoidal, and middle sacral arteries the hypogastric divisions of the common iliac arteries supply the pelvic viscera. The uterine artery arises from the anterior division of the hypogastric artery close to or in common with the middle hemorrhoidal or vaginal artery. It courses slightly forward and medialward on the superior fascia of the levator ani muscle to the lower margin of the broad ligament. It arches over the ureter approximately 2 cm from the uterus. At the level of the isthmus, it gives off a descending cervical branch, which surrounds the cervix and anastomoses with the branches of the vaginal artery. The main uterine vessels follow a tortuous course upward along the lateral margin of the uterus, giving off spiral branches to the anterior and posterior surfaces of the uterus. The uterine artery terminates in a tubal branch within the mesosalpinx and an ovarian ramus, which anastomoses with the ovarian artery in the mesovarium.

9 CERVIX, UTERUS, AND ADNEXA

The uterus is a pear-shaped, thick-walled, hollow, muscular organ situated between the bladder and rectum. The fundus is the dome-shaped portion above the entrance level of the Fallopian tubes. The body, or corpus, lies below this and is separated from the cervix by a slight constriction, termed the isthmus. The cavity of the uterine body is a flattened potential space that is triangular in shape. The uterine tubes open into its basal angles in the fundus. The uterine cavity is continuous with the cervical canal at the internal os. The uterine wall is composed of an outer serosal layer (peritoneum); a firm, thick, intermediate coat of smooth muscle (myometrium); and an inner mucosal lining (endometrium).

The superior surface of the uterus is convex and generally directed forward. The anterior surface is flat and looks downward and forward, resting on the bladder. Its peritoneal covering is reflected at the level of the isthmus to the upper aspect of the bladder, creating the vesicouterine pouch. The posterior surface of the uterus is convex and lies in relation to the pelvic colon and rectum. The peritoneum of the posterior wall covers the body and upper cervix and then extends over the posterior fornix of the vagina to the rectum to form the rectouterine pouch or cul-de-sac of Douglas. Laterally the visceral peritoneum becomes the anterior and posterior leaves of the broad ligament.

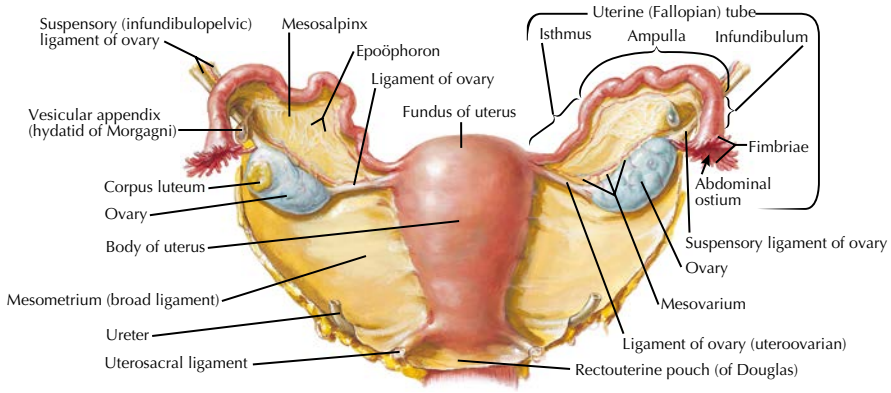
The cervix is cylindric, slightly expanded in its middle, and approximately 2.5 cm in length. Its canal is spindle-shaped and opens into the vagina through the external os. On the anterior and posterior walls, the endocervical mucosa is raised in a series of palmate folds. The cervical wall is more fibrous than the corpus. The oblique line of attachment of the vagina to the cervix divides the latter into supra- and infravaginal segments. Approximately one-third of the anterior surface and one-half of the posterior surface of the cervix constitute the vaginal portion. The cervix is directed downward and backward to rest against the posterior vaginal wall. Only the upper half of its posterior surface is covered by the peritoneum. The external os of the cervix lies at about the level of the upper border of the symphysis pubis in the plane of the ischial spine.

The peritoneum covers the fundus and corpus uteri on both its anterior and posterior aspects, reflecting at the cervicouterine junction to cover the vesicouterine excavation in the front and the rectouterine excavation (cul-de-sac, pouch of Douglas) in the back, whence it spreads over the bladder and rectum, respectively. At its lowest part the peritoneum covers the cardinal ligament, which stretches laterally across the pelvic floor to the lateral pelvic walls.

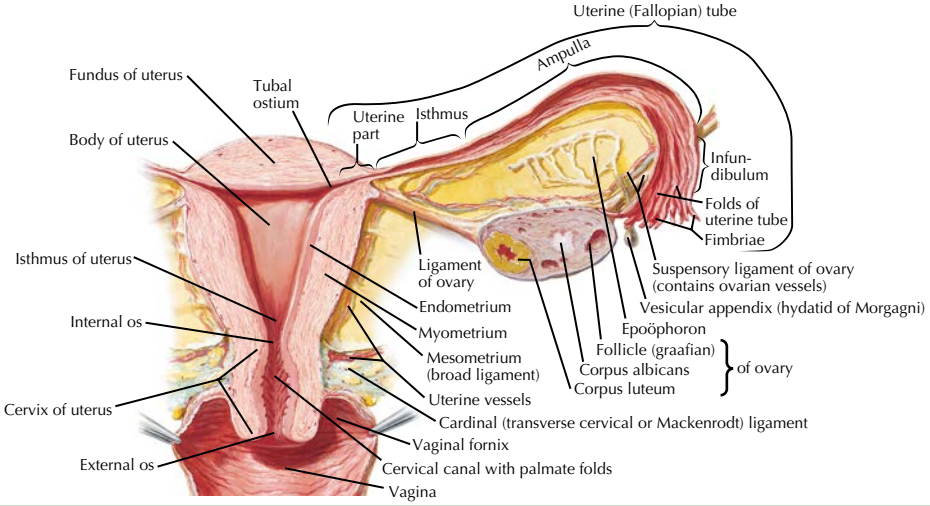
The peritoneal layers that sheathe the fundus and uterine body unite on both sides of the uterus to form the broad ligament, which separates the vesicouterine and rectouterine pouches. The upper borders of the broad ligaments are folds of the peritoneum coming into existence when the anterior sheath turns to become the posterior sheath. These folds enclose the Fallopian tubes. The broad ligaments expand downward from the lower edges of the tubes, assuming the function of a mesentery to the tubes, the mesosalpinx, in which the vessels to and from the tube take their course. In the mesosalpinx are also found the vestigial remnants of the mesonephric ducts.

The extreme lateral parts of the Fallopian tube—the fimbriated infundibulum and ampulla—are not enclosed by the broad ligament, but the latter forms in this region a band, the infundibulopelvic ligament, which attaches the posterior surface of this end of the tube to the lateral wall of the pelvis. Another peritoneal fold, the suspensory ligament of the ovary, crosses the iliac vessels and runs medially to the free ends of the tubes. It contains the ovarian vessels and provides an attachment to the lateral pole of the ovary. This fold is not to be confused with the ligament of the ovary, a cord within the broad ligament, running from the lateral angle of the uterus just below the uterine end of the tube downward to the lower or uterine margin of the ovary. The ovary is not enwrapped by the broad ligament. Only its lateral surface lies on the parietal pelvic peritoneum, where the external iliac vessels, obliterated umbilical artery, and ureter pattern a shallow depression called the ovarian fossa. The anterior border of the ovary is attached to the posterior layer of the broad ligament by a short fold through which the blood vessels pass to reach the hilus of the ovary. For this reason, the fold has been named the mesovarium.

Posterior view



Frontal section



Fallopian tubes

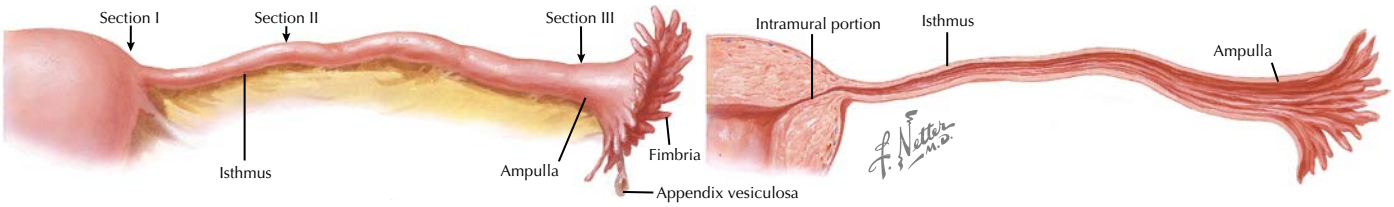


Figure 9.1 Uterus, ovaries, and uterine (Fallopian) tubes

OVARIES

10

The ovaries develop from a thickening of cells, which form ridges medial to the Müllerian and Wolffian bodies, during the sixth week of gestation. Primary oocytes, arising in the posterior wall of the primitive gut, migrate into these embryonic gonads, providing the countless thousands of ova that crowd the ovary at birth.

By the third month of gestation, the ovaries descend toward the pelvis. The pull of the gubernaculum—an abdominal fold that grows more slowly than the rest of the fetus—exerts a downward traction on the gonadal ridges. Later, these folds fuse in their mid-portion with the part of each Müllerian duct that develops into the uterine fundus. The lateral half and medial portion of the folds become the round ligaments and the suspensory ligaments of the ovary, respectively.

The infant ovary is a sausage-shaped structure, with a pale and smooth surface. A gradual thickening and shortening occurs throughout the first decade of life. The major gain in size and weight

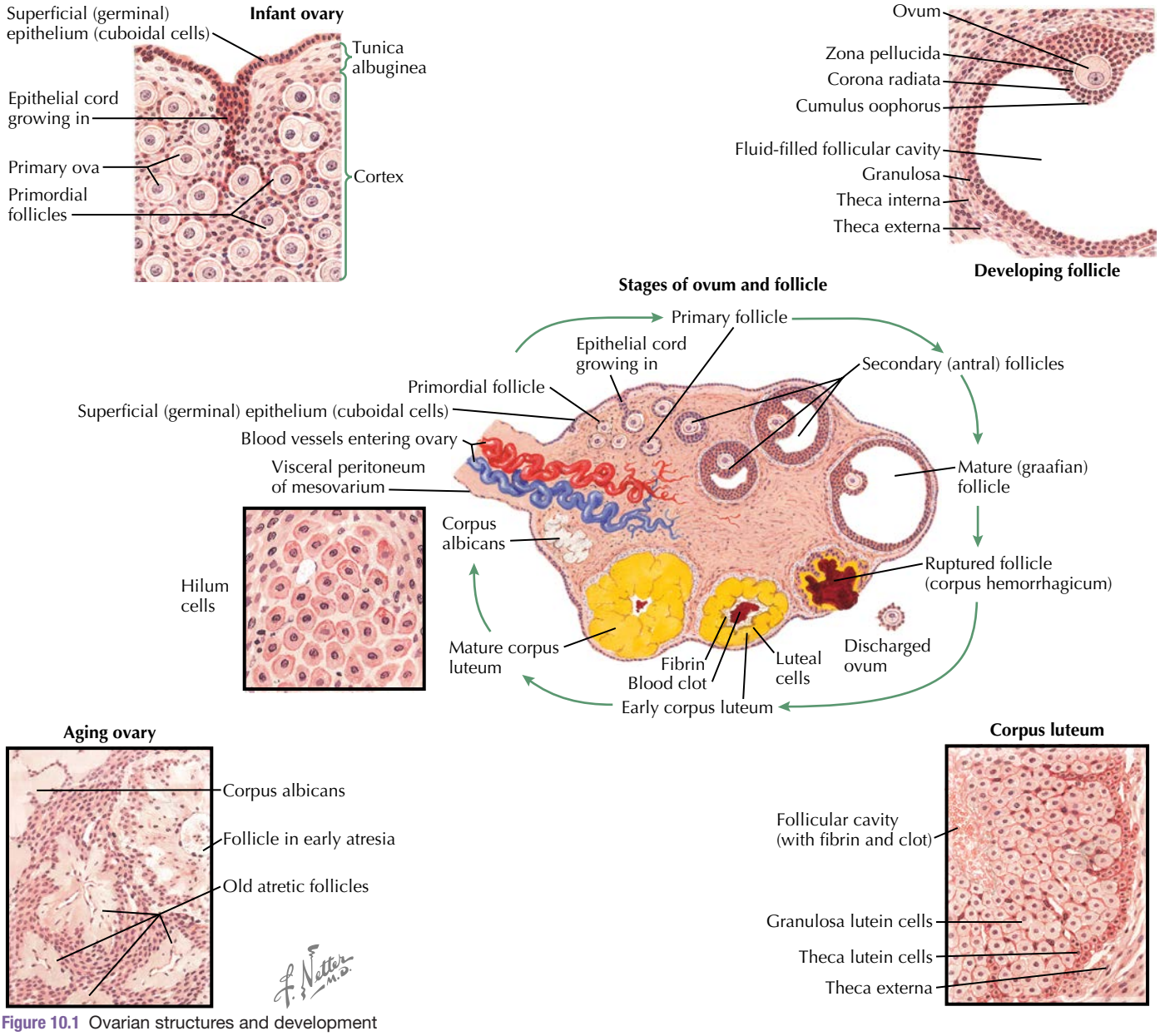


Figure 10.1 Ovarian structures and development

occurs after menarche and during adolescence. Two layers, the germinal epithelium and the tunica albuginea, constitute the surface of the prepubertal ovary. They are crowded with primordial ova that are surrounded by dark-staining cells, the origin of the future granulosa cells.

As the primordial follicle develops, it sinks, with its single layer of epithelial cells, toward the center of the ovary. The attendant cells proliferate to form a layered coating of granulosa cells. A crescentic cavity forms eccentrically, in which follicular fluid accumulates. From the surrounding ovarian stroma, a capsule of theca cells differentiates. The theca interna is rich in capillaries, on which the avascular theca granulosa must depend for nourishment. That stage of development is reached before menarche, while still little or no follicle-stimulating hormone is present. Before menarche, most, if not all, of these follicles develop no further but degenerate and become atretic.

The mature gonad is an approximately almond-shaped structure, pitted, and scarred by the stigmata of ovulation. Spiral arteries enter at the hilus and are involved in sequential changes during the cyclic ebb and sway of follicle growth and development of corpora lutea. In the hilus are also found cells with morphologic and histochemical properties, similar to the interstitial cells of the testis, vestiges from the fetal period, before sexual differentiation occurred. Proliferation of these cells or tumor formation may result in virilization.

In the ripening follicle, a dense layer of granulosa cells, the cumulus oophorus, closely protects the egg. A transparent membrane, the zona pellucida, encloses a fluid-filled perivitelline space in which the egg floats freely. The cumulus cells immediately next to the zona arrange themselves outward to form the corona radiata. The egg itself is a spherical body composed of clear protoplasm. It contains a round, dark-staining nucleus, with a definite surrounding membrane and an eccentric nucleolus.

The two-layered theca envelope coats the follicle. The theca interna is composed of large epithelioid cells interspersed in connective tissue and rich in blood and lymph vessels. The theca externa is thick and dense, consisting of circularly arranged connective tissue fibers.

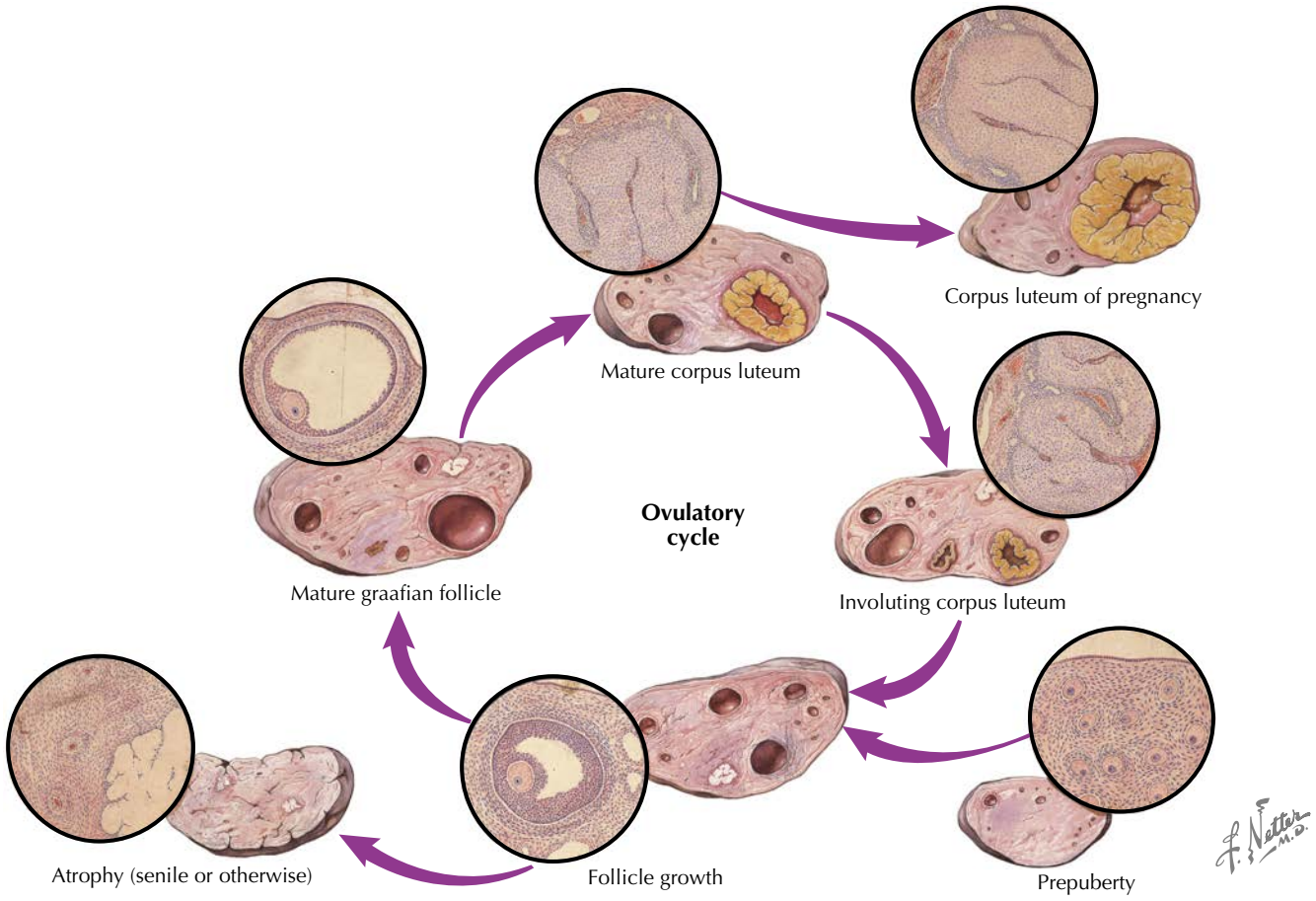


Figure 10.2 Ovarian cycle

In the follicles that do not mature but degenerate the granulosa layer first becomes disorganized. The corona loses its radial arrangement. Thereafter, the follicular cavity shrinks, and soon the egg itself loses its characteristic features. Hyaline is deposited in a wavy, concentric band. Up to this point, the theca interna has continued to be a prominent layer of large, vesicular, nucleated cells. Degenerative changes rapidly progress until nothing is left except an amorphous hyaline scar.

BREAST 11

The size of the adult female breast is variable, but in most instances it extends from the second through the sixth rib and from the sternum to the anterior axillary line, with an axillary tail (of Spence) in the outer and upper portion that can be palpated along the outer border of the pectoralis major muscle. The mammary tissue lies directly over the pectoralis major muscle and is separated from the outer fascia of this muscle by a layer of adipose tissue, which is continuous with the fatty stroma of the gland itself.

The center of the dome-shaped, fully developed breast in the adult woman is marked by the areola mammae, a circular, pigmented skin area that is 1.5–2.5 cm in diameter. The surface of the areola appears rough because of large, somewhat modified sebaceous glands, the glands of Montgomery, which are located directly beneath the skin in the thin subcutaneous tissue layer. The fatty secretion of these glands is said to lubricate the nipple. Bundles of smooth muscles in the areolar tissue serve to stiffen the nipple for a better grasp by the suckling infant.

The nipple or mammary papilla is elevated a few millimeters above the breast and contains 15–20 lactiferous ducts surrounded by fibromuscular tissue and covered by wrinkled skin. Partly within this compartment of the nipple and partly below its base, these ducts expand to form the short sinus lactiferi or ampullae in which the milk

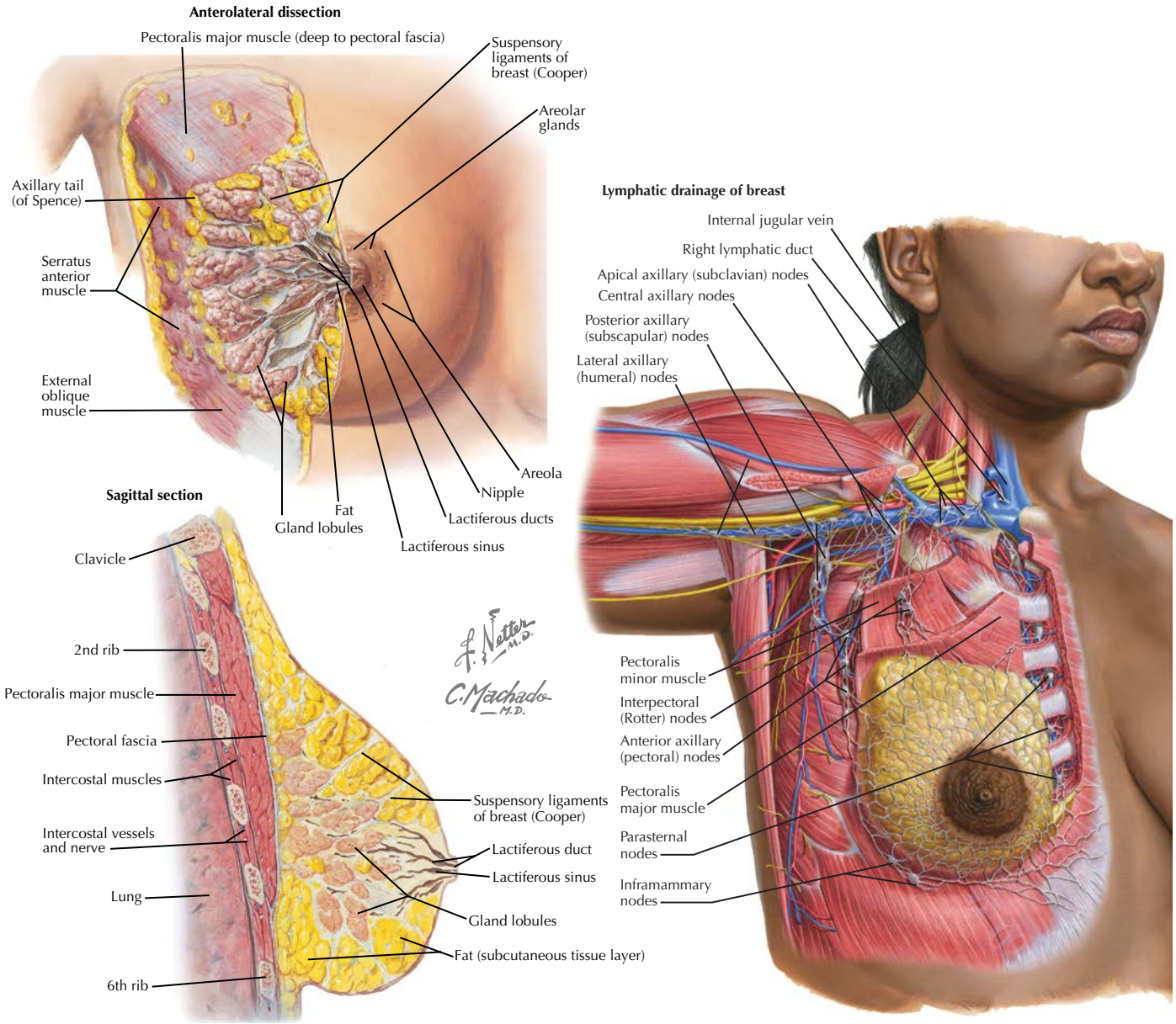


Figure 11.1 Position, structure, and lymphatic drainage of the breast

may be stored. These ampullae are the continuation of the mammary ducts, which extend radially from the nipple toward the chest wall. From them sprout variable numbers of secondary tubules. These end in epithelial masses, forming the lobules or acinar structures of the breast. The number of tubules and the size of the acinar structures vary greatly in different individuals and at different stages of life. In general, the terminal tubules and acinar structures are most numerous during the childbearing period and reach their full physiologic development only during pregnancy and lactation. These epithelial structures constitute collectively the parenchyma of the gland. The stroma is composed of a mixture of fibrous and fatty tissue, and in the absence of pregnancy and lactation, the relative amounts of fatty and fibrous tissue determine the size and consistency of the breast.

Fatty deposits surround and intermix with the glandular elements and make up a significant portion of the breast structure, providing much of its bulk and shape. The ratio of fatty to glandular tissue varies among individuals and with the stage of life. During menopause, the relative amount of fatty tissue increases as the glandular tissue decreases. A rich vascular and lymphatic network supplies the breasts.

The sources of the abundant vascular supply of the mammary gland are the descending thoracic aorta, from which the posterior intercostal arteries branch off; the subclavian artery, from which the internal mammary artery arises; and the axillary artery, serving the mammary gland through the lateral thoracic artery and sometimes through another branch, the external mammary artery. Additional blood may be supplied by branches from the thoracodorsal artery and thoracoacromial artery, which is a short trunk that arises from the forepart of the axillary artery, its origin being generally overlapped by the upper edge of the pectoralis minor.

The lymphatic distribution of the breast is complex. The mammary gland has a very rich network of lymph vessels, which is separated into two planes, the superficial or subareolar plexus of lymphatics and the deep or fascial plexus. Both originate in the interlobular spaces and in the walls of the lactiferous ducts. The lymph nodes that drain the breast are not linked in a straight line; instead, they are staggered,

variable, and fixed within fat pads. This arrangement complicates lymph node removal during breast cancer surgery.

The sensory innervation of the breast follows the normal distribution of the dermatomes and is mainly derived from the anterolateral and anteromedial branches of the thoracic intercostal nerves T_3–T_5. Supraclavicular nerves from the lower fibers of the cervical plexus also provide innervation to the upper and lateral portions of the breast. Sensory enervation of the nipple is from the lateral cutaneous branch of T_4.

Support for the breast comes from both the skin envelope and fibrous suspensory ligaments of Cooper that anchor the breast to the pectoralis major fascia. The enveloping fascia of the breast is continuous with the pectoral fascia. It subdivides the glands into lobules and sends strands into the overlying skin, which in the upper hemisphere are known as the suspensory ligaments of Cooper. Because these strands are not taut, they enable the natural motion of the breast but result in breast ptosis as these ligaments relax with age.

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SECTION

III

General Health Considerations and Counseling

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PUBERTY: NORMAL SEQUENCE

12

THE CHALLENGE

The onset of puberty in adolescents is a time of great emotional and physical change. By understanding the normal sequence of events and being sensitive to the presence of abnormalities, the caregiver may be able to make the most of opportunities to improve health and well-being.

Scope of the Problem

The variety of decisions, concerns, and changes confronting an adolescent are formidable, not the least of which are health issues that result from rapid growth, sexual maturation, and emerging sexuality. Puberty involves physical, emotional, and sexual changes that mark the transition from childhood to adulthood. Despite the potential need for medical education and care, teenagers have the lowest rate of physician office visits of any group. Embarrassment, an inability to pay, a lack of familiarity with healthcare delivery options, and legal obstructions to access contribute to the lack of care.

Objectives of Management

Understanding the normal sequence of events involved in sexual maturation is important for counseling young women who may be concerned about "being normal." Identifying adolescents in whom the progression of sexual maturation is not normal is important so that timely evaluation and intervention may be achieved.

TACTICS

Relevant Pathophysiology

Hormonally, puberty involves a change from negative gonadal feedback to the establishment of the circadian and ultradian gonadal rhythms and the positive feedback controls that result in monthly cycles and fertility. It appears that three elements must be present for puberty to progress normally: adequate body mass (mediated by leptin), adequate sleep, and exposure to light. These factors appear to facilitate or allow the complex hypothalamic, pituitary, and ovarian changes that must occur. (Genetics accounts for 50%–75% of the variance in the timing of pubertal onset in developed countries.) As the hypothalamus matures, there is a decrease in its sensitivity to estrogen, resulting in an increase in the production and release of gonadotropin-releasing hormone (GnRH). Consequently, follicle-stimulating hormone (FSH) levels begin to increase at approximately the 8th–10th year of life, accompanied by an increase in estrogen levels. As the sensitivity of the hypothalamus to negative feedback further decreases, FSH and luteinizing hormone (LH) levels continue to increase and acquire the rhythmic patterns necessary for normal cycling. Eventually, these hormones reach a sufficient level that the follicles can respond, initiating cyclic ovulation and menstruation.

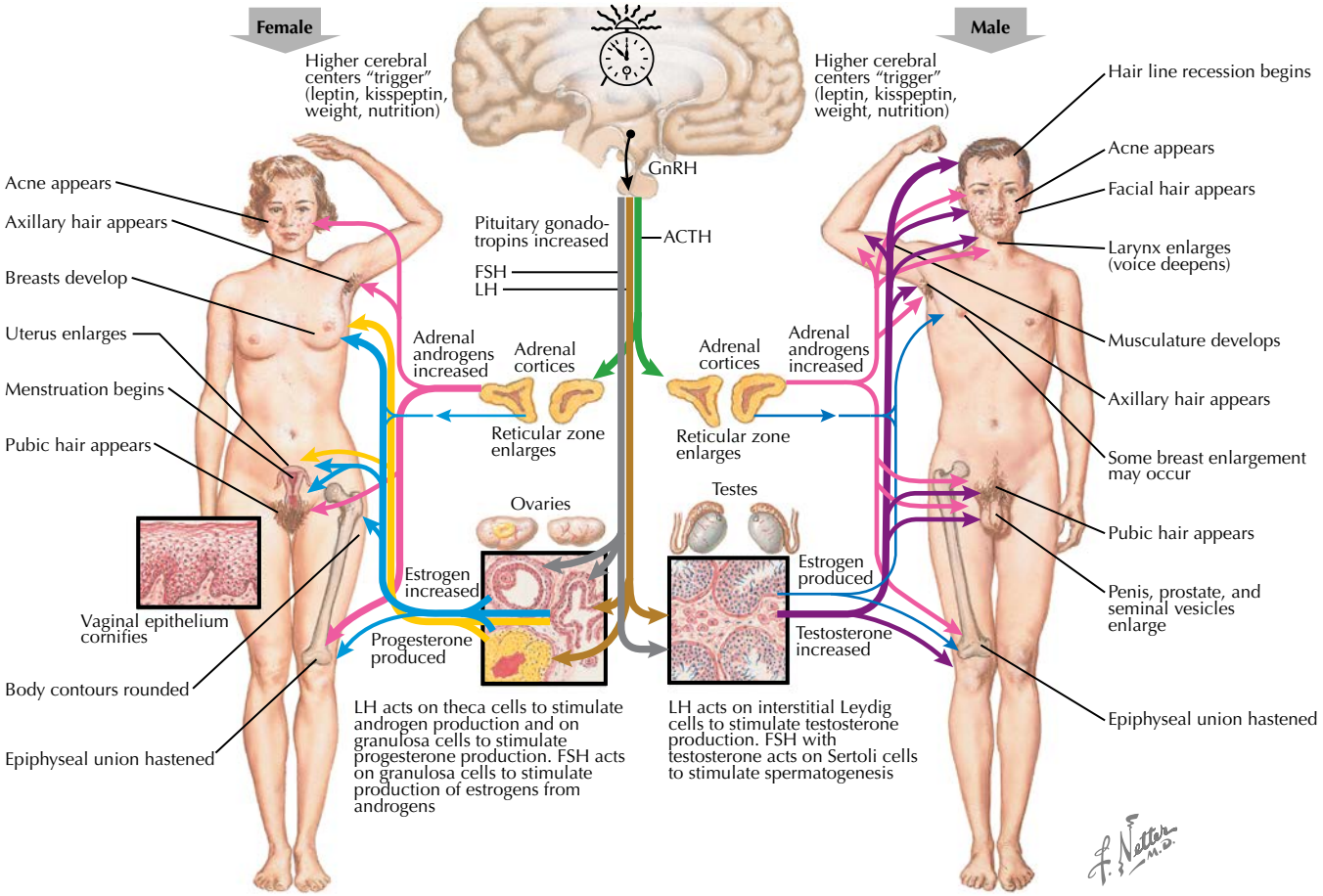

Figure 12.1 Hormonal events in female and male pubescence

Strategies

The changes in puberty generally follow a predictable pattern. A growth spurt and the rounding of body curves generally herald puberty. Breast tissue begins to develop, the nipples darken, and fat is laid down in the shoulders, hips, and buttocks and in front of the pubic bone (the mons). Body hair begins to appear because of the influence of androgens made in small amounts by the ovary and adrenal glands. Height increases because of accelerated growth in the long bones of the body, capped off by the closure of the growth centers near the end of puberty. Generally, this growth spurt begins approximately 2 years before the start of menstruation itself, with growth slowing about the same time menstruation begins.

Patient Education

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- You and Your Sexuality—Especially for Teens, 2015
- Your Changing Body—Puberty in Girls, 2018
- Your First Gynecologic Visit—Especially for Teens, 2018
- Your First Period—Especially for Teens, 2018

IMPLEMENTATION

Special Considerations

The average age of first menstruation (menarche) is approximately 11.6 years, with a normal age range of 8–16 years. These age ranges have gradually declined over the past few decades and are as much as 2 years earlier for girls of African-American descent. Menarche generally occurs after the growth spurt and beginning of breast development, while changes in the pubic hair and labia are still under way. Although there is some variation in the normal progression of events, thelarche is the indication of pubertal change for most, followed by adrenarche and peak growth velocity and ending with the onset of menstruation. This sequence generally takes 4.5 years to run its course, with a range of 1.5–6 years.

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13 HEALTH MAINTENANCE: AGES 12–18 YEARS

IMPORTANT CONSIDERATIONS (PHYSIOLOGIC CHANGES)

This age group is notable for the development and consolidation of reproductive capacity, sexual identity, and expressiveness. Changing life roles and self-awareness present both challenges and opportunities for the development of good health practices. The first visit to the obstetrician-gynecologist for screening and the provision of preventive healthcare services and guidance often occurs between the ages of 13 and 15 years; however, this visit should not be viewed by anyone involved, including the patient or caregiver, as the right time for the first internal pelvic examination, unless indicated by the medical history.

Healthcare for the adolescent should include a review of normal menstruation; diet and exercise; healthy sexual decision-making; the development of healthy, safe relationships; immunizations; and injury prevention. Most of the health problems facing this age group are the result of risk-taking behaviors such as unsafe sexual practices, reckless driving, depression, poor or distorted eating patterns, and use of substances such as alcohol and drugs.

Leading Causes of Death

- Motor vehicle accidents
- Suicide
- Malignant neoplasms
- Homicide
- Congenital anomalies/heart disease
- Diabetes

Leading Causes of Morbidity

- Nose, throat, and upper respiratory conditions
- Viral, bacterial, and parasitic infections
- Sexual abuse
- Musculoskeletal and soft tissue injuries
- Acute ear infections
- Digestive system and acute urinary conditions
- Obesity
- Sexually transmitted infections (STIs)
- Vaginitis

Figure 13.1 The ages of 12–18 years represent a time of extreme changes in the body, body image, personality, and personal interactions. The physician must be aware of these changes, initiate a frank and open dialogue, and ensure confidentiality except in those cases in which safety or bodily harm is involved.

Screening

History

- Reason for visit
- Health status: medical, surgical, family
- Dietary/nutritional assessment
- Physical activity
- Tobacco, vaping, alcohol, other drugs (including complementary and alternative medicines; many adolescents will begin engaging in risk-taking behaviors by the age of 13 years: 27.8% of adolescents report alcohol use before the age of 13 years)
- Abuse/neglect (20%–40% of adults, both male and female, report abuse or sexual victimization before 18 years of age)
- Sexual practices

Physical

- Height
- Weight (body mass index)
- Blood pressure
- Secondary sexual characteristics (Tanner staging)
- Pelvic examination (annually after 21 years of age)
- Skin

Laboratory (Only as Dictated by the Patient's History)

- Periodic
  - Pap test should NOT be done in this age group. (Note: Many patients are unaware of the difference between a Pap test and a pelvic examination for any other reason. Should the question of cervical cytology come up, this can be a good opportunity to discuss the difference.)
  - Cholesterol, high-density lipoprotein cholesterol (every 5 years)
- As indicated by risk factors
  - Hemoglobin
  - Bacteriuria testing
  - Sexually transmitted disease testing—chlamydia and gonorrhea (if the patient has had sexual contact, screening for STIs is important but urine-based STI testing can be an efficient means for doing so without a speculum examination)
  - Human immunodeficiency virus (HIV) testing (the Centers for Disease Control and Prevention and the American College of Obstetricians and Gynecologists recommend that females aged 13–64 years be tested at least once in their lifetime and annually thereafter based on factors related to risk.)
  - Genetic testing/counseling
  - Rubella titer
  - Tuberculosis skin test
  - Lipid profile
  - Fasting glucose

Imaging

None indicated as routine care

COUNSELING

It is important to discuss issues of confidentiality with both the patient and her parent or guardian: concerns over confidentiality often are a barrier to the delivery of healthcare services, especially reproductive healthcare, for adolescents. To overcome this obstacle, a discussion of this topic at the initial visit is important along with advice about relevant state and local statutes. For example, if the patient discloses any evidence or risk of bodily harm to herself or others, confidentiality must be breached. Furthermore, state laws may mandate the reporting of physical or sexual abuse of minors. Physicians should be familiar with state and local statutes regarding the rights of minors to healthcare services and the federal and state laws that affect confidentiality.

The main purpose of the initial reproductive health visit is preventive health, including educational information, rather than problem-focused care. Preventive counseling for parents or other supportive adults can include discussions about physical, sexual, and emotional development; signs and symptoms of common conditions affecting adolescents; and encouragement of lifelong healthy behaviors.

- Sexuality/sexual identity (including topics such as prevention of pregnancy and STIs) is important because more than 85% of adolescent females will have had some form of sexual contact (vaginal, anal, oral, or same sex) by the age of 19 years; more than 60% of all 12th graders report having had sexual intercourse, and nearly one-third of all ninth graders report having had sexual intercourse.
- Preventing unwanted/unintended pregnancy
  - Postponing sexual involvement
  - Contraceptive options (should also include emergency contraceptive options)
  - STIs
  - Partner selection
  - Barrier protection
- Date rape prevention
- Development
- High-risk behaviors
- Responsible use of social media
- Fitness

- Hygiene (including dental); fluoride supplementation/treatment
- Dietary/nutritional assessment (including eating disorders, calcium intake, and folic acid supplementation of 0.4 mg/day)
- Domestic violence (there are more than 1.5 million cases of domestic violence each year; 20%–40% of adults report abuse or sexual victimization before the age of 18 years, and 10%–25% of wives)
- Exercise program
- Psychosocial evaluation
- Interpersonal/family relationships
- Personal goal development
- Behavioral/learning disorders
- Abuse/neglect
- Cardiovascular risk factors
  - Family history
  - Hypertension
  - Dyslipidemia
  - Obesity
  - Diabetes mellitus
- Health/risk behaviors
- Injury prevention
- Safety belts and sports or bicycle helmets
- Recreational hazards
- Firearms
- Hearing damage
- Sports
- Skin exposure to ultraviolet rays
- Suicide/depressive symptoms
- Tobacco, vaping, alcohol, and other drugs

COUNSELING RESOURCES

American Cancer Society: American Cancer Society:
- Guidelines for the Early Detection of Cancer. Available at: http://www.cancer.org/healthy/findcancerearly/cancerscreeningguidelines/american-cancer-society-guidelines-for-the-early-detection-of-cancer. Accessed January 30, 2022.

American College of Obstetricians and Gynecologists Patient Education Booklets and Fast Facts:
- Birth Control—Especially for Teens, 2018
- You and Your Sexuality—Especially for Teens, 2015
- Your Changing Body—Puberty in Girls, 2018
- Your First Gynecologic Visit—Especially for Teens, 2018
- Your First Period—Especially for Teens, 2018
- Your Sexual Health, 2019

INTERVENTIONS: IMMUNIZATIONS

If not already accomplished, human papillomavirus (HPV) and hepatitis B vaccine series.

Meningococcal conjugate vaccine (MCV4) is now recommended. For adolescents who have not received MCV4, the CDC now recommends vaccination before entry into high school, at approximately 15 years of age.

COVID-19 vaccines should be administered following current guidelines.

Periodic

- Tetanus-diphtheria booster (once between the ages of 14 and 16 years)
- Seasonally appropriate influenza vaccine

High-Risk Groups

- Measles, mumps, rubella (MMR) vaccine

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SEXUALITY AND GENDER DYSPHORIA

14

THE CHALLENGE

Description

Sexuality includes an individual's sexual feelings, thoughts, attractions, and behaviors toward others. One can find other people physically, sexually, or emotionally attractive—all of which are a part of sexuality. Sexuality, sexual behaviors, and sexual relationships are an important and necessary part of human development. Responsible sexual behavior, including delaying initiation of sexual activity, choosing caring and respectful partners, the use of safe sexual behaviors, and using effective contraception, are important personal and public health issues.

The terms transgender and gender incongruence describe a situation in which an individual's gender identity differs from external sexual anatomy at birth: Those who have male genitals and facial hair but do not identify as a male or feel masculine, or those with female genitals and female breasts but do not identify as a female or feel feminine. Gender dysphoria is a concept designated in the *Diagnostic and Statistical Manual,* Fifth Edition, (DSM-5), as clinically significant, long-standing distress or impairment related to a strong desire to be of another gender, which may extend all the way to a desire to change primary and/or secondary sex characteristics. Most transgender or gender-diverse people do not experience dysphoria. Problems may arise, however, for adolescents who encounter disparity between their emerging sexuality and the sexuality that is imposed by families, peers, culture, and society.

SCOPE OF THE PROBLEM

The development of a sexual identity is a part of normal childhood, adolescence, and adulthood. Sexuality is diverse, and there are many different types. It can take time to figure out the sexuality that fits the individual. Sexuality can even change over time. Depending upon the definition used to classify a person as transgender, data suggest that 0.3%–1.8% of the adult population is transgender. According to the DSM-5, the prevalence of true gender dysphoria is 0.005%–0.014% for adult natal males and 0.002%–0.003% for adult natal females. In Europe, 1/30,000 adult males and 1/100,000 adult females seek sexual reassignment surgery.

OBJECTIVES OF MANAGEMENT

The objectives of management are to provide emotional support and appropriate healthcare to individuals independent of their sexual identity, orientation, or expression. Increasing evidence suggests that allowing children and adolescents to explore and identify as their authentic gender and sexual selves offers immediate and long-term improved health outcomes.

TACTICS

Relevant Pathophysiology: Gender, gender identity, gender role, and gender expression are personal, psychologic, and cultural constructs:

- Sex (formerly biologic, anatomic, or natal sex) is generally that which is assigned at birth, based upon the physiognomy of the external genitals or chromosomal complement. Anatomic sex usually is binary: male or female. Rare individuals have both male and female gonadal tissue (intersex or differences in sex development). These may present during the newborn period, childhood, or adolescence.
- Gender identity is the innate sense of being male, female, androgenous, nonbinary, or the rejection of a gender designation. Gender identity is generally developed during early childhood (as early as ages 2–5 years) or adolescence but may evolve across the individual's life span. Current discussions of gender identity have generally moved beyond male and female to include multiple variations of self-identification and terminology. Sexual behavior itself is neither sensitive nor specific as a predictor of adolescent gender identification, sexual orientation, or sexual identity.
- Gender roles are social constructs embodying societal expectations of attitudes, behaviors, and personality traits typically based on biologic sex. Masculinity and femininity are the main cultural associations.
- Gender expression is how gender is presented to the outside world, not necessarily correlating with gender or gender identity. Sexual orientation refers to an individual's pattern of physical, emotional, and romantic arousal and the gender(s) of persons to whom an individual is physically or sexually attracted.

The exact causes of gender dysphoria are not completely understood. Genetics, hormonal influences during prenatal development, and environmental factors may be involved. The onset of gender dysphoria may be seen as early as childhood.

Strategies: Except when sexuality, sexual identity, or sexual orientation causes the individual stress or dysfunction, no intervention is needed. When appropriate, consider adding the following:

- Peer support groups.
- Voice and communication therapy to develop vocal characteristics matching the experienced or expressed gender.
- Hair removal or transplantation.
- Genital tucking.
  - Breast binding.

While body is formed and changes the most during the teenage years, questioning and discomfort, including gender dysphoria, can occur at any age.
Figure 14.1 Sexuality and gender dysphoria

- Breast padding.
- Referral to specialized care when gender reassignment surgery is considered.

All care should be tailored to the needs of the individual. Gender identity–affirming care, for those who desire, can include hormone therapy and affirming surgeries. Any discussion of sexuality offers an opportunity to address health issues such as disease and pregnancy prevention.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- You and Your Sexuality—Especially for Teens, 2015
- Your Sexual Health, 2019
- Your Changing Body—Puberty in Girls, 2018

IMPLEMENTATION

Special Considerations: Many transgender individuals will be straightforward in their presentation, while others will present with, or have the diagnosis confounded by, other mental health concerns. Therefore, the diagnosis of gender incongruence or gender dysphoria should be made by experienced medical providers who are both well acquainted with the diagnostic criteria and have the necessary experience assessing the mental health issues that might muddle the diagnosis. Hormone and surgical therapies are usually undertaken with the goal of making the external body appearance more congruent with the individual's gender identity. Expectations that patients may have about other benefits must be addressed and placed in perspective.

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HEALTH MAINTENANCE: AGES 19–39 YEARS

15

IMPORTANT CONSIDERATIONS (PHYSIOLOGIC CHANGES)

This age group is notable for more established menstrual function, punctuated for many individuals by one or more pregnancies. Sexuality and sexual expression patterns have generally become well established and comfortable. Healthcare is directed toward prevention and health promotion because these patients generally have good health during these years.

Leading Causes of Death

- Motor vehicle accidents/unintentional injuries
- Malignant neoplasms
- Suicide
- Homicide
- Cardiovascular disease
- Pregnancy complications
- Influenza
- Cerebrovascular disease
- Diabetes mellitus and its complications
- Acquired immunodeficiency syndrome (AIDS)

Leading Causes of Morbidity

- Diabetes mellitus
- Nose, throat, and upper respiratory conditions
- Menstrual disorders
- Musculoskeletal and soft tissue, including back and upper and lower extremities
- Obesity
- Sexual assault/domestic abuse
- Sexually transmitted infections (STIs)

SCREENING

History

- Reason for visit
- Health status: medical, surgical, family
- Dietary/nutritional assessment
- Physical activity
- Tobacco, vaping, alcohol, and other drugs (including complementary and alternative medicines)
- Abuse/neglect
- Sexual practices/contraception

Physical

- Height
- Weight (body mass index [BMI])
- Blood pressure
- Neck: adenopathy, thyroid palpation
- Breasts

Figure 15.1 During the early reproductive years, girlhood gives way to careers, motherhood, and family responsibilities with all the attendant physical and emotional changes

- Abdomen
- Pelvic examination
- Skin screening

Laboratory

- Periodic
  - Pap test at or after 25 years of age, every 3 years thereafter until age 30. Primary human papillomavirus (HPV) testing every 5 years from ages 30–50 years, regardless of triaging strategy. Studies show that this results in the largest reductions in cervical cancer incidence and mortality rates, with >50% reduction in cervical cancer incidence and >55% reduction in cervical cancer mortality. Cervical cytology alone every 3 years, or cotesting with a combination of cytology and high-risk HPV testing every 5 years is also acceptable for those at low risk between the ages of 30 and 65 years.
  - Cholesterol, high-density lipoprotein cholesterol (every 5 years)
- As indicated by risk factors
  - Bacteriuria testing
  - Fasting glucose test or hemoglobin A1c
  - Genetic testing/counseling
  - Hemoglobin
  - Human immunodeficiency virus (HIV) testing (the Centers for Disease Control and Prevention and the American College of Obstetricians and Gynecologists recommend that females aged 13–64 years be tested at least once in their lifetime and annually thereafter based on factors related to risk.)
  - Mammography (for only very select indications)
  - Rubella titer
  - STI testing
  - Thyroid-stimulating hormone
  - Tuberculosis skin test

Imaging

Screening mammography may be started before the age of 40 years for patients with a strong family history of early-onset breast cancer or heritable cancer syndromes.

COUNSELING

For those considering or at risk for pregnancy, counseling regarding preconception testing, immunization, folic acid supplementation, and nutrition is always appropriate. Healthcare encounters during this period are also an excellent opportunity to discuss long-term health improvement strategies such as weight control, exercise, and nutrition.

Sexuality

- High-risk behaviors
- Contraceptive options
  - Genetic counseling
  - Prevention of unwanted pregnancy (including emergency contraceptive options)
- STIs
  - Partner selection
  - Barrier protection
- Sexual function

Fitness

- Hygiene (including dental)
- Dietary/nutritional assessment (folic acid supplementation for those at risk for or considering pregnancy; 0.4 mg/day has been shown to reduce the risk of neural tube defects)
- Exercise program

Psychosocial Evaluation

- Interpersonal/family relationships
- Domestic violence (there are more than 1.5 million cases of domestic violence each year; 20%–40% of adults report abuse or sexual victimization before the age of 18 years, and 10%–25% of wives)
- Job satisfaction
- Lifestyle/stress
- Sleep disorders

Cardiovascular Risk Factors

- Family history
- Hypertension
- Dyslipidemia
- Obesity/diabetes mellitus
- Lifestyle

Health/Risk Behaviors

Injury Prevention

- Safety belts and sports and bicycle helmets
- Recreational hazards
- Firearms
- Hearing
- Breast self-examination (while data on the efficacy of breast self-examination are lacking, and some organizations discourage the

practice, the possibility of detecting breast disease makes breast awareness reasonable)
- Breast cancer chemoprophylaxis (selective estrogen receptor modulator therapy for high-risk women over the age of 35 years)
- Skin exposure to ultraviolet rays
- Suicide/depressive symptoms
- Tobacco, vaping, alcohol, and other drugs

COUNSELING RESOURCES

American College of Obstetricians and Gynecologists Patient Education Booklets and Fast Facts:
- Birth Control—Especially for Teens, 2018
- Chlamydia, Gonorrhea, and Syphilis, 2021
- Cholesterol and Women's Cardiovascular Health, 2021
- Frequently Asked Questions for HPV Vaccination
- Good Health Before Pregnancy—Prepregnancy Care, 2020
- Healthy Eating, 2020
- Human Papillomavirus Vaccination, 2021
- Intimate Partner Violence, 2020
- Weight Control—Eating Right and Keeping Fit, 2021
- Your First Period—Especially for Teens, 2018

INTERVENTIONS: IMMUNIZATIONS

If not already accomplished, HPV and hepatitis B vaccine series
COVID-19 vaccines should be administered following current guidelines.

Periodic

- Tetanus–diphtheria booster (every 10 years)
- Seasonally appropriate influenza vaccine
- COVID-19 vaccine booster based upon current recommendations, including initial series of inoculations if not already achieved

High-Risk Groups

- Measles, mumps, rubella (MMR) vaccine
- Hepatitis B vaccine
- Pneumococcal vaccine

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CONTRACEPTION: COUNSELING PRINCIPLES

16

THE CHALLENGE

The challenge is to assist couples in identifying and using the most appropriate method of controlling fertility. Changing patterns of sexual expression, new technologies, increased consumerism, and heightened cost pressures all affect the choices made in the search for fertility control. The very nature of the topic gives contraception personal, religious, and political overtones that often lead to conflict, emotionality, and confusion.

SCOPE OF THE PROBLEM

In the United States, nearly half (45%) of all pregnancies are unplanned. Specifically, 27% of all pregnancies were "wanted later"

Table 16.1 Contraceptive Use Among Women in the United States, 2018

Method	Percent of Users Aged 15–49	Perfect Use Failure[a]	Actual Use Failure[a]
Sterilization (female)	27.7	0.5	0.5
Oral contraceptives	21.4	0.3	7
Condom (male)	12.9	2.0	13
Intrauterine contraceptive device	12.9	0.1–0.6	0.1–0.8
Sterilization (male)	8.6	0.1	0.15
Withdrawal	5.6	4.0	20
Implant	3.1	0.1	0.1
Injectable	3.0	0.2	4
Periodic abstinence (calendar)	2.6	<1–2	2–34
Vaginal ring	1.3	0.3	7
Transdermal patch	0.5	0.3	7
Emergency contraception	0.2	0.2	0.2
Other (sponge, cervical cap, female condom, etc.)	0.3	5–26	16–32

[a]Percentage of women experiencing unintended pregnancy within first year of use
Data from: The Alan Guttmacher Institute. *Contraceptive Use in the United States by Method, 2018.* Available at: https://www.guttmacher.org/fact-sheet/contraceptive-method-use-united-states. Accessed on January 30, 2022.

and 18% of pregnancies were "unwanted." Despite the fact that 90% of women at risk (fertile, sexually active, and neither pregnant nor seeking pregnancy) are using some form of contraception, nearly 5% of reproductive-age women have an unintended pregnancy each year. The 10% or so of women not using contraception account for more than half of these unintended pregnancies. The remaining unplanned pregnancies occur as either failure of the contraceptive method used or the improper or inconsistent use of the method. Roughly 40% of unintended pregnancies (excluding miscarriages) end in elective termination.

OBJECTIVES OF COUNSELING

There is no "ideal" contraceptive method. While efficacy and an acceptable risk of side effects are important in the choice of contraceptive methods, these are often not the factors upon which the final choice is made. Motivation to use or continue to use a contraceptive method is based on education, cultural background, cost, and individual needs, preferences, and prejudices. Factors such as availability, cost, coital dependence, personal acceptability, and the patient's perception of the risk all have a role in the final choice of methods. Side effects, such as irregular or unpredictable vaginal bleeding, can often contribute more to the patient's acceptance or continuance of a method than any other factor.

TACTICS

Relevant Pathophysiology

Currently available contraceptive methods seek to prevent pregnancy by preventing the sperm and egg from uniting or by preventing implantation and growth. These goals are accomplished by preventing the development and release of the egg (oral and nonoral hormonal contraceptives and long-acting hormonal methods), preventing the union of sperm and egg by imposing a mechanical, chemical, or temporal barrier between sperm and egg (condom, diaphragm, foam, intrauterine contraceptive devices, rhythm method, withdrawal, and postcoital oral contraception), or altering the likelihood of implantation or growth (RU-486). Relative efficacy (first year failure, both real and theoretical) is shown in the accompanying table (Table 16.1).

Strategies

For a couple to use a method, it must be accessible, immediately available (especially in coitally dependent or "use oriented" methods), and of reasonable cost. The impact of a method on spontaneity or the modes of sexual expression preferred by the patient and his/her partner may also be important considerations. A decision tree based on these concepts is presented in Fig. 16.1.

Patient Education

American College of Obstetricians and Gynecologists Patient Education Booklets and Fast Facts:

- Barrier Methods of Birth Control—Spermicide, Condom, Sponge, Diaphragm, and Cervical Cap, 2018
- Birth Control—Especially for Teens, 2021
- Birth Control Method—Cervical Cap, 2021
- Birth Control Method—Condom, 2021
- Birth Control Method—Diaphragm, 2021
- Birth Control Method—Hormonal IUD & Copper IUD, 2021
- Birth Control Method—Injection, 2021
- Birth Control Method—Patch, 2021
- Birth Control Method—Spermicide, 2021
- Birth Control Method—Sponge, 2021
- Birth Control Method—Sterilization, 2021
- Birth Control Method—Vaginal Ring, 2021
- Combined Hormonal Birth Control Pills, 2021
- Combined Hormonal Birth Control—Pill, Patch, and Ring, 2020
- Effectiveness of Birth Control Methods, 2021
- Fertility Awareness—Based Birth Control Methods, 2021
- Having a Baby After Age 35—How Aging Affects Fertility and Pregnancy, 2020
- Long-Acting Reversible Contraception—Intrauterine Device and Implant, 2021
- Progestin-Only Birth Control Pills, 2021
- Progestin-Only Hormonal Birth Control Methods—Pills and Injections, 2020

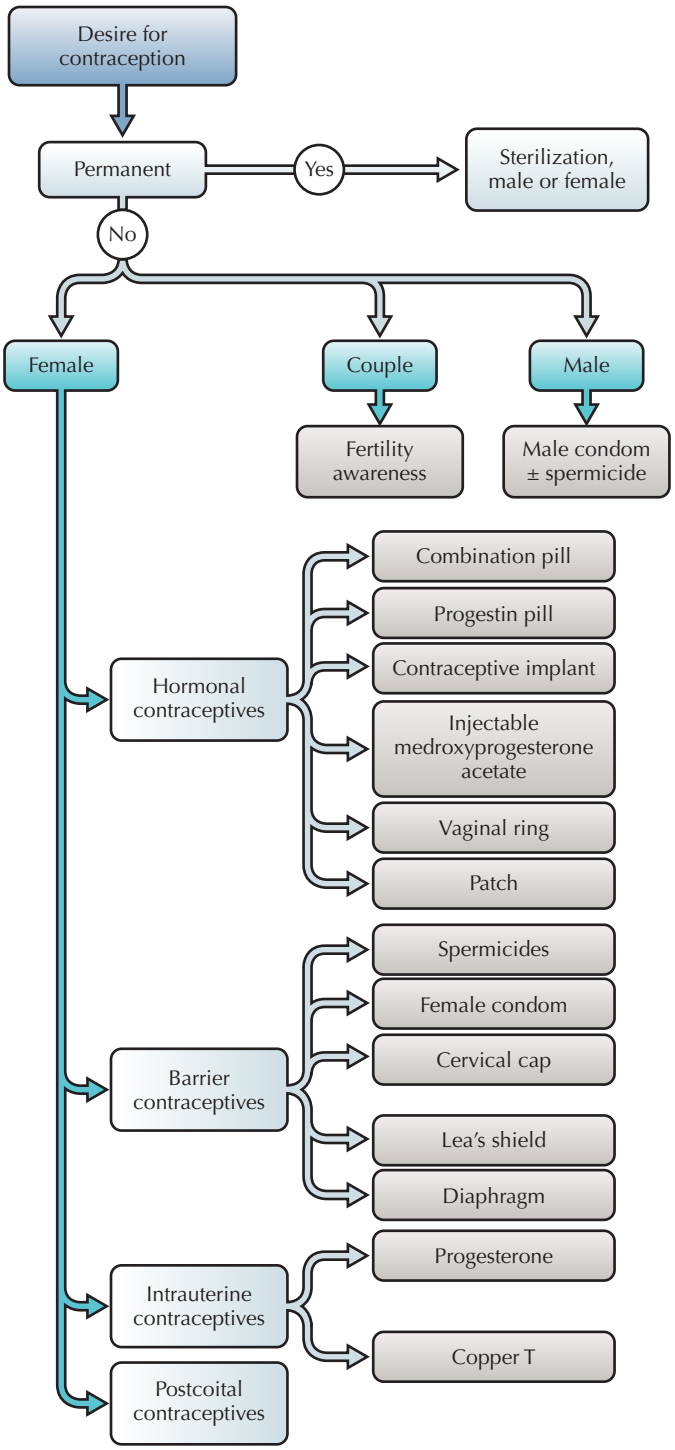

Figure 16.1 One of many possible decision tree approaches to the choice of contraceptive methods. (Reused with permission from Beckman RB, Ling FW, Herbert WN, et al. *Obstetrics and Gynecology.* 7th ed. Baltimore, MD: Williams & Wilkins; 2013.)

IMPLEMENTATION

Special Considerations

Adolescent patients require reliable contraception but often have problems with adherence. Careful counseling about options (including abstinence), the risks of pregnancy and sexually transmitted infections, and the need for both contraception and disease protection must be provided. These patients may be better served by methods that rely less on the user for reliability (intrauterine contraceptive devices [IUCDs] or long-acting hormonal agents such as injections, ring, patches, and implants) than those that depend on consistent use (use-oriented methods and those that are very time-sensitive such as progestin-only oral contraceptives).

Contraception for breastfeeding mothers may include oral contraceptives if milk flow is well established. Long-acting progesterone contraceptives may result in a slight increase in breast milk production. Barrier contraceptives are not contraindicated in these patients. IUCDs, copper- or hormone-containing, also may be placed once the uterus has returned to normal or immediately postpartum following delivery of the placenta.

Patients over the age of 35 years may continue to use low-dose oral contraceptives if they have no other risk factors and do not smoke. Adherence concerns are generally less in these patients, making use-oriented methods more acceptable and reliable. Long-term methods (IUCDs, long-acting progesterone contraception, or sterilization) also may be appropriate. Until menopause is confirmed by clinical or laboratory methods, contraception must be continued.

Following abortion (spontaneous or induced), ovulation may occur as soon as after 2 weeks. If oral contraceptives are selected, they should be started immediately after the abortion.

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17 HEALTH MAINTENANCE: AGES 40–64 YEARS

IMPORTANT CONSIDERATIONS (PHYSIOLOGIC CHANGES)

This age group is notable for transitions from reproductive function to maturity, from rhythmic menstrual function to menopause, and from robust health to the emergence of age-related changes.

Leading Causes of Death

- Breast, lung, colorectal, and ovarian cancer
- Coronary artery disease
- Accidents/unintentional injury
- Diabetes mellitus and its complications
- Cerebrovascular disease
- Obstructive pulmonary disease

Leading Causes of Morbidity

- Nose, throat, and upper respiratory tract conditions
- Osteoporosis
- Arthritis
- Hypertension
- Depression
- Orthopedic deformities, including back and upper and lower extremities
- Obesity
- Heart disease
- Hearing and vision impairments

SCREENING

History

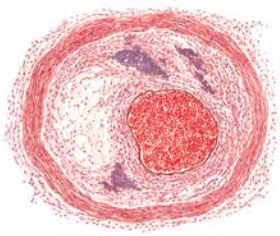
- Reason for visit
- Health status: Medical, surgical, family
- Dietary/nutritional assessment
- Physical activity
- Tobacco, vaping, alcohol, and other drugs (including complementary and alternative medicines)
- Abuse/neglect
- Sexual practices/contraception
- Urinary and fecal incontinence (These issues become more common with childbearing and age, but patients seldom volunteer these complaints.)

Physical

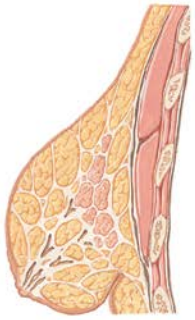
- Height
- Weight (body mass index [BMI])
- Blood pressure
- Oral cavity
- Neck: adenopathy, thyroid palpation
- Breasts
- Abdomen
- Pelvic and rectovaginal examination
- Skin screening

Laboratory

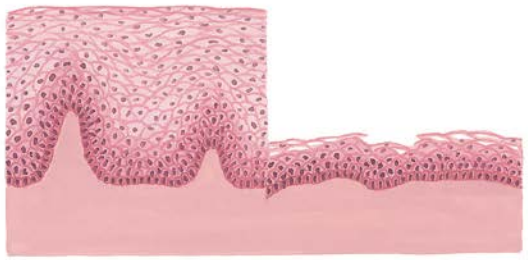
- Periodic
  - Primary human papillomavirus (HPV) testing every 5 years from ages 30–50 years, regardless of triaging strategy. Studies show that this results in the largest reductions in cervical cancer incidence and mortality rates, with >50% reduction in cervical cancer incidence and >55% reduction in cervical cancer mortality. Cervical cytology alone every 3 years, or cotesting with a combination of cytology and high-risk HPV testing every 5 years is also acceptable for those at low risk between the ages of 30 and 65 years. Cholesterol, high-density lipoprotein cholesterol (every 5 years, starting at the age of 45 years)



Coronary artery disease



Breast, ovarian, and lung cancer



Vaginal atrophy

Osteoporosis and obesity

Diabetes

Obstructive pulmonary disease

Depression

Figure 17.1 Leading causes of death and morbidity in women aged 40–64 years

- Fecal DNA testing (A single stool sample collected at the time of digital rectal examination is not sufficient to adequately screen for colon cancer.)
- Sigmoidoscopy (every 3–5 years after the age of 45 years; double-contrast barium enema study may be substituted, or a complete colonoscopy may be performed every 10 years)

- As indicated by risk factors
  - Bacteriuria testing
  - Colonoscopy
  - Fasting glucose test
  - Hemoglobin
  - Human immunodeficiency virus (HIV) testing
  - Lipid profile
  - Mammography
  - Sexually transmitted disease testing
  - Thyroid-stimulating hormone test
  - Tuberculosis skin test

Imaging

- Mammography (every 1–2 years until the age of 45 years; annually age 55 years of age; every 2 years after age 55 (or can continue yearly screening). Screening should continue as long as a woman is in good health and is expected to live 10 more years or longer.)
- Bone density assessment (Testing should be performed on the basis of an individual woman's risk profile and is not indicated unless the results will influence a treatment or management decision. Testing may be recommended to postmenopausal women younger than 65 years who have risk factors for osteoporosis.)

COUNSELING

Healthcare encounters during this period are an excellent opportunity to discuss long-term health improvement strategies such as weight control, exercise, and nutrition. As women approach the transition from reproduction to maturity, there are often increased opportunities to rededicate to healthy lifestyles and prevention. The increasing importance of surveillance as one ages is also an important message for patients in this age group.

Sexuality

- High-risk behaviors
- Contraceptive options
  - Genetic counseling (for women in this age range)
  - Prevention of unwanted pregnancy (including emergency contraceptive options)
- Sexually transmitted disease
  - Partner selection
  - Barrier protection
- Sexual function (including sexual pain)

Fitness

- Hygiene (including dental)
- Dietary/nutritional assessment (1000–1200 mg of calcium by diet and/or supplements; folic acid supplementation of 0.4 mg/day up to the age of 50 years)
- Discussion of exercise program and the importance of remaining physically active

Psychosocial Evaluation

- Interpersonal/family relationships
- Domestic violence
- Job/work satisfaction
- Lifestyle/stress
- Retirement planning
- Sleep disorders

Cardiovascular Risk Factors

- Family history
- Hypertension
- Dyslipidemia
- Obesity/diabetes mellitus
- Lifestyle

Health/Risk Behaviors

- Hormone therapy (Data suggests that when hormone replacement is initiated within 10 years of menopause, it is not associated with some of the adverse effects reported in the Women's Health Initiative [WHI] study and may even be associated with reductions in such things as cardiovascular disease. Despite this, hormonal therapy is generally reserved for the treatment of systemic symptoms or local symptoms refractory to local therapy.)
- Breast cancer chemoprophylaxis (selective estrogen receptor modulator therapy for high-risk women over the age of 35 years)
- Injury prevention
  - Safety belts
  - Recreational hazards
  - Sports involvement
  - Vision and hearing
- Breast self-awareness
- Skin exposure to ultraviolet rays
- Suicide/depressive symptoms
- Tobacco, alcohol, and other drugs

COUNSELING RESOURCES

American College of Obstetricians and Gynecologists Patient Education Booklets and Fast Facts:

- Benign Breast Conditions, 2021
- Chlamydia, Gonorrhea, and Syphilis, 2021
- Cholesterol and Women's Cardiovascular Health, 2021
- Good Health Before Pregnancy—Prepregnancy Care, 2020
- Healthy Eating, 2020
- Heart Health for Women, 2021
- Intimate Partner Violence, 2020
- Mammography and Other Screening Tests for Breast Problems, 2017
- Managing High Blood Pressure, 2020
- The Menopause Years, 2020
- Weight Control: Eating Right and Keeping Fit, 2021

INTERVENTIONS: IMMUNIZATIONS

Periodic

- Tetanus–diphtheria booster (every 10 years)
- Influenza vaccine
- COVID-19 vaccine booster based upon current recommendations, including initial series of inoculations if not already achieved
- Zoster recombinant (2 doses after age 50)

High-Risk Groups

- Measles, mumps, rubella (MMR) vaccine
- Hepatitis A and/or B vaccine
- Influenza vaccine
- Pneumococcal vaccine
- Varicella vaccine

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HEALTH MAINTENANCE: AGES 65 YEARS AND OLDER 18

IMPORTANT CONSIDERATIONS (PHYSIOLOGIC CHANGES)

This age group is notable for maturity, leisure, and age-related health changes. Healthcare is still directed toward prevention; however, it becomes more and more occupied by the management of general medical and age-related illness. While reproductive health issues no longer are the focus of well-women visits, the women's healthcare provider is often still the patient's primary entry point for healthcare.

Leading Causes of Death

- Cardiovascular disease
- Coronary artery disease
- Colorectal, lung, and breast cancer
- Alzheimer disease
- Cerebrovascular disease
- Obstructive lung disease
- Pneumonia/influenza
- Diabetes mellitus and its complications
- Accidents
- Renal disease

Leading Causes of Morbidity

- Nose, throat, and upper respiratory conditions
- Osteoporosis
- Arthritis
- Hypertension
- Urinary and fecal incontinence
- Heart disease
- Musculoskeletal and soft tissue injuries
- Hearing and vision impairment
- Colon disease (diverticulitis, etc.)

SCREENING

History

- Reason for visit
- Health status: Medical, surgical, family
- Dietary/nutritional assessment
- Physical activity and activities of daily life
- Tobacco, vaping, alcohol, and other drugs (concurrent medications including complementary and alternative medicines)
- Abuse/neglect (Two-thirds of the victims of elderly abuse are women, with almost 90% of abuse cases occurring in the home.)
- Sexual practices/activity
- Urinary and fecal incontinence (These issues become more common with childbearing and age, but patients seldom volunteer these complaints.)

Physical

- Height
- Weight (body mass index [BMI])
- Blood pressure
- Oral cavity
- Neck: Adenopathy, thyroid
- Breasts
- Abdomen
- Pelvic and rectovaginal examination
- Skin
- Hearing and vision screening (including glaucoma)

Laboratory

- Periodic
  - Pap test (not recommended if low risk—women over age 65 who have had regular cervical cancer testing in the past 10 years with normal results should not be tested for cervical cancer.)
  - Urinalysis/dipstick
  - Cholesterol, high-density lipoprotein cholesterol (every 3–5 years)
  - Fecal DNA testing (A single stool sample collected at the time of digital rectal examination is insufficient to adequately screen for colon cancer.)
  - Sigmoidoscopy (every 3–5 years; double-contrast barium enema study may be substituted or a complete colonoscopy may be performed every 10 years). Patients over age 85 should no longer get colorectal cancer screening.
  - Thyroid-stimulating hormone test (every 3–5 years)
- As indicated by risk factors
  - Hemoglobin
  - Fasting glucose test
  - Sexually transmitted disease testing
  - Human immunodeficiency virus (HIV) testing
  - Tuberculosis skin test
  - Lipid profile

Back pain is a common "anginal equivalent" in women

Figure 18.1 Fatigue and dyspnea on exertion with decreased exercise tolerance are common complaints

Imaging

- Mammography every 2 years (or can continue yearly screening). Screening should continue as long as a woman is in good health and is expected to live 10 more years or longer.
- Bone density assessment (Bone mineral density testing should be recommended to all postmenopausal women aged 65 years or older. In the absence of new risk factors, densitometry should not be performed more frequently than every 2 years.)

COUNSELING

As functions change due to aging, both the patient and provider should be vigilant for subtle losses of abilities and should be prepared to make accommodations as required.

Sexuality

- Sexual functioning
- Sexual behaviors
- Sexually transmitted diseases

Fitness

- Hygiene (general and dental)
- Dietary/nutritional assessment (women in this age group should take 1200 mg of calcium and 10 μg of vitamin D per day to prevent osteoporosis)
- Discussion of exercise program and the importance of remaining physically active

Psychosocial Evaluation

- Neglect/abuse
- Lifestyle/stress
- Depression/sleep disorders (These are particularly prevalent, but often overlooked.)
- Family relationships
- Job/work/retirement satisfaction

Cardiovascular Risk Factors

- Hypertension
- Dyslipidemia
- Obesity
- Diabetes mellitus
- Sedentary lifestyle

Health/Risk Behaviors

- Hormone replacement therapy
- Breast cancer chemoprophylaxis (selective estrogen receptor modulator therapy for high-risk women)
- Injury prevention
  - Safety belts and helmets
  - Occupational hazards
  - Recreational hazards
  - Fall prevention
  - Hearing and visual acuity/glaucoma screening
  - Breast self-examination
  - Skin exposure to ultraviolet rays
  - Suicide/depressive symptoms
  - Tobacco, alcohol, and other drugs

COUNSELING RESOURCES

American College of Obstetricians and Gynecologists Patient Education Booklets and Fast Facts:

- Benign Breast Conditions, 2021
- Cholesterol and Women's Cardiovascular Health, 2021
- Heart Health for Women, 2021
- Mammography and Other Screening Tests for Breast Problems, 2017
- Managing High Blood Pressure, 2020
- The Menopause Years, 2020

INTERVENTIONS: IMMUNIZATIONS

Periodic

- Tetanus–diphtheria booster (every 10 years)
- COVID-19 vaccine booster based upon current recommendations, including initial series of inoculations if not already achieved
- Influenza vaccine (annually; should be given as the high-potency dose)
- Pneumococcal vaccine, including the 20-valent vaccine containing 20 serotypes of pneumococcus (If the PVC20 vaccine is used, it should be followed in 1 year by the standard pneumococcal vaccine.)
- Zoster recombinant (two doses after age 50)

High-Risk Groups

- Hepatitis B vaccine
- Varicella vaccine (if not already administered)

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SECTION
IV

Diseases, Disorders, and Common Problems

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ABUSE: PHYSICAL AND SEXUAL

19

INTRODUCTION

Description: Abuse is a pattern of physical or emotional trauma that occurs in a continuing relationship (see Chapter 35, Domestic Violence [Intimate Partner Violence]). Although the definition of abuse requires only one episode of abuse, a pattern of escalating violence is more typical. (In at least one-fourth of cases, there have been three or more episodes of violence in the 6 months preceding the report of abuse.) In the United States, women are at a greater risk of injury or death at the hands of a domestic partner than from an unrelated attacker. Sexual abuse is a specific form of physical abuse that is related to trauma of a sexual nature or a pattern of coercive sexual activities. Sexual abuse includes but is not limited to, disrobing, exposure, photography or posing, oral–genital contact, insertion of foreign bodies, and vaginal or rectal intercourse.

Prevalence: More than 1.5 million cases of domestic violence annually occur. It is estimated that between 5% and 25% of women who are treated for injuries in emergency rooms receive these injuries as a result of domestic violence. Of adults, 20%–40% report abuse or sexual victimization before the age of 18 years and 10%–25% of wives report one or more episodes of sexual abuse. Over 43 million women have experienced psychologic aggression by an intimate partner in their lifetime.

Predominant Age: Any, most common teens to 30s.

Genetics: Women are the primary victims of domestic violence, accounting for almost 95% of incidents.

ETIOLOGY AND PATHOGENESIS

Causes: Multiple factors. Alcohol or drugs are often involved, although they are not causative factors.

Risk Factors: Such abuse occurs at a slightly higher rate among those of lower educational or socioeconomic status.

SIGNS AND SYMPTOMS

Physical Abuse

Signs and symptoms are highly variable. In almost 85% of reported cases, the injuries sustained are sufficient to require medical treatment. Between 5% and 25% of women treated for injuries in emergency rooms receive these injuries as a result of domestic violence. The correct diagnosis is rendered in less than 5% of women. The most frequent locations for injuries are the head, neck, chest, abdomen, and breasts. Upper-extremity injuries result from defensive efforts.

Sexual Abuse

Signs and symptoms are nonspecific.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Depression (may mimic the vague complaints that should raise the suspicion of abuse)
- Coagulopathy (leading to bruising)

Associated Conditions: More than one-half of men who abuse their wives also abuse their children. Between one-third and one-half of all murders of women occur at the hands of a male partner.

Workup and Evaluation

Laboratory: No evaluation is indicated.

Imaging: No imaging is indicated unless fracture or other injury is suspected.

Special Tests: The five-question Abuse Assessment Screen increases the likelihood of detecting abuse. The longer it has been since an assault or when abuse is ongoing, the more likely it is for the presenting complaints to be unrelated to the underlying acute concerns generated by the attack. Somatic complaints and subtle behavioral changes may suggest the possibility of domestic violence or abuse.

Diagnostic Procedures: History and suspicion. Because one of the pivotal aspects of sexual assault is the loss of control, every effort should be made to allow the patient control over even the most trivial aspects of the physical examination.

Pathologic Findings

In the typical battering relationship, three phases are usually present: a tension-building phase that gradually escalates; the battering incident, which may be triggered by almost any event; and a period of contrition, during which the batterer apologizes and asks for forgiveness. This cycle tends to repeat and escalate with greater physical harm and risk and less remorse.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Offer support, contact with social agencies, and assistance with developing means for independence (eg, money, transportation, destination, childcare) should escape become necessary.

Specific Measures: Assess and manage any injuries present. The patient should be given the telephone number of and directions to a shelter or safe house.

Diet: No specific dietary changes are indicated.

Activity: No restriction.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Intimate Partner Violence, 2020.

Drug(s) of Choice

None indicated. Great care must be used with any antidepressants or other mood-altering drugs given in these situations.

FOLLOW-UP

Patient Monitoring: In many locations, suspected sexual assault must be reported to law enforcement authorities. In all locations, suspected abuse, sexual or otherwise, occurring to a minor must be reported.

Prevention/Avoidance: None. Patients must be told they are not at fault and that their efforts to change the abuser are unlikely to have an effect in reducing the number of future episodes.

Possible Complications: Escalating violence with an increasing risk of severe injury or death.

Expected Outcome: The pattern of physical or sexual abuse is ongoing. Acute management of trauma is only a part of the larger problem and interpersonal dysfunction. If the abuser receives counseling and treatment, the outcome can be good; without it, there is a great risk of continued or worsening abuse. Abuse is associated with poorer general and sexual health for the victim. In one study, more than half of the women who were abused had

experienced common physical complaints during the previous 12 months compared with one-third of the nonabused.

MISCELLANEOUS

Pregnancy Considerations: Of pregnant women, 10%–20% report physical abuse during pregnancy. For these women, injuries to the breast and abdomen are more frequent. The dangers of physical violence during pregnancy may include:

- Stillbirth
- Pelvic fracture
- Placental abruption
- Fetal injury
- Preterm delivery
- Low birth weight

ICD-10-CM Codes: T74.11XA, T76.11XA (Adult physical abuse, confirmed, initial encounter; Adult physical abuse, suspected, initial encounter), T74.91XA, T76.91XA (Unspecified adult maltreatment, confirmed, initial encounter; Unspecified adult maltreatment, suspected, initial encounter).

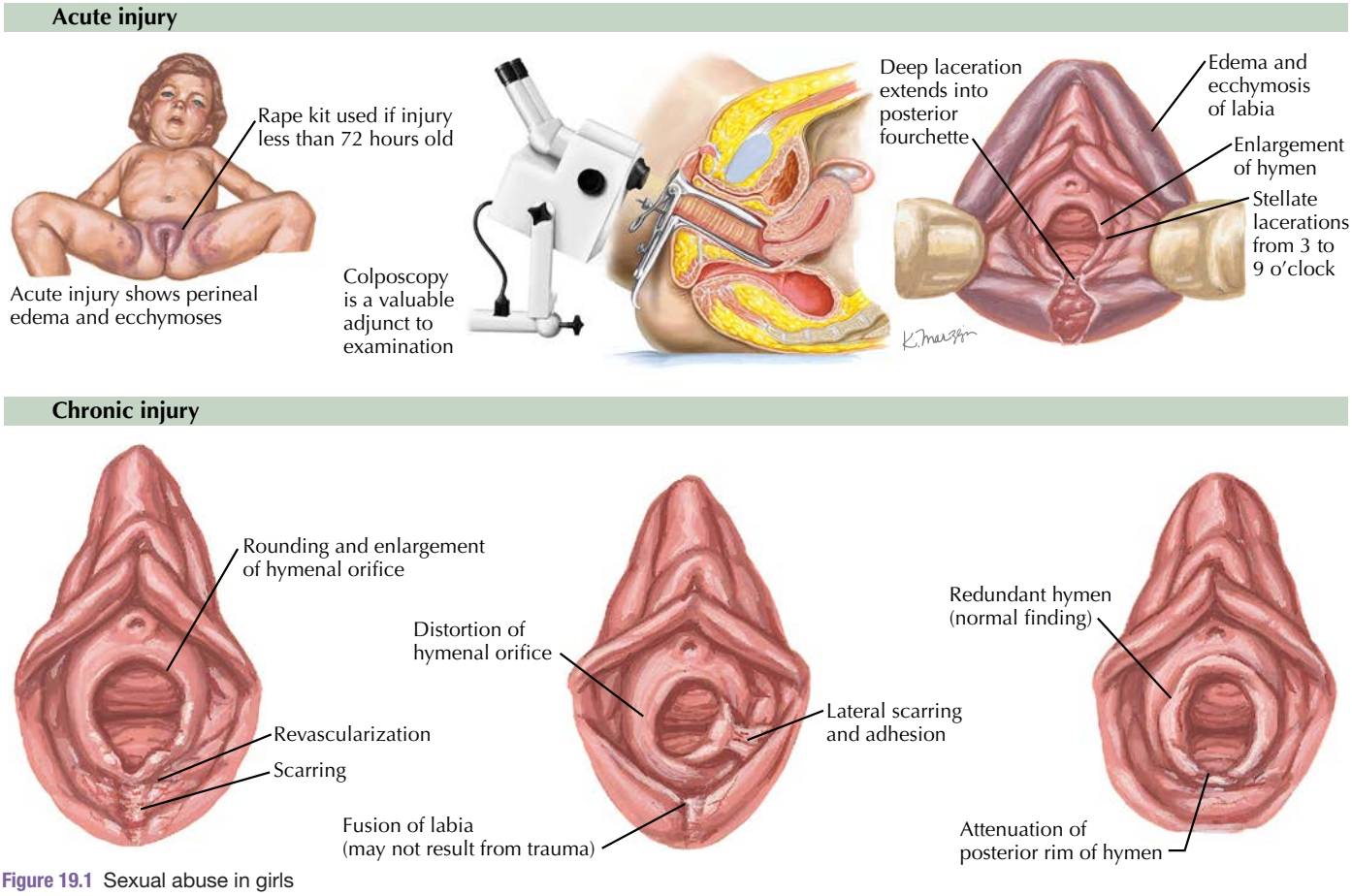

Figure 19.1 Sexual abuse in girls

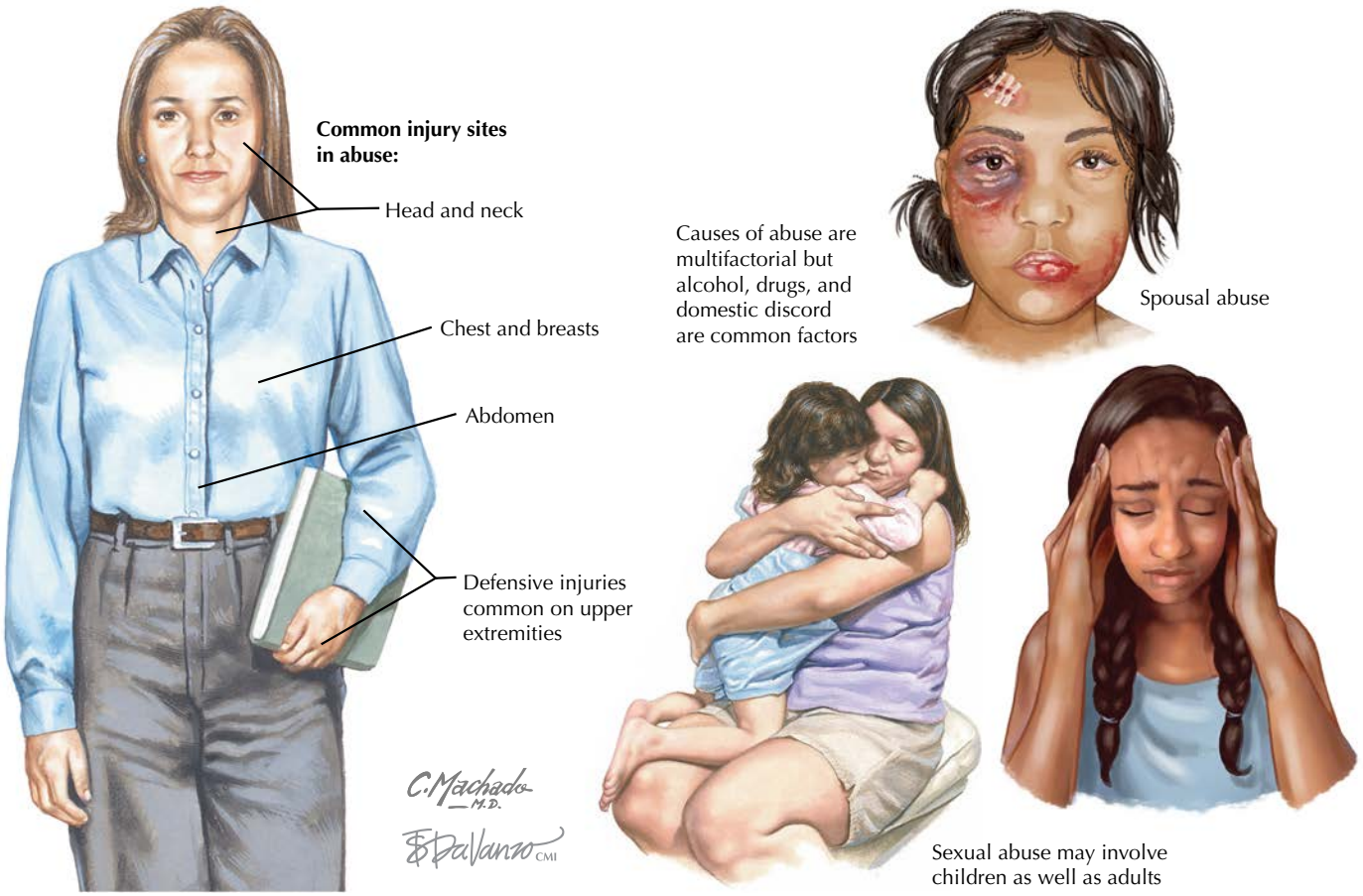

Figure 19.2 Physical and sexual abuse

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20 ACNE

INTRODUCTION

Description: Acne is an inflammatory disorder of the sebaceous glands that results in comedones, papules, inflammatory pustules, and scarring. The significance of acne often exceeds that dictated by medical considerations. For a woman, it is often a reason to either choose or discontinue the use of oral contraceptives. Acne, or the fear of it, is a major factor in poor compliance with oral contraceptives.
Prevalence: Most adolescents; 15% seek care. (Eighth most common disease and most common skin disease worldwide).
Predominant Age: Early teens to 20s; may persist into 40s (4%).
Genetics: A genetic predisposition may be present in as many as 80% of cases. The genetics of acne susceptibility is likely polygenic as the disease does not follow a classic mendelian inheritance pattern. Women generally have milder forms of acne than men, although the social consequences are often greater.

ETIOLOGY AND PATHOGENESIS

Causes: Increased turnover of keratin in sebaceous glands under the influence of androgens. This results in a keratin plug (comedone) that obstructs sebum drainage from the gland. Infection by *Propionibacterium acnes* results in inflammation and pustule formation.
Risk Factors: Increased androgen of adolescence, oily cosmetics or moisturizers, virilizing conditions, medications (oral contraceptives, iodides, bromides, lithium, phenytoins, corticosteroids), and poor local hygiene. Cigarette smoking increases the risk of developing acne and worsens its severity.

SIGNS AND SYMPTOMS

- Closed comedones (whiteheads)
- Open comedones (blackheads; black because of oxidation of sebum)
- Nodules and papules
- Pustules and cysts, with or without erythema and edema, may result in scarring (most extensive in severe nodular acne)
- Most lesions concentrated over the forehead, cheeks, nose, upper back, and chest

DIAGNOSTIC APPROACH

Differential Diagnosis

- Chemical exposure (grease, oils, tars)
- Dermatologic conditions (angiofibromas, folliculitis, keratosis pilaris, perioral dermatitis, rosacea)
- Steroid acne
- Virilizing conditions (such as polycystic ovary syndrome, congenital adrenal hyperplasia, and androgen-secreting tumors)

Concerns: Acne may serve as a surrogate for other issues with sexual development, menstruation, and contraception.
Associated Conditions: Social or emotional withdrawal.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated.
Special Tests: None indicated.
Diagnostic Procedures: History and physical examination. Several scales exist to grade severity, but none has been universally accepted.

Pathologic Findings

Increased oiliness of the skin, increased skin thickness with hypertrophic sebaceous glands, perifolliculitis, and scarring.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: General hygiene, nail clipping (to reduce secondary trauma and infections), twice-a-day cleansing with a mild soap, oil-free sunscreens. In general, at least 2 to 3 months of consistent adherence to a treatment regimen is necessary to assess efficacy.
Specific Measures: Comedone extraction (with extractor), topical medical therapy. Light-based treatment modalities have limited experimental support and have generally fallen out of use due to cost and low efficacy. There may, however, be a role in the treatment of post-acne scaring.
Diet: No specific dietary changes indicated. (None has been demonstrated to be effective, and diet is not considered to play a role in causation.)
Activity: No restriction.
Patient Education: General hygiene measures, need for long-term treatment.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Birth Control - Especially for Teens, 2018
- Combined Hormonal Birth Control - Pill, Patch, and Ring, 2020
- Your Changing Body - Puberty in Girls, 2018

Drug(s) of Choice

- Azelaic acid, 15% or 20% concentration gel, applied topically twice daily (more expensive than retinoids)
- Benzoyl peroxide 5% applied to skin every night (does not create bacterial resistance)
- Tretinoin (retinoic acid) 0.025% cream applied to skin every night (applying 30 minutes after washing reduces side effects). Topical salicylic acid is an alternative comedolytic agent for patients who cannot tolerate or cannot obtain a topical retinoid.
- Topical antibiotics: erythromycin, clindamycin (2%) in water base
- Systemic antibiotics: tetracycline 250 mg PO four times daily for 7–10 days then tapering to lowest effective dose, erythromycin 250 mg PO four times daily for 7–10 days then tapering to lowest effective dose
- Oral contraceptives (reduce androgen production by the ovaries)

Contraindications: Known or suspected allergy, hepatic dysfunction for oral agents, pregnancy (tetracycline and isotretinoin).
Precautions: Tetracycline and benzoyl peroxide may cause photosensitivity.
Interactions: Tetracycline should not be given with antacids, dairy products, or iron. Erythromycin should not be given with terfenadine

(Seldane) and astemizole because it may cause cardiac abnormalities, including arrhythmias and death. Broad-spectrum antibiotics may (theoretically) interfere with oral contraceptive efficacy.

Alternative Drugs

- Tretinoin (retinoic acid) 0.025% gel applied on chest or back every night.
- Isotretinoin (Accutane) 0.5–1 mg/kg/day in two doses for 12–16 weeks with a second course possible after an 8-week interval (associated with significant side effects, including dry skin, dryness of the mucous membranes, and cheilitis).

FOLLOW-UP

Patient Monitoring: Periodic follow-up (monthly) until control is obtained. For patients receiving isotretinoin, liver function, lipid concentrations, and the possibility of pregnancy should be monitored.

Prevention/Avoidance: None. Daily use of sunscreen and/or sun-protective clothing recommended.

Possible Complications: Scarring, hypopigmentation or hyperpigmentation, keloidal scarring on the sternum or shoulders.

Expected Outcome: Gradual improvement over time and with therapy.

MISCELLANEOUS

Pregnancy Considerations: Pregnancy may cause a flare-up or remission of acne. Isotretinoin, tetracycline, and erythromycin should not be used during pregnancy.

ICD-10-CM Codes: L70.0 (Acne Vulgaris).

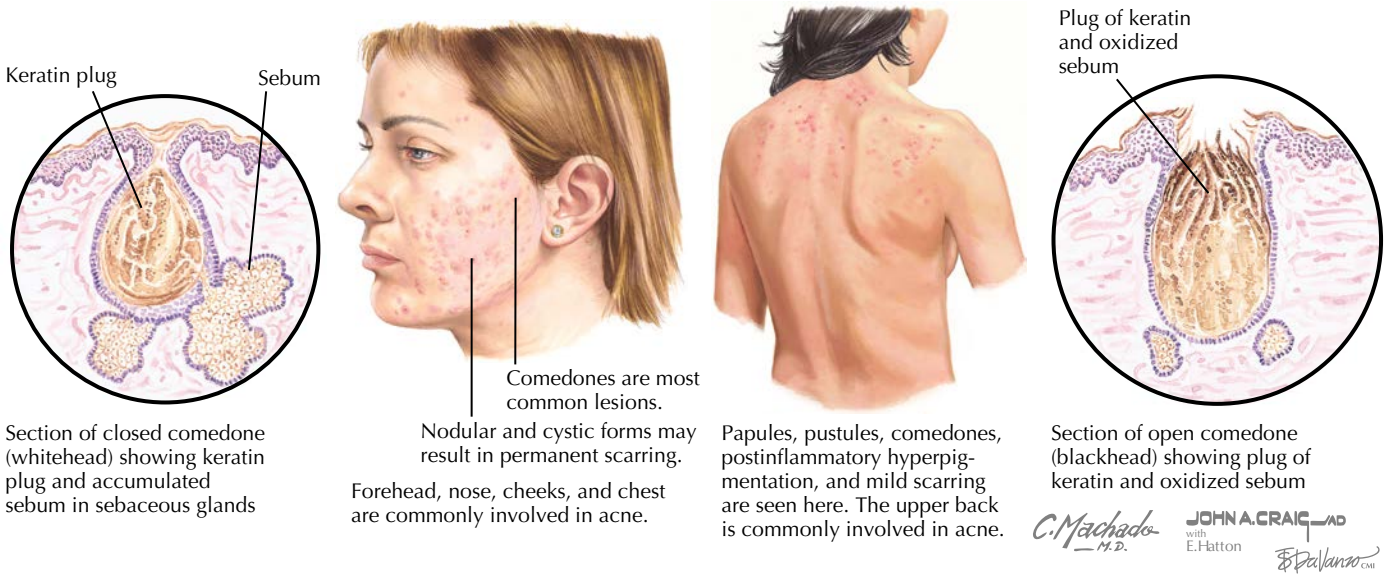

Figure 20.1 Acne vulgaris

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21 ALCOHOL ABUSE IN WOMEN

INTRODUCTION

Description: Alcohol abuse and other substance use disorders are significant, underdiagnosed health problems for women and carry high costs for individuals and society. Compared with men, alcohol abuse by women has a disproportionate effect on their health and lives, including reproductive function and pregnancy outcomes. The National Institute on Alcohol Abuse and Alcoholism defines at-risk alcohol use for healthy women as more than three drinks per occasion (Box 21.1), more than seven drinks per week, or any amount of drinking for women who are pregnant or at risk of pregnancy. Moderate drinking is defined as one drink per day, but 50% of binge drinking occurs among otherwise moderate drinkers.

Prevalence: Alcohol use disorders are the most prevalent of all substance use disorders worldwide: American Indian and Alaska Native women (13.7%), White non-Hispanic women (5.6%), Black non-Hispanic women (3.5%), and Hispanic or Latino women (3.8%). Over 25% of individuals aged 18–24 years report binge drinking. Among women aged 18–34 years who binge drink, 31.4% report drinking eight or more drinks per occasion. Alcohol-related mortality is the third leading cause of preventable death for women in the United States.

Predominant Age: Not age specific, most common from teens to early 30s.

Genetics: Estimated 50% of the vulnerabilities related to alcohol use disorder are genetic.

ETIOLOGY AND PATHOGENESIS

Causes: Excessive and frequent use of alcohol.

Risk Factors: Male gender, age 18–29, Native American and White ethnicity, significant disability, other substance use disorder, mood disorder (eg, major depression, bipolar disorder), personality disorder (eg, borderline or antisocial personality). (Higher than average rates of alcohol use disorder also have been reported among transgender populations.)

CLINICAL CHARACTERISTICS

Signs and Symptoms

- History of >3 drinks per occasion, >7 drinks per week, or drinking any amount during pregnancy
- Alcohol withdrawal (tremor, agitation, clouding of the sensorium)
- Anxiety, depression, suicidality
- Bone marrow suppression
- Cardiac symptoms
- Central or peripheral neurologic symptoms
- Comorbid substance-use disorders
- Electrolyte disturbance
- Gastrointestinal symptoms, including reflux
- Hypertension
- Increased liver enzymes, including elevated γ-glutamyl transpeptidase
- Macrocytosis
- Malignancies of various organ systems (eg, oropharynx, gastrointestinal, breast)
- Sleep disturbance
- Social or legal problems
- Trauma or injury

Box 21.1 Standard Drink

One standard drink is equal to 15 mL of pure ethanol
- Beer or wine cooler: 12 oz
- Table wine: 5 oz (25-oz bottle = 5 drinks)
- Malt liquor: 8–9 oz (12-oz can = 1.5 drink)
- 80-Proof spirits: 1.5 oz (a mixed drink may contain 1–3 or more drinks)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Drug or other substance use disorders
- Depression or anxiety disorders
- Post-traumatic stress disorder
- Eating disorders
- Sleep disorders

Associated Conditions: Breast cancer (women who drink 2–5 drinks per day have up to a 41% increased incidence of breast cancer; the risk increases linearly with consumption), brain, heart, pancreatic, and liver damage/dysfunction (acute and chronic), sexually transmitted diseases, menstrual disorders, reduced fertility, trauma/injury, seizures, malnutrition.

Obstetric: Fetal alcohol syndrome (central nervous system abnormalities, growth defects, facial dysmorphia, neurobehavioral defects, impaired intellectual development), fetal loss, preterm birth, unplanned pregnancy.

Psychosocial: Depression and suicide, domestic violence, sexual assault, altered judgment, disruption of work or personal relations, child neglect or abuse, and loss of child custody.

Workup and Evaluation

Laboratory: There are no specific markers for alcohol use or use disorders. Assessment of hemoglobin, complete blood count, or hepatic and other functions as indicated by degree of use or signs of dysfunction.

Imaging: No imaging is indicated.

Special Tests: History and screening test such as TACE with additional questions about the quantity and frequency of alcohol use (Box 21.2). The CAGE mnemonic screening tool has not proved to be sensitive for women and minorities.

Diagnostic Procedures: Women who use alcohol at risk levels have no signs on physical examination. A detailed history remains the most sensitive means of detecting alcohol abuse. All women should be screened for alcohol use at least yearly and within the first trimester of pregnancy. Routine screening should be applied equally to all patients, regardless of age, race, ethnicity, or socioeconomic status. This screening can be accomplished by way of validated questionnaires or conversations with patients.

Pathologic Findings

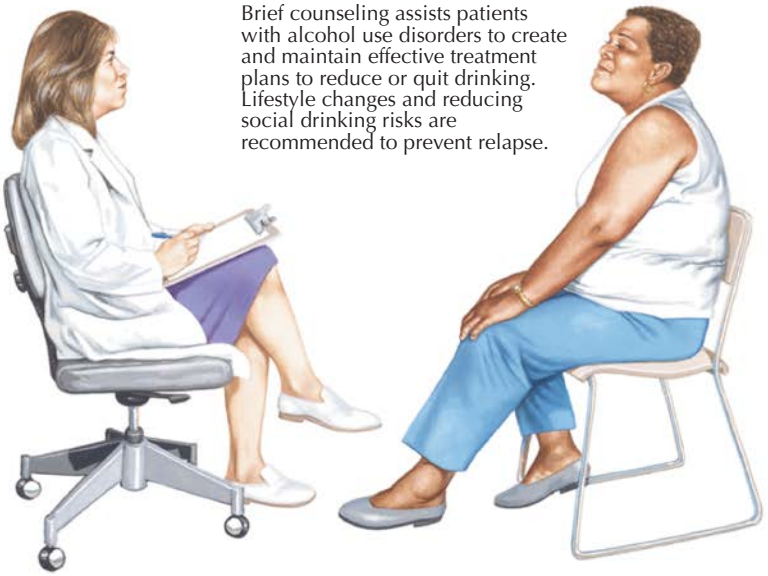
Hepatic cirrhosis or injury may be typical but is not pathognomonic.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: The provider should be familiar with resources available through their local hospital, community, or state to refer patients appropriately and effectively for treatment. For women who are not physically addicted to alcohol, brief intervention and

Alcohol use disorders are common and treatable. All patients should be routinely screened with evidence-based assessments, such as the 3-item AUDIT-C and offered medical assistance for positive screening.



Brief counseling assists patients with alcohol use disorders to create and maintain effective treatment plans to reduce or quit drinking. Lifestyle changes and reducing social drinking risks are recommended to prevent relapse.

Patients who actively use mutual support groups (Alcoholics Anonymous or SMART Recovery) in addition to professional help improve their chances of achieving and sustaining recovery from alcohol use disorders.

Patients with alcohol dependence are encouraged to use medication therapies to assist efforts to stop drinking; these include naltrexone, acamprosate, and disulfiram.

Figure 21.1 Alcohol abuse in women

Box 21.2 TACE Screening Tool

- **T**: Tolerance (How many drinks does it take to make you feel high? More than 2 drinks = 2 points)
- **A**: Annoyed (Have people annoyed you by criticizing your drinking? Yes = 1 point)
- **C**: Cut down (Have you ever felt you ought to cut down on your drinking? Yes = 1 point)
- **E**: Eye-opener (Have you ever had a drink first thing in the morning to steady your nerves or get rid of a hangover? Yes = 1 point)

A total score of 2 points or more indicates a positive screening for at-risk drinking.

Reused with permission from Sokol RJ, Martier SS, Ager JW. The T-ACE questions: practical prenatal detection of risk-drinking. *Am J Obstet Gynecol.* 1989;160(4):863–868; discussion 868–870. https://doi.org/10.1016/0002-9378(8990302-5. PMID: 2712118.

motivational interviewing can be effective and incorporated into an office visit. For pregnant women and those at risk of pregnancy, it is important to give compelling and clear advice to avoid alcohol use, help with achieving abstinence, or provide effective contraception if needed.

Specific Measures: Evaluation for the potential of alcohol withdrawal or symptoms of alcohol withdrawal is important. These must be dealt with prior to any long-term treatment planning.

- Psychosocial interventions are effective; however, as many as 70% of individuals return to heavy drinking after psychosocial treatment alone. Referral for specialist treatment may be appropriate for those with alcohol abuse or dependence.
- For patients with moderate to severe use disorders, treatment with medication combined with structured, evidence-based psychosocial interventions is most effective.

Diet: Restore adequate nutrition (calories and protein), multivitamin formulations (containing thiamine 100 mg, pyridoxine 2 mg, and folic acid 400 mcg to 1 mg), vitamin B_1 (thiamine).

Activity: No restriction, activity encouraged.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Alcohol and Women, 2015,
- Tobacco, Alcohol, Drugs, and Pregnancy, 2020.

Drug(s) of Choice

- Naltrexone 50 mg once daily; may increase to 100 mg once daily after 1 week based on response and tolerability.
- Acamprosate 666 mg three times daily, reduced for those <60 kg or with renal impairment.
- Gabapentin therapy may provide some benefit in patients with alcohol use disorders and a history of alcohol withdrawal symptoms.

Contraindications: Naltrexone: Hypersensitivity to naltrexone or any component; current physiologic opioid dependence or current use of opioid analgesics (including partial opioid agonists); acute opioid withdrawal. Acamprosate: Hypersensitivity to acamprosate or any component; severe renal impairment.
Precautions: Naltrexone is not recommended for patients currently taking opioids or with acute hepatitis, liver enzymes ≥3–5 times normal, or liver failure. Watch for the emergency of suicidal thoughts/depression.
Alternate Therapies: Disulfiram loading dose 250–500 mg PO once daily for 1–2 weeks followed by maintenance dose of 250 mg PO once daily (range: 125–500 mg/day). Topiramate 25 mg PO once daily, increased by 25 mg per week for 4 weeks, then increase by 50 mg per week to maximum dose of 300 mg per day as tolerated. (Daily doses >50 mg are administered in divided doses.)

FOLLOW-UP

Patient Monitoring: Frequent follow-up and support along with normal health maintenance.
Prevention/Avoidance: Abstinence (primary treatment goal) or use in moderation, substitutions with nonalcoholic beer or soft drinks.
Possible Complications: Progressive organ injury (hepatic, cardiac, pancreatic, brain), increased risk of cancer (breast, esophageal), interpersonal and social isolation. Adverse pregnancy outcomes.
Expected Outcome: Good with supportive care and behavioral change.

MISCELLANEOUS

Pregnancy Considerations: Significant impact on pregnancy: Fetal alcohol syndrome (central nervous system abnormalities, growth defects, facial dysmorphia, neurobehavioral defects, impaired intellectual development), fetal loss, preterm birth, unplanned pregnancy.
- Alcohol consumption does not enhance lactational performance and is associated with altered postnatal growth, abnormal sleep patterns, and psychomotor development in the infant.

ICD-10-CM Codes: F10.1 (Alcohol abuse), F10.10 (Alcohol abuse, uncomplicated), F10.19 (Alcohol abuse with unspecified alcohol-induced disorder), Z71.4 (Alcohol abuse counseling and surveillance), F10.2 (Alcohol dependence)
CPT Codes: 99408 (Alcohol abuse structured screening and brief intervention services; 15 to 30 minutes) and 99409 (greater than 30 minutes) for screening and brief intervention services for patients without Medicare. These are only reportable for structured screening using a validated screening tool, such as TACE, and brief intervention.

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ALZHEIMER DISEASE

22

INTRODUCTION

Description: Alzheimer disease is a degenerative organic mental syndrome that is characterized by progressive intellectual deterioration and dementia. It is the most common form of dementia (60%–70%).

Prevalence: More than 55 million people live with dementia worldwide; roughly 47 million of whom have Alzheimer symptoms or findings. This figure is projected to rise to 13.8 million in the United States and >130 million worldwide by 2050. Alzheimer disease affects 6% of people aged 65 years and older and 40% of people older than 85 years, with 121,499 deaths per year (2019). Sixth-leading cause of death in the United States.

Predominant Age: Older than 65 years.

Genetics: 2- to 3-fold more common in women (due to differences in life expectancy), increased familial risk (70% of patients). Markers have been found on chromosomes 1 and 14 for early onset (autosomal dominant inheritance pattern) and 12 and 19 for late onset.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown but associated with misfolded proteins and plaque formation (amyloid β peptides containing 42 amino acids). Proposed causes include genetic alteration in amyloid production or metabolism (1%–5%), slow virus, aluminum exposure, accelerated aging, and autoimmune process.

Risk Factors: Aging, head trauma, Down syndrome, and family history. An association with depression and hypertension also has been proposed.

SIGNS AND SYMPTOMS

- Loss of mental function (calculation, abstraction, memory, aphasia)
- Social withdrawal (anhedonia, apathy, personality change, anxiety, depression)
- Delusions and confabulation
- Dementia
- Sleep disturbances and restlessness
- Behavioral change (aphasia, disorientation, disinhibition, violence, or passivity)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Dementia (vascular, infarct, Parkinson disease)
- Multiple sclerosis
- Brain tumor (primary or metastatic)
- Alcohol or drug use/abuse
- Drug reaction
- Depression
- Hepatic or renal failure leading to toxicity
- Neurosyphilis
- Hypothyroidism

Associated Conditions: Down syndrome, depression, and insomnia.

Workup and Evaluation

Laboratory: Screening to rule out other causes as indicated.

Imaging: Computed tomography (CT) or magnetic resonance imaging (MRI) may show characteristic changes but are not required to make a diagnosis.

Special Tests: Spinal tap as indicated by the diagnoses being considered. Special paper and pencil tests are available to help with the assessment of cognitive function.

Diagnostic Procedures: History and clinical characteristics.

Pathologic Findings

β-Amyloid deposits in neuritic plaques and on arteriolar walls characterize the disease. Pyramidal cell loss, decreased cholinergic innervation, and neuritic senile plaques and neurofibrillary tangles are also observed.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Support, exercise to reduce restlessness and improve sleep, continued cognitive challenge, and family support.

Specific Measures: Estrogen replacement is associated with a 50% reduction in risk and a delay in the onset of symptoms in some studies, although more recent studies do not confirm these findings. For those with Alzheimer changes, estrogen replacement near the time of menopause appears to improve function; late replacement (as in the Women's Health Initiative study) does not.

Diet: No specific dietary changes indicated.

Activity: No restriction except those imposed by ability.

Patient Education: Reassurance. Extensive educational materials are available from support groups, Internet sites, and the Alzheimer's Association (Chicago).

Drug(s) of Choice

- Acetylcholinesterase inhibitors (tacrine, rivastigmine, galantamine, and donepezil) and NMDA receptor antagonist (memantine) are used, but benefits are small.
- Only donepezil is approved for treatment of advanced dementia.
- Aducanumab (a recombinant monoclonal antibody directed against amyloid β) is approved for mild Alzheimer disease, but its use in controversial and its effects limited.
- Drugs may be used to improve specific manifestations such as insomnia or depression.

Contraindications: Avoid anticholinergic drugs such as tricyclic antidepressants and antihistamines.

Precautions: Tacrine (Cognex) may cause liver toxicity. Benzodiazepines may produce paradoxical excitation. Triazolam (Halcion) can produce memory loss, confusion, or psychotic reactions. Care must be taken in the use of all drugs in these patients as they tend to tolerate them poorly and confusion may lead to dosing errors.

Alternate Therapies: Ginkgo biloba has shown some promise but limited clinical studies have not supported its use. Antioxidant treatments such as vitamin E (alpha-tocopherol) and selegiline (a monoamine oxidase inhibitor) have been studied but have limited effects.

FOLLOW-UP

Patient Monitoring: Watch for problems with nutrition, further mental deterioration, and drug use. Provide continuing and aggressive family support. Periodically evaluate the need for nursing home placement or other assistance.

Prevention/Avoidance: None. Some data suggest that remaining intellectually active (games or puzzles), physical activity, and social interaction may reduce the risk or delay the onset.

Possible Complications: Progressive deterioration with metabolic changes, dehydration, drug overdose, falls, depression, and suicide.

Expected Outcome: Poor—progressive deterioration with 3- to 9-year average survival.

MISCELLANEOUS

ICD-10-CM Codes: G30.9 (Alzheimer disease, unspecified), F03.90 (Unspecified dementia without behavioral disturbance).

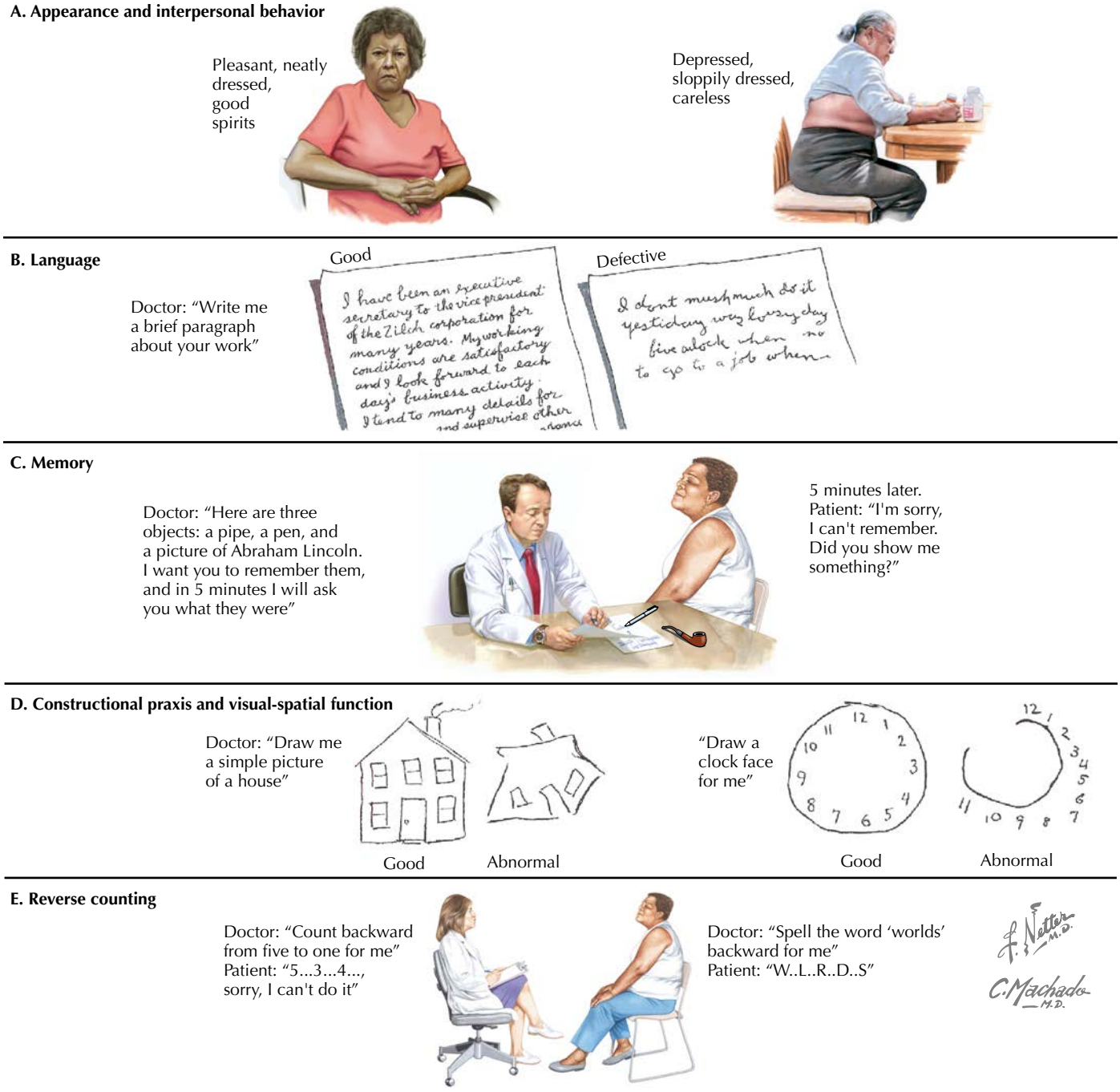

Figure 22.1 Testing for defects of higher cortical function

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ANAL INCONTINENCE

23

INTRODUCTION

Description: Anal incontinence is the recurrent involuntary passage of solid or liquid fecal material or flatus. Anal incontinence may be further divided into urge incontinence (incontinence occurs despite efforts to retain stool) and passive (the lack of awareness before the incontinent episode). Anal incontinence can result from damage or dysfunction of the anal sphincters, abnormal rectal compliance, decreased rectal sensation, altered stool consistency, or a combination of these.

Prevalence: Between 7% and 15% of the population (>5.5 million Americans), up to 43% of acutely ill hospital patients and 70% of nursing home populations. It is the leading cause of admission to nursing homes. Women are affected at rates that are slightly higher than those for men (primarily due to increased life expectancy and obstetric trauma).

Predominant Age: Incidence increases with age (2.6% adults aged 20–29 years, 15.3% adults aged ≥70 years)

Genetics: No genetic predisposition.

ETIOLOGY AND PATHOGENESIS

Causes: Normal sphincters and pelvic floor; diarrhea, infection, inflammatory bowel disease; anatomic derangements and rectal disease—congenital abnormalities, fistula, rectal prolapse, anorectal trauma (including obstetric), surgery (hemorrhoidectomy), Crohn disease; neurologic disease—central disease (dementia, sedation, stroke, brain tumor, spinal cord lesions, multiple sclerosis, tabes dorsalis, back surgery), peripheral disease (cauda equina lesions, polyneuropathies, diabetes mellitus, Shy-Drager syndrome, toxic or traumatic neuropathy, fecal impaction, delayed-sensation syndrome); skeletal muscle disease—myasthenia gravis, muscular dystrophy, smooth muscle dysfunction; proctitis (inflammatory bowel disease)—radiation proctitis, rectal ischemia, fecal retention or impaction, internal sphincter weakness, diabetes mellitus. Multiple factors may exist at the same time.

Risk Factors: Traumatic injury (anal surgery, obstetric lacerations, operative vaginal delivery, high-birthweight infant, a long second stage of labor, and occipitoposterior presentation of the fetus, anal intercourse), neurologic disease, infectious or other diarrhea, irritable bowel syndrome, older age, diabetes mellitus, postmenopausal hormone therapy. Medications such as metformin, antibiotics, antacids, laxatives, and proton pump inhibitors increase the risk.

SIGNS AND SYMPTOMS

- Variable large, uncontrolled, loose bowel movement
- Involuntary loss of stool or flatus
- Fecal staining of undergarments

DIAGNOSTIC APPROACH

Differential Diagnosis

- Discharge of mucus or blood
- Behavioral (psychogenic, acting out)

Associated Conditions: Anal pruritus, vulvitis, urinary tract infection, social ostracization, impaired quality of life, loss of the ability to live independently.

Workup and Evaluation

Laboratory: In patients with diarrhea; stool studies to determine the etiology. Other studies based upon the diagnosis under consideration.

Imaging: Endorectal ultrasonography. Magnetic resonance imaging (MRI) is the optimal way of assessing the integrity of the internal anal sphincter. Defecography adds little to treatment planning.

Special Tests: Voluntary squeeze, anal wink, anal manometry.

Diagnostic Procedures: History and clinical characteristics. (Note: Because of the stigma often associated with anal incontinence,

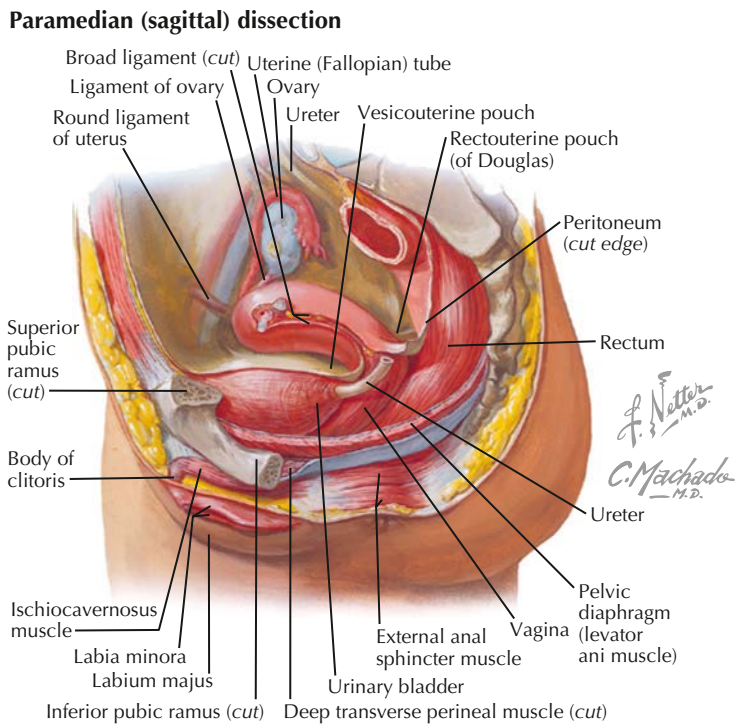

Figure 23.1 Structure of the anal sphincter and support for the rectum

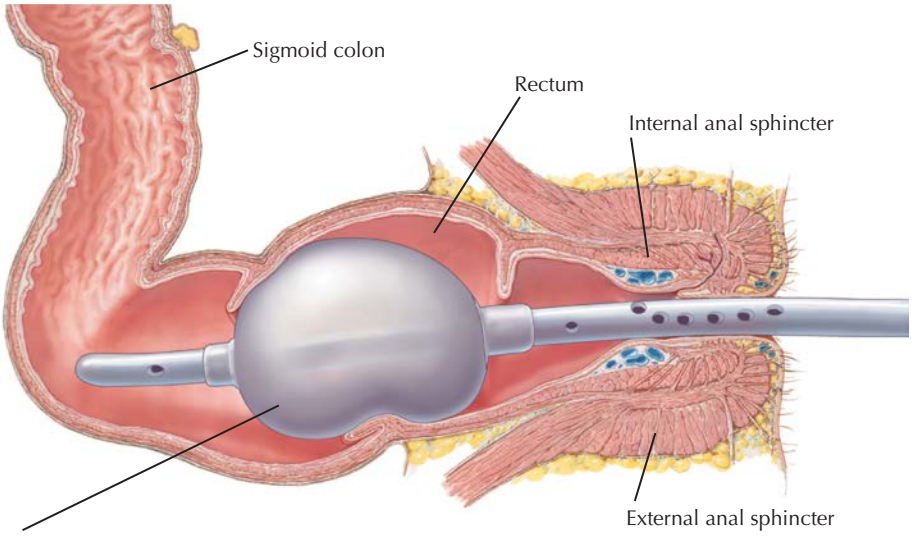

Figure 23.2 Anal manometry

patients are reluctant to disclose symptoms until late in the process. Hence, inquiry and screening should be a part or the routine review of symptoms.) Physical examination of the anus and perianal region. (The "dovetail" sign—loss of the normal puckering around the anus anteriorly—suggests disruption of the external sphincter.) Endoscopy may be used to evaluate the internal sphincter.

Pathologic Findings

Only those specific to the underlying cause.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Supportive care, perianal skin care. Antidiarrheal medications (if needed), stool softening/bulking agents. Application of a barrier cream (eg, zinc oxide) to the perianal skin.

Specific Measures: Biofeedback (bowel training), neuromodulation, sphincteroplasty, vaginal pessaries or occluding devices, anal bulking agents (limited duration of effect), diverting colostomy (last resort).

Diet: Increase dietary fiber; avoidance of irritants, incompletely digested sugars (eg, fructose, lactose), and caffeine.

Activity: No restriction except those imposed by ability.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Accidental Bowel Leakage, 2021.

Drug(s) of Choice

In the absence of diarrheal symptoms, no specific medication has been proven to be of benefit.

Alternate Therapies: Bismuth subsalicylate or bile acid binders (eg, cholestyramine) may be useful adjuncts for patients who do not have an adequate response to antidiarrheal agents such as loperamide.

FOLLOW-UP

Patient Monitoring: Frequent follow-up and symptom review.

Prevention/Avoidance: The preservation of anal continence should not be used as a criterion for choosing elective primary cesarean delivery.

Possible Complications: Progressively worsening symptoms, perianal skin breakdown and infection, urinary tract infections, vulvitis.

Expected Outcome: Based upon underlying cause; neurologic disease has a generally poor prognosis, whereas sphincter damage generally responds well to biofeedback and surgical modalities.

MISCELLANEOUS

ICD-10-CM Codes: R15 (Fecal incontinence), R15.9 (Full incontinence of feces), K62.81 (Anal sphincter tear, healed)

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24 ANEMIA

INTRODUCTION

Description: Anemia is the reduction (ie, below normal) in the oxygen-carrying capacity of the blood as reflected by the hemoglobin or hematocrit values. Women are at a higher risk because of menstrual blood loss and the iron demands of pregnancy and delivery.

Prevalence: Approximately 20%–30% of women; 50%–60% of pregnant women. (The prevalence of anemia in pregnancy in non-Hispanic Black women [35.38/1000] is 2-fold higher than that of non-Hispanic Whites [18.02/1000]). Anemia, the most common hematologic abnormality

Predominant Age: Reproductive age is the most common for women. Risk increases with age.

Genetics: Hemoglobinopathies, such as sickle cell disease and thalassemia, are associated with anemia.

ETIOLOGY AND PATHOGENESIS

Causes: Abnormalities of production (eg, iron deficiency, chronic disease, cancer, chemotherapy, radiation, and vitamin B_{12} deficiency). Abnormalities of destruction or loss (eg, hemorrhage, hemolysis, and sickle cell disease).

Risk Factors: Excessive blood loss (menorrhagia), poor diet, pica, malabsorption, chronic disease, endocrinopathy (thyroid). Smokers have slightly higher hemoglobin values (0.5–1.0 g/dL).

SIGNS AND SYMPTOMS

- Asymptomatic
- Fatigue, palpitations, dyspnea, exhaustion (late signs)
- Ice craving, spooning, or ridging of fingernails (iron deficiency anemia)
- Sore mouth or dysphagia (B_{12} or iron deficiency anemia)
- Joint and bone pain (sickle cell anemia)
- Exercise intolerance, dyspnea
- Beeturia (urine turns red following ingestion of beets—not diagnostic)

DIAGNOSTIC APPROACH

Differential Diagnosis

See Fig. 24.1.

Associated Conditions: Stomatitis, ridging or spooning (koilonychia) of fingernails, hypersegmented polymorphonuclear neutrophils (megaloblastic anemia), restless legs syndrome. Iron deficiency anemia during pregnancy; low birthweight, preterm delivery, perinatal mortality, postpartum depression.

Workup and Evaluation

Laboratory: Mean corpuscular volume, reticulocyte count, blood smear, iron studies, hemoglobin electrophoresis; others based

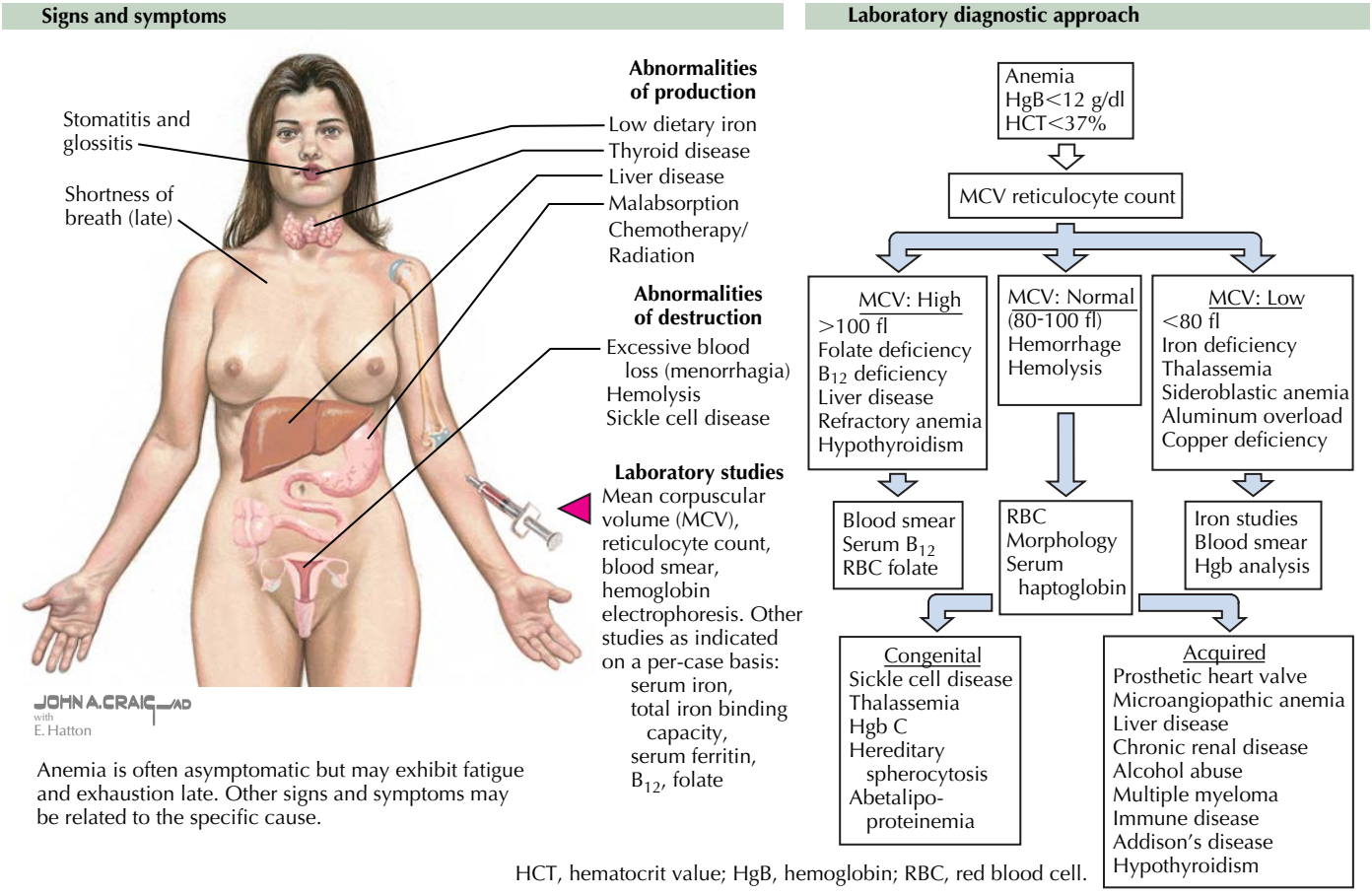

Figure 24.1 Anemia

on individual patient—serum iron, total iron binding capacity, and serum ferritin. Macrocytic anemia may be confirmed by measurement of serum folic acid or vitamin B_{12} (cyanocobalamin) levels. Estimation of glomerular filtration rate (GFR).

Imaging: No imaging indicated.

Special Tests: Bone marrow analysis (not necessary for the majority of patients).

Diagnostic Procedures: Laboratory evaluation.

Pathologic Findings

Based on underlying cause.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, diet counseling, and control of menstrual abnormalities.

Specific Measures: Based on cause.

Diet: Adequate iron (7–12 mg/day) and folate (1–5 mg/day). The recommended daily dietary allowance of ferrous iron during pregnancy is 27 mg and in lactation it is 9 mg.

Activity: No restriction.

Patient Education: Diet counseling.

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Nutrition During Pregnancy, 2020.

Drug(s) of Choice

- Iron supplements (ferrous sulfate 300–350 mg PO three times daily) for 6–12 months or longer. Parenteral iron may be given to patients with severe anemia or to those who do not comply with oral therapy. There is a limited role for erythropoietin.
- For pernicious anemia—vitamin B_{12} 100 mg IM monthly. Treatment of megaloblastic anemia resulting from B_{12} deficiency with folate will reverse anemia, but progressive and irreversible neurologic damage may result. B_{12} levels should always be checked if this is suspected.

Precautions: Anaphylaxis may occur with parenteral iron.

Interactions: Ascorbic acid increases iron absorption.

FOLLOW-UP

Patient Monitoring: Normal health maintenance, periodic evaluation of blood count.

Prevention/Avoidance: Good diet, control of excessive menstrual blood loss.

Possible Complications: Progressive and irreversible neurologic damage may result with untreated vitamin B_{12} deficiency.

Expected Outcome: Generally good response to iron therapy (iron deficiency type).

MISCELLANEOUS

Pregnancy Considerations: Anemia more common in pregnancy. Pregnancy iron demands: Maternal 500 mg, fetal 350 mg, delivery 250 mg.

ICD-10-CM Codes: D64.9 (Anemia, unspecified, others based on cause).

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25 ANORECTAL FISTULA

INTRODUCTION

Description: An anorectal fistula involves communication between the anal or rectal canal and the perineum.
Prevalence: Common. For women, 5.6/100,000 population. The male-to-female ratio is 1.8:1.
Predominant Age: Any. The average age is late 30s to early 40s.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Anorectal fistulae may spontaneously arise or result from the drainage of a perirectal abscess, most commonly an infected anal crypt gland. Patients with anal fistulae should be evaluated for the possibility of inflammatory bowel disease.
Risk Factors: Although Crohn disease and tuberculosis are recognized risk factors, in most patients a predisposing cause is not apparent. Other risk factors include tears, puncture wounds, and internal hemorrhoids. Less commonly, carcinoma, radiotherapy, actinomycoses, tuberculosis, and chlamydial infections increase the risk. Up to 50% of patients with anal abscesses will develop a fistula.

SIGNS AND SYMPTOMS

- Intermittent perineal drainage or discharge
- Perianal lump or mass
- Pain (external sphincter) with defecation
- Anal bleeding
- Skin excoriation
- Most fistulae have the involvement of the posterior midline and origin in the anorectal crypts

DIAGNOSTIC APPROACH

Differential Diagnosis

- Inflammatory bowel disease (Crohn disease)
- Pilonidal sinus
- Perianal or other abscess
- Rectal carcinoma
- Acne inversa
- Bartholin gland abscess

Associated Conditions: Crohn disease

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: If inflammatory bowel disease is suspected, lower gastrointestinal series. Fistulography (accuracy rate, 16%–48%) or magnetic resonance imaging (MRI; the study of choice when evaluating complex fistulae; shown to reduce recurrence rates by identifying unknown extensions). Transrectal ultrasonography has gained some acceptance.
Special Tests: None indicated.
Diagnostic Procedures: History, physical examination, probe of fistulous tract. Anoscopy, proctoscopy, or sigmoidoscopy may be helpful.

Pathologic Findings

Inflammation and granulation change from chronic infection. Tract may be single or multiple. Internal opening is generally within an anal crypt.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, stool softening, and sitz baths.
Specific Measures: The only effective treatment is surgical, often conducted under general or spinal anesthesia in an ambulatory surgery unit. Fistulectomy or fistulotomy should not be performed in the presence of diarrhea or active inflammatory bowel disease.
Diet: High-fiber diet advisable.
Activity: No restriction.
Patient Education: Perianal care and sitz baths.

Drug(s) of Choice

Although the only effective treatment is surgery, the use of stool softeners is often beneficial.

FOLLOW-UP

Patient Monitoring: Close follow-up during postoperative period, routine healthcare thereafter.
Prevention/Avoidance: None.
Possible Complications: Constipation, rectovaginal fistula, recurrence. An increase in the risk for adenocarcinoma has been reported.
Expected Outcome: Healing is generally good after surgical excision, although recurrence resulting from underlying disease is common.

MISCELLANEOUS

Other Notes: Goodsall–Salmon law states that fistulae with an external opening anterior to a plane passing transversely through the center of the anus will follow a straight radial course to the dentate line. Fistulae with their openings posterior to this line will follow a curved course to the posterior midline. Exceptions to this rule are external openings >3 cm from the anal verge, which almost always originate as a primary or secondary tract from the posterior midline, consistent with a previous horseshoe abscess.
Pregnancy Considerations: No effect on pregnancy, although may affect the choice of an episiotomy site, should one be used.
ICD-10-CM Codes: K60.3 (Anal fistula), K60.4 (Rectal fistula), K60.5 (Anorectal fistula).

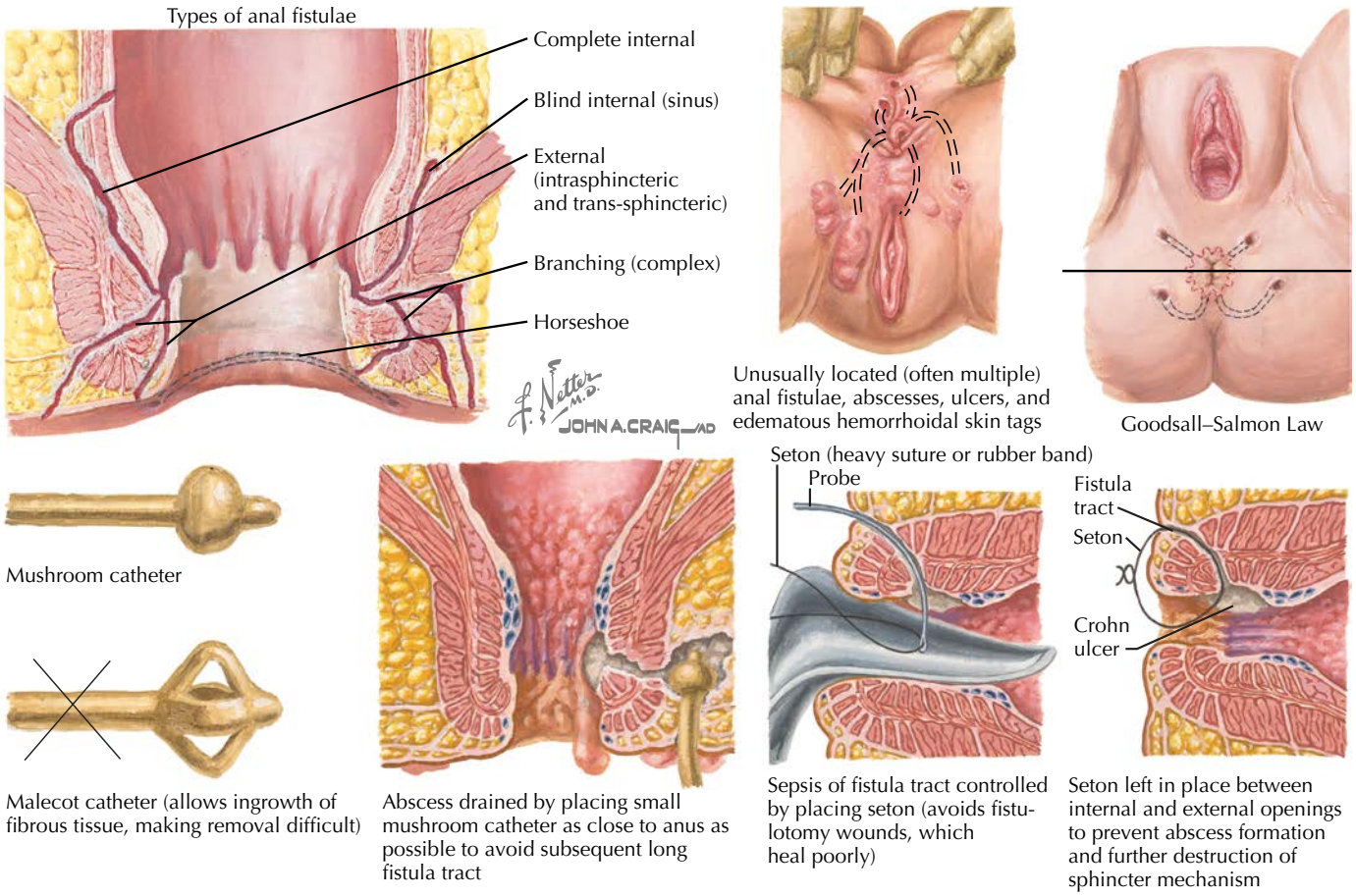

Figure 25.1 Appearance and management of anorectal Crohn disease

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26 ANXIETY

INTRODUCTION

Description: Anxiety is a common acute or chronic emotion that is associated with physical symptoms. It is two to three times more common in women. Subtypes of anxiety include situational anxiety, adjustment disorders, panic disorders, phobias, and post-traumatic stress disorder. Moreover, obsessive–compulsive disorders are often classified in this group.
Prevalence: 18% of women; 40 million Americans.
Predominant Age: 20–45 years.
Genetics: Increased risk of panic disorders within monozygotic twins (data inconsistent). Panic disorder, social phobia, and obsessive–compulsive disorders have a genetic base.

ETIOLOGY AND PATHOGENESIS

Causes: Psychosocial stressors (eg, pregnancy loss or breast cancer), abnormality of neurotransmitter systems (serotonin, norepinephrine, and γ-aminobutyric acid), involving the amygdala and hippocampus.
Risk Factors: Social, family, or financial stress (poverty); medical illness or adverse life event; family history; and a lack of social support network.

SIGNS AND SYMPTOMS (VARY WITH SUBTYPE)

- Unrealistic or excessive worry. (Diagnosis generally requires at least 6 months of excessive and persistent worrying that is hard to control, causes significant distress, and occurs on more days than not.)
- Sense of impending doom
- Nervousness or instability
- Palpitations or tachycardia
- Hyperventilation or sense of suffocation
- Systemic systems (nausea, abdominal pain, paresthesias, diaphoresis, chest tightness, dizziness, muscle tension, headaches, and backaches)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Behavioral/psychiatric (depression, hypochondriasis, panic disorder, adjustment disorder, obsessive–compulsive disorder, separation disorder)
- Cardiovascular (ischemic heart disease, valvular disease, cardiomyopathies, arrhythmias, mitral valve prolapse)
- Respiratory (asthma, emphysema, pulmonary embolism)
- Central nervous system (transient ischemia, psychomotor epilepsy, essential tremor)
- Metabolic (hyperthyroidism, adrenal insufficiency, pheochromocytoma, Cushing syndrome, hypoglycemia, hypokalemia, hyperparathyroidism, myasthenia gravis)
- Nutritional (thiamine, pyridoxine, or folate deficiency)
- Medication/drugs (caffeine, alcohol, cocaine, sympathomimetics, amphetamine)

Associated Conditions: Depression, social phobia, panic disorder, post-traumatic stress disorder, obsessive–compulsive disorder, mitral valve prolapse, irritable bowel syndrome (IBS), agoraphobia, substance abuse, and somatoform disorders.

Workup and Evaluation

Laboratory: No specific evaluation indicated. Tests should be based on the diagnoses being considered (eg, thyroid function studies).
Imaging: No imaging indicated.
Special Tests: None indicated.
Diagnostic Procedures: History and psychologic testing.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and assessment of cause and subtype, screening for substance abuse, counseling, establishing ties to support systems, beginning exercise program, and maintaining frequent follow-up.
Specific Measures: Psychotherapy (cognitive–behavioral therapy), medications.
Diet: No specific dietary changes indicated.
Activity: No restriction. Exercise encouraged.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Alcohol and Women, 2015
- Depression, 2018

Drug(s) of Choice

- Acute anxiety or adjustment disorders—short-term benzodiazepines: alprazolam 0.25 mg two to three times daily, increase in 0.25-mg increments if required.
- Generalized anxiety—Selective serotonin reuptake inhibitors (SSRIs; paroxetine, sertraline, citalopram, and escitalopram first line, fluoxetine and fluvoxamine effective as well) and serotonin-norepinephrine reuptake inhibitors (SNRIs; venlafaxine [extended-release], duloxetine) are the preferred initial pharmacotherapy. For individuals with a partial response to SSRI therapy buspirone 5 mg PO two to three times daily, increased every 2–3 days to a maximum of 60 mg/day, may be added. Selection among agents is based on the side effect profile, drug–drug interactions, patient treatment history.
- Panic disorders and phobias—selective serotonin reuptake inhibitors (SSRIs; fluoxetine [Prozac] 4 mg PO, increased by 4 mg every 5 days to maximum of 40 mg; sertraline [Zoloft] 25 mg PO, increased by 25 mg every 5 days; paroxetine [Paxil] 10 mg PO increased by 10 mg every 5 days).
- Obsessive–compulsive disorders—SSRIs or clomipramine (Anafranil) 25 mg PO two times daily, increased to 250 mg/day.

Contraindications: Benzodiazepines are contraindicated in the first trimester of pregnancy, in patients with acute alcohol intoxication, and in patients with sleep apnea or open-angle glaucoma.
Precautions: All pharmacotherapeutic agents should be titrated upward from a low starting dose at 4- to 6-week intervals. Agents with short half-lives (eg, alprazolam) have a high potential for dependency and withdrawal symptoms. Acute withdrawal may precipitate panic attacks or seizures. Hepatic and renal function should be monitored in patients using benzodiazepines or buspirone. Breastfeeding should be discouraged in women taking chronic or high-dose benzodiazepines.

Interactions: Buspirone should not be used with monoamine oxidase inhibitors (MAOIs).

Alternative Drugs

- Panic disorders and phobias—imipramine (Tofranil) 10–25 mg PO every night, increased by 10–25 mg/day every 2 weeks to a maximum of 300 mg/day in adults and 100 mg/day in adolescents and elderly patients.

FOLLOW-UP

Patient Monitoring: Frequent follow-up, identification and treatment of associated depression, periodic assessment of renal and hepatic function (based on medical therapy chosen).

Prevention/Avoidance: Stress management, relaxation training.

Possible Complications: Social withdrawal or isolation, drug dependence or side effects.

Expected Outcome: Generally good outcome, though it is considered to be a chronic illness with fluctuating symptom severity. (Obsessive–compulsive disorders and post-traumatic stress disorders are more difficult to treat.)

MISCELLANEOUS

Pregnancy Considerations: Medical therapy must be adjusted based on the risk and requirement. Cognitive–behavioral therapy has been suggested as the first-line therapy during pregnancy.

ICD-10-CM Codes: F41.9 (Anxiety disorder, unspecified).

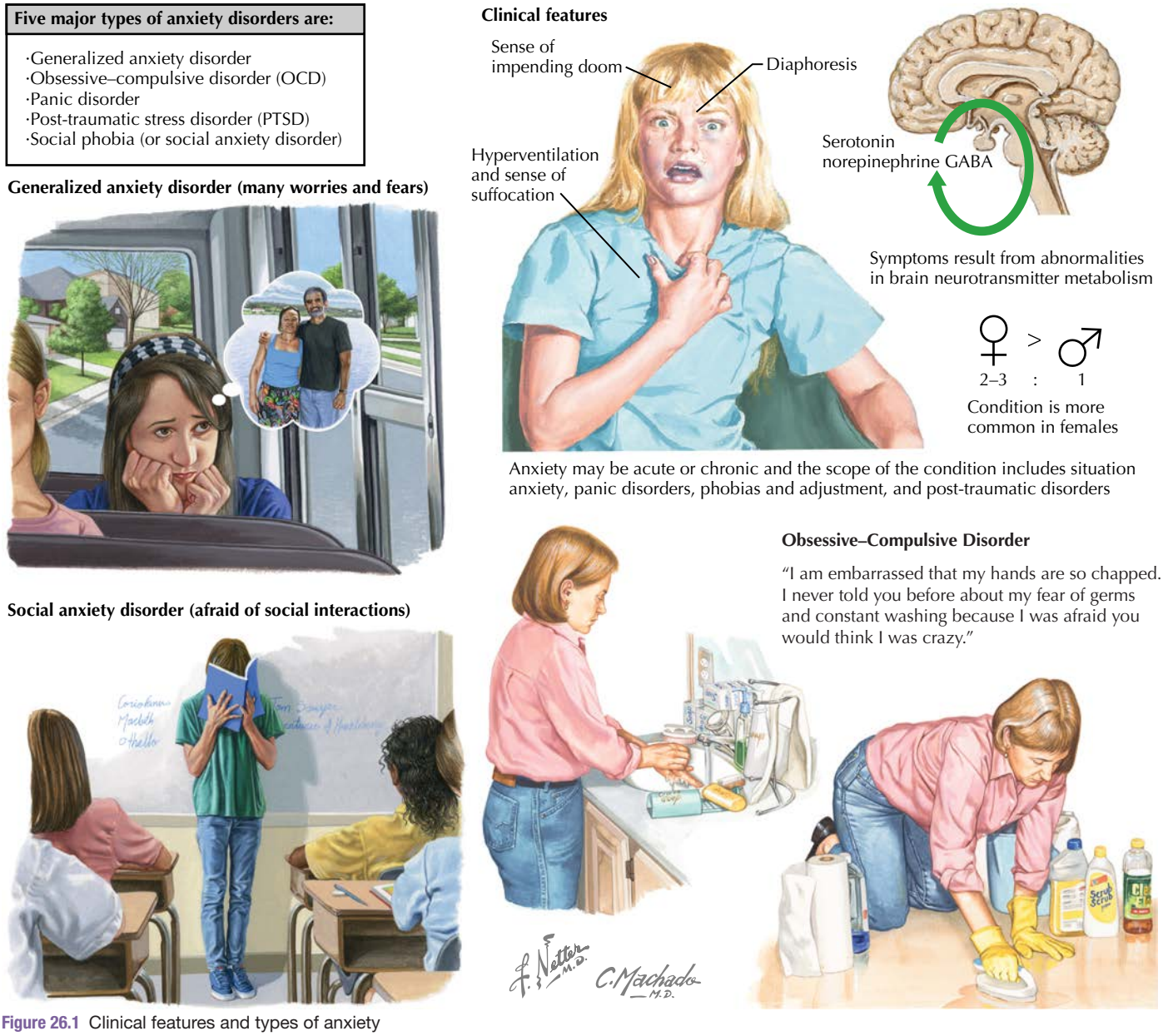

Figure 26.1 Clinical features and types of anxiety

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27 ASTHMA

INTRODUCTION

Description: Asthma (from the Greek for "panting") is an intermittent or chronic obstructive tracheobronchial condition that is characterized by wheezing or cough. Adult-onset asthma is more common in women and poses potential problems during pregnancy.

Prevalence: 7% of the United States population, 4%–8% of pregnancies.

Predominant Age: Adults aged 16–40 years (50% of patients are younger than 10 years).

Genetics: Familial association with reactive airway disease, ectopic dermatitis, and allergic rhinitis.

ETIOLOGY AND PATHOGENESIS

Causes: Allergic factors (airborne pollens, molds, house dust, animal dander, feather pillows; a 2004 study showed that 71% had more than one allergy and 42% had more than three allergies), smoke or pollutants, viral upper respiratory tract infections, aspirin or nonsteroidal antiinflammatory agents, exercise, gastrointestinal reflux.

Risk Factors: Family history and viral pneumonitis in infancy.

SIGNS AND SYMPTOMS

- Shortness of breath
- Wheezing and coughing (one or both)
- Prolonged exhalation
- Decreased breath sounds, hyperresonant chest
- Periodic (especially nocturnal) attacks
- Cyanosis and tachycardia
- Pulsus paradoxus, accessory muscle used for breathing, flattened diaphragm on chest radiograph or physical examination

Symptoms are usually worse at night and in the early morning. Up to 40% of asthmatic women of childbearing age may experience a cyclical exacerbation of asthmatic symptoms during the perimenstrual period.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Recurrent pneumonia
- Chronic bronchitis
- Viral or fungal infection
- Aspiration (foreign body)
- Cystic fibrosis
- Tuberculosis
- Mitral valve prolapse
- Congestive heart failure
- Chronic obstructive pulmonary disease

Associated Conditions: Reflux esophagitis, sinusitis.

Workup and Evaluation

Laboratory: Complete blood count, arterial blood gases (severe cases).

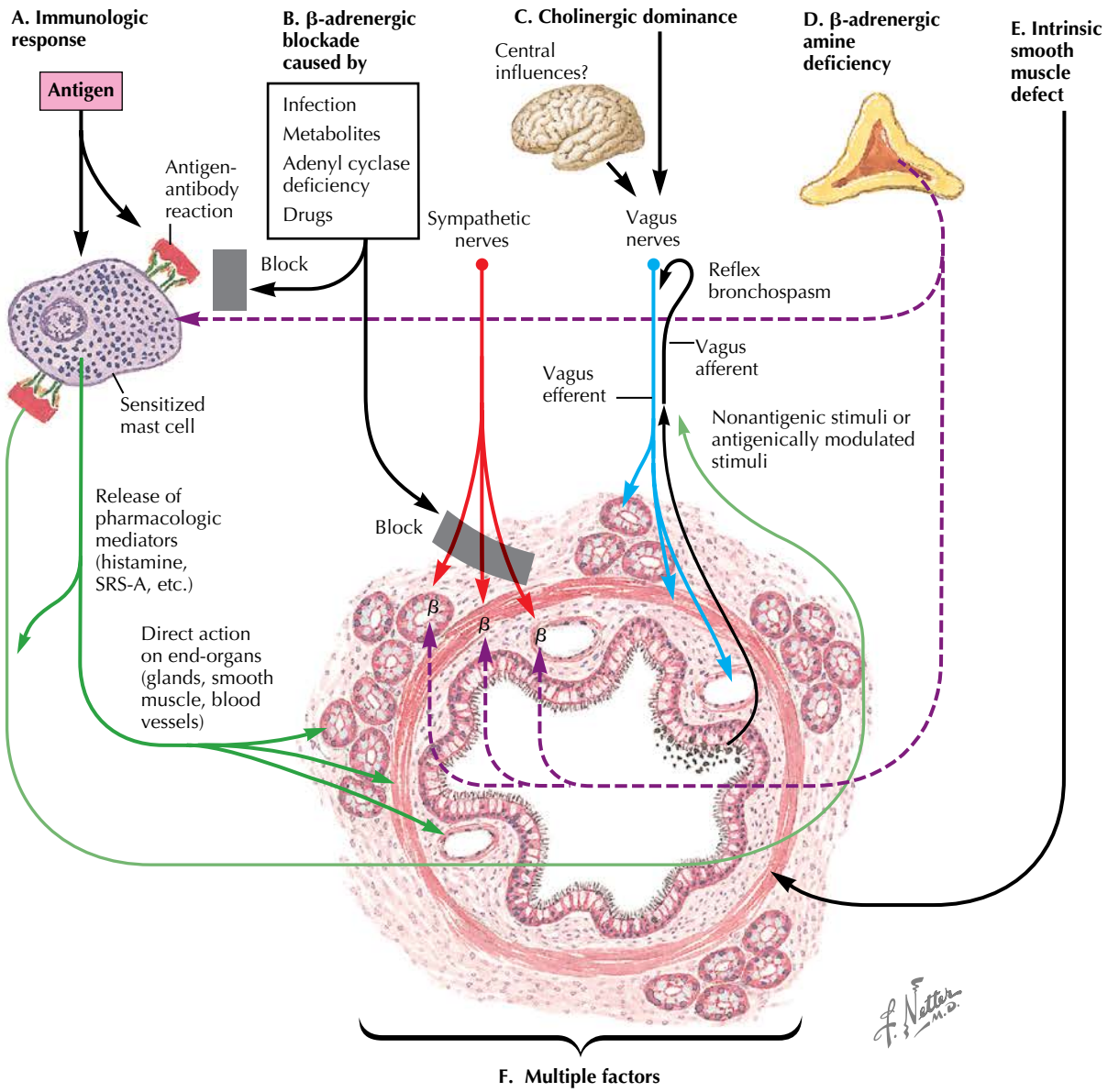

Figure 27.1 Postulated mechanisms of airway hyperactivity causing asthma

Imaging: No imaging indicated. (Chest radiograph shows hyperinflation, atelectasis, or air leak, but it is nonspecific.)

Special Tests: Sweat chloride test (childhood), nasal/pulmonary eosinophils, pulmonary function testing (peak expiratory flow rate), allergy testing (selected patients).

Diagnostic Procedures: History, physical examination, pulmonary function testing (forced expiratory volume in 1 second [FEV_1]). An excellent office screening test is to ask the patient to blow out a lit match held at arm's length. Patients with reduced FEV_1 are unable to accomplish this task.

Pathologic Findings

Narrowing of large and small airways because of bronchial smooth muscle spasm, edema, and inflammation of the bronchial mucosa with increased mucus production characterize acute attacks. Chronic inflammatory changes are histologically observed. Biochemical factors related to inflammation mediators include chemical, eosinophil, and neutrophil chemotactic factors, bradykinins, and others.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, eliminate irritants, education, caffeine for mild symptoms.

Specific Measures: Mild—intermittent β-agonists via inhaler or cromolyn sodium four times daily plus low-dose inhaled steroids (beclomethasone dipropionate 400 mg/day) may add slow-release xanthines, leukotriene modifiers (montelukast, zafirlukast, pranlukast, and zileuton). Methylxanthines (theophylline and aminophylline), if sufficient control cannot be achieved with inhaled glucocorticoids and long-acting β-agonists alone. Severe—cromolyn sodium plus high-dose inhaled steroids plus theophylline (therapeutic level 10–20 mg/mL), inhaled β-agonist to reverse airflow obstruction. During asthma attacks, patients should avoid fluid loading, intermittent positive pressure breathing, or airway mist or humidification; these worsen symptoms.

Diet: No specific dietary changes indicated. Avoid known allergens (if any).

Activity: No restriction or restriction based on pulmonary function, except for those with exercise-induced asthma (eg, cold weather, excessive activity).
Patient Education: Understanding of disease and use of inhalers, education about triggering factors and allergens.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- It's Time to Quit Smoking, 2019

Drug(s) of Choice

- β-Agonists (albuterol, levalbuterol, bitolterol, salmeterol, terbutaline)
- Steroids (formoterol, beclomethasone, ciclesonide, fluticasone propionate, mometasone, prednisone)
- Cromoglycate and nedocromil
- Methylxanthines (theophylline)
- Anticholinergics (glycopyrrolate, atropine, ipratropium bromide)
- Leukotriene antagonists
- Combination agents (budesonide, glycopyrrolate, and formoterol fumarate or budesonide, formoterol)
- Immune modulators (mepolizumab, dupilumab)

Contraindications: Sedatives, mucolytics.
Precautions: β-Agonists should be used only intermittently. Most guidelines do not recommend the use of short-acting β-agonists without other simultaneous medical treatment. The US Food and Drug Administration has placed a boxed warning on montelukast regarding potential behavior and mood-related changes.
Interactions: Erythromycin and ciprofloxacin slow theophylline clearance and can increase levels by 15%–20%.

Alternative Drugs

Histamine H_1 antagonists, methotrexate

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: Avoid known allergens, aspirin, nonsteroidal antiinflammatory and β-adrenergic blocking drugs. Have a prearranged action plan for acute attacks. Obtain annual influenza immunization. Avoid food additives known to precipitate attacks (sulfites and tartrazine).
Possible Complications: Respiratory failure, atelectasis, pneumothorax, death. Mortality increases with more than three emergency visits or more than two hospital admissions per year, nocturnal symptoms, history of intensive care unit admission or mechanical ventilation, steroid dependence, and history of syncope with attacks.
Expected Outcome: Excellent with careful management.

MISCELLANEOUS

Other Notes: For those with exercise-induced asthma, activities in which the patient breathes large amounts of cold air (eg, skiing or running) are more likely to provoke an attack, whereas swimming in an indoor, heated pool, with warm, humid air, is less likely to cause problems.
Pregnancy Considerations: Approximately 50% of patients have no change in symptoms, 25% improve, and 25% worsen. Asthma is found in 1% of pregnant patients, 15% of whom have one or more significant attacks during gestation. The effects are highly variable but may include chronic hypoxia, intrauterine growth restriction, and (rarely) fetal death.
ICD-10-CM Codes: J45.909 (Unspecified asthma, uncomplicated), J45.998 (Other asthma).

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CARDIOVASCULAR DISEASE IN WOMEN

28

INTRODUCTION

Description: Disease and dysfunction of the heart and vascular system, including coronary heart disease (CHD, 30%–50% of cases), atherosclerosis, heart failure, hypertension, cardiomyopathy, aneurysm, and stroke.

Prevalence: Cardiovascular disease (CVD) is the number one killer of American women—annual deaths from CVD are 10-fold those of breast cancer. It is estimated that 48% of persons ≥20 years of age in the United States have early-stage CVD. In the United States, disease and dysfunction of the heart and vascular system is now the leading cause of death in pregnant women and women in the postpartum period (26.5% of US pregnancy-related deaths).

Predominant Age: Prevalence increases with age for both males and females.

Genetics: Familial cardiovascular patterns, male sex, 46 single nucleotide polymorphisms (SNPs) across the genome, which are significantly associated with an increased risk, such as *MYH7* for cardiomyopathy and those on locus 9p21, which have shown the strongest association.

ETIOLOGY AND PATHOGENESIS

Causes: Multifactorial. Others specific to the disease process.

Risk Factors: Smoking, diabetes mellitus, hypercholesterolemia/dyslipidemia, obesity (body mass index ≥35), hypertension (these five risks are responsible for more than half of cardiovascular mortality), substance use, anemia, collagen vascular disease, chemotherapy, sedentary lifestyle, abnormal sleep duration (short or long), mild to moderate kidney dysfunction. For women: Non-Hispanic Black race (3.4-fold increased risk), age >40 years (maternal death for this group is 30-fold over that at age 20), pre-eclampsia, premature menopause (<40 years), spontaneous pregnancy loss, breast cancer. Greater than 90% of all CHD/myocardial infarction events occur in individuals with at least one risk factor. Lactation is associated with reduced risk.

SIGNS AND SYMPTOMS

- Acute chest pain (myocardial infarction)
- Acute abdominal pain (aortic dissection)
- Back pain (aortic dissection, myocardial infarction)
- Dyspnea (heart failure, myocardial infarction)
- Elevated blood pressure (hypertension)
- Face drooping (stroke)
- Headache (stroke)
- Intermittent claudication (peripheral vascular disease)
- Orthopnea (heart failure)
- Palpitations (arrhythmia, myocardial infarction)
- Peripheral edema (heart failure)
- Speech difficulty (stroke)
- Syncope (myocardial infarction, stroke)
- Unilateral arm weakness (aortic dissection, stroke, myocardial infarction)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Anxiety
- Back ache (musculoskeletal)
- Headache (cluster, migraine)
- Herpes zoster (shingles)
- Pleuritis/costochondritis
- Radiculopathy
- Vasovagal syncope

Associated Conditions: Hypertensive disorder of pregnancy, gestational diabetes, preterm delivery, placental abruption, and spontaneous pregnancy loss, early menarche, late menarche, early menopause, polycystic ovary syndrome (PCOS), and some autoimmune disorders.

Workup and Evaluation

Laboratory: Cholesterol monitoring (total, high-density lipoprotein [HDL], low-density lipoprotein [LDL]), triglycerides, renal function tests, brain natriuretic peptide (BNP) and N-terminal fragment (N-pro-BNP), plasma fibrinogen (independent risk factors for CVD).

Imaging: Computed tomography heart imaging (coronary artery calcification), echocardiography, angiography.

Special Tests: Electrocardiography, exercise tolerance test (peak exercise heartrate), aortic pulse wave velocity (PWV).

Diagnostic Procedures: History and clinical characteristics. INTERHEART risk score assessment. Note: In women, cardiovascular symptoms, especially those involving the chest, are often incorrectly attributed to the breast or chest wall.

Pathologic Findings

Atherosclerosis may be seen as early as the second and third decades of life. It is responsible for almost all cases of CHD.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Lifestyle optimization (diet, exercise)

Specific Measures: Blood pressure and glucose control. Others based upon specific pathology or disease.

Diet: Consumption of fruits and vegetables is associated with lower risk. Randomized prospective studies of vitamin E, vitamin C, and beta-carotene supplementation have shown no clear evidence of benefit. Diets high in omega-3 fatty acids (or supplements). High folate intake (or supplementation) may reduce the risk of hypertension and CHD.

Activity: Even moderate exercise has a protective effect against CHD and all-cause mortality.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Cholesterol and Women's Cardiovascular Health, 2021
- Heart Health for Women, 2021

Drug(s) of Choice

- A-V node blocking agents (adenosine, digoxin)
- Angiotensin-converting enzyme inhibitors (benazepril, captopril, enalapril, fosinopril, lisinopril, moexipril, perindopril, quinapril)
- Angiotensin receptor blockers (azilsartan, candesartan, eprosartan, irbesartan, losartan, olmesartan, telmisartan, valsartan)
- Antiarrhythmic agents (lidocaine, procainamide, phenytoin, amiodarone, flecainide, sotalol)
- Anticoagulants and antithrombotics (warfarin low-molecular-weight heparin, ultrafractionated heparin, clopidogrel)
- Aspirin (low dose)
- β-Blockers (propranolol, labetalol, atenolol, metoprolol, esmolol, carvedilol)
- Calcium channel blockers (verapamil, nifedipine, diltiazem, amlodipine)

- Combination neprilysin inhibitor and angiotensin II receptor blocker (sacubitril plus valsartan)
- Direct factor Xa inhibitors (rivaroxaban, apixaban)
- Diuretics (hydrochlorothiazide, furosemide)
- Inotropic agents (dopamine, dobutamine, epinephrine)
- Statins
- Vasodilators (nitroprusside, hydralazine, nitroglycerine, ephedrine sulfate)

Contraindications: Angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, aldosterone antagonists, and the combination sacubitril plus valsartan should be avoided during pregnancy because of the risk of fetal adverse effects. Human data suggests a fetal risk with sotalol.

Precautions: Many agents can cause hypotension, dehydrations, or electrolyte abnormalities.

Alternative Therapies: There is some evidence that lends support for cardiovascular benefit derived from estrogen therapy or hormone therapy if used close to the onset of menopause.

FOLLOW-UP

Patient Monitoring: Blood pressure, lipid, and activity monitoring.

Prevention/Avoidance: Control of modifiable risk factors such as optimizing weight, blood pressure, glucose, and cholesterol levels. Encourage heart-healthy lifestyles (smoking cessation, exercise programs) and other strategies to reduce cardiovascular risk.

Possible Complications: Possible progression of disease.

Expected Outcome: Many risk reduction strategies are associated with improved outlook.

MISCELLANEOUS

ICD-10-CM Codes: Z13.6 (Encounter for screening for cardiovascular disorders), R94.39 (Abnormal result of other cardiovascular function study), I42 (Cardiomyopathy), I25.1 (Atherosclerotic heart disease of native coronary artery), I70 (Atherosclerosis), P29.9 (Cardiovascular disorder originating in the perinatal period, unspecified), O90.3 (Peripartum cardiomyopathy)

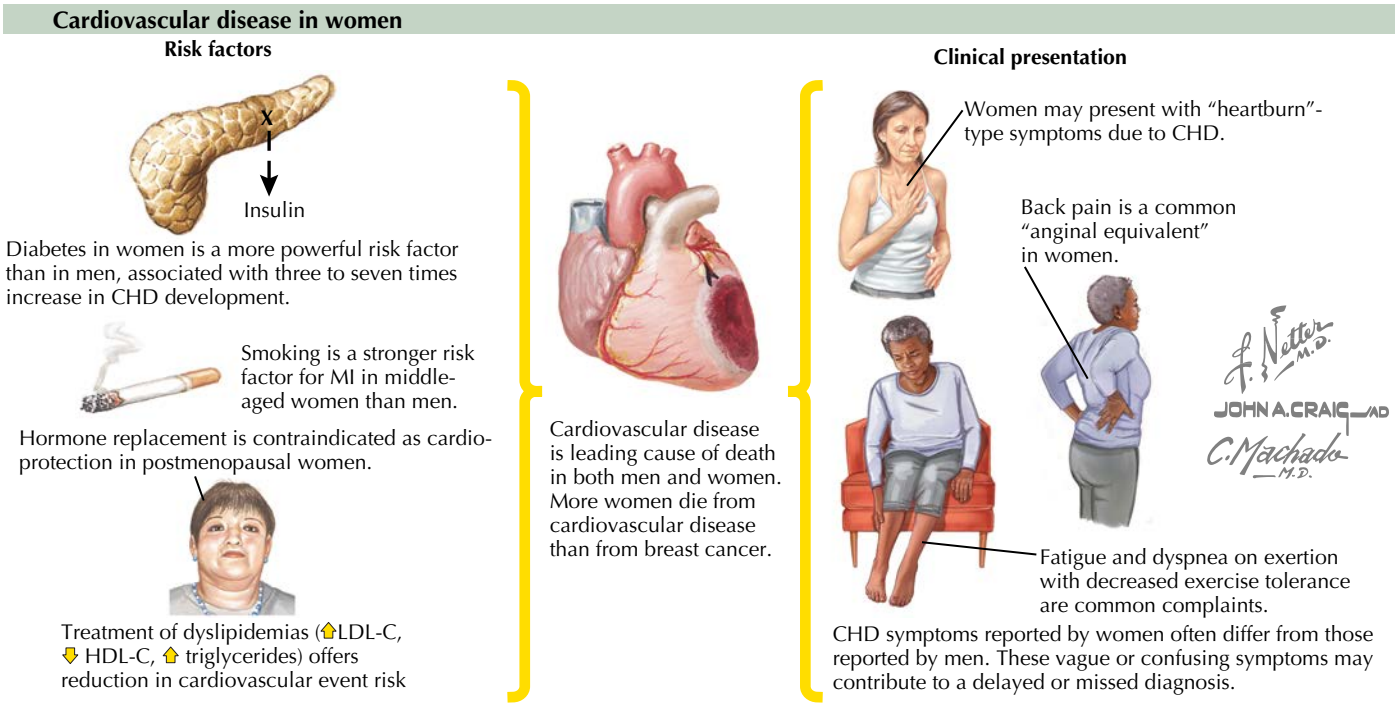

Figure 28.1 Cardiovascular disease in women

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CHOLELITHIASIS

29

INTRODUCTION

Description: Cholelithiasis is the formation of stones in the gallbladder or biliary collecting system. Most stones (80%) are the result of precipitation of supersaturated cholesterol.
Prevalence: 9% of women; 1 million cases per year.
Predominant Age: 70% of patients are older than 40 years.
Genetics: Ratio of women to men is 3:1; some races at greater risk (eg, Pima Indians). Pigment gallstones affect men and women equally. A mutation in the gene *ABCG8* significantly increases a person's risk of gallstones.

ETIOLOGY AND PATHOGENESIS

Causes: The metabolic alteration leading to cholesterol stones is thought to be a disruption in the balance between hydroxymethylglutaryl coenzyme A (HMG-CoA) reductase and cholesterol 7α-hydroxylase. HMG-CoA controls cholesterol synthesis, whereas cholesterol 7α-hydroxylase controls the rate of bile acid formation. Patients who form cholesterol stones have elevated levels of HMG-CoA and depressed levels of cholesterol 7α-hydroxylase. This change in ratio increases the risk of precipitation of cholesterol as stones.
Risk Factors: Age, female gender, parity (75% of affected women have had one or more pregnancies), obesity (15–20 lb overweight is associated with a 2-fold increase in risk; 50–75 lb excess weight is associated with a 6-fold increase in risk) and weight cycling, pregnancy, estrogen use (oral), cirrhosis, diabetes, and Crohn disease. A family history of cholelithiasis in siblings or children results in a 2-fold increase in risk. Vegetarians are at a 9-fold lower risk.

SIGNS AND SYMPTOMS

- Asymptomatic (60%–70%; 50% become symptomatic; 20% develop complications)
- Fatty food intolerance
- Variable right upper quadrant pain with radiation to the back or scapula especially after meals
- Belching, nausea, or vomiting (often mistaken for "indigestion")
- Fever usually associated with cholangitis

DIAGNOSTIC APPROACH

Differential Diagnosis

- Gastroenteritis
- Esophageal reflux
- Malabsorption
- Irritable bowel syndrome (IBS)
- Peptic ulcer disease
- Coronary artery disease
- Pneumonia
- Appendicitis
- Pregnancy complications (pre-eclampsia/HELLP syndrome, acute fatty liver, placental abruption, uterine rupture)

Associated Conditions: Cirrhosis, pancreatitis, and ileus.

Workup and Evaluation

Laboratory: Supportive, but often not diagnostic—complete blood count, serum bilirubin, amylase, alkaline phosphatase, and aminotransferase measurements.
Imaging: Ultrasonography of the gallbladder (96% accuracy for diagnosing sludge or a stone in the gallbladder).

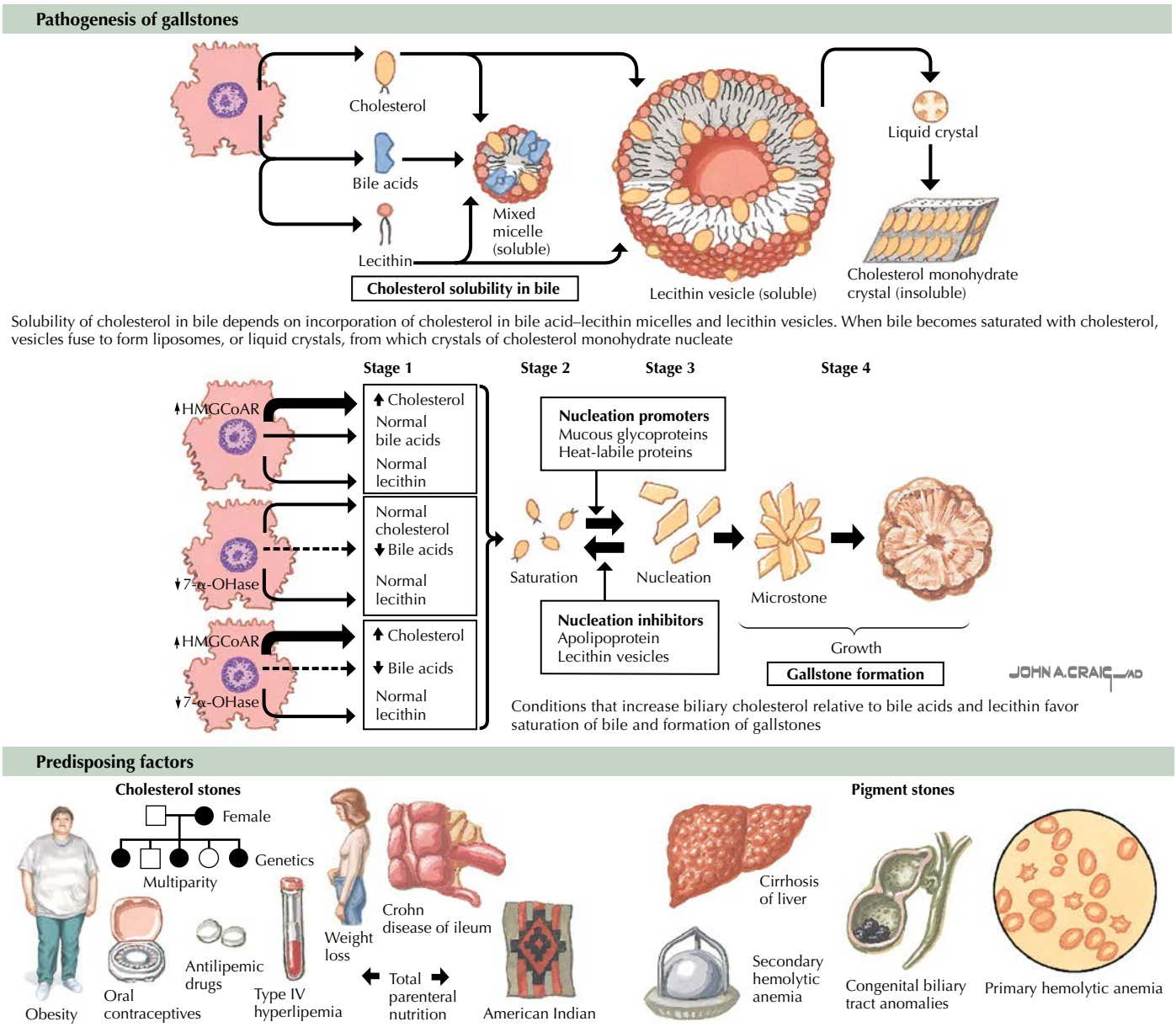

Figure 29.1 Pathogenesis and predisposing factors of cholelithiasis

Special Tests: Cholescintigraphy (also called gallbladder radionuclide scan or hepatobiliary [HIDA] scan), magnetic resonance cholangiopancreatography (MRCP).
Diagnostic Procedures: History, physical examination, ultrasonography, and laboratory investigation.

Pathologic Findings

Supersaturated bile, inflammation when accompanied by infection or obstruction.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Watchful waiting and dietary modifications.
Specific Measures: Oral therapy, surgical extirpation, lithotripsy.
Diet: Reduced fatty food and cholesterol intake.
Activity: No restriction.
Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Weight Control: Eating Right and Keeping Fit, 2021

WebMD Article:
- Gallstones, available at: http://www.webmd.com/digestive-disorders/gallstones. Accessed February 6, 2022.

Drug(s) of Choice

- Ursodeoxycholic acid (Actigall) 8–10 mg/kg/day as two to three doses.
- When infection is present or suspected: Monotherapy with a β-lactam/β-lactamase inhibitor (ampicillin-sulbactam 3 g IV every 6 hours, or piperacillin-tazobactam 3.375 g IV every 6 hours).

Contraindications: Known allergy, acute cholecystitis, abnormal liver function, calcified stones (not cholesterol based).
Precautions: The rate of stone dissolution (approximately 1 mm/mo) limits applicability of oral therapy for stones greater than 1.5–2 cm in size.
Interactions: None.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.

Prevention/Avoidance: Low-fat and low-cholesterol diet may delay symptoms. Oral prophylaxis during rapid weight loss has been advocated for those otherwise at risk.

Possible Complications: Acute cholecystitis, pancreatitis, ascending cholangitis, peritonitis, internal fistulization. Stones re-form in approximately 50% of patients treated with oral therapy, although the majority (85%) remain asymptomatic. Those who have recurrent symptoms respond to additional courses of oral therapy.

Expected Outcome: Generally good with either oral or surgical therapy. Oral therapy results in resolution of symptoms in 2–3 months. Despite this, gallstone disease is responsible for about 10,000 deaths per year in the United States.

MISCELLANEOUS

Pregnancy Considerations: Of pregnant patients, 3%–4% experience gallstone symptoms. Women with increased parity and multifetal pregnancies are at greatest risk.

ICD-10-CM Codes: K80.20 (Calculus of gallbladder without cholecystitis without obstruction).

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CHRONIC PELVIC PAIN

30

INTRODUCTION

Description: Chronic pelvic pain has been defined as noncyclic pain of 6 or more months' duration that localizes to the anatomic pelvis, anterior abdominal wall at or below the umbilicus, lumbosacral back, or buttocks and is of sufficient severity to cause functional disability or lead to medical care. It is often associated with negative cognitive, behavioral, sexual, and emotional consequences. Chronic pelvic pain can be a vexing problem for the patient and physician, and many think the pain itself becomes the disease.

Prevalence: 15% of women. In the United States: $3 billion annual economic cost; 12%–20% of hysterectomies and up to 40% of

gynecologic laparoscopies are performed for pelvic pain; 10% of referrals to gynecologists are for pelvic pain.

Predominant Age: 15–50 years; peak during 26–30 years.

Genetics: Chronic pelvic pain disproportionately affects women. In one study, non-Hispanic Blacks had a higher incidence of pelvic pain.

ETIOLOGY AND PATHOGENESIS

Causes: Frequently unknown. There is growing evidence of central sensitization in perpetuating chronic pain syndromes.

Risk Factors: Childhood physical or sexual abuse. A history of abuse, mental illness, lack of social support, social stressors, and relationship discord increase the risk of pelvic pain and dyspareunia.

SIGNS AND SYMPTOMS

General: Nonspecific, diffuse lower abdominal, pelvic, or low back pain persisting for more than 6 months. Incomplete relief by most previous treatments.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Abdominal migraine
- Abuse
- Anxiety disorders
- Bladder cancer
- Celiac disease
- Chronic constipation
- Chronic pelvic inflammatory disease
- Colorectal cancer
- Depression
- Diverticulitis
- Endometriosis
- Fibromyalgia
- Interstitial cystitis (also known as painful bladder syndrome)
- Inflammatory bowel disease
- Irritable bowel syndrome (IBS)
- Myofascial syndrome
- Osteitis pubis
- Ovarian malignancy
- Ovarian remnant syndrome
- Pelvic adhesions
- Pelvic congestion (postulated but controversial)
- Pelvic floor tension myalgia (also called levator spasm or levator ani syndrome)
- Pelvic organ prolapse
- Residual ovary/ovarian remnant syndrome
- Somatization
- Substance use disorders
- Uterine leiomyomata
- Uterine malposition (eg, retroversion)
- Vestibulitis
- Vulvodynia

Associated Conditions: Anxiety, anger-hostility, catastrophization, depression, fibromyalgia, marital distress and sexual dysfunction, migraine headaches, sleep disturbance, somatization, temporomandibular joint disorder, vulvodynia.

Workup and Evaluation

Laboratory: No specific evaluation indicated. Tests should be based on the diagnoses being considered.

Imaging: Ultrasonography based upon diagnoses being considered and an inadequate or inconclusive physical examination (generally of limited value).

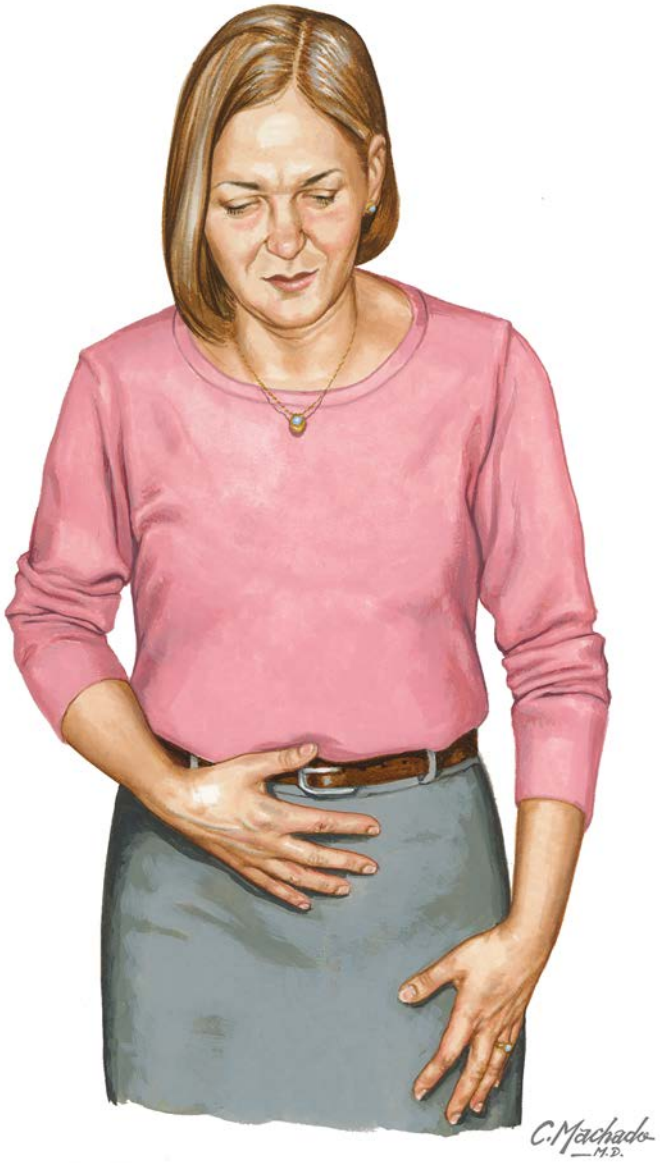

Figure 30.1 Cramping in chronic pelvic pain

Special Tests: Diagnostic laparoscopy may be indicated, but in many instances, visible pathology found at laparoscopy may be incidental and not related to the pain. Psychologic tests and interviews (uncertain value).

Diagnostic Procedures: History, physical examination (careful, detailed, focused), ultrasonography, and laboratory investigation. Single-digit palpation of the levator plate, piriformis, and obturator muscles can elicit the tenderness of pelvic floor tension myalgia.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Diagnosis and treatment of any underlying pathophysiologic etiologies, analgesics, antidepressants (when indicated). The goal of the treatment is not necessarily complete eradication of pain but rather finding effective strategies that allow functional living. An interdisciplinary team approach is often optimal.

Specific Measures: The mainstay of treatment of muscular components of pelvic pain is physical therapy. Biofeedback or relaxation training may be of help. Complementary strategies (eg, mindfulness-based meditation, yoga, acupuncture), good sleep hygiene, exercise, smoking cessation, healthy eating, and social support. Presacral neurectomy (surgical interruption of the superior hypogastric plexus) is effective at treating central uterine pain, dysmenorrhea, and endometriosis but is associated with a significant rate of complications. Cognitive–behavioral therapy can augment treatment and facilitate adaptations to unresolved symptoms. Laparoscopic adhesiolysis is not recommended for the management of chronic pelvic pain.

Diet: No specific dietary changes indicated.

Activity: No restrictions.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Chronic Pelvic Pain, 2014
- Dysmenorrhea: Painful Periods, 2020

Drug(s) of Choice

- Nonsteroidal antiinflammatory drugs and opioid narcotics (adverse outcomes and limited efficacy associated with long-term use).
- Neuromodulatory medications (eg, tricyclic antidepressants, neurotransmitter reuptake inhibitors, neuroleptics), psychologic adjuncts (eg, cognitive–behavioral therapy, pain psychotherapy, sexual counseling).
- Neuroleptics such as gabapentin, pregabalin, and lamotrigine are generally employed when symptoms are neuropathic in nature.
- Serotonin-norepinephrine reuptake inhibitors (SNRIs) are recommended for patients with neuropathic chronic pelvic pain. Duloxetine and desvenlafaxine can be useful.

Contraindications: Based on the agent used.

Precautions: Opioid narcotics should be used with caution, if at all. The use of gonadotropin-releasing hormone agonists does not reliably differentiate gynecologic from other causes of pain.

Interactions: Based on the agent used.

Alternative Drugs

- Combined oral contraceptives are effective in reducing dysmenorrhea and cyclic symptoms associated with endometriosis.
- Tricyclic antidepressants such as amitriptyline, nortriptyline, and desipramine have a long record of being effective in treating chronic pain.
- Trigger point injection (1–5 mL of 1% lidocaine or 0.25%–0.5% bupivacaine) for entrapped segmental nerve (eg, ilioinguinal) or abdominal wall trigger point.

FOLLOW-UP

Patient Monitoring: Frequent follow-up, identification, and treatment of associated depression.

Prevention/Avoidance: Early and effective treatment of conditions associated with chronic pain states.

Possible Complications: Dysfunctional adaptive behaviors, social withdrawal or isolation, drug seeking, dependence or side effects, sexual or social dysfunction. Between 12% and 33% of women with chronic pelvic pain also meet criteria for major depression.

Expected Outcome: Persistent pain, initially met with anger and denial, leading to acceptance and functional adaptations.

MISCELLANEOUS

Other Notes: Whether mood disorder is a predisposing factor to, or a result of, chronic pain is not clear. Pain that first develops prior to menarche is unlikely to have a gynecologic etiology.

ICD-10-CM Codes: R10.2 (Pelvic and perineal pain), G89.4 (Chronic pain syndrome), G89.29 (Other chronic pain).

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31 CONSTIPATION

INTRODUCTION

Description: Constipation is the infrequent passage of hard stools, often associated with mechanical or other means to stimulate bowel movements. It is often also related to changes in the size, consistency, and ease of bowel movement in the subjective definition of constipation.
Prevalence: Very common as a sporadic problem; 8%–10% of women.
Predominant Age: Any; more common in youth and old age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Inadequate dietary fiber or fluid intake, altered gastrointestinal motility (drugs, illness, injury, laxative abuse, irritable bowel syndrome), metabolic (hypothyroidism, diabetes, anorexia nervosa, pregnancy), neurogenic (autonomic neuropathy, Hirschsprung disease, Chagas disease, multiple sclerosis, spinal cord injury, Parkinson disease), medication side effect (anticholinergics, cation-containing agents, neurally active agents) and mechanical (obstruction, impaction, pregnancy).
Risk Factors: Poor diet and fluid intake, inactivity, medications (narcotics, iron therapy), sedentary lifestyle, female sex, pregnancy.

SIGNS AND SYMPTOMS

- Bowel movements fewer than three times per week
- Hard stools
- Straining to have a bowel movement
- Inability to have bowel movements without medical or mechanical interventions (enemas, manual evacuation)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Hypothyroidism
- Rectocele
- Laxative abuse
- Dehydration
- Inappropriate expectation

Associated Conditions: Diverticulitis, abdominal pain, urinary incontinence.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: Radiography (abdominal plain film, barium enema, defecography) may help in identifying the source of the problem but is not required for diagnosis.
Special Tests: Rectal examination, flexible sigmoidoscopy, or colonoscopy should be considered for older patients. Anorectal manometry or rectal balloon expulsion tests for selected patients.
Diagnostic Procedures: History and physical examination. Rome IV criteria: Any two of the following: straining, lumpy hard stools, sensation of incomplete evacuation, use of digital maneuvers, sensation of anorectal obstruction or blockage with 25% of bowel movements, and decreased stool frequency (fewer than three bowel movements per week).

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Fluids, dietary fiber, fiber supplements, and physical activity.
Specific Measures: Mechanical assistance (enemas), mechanical disimpaction.
Diet: Increased dietary fiber (recommended dietary fiber is 20 to 35 g/day), adequate fluids, and fiber supplements as needed.
Activity: No restriction, activity encouraged.
Patient Education: Reassurance, diet counseling.

Drug(s) of Choice

- Fiber supplements, stool softeners (docusate sodium 100 mg PO two times daily), laxatives (osmotic [lactulose, polyethylene glycol], bulk-forming laxatives [psyllium, methylcellulose, calcium polycarbophil, wheat dextrin], use all laxatives with caution)
- Guanylate cyclase-C receptor agonists (linaclotide, plecanatide)
- Lubiprostone (chloride channel activator)
- Misoprostol (prostaglandin analog)
- Prucalopride (5HT4 prokinetic agent)

Contraindications: Bowel obstruction, peritonitis
Precautions: Laxative abuse and dependence are common. Patients should be warned about their appropriate use. Consuming large amounts of fiber can cause abdominal bloating or flatulence. Osmotic laxatives can cause electrolyte imbalances.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: Adequate fiber and fluid, physical activity
Possible Complications: Impaction, fluid or electrolyte imbalance with laxative abuse, possible increase in the risk of colon cancer (proposed, but unproved).
Expected Outcome: Good with adequate diet, fluid, and activity.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy, although pregnancy (and associated iron supplementation) make constipation worse.
ICD-10-CM Codes: K59.00 (Constipation, unspecified).

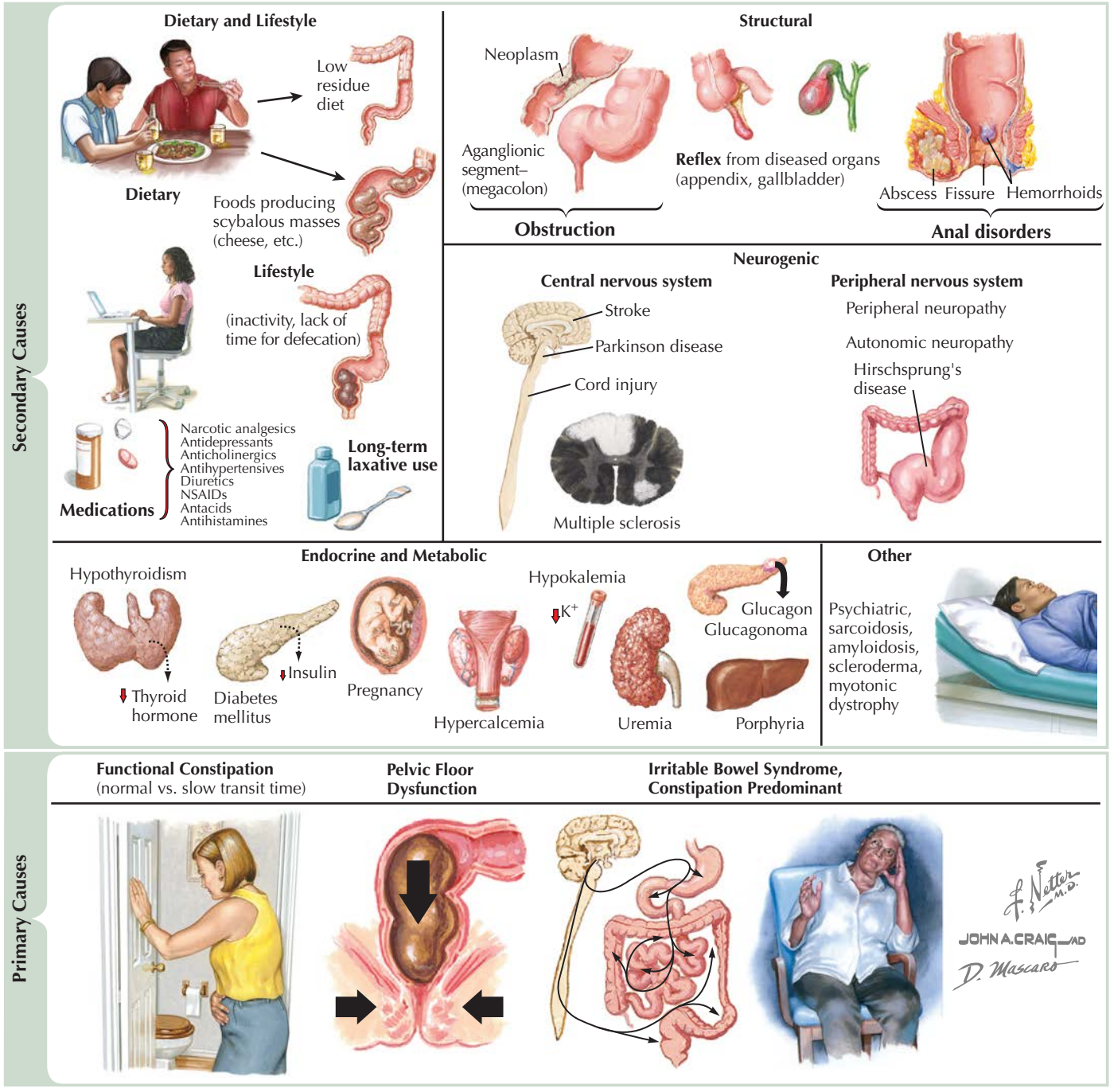

Figure 31.1 Overview of constipation

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32 CROHN DISEASE

INTRODUCTION

Description: An idiopathic inflammatory bowel disease characterized by transmural involvement resulting in severe gastrointestinal symptoms and significant morbidity.
Prevalence: 2–10/10,000 people, slightly more women than men.
Predominant Age: 15–30 years.
Genetics: First-degree relative for 20% of patients; more common in Whites and Jewish population. Significant associations with *NOD2/CARD15* variants.

ETIOLOGY AND PATHOGENESIS

Causes: The inflammatory process in Crohn disease is transmural and involves both the large and small bowel in 80% of patients.
Risk Factors: Cigarette smoking, sleep deprivation. There is some evidence for reduced levels of vitamin D as a risk factor.

SIGNS AND SYMPTOMS

- Abdominal pain (80%–85%; often lasting for days or weeks; the pain described is frequently located in the mid-abdomen or right lower quadrant, although generalized pain is often present)
- Diarrhea (20%; voluminous, watery, with occasional blood)
- Fatigue
- Weight loss
- Fever
- Dyspareunia
- Vulvar or perineal fissures or fistulae, or occasionally vulvar granulomas (30% of patients)
- Arthritis, sclerosing cholangitis (5%–10%)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Irritable bowel syndrome (IBS)
- Ulcerative colitis
- Enteric pathogens, infectious colitis
- Celiac disease
- Lymphoma
- Lactose intolerance
- Pelvic inflammatory disease (PID; acute episodes)
- Endometriosis

Associated Conditions: Arthritis, dyspareunia, vulvar or perineal fissures or fistulae (30%–40% of patients), vulvar granulomas, erythema nodosum, malabsorption, internal fistulation, renal stones, and sclerosing cholangitis. Severe oral involvement may present with aphthous ulcers or pain in the mouth and gums.

Workup and Evaluation

Laboratory: Complete blood count, sedimentation rate, C-reactive protein (CRP).
Imaging: Barium enema, upper gastrointestinal radiograph with small-bowel follow-through, magnetic resonance imaging with small bowel enterography (MRE).
Special Tests: Sigmoidoscopy, colonoscopy, ileocolonoscopy, or rectal biopsy. Antineutrophil cytoplasmic antibodies (pANCA) and anti-*Saccharomyces cerevisiae* antibodies (ASCA) have been proposed for diagnosing inflammatory bowel disease and distinguishing Crohn disease from ulcerative colitis.
Diagnostic Procedures: History, sigmoidoscopy, colonoscopy, radiologic studies, rectal biopsy.

Pathologic Findings

Transmural inflammation with ulceration and distortion. Areas of normal bowel (skip areas). Granulomas may be found in 15% of patients. Approximately 80% of patients have small bowel involvement, but half of patients with colitis have sparing of the rectum.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Maintenance of weight and nutrition, perineal care.
Specific Measures: Surgical therapy (resection) often required (two-thirds to three-fourths of patients).
Diet: No specific dietary changes indicated; increased dietary fiber sometimes recommended.
Activity: No restriction.
Patient Education: Reassurance, diet counseling.

Drug(s) of Choice

- Mesalamine (5-aminosalicylic acid), methotrexate, or azathioprine (Imuran) for maintenance and suppression.
- Prednisone (20–40 mg PO daily, tapered after 4–6 weeks) or sulfasalazine or mesalamine at increased doses for acute exacerbations. Other immunosuppressives (6-mercaptopurine, azathioprine, infliximab [Remicade]) also may be used. Biologic therapies (eg, infliximab, adalimumab, ustekinumab) are gaining in use for refractory patients but are still limited by cost and side effects.
- For acute management, antibiotics, antidiarrheals, and fluid replacements may be needed.

Precautions: Folic acid supplements should be used with mesalamine.

FOLLOW-UP

Patient Monitoring: Weight and symptoms, periodic blood count, and sedimentation rate. Endoscopy to monitor disease (as needed)
Prevention/Avoidance: None.
Possible Complications: Bowel thickening, stenosis, and internal fistula formation are common. Short bowel syndromes and malabsorption are common after repeated surgery. One study found a 2.5-fold increase in the risk of colon cancer in patients with Crohn disease.
Expected Outcome: Need for eventual or repeated surgery very likely.

MISCELLANEOUS

Pregnancy Considerations: Inflammatory bowel disease may increase the odds of adverse pregnancy outcomes, including preterm birth, small for gestational age infants, stillbirths, and congenital anomalies.
ICD-10-CM Codes: K50.90 (Crohn disease, unspecified, without complications).

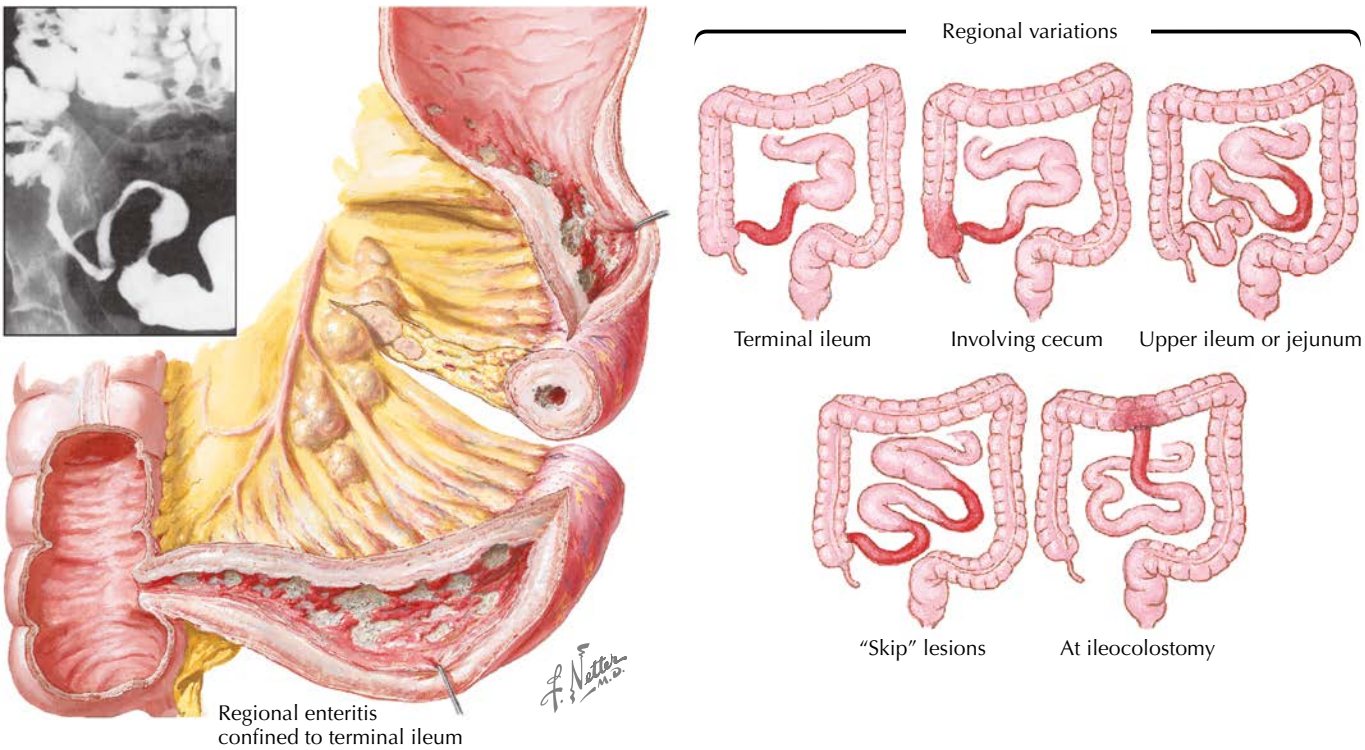

Figure 32.1 Crohn disease

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33 DEPRESSION (UNIPOLAR)

INTRODUCTION

Description: Depression is a biochemically mediated state in which anger, frustration, loss of pleasure, discouragement or hopelessness, and withdrawal predominate. This must be separated from normal stress reactions and grief. The term may be used to describe a mood state, syndrome, or mental disorder.
Prevalence: Twenty million American adults per year; one in six to eight lifetime risk; 6%–14% of primary care visits; 2:1 female-to-male ratio (1:1 after the age of 55 years). Depression is the fourth most common reason to seek medical care, yet may be missed in more than 50% of cases.
Predominant Age: Rare before puberty. Commonly begins in 20s–30s.
Genetics: Possible defect on chromosome 11 or X.

ETIOLOGY AND PATHOGENESIS

Causes: Proposed—alteration in norepinephrine or serotonin through impaired synthesis of neurotransmitters, increased breakdown or metabolism of neurotransmitters, increased uptake of neurotransmitters.
Risk Factors: Strong family history (depression, suicide, alcoholism, substance abuse). Women are at greatest risk during adolescence (up to 60% meet the criteria), the premenstrual period, pregnancy, the postpartum period, perimenopause, after pregnancy loss (three times increased risk), and with infertility (two times increased risk). Women are especially vulnerable to depression after giving birth.

SIGNS AND SYMPTOMS

- Depressed mood or anhedonia plus five or more other symptoms over a 2-week period:
  - Weight loss
  - Sleep changes
  - Psychomotor changes
  - Fatigue
  - Feeling of worthlessness or guilt
  - Inability to concentrate
  - Thoughts of death

(Hallucinations and delusions may appear in profound cases.)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Endocrine disorders (diabetes, pituitary, adrenal, thyroid)
- Burnout (professional or general)
- Borderline personality disorder
- Malignancies
- Infections
- Neurologic disorders (organic brain disease)
- Autoimmune disease
- Cardiovascular, hepatic, or renal disease
- Vitamin or mineral deficiency or excess
- Medication side effect (cardiovascular drugs, hormones, anticancer agents, antiinflammatory or antiinfective agents, amphetamines [withdrawal], L-dopa, cimetidine)

Associated Conditions: Chronic pain, sexual dysfunction, weight changes (up or down), bipolar disorders (manic depression), schizophrenia, and substance abuse

Workup and Evaluation

Laboratory: No evaluation indicated (clinical diagnosis only). Urine toxicology screen for drugs of abuse (when suspected).
Imaging: No imaging indicated unless organic brain syndrome is being considered.
Special Tests: Zung's Self-Rating Depression Scale, Beck's Depression Inventory, Criteria for Epidemiologic Studies Depression Scale, Children's Depression Inventory, or similar tests.
Diagnostic Procedures: Complete evaluation to rule out organic cause. Depression scales are helpful but are not required.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, support, and evaluation of support systems available to the patient.
Specific Measures: Psychotherapy (patients with mild depression without psychosis), medical therapy (choose agent to optimize

benefit, decrease risk, and avoid drug interactions), electroshock therapy in patients with refractory conditions (controversial). The combination of pharmacotherapy and psychotherapy is more effective than either treatment alone.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education: Reassurance, careful instruction on medication use.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Depression, 2018
- Postpartum Depression, 2020

Drug(s) of Choice

- Tricyclic agents—amitriptyline 50–300 mg/day; doxepin 25–300 mg/day; imipramine 50–300 mg/day; nortriptyline 50–200 mg/day.
- Monoamine oxidase inhibitors (MAOIs).
- Selective serotonin reuptake inhibitors (SSRIs)—fluoxetine 10–80 mg/day (modal dose 20 mg/day); fluvoxamine 100–300 mg/day; paroxetine 10–50 mg/day; sertraline 50–200 mg/day; citalopram 20–40 mg/day; escitalopram 5–20 mg/day.
- Serotonin-norepinephrine reuptake inhibitors (SNRIs)—venlafaxine 75–375 mg/day (modal dose range 75–150 mg/day); duloxetine 40–60 mg/day in two divided doses.
- Noradrenergic and specific serotonergic agents—mirtazapine 15–45 mg/day.
- Miscellaneous agents—nefazodone 200–600 mg/day; trazodone 150–400 mg/day; bupropion 300–400 mg/day.

Contraindications: See individual agents. Most agents are pregnancy category B. Many are contraindicated in patients with seizure disorders or cardiac arrhythmias (tricyclic agents).

Precautions: MAOIs are associated with both treatment and adverse reactions that appear as emergencies. Overdoses may be lethal. SSRIs are associated with nausea (20%–35%) and sexual dysfunction (10%–30%). Some agents can alter the dose or effectiveness of other drugs such as antihypertensive agents, digoxin, and antiseizure medications. Fluoxetine, sertraline, and paroxetine are best given in the morning. Many pharmacotherapies carry black-boxed warnings about an increased risk of suicide.

Interactions: MAOIs and SSRIs or SNRIs may have lethal interactions and must not be used together. (Allow at least 2 weeks to elapse between therapies.) Avoid use of nonprescription drugs with pseudoephedrine, phenylephrine, or phenylpropanolamine.

Alternative Drugs

- Additional tricyclic agents include clomipramine 100–250 mg/day, desipramine 50–300 mg/day, protriptyline 14–60 mg/day, and trimipramine 75–300 mg/day.
- A large study conducted by the National Center for Complementary and Alternative Medicine has found that St. John's wort is not effective for treating major depressive disorder. Similarly, omega-3 fatty acids have not been demonstrated to be effective.

FOLLOW-UP

Patient Monitoring: Normal health maintenance. Monitor for recurrence, substance abuse, or suicide. Patients must be monitored every 1–2 weeks after they start medication and reassessed

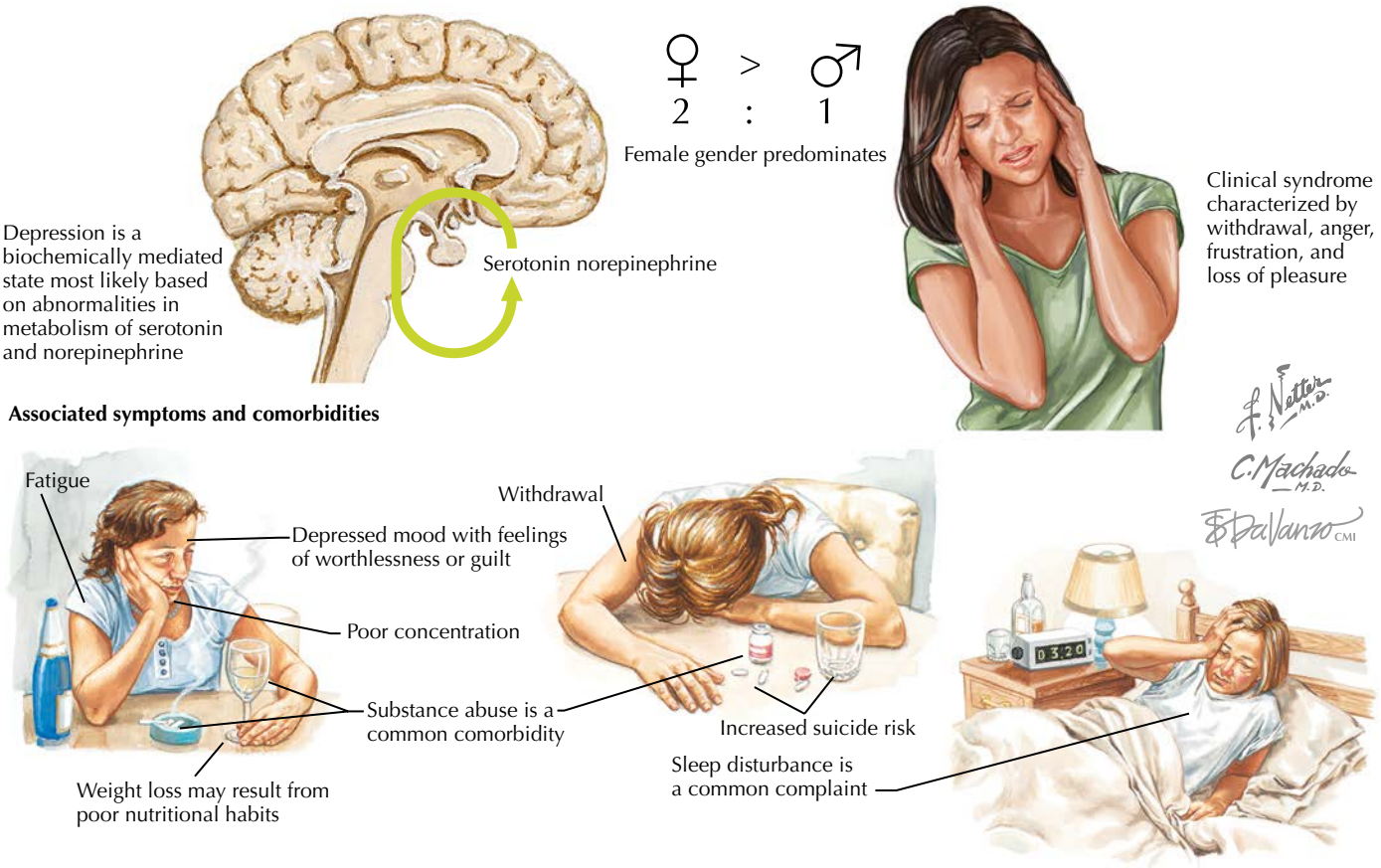

Figure 33.1 Depression

at 6 weeks. Follow-up of treatment should continue every 3 months while therapy is maintained (6 months to 2 years). Initial treatment with a single antidepressant leads to remission in only 30%–50% of patients.

Prevention/Avoidance: None.

Possible Complications: Increased risk of general medical disorders and worsened prognosis, disability, impaired function (family, work, social, sexual), chronic pain, mortality (30,000 suicides per year in United States; adolescent girls are at the greatest risk).

Expected Outcome: Medical therapy is associated with 85%–90% success rates.

MISCELLANEOUS

Pregnancy Considerations: Up to 70% of pregnant patients have depressive symptoms and 10%–15% meet the diagnostic criteria for major depressive disorder during pregnancy. Symptoms often mimic those of pregnancy itself. Depression may result in poor nutrition, increased substance abuse, poor fetal outcome, and reduced or shortened duration of breastfeeding. Drug therapy should be avoided or used sparingly in pregnancy unless benefits outweigh the risks. Postpartum depression is seen by many as a special form of depression.

ICD-10-CM Codes: F32.9 (Major depressive disorder, single episode, unspecified).

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34 DIVERTICULAR DISEASE

INTRODUCTION

Description: Diverticular disease involves the herniation of the colonic mucosa through the muscular wall. These herniations are most common in the sigmoid and distal colon, increase in prevalence with age, and can lead to significant morbidity when rupture or abscess formation occurs. Diverticulosis is the presence of these herniations, whereas diverticulitis is the symptomatic state.

Prevalence: 20% of patients, increasing with age to 40%–50% by the age of 60–80 years.

Predominant Age: Uncommon in patients younger than 40 years; most common in patients older than 50 years.

Genetics: Recent studies suggest a genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Speculative, not clearly established. Proposed—defect in colon motility with increased intraluminal pressure, exacerbated by a low-fiber diet or an intrinsic defect in the colon wall.

Risk Factors: Low-fiber diet, age older than 40 years, smoking, and previous diverticulitis. Obesity and sedentary lifestyle have been associated with an increase in risk of both diverticulitis and diverticular bleeding.

SIGNS AND SYMPTOMS

- Asymptomatic (75%–90%; diverticulosis)

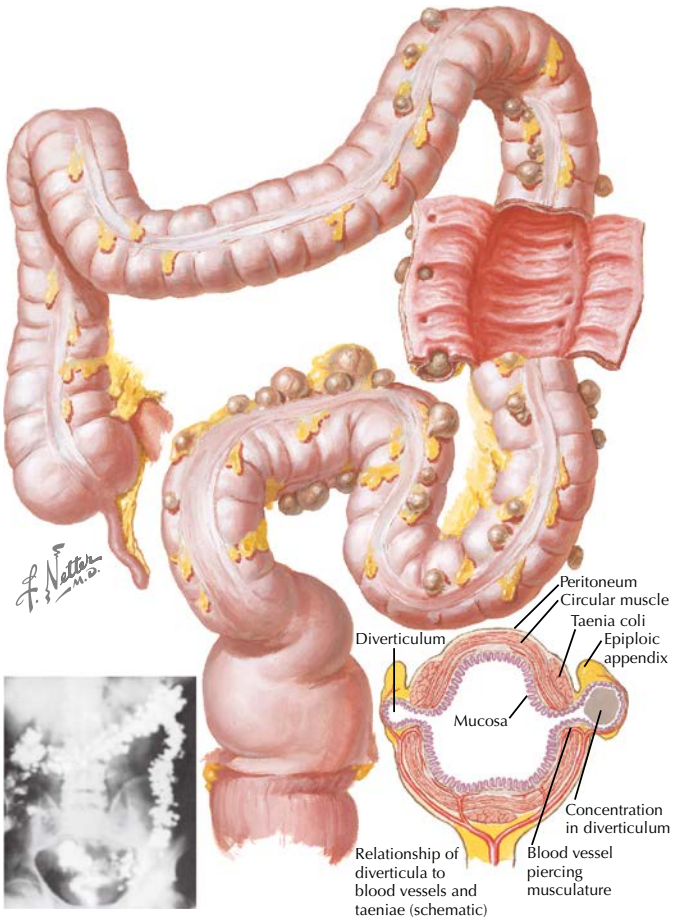

Figure 34.1 Diverticular disease

- Left lower quadrant abdominal pain (worse after eating, better after bowel movement or flatus). Patients may also have suprapubic or right lower quadrant pain.
- Nausea and vomiting
- Diarrhea (25%–35%) or constipation (50%)
- Fever or chills
- Anorexia, nausea, vomiting
- Abdominal distention
- Peritonitis (rebound tenderness, guarding, rigidity, depressed bowel sounds)
- Rectal tenderness or mass (20%) on rectal examination

DIAGNOSTIC APPROACH

Differential Diagnosis

- Irritable bowel syndrome (IBS)
- Lactose intolerance
- Inflammatory bowel disease (ulcerative colitis, Crohn disease)
- Carcinoma of the colon
- Infectious colitis
- Appendicitis
- Ectopic pregnancy (in reproductive-age women)
- Tubo-ovarian abscess

Associated Conditions: Irritable bowel syndrome.

Workup and Evaluation

Laboratory: Complete blood count, sedimentation rate, urinalysis with culture. Elevated C-reactive protein and a mild leukocytosis common but not diagnostic.

Imaging: Barium enema generally demonstrates diverticulosis. Computed tomography has high sensitivity and specificity for acute diverticulitis. Magnetic resonance imaging (MRI) and ultrasonography can play a role in documenting acute disease or abscess formation. Supine and upright abdominal radiograph may demonstrate free air in the peritoneal cavity if rupture has occurred.

Special Tests: Colonoscopy or flexible sigmoidoscopy.

Diagnostic Procedures: History and physical examination, imaging, or endoscopy. A palpable, tender left lower quadrant mass may be present in up to 20% of patients.

Pathologic Findings

Herniation of colon mucosa through the muscularis, usually at the site of a perforating artery (vasa recta) lying between two layers of serosa in the mesentery. Increased thickness of the muscular wall and narrowing of the gut lumen. With inflammation, necrosis and perforation occur.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: For diverticulosis—increased dietary fiber, stool softeners. Fiber supplements may be considered. For diverticulitis—evaluation, possible hospitalization (2%–5% of patients).

Specific Measures: Patients with diverticulitis may become acutely ill with sepsis, toxicity, and peritonitis. These patients require hospitalization, fluid support, and aggressive antibiotic treatment. Surgical resection may be considered in patients with multiple attacks, fistulae, or abscesses that do not respond to medical therapy.

Diet: Increased dietary fiber is desirable both as a preventive measure and to decrease the risk of complications in established disease. Patients who are acutely ill should receive nothing by mouth.

Activity: No restriction. Activity is encouraged to foster normal bowel function.

Patient Education: Reassurance, counseling regarding diet and the need for periodic flexible sigmoidoscopy or colonoscopy screening.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Healthy Eating, 2020
- Problems of the Digestive System, 2014

Drug(s) of Choice

- Antispasmodics and adjuncts—hyoscyamine (Levsin) 0.125 mg PO one to two every 4 hours for 12-24 hours); buspirone (BuSpar) 15–30 mg PO daily.
- Antibiotics (ambulatory)—ciprofloxacin (500 mg PO twice daily) plus metronidazole (500 mg PO three times daily); amoxicillin-clavulanate (875/125 mg twice daily) is an acceptable alternative.
- Symptomatic control of diarrhea or constipation as needed.

Contraindications: See individual agents. Contraindications to flexible sigmoidoscopy: absolute—active diverticulitis, acute abdomen, blood dyscrasia, or coagulopathy; cardiopulmonary disease (acute or severe); inadequate bowel preparation; subacute bacterial endocarditis or prosthetic heart valve without adequate antibiotic prophylaxis; suspected bowel perforation; relative—active infection, peritonitis, pregnancy, recent abdominal surgery.

Precautions: If narcotic pain relievers are needed, meperidine (Demerol) is preferred; others should be avoided because they cause changes in bowel motility. Aminoglycosides may be associated with renal toxicity.

Interactions: See individual agents.

Alternative Drugs

Tobramycin may be used in combination with metronidazole.

Follow-Up

Patient Monitoring: Normal health maintenance. Monitor for development of symptoms; perform routine flexible sigmoidoscopy and fecal occult blood screening.

Prevention/Avoidance: High-fiber diet and good bowel habits.

Possible Complications: Diverticulitis develops in 5% of patients with diverticulosis each year; lifetime risk is 50%. Enterocutaneous, enterovaginal, and perirectal fistulae may occur. Acutely, hemorrhage, perforation, abscess formation, peritonitis (with toxicity and collapse), and bowel obstruction may occur.

Expected Outcome: With early detection and dietary change, the prognosis is good. With aggressive management of the first episode of diverticulitis, two-thirds of patients do not have a recurrence. Up to 20% of those with rectal bleeding caused by diverticular disease have a recurrence of bleeding.

MISCELLANEOUS

Pregnancy Considerations: No direct effect on pregnancy; uncommon in reproductive-age women.

ICD-10-CM Codes: K57.30 (Diverticulosis of large intestine without perforation or abscess without bleeding), K57.32 (Diverticulitis of large intestine without perforation or abscess without bleeding).

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35 DOMESTIC VIOLENCE (INTIMATE PARTNER VIOLENCE)

INTRODUCTION

Description: Domestic violence (domestic abuse) is a pattern of behavior that involves violence or other abuse by one person against another in a home or family setting. It may include physical, verbal, emotional, economic, and sexual abuse, which can range from subtle, coercive forms, to overt acts (see Chapter 19, Abuse: Physical and Sexual).

Prevalence: Over 32 million women in the United States have experienced intimate partner violence (IPV) and 43 million women have experienced psychologic aggression by an intimate partner in their lifetime. Approximately 1 in 3 women have experienced some form of physical violence by an intimate partner, including a range of behaviors (eg, slapping, shoving, pushing). Roughly 1 in 4 women have been victims of severe physical violence (eg, beating, burning, strangling) by an intimate partner in their lifetime. Lifetime estimates for IPV involving women in the United States range from 22% to 39%. IPV accounts for 15% of all violent crime.

Predominant Age: Most common during the early reproductive years, though elder abuse constitutes a special case.

Genetics: Male-to-female ratio is 1:5+. A wife or female partner is more commonly the victim of such violence.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown

Risk Factors: Childhood physical or sexual victimization, prior history of IPV, alcohol or drug use, lower socioeconomic status, unemployment. Women with an unintended pregnancy have a higher risk (3-fold greater in one study).

SIGNS AND SYMPTOMS

- Direct signs of physical violence, often inconsistently or inconsistently explained
- Delay in seeking treatment
- Frequent emergency room visits
- Vague somatic complaints ("hidden agenda")
- Inappropriate affect/poor eye contact
- Overly attentive or verbally abusive partner
- Social withdrawal
- Anxiety or depression

DIAGNOSTIC APPROACH

Differential Diagnosis

- Mood disorders (anxiety or depression independent of abuse)
- Poor health literacy
- Somatization

Associated Conditions: High-risk sexual behaviors, poor compliance (medical and contraceptive), substance abuse.

Workup and Evaluation

Laboratory: No evaluation indicated.

Imaging: Based upon injuries sustained only.

Special Tests: Screening for anxiety or depression is often warranted.

Diagnostic Procedures: History and physical examination. Several short questionnaires have been developed to assist screening: HITS (Hurt, Insult, Threaten, Scream), STaT (Slapped, Threatened, and Throw), HARK (Humiliation, Afraid, Rape, Kick), WAST (Woman Abuse Screen Tool), and SAFE (Stress/Safety, Afraid/Abused, Friend/Family, Emergency Plan).

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Support, survivor safety, survivor empowerment, perpetrator accountability. If significant risk factors are present, a safety plan should be implemented (an emergency kit with important documents, keys, money, and other essential items including cash, a place to go, signal to alert children or neighbors to call for help).

Specific Measures: Ensure that the patient has access to resources and escape plans.

Diet: No specific dietary recommendations.

Activity: No restriction, activity encouraged.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Intimate Partner Violence, 2020

Drug(s) of Choice

Only as needed for sequelae such as anxiety or depression. Analgesics for injuries as needed.

Contraindications: See individual agents.

Precautions: See individual agents.

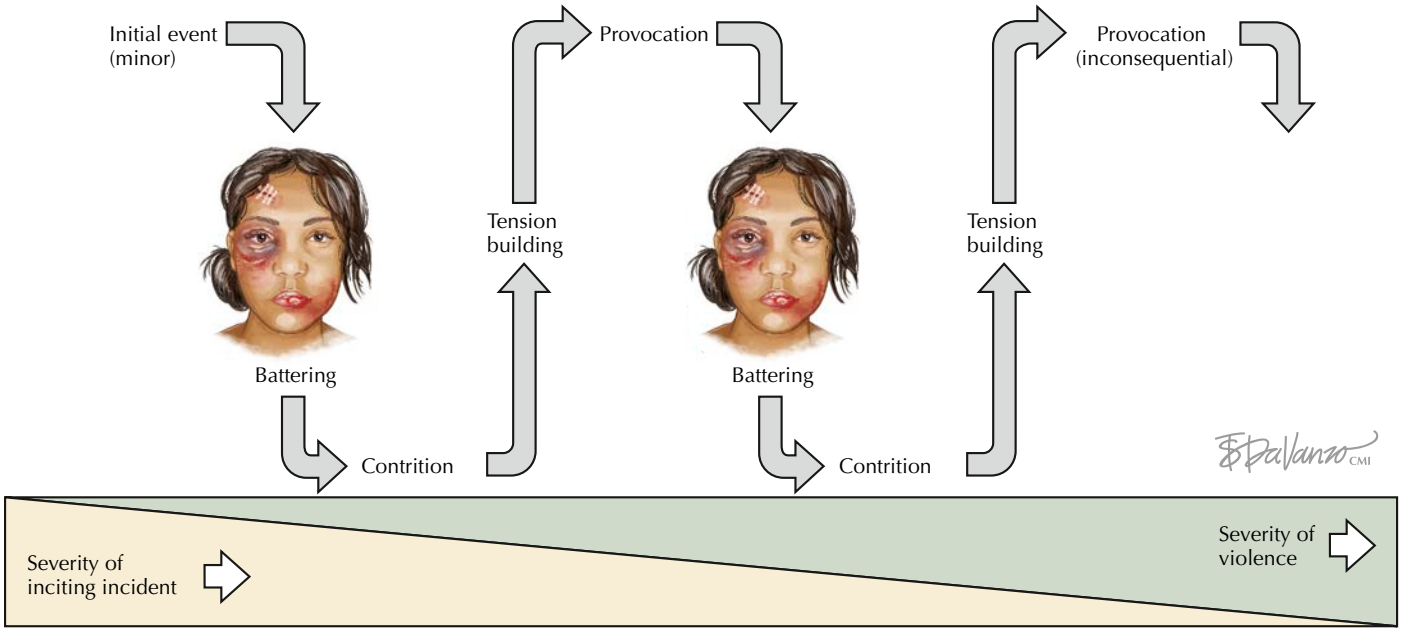
FOLLOW-UP

Patient Monitoring: Normal health maintenance, frequent screening for abuse.

Prevention/Avoidance: None.

Possible Complications: Escalating violence with increasing frequency and severity of injury or possibility of death (in 2018, partner violence accounted for 20% of all violent crime in the United States). Headache, anxiety, depression, sleep disturbances, social isolation, eating disorders, and low self-esteem.

Expected Outcome: Violence tends to escalate with time unless the victim is removed from the setting.



Cycle of abuse is characterized by progressively smaller incidents inciting progressively greater violence interspersed with periods of remorse.

Figure 35.1 Abuse cycle

MISCELLANEOUS

Pregnancy Considerations: Outside of any injuries sustained, no effect on pregnancy. Domestic violence often begins or increases during pregnancy and the postpartum period. Injuries to the abdomen increase during pregnancy. The dangers of physical violence during pregnancy may include:

- Stillbirth
- Pelvic fracture
- Placental abruption
- Fetal injury
- Preterm delivery
- Low birth weight

ICD-10-CM Codes: Z91.410 (Personal history of adult physical and sexual abuse), T74.11 (Current adult physical abuse, confirmed), Z91.419 (Personal history of unspecified adult abuse).

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DYSMENORRHEA: PRIMARY AND SECONDARY

36

INTRODUCTION

Description: Primary dysmenorrhea is painful menstruation without a clinically identifiable cause. Secondary dysmenorrhea is recurrent menstrual pain resulting from a clinically identifiable cause or abnormality.

Prevalence: Of all women, 10%–15% are unable to function because of pain; 90% have discomfort with at least one cycle.

Predominant Age: Late teens to early 30s (primary), prevalence follows the occurrence of underlying conditions for secondary dysmenorrhea. Dysmenorrhea that begins after the age of 25 years is most often secondary.

Genetics: No genetic pattern, although some suggest a familial pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Primary—increased production of prostaglandin F2α (PGF2α) resulting in increased uterine contractions (dysrhythmic) and markedly elevated intrauterine pressures (up to 400 mm Hg); possible increased sensitivity to PGF2α as well. Secondary—uterine (adenomyosis, cervical stenosis, and cervical lesions), congenital abnormalities (outflow obstructions, uterine anomalies), infection (chronic endometritis), intrauterine contraceptive devices, myomas (generally intracavitary or intramural), polyps; extrauterine (endometriosis [most common], inflammation, and scarring [adhesions]); nongynecologic causes (musculoskeletal, gastrointestinal, urinary); "pelvic congestive syndrome" (debated); psychogenic (rare); tumors (myomas, benign or malignant tumors of ovary, bowel, or bladder).

Risk Factors: None known.

SIGNS AND SYMPTOMS

- Primary—crampy, midline, lower abdominal pain (often demonstrated by a fist opening and closing)
- Nausea, vomiting, and diarrhea are common.
- Syncope
- Headache
- Secondary—midline lower abdominal or low back pain accompanying menstruation
- Pelvic heaviness or pressure
- Symptoms specifically associated with the underlying condition

DIAGNOSTIC APPROACH

Differential Diagnosis

- Endometriosis (especially when acyclic pain is present)
- Irritable bowel syndrome
- Inflammatory bowel disease
- Somatization (rare)
- Abrupt onset of painful menstruation should suggest the possibility of a complication of pregnancy (abortion or ectopic pregnancy).

Associated Conditions: Menorrhagia is commonly associated. The prevalence of depression and premenstrual syndrome (premenstrual dysphoric disorder) increases with increasing severity of dysmenorrhea symptoms.

Workup and Evaluation

Laboratory: Infrequently required, based on suspected or confirmed cause.

Imaging: For selected patients with secondary dysmenorrhea, ultrasonography of the pelvic organs may be indicated.

Special Tests: None indicated. Sigmoidoscopy may be helpful in selected patients with secondary dysmenorrhea.

Diagnostic Procedures: The absence of abnormality on pelvic examination, combined with historical characteristics, is diagnostic of primary dysmenorrhea. A pelvic examination that reveals a possible cause defines secondary dysmenorrhea.

Pathologic Findings

Based on the causative condition.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Rest, analgesics (nonsteroidal antiinflammatory agents or pain relievers), heat (heating pad, hot water bottle, self-heating pads [ThermaCare]).

Specific Measures: Primary—medical management most effective; heat (heating pad, hot water bottle, or self-heating pads [ThermaCare]) appears comparable to medical management for many; transcutaneous electrical nerve stimulation (TENS) is effective for selected patients; biofeedback has been suggested, but success has been poor or variable. Secondary—measures directed toward the underlying pathologic condition; modification of periods (oral contraceptives [including long-cycle and continuous], menstrual suppression [depot medroxyprogesterone acetate, gonadotropic-releasing hormone agonists [with add-back]); surgery for specific pathologic conditions.

Diet: No specific dietary changes indicated.

Activity: No restriction; based on patient comfort. Some studies have suggested that noncompetitive sports can provide some relief.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Dysmenorrhea - Painful Periods, 2020
- Your First Gynecologic Visit - Especially for Teens, 2018
- Your First Period - Especially for Teens, 2018

American College of Obstetricians and Gynecologists Patient Education Pamphlets related to underlying causes:

- Chronic Pelvic Pain, 2014
- Endometriosis, 2021
- Pelvic Inflammatory Disease, 2019
- Uterine Fibroids, 2020

Drug(s) of Choice

- Primary—nonsteroidal antiinflammatory drugs (NSAIDs): ibuprofen 800 mg, two at onset of flow and one every 4–6 hours prn for pain; naproxen sodium 275 mg, two at onset of flow and one every 6–8 hours prn for pain; meclofenamate 100 mg, one at onset of flow and one every 4–6 hours prn for pain, mefenamic acid 250 mg, two at onset of flow and one every 4–6 hours prn for pain. Long-cycle or continuous use of combined oral contraceptives can be appropriate for many.
- Secondary—based on pathophysiologic condition. NSAIDs or analgesics may be used.

Contraindications: Aspirin-sensitive asthma, ulcers, inflammatory bowel disease.

Precautions: Some patients experience increased stomach upset with NSAIDs, but this may be reduced by taking them with food. Opioids, including tramadol, should not be used as a treatment for adolescents with dysmenorrhea.

Interactions: Other over-the-counter pain relievers containing NSAID compounds.

Alternative Drugs

Other rapidly acting NSAIDs may be used. Combination oral contraceptives generally provide milder periods (and contraception if necessary). Centrally acting analgesics may be added with care to avoid interaction with NSAIDs. Suppression of menstruation (depot medroxyprogesterone acetate, gonadotropin-releasing hormone [GnRH] agonists, long-cycle, or continuous use of combined oral contraceptives, contraceptive patches, rings, or rods) may be indicated for patients with severe pain. Levonorgestrel-containing intrauterine contraceptive devices generally provide lighter or absent menses.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.

Possible Complications: Most commonly side effects of medication. Anemia (if menorrhagia is present), others based on underlying cause.
Expected Outcome: Primary dysmenorrhea—significant relief of symptoms with medical therapy. If medical therapy does not produce pronounced improvement within 3–6 cycles, the diagnosis should be re-evaluated. The prevalence of primary dysmenorrhea declines with time. Secondary dysmenorrhea—based on cause and mode of therapy, resolution of symptoms is generally possible with NSAIDs, analgesics, or period modification.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: N94.6 (Dysmenorrhea, unspecified), (others based on underlying cause).

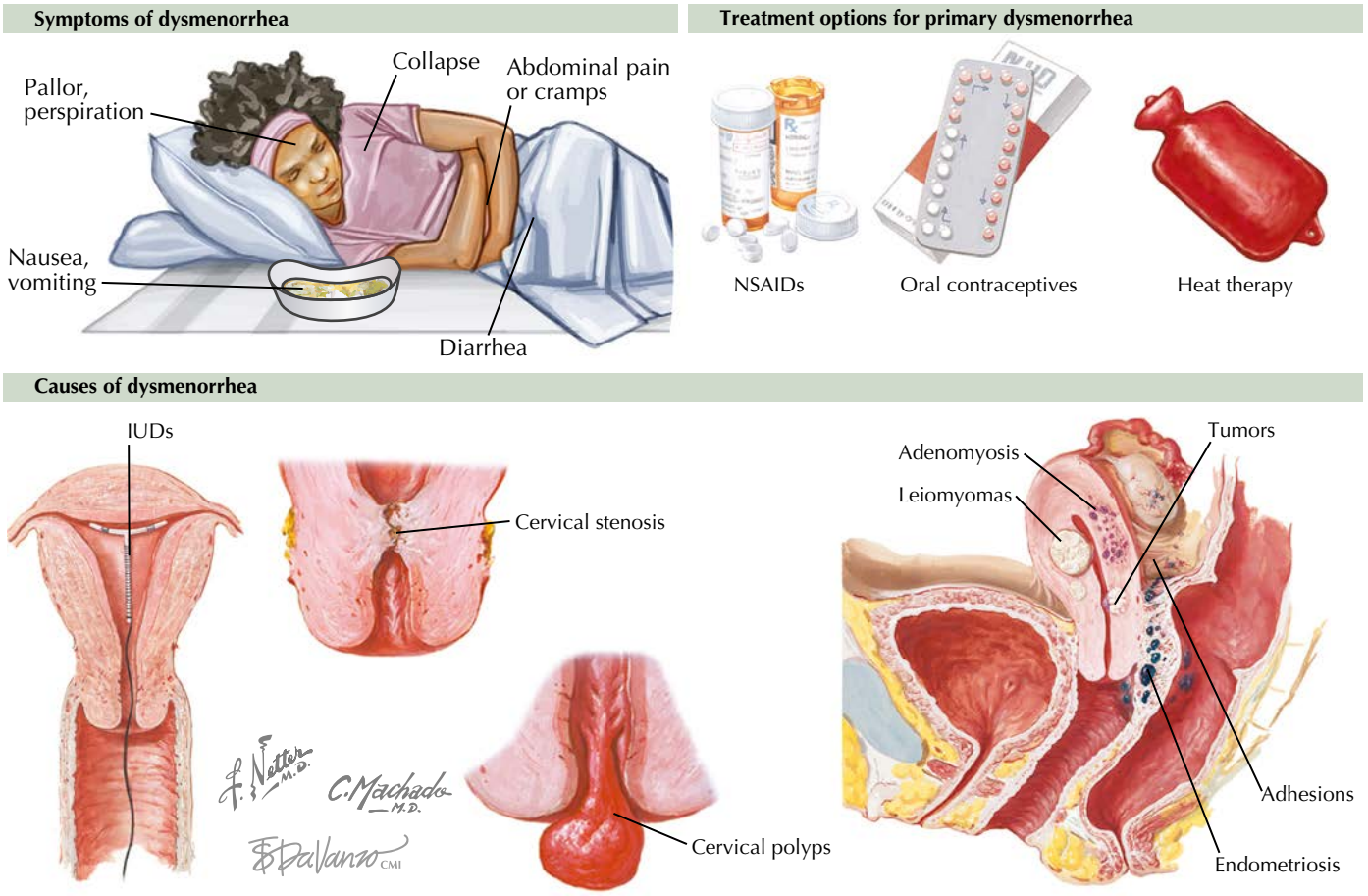

Figure 36.1 Symptoms and possible causes of dysmenorrhea

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DYSPAREUNIA: DEEP THRUST

37

INTRODUCTION

Description: Abdominal, pelvic, or vaginal pain that arises during sexual thrusting, especially with deep penetration.
Prevalence: Approximately 15% of women each year (severe—less than 2% of women).
Predominant Age: Reproductive age and beyond.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes

Gynecologic—extrauterine (adhesions, chronic pelvic infection, cysts, endometriosis, pelvic relaxation [cystocele, urethrocele, rectocele, enterocele], prolapsed adnexa or adnexa adherent to vaginal apex, retained ovary syndrome, shortening of the vagina after surgery or radiation); uterine (adenomyosis, fibroids, malposition [retroversion]).
Urologic—chronic urinary tract infection, detrusor dyssynergia, interstitial cystitis, urethral syndrome.
Gastrointestinal—chronic constipation, diverticular disease, inflammatory bowel disease (Crohn disease, ulcerative colitis), irritable bowel syndrome.
Musculoskeletal—fibromyositis, hernias (abdominal, femoral), herniated disk.
Other—inadequate arousal (failure of vaginal apex expansion), pelvic tumors (benign or malignant). Care must be taken to avoid labeling any dyspareunia as purely physical or purely emotional in origin. Most often a mixture of factors causes or contributes to the problem.
Risk Factors: Positions or practices that result in particularly deep or forceful penetration, such as male superior or rear-entry positions. Prior surgery, particularly following mesh placement for pelvic organ prolapse, or cosmetic procedures such as "vaginal rejuvenation."

SIGNS AND SYMPTOMS

Ache-like pain, crampy visceral pain, burning, a sense of fullness, or a feeling as if something is being bumped during deep sexual thrusting. Occasionally, the pain is sharp and abrupt in character. Pain often depends on the type of sexual activity involved or the positions used.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Vulvitis
- Vestibulitis
- Vaginitis
- Bartholin gland infection, abscess, cyst
- Atrophic change
- Anxiety, depression, phobia
- Sexual or other abuse
- Pelvic mass (uterine leiomyomata, ovarian cyst)
- Shortening of the vagina after surgery or radiation

Associated Conditions: Vaginismus, orgasmic dysfunction.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated, pelvic (abdominal or transvaginal) ultrasonography for specific indications.
Special Tests: None indicated.
Diagnostic Procedures: History (general and sexual) and careful pelvic examination. (If discomfort is produced, it is important to be sure that the sensation matches that experienced during intercourse.)

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, reassurance, relaxation measures.
Specific Measures: Because dyspareunia is ultimately a symptom, the specific therapy for any form of sexual pain is focused on

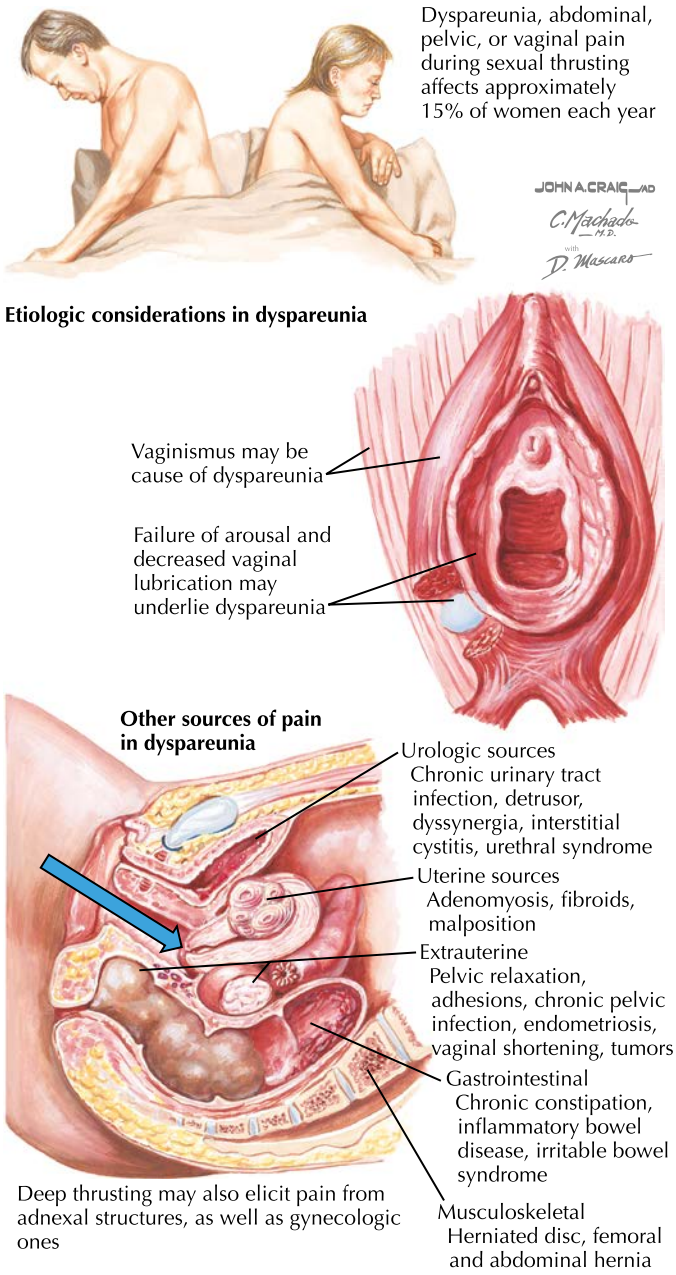

Figure 37.1 Etiologic considerations and other source of pain in dyspareunia

the underlying cause. Vaginal lubricants (water-soluble or long-acting agents such as Astroglide, Replens, Lubrin, and K-Y Jelly), local anesthetics (for vulvar lesions), or pelvic relaxation exercises may be appropriate while more specific therapy is under way.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education: Reassurance, relaxation training, alternative sexual positions and forms of expression.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Your Sexual Health, 2019
- You and Your Sexuality - Especially for Teens, 2015
- When Sex is Painful, 2020

Drug(s) of Choice

The judicious use of anxiolytics or antidepressant medications for selected patients may be appropriate but for short periods of time only.

ALTERNATIVE THERAPIES

Modifying sexual techniques used by the couple may reduce pain with intercourse. Delaying penetration until maximal arousal has been achieved improves vaginal lubrication, ensures vaginal apex expansion, and provides an element of control for the female partner. Sexual positions that allow women to control the direction and depth of penetration (such as woman astride) also may be helpful.

FOLLOW-UP

Patient Monitoring: Normal health maintenance. Watch for signs of abuse, anxiety, or depression.

Prevention/Avoidance: None.

Possible Complications: Marital discord, orgasmic or libidinal dysfunction.

Expected Outcome: With diagnosis and treatment of the underlying cause, response should be good.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. Occasionally, the coital changes necessitated by the growing uterus may result in new-onset dyspareunia. Positional changes (as noted earlier) are generally sufficient to relieve these cases.

ICD-10-CM Codes: N94.1 (Dyspareunia).

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DYSURIA

38

INTRODUCTION

Description: Dysuria is the painful passage of urine (symptom, not diagnosis).
Prevalence: Common in women; 10%–20% of women per year. One-third of women during their lifetime.
Predominant Age: Any increases with age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Infection and inflammation in the urethra and suburethral tissues. (Inflammation of the bladder causes urgency; inflammation of the urethra causes dysuria.) Most urinary tract infections in women ascend from contamination of the vulva and meatus acquired via instrumentation, trauma, or sexual intercourse. (A history of intercourse within the proceeding 24–48 hours is present in up to 75% of patients with acute urinary tract infection.) Coliform organisms, especially *Escherichia coli,* are the most common organisms responsible for asymptomatic bacteriuria, cystitis, and pyelonephritis. Ninety-five percent of first infections and 80% of recurrent infections are caused by *E. coli,* with between 10% and 20% resulting from *Staphylococcus saprophyticus.* Infection with other pathogens such as *Klebsiella* species (5%) and *Proteus* species (2%) accounts for most of the remaining infections. Infection with *Neisseria gonorrhoeae, Chlamydia trachomatis, Mycoplasma,* and *Ureaplasma* all should be considered when urethritis is suspected. Chemical irritation, allergic reactions, or vulvitis may all produce dysuria symptoms.
Risk Factors: Sexual activity, instrumentation, more virulent pathogens, altered host defenses, infrequent or incomplete voiding, foreign body or stone, obstruction, or biochemical changes in the urine (diabetes, hemoglobinopathies, pregnancy), estrogen deficiency, diaphragm use, spermicides.

SIGNS AND SYMPTOMS

- Painful urination
- Frequency, urgency, nocturia (commonly associated and indicate irritation of the bladder wall)
- Pelvic pressure or suprapubic pain (if cystitis is present)
- Pyuria (more than five white blood cells per high-power field in a centrifuged specimen, most prominent in first one-third of voided specimen) or hematuria

DIAGNOSTIC APPROACH

Differential Diagnosis

- Cystitis
- Traumatic trigonitis
- Urethral syndrome
- Interstitial cystitis
- Bladder tumors or stones
- Vulvitis and vaginitis (may give rise to external dysuria as in herpetic vulvitis)
- Urethral diverticulum
- Infection in the Skene's glands
- Detrusor instability

Associated Conditions: Dyspareunia, cystitis, urinary urgency.

Workup and Evaluation

Laboratory: Nonpregnant women with a first episode of dysuria suggestive of urinary tract infection do not need laboratory confirmation of the diagnosis; they may be treated empirically. (Data suggest that this may be an acceptable strategy for women with fewer than three episodes per year, who lack fever or flank pain, and have not been treated recently for the same symptoms.) For others, urinalysis and culture should be performed. For uncentrifuged urine samples, the presence of more than one white blood cell per high-power field is 90% accurate for detecting infection. "Dipstick" point of care testing of a clean-voided sample demonstrating leukocyte esterase, nitrite, or bacteria is supportive of the clinical diagnosis, though not diagnostic. (False positive nitrite tests can occur with substances that turn the urine red, such as the bladder analgesic phenazopyridine or ingestion of beets.)
Imaging: No imaging indicated.
Special Tests: A sterile swab inserted into the urethra also may be used to obtain material for culture. Urine culture is helpful if there is reason to suspect antimicrobial resistance.
Diagnostic Procedures: History and physical examination, urinalysis. (Gentle pressure beneath the urethra or bladder trigone will often reproduce the patient's symptoms when significant urethritis is present.)

Pathologic Findings

Pyuria (hematuria may be present as well).

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Fluids, frequent voiding, and antipyretics. Urinary acidification (with ascorbic acid, ammonium chloride, or acidic fruit juices) and urinary analgesics (phenazopyridine [Pyridium]) also may be added based on the needs of the individual patient.
Specific Measures: Antibiotic therapy when infection is suspected.
Diet: Increased fluids and reduction of caffeine.
Activity: No restriction.
Patient Education: Reassurance.

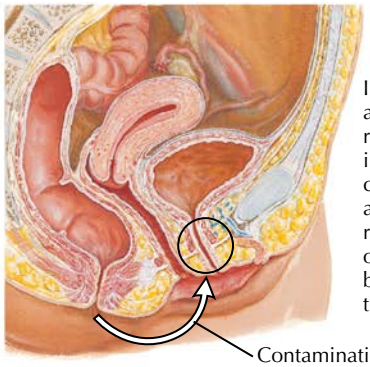
American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Urinary Tract Infections, 2020

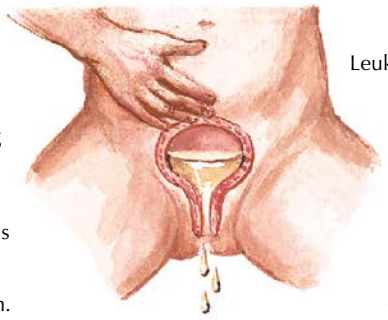
Drug(s) of Choice (Nonpregnant Patients)

- **Single-dose therapy:** amoxicillin 3 g; ampicillin 3.5 g; a first-generation cephalosporin 2 g; nitrofurantoin 200 mg; sulfisoxazole 2 g; trimethoprim 400 mg; trimethoprim/sulfamethoxazole (320/1600 mg); fosfomycin (3 g single dose).
- **Three- to seven-day therapy:** amoxicillin 500 mg every 8 hours; a first-generation cephalosporin 500 mg every 8 hours; ciprofloxacin 250 mg every 12 hours; nitrofurantoin 100 mg every 12 hours; norfloxacin 400 mg every 12 hours; ofloxacin 200 mg every 12 hours; sulfisoxazole 500 mg every 6 hours; tetracycline 500 mg every 6 hours; trimethoprim/sulfamethoxazole 160/800 mg every 12 hours; trimethoprim 100 (200) mg every 12 hours.

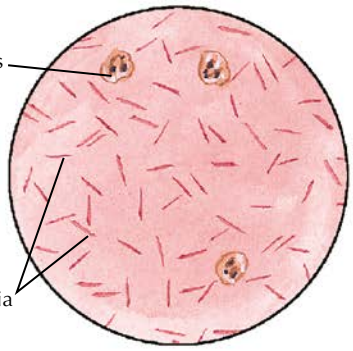
Contraindications: Known or suspected hypersensitivity.
Precautions: Urinary analgesics (phenazopyridine [Pyridium]) should be used for no longer than 48 hours and may stain some types of contact lenses.
Interactions: See individual medications.



Inflammation of urethra and suburethral tissue resulting from ascending infection caused by contamination of vulva and meatus are often responsible for symptoms of dysuria. Coliform bacteria are most often the responsible organism.

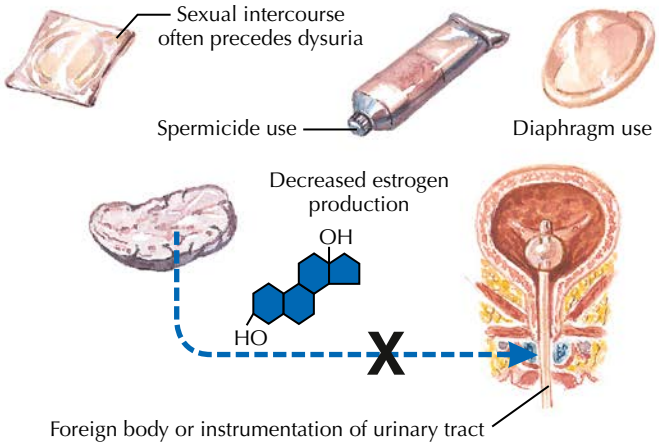


Painful urination, frequency, and urgency are common symptoms of dysuria



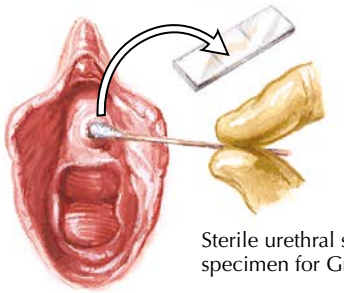
Bacteriuria and pyuria are common findings on urine examinations

Risk factors



Evaluation

First episode in a nonpregnant patient does not require laboratory confirmation; others should have culture and urinalysis



Sterile urethral swab may be used to obtain specimen for Gram stain and culture

Figure 38.1 Risk factors and evaluation of dysuria

Alternative Drugs (Pregnant Patients)

- Seven-day therapy—amoxicillin 500 mg every 8 hours; a first-generation cephalosporin 500 mg every 6 hours; nitrofurantoin 100 mg every 12 hours.

FOLLOW-UP

Patient Monitoring: No follow-up is necessary after single-dose treatment or after multiday treatment for nonpregnant women who experience resolution of their symptoms. Cure for all other patients should be confirmed by urinalysis and culture. Recurrent lower tract infections require prompt evaluation. Possible causes include incorrect or incomplete (eg, noncompliant) therapy, mechanical factors (such as obstruction or stone), or compromised host defenses.

Prevention/Avoidance: Frequent voiding, adequate fluid intake, voiding after intercourse.

Possible Complications: Urethral syndrome and interstitial cystitis. Bacteremia, septic shock, acute respiratory distress syndrome, and other serious sequelae are associated with pyelonephritis.

Expected Outcome: For most patients, symptoms (when resulting from infection) should resolve within 2–3 days after the initiation of therapy.

MISCELLANEOUS

Pregnancy Considerations: Those at high risk (eg, patients with diabetes) should be monitored carefully to avoid urethritis, cystitis, and ascending infection.

ICD-10-CM Codes: R30.0 (Dysuria), R30.9 (Painful micturition, unspecified), and O23.40 (Unspecified infection of urinary tract in pregnancy, unspecified trimester).

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EATING DISORDERS: ANOREXIA NERVOSA AND BULIMIA

39

INTRODUCTION

Description: Anorexia nervosa is a syndrome characterized by an altered body image, significant weight loss, and amenorrhea that are not caused by physical disease. Bulimia is an eating disorder characterized by an altered body image and recurrent binge eating, with or without purging, through self-induced vomiting, laxative abuse, or diuretics. Exercise excess is often a part of after-binge behavior. Both affect more women than men.

Prevalence: Females, 1%–3%; 3-fold greater prevalence in women than in men. Subclinical eating disorders are common in university populations.

Predominant Age: Teens to early 20s, median onset at 18 years of age.

Genetics: A study of Finnish twins found a higher lifetime prevalence of 2.2% vs. a background rate of 0.3%–1.0%. A locus on chromosome 12 (rs4622308) has been associated with anorexia nervosa.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown (emotional). Abnormal functioning of corticolimbic circuits involved in appetite may contribute to anorexia nervosa. Deficits have been found in dopaminergic function (dopamine is considered to be involved with eating behavior, motivation, and reward) and serotonergic function (serotonin may be involved with mood, impulse control, and obsessional behavior).

Risk Factors: Anorexia nervosa—perfectionistic personality (high expectations, personal, or external). Bulimia—impulsive character, low self-esteem, stress (eg, multiple responsibilities, tight schedules), early puberty. At high risk for both: dancers, models, cheerleaders, and athletes.

SIGNS AND SYMPTOMS

- Insidious onset (occasionally stress related)
- Significant weight loss (15% below expected weight, average body mass index = 16 kg/m^2)
- Denial of problem
- Preoccupation with weight or body image
- Anorexia nervosa—impression of obesity rather than objective view of weight
- Reduced food intake or refusal (often associated with elaborate eating rituals)
- Intense fear of gaining weight
- Excessive exercise (marathon running)
- Bulimia—high-calorie binges followed by severe restriction
- Food collections or hoarding
- Medication abuse (laxatives, diuretics, ipecac, thyroid medication)
- Dental erosion and scarred knuckles (secondary to finger-induced vomiting)
- Amenorrhea is common but not required for the diagnosis

DIAGNOSTIC APPROACH

Differential Diagnosis

- Wasting disease (tumors)
- Depression
- Hypothalamic tumor
- Food phobia
- Gastrointestinal disease
- Other emotional disorders (conversion disorder, schizophrenia, body dysmorphic disorder)

Associated Conditions: Major depressive disorder (50%–75% of patients), obsessive–compulsive disorders (10%–13%), bipolar disorder, attention deficit hyperactivity disorder (20%), alcohol use disorder (20%), sexual disinterest, growth arrest, hypotension and bradycardia, myocardial atrophy or fibrosis, mitral valve prolapse, gastroparesis, constipation, hypothermia, and peripheral edema. Prolonged amenorrhea is associated with an increased risk of osteoporosis, which may not be reversible. Bulimia—social phobia and anxiety disorders, substance abuse, and shoplifting are common.

Workup and Evaluation

Laboratory: No evaluation specific for anorexia. For patients with bulimia there may be laboratory changes consistent with repeated vomiting (hypokalemia, hypomagnesemia, or hypochloremia).

Imaging: No imaging indicated.

Special Tests: Assessment of body fat. Several short screening questions have been validated to assist with the diagnosis.

Diagnostic Procedures: History and physical examination, Eating Attitudes Test.

Pathologic Findings

Anorexia nervosa—dry, cracked skin; sparse scalp hair; fine lanugo hair on extremities, face, and trunk; arrested maturation; pathologic fractures; cognitive defects. Bulimia—eroded dental enamel, esophagitis, Mallory–Weiss tears, parotid enlargement, gastric dilation.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Psychologic evaluation and support, supervised eating and exercise program, progressive increase in calories and activity as weight is regained (anorexia), limit access to bathroom for 2 hours after eating (bulimia).

Specific Measures: All patients should be evaluated for medical complications. Hospitalization may be required, including intensive psychologic assessment and therapy. Tube feedings and intravenous fluids may be required for patients with anorexia.

Diet: Supervised program of re-education and behavior modification. For patients with anorexia, a gradual increase in caloric intake as part of a supervised program of re-education and behavior modification.

Activity: Stepwise increase based on weight change, avoiding goal-oriented activities.

Patient Education: Nutritional instruction, assistance with a food log.

- American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Healthy Eating, 2020
- Staying Active: Physical Activity and Exercise, 2021
- Weight Control: Eating Right and Keeping Fit, 2021

Drug(s) of Choice

- Olanzapine 2.5–10 mg/day
- Risperidone (mean dose, 2.5 mg/day)
- Fluoxetine (Prozac) 10–60 mg PO daily

- Oxazepam 15 mg or alprazolam 0.25 mg PO before meals to reduce anxiety about weight gain

Contraindications: See specific agents.

Precautions: Starved patients tend to be more sensitive to medications or have compromised renal, cardiac, or liver function.

Alternative Drugs

- Imipramine (Tofranil) 10 mg gradually increased to 200 mg or desipramine (Norpramin) 25 mg gradually increased to 150 mg PO daily.
- Lithium (Eskalith) 300 mg PO twice daily gradually increased until blood level of 0.6–1.2 mEq/L if bipolar disorder is present.
- Cisapride (Propulsid) 10–20 mg before meals to increase gastric emptying.
- Psyllium (Metamucil) 1 tablespoon every night to prevent constipation.

FOLLOW-UP

Patient Monitoring: Periodic weight measurements (weekly until stable, then monthly). Monitor for depression or suicidal ideation.

Prevention/Avoidance: Encourage healthy attitudes about weight, eating, and exercise; enhance self-esteem; and reduce stress.

Possible Complications: Drug and alcohol use/abuse, suicide, cardiac arrhythmia or arrest (potassium depletion), cardiomyopathy, suicide, necrotizing colitis, osteoporosis and osteoporotic fractures. Depression is common.

Expected Outcome: Highly variable, but often prolonged with relapses common; better outcome with inpatient care. Bulimia may spontaneously remit.

MISCELLANEOUS

Pregnancy Considerations: Amenorrhea and infertility common in women with anorexia. For women with bulimia, the binge-purge cycle may affect fetal nutrition and growth when the behavior persists during pregnancy. Pregnancy is possible even in the presence of amenorrhea. Therefore, contraception should be offered to all women at risk.

ICD-10-CM Codes: F50.00 (Anorexia nervosa, unspecified) and Z87.898 (Bulimia-Personal history of other specified conditions).

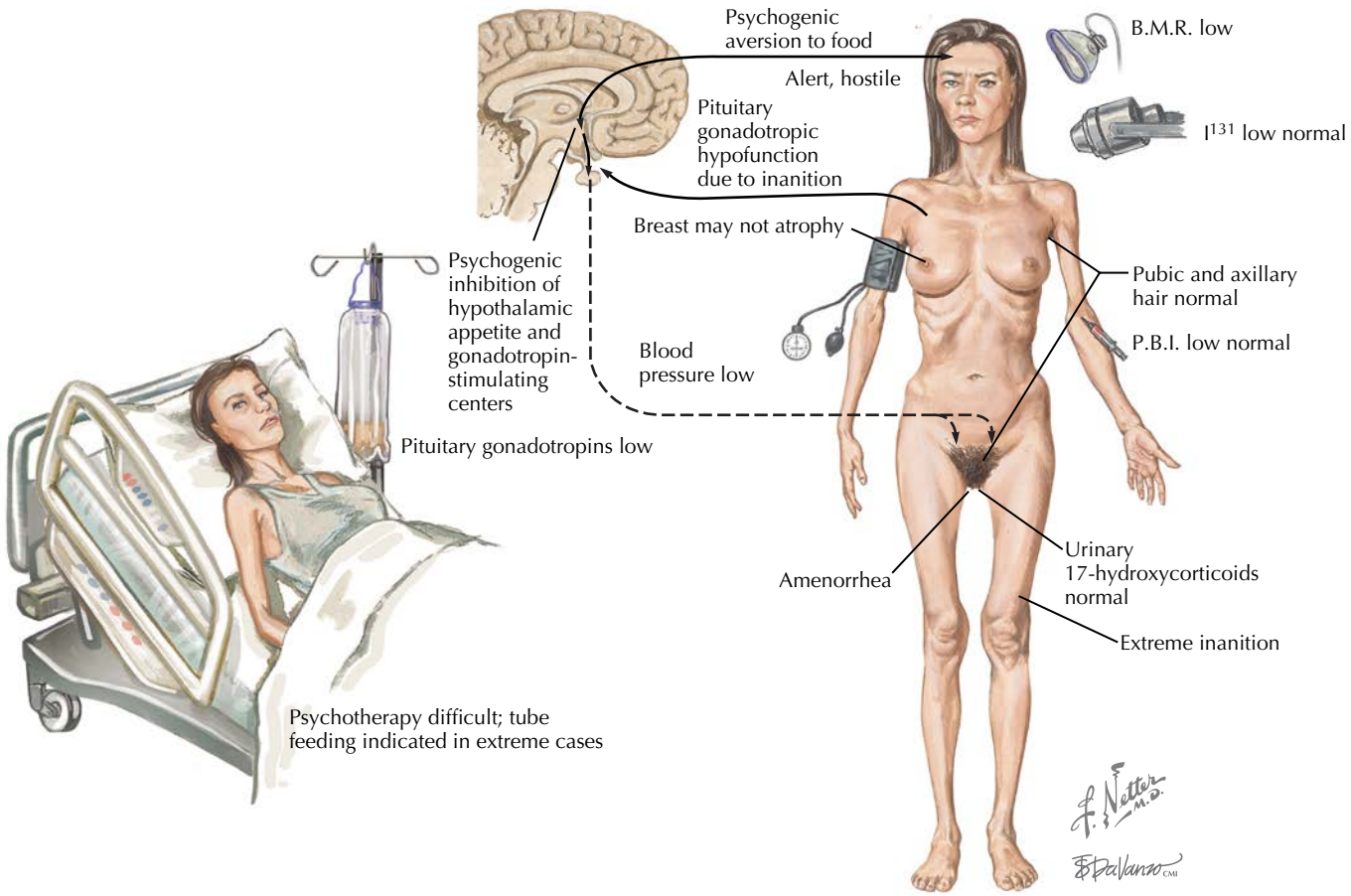

Figure 39.1 Anorexia nervosa

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FIBROMYALGIA

40

INTRODUCTION

Description: Fibromyalgia presents with chronic, widespread musculoskeletal pain, accompanied by fatigue, cognitive disturbance, psychiatric symptoms, and multiple somatic symptoms. Fibromyalgia is often associated with other conditions that may cause musculoskeletal pain, disruption of sleep, or psychiatric symptoms.

Prevalence: 1.75%–5% of the population, increases with age.

Predominant Age: 20–55 years. The most common cause of generalized, musculoskeletal pain in women of this age.

Genetics: A number of genes and enzyme systems have been implicated, but a direct unequivocal link remains to be established. Up to 6-fold greater prevalence in women than in men.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown, broadly considered to be a disorder of pain regulation.

Risk Factors: Sleep abnormalities, focal tissue abnormalities, including myofascial trigger points, ligamentous trigger points, or osteoarthritis of the joints and spine.

SIGNS AND SYMPTOMS

- Widespread musculoskeletal pain and fatigue (present for at least 3 months)
- Tenderness in multiple soft tissue locations
- Fatigue
- Sleep disorders
- Cognitive disturbances (problems with attention and difficulty with tasks that require rapid thought changes)
- Depression
- Headache
- Paresthesias

DIAGNOSTIC APPROACH

Differential Diagnosis

- Peripheral neuropathies, nerve entrapment
- Somatization
- Sleep disturbances
- Inflammatory and autoimmune rheumatologic disorders (eg, rheumatoid arthritis, lupus)
- Hypothyroidism
- Hyperparathyroidism
- Ankylosing spondylitis
- Osteoarthritis
- Inflammatory myositis
- Tendinitis and bursitis
- Statin myopathy
- Infectious mononucleosis
- Chronic fatigue syndrome (systemic exertion intolerance disease)
- Obstructive sleep apnea and restless legs

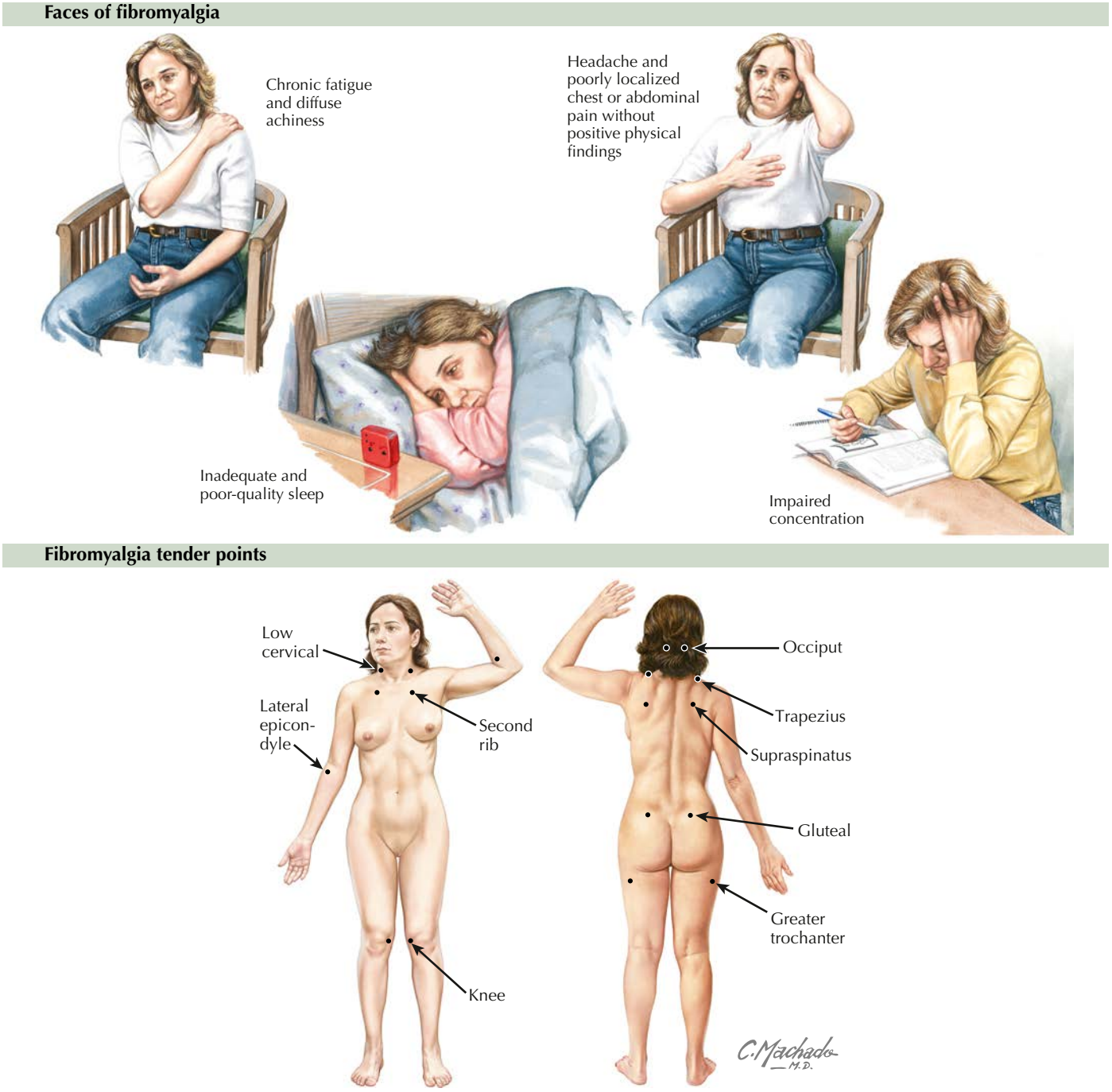

Figure 40.1 Fibromyalgia

Associated Conditions: Somatization, sleep disruptions, anxiety, depression, abdominal and chest wall pain, irritable bowel syndrome, migraine, palpitations, dyspnea, vulvodynia, dysmenorrhea, sexual dysfunction, weight fluctuations, night sweats, dysphagia, dysgeusia, and orthostatic intolerance.

Workup and Evaluation

Laboratory: No evaluation indicated except to rule out other possible causes.
Imaging: None indicated.
Special Tests: Screening for psychiatric conditions, including anxiety and depression, as indicated.
Diagnostic Procedures: History and physical examinations. Other than tenderness, no obvious abnormalities on physical examination. Diagnostic criteria require findings of at least 11 of 18 defined tender points.

Pathologic Findings

No specific findings. Despite symptoms of soft tissue pain, there is no tissue inflammation.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Reassurance, good sleep hygiene, an exercise program (including aerobic conditioning, stretching, and strengthening, and cardiovascular exercise), and cognitive–behavioral therapy.

Specific Measures: Consultations as indicated.
Diet: No dietary restrictions.
Activity: No restriction, activity encouraged.
Patient Education: Reassurance that the condition is real.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Back Pain During Pregnancy, 2020
- Chronic Pelvic Pain, 2014

DRUG(S) OF CHOICE

- Tricyclic medications, such as amitriptyline, and several selective serotonin and norepinephrine reuptake inhibitors (SSRIs and SNRIs, respectively), including duloxetine and milnacipran, have shown efficacy.
- Gabapentin and pregabalin also may be useful in selected patients.
- In patients unresponsive to or intolerant of amitriptyline or who have severe fatigue or depression in addition to pain, treatment with duloxetine instead of amitriptyline may be effective.
- Data do not favor any one approach over another.

Contraindications: See specific agents.
Precautions: Only a minority of patients experience substantial improvement with drug therapy, and adverse side effects are common.

FOLLOW-UP

Patient Monitoring: Normal health maintenance; close follow-up of symptoms and therapeutic response.
Prevention/Avoidance: None known.
Possible Complications: Progression of symptoms and the emergence of psychiatric disease.
Expected Outcome: Fair to good with exercise and sleep therapy. There is a slight improvement with the addition of pharmacologic agents.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: M79.7 (Fibromyalgia).

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GALLBLADDER DISEASE

41

INTRODUCTION

Description: Any diseases that involve the gallbladder, most commonly because of the formation of cholesterol stones. Obstruction can result in either acute or chronic cholecystitis, leading to serious, sometimes life-threatening complications such as a gallbladder rupture. Approximately 20% of patients with acute cholecystitis develop infection. Acalculous gallbladder disease or biliary dyskinesia (functional gallbladder disorder) occurs without the presence of gallstones. Sclerosing cholangitis has an unknown etiology and is associated with an enlarged liver or spleen, decreased appetite, and weight loss. Gallbladder cancer is uncommon. Xanthogranulomatous cholecystitis is a rare form of gallbladder disease that mimics gallbladder cancer, although it is not cancerous.
Prevalence: 10% of the population has some form of gallbladder disease. Cholangiocarcinomas and other bile duct tumors are rare (1–2/100,000 people; fewer than 5000 new cases per year in the United States).
Predominant Age: Older than 40 years.
Genetics: Ratio of women to men is 3:1 for gallstones. A mutation in the gene *ABCG8* significantly increases the risk of gallstones in an individual.

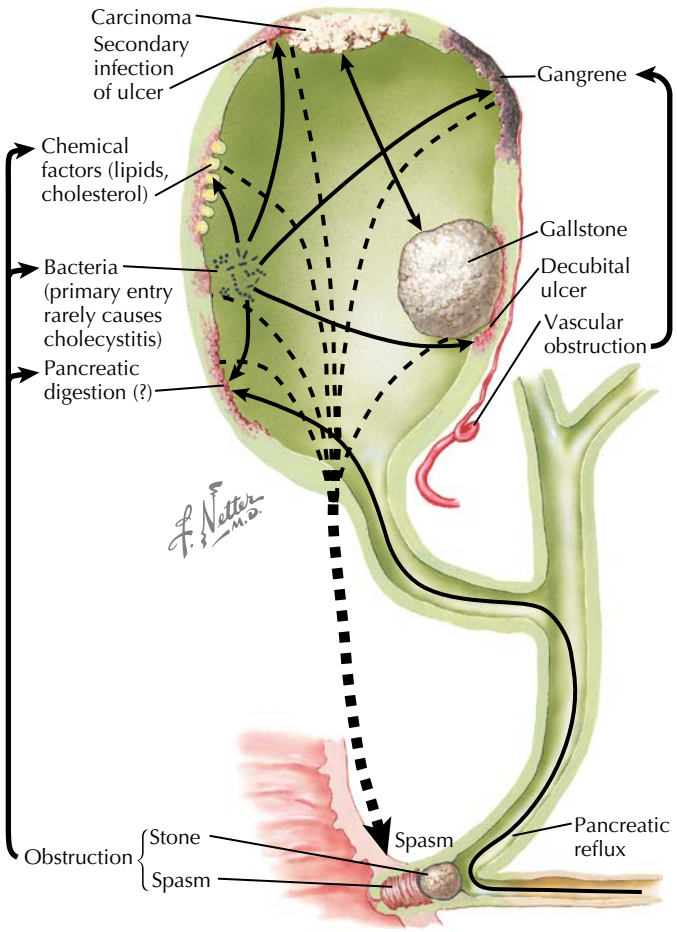

Figure 41.1 Interrelation of gallbladder diseases

ETIOLOGY AND PATHOGENESIS

Causes: The most common cause of gallbladder disease is the formation of cholesterol sludge or stones. These can lead to the obstruction of the common bile duct, resulting in inflammation, distention, and potential rupture (1%–3% of people with symptomatic gallstones develop acute cholecystitis). Ascending infection can also involve the gallbladder.

Risk Factors: Age, female sex, parity (75% of affected women have had one or more pregnancies), obesity (15–20 lb overweight is associated with a 2-fold increase in risk; 50–75 lb excess weight is associated with a 6-fold increase in risk) and weight cycling, estrogen use (oral), cirrhosis, diabetes, and Crohn disease. A family history of cholelithiasis in siblings or children results in a 2-fold increase in risk. Approximately 10% of patients with cholelithiasis will have a stone pass into the common duct. Primary sclerosing cholangitis is associated with a lifetime risk of 7%–12% for gallbladder cancer.

SIGNS AND SYMPTOMS

- Asymptomatic (60%–70%)
- Variable right upper quadrant pain with radiation to the back or scapula
- Right upper quadrant tenderness
- Nausea or vomiting
- Fever (associated with cholangitis)
- Jaundice
- Pale stools
- Bloating and belching
- Heartburn and regurgitation
- Fever and chills (when cholecystitis is present)
- Chronic diarrhea (4–10 bowel movements every day for at least 3 months)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Gastroenteritis
- Esophageal reflux
- Malabsorption
- Irritable bowel syndrome
- Peptic ulcer disease
- Coronary artery disease
- Pneumonia
- Appendicitis
- Fitz–Hugh–Curtis syndrome (perihepatitis caused by gonococcal infection)

Associated Conditions: Pancreatitis, ascending cholangitis, peritonitis, internal fistulization.

Workup and Evaluation

Laboratory: Bilirubin and alkaline phosphatase are usually elevated in acute cholecystitis and especially in choledocholithiasis. Blood tests for pancreatitis (serum alanine aminotransferase, aspartate aminotransferase, bilirubin, alkaline phosphatase/γ-glutamyl transpeptidase, amylase, and lipase) are appropriate when the diagnosis is entertained. Patients with functional gallbladder disorder will have normal laboratory profiles.

Imaging: Ultrasonography of the gallbladder (96% accuracy for diagnosing sludge or a stone in the gallbladder). Magnetic resonance cholangiopancreatography (MRCP) may be of help in selected cases.

Special Tests: Cholescintigraphy (also called gallbladder radionuclide scan or hepatobiliary [HIDA] scan).

Diagnostic Procedures: History and physical examination, ultrasonography, and laboratory investigation.

Pathologic Findings

Based on diagnosis. Gangrenous cholecystitis is the most common complication of cholecystitis, particularly in older patients, patients with diabetes, or those who delay seeking therapy. Emphysematous cholecystitis often heralds the development of gangrene, perforation, and other complications. Porcelain gallbladder is an uncommon manifestation of chronic cholecystitis that is characterized by intramural calcification of the gallbladder wall. Gallbladder polyps are usually found incidentally on ultrasonography and are benign.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Analgesics, fluids, and general support based upon the diagnosis.

Specific Measures: Single-incision laparoscopic cholecystectomy (SILC) is safe, and although it requires more operating time, cosmetic satisfaction is higher than traditional (4-port) laparoscopic surgery. Endoscopic retrograde choliangiopancreatography (ECRP) with endoscopic sphincterotomy is the most common procedure for detecting and managing bile duct stones. A small number of patients may be candidates for extracorporeal shock wave lithotripsy (ESWL). The Natural Orifice Translumenal Endoscopic Surgery (NOTES) trial is exploring the possibility of removing the gallbladder through the mouth or vagina.

Diet: Reduced fatty food and cholesterol intake.

Activity: No restriction except as dictated by the patient's condition.
Patient Education:
WebMD Articles:
- Gallstones, available at: http://www.webmd.com/digestive-disorders/gallstones, accessed on February 9, 2022
- Cholecystitis, available at: http://www.webmd.com/digestive-disorders/cholecystitis-10620, accessed on February 9, 2022

Drug(s) of Choice

- Ursodeoxycholic acid (Actigall) 8–10 mg/kg/day as two to three doses for cholesterol stones.
- Admission to the hospital for supportive care, including intravenous fluids, correction of electrolyte disorders, and control of pain (nonsteroidal antiinflammatory drugs or opioids). Antibiotics may be indicated based on the clinical findings.
- When infection is present or suspected: Monotherapy with a β-lactam/β-lactamase inhibitor (ampicillin-sulbactam 3 g IV every 6 hours, or piperacillin-tazobactam 3.375 g IV every 6 hours).

Contraindications: Known allergy, acute cholecystitis, abnormal liver function, calcified stones (not cholesterol based).
Precautions: The rate of stone dissolution (approximately 1 mm/mo) limits applicability of oral therapy for stones >1.5–2 cm in size. In acute cases, surgical treatment is definitive and preferred.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: Some advocate a high-fiber, low-fat diet.
Possible Complications: Acute cholecystitis can progress to gangrene or perforation of the gallbladder if left untreated, resulting in fistula formation (10%), peritonitis (1%), or bowel obstruction (gallstone ileus). Infection develops in approximately 20% of patients with acute cholecystitis. Common bile duct stones are responsible for most cases of pancreatitis, which can be life threatening. There is a strong association between gallbladder cancer and cholelithiasis, chronic cholecystitis, and inflammation (gallstones are present in approximately 80% of patients with gallbladder cancer).
Expected Outcome: Good with appropriate medical or surgical therapy. Symptoms of gallbladder cancer usually do not appear until the disease has reached an advanced stage, but survival rates are rising with new therapeutic options.

MISCELLANEOUS

Pregnancy Considerations: Pregnancy increases the risk for gallstones, and pregnant women are more likely to develop symptoms. Surgery should be delayed until after delivery, if possible.
ICD-10-CM Codes: K82.9 (Disease of gallbladder, unspecified), K82.8 (Other specified diseases of gallbladder), K80 (Cholelithiasis), K80.80 (Other cholelithiasis without obstruction), K80.8 (Other cholelithiasis), K80.20 (Calculus of gallbladder without cholecystitis without obstruction).

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GASTRITIS

42

INTRODUCTION

Description: Gastritis is an inflammatory condition that affects the stomach lining and results in acute or chronic indigestion, bloating, "gas," and heartburn. Gastropathy (noninflammatory) is usually caused by irritants such as drugs (eg, nonsteroidal antiinflammatory agents), alcohol, bile, circulatory failure, or chronic congestion.
Prevalence: Common.
Predominant Age: Any.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Generalized inflammation of the stomach lining, which in some cases may be infectious *(Helicobacter pylori)* or immune-mediated.

Risk Factors: Cigarette smoking, alcohol abuse, some medications (nonsteroidal antiinflammatory drugs [NSAIDs]), bile reflux, radiation.

SIGNS AND SYMPTOMS

- Nausea, vomiting, dyspepsia, heartburn, and "gas" (symptoms are most common after eating large meals, consuming certain foods)
- Upper abdominal pain or tenderness
- Hiccups

DIAGNOSTIC APPROACH

Differential Diagnosis

- Gastrointestinal reflux
- Ulcer disease (gastric or duodenal)
- Esophageal cancer
- Linitis plastica

Associated Conditions: Bleeding, dysphagia, and gastric or duodenal ulcer.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated.
Special Tests: Gastroscopy (with or without biopsy) establishes the diagnosis but most often is unnecessary. A mucosal biopsy is required to distinguish between acute, chronic active, or chronic gastritis because endoscopic and radiologic features may be similar. Testing of biopsy specimens for *H. pylori* or noninvasive testing (urea breath testing or stool antigen testing) may be helpful.
Diagnostic Procedures: History and physical examinations (suspicious), gastroscopy (diagnostic).

Pathologic Findings

Patchy erythema of the gastric mucosa (seldom full thickness) is most common in the pyloric antrum. Histologic findings can vary over a wide spectrum ranging from epithelial hyperplasia to extensive epithelial cell damage with infiltration by inflammatory cells.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Dietary changes, elevation of the head of the bed, smoking cessation, alcohol in moderation only, antacids. Antacids that coat (liquids) and those that tend to float on the surface of the stomach contents, such as Gaviscon, give better heartburn relief than other agents.
Specific Measures: Eliminate medications that contribute to reduced esophageal pressure, such as diazepam and calcium channel blockers, or that may damage the esophagus (NSAIDs). Use acid-blocking therapy.
Diet: No specific dietary changes indicated.
Activity: No restriction.

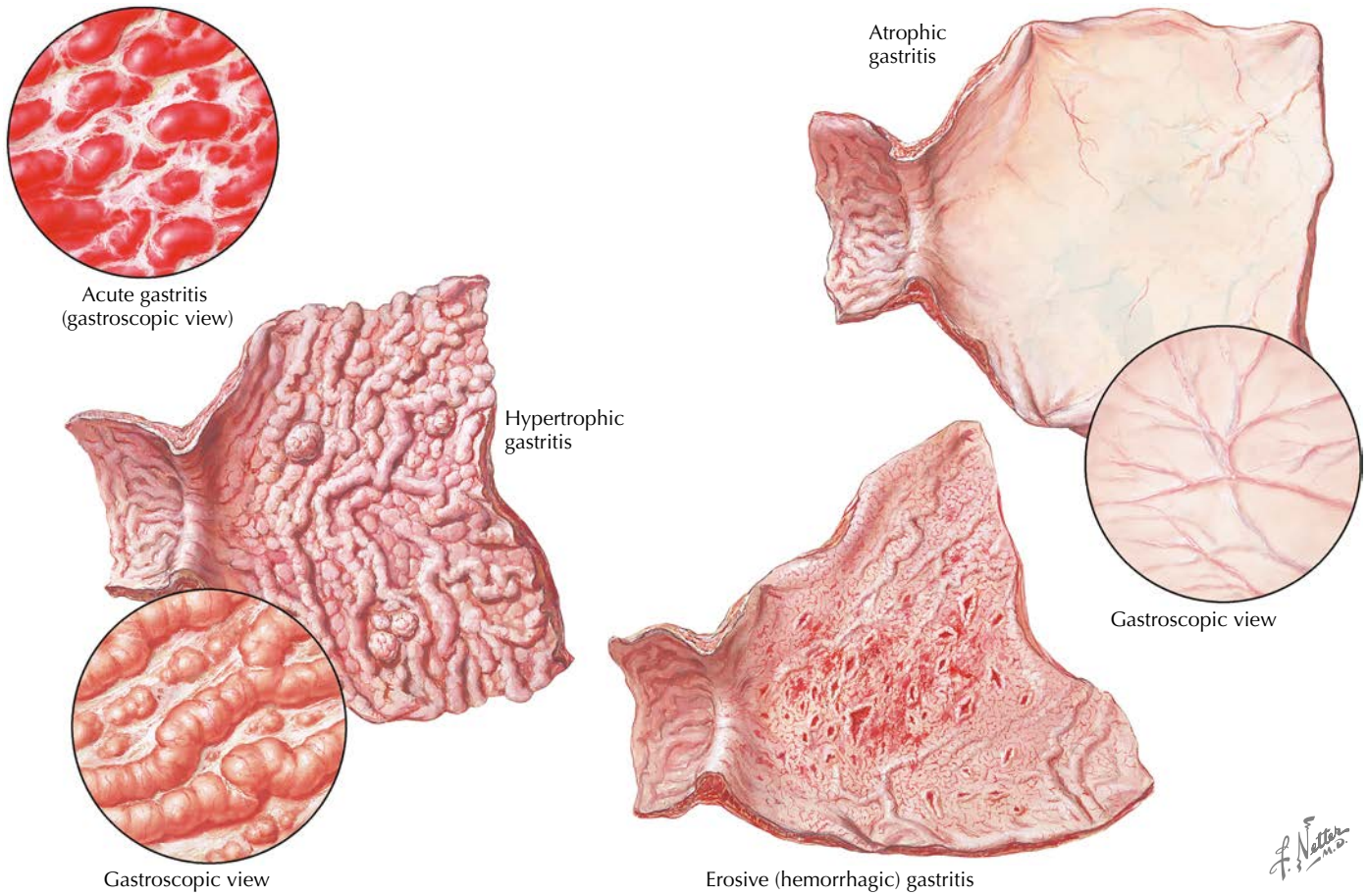

Figure 42.1 Gastritis

Patient Education: Reassurance, diet counseling, behavior modification.

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Problems of the Digestive System, 2014

Drug(s) of Choice

- Antacids
- Sucralfate 1-g tablet or 1-g/10 mL oral suspension taken two to four times daily on an empty stomach at least 1 hour before a meal.
- Histamine H_2 antagonists—cimetidine 800 mg two times daily; ranitidine 400 mg four times daily; famotidine 20 mg two times daily; nizatidine 150 mg two times daily.
- Hydrogen potassium pump blockers—omeprazole 20–40 mg daily for 4–8 weeks; esomeprazole 20–40 mg daily for 4–8 weeks; lansoprazole 15–30 mg daily for 8 weeks; pantoprazole 40 mg daily for 8 weeks, dexlansoprazole 30 mg daily for 8 weeks; rabeprazole 20 mg daily for 8 weeks.
- Misoprostol (Cytotec) 100–200 mcg PO four times daily if mucosal injury is documented or suspected.

Contraindications: Known or suspected hypersensitivity. Misoprostol is contraindicated during pregnancy and lactation.

Precautions: If bismuth is prescribed, warn the patient about black stools. Because of a lack of long-term follow-up, hydrogen pump inhibitors may be taken for only 8–12 weeks. Alcohol should be avoided while taking H_2 antagonists.

Interactions: Multiple drug interactions are possible with agents such as cimetidine; check full prescribing information.

Alternative Drugs

- In patients with *H. pylori* infection, a combination of bismuth (Pepto-Bismol) and an antibiotic (metronidazole 250 mg every 6 hours; tetracycline 500 every 6 hours; or amoxicillin 500 mg every 8 hours) has been recommended for 2 weeks.
- A 4-week treatment with clarithromycin (Bixin) and either omeprazole (Prilosec) or ranitidine bismuth citrate (Tritec) may also be used.

FOLLOW-UP

Patient Monitoring: Normal health maintenance. If significant gastric erosion is documented, repeat gastroscopy after 6 weeks is often recommended.

Prevention/Avoidance: Reduction of modifiable risk factors (eg, smoking).

Possible Complications: Chronic pain, ulcer formation, and perforation.

Expected Outcome: Generally good symptomatic relief, but long-term therapy is often required.

MISCELLANEOUS

Pregnancy Considerations: No direct effect on pregnancy, although severe gastritis may interfere with maternal nutrition.

ICD-10-CM Codes: K29.70 (Gastritis, unspecified, without bleeding), K29.90 (Gastroduodenitis, unspecified, without bleeding). Others based on a cause.

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GASTROESOPHAGEAL REFLUX

43

INTRODUCTION

Description: The reflux of gastric acid to the sensitive esophagus causing heartburn, the cardinal manifestation of gastroesophageal reflux disease (GERD).

Prevalence: Common (10%–25% of adults in the United States).

Predominant Age: Generally reproductive and beyond.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: The most common cause is decreased tone of the lower esophageal sphincter (LES). This is complicated in pregnant patients by the reduced gastric emptying and reduced esophageal sphincter tone that occur during pregnancy.

Risk Factors: Cigarette smoking, alcohol abuse, some medications or foods, pregnancy, scleroderma, sliding hiatal hernia.

SIGNS AND SYMPTOMS

- Upper abdominal pain, nausea, vomiting, dyspepsia, heartburn, chest pain, and "gas" (70%–85%; symptoms most common after large meals, consuming certain foods, and on assuming the recumbent position)
- Dysphagia (15%–20%, suggests stricture)
- Bronchospasm/asthma (15%–20%)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Ulcer disease (gastric or duodenal)
- Chemical or infectious esophagitis
- Crohn disease of the esophagus
- Angina pectoris
- Achalasia
- Esophageal cancer

Associated Conditions: Dysphagia. Nocturnal aspiration may occur and be mistaken for asthma.

Workup and Evaluation

Laboratory: No evaluation indicated.

Imaging: Barium swallow may demonstrate hiatal hernia or esophageal narrowing. For patients who are pregnant, this should be reserved for after the completion of the pregnancy.

Special Tests: Upper gastrointestinal endoscopy eliminates other potential causes of GERD that include esophageal motility disorders, erosive esophagitis, and peptic ulcer disease (gastric or duodenal), but its role is controversial.

Diagnostic Procedures: History (>80% accurate), physical examination, endoscopy, barium swallow.

Pathologic Findings

Acute inflammatory changes and hyperplasia of the basal layers of epithelium (85%). Squamous metaplasia of the lower esophagus may occur with chronic exposure to reflux acid (Barrett syndrome), which may undergo dysplasia or malignant change.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Dietary changes, elevation of the head of the bed, smoking cessation, alcohol in moderation only, weight loss. Antacids do not prevent GERD; their role is limited to intermittent symptomatic use. Antacids that coat (liquids), and those that tend to float on the surface of the stomach contents, such as Gaviscon, give better symptom relief than other agents.

Specific Measures: Eliminate medications that contribute to reduced esophageal pressure, such as diazepam and calcium channel blockers, or that may damage the esophagus (nonsteroidal antiinflammatory drugs [NSAIDs]). Current recommendations support empiric hydrogen potassium pump blocker treatment for 8 weeks, reserving further evaluations for those who are refractory to this trial.

Diet: Avoid eating spicy or acidic meals, chocolate, onions, garlic, peppermint, and large meals before bedtime.

Activity: No restriction.

Patient Education: Reassurance, diet counseling, behavior modification.

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Problems of the Digestive System, 2014

Drug(s) of Choice

- Antacids
- Sucralfate 1-g tablet or 1-g/10 mL oral suspension taken two to four times daily, on an empty stomach at least 1 hour before a meal.
- Histamine H_2 antagonists—cimetidine 800 mg two times daily; ranitidine 400 mg four times daily; famotidine 20 mg two times daily; or nizatidine 150 mg two times daily.
- Hydrogen potassium pump blockers—omeprazole 20–40 mg daily for 4–8 weeks; lansoprazole 15–30 mg daily for 8 weeks; esomeprazole 20–40 mg daily for 4–8 weeks; pantoprazole 40 mg daily for 8 weeks, dexlansoprazole 30 mg daily for 8 weeks; rabeprazole 20 mg daily for 8 weeks.
- Cisapride 10–20 mg four times daily, before meals and every night.

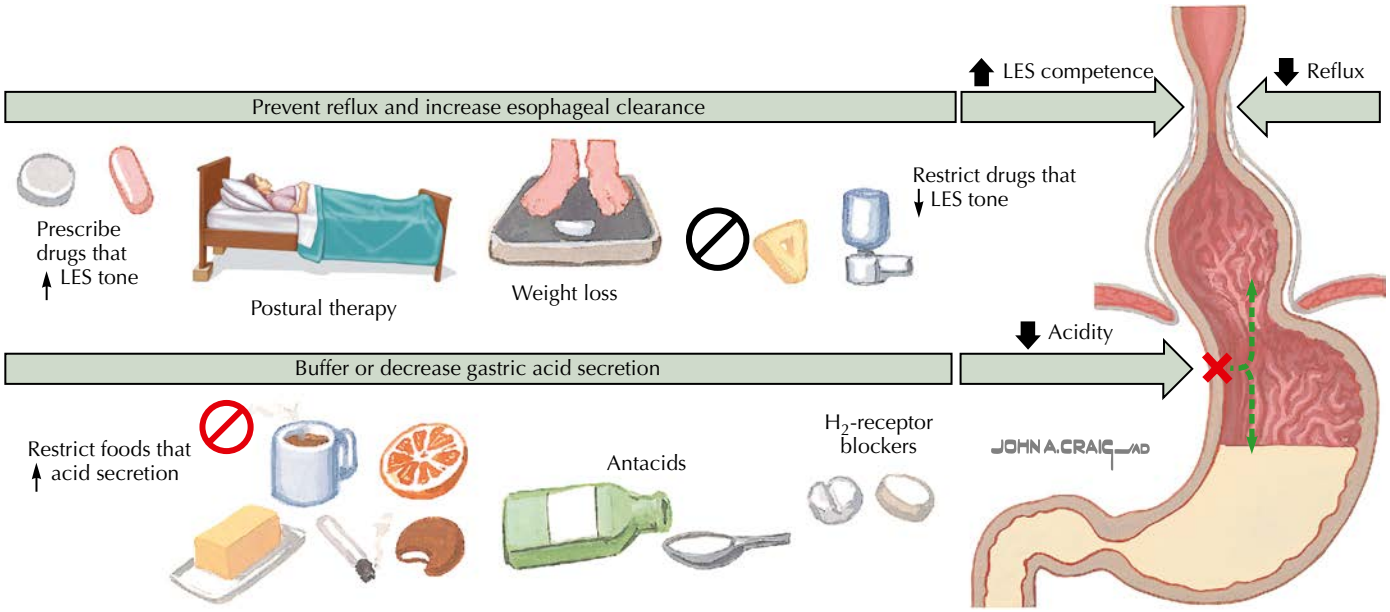

Figure 43.1 Principles of medical management in gastroesophageal reflux

- Misoprostol (Cytotec) 100–200 mcg PO four times daily if mucosal injury is documented or suspected.

Contraindications: Known or suspected hypersensitivity. Misoprostol is contraindicated during pregnancy and lactation.

Precautions: A trial off of hydrogen potassium pump blocker medications should be considered after 8–12 weeks. Alcohol should be avoided while taking H_2 antagonists.

Interactions: Multiple drug interactions are possible with agents such as cimetidine (check full Prescribing Information).

Alternative Drugs

Bethanechol, antiemetics, phenobarbital if necessary.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.

Prevention/Avoidance: Reduction of modifiable risk factors (eg, smoking, weight loss, diet).

Possible Complications: Esophageal stricture, bleeding. Prolonged exposure of acid to the esophagus may lead to stricture formation and dysphagia. Epithelial changes induced in the lower esophagus are also associated with an increased risk of esophageal cancer.

Expected Outcome: Generally good symptomatic relief, but long-term therapy is often required. Between 10%–40% of patients fail to respond symptomatically, either partially or completely, to proton pump inhibitor (PPI) therapy.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy, although it may worsen during pregnancy because of reduced esophageal tone and increased intraabdominal pressure caused by the expanding uterus. Sucralfate is considered safe during pregnancy and lactation because it is poorly absorbed. PPIs are not recommended in women who are breastfeeding due to the paucity of safety data.

ICD-10-CM Codes: K21.0 (Gastro-esophageal reflux disease with esophagitis).

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HAIR LOSS

44

INTRODUCTION

Description: Patients often experience hair loss in the early stages of pregnancy, in the immediate postpartum period, or in the postmenopausal years. For some, this may be of sufficient volume to cause concern or cosmetic problems. "Female-pattern hair loss" is the preferred term for hair loss in women.

Prevalence: Of all postmenopausal women, 37% have some hair loss. Loss of hair at 1–2 months after delivery (telogen effluvium) is common.

Predominant Age: Older than 50 years. Alopecia areata onset before the age of 30 years.

Genetics: Androgenic alopecia (male pattern) follows autosomal dominance with incomplete penetrance. Research suggests that

the aromatase gene *(CYP19A1)* may contribute to female hair loss. A genetic role in alopecia areata has been suggested.

ETIOLOGY AND PATHOGENESIS

Causes: Accelerated hair loss may occur at any time if there is an abrupt change in hormonal patterns and is the result of a higher number of hair follicles entering into the resting, or telogen, phase of hair growth. Hair follicles have cycles of growth (anagen), followed by a resting phase (telogen) of 3–9 months, and then the resumption of normal growth. Alterations in hormones may induce an increased number of follicles to enter telogen. If this is the situation, the lost hair will be regained in time. Stress and some medications (anticoagulants, retinoids, β-blockers, chemotherapeutic agents) may also cause similar hair loss. The relative androgen dominance found in postmenopausal women not undergoing hormone replacement therapy might also cause male-pattern hair loss (temporal balding, androgenic alopecia). Infections with the COVID-19 virus have been associated with telogen effluvium.

Risk Factors: Pregnancy, delivery, hormonal contraception, scalp disease, family history of baldness, nutritional deprivation, and drug or toxin exposure.

SIGNS AND SYMPTOMS

- Hair loss
- Pruritus, scaling, and broken hairs (tinea)
- Tapered, easily removed hair near the edge of patches (alopecia areata)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Telogen effluvium (as seen after pregnancy)
- Anagen effluvium (loss that includes growing hairs and may progress to complete baldness)
- Cicatricial alopecia (resulting from scarring)
- Androgenic alopecia (male-pattern hair loss)
- Traction alopecia (trauma)
- Tinea capitis
- Drug, poison, or chemotherapy exposure
- Local infection or dermatitis
- Endocrinopathy (polycystic ovaries, adrenal hyperplasia, pituitary hyperplasia)
- Secondary syphilis

Associated Conditions: Alopecia areata, Down syndrome, vitiligo, diabetes, traction alopecia, and behavior aberrations. Social withdrawal may accompany postmenopausal hair loss when severe.

Workup and Evaluation

Laboratory: No evaluation indicated except as dictated by specific differential diagnoses being considered.

Imaging: No imaging indicated.

Special Tests: Inspection of hair shafts, skin scraping for fungi.

Diagnostic Procedures: History, physical examination, inspection of hair shafts.

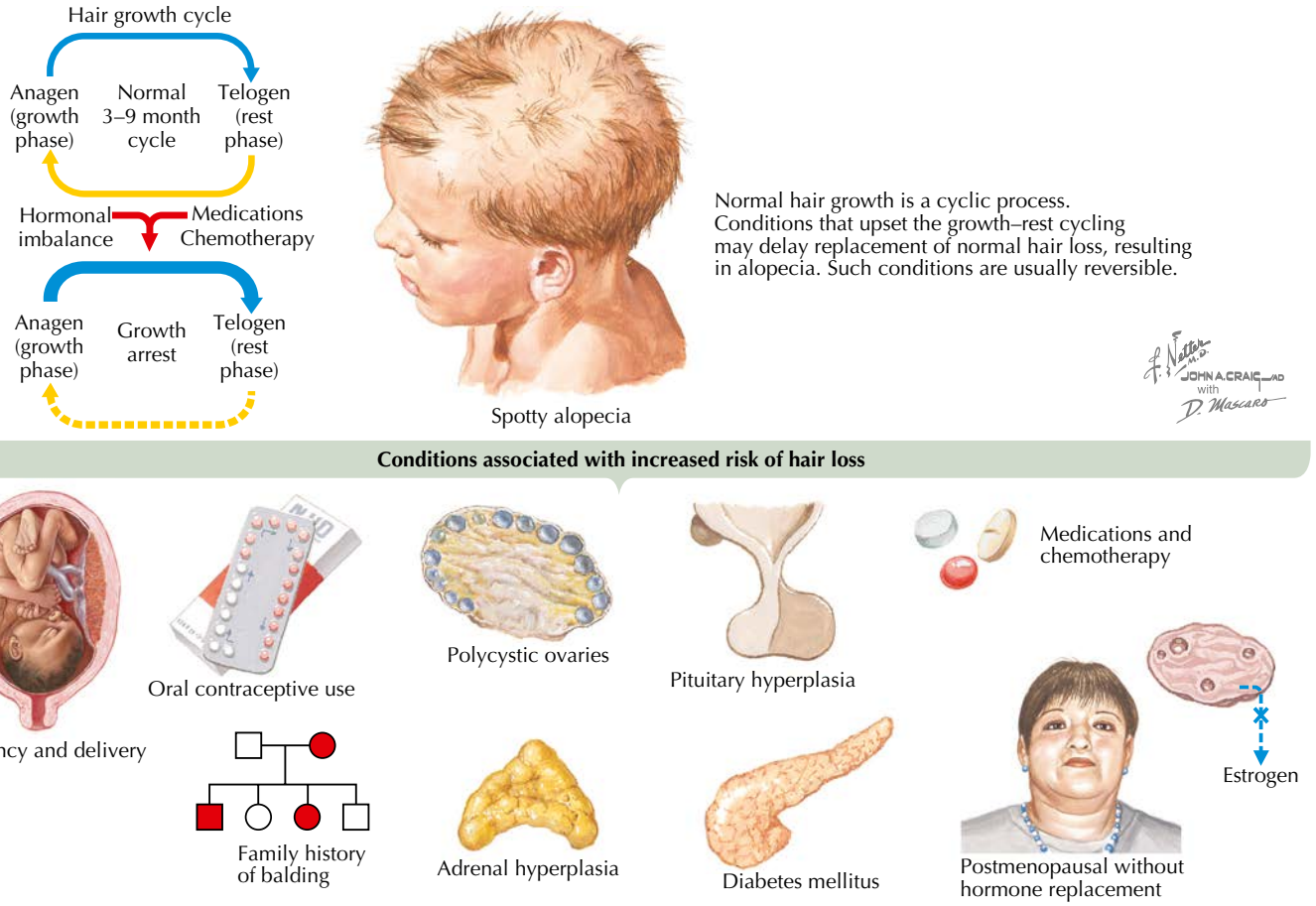

Figure 44.1 Hair loss and conditions associated with increased risk

Pathologic Findings

If the base of the hair shaft is smooth, it came from natural (telogen) loss; if the base has the follicular bulb still attached (a white swelling at the end), the loss may be due to dermatologic or other disease conditions, and consultation is suggested.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, reassurance often is all that is required (telogen effluvium is self-limited).
Specific Measures: Based on cause, most are self-limited or reverse with correction of the underlying problem. For postmenopausal women, hormone replacement therapy often arrests or reverses hair loss.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance and information about hair growth.

Drug(s) of Choice

- For androgenic effluvium—topical minoxidil (Rogaine) 2% (approximately 40% response rate in 1 year).
- For alopecia areata—high-potency topical steroids.
- For tinea capitis—6- to 8-week therapy with either griseofulvin (ultramicro size) 250–375 mg PO daily or ketoconazole 200 mg PO daily and careful hand washing.

Contraindications: Griseofulvin is contraindicated in pregnant patients and in those with porphyria and hepatocellular failure. Ketoconazole and itraconazole should not be used concomitantly with cisapride (Propulsid).
Precautions: Topical minoxidil can cause eye irritation. Griseofulvin use is associated with the possibility of photosensitivity, lupus-like syndromes, oral thrush, and granulocytopenia. Ketoconazole and itraconazole may be associated with hepatotoxicity.
Interactions: Minoxidil may potentiate the actions of other antihypertensive agents. Griseofulvin can interact with both barbiturates and warfarin. Ketoconazole and itraconazole may interact with warfarin, histamine H_2 blockers, digoxin, isoniazid, rifampin, and phenytoin.

Alternative Drugs

Finasteride (Propecia) has been used for male-pattern baldness in men, but it is ineffective for postmenopausal hair loss for women and is contraindicated during pregnancy.

FOLLOW-UP

Patient Monitoring: Normal health maintenance. With ketoconazole and itraconazole periodic assessment of liver function is prudent.
Prevention/Avoidance: None.
Possible Complications: Social withdrawal.
Expected Outcome: Most hair loss is not permanent; a gradual return may be expected in 3–6 months after any causes have been eliminated. Only cicatricial alopecia is associated with permanent damage to the hair follicles.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy, although delivery is often the trigger for increased hair loss.
ICD-10-CM Codes: L65.0 (Telogen effluvium), L65.9 (Nonscarring hair loss, unspecified), and L63.8 (Other alopecia areata).

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45 HEADACHE: TENSION AND CLUSTER

INTRODUCTION

Description: Tension headache, now called tension-type headache, is the most common form of headache and is caused by abnormal neuronal sensitivity and pain facilitation and/or contracted muscles of the neck and scalp. Cluster headaches are a type of recurrent headache that are characterized as unilateral and "stabbing" and are associated with symptoms of histamine release such as nasal stuffiness, lacrimation, facial sweating, or eyelid edema. These occur in episodic waves of frequent headaches separated by days, weeks, or years of remission.

Prevalence: 90% of women experience tension headaches; 60% within the previous year. The male-to-female ratio is 1:1.27. Approximately 10% of tension headache sufferers also have migraine headaches. Cluster headaches occur in 4/100,000 women per year; most cluster headaches occur in men in a ratio of 4.3:1.

Predominant Age: Tensions headaches—any age; 60% begin after the age of 20 years. Rarely do tension headaches start after the age of 50 years. Cluster headaches—ages 20–30 years.

Genetics: Women are more often affected by tension headaches than men (88% vs. 69%); 40% have a family history of headache. Cluster headaches are four times more common in women than in men. There is suggestive evidence for an autosomal dominant gene involved in cluster headache inheritance in some families; a family history of cluster headache is present in 5%–20% of patients

ETIOLOGY AND PATHOGENESIS

Causes: Tension headache—abnormal neuronal sensitivity and pain facilitation; no correlation to muscle contraction. They generally build in intensity in relation to stress. Cluster headache—incompletely understood; postulated: disorders of histamine release or sensitivity, serotonin metabolism or transmission, hypothalamic circadian rhythm, or cerebral artery autoregulation. The most generally accepted mechanism is one of hypothalamic activation causing activation of the trigeminal-autonomic reflex through a trigeminal-hypothalamic pathway.

Risk Factors: Tension headache—physical or emotional stress, poor posture, depression, obstructive sleep apnea, excess caffeine. Cluster headache—allergies, alcohol, tobacco, nitroglycerin, high altitudes, sleep-cycle disruption, stress. One study found an association between a history of head trauma and cluster headache.

SIGNS AND SYMPTOMS

Tension Headache

- Dull, aching, and constant pain of mild to moderate intensity lasting from 30 minutes to 7 days, often located in the temples, around the head in a band, or up the back of the neck. It is rare, but some patients experience chronic tension-type headaches that are characterized by occurring 15 days/mo for 6 months or longer.
- Pressing or tightening quality (nonpulsating)
- Bilateral symmetry
- Not aggravated by physical activity
- No nausea or vomiting, photophobia or phonophobia (may have one but not both)
- Teeth grinding common

Cluster Headache

- Unilateral or orbital distribution (90% of headaches recur on the same side)
- Sharp, stabbing, or "ice pick" in character
- Symptoms of histamine release (nasal stuffiness and rhinorrhea, facial flushing, lacrimation, edema of eyelids)
- Symptoms are relieved when the patient is moving around (patients are often restless and pace about or sit and rock back and forth during the headache)
- Strong association with sleep
- Duration of <1 hour (range 15 minutes to 3 hours)
- No aura or prodrome
- Annual recurrence common

DIAGNOSTIC APPROACH

Differential Diagnosis

- Depression
- Cervical spondylosis
- Temporomandibular joint syndrome
- Analgesic dependency
- Anemia
- Medication or toxin exposure or overuse
- Dental disease
- Temporal arteritis
- Trigeminal neuralgia
- Pheochromocytoma
- Central nervous system tumor
- Pre-eclampsia

Associated Conditions: Tension headache has been associated with an increased risk of epilepsy (4-fold). Cluster headaches are associated with seasonal allergy and a high risk of depression (roughly 45% of patients).

Workup and Evaluation

Laboratory: No evaluation indicated.

Imaging: No imaging indicated (computed tomography, electroencephalogram, and other evaluations are not indicated unless there is new onset of headaches after the age of 50 years). Some authors suggest neuroimaging (magnetic resonance imaging [MRI] scan) for patients being initially evaluated for cluster headaches.

Special Tests: None indicated.

Diagnostic Procedures: History. The diagnosis of tension-type headache is driven by what it is not: preceded by aura, localized, throbbing, severe, or aggravated by activity.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Tension headache—over-the-counter analgesics, rest, fluids, massage of shoulders, neck, or temples. Cluster headache—over-the-counter analgesics; rest; fluids; avoidance of alcohol, bright lights, and noise. Some acute cluster headaches may require subcutaneous sumatriptan and oxygen inhalation.

Specific Measures: Nonsteroidal antiinflammatory drugs (NSAIDs), stress reduction techniques, and biofeedback are indicated for tension headache. The effectiveness of analgesics tends to decrease with increasing headache frequency. Prophylaxis (verapamil) is most effective for cluster headaches.

Diet: No specific dietary changes indicated (caffeine restriction has been suggested). Patients should avoid alcohol or food known to hasten attacks.

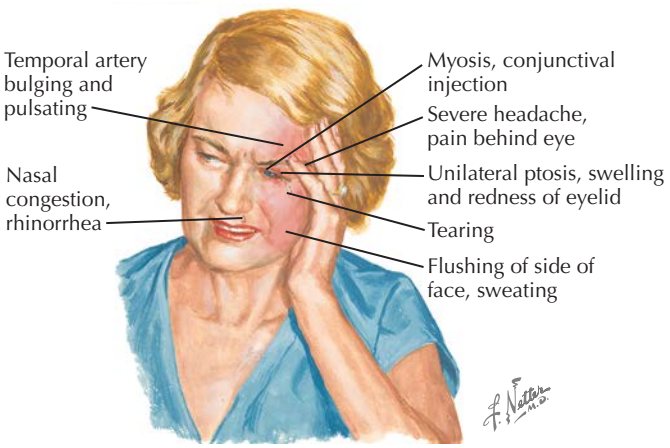
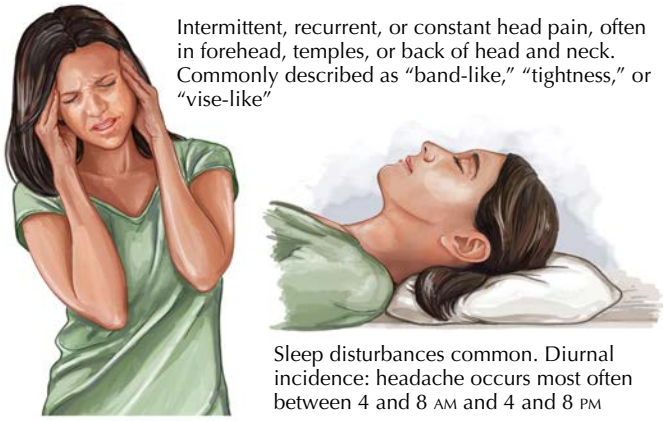


Figure 45.1 Cluster headache



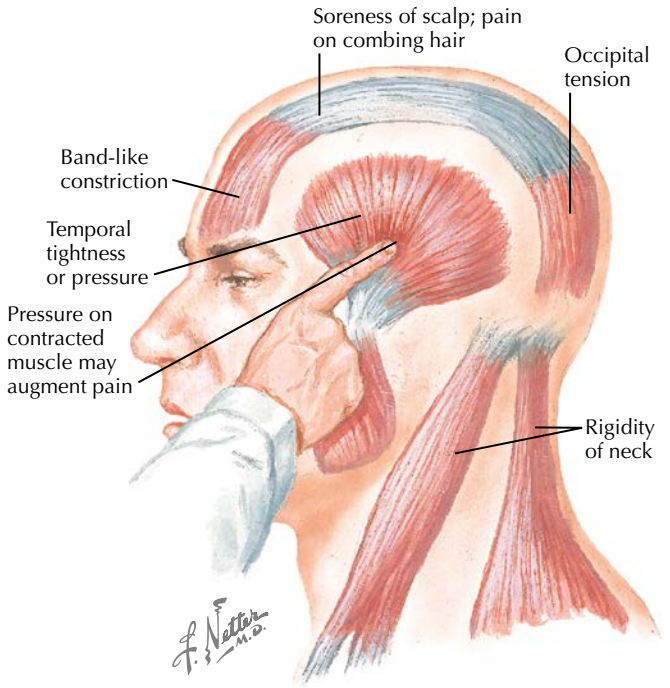


Figure 45.2 Muscle contraction headache

Activity: No restriction, avoidance of known precipitating activities. Improved general fitness and strengthening may reduce incidence.

Patient Education: Reassurance and education.

Drug(s) of Choice

Tension headache—over-the-counter analgesics, NSAIDs, antidepressants (when appropriate). Acetaminophen (1000 mg) is probably less effective than NSAIDs or aspirin. Tricyclic drugs (eg, amitriptyline) and nitric oxide synthase inhibitors can reverse central sensitization and the chronicity of tension-type headache. The addition of caffeine to analgesic therapy increases both efficacy and side effects.

Cluster headache—prophylaxis: ergotamine 1–2 mg PO 2 hours before likely attack (eg, sleep); verapamil 80 mg PO four times daily; lithium carbonate (Eskalith) 300 mg PO two to four times daily; methysergide (Sansert) 2 mg three or four times daily; acute attacks: oxygen 100% 7–10 L/min via mask for 10–15 minutes; sumatriptan (Imitrex) 6 mg SC or 100 mg PO, may repeat dose once in 24 hours when separated by at least 1 hour; zolmitriptan (Zomig) 5–10 mg at onset, maximum single dose 10 mg); dihydroergotamine mesylate (DHE 45) 1 mg IM or IV. Octreotide 100 mcg is a somatostatin analog with a 90-minute half-life that may have advantages despite its increased cost and slower initial response rate. Although the symptoms of cluster headaches are consistent with histamine release, treatment with antihistamines is ineffective. Oxygen therapy may be effective for aborting cluster headache.

Contraindications: Aspirin-sensitive asthma, known or suspected sensitivity. See individual medications for others.

Precautions: Overuse of analgesics may lead to habituation and "analgesic rebound headaches" perpetuating the cycle of headache and analgesic use. Avoid the use of narcotic analgesics, especially oral agents in patients with cluster headaches; may convert attack to chronic form. The use of opioids or butalbital for tension headaches is not recommended.

Alternative Drugs

Cluster headache—indomethacin 25 mg PO four times daily; nifedipine 40–120 mg/day.

FOLLOW-UP

Patient Monitoring: Normal health maintenance. Anticipate episodic recurrences for cluster headaches.

Prevention/Avoidance: Stress reduction, muscle strengthening and training, and biofeedback. For cluster headaches the prophylactic use of antihistamines should be considered during the times of year when the patient is most likely to have a recurrence. During the same period, alcoholic beverages and tobacco should be avoided because they may trigger an attack. These patients should also avoid sleep-cycle disruption. During pregnancy, verapamil (80 mg three times daily) has been used for prophylaxis.

Possible Complications: Headaches that are of sudden onset; begin after the age of 50 years; are dramatically different from past experience; have an accelerating pattern; are brought on by exertion, sexual activity, coughing, or sneezing; or are accompanied by focal neurologic signs that are ominous and demand aggressive evaluation for possible intracranial or other pathologic cause. Patients with cluster headaches have an increased risk for peptic ulcers and gastrointestinal injury (from medications), caffeine dependence, coronary heart disease, and suicide.

Expected Outcome: Tension headaches generally resolve with rest and analgesics, although intermittent recurrence is common without lifestyle changes. Cluster headaches commonly have seasonal or annual recurrence patterns. Prolonged remission also is common.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. Pregnancy does not appear to affect the frequency of tension headaches. Cluster headaches are very rare in pregnancy. Pregnancy may alter medical therapy because of adverse effects of medications on the pregnant patient or fetus. Acetaminophen is preferred as initial therapy during pregnancy. As second-line therapies, 0.5 mL lidocaine 4% (placed inside the nostril on the affected side) or intranasal sumatriptan 20 mg (placed in the contralateral nostril), have been reported.

ICD-10-CM Codes: G44.209 (Tension-type headache, unspecified, not intractable) and G44.009 (Cluster headache syndrome, unspecified, not intractable).

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46 HEADACHE: MIGRAINE

INTRODUCTION

Description: Migraine headaches are recurrent severe headaches that last for 4–72 hours and are accompanied by neurologic, gastrointestinal, and autonomic changes. These may or may not be preceded by a characteristic aura.

Prevalence: Migraine headaches affect 15%–20% of women in the reproductive age. Approximately 10% of tension headache sufferers also have migraine headaches.

Predominant Age: Migraine headaches—ages 25–55 years (peak, 30–49 years), first attack generally between adolescence and 20 years.

Genetics: Migraines are three times more common in women than in men. Of migraine sufferers, 89% have a family history of headache. Several genes have been implicated, including the *KCNK18* gene (encodes for TRESK, a two-pore domain potassium channel) and the *CSNK1D* (encodes casein kinase I isoform delta), but confirmed associations are lacking.

ETIOLOGY AND PATHOGENESIS

Causes: Neuronal dysfunction leads to a sequence of changes intracranially and extracranially that results in migraine (including the four phases; prodromal symptoms, aura, headache, and postdrome). Migraine aura and headache are related to a cortical spreading depression (self-propagating wave of neuronal and glial depolarization that spreads over the cerebral cortex). This depolarization results in the aura of migraine, activation of trigeminal

nerve afferents, and altered blood-brain barrier permeability. Activation of trigeminal afferents causes sterile inflammatory changes in the pain-sensitive meninges, resulting in headache. Stimulation of the trigeminal ganglion also causes release of vasoactive neuropeptides (substance P, calcitonin gene-related peptide [CGRP], neurokinin A) resulting in vasodilation and protein extravasation. Neuronal sensitization occurs, amplifying nociception. The CGRP (a 37–amino acid neuropeptide) plays a key role in mediating trigeminovascular pain transmission and vasodilation. A strong relationship with female sex hormones is suspected.

Risk Factors: More common in upper-income patients (1.6 times); 60%–70% of women note a link with menstruation (14% of women have migraine headaches only during menses). Precipitating factors: emotional stress (80%), some foods, stress relief (let down), missed meals, sleep disturbances.

SIGNS AND SYMPTOMS

- May be preceded by prodrome (75%) or aura lasting <1 hour (25%)
- May begin with dull ache
- Unilateral pain (30%–40%, may switch sides from attack to attack)
- Pulsating quality (60%), rapid onset
- Moderate to severe intensity
- Made worse by activity
- Frequently accompanied by nausea (90%), vomiting (60%), photophobia (80%), phonophobia, blurred vision, scalp tenderness and neck stiffness, restlessness, irritability, nasal congestion, facial edema
- Menstrual migraine is characterized by onset between 1 day before and 4 days after menstruation (first day is most common). This pattern is observed in 15% of patients.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Depression
- Cervical spondylosis
- Temporomandibular joint syndrome
- Analgesic dependency
- Anemia
- Medication or toxin exposure
- Dental disease
- Chronic sinusitis
- Temporal arteritis
- Trigeminal neuralgia
- Transient ischemic attack
- Pheochromocytoma

Associated Conditions: Associated with increased risk of peptic ulcer and coronary heart disease. Epilepsy, depression, anxiety, Raynaud phenomenon, mitral valve prolapse, stroke, motion sickness, and panic disorders are more common in patients with migraine headaches.

Workup and Evaluation

Laboratory: No evaluation indicated.

Imaging: No imaging indicated (computed tomography, magnetic resonance imaging, electroencephalogram, and other evaluations are not indicated unless there is the new onset of headaches after the age of 50 years).

Special Tests: None indicated.

Diagnostic Procedures: History.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Rest; fluids; analgesics; avoidance of alcohol, bright lights, and noise. Compression over the temporal artery may help. Biofeedback has been suggested but results vary.

Specific Measures: Nonsteroidal antiinflammatory drugs, stress reduction techniques, and biofeedback are indicated for tension headache. Migraine headaches should be treated with medical therapy for acute attacks and prophylaxis against recurrent headaches.

Diet: No specific dietary changes indicated (caffeine restriction has been suggested). Patients should avoid alcohol or food known to hasten attacks.

Activity: No restriction, avoidance of known precipitating activities. Improved general fitness and strengthening may reduce incidence. Bed rest for severe migraine attacks.

Patient Education:

Mayo Clinic:

- Patient Care and Health Information - Migraine. Available at https://www.mayoclinic.org/diseases-conditions/migraine-headache/diagnosis-treatment/drc-20360207, Accessed February 11, 2022

Drug(s) of Choice

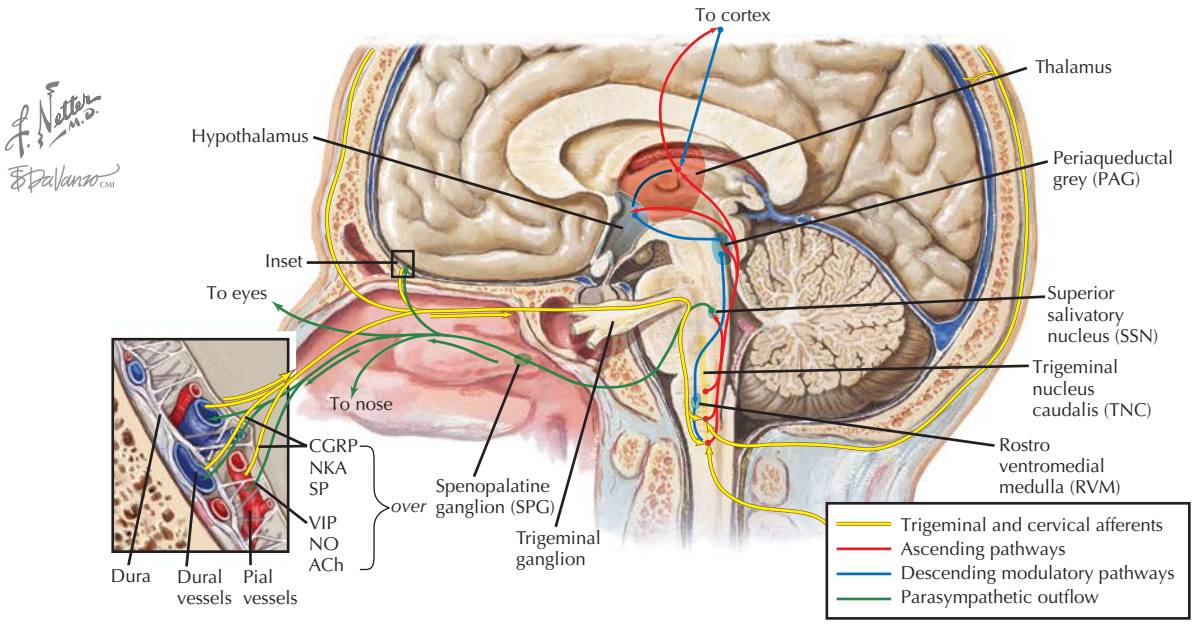
- Nonsteroidal antiinflammatory drugs—may provide relief for some or may abort the headache if taken early in the attack.
- Ergotamine preparations—ergotamine tartrate rectally at onset, may repeat in 1 hour or ergotamine tartrate 1 mg with caffeine 100 mg (Cafergot), two PO at onset, repeat every 30 minutes up to six per day; dihydroergotamine mesylate 1 mg IM or 2–3 mg intranasally at onset, 3 mg in 24 hours maximum.
- Triptans (serotonin 1b/1d agonists)—sumatriptan 6 mg SC or 100 mg PO or 5–20 mg intranasally at onset, may repeat once in 24 hours with a minimum of 1-hour separation; naratriptan 1–2.5 mg PO, may repeat in 4 hours, 5 mg in 24 hours maximum; zolmitriptan 2.5 mg PO, may repeat in 2 hours, 10 mg in 24 hours maximum; lasmiditan 50–100 mg single dose in 24 hours. New triptans include rizatriptan, almotriptan, eletriptan, frovatriptan. CGRP modulators/antagonists—Monoclonal antibodies against the CGRP receptor or ligand (erenumab, eptinezumab, fremanezumab, galcanezumab) are given by injection for migraine prevention. Small-molecule CGRP antagonists (atogepant, rimegepant, ubrogepant) are given orally for the acute treatment of migraine. These agents are generally reserved for patients with marked disability from frequent migraines or those who do not respond to or cannot tolerate other agents.

Contraindications: Aspirin-sensitive asthma, known or suspected sensitivity. Ergotamine and CGRP antagonists are absolutely contraindicated during pregnancy. See individual medications for others. CGRP antagonists should not be used in the presence of strong *CYP3A4* modulators.

Precautions: Overuse of analgesics may lead to habituation and "analgesic rebound headaches" perpetuating the cycle of headache and analgesic use. Significant side effects are possible with most migraine therapy—see individual agents. Use vasoactive agents with care in patients with cardiovascular disease.

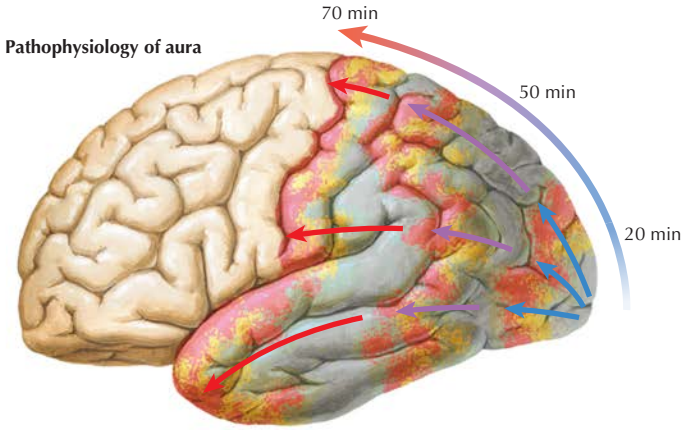
Alternative Drugs

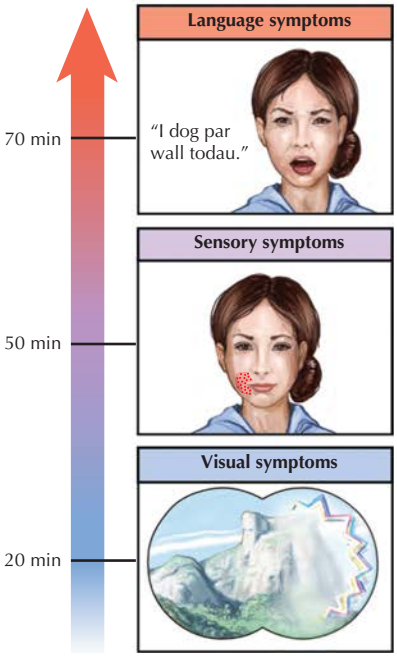
Antiemetics and phenothiazines may abort migraine headaches or help relieve associated symptoms. Metoclopramide may be used to reduce nausea. Narcotic analgesics may be used for patients who do not achieve relief with other measures or cannot take other agents. Botulinum toxin injections may be considered, but only for patients with the chronic form of migraine.



Pain-producing structures in the head send pain information via primary sensory afferent neurons through the trigeminal nerve and upper cervical roots to synapse on the second-order neurons in the trigeminal nucleus caudalis (TNC) as part of the trigeminocervical complex. Neurons in the TNC send projections to the thalamus (via the trigeminothalamic or quintothalamic tract, which decussates in the brainstem), which then projects to the cortex. The TNC is thought to project to other structures as well, including the periaqueductal gray (PAG), which also send signals to the thalamus and hypothalamus, with projections to the cortex. There are descending projections from the cortex back to the thalamus and hypothalamus. Descending modulation of the TNC takes place via nuclei in the hypothalamus, as well as direct projections from the PAG through the rostral ventromedial medulla (RVM).

Cranial parasympathetic outflow stems from a reflex connection from the TNC to the superior salivatory nucleus (SSN) in the pons. Efferents from the SSN (via the facial nerve) connect with neurons in the sphenopalatine ganglion (SPG; pterygopalatine). The SPG then projects to innervate intracranial vessels (vasodilation), as well as the nasal and lacrimal glands.





A wave of cortical spreading depression (CSD) gradually spreads through the cortex at a rate of 3-5 mm/min. It is thought that the wave of neuronal depolarization associated with transient increased then decreased cortical blood flow is responsible for the patient's symptoms as it moves through the occipital cortex, somatosensory cortex, and language areas.

Figure 46.1 Migraine pathophysiology

FOLLOW-UP

Patient Monitoring: Normal health maintenance. Anticipate episodic recurrences.

Prevention/Avoidance: Patients who suffer from migraine headache should have adequate rest and fluids and regular meals and exercise and should avoid known triggers. Prophylactic medical therapy may be warranted for patients with two or more attacks per month. Prophylaxis may be attempted using β-blockers, divalproex, calcium antagonists, antidepressants, CGRP modulators, or serotonin antagonists.

Possible Complications: Headaches that are of sudden onset; begin after age 50; are dramatically different from past experience; have an accelerating pattern; are brought on by exertion, sexual activity, coughing, or sneezing; or are accompanied by focal neurologic signs are ominous and demand aggressive evaluation for possible intracranial or other pathologic cause. Patients with migraine headaches have an increased risk for peptic ulcers and gastrointestinal injury (from medications), caffeine dependence, coronary heart disease, and suicide. Some data suggest an increased risk for hypertensive disorders during pregnancy.

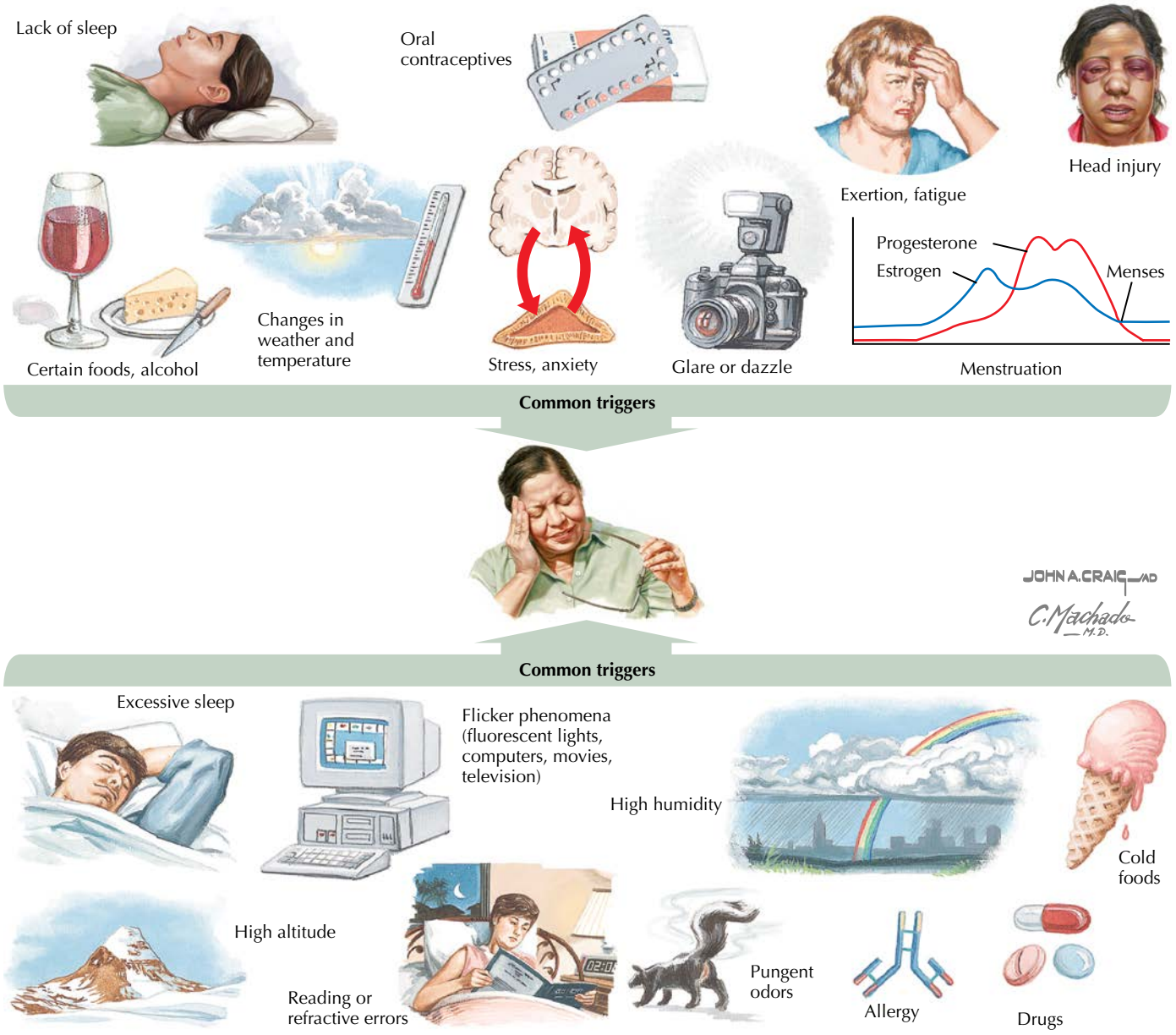


Figure 46.2 Triggers of migraine

Expected Outcome: Migraines can generally be controlled, but recurrence is common. Severity and frequency tend to decline with age.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. Migraine headaches may worsen in the first trimester of pregnancy and generally become less severe in the second and third trimesters (60%–70%). Pregnancy may alter medical therapy because of adverse effects of medications on the pregnant patient or fetus. Acetaminophen (1000 mg, with or without caffeine 100–130 mg) is first-line therapy during pregnancy. Metoclopramide (10 mg) also may be added. The H_1 antagonists meclizine (25 mg), diphenhydramine (25 to 50 mg), and promethazine (12.5–25 mg) are preferred for nausea and vomiting associated with migraine or its therapy.

ICD-10-CM Codes: G43.909 (Migraine, unspecified, not intractable, without status migrainosus) and G43.109 (Migraine with aura, not intractable, without status migrainosus).

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47 HEMATURIA

INTRODUCTION

Description: Hematuria is the presence of blood, either microscopically or macroscopically, in the urine. Hematuria is only a symptom and requires further evaluation to establish a cause. Hematuria should be considered an indication of malignancy until proven otherwise for those over the age of 35 years.
Prevalence: Common in women.
Predominant Age: Any age, most common in reproductive years in association with urinary tract infections.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Disruption of the uroepithelium by infection, neoplasia (benign or malignant), or mechanical trauma (trauma, stone).
Risk Factors: Sexual activity, instrumentation, urinary tract infection, foreign body, or stone. Smoking is a risk factor for urinary tract malignancy.

SIGNS AND SYMPTOMS

- Painless (or otherwise) passage of blood in the urine

DIAGNOSTIC APPROACH

Differential Diagnosis

- Renal or bladder cancer
- Lower urinary tract infection (urethritis, cystitis)
- Pyelonephritis
- Urolithiasis
- Endometriosis involving the urinary tract
- Traumatic trigonitis
- Interstitial cystitis
- Coagulopathy (iatrogenic or natural)
- Contamination of the urine from another source (vaginal, rectal, anal, factitious)
- Porphyria (resulting in discolored urine)

Associated Conditions: Dysuria, urinary frequency, and urinary tract infections.

Workup and Evaluation

Laboratory: Urinalysis, urine culture and sensitivity (based on other symptoms present).
Imaging: Intravenous or retrograde pyelography. Renal ultrasonography may reveal dilation of the collecting system. Magnetic resonance imaging is not as sensitive for small lesions or stones.
Special Tests: Cystoscopy may be necessary for selected patients. Urine should be collected and passed through a fine screen or mesh if a stone is suspected.
Diagnostic Procedures: History and physical examinations, urinalysis.

Pathologic Findings

Based on cause.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, hydration.

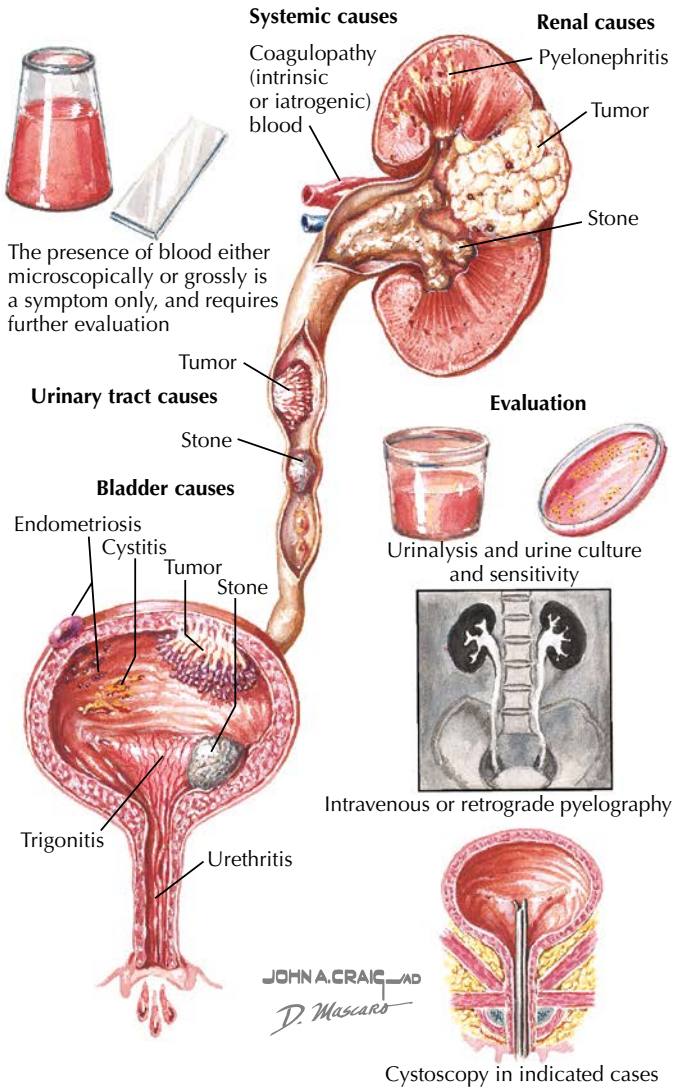

Figure 47.1 Causes and evaluation of hematuria

Specific Measures: Based on the underlying cause; infection should be treated with appropriate antibiotics; stones and tumors require more extensive diagnosis and eventual removal (or passage).
Diet: Adequate fluid intake.
Activity: No restriction except those imposed by the causative process.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- Urinary Tract Infections, 2020

Drug(s) of Choice

Drug choice is based on the cause.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: Failure to diagnose a malignancy in a timely manner. With large-volume bleeding, clotting with urethral obstruction is theoretically possible.
Expected Outcome: For most patients, the complete resolution of their symptoms occurs with appropriate treatment of the base problem.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy except that caused by the underlying condition. Computed tomographic urography should not be performed during pregnancy due to the higher radiation exposure involved vs. conventional pyelography.
ICD-10-CM Codes: R31.9 (Hematuria, unspecified), R31.0 (Gross hematuria), and R31.2 (Other microscopic hematuria).

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48 HEMORRHOIDS

INTRODUCTION

Description: A hemorrhoid is a symptomatic dilation of the hemorrhoidal venous plexus that results in perianal swelling, itching, pain, hematochezia, and fecal soiling. The dentate line demarcates internal and external hemorrhoids.
Prevalence: Present in 50%–80% of all Americans.
Predominant Age: Adult (peak age 45–65); more common after pregnancy.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Dilated rectal venous plexus with varying degrees of inflammation.
Risk Factors: Pregnancy, obesity, chronic cough, constipation, heavy lifting, sedentary work or lifestyle, hepatic disease, colon malignancy, portal hypertension, loss of muscle tone resulting from age, surgery, episiotomy, anal intercourse, or neurologic disease (multiple sclerosis).

SIGNS AND SYMPTOMS

- The development of symptoms prior to the age of 20 years is uncommon.
- Rectal bleeding
- Anal protrusion
- Anal itching and pain (especially with thrombosis or ulceration)
- Constipation and straining for bowel movement
- Rectal incontinence and soiling
- Hematochezia and stool mucus
- Anal fissure, infection, or ulceration
- Hemorrhoidal thrombosis

DIAGNOSTIC APPROACH

Differential Diagnosis

- Colon cancer
- Colon polyps
- Soiling caused by loss of anal tone (anal intercourse, multiple sclerosis, episiotomy)
- Pinworms
- Rectocele
- Fecal impaction
- Anal fissure or fistula

Associated Conditions: Liver disease, pregnancy, portal hypertension, and constipation.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated.
Special Tests: None indicated.
Diagnostic Procedures: History and physical examination.

Pathologic Findings

Enlarged hemorrhoidal veins with stasis and inflammation are common.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Stool softeners, bowel movement regulation, and topical medications.
Specific Measures: Surgical therapy is appropriate for those patients with debilitating symptoms or for whom medical therapy has failed (15%–20% of patients). Banding of internal hemorrhoids is better accepted by patients than traditional surgical therapy. Hemorrhoidal banding requires a minimum of equipment and is well suited to the office or outpatient surgical setting. Some aching is generally experienced for several days after hemorrhoid banding procedures. Sitz baths and topical analgesics such as witch hazel are generally sufficient. Injectable sclerosant solutions also can be used to treat symptomatic hemorrhoids.
Diet: Increased dietary fiber.
Activity: Avoid prolonged sitting, straining, or heavy lifting. Encourage physical fitness.
Patient Education: Reassurance, diet instruction.

Drug(s) of Choice

- Dietary fiber supplements.
- Stool softeners—docusate sodium (Colace, Dialose, Sof-Lax) 50–300 mg PO daily (larger doses are generally divided over the day).
- Topical analgesic sprays or ointments—benzocaine 20% spray or gel (Americaine, HurriCaine), dibucaine 1% ointment (Nupercainal).
- Antipruritics and antiinflammatory agents—hydrocortisone (Anusol-HC, Analpram-HC, Cortenema, Cortifoam, Epifoam, Proctofoam-HC), pramoxine 1% (Fleet rectal pads, Analpram HC), witch hazel 50% (Tucks pads or gel).
- Astringents—Phenylephrine (Preparation H).

Contraindications to Surgical Therapy: Acquired immunodeficiency syndrome (AIDS) or immunocompromise, anorectal fissures, bleeding diathesis or blood dyscrasia, inflammatory bowel disease, portal hypertension, rectal prolapse, undiagnosed anorectal tumor, undiagnosed rectal bleeding.
Precautions: See individual agents.
Interactions: Docusate sodium may potentiate the hepatotoxicity of other drugs; see individual agents.

Alternative Drugs

A small, controlled trial suggested a benefit of topical nifedipine.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: Avoidance of constipation (bowel regularity); weight loss (if appropriate); physical fitness; avoidance of prolonged sitting, straining, or heavy lifting.
Possible Complications: Thrombosis, bleeding, secondary infection, ulceration, anemia, and rectal incontinence.
Expected Outcome: Resolution (spontaneous resolution or with medication), recurrence common.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. Hemorrhoids are extremely common as pregnancy progresses (25%–35% or patients). Dietary prophylaxis and symptomatic therapy early reduce the severity of symptoms. At least partial resolution after delivery is expected.
ICD-10-CM Codes: K64.9 (Unspecified hemorrhoids), K64.4 (Residual hemorrhoidal skin tags), K64.8 (Other hemorrhoids), and K64.5 (Perianal venous thrombosis).

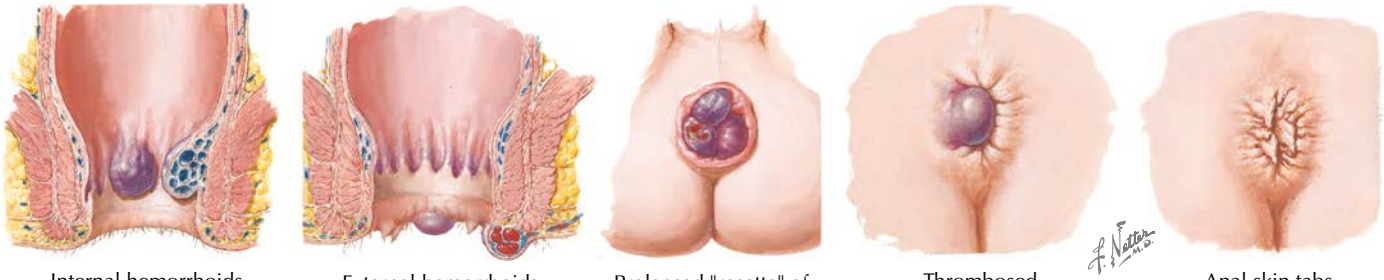

Figure 48.1 Types of hemorrhoids

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HYPERTHYROIDISM

49

INTRODUCTION

Description: Hyperthyroidism is the excess production of thyroid hormone. It is three times more common in women than in men and may result in menstrual irregularity or fertility disturbances or may complicate pregnancy. It may occur because of Graves autoimmune disease (most common) or toxic single or multinodular goiters. Trophoblastic tumors or dermoid cysts may rarely be the cause.

Prevalence: 1/1000 women; 0.1%–0.4% of all pregnancies.

Predominant Age: 20–40 years.

Genetics: Graves disease may follow a familial pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Graves disease—an autoimmune disease in which thyroid-stimulating immunoglobulins bind to thyroid-stimulating hormone (TSH) receptors mimicking the action of thyroid-stimulating hormone and causing excess secretion of triiodothyronine (T_3) and thyroxine (T_4). Goiter and exophthalmos are common. Toxic single or multinodular goiter—one or more autonomous benign nodules that slowly grow. Exophthalmos and myxedema are generally absent.

Risk Factors: Family history, other autoimmune disorders, iodine deprivation followed by replacement.

SIGNS AND SYMPTOMS

- Nervousness (85%)
- Palpitations, tachycardia (>100 beats/min), and dyspnea (75%)
- Heat intolerance (70%)
- Fatigue and weakness (60%)
- Weight loss (50%)
- Increased appetite (40%)
- Palpable goiter (90%)
- Tremor (65%)

- Exophthalmos (35%)
- Anxiety and emotional lability

DIAGNOSTIC APPROACH

Differential Diagnosis

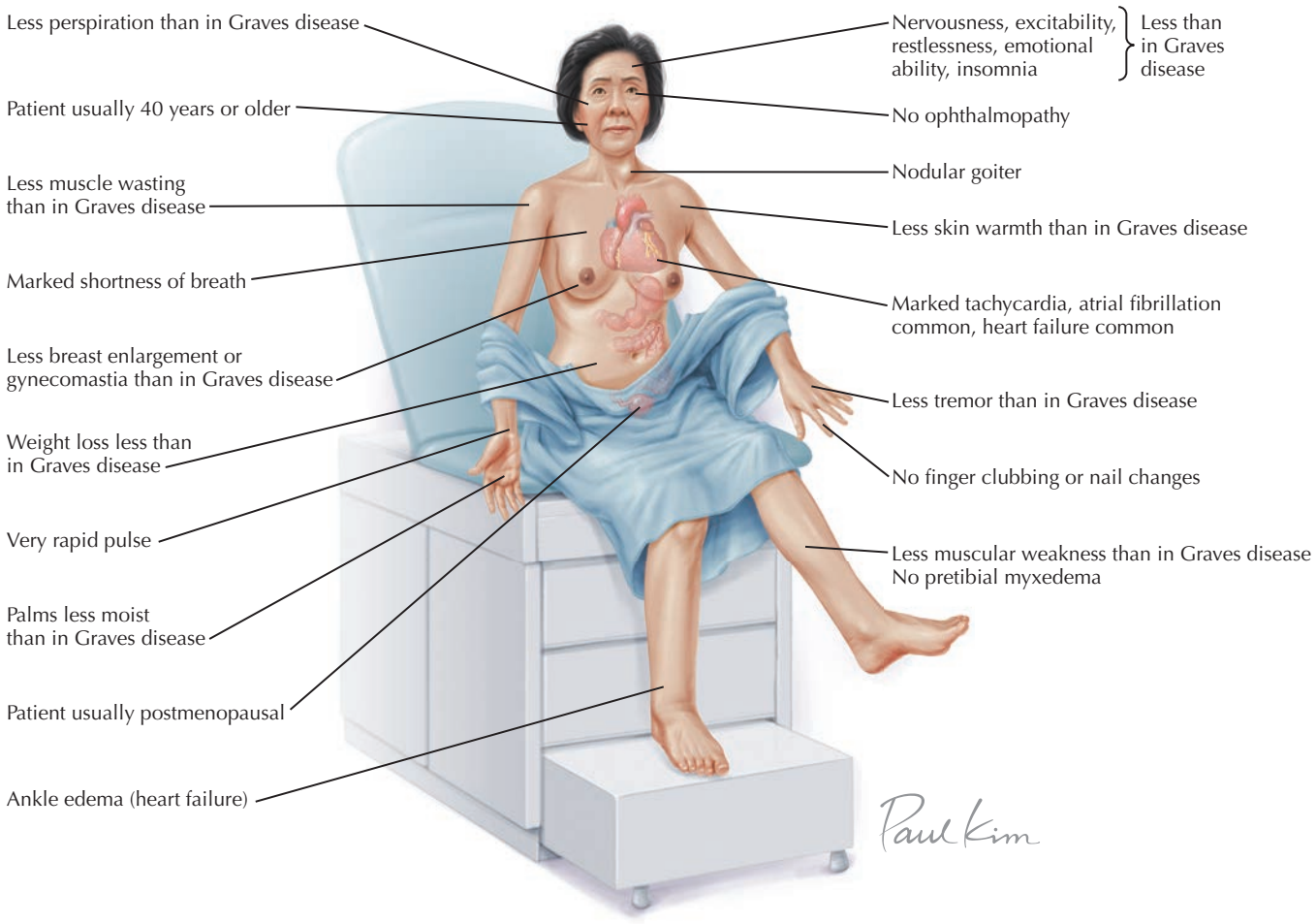
- Physiologic changes of pregnancy
- Anxiety
- Malignancy
- Diabetes
- Pregnancy
- Hyperemesis gravidarum
- Menopause
- Pheochromocytoma
- Substance abuse (caffeine, diet preparations, cocaine)
- Struma ovarii

Associated Conditions: Other autoimmune diseases (Graves disease).

Workup and Evaluation

Laboratory: Sensitive thyroid-stimulating hormone (below normal), T_3 radioimmunoassay (RIA; >200 ng/mL), T_4 radioimmunoassay (>160 nmol/L), free thyroxine index (>12).

Imaging: Radioiodine thyroid scan (diffuse uptake in Graves disease; focal uptake in nodular goiter).



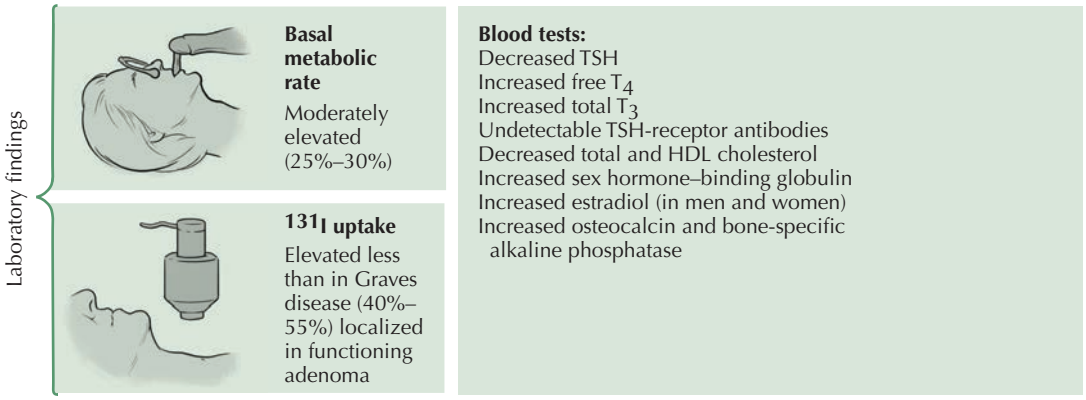


Figure 49.1 Symptoms and laboratory findings in hyperthyroidism

Special Tests: None indicated.
Diagnostic Procedures: History, physical examination, and laboratory studies.

Pathologic Findings

Graves disease—diffuse hyperplasia; toxic nodules—discrete nodule formation.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and education about the need for continuing therapy, β-blockers for tachycardia symptoms or tremor.
Specific Measures: Antithyroid medication, therapeutic radioiodine, surgical reduction of thyroid, or excision of nodules.
Diet: No specific dietary changes indicated. Maintain adequate calories to avoid weight loss.
Activity: No restriction, as tolerated.
Patient Education: Education regarding the requirement for compliance with medication and follow-up.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- Thyroid Disease, 2021

Drug(s) of Choice

- For thyrotoxic crisis—propylthiouracil (PTU) 15–20 mg PO every 4 hours during the first day in addition to other therapies.
- Initial treatment—PTU 30–300 mg PO three times daily (no more than 300 mg/day during pregnancy), maintain at 25–300 mg PO two times daily; methimazole (Tapazole, MMI) 15–60 mg PO daily, maintain at 5–30 mg PO daily; radioiodine therapy: sodium iodine (I^{131}).
- Adjunctive therapy—propranolol (Inderal) 40–240 mg PO daily.

Contraindications: Radioiodine therapy is contraindicated in pregnancy (may cause fetal hypothyroidism or malformation). Propranolol is contraindicated in the presence of congestive heart failure, asthma, chronic bronchitis, and hypoglycemia and during pregnancy.
Precautions: Both PTU and methimazole may cause agranulocytosis, dermatitis, or hepatotoxicity.
Interactions: PTU may potentiate the actions of anticoagulants.

Alternative Drugs

- Ipodate sodium (Oragrafin) 0.5 g PO four times daily (not used as primary therapy because of the possible induction of resistant hyperthyroidism).
- Teprotumumab-trbw (Tepezza), an insulin-like growth factor-1 receptor inhibitor, has proven effective in reducing ocular symptoms of hyperthyroidism.

FOLLOW-UP

Patient Monitoring: Normal health maintenance, undergo thyroid function test twice yearly. After radioiodine therapy, thyroid function should be checked at 6 and 12 weeks, 6 months, and then yearly.
Prevention/Avoidance: None.
Possible Complications: Hypothyroidism after medical therapy, vision change or loss caused by ophthalmopathy, pretibial myxedema or cardiac failure, muscle wasting and proximal muscle weakness. Surgical therapy—hypoparathyroidism, recurrent laryngeal nerve damage, hypothyroidism.
Expected Outcome: With early diagnosis and adequate treatment, a good outcome is expected.

MISCELLANEOUS

Pregnancy Considerations: Difficult to diagnose in pregnancy. Increased risk of spontaneous abortion, fetal growth restriction, preterm labor, and pre-eclampsia. Thyrotoxicosis often improves during pregnancy only to relapse postpartum—must be alert for this possibility. Any goiter is abnormal. Doses of PTU and methimazole must be reduced. Radioiodine therapy is contraindicated.
ICD-10-CM Codes: Based on cause, symptoms, and severity.

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50 HYPOTHYROIDISM

INTRODUCTION

Description: Reduced or inadequate circulating levels of thyroid hormone. Women are 5–10 times more likely to suffer from hypothyroidism than men. Menstrual disturbances may be the first indication of this abnormality. Some women develop a transient (3–4 months) hypothyroid state (painless subacute thyroiditis) after giving birth.
Prevalence: 5–10/1000 general population; 6%–10% of women older than 65 years.
Predominant Age: Older than 40 years.
Genetics: No genetic pattern for idiopathic type; may be associated with type II autoimmune polyglandular syndrome (*HLA-DR3* and *HLA-DR4*).

ETIOLOGY AND PATHOGENESIS

Causes: Idiopathic or autoimmune (most common when goiter is present)—after ablative medical or surgical therapy. The most common cause of hypothyroidism during pregnancy is chronic autoimmune (Hashimoto) thyroiditis. Postpartum thyroiditis (silent)—abnormalities of thyroid-stimulating hormone (TSH) or thyrotropin-releasing hormone (TRH) production or release.
Risk Factors: Age, other autoimmune disease, ablative therapy, pituitary failure.

SIGNS AND SYMPTOMS

- Weakness, lethargy, fatigue
- Cold intolerance, hypothermia
- Menstrual disturbances (dysfunctional bleeding, amenorrhea, menorrhagia)
- Decreased memory, hearing loss
- Constipation
- Dry, coarse skin, brittle hair (hair loss is common)
- Periorbital puffiness, swelling of hands and feet
- Bradycardia, narrowed pulse pressure
- Anemia
- Cardiomegaly, pericardial effusion

DIAGNOSTIC APPROACH

Differential Diagnosis

- Depression
- Congestive heart failure
- Dementia
- Amyloidosis
- Nephrotic syndrome
- Chronic nephritis
- **Associated Conditions:** Anemia, bipolar disorder, depression, diabetes mellitus, hypercholesterolemia, hyponatremia, idiopathic adrenocorticoid deficiency, mitral valve prolapse, myasthenia gravis, and vitiligo. Depending on the severity of disease, hypothyroidism during pregnancy is associated with an increased risk of pre-eclampsia, placental abruption, preterm delivery, low birthweight, and postpartum hemorrhage.

Workup and Evaluation

- **Laboratory:** Sensitive TSH (>4 micro-IU/mL), triiodothyronine (T_3) resin uptake (increased), thyroxine (T_4) radioimmunoassay (decreased), free thyroxine index (low). High serum human chorionic gonadotropin (hCG) levels during early pregnancy result in a reduction in the first-trimester serum TSH concentrations.
- **Imaging:** No imaging indicated.
- **Special Tests:** None indicated.
- **Diagnostic Procedures:** History, physical examination, and laboratory studies.

Pathologic Findings

The thyroid may be small and atrophic, normal, or enlarged.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, education about need for continuing therapy.
Specific Measures: Thyroid replacement mediation.
Diet: High-bulk diet to avoid constipation.
Activity: No restriction.
Patient Education: Education regarding need for compliance with medication and follow-up.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- Thyroid Disease, 2021

Drug(s) of Choice

- Levothyroxine (Synthroid, Levothroid) 50–100 mcg PO daily, increase by 25 mcg/day every 4–6 weeks until TSH is in normal range.

Contraindications: Adrenocorticoid insufficiency (uncorrected), thyrotoxic heart disease.
Precautions: The initial dose should be reduced in elderly patients.
Interactions: The dose of insulin, oral hypoglycemics, and anticoagulants may be required to be adjusted after thyroid therapy is initiated. Other possible interactions may be seen with oral contraceptives, estrogen, and cholestyramine. Ferrous sulfate may decrease the absorption of thyroid replacement medications.

FOLLOW-UP

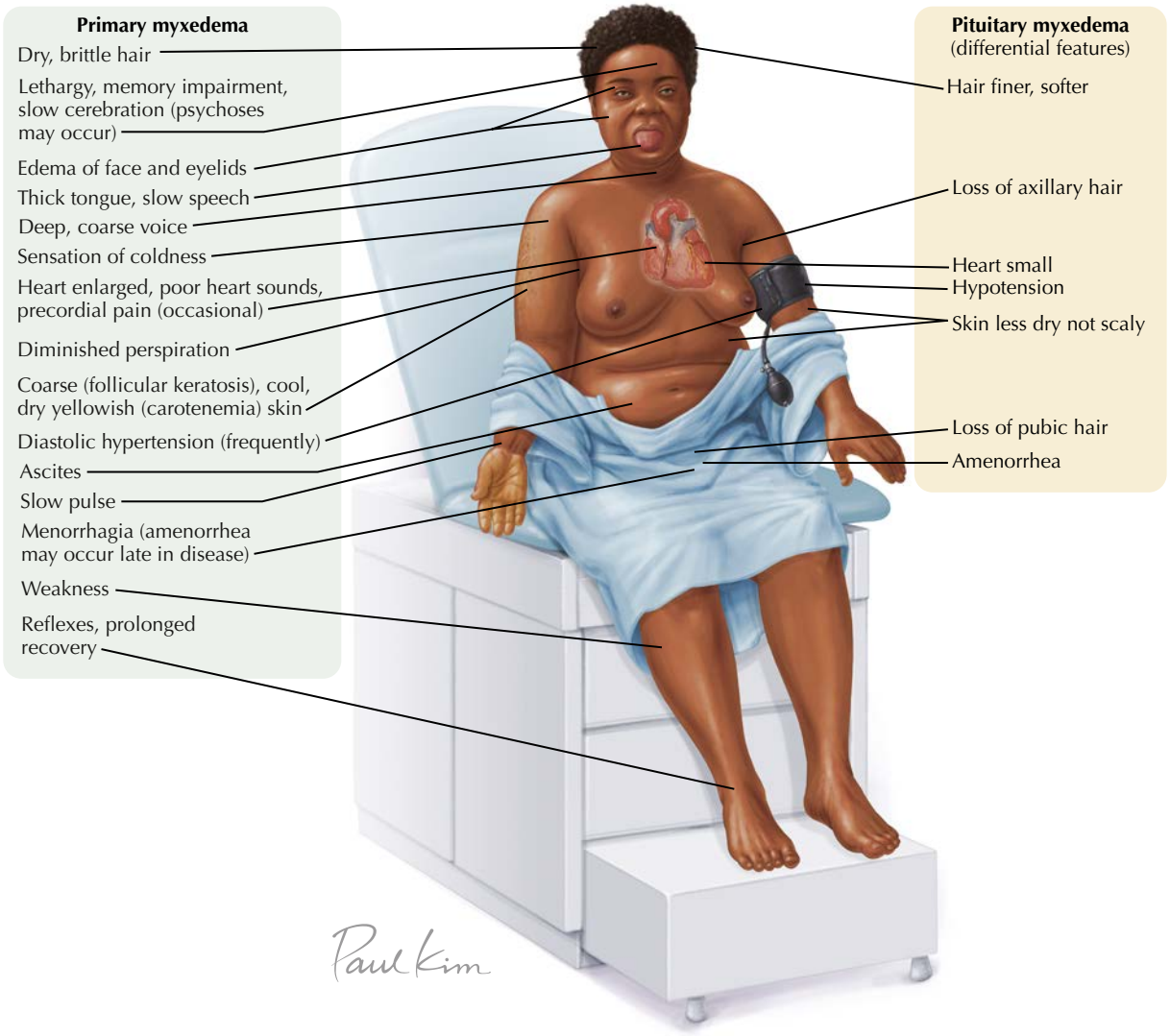
Patient Monitoring: Thyroid status should be checked every 6 weeks until stable, then every 6 months. Because of the prevalence of hypothyroidism in older women, a baseline assessment should be obtained at the age of 45 years and periodic screening (biannually) is recommended in patients older than 60 years.
Prevention/Avoidance: None.
Possible Complications: Life threatening—coma (myxedema coma) and hypothermia. Treatment is with intravenous thyroid hormone replacement and steroid therapy. Supportive therapy (oxygen, assisted ventilation, fluid replacement) and intensive-care nursing may be indicated. Others—treatment-induced congestive heart failure, increased susceptibility to infection, megacolon, organic psychosis with paranoia, infertility and amenorrhea, or osteoporosis resulting from overtreatment.
Expected Outcome: With treatment, return to normal function. Relapse will occur if therapy is discontinued.

MISCELLANEOUS

Pregnancy Considerations: Medication may need to be adjusted (generally upward by 30%–50%). For those with

hypothyroidism, TSH levels should be checked monthly during the first trimester, though evidence of altered outcomes is limited. TSH levels should be checked at 6 weeks postpartum. Women who develop postpartum thyroiditis have a 30% chance of developing hypothyroidism in the future. Any goiter during pregnancy is abnormal. During pregnancy, hypothyroidism is associated with an increased risk of pre-eclampsia and gestational hypertension, placental abruption, low birthweight and preterm delivery, and postpartum hemorrhage. The treatment of hypothyroidism in pregnancy is the same as in nonpregnant patient.

ICD-10-CM Codes: Based on cause, symptoms, and severity.



PBI and BEI; low – no rise after TSH	Low, but rise after TSH
I^{131}; 24-hour uptake low – no rise after TSH	Low, but rise after TSH
Cholesterol; elevated (usually)	Normal (usually)
Uric acid; elevated in males and postmenopausal females	Same
Urinary gonadotropins; positive	Absent
17-Ketosteroids; low	Lower

BEI, plasma butanol-extractable iodine; PBI, plasma protein-bound iodine; TSH, thyroid-stimulating hormone.

Figure 50.1 Signs and symptoms of hypothyroidism

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51 INFERTILITY: GENERAL CONSIDERATIONS

THE CHALLENGE

The challenge is to assist couples who experience difficulty conceiving through normal means.

Scope of the Problem: The inability to conceive and bear children affects 6%–12% of the American population. Under ordinary circumstances, 80%–90% of normal couples conceive during 1 year of attempting pregnancy. Infertility is generally defined as failure to conceive after 1 year of regular, unprotected intercourse (or after 6 months for women older than 30 years). If a woman has a condition known to cause infertility, immediate evaluation is appropriate. Infertility may be further subdivided into primary and secondary types based on the patient's reproductive history: patients with infertility who are nulligravid are in the primary infertility group; those who have achieved a pregnancy more than 1 year previously, regardless of the outcome of that pregnancy, are grouped in the secondary infertility group. Slightly more than half of infertility patients fall into the primary group.

Objectives of Management: To establish the relevant cause or causes and develop strategies that result in conception and delivery. With improved understanding of the physiology of conception and a wide range of technologies that may be brought to bear to assist with procreation, 85% of "infertile" couples may be helped.

TACTICS

Relevant Pathophysiology: The male partner brings to the union sperm-laden semen, which is deposited in the vagina during intercourse. The average ejaculate has a volume of between 1 and 15 mL and contains more than 20 million spermatozoa. The survival of sperm in the female genital tract is considered to be at least 96 hours and may be as long as 8 days. However, it is probable that sperms are capable of fertilizing an egg for only the first 24–48 hours after ejaculation. The woman's gametic contribution, the oocyte, is released from the ovary during the mid-cycle process of ovulation, 14 days before the onset of menstruation, regardless of the total cycle length. Progesterone is produced by the luteinized follicle, producing a characteristic increase of between 0.5°F and 1°F in basal body temperature. The oocyte may be fertilized during the first 24 hours after ovulation only. Fertilization generally occurs in the distal portion of the fallopian tube. Pregnancy does not result unless the zygote passes into the uterine cavity at the correct time (3–5 days after fertilization), encounters a receptive endometrium, and can successfully implant and grow.

Strategies: To achieve pregnancy, three critical elements must be in place: (1) a sperm must be available, (2) an egg must be available, and (3) the sperm and egg must meet at a time and place conducive to fertilization. It is the investigation of these three elements that constitutes the evaluation of the infertile couple.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Booklet:

- Evaluating Infertility, 2020
- Treating Infertility, 2019

IMPLEMENTATION

Special Considerations: While the evaluation of infertility proceeds, couples should be instructed to continue to attempt pregnancy through intercourse timed to the most fertile days of the cycle. Between one-third and one-half of all infertility problems may be diagnosed in the first phase of evaluation. The medical definition of infertility differs from that of fecundity, which refers to the physical ability of a woman to have children. Women with impaired fecundity include those who find it physically difficult or medically inadvisable to conceive and those who fail to conceive after 36 months of regular, unprotected intercourse. In short, fecundity deals with childbearing ability and fertility deals with childbearing performance. When dealing with infertility, establishing the diagnosis is not the problem; the problem is identifying the underlying pathophysiologic causes. Unlike most areas of medicine, the provider must deal with two patients at the same time because it is the couple that is infertile, not the man or woman. When the relative frequency of causes is considered, it is apparent that male and female factors are present in roughly equal proportion, with a small remainder that is idiopathic. This is important to consider during counseling. The distribution of causes is also helpful in designing a logical and efficient strategy for the evaluation of the infertile couple.

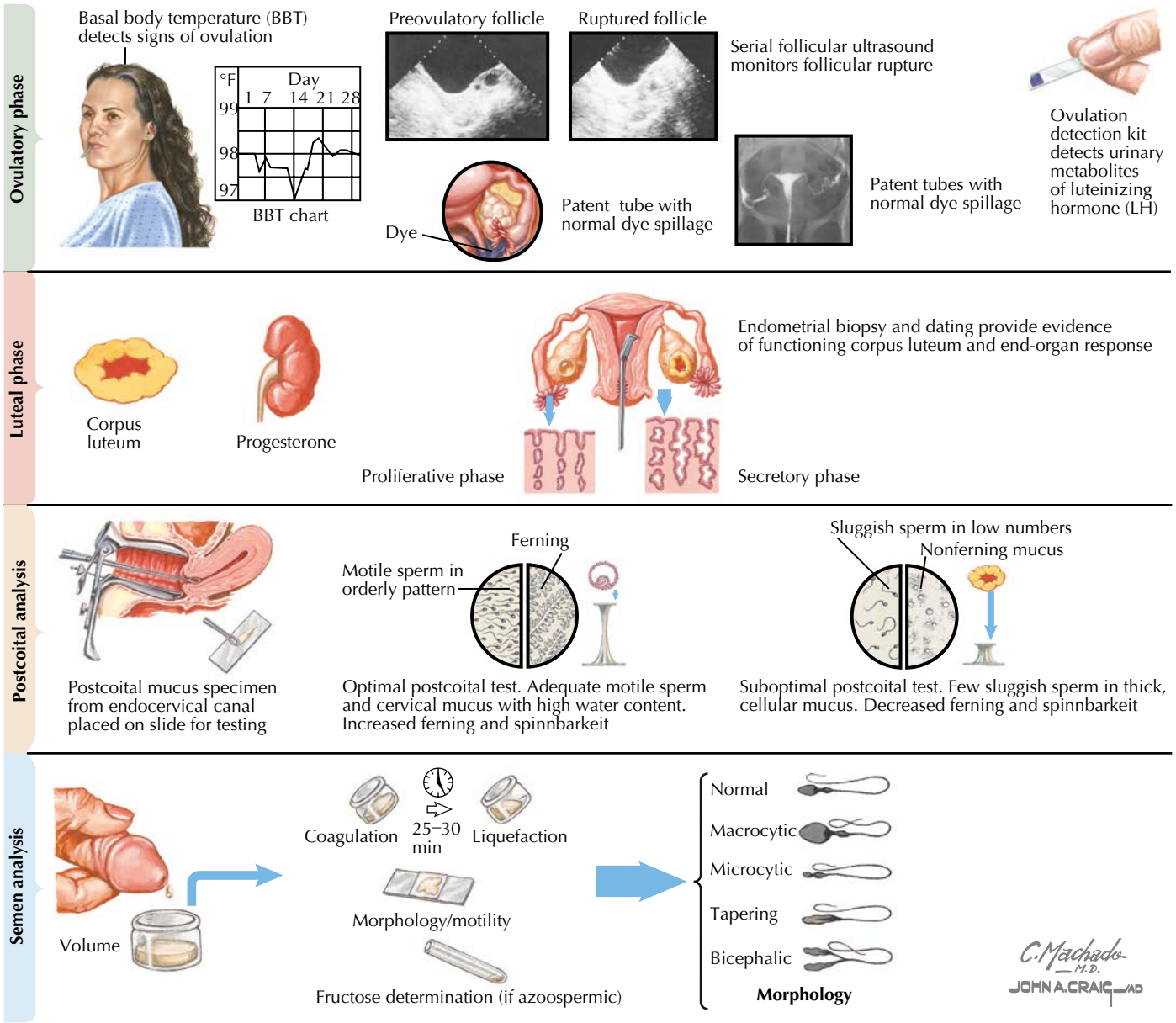

Figure 51.1 Infertility analysis

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52 IRRITABLE BOWEL SYNDROME

INTRODUCTION

Description: A functional syndrome of intermittent abdominal pain, constipation, and diarrhea related to hypermotility of the gut in the absence of any organic cause.

Prevalence: 15% of the population. First described in 1818 and accounts for 50% of all visits to gastroenterologists; 2.4–3.5 million physician visits per year and an estimated 2.2 million prescriptions. Despite the prevalence of irritable bowel syndrome (IBS), only approximately 25% of those with IBS seek care and only 1% of those with IBS are referred to specialists or become chronic health care users.

Predominant Age: Young to middle age.

Genetics: No genetic pattern; the female-to-male ratio is 2:1. Females are more likely to have constipation-predominant IBS.

ETIOLOGY AND PATHOGENESIS

Causes: Colonic wall motility is altered unpredictably in patients with IBS, with evidence suggesting altered colonic wall sensitivity. Patients with IBS have altered motor reactivity to various stimuli, including meals, psychologic stress, and balloon distention of the rectosigmoid, resulting in altered transit time, which in turn results in pain, constipation, and diarrhea. Studies of patients with and without IBS revealed that there are significantly higher levels of 5-hydroxytryptamine (5-HT) in patients with IBS, supporting a possible causal role. Recent studies have considered the role of inflammation, alterations in fecal flora, and bacterial overgrowth.

Risk Factors: None known; prior infectious gastroenteritis has been postulated as a risk factor.

SIGNS AND SYMPTOMS

- Intermittent abdominal pain (crampy in character, often worse before menses)
- Bloating and nausea
- Alternating constipation and diarrhea
- Tenesmus

Symptoms are generally worse 1–1.5 hours after meals, with 50% of patients experiencing pain that lasts for hours or days;

pain may last for weeks in up to 20% of patients. Pain is generally worse with high-fat meals, stress, depression, or menstruation and is better after bowel movements. There are four common clinical variants: (1) IBS with constipation characterized by chronic abdominal pain and constipation; (2) IBS with diarrhea, which is usually painless; (3) mixed IBS with alternating diarrhea and constipation; and (4) unsubtyped IBS (see box).

DIAGNOSTIC APPROACH

Differential Diagnosis

- Bacterial or parasitic infections
- Somatization
- Laxative abuse
- Iatrogenic diarrhea (dietary—eg, tea, coffee, food poisoning, sorbitol)
- Ulcerative colitis or Crohn disease
- Lactose intolerance
- Diverticular disease
- Celiac disease
- Giardia infection

Associated Conditions: High prevalence of psychopathologic conditions among IBS sufferers; a greater likelihood of somatization disorders, stress, anxiety disorders, depression, hysteria and hypochondriasis, chronic fatigue syndrome, impaired sexual function, dysmenorrhea, dyspareunia, increased urinary frequency and urgency, gastrointestinal reflux disease, and fibromyalgia symptoms.

Workup and Evaluation

Laboratory: No evaluation indicated. Fecal calprotectin or fecal lactoferrin have been proposed as screening tests.

Imaging: No imaging indicated.

Special Tests: Flexible sigmoidoscopy or colonoscopy may be considered for selected patients.

Diagnostic Procedures: History and exclusion of other pathologic conditions. Fecal calprotectin >50 mcg/g has a pooled sensitivity and specificity for IBS of 81% and 87%, respectively.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Because many of these patients have hysterical, depressive, and bipolar personality disorders, psychologic support is important. In some studies, placebo response rates are as high as 80%.

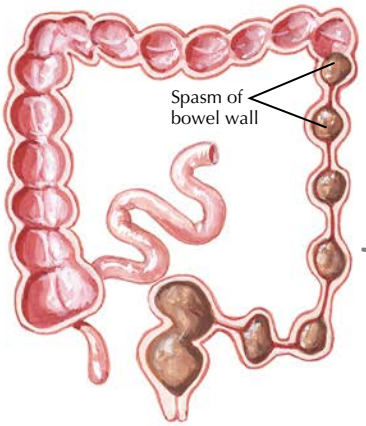
Specific Measures: Mild sedation with phenobarbital and tranquilizers may offer some relief, although long-term success is generally poor.

Diet: Bulk agents and increased dietary fiber; reduction in alcohol, fat, caffeine, sorbitol, and foods that increase flatulence. Both fasting and probiotic diets have been suggested with variable results.

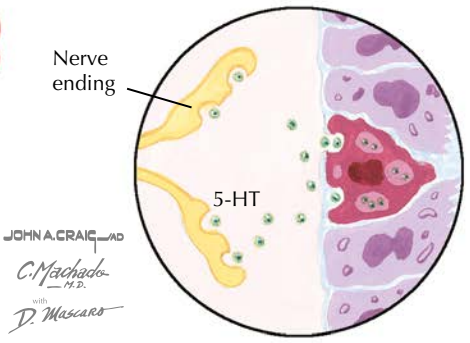
Activity: No restriction.

Irritable bowel syndrome is a syndrome of intermittent abdominal pain, diarrhea, and constipation related to hypermotility of the gut. Clinical variants include:

1) Spastic colitis characterized by chronic abdominal pain and constipation
2) Intermittent diarrhea that is usually painless
3) Combination of both with alternating diarrhea and constipation



Altered bowel wall sensitivity and motility result in IBS symptom complex



Actions of gut wall 5-hydroxytryptamine (5-HT) may underlie anomalies of motility

Rome III diagnostic criteria for irritable bowel syndrome	Alarm signs and symptoms that might suggest another diagnosis
Recurrent abdominal pain or discomfort** at least 3 days/month in the last 3 months associated with two or more of the following: 1. Improvement with defecation 2. Onset associated with a change in frequency of stool 3. Onset associated with a change in form (appearance) of stool	1) Anemia 2) Fever 3) Persistent diarrhea 4) Rectal bleeding 5) Severe constipation 6) Weight loss 7) Nocturnal GI symptoms 8) Family history of GI cancer, inflammatory bowel disease, or celiac disease 9) New onset of symptoms after age 50

*Criterion fulfilled for the last 3 months with symptom onset at least 6 months prior to diagnosis

**"Discomfort" means an uncomfortable sensation not described as pain. In pathophysiology research and clinical trials, a pain/discomfort frequency of at least 2 days a week during screening evaluation is recommended for subject eligibility

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Figure 52.1 Irritable bowel syndrome

Patient Education: Diet (increased fiber) and stress management. Biofeedback and relaxation techniques may be of some help.

Drug(s) of Choice

- Bulk-forming agents, including guar gum; osmotic laxatives.
- 5-HT_3 receptor-blocking agents (alosetron) may be used in patients with diarrhea. Melatonin has shown promise in some trials. Rifaximin 550 mg (Xifaxan) orally three times daily, a semisynthetic antibiotic based on rifamycin, has shown an 11% benefit over placebo.

Contraindications: Bowel obstruction or fecal impaction, known or suspected allergy to agent or any component.

Precautions: Empiric therapy may be initiated during the process of evaluation but should not be indefinitely continued without the establishment of a diagnosis. Bulk-forming agents must be taken with adequate fluid intake to prevent obstruction and provide optimal effects. Rectal bleeding, abdominal pain at night, or weight loss are not generally associated with IBS and should suggest further evaluation. Alosetron may cause serious gastrointestinal side effects, including ischemic colitis and severe constipation, which may require hospitalization.

Alternative Drugs

- Linaclotide is a guanylate cyclase agonist that stimulates intestinal fluid secretion and transit and may be used for IBS with constipation when osmotic laxatives fail.
- Antispasmodics (eg, hyoscyamine 0.125–0.25 mg PO or SL three to four times daily) may be of help in selected patients.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.

Prevention/Avoidance: High-fiber diet, stress reduction.

Possible Complications: Continued dependency on others, adverse effects of work, school, or home functions. Relapses are common.

Expected Outcome: Transient response is often good with most therapies. Long-term relapse is common (30%–50%).

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.

ICD-10-CM Codes: K58.9 (Irritable bowel syndrome without diarrhea).

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LOW BACK PAIN

53

INTRODUCTION

Description: Pain located in the lower portion of the back (generally between the level of the iliac spines and the lower ribs) with radiation to the abdomen, pelvis, legs, or trunk. In women, gynecologic processes are often implicated (correctly or incorrectly) in this complaint. Low back pain is especially common during pregnancy.
Prevalence: Common (>80% suffer some form of low back pain during their lifetime, 1.3% of office visits in the United States).
Predominant Age: 25–45 years.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Normal aging aggravated by trauma, injury, or pregnancy.
Risk Factors: Obesity, poor posture, improper lifting, age, sedentary lifestyle, osteoporosis, psychosocial factors (secondary gain), and trauma. Smoking, low educational attainment, and female sex are also associated.

SIGNS AND SYMPTOMS

- Pain and discomfort between the level of the iliac spines and the lower ribs, generally sudden in onset after an injury or gradually over the subsequent 24 hours
- Radiation of pain to buttocks or posterior thighs (stopping at the knees); referred pain, not radicular; back pain greater than leg pain
- Pain aggravated by back motion, lifting, coughing, straining, bending, or twisting; relieved by rest
- Normal sensory, motor, and reflex findings; decreased range of motion

DIAGNOSTIC APPROACH

Differential Diagnosis

- Gynecologic disease (pregnancy, endometriosis, pelvic inflammatory disease)
- Gastrointestinal disease (duodenal ulcer, pancreatitis, irritable bowel syndrome, inflammatory bowel disease, diverticulitis)
- Urinary tract disease (pyelonephritis, nephrolithiasis)
- Disc herniation or degenerative disease
- Osteoporotic fracture
- Fibromyalgia
- Spinal stenosis
- Spondylolisthesis
- Ankylosing spondylitis
- Arthritis (hip or back)
- Neoplasia (primary or metastatic)
- Fictitious complaint (somatization, secondary gain)

Associated Conditions: Chronic pain states (pelvic pain, headaches), radiculopathy, obesity, and psychosocial disease. Secondary gain often complicates both the diagnosis and treatment of low back pain. Warning signs of significant secondary gain include pending litigation or compensation, depression, hostility, and prolonged use of potent analgesics.

Workup and Evaluation

Laboratory: No evaluation indicated unless suggested by nonmechanical symptoms or atypical patterns of pain.
Imaging: Generally not required. When indicated (persistent pain, atypical symptoms)—magnetic resonance imaging (MRI) without contrast is considered the best initial test. Anteroposterior, lateral, and spot films of L_5–S_1 area may be of use in selected patients. Bone scan if tumor, trauma, or infection is suspected.
Special Tests: Computed tomography, magnetic resonance imaging, or myelography only for specific cause.
Diagnostic Procedures: History and physical examination (with special attention to the back and hips).

Pathologic Findings

Based on the cause

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Bed rest, short-term analgesics or antiinflammatory agents, or massage.
Specific Measures: Muscle relaxants, Williams flexion exercises, physical therapy, topical low-level continuous heat therapy, transcutaneous electrical nerve stimulation (TENS). Mindfulness and pain reprocessing therapy, in which the patient learns to view and deal with pain in better ways, have been shown to be effective.
Diet: No specific dietary changes indicated. Weight reduction, if appropriate.
Activity: Restricted activity for 3–6 weeks, then a gradual return to normal activity as tolerated. Patients should begin Williams flexion exercises as prevention for future injuries.
Patient Education: Posture and activity counseling, home back exercises.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Easing Back Pain During Pregnancy, 2020
- Exercises During Your Pregnancy and Exercises After Your Baby is Born (Tear Pad), 2019

Drug(s) of Choice

- Nonsteroidal antiinflammatory drugs, muscle relaxants—cyclobenzaprine (Flexeril) 10 mg PO three times daily, diazepam (Valium) 5–10 mg PO two times daily.

Contraindications: See individual agents. Aspirin-sensitive asthma for most agents.
Precautions: See individual agents. Ulcer or renal disease for most agents.
Interactions: See individual agents.

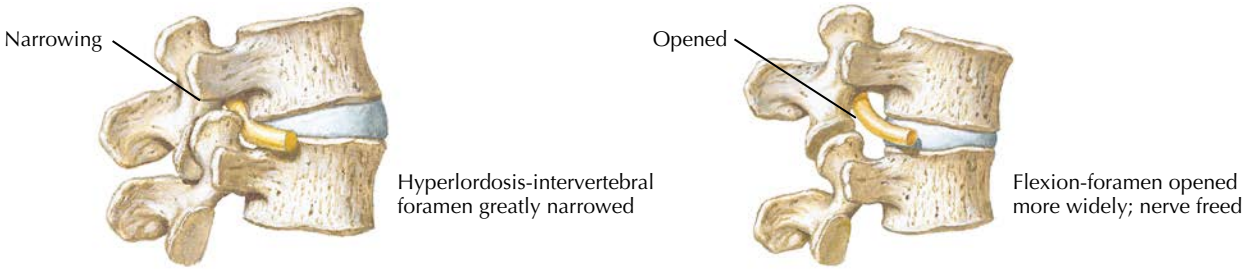
FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: Muscle-strengthening exercises, care in lifting, maintenance of reasonable weight. Avoid tasks that aggravate (heavy lifting, bending, twisting, sudden movements). Weight reduction, if appropriate.
Possible Complications: Chronic low back pain, pain medication dependence, and dependency state resulting from secondary gain.
Expected Outcome: Gradual improvement with analgesics, muscle relaxants, massage, and exercise (1–6 weeks).

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy, although pregnancy (and the postural changes brought about by it) may worsen existing low back pain. Some relief is gained when the fetus descends into the pelvis in the last days of the gestation, but the sudden return to upright and the constant bending to care for a newborn make this improvement short lived.
ICD-10-CM Codes: Based on the cause.

Effects of lumbar hyperlordosis on spinal nerve roots



Treatment of lumbar strain

Acute

- Absolute bed rest
- Warm tub baths, heat pad, hydrocollator
- Sedation
- Firm mattress, bed board
- Diathermy, massage
- Local anesthetic infiltration to trigger zones
- Occasionally corset, brace, or strapping

Chronic and prophylactic

- Reduction of weight
- Correction of posture
- Firm mattress, bed board
- Daily low back exercises
- Regular sports activity compatible with age and physique

Exercises for chronic lumbar strain (starting positions in outline)

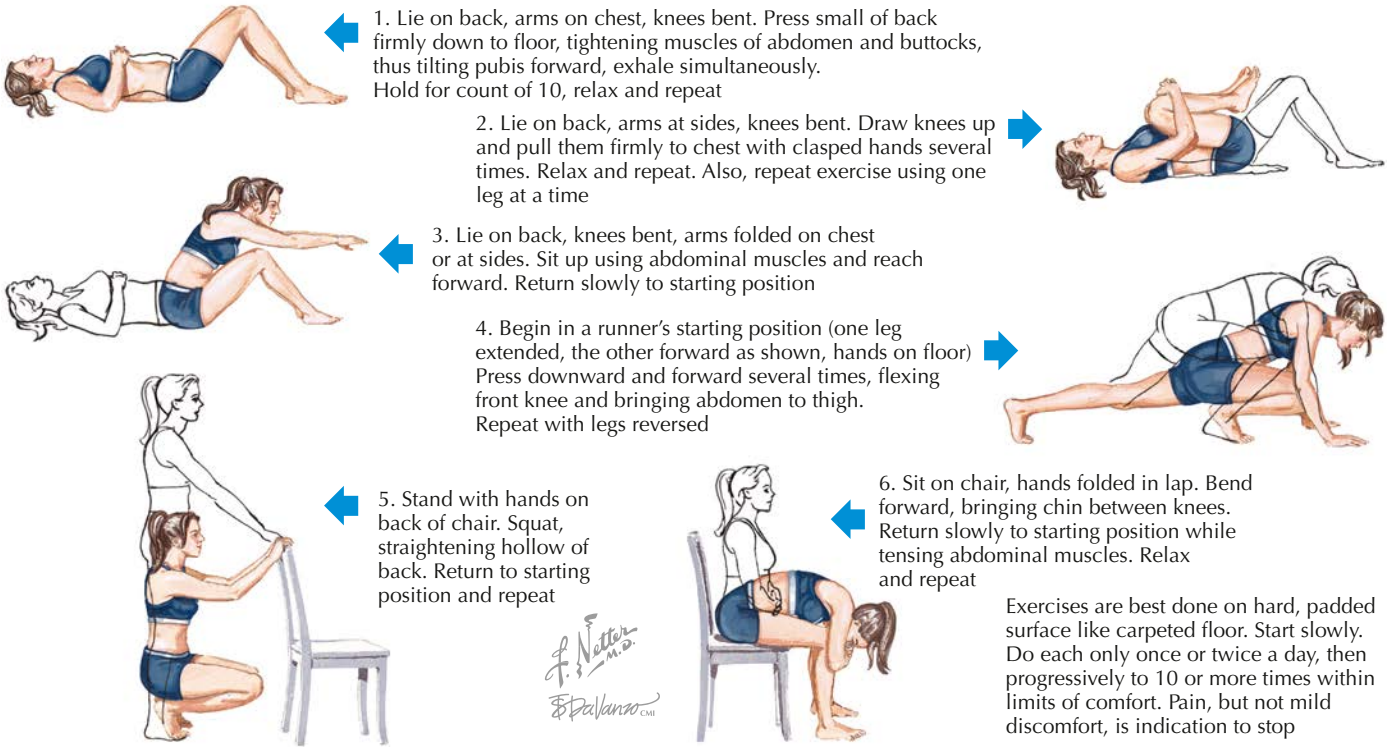


Figure 53.1 Lumbar strain in low back pain

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MELANOMA

54

INTRODUCTION

Description: Benign proliferations of melanocytes (junctional nevi) are often referred to as melanomas. Malignant melanoma is the malignant degeneration of cells from the melanocytic (pigment) system. Although generally a skin lesion, malignant melanomas may arise in any pigmented tissue (eg, the eye). The vulva accounts for 5%–10% of all malignant melanomas in women, despite containing only 1% of the skin surface.

Prevalence: 4.5/100,000 people; an estimated 197,700 cases of malignant melanoma will be diagnosed in the United States in 2022 (57,180 men, 42,600 women), with 7650 people (5080 men and 2570 women) anticipated to die of the disease. It is the most common malignancy in women during their reproductive years.

Predominant Age: 20–40 years (50% of patients).

Genetics: Familial dysplastic nevus syndrome (if history includes a family member with melanoma, lifetime risk is 100%). At least nine different major genes have been associated with melanoma, including *CDKN2A/p16* and *p14/ARF, CDK4* and *CDK6,* and telomere maintenance and DNA repair genes. Half of cutaneous melanomas have a V600 mutation in the *BRAF* gene.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown; may be related to ultraviolet (A and B) light exposure.

Risk Factors: Sun exposure (ultraviolet light) is the greatest risk factor along with previous dysplastic nevi, multiple pigmented lesions, fair complexion, freckling, blue eyes and blond hair, adolescent blistering sunburn (2-fold increase in risk), family history of melanoma.

SIGNS AND SYMPTOMS

- Asymptomatic
- Pigmented lesion with irregular border and variegation in color
- Bleeding, scaling, size, or texture change in any pigmented lesion (ABCDE mnemonic—**a**symmetry, **b**order irregularity, **c**olor variegation, **d**iameter ≥6 mm on back or lower leg [in Whites] or hand, feet, and nails [in African Americans], **e**levation above the skin surface)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Junctional nevus
- Dysplastic nevus
- Malignant melanoma (the risk of malignancy is greatest in nevi that are >6 mm in diameter, have irregular borders, are asymmetric, or have variegated coloration)
- Pigmented basal or squamous cell carcinoma

- Seborrheic keratoses

Associated Conditions: Junctional nevus, dysplastic nevus

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated, used only to evaluate metastases (brain, bone, lymph nodes).
Special Tests: Excisional biopsy for all vulvar nevi or suspicious nevi anywhere on the body. All lesions should be submitted for histologic examination; they never should be destructively removed.
Diagnostic Procedures: Physical examination and excisional biopsy.

Pathologic Findings

Superficial spreading melanoma (70% of cases), nodular (vertical growth, 15%), acral lentiginous (2%–8%), lentigo maligna (4%–10%)

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, biopsy of suspicious lesions, instruction on prevention (use of sunscreen, avoidance of excessive exposure).
Specific Measures: Surgical excision with a 1-cm margin for lesions less than 2-mm thick and a 3-cm margin for thicker lesions.
Diet: No specific dietary changes indicated.
Activity: Sun exposure reduction and protection.
Patient Education: Risks of sun exposure, use of sunscreen products, characteristics of suspicious lesions.
Skin Cancer Foundation:

- Melanoma Overview. Available at: https://www.skincancer.org/skin-cancer-information/melanoma/. Accessed February 12, 2022.

Drug(s) of Choice

- Therapy with high-dose interleukin-2 has had limited success, and severe toxicity limits use.
- Immunotherapy, especially ipilimumab-containing regimens.
- Immunotherapy using checkpoint inhibitors (the *anti-PD1* antibodies [pembrolizumab, nivolumab] and the *anti-CTLA4* antibody [ipilimumab]) and targeted therapy (*BRAF* and/or *MEK* inhibition). Both types of therapy prolong progression-free and overall survival vs. chemotherapy. Combined *BRAF* plus *MEK* inhibitor therapy; dabrafenib plus trametinib, vemurafenib plus cobimetinib, and encorafenib plus binimetinib.

Contraindications: See individual agents.
Precautions: See individual agents.
Interactions: See individual agents.

FOLLOW-UP

Patient Monitoring: Frequent (every 3–6 months) total body inspection for abnormal or changing nevi. Annual chest radiograph (6% of recurrences diagnosed this way). Weekly self-examination.
Prevention/Avoidance: Avoidance of excessive sun exposure, especially blistering sunburn and indoor tanning. Use of sunscreen.
Possible Complications: Disease progression or spread, cosmetic damage by excision.
Expected Outcome: Prognosis is based on staging—5-year survival if no local or distant spread (70%); <0.85-mm thick (95%–100%); lymphatic involvement (5%).

MISCELLANEOUS

Pregnancy Considerations: Although rarely observed, malignant melanoma is the most common malignancy in pregnancy and is considered to be exacerbated by pregnancy. Although any malignant metastasis to the fetus is rare, melanomas represent up to one-third of all malignancies found. Melanoma is one of the few malignancies that spread to the placenta, and metastatic melanoma is a threat to both the fetus and mother. If a woman has had melanoma, it is recommended that she wait for 2 or more years before planning a pregnancy.
ICD-10-CM Codes: Based on location and severity of the disease.

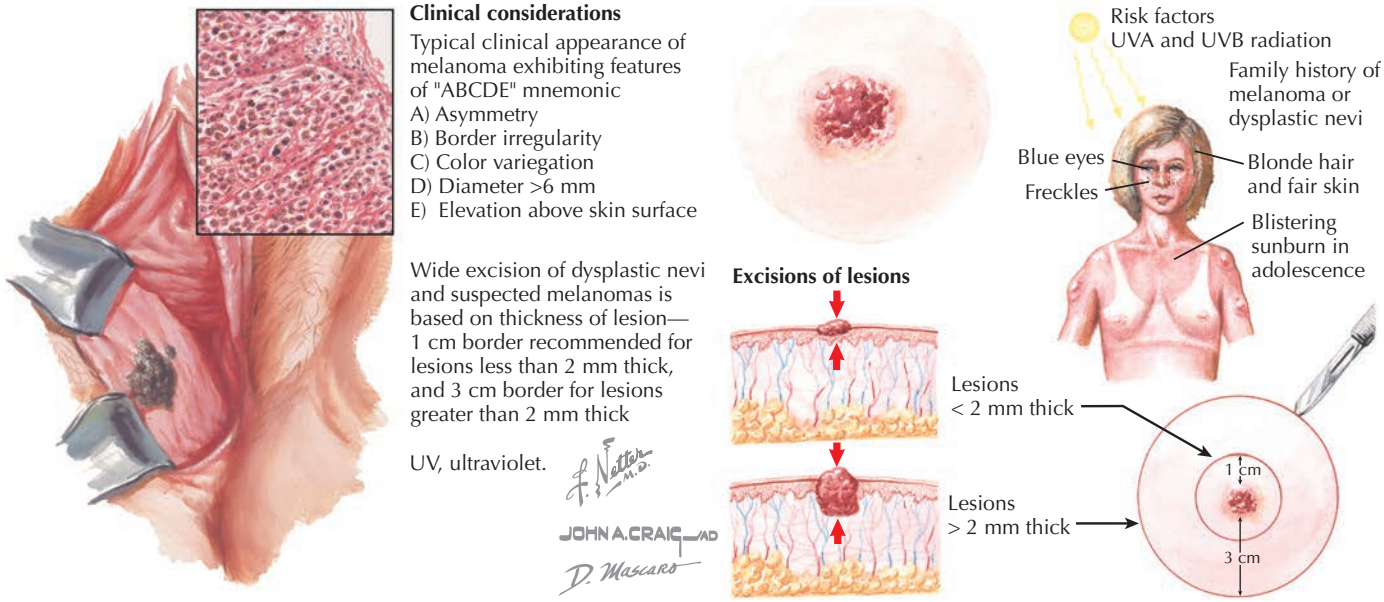

Figure 54.1 Clinical considerations and excisions of lesions in melanoma

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MYOFASCIAL SYNDROMES

55

INTRODUCTION

Description: Myofascial syndrome is characterized by muscular and fascial pain and is associated with localized tenderness and pain referred to sites that are often remote. Myofascial pain syndromes and fibromyalgia frequently demonstrate trigger-point involvement. These syndromes may present as chronic lower abdominal or pelvic pain that is easily confused with gynecologic causes.

Prevalence: 3% of the population. Approximately 15% of women with chronic pain syndromes.

Predominant Age: Sedentary middle-aged women.

Genetics: No genetic pattern. More common in women (80%–90%) than in men. Several studies indicate that women who have a family member with fibromyalgia are more likely to have fibromyalgia themselves.

ETIOLOGY AND PATHOGENESIS

Causes: Abnormal spasm of a small portion of a muscle resulting in an extremely taut, tender band of muscle (trigger point). Compression of this site elicits local tenderness and often reproduces the referred pain. Most trigger points are located at or near areas of moving or sliding muscle surfaces, although they are not limited to these locations. Genetics and physical and emotional stressors are possible contributory factors to the development of the illness. Central pain sensitization may also play a role.

Risk Factors: Stress, sleep deprivation, trauma, depression, and weather changes.

SIGNS AND SYMPTOMS

- Chronic pain referred to remote sites.
- "Trigger points" (hypersensitive areas overlying muscles that induce spasm and pain) that induce or reproduce the patient's symptoms. Trigger points may be found throughout the body but are most common in the abdominal wall, back, and pelvic floor when pelvic pain is the symptom. Most patients have 11 or more trigger points.
- Pain is worse in the morning, with stress or weather change, after nonrestorative sleep. Pain is better with activity, stress reduction, and rest.

- Urinary tract symptoms (frequency, urgency, incontinence, nocturia, dysuria, sensation of incomplete emptying, bladder pain)
- Vulvovaginal discomfort/dyspareunia
- Two criteria established by the American College of Rheumatology: a history of widespread pain lasting more than 3 months and the presence of tender points.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Somatization
- Sympathetic dystrophy
- Muscle strain or sprain
- Polymyalgia rheumatica
- Temporal arteritis
- Irritable bowel syndrome
- Low back strain or sprain
- Interstitial cystitis

Associated Conditions: Chronic pain syndromes, irritable bowel syndrome, depression, sleep abnormalities, reduced physical endurance, and social withdrawal.

Workup and Evaluation

Laboratory: No evaluation indicated. Screening with an erythrocyte sedimentation rate (normal) may be helpful. Others based on diagnosis being considered.
Imaging: No imaging indicated.
Special Tests: None indicated.

Diagnostic Procedures: History and physical examination generally sufficient. Palpation of the anterior abdominal wall may demonstrate thickening or tenderness that is suggestive of the diagnosis. Symptoms do not generally change during menses.

Pathologic Findings

A trigger point is often felt as an extremely taut band of muscle (normal muscle should not be tender to firm compression and does not contain taut bands).

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, analgesics, heat (low-level continuous topical heat [ThermaCare], hot packs, ultrasound therapy), and general conditioning exercises.
Specific Measures: Transcutaneous electrical nerve stimulation (TENS), trigger-point injections. A 22-gauge needle is selected for trigger-point injections because of the amount of movement within the tissue that is often required to probe for and block the taut muscle bundle. Thinner needles may bend or break under these circumstances. The length of the needle should be sufficient to allow the entire trigger point to be reached without indenting the skin or having the hub at the skin surface. Superficial trigger points also may be treated with a "spray-and-stretch" technique (the area overlying the trigger point is sprayed with a coolant or freezing spray [eg, ethyl chloride] for several seconds, and the muscle is forcibly stretched by passive extension). Hypnosis and/or acupuncture also may be used.

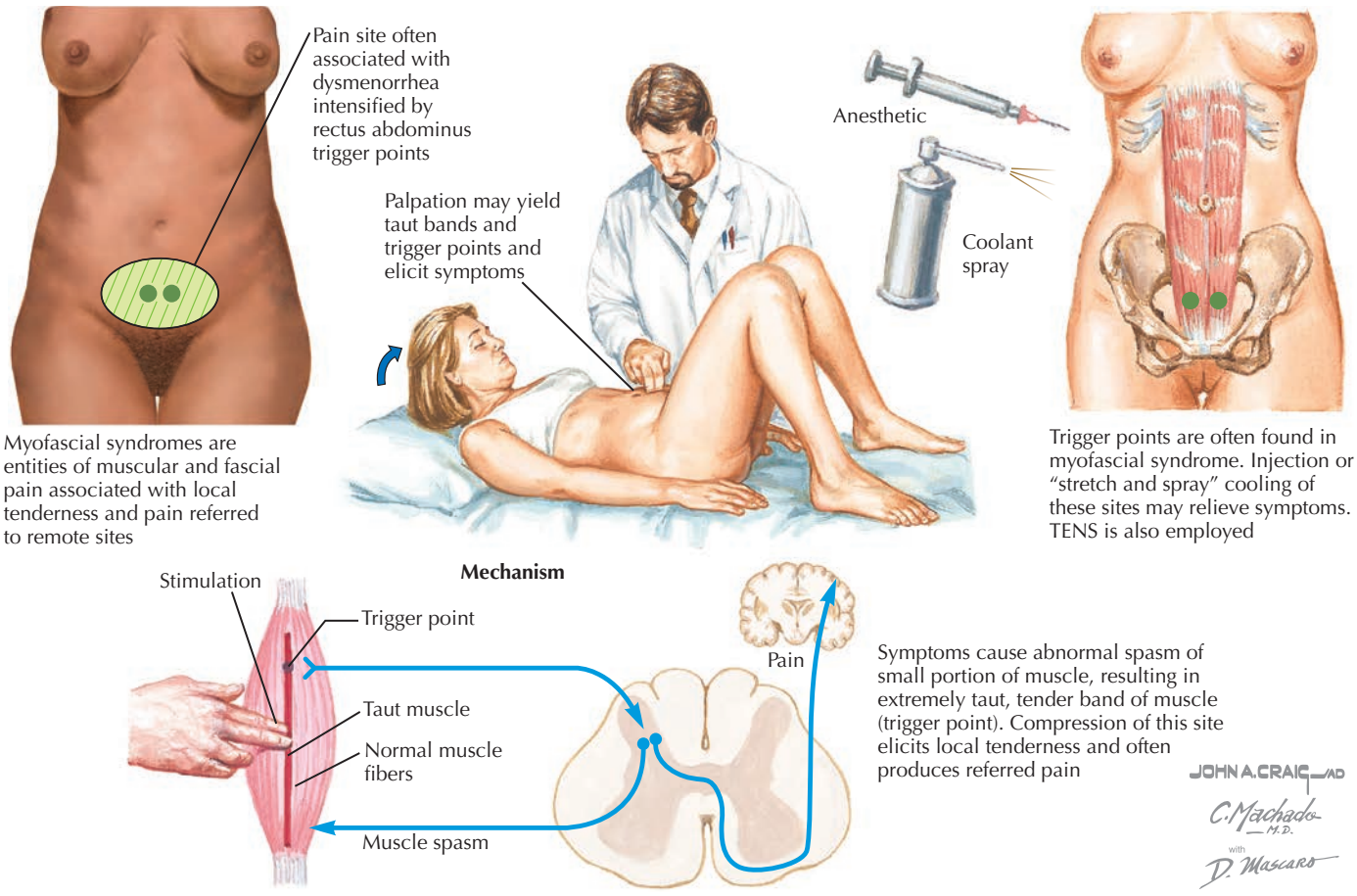

Figure 55.1 Myofascial syndromes

Diet: No specific dietary changes indicated.
Activity: No restriction except that caused by pain. Directed pelvic floor physical therapy has shown good effect and for many represents first-line therapy when pelvic muscles are involved.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Back Pain During Pregnancy, 2020
- Chronic Pelvic Pain, 2014

Drug(s) of Choice

- Nonsteroidal antiinflammatory drugs (NSAIDs).
- Sleep aids—flurazepam (Dalmane) 15 mg PO every night, triazolam (Halcion) 0.125 mg PO every night, amitriptyline (Elavil) 20–25 mg PO every night.
- Local anesthetic for injection (generally 1% lidocaine without epinephrine, limit injection to approximately 10 mL/site, four sites per session).
- Adjuvant therapy with gabapentin, pregabalin, and 5-HT_3 receptor–blocking agents gives good results for selected patients.

Contraindications: See individual agents. Trigger-point injections should not be attempted when infection is present near the planned site.
Precautions: Watch for side effects or dependence.

Alternative Drugs

- Trazodone (Desyrel) 50 mg PO every night.
- Botulinum toxin type A injections instead of local anesthetics.

FOLLOW-UP

Patient Monitoring: Normal health maintenance, monitor for medication side effects.
Prevention/Avoidance: Adequate restorative sleep, stress reduction, physical fitness, and activity.
Possible Complications: Depression, reduced physical endurance, social withdrawal, chronic pain, work compromise or absence. The most common complications of trigger-point injection are local ecchymoses and anesthetic agent toxicity. The latter is best avoided by strictly limiting the total dose given. Infection is rare if the skin is first disinfected, and areas of frank infection are avoided.
Expected Outcome: Improvement with medical therapy is generally seen in 2–4 weeks. With the identification of a specific trigger point and the use of trigger-point injection, results should be good. Response to trigger-point injection routinely persists longer than the duration of action of the anesthetic agent used. This frequently extends to permanent relief after only one or two injections.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. Pregnancy may limit some therapies. Pregnancy is generally not a contraindication to trigger-point injections.
ICD-10-CM Codes: R10.2 (Pelvic and perineal pain), M79.1 (Myofascial pain), M60.9 (Myocitis), and G89.29 (Other chronic pain). Others based on type and location.

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56 OBESITY

INTRODUCTION

Description: Obesity is a state of increased fat and lean body mass (>20% higher than ideal weight; body mass index [BMI] ≥30 kg/m^2) that is associated with increased health risks. Obesity affects more women than men and is of special concern in adolescents and older women. Weight gained during pregnancy (in excess of that related to the pregnancy) is often not lost.
Prevalence: Varies with age; >40% of women. The prevalence of severe obesity (BMI ≥40 kg/m^2) in the general population is 9.2%.
Predominant Age: Any.
Genetics: Of the variance in body mass, 20%–30% may be genetically determined. Rare genetic syndromes have been described.

ETIOLOGY AND PATHOGENESIS

Causes: Calorie consumption in excess of expenditure, insulinoma, hypothalamic disorders, Cushing syndrome, corticosteroid drugs.
Risk Factors: Parental obesity, pregnancy, sedentary lifestyle, high-fat diet (higher calorie density), low socioeconomic status, non-Hispanic Black race.

SIGNS AND SYMPTOMS

- Increased body mass and fat (male-pattern obesity [abdominal] is associated with the greatest health risk)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Pathologic process other than excess dietary consumption

Associated Conditions: Increased morbidity and mortality (see Complications), cholelithiasis. Recent studies indicate an increase in the risks for ovarian and breast cancers.

Workup and Evaluation

Laboratory: No evaluation indicated. Consider thyroid testing in selected patients. Determine serum cholesterol, triglycerides, or glucose levels to assess risk factors for complications.
Imaging: No imaging indicated.
Special Tests: BMI = Weight (kg)/height (m)^2; ratio of waist to hip circumference (normal female gynecoid pattern is >0.85). A waist circumference of ≥35 in (88 cm) in women is indicative of increased cardiometabolic risk. Separate screening for other cardiovascular risk factors is also appropriate.
Diagnostic Procedures: Physical examination, BMI, waist circumference.

Pathologic Findings

Hypertrophy and/or hyperplasia of adipocytes. Cardiomegaly or hepatomegaly is common.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Risk assessment, diet and exercise counseling. Comprehensive lifestyle intervention: a combination of diet, exercise, and behavioral modification. Assistance with diet planning or selection of a commercial program.
Specific Measures: Behavior modification and hypnosis have been applied with variable success. The addition of single pharmacologic agents is appropriate for those with a BMI ≥30 kg/m^2 (≥27 kg/m^2 with comorbidities). In select patients (BMI >40 kg/m^2), surgical intervention (stapling or bypass) may be indicated. Surgery is the most effective long-term therapy for morbid obesity.
Diet: Restriction to 500 kcal below maintenance generally provides the best sustainable loss (1 lb/week). Very low-calorie diets are associated with increased risk and occasional deaths.
Activity: A program of physical activity should accompany any calorie restriction diet. Activity by itself is generally ineffective.
Patient Education: Diet and exercise instruction, behavior modification.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Cholesterol and Women's Cardiovascular Health, 2021
- Exercise During Pregnancy, 2020
- Exercise After Pregnancy, 2019
- Healthy Eating, 2020
- Obesity and Pregnancy, 2021
- Staying Active - Physical Activity and Exercise, 2021
- Weight Control - Eating Right and Keeping Fit, 2021

Drug(s) of Choice

Drug therapy is not generally recommended for those with a BMI of <30 kg/m^2.

- Glucagon-like peptide 1 (GLP-1) agonists (eg, semaglutide, liraglutide) are reasonable first-line treatments. Semaglutide is often preferred because of its once-weekly dosing.
- Orlistat (Xenical) 120 mg PO three times daily, taken during or up to 1 hour after meals that contain fat, may be recommended. A reduced-dose version of orlistat (Alli) was introduced as an over-the-counter adjunct for weight loss. With these agents, high-fat meals should be avoided to reduce cramping and diarrhea.
- Phentermine, benzphetamine, phendimetrazine, and diethylpropion have all been used with some success. (Sympathomimetic drugs cause early satiety, reducing food intake.)

Contraindications: See individual agents. Most are contraindicated in the presence of atherosclerosis or other heart disease, hypertension, hyperthyroidism, or glaucoma. Patients with chronic malabsorption syndromes or cholestasis should avoid orlistat.
Precautions: Relapse is common, and abuse potential is high for stimulants. Diarrhea, fatty stools, increased frequency of bowel movements, fecal incontinence, abdominal pain, and nausea may occur with orlistat therapy. Lorcaserin was voluntarily withdrawn from the market in 2020 because of concerns over increased cancer rates. Over-the-counter dietary supplements have not been shown to be effective and have been found to frequently be contaminated with sibutramine, fenproporex, fluoxetine, bumetanide, furosemide, phenytoin, and other agents. They are not recommended.
Interactions: Some agents may cause arrhythmias with general anesthetic agents. Orlistat can interact with cyclosporine, fat-soluble vitamin absorption, and warfarin.

Alternative Drugs

- Phenylpropanolamine (over-the-counter preparations)

FOLLOW-UP

Patient Monitoring: Long-term follow-up, screening for complications of drug therapy or obesity itself.

Prevention/Avoidance: Diet and exercise counseling (especially important for adolescents and children).

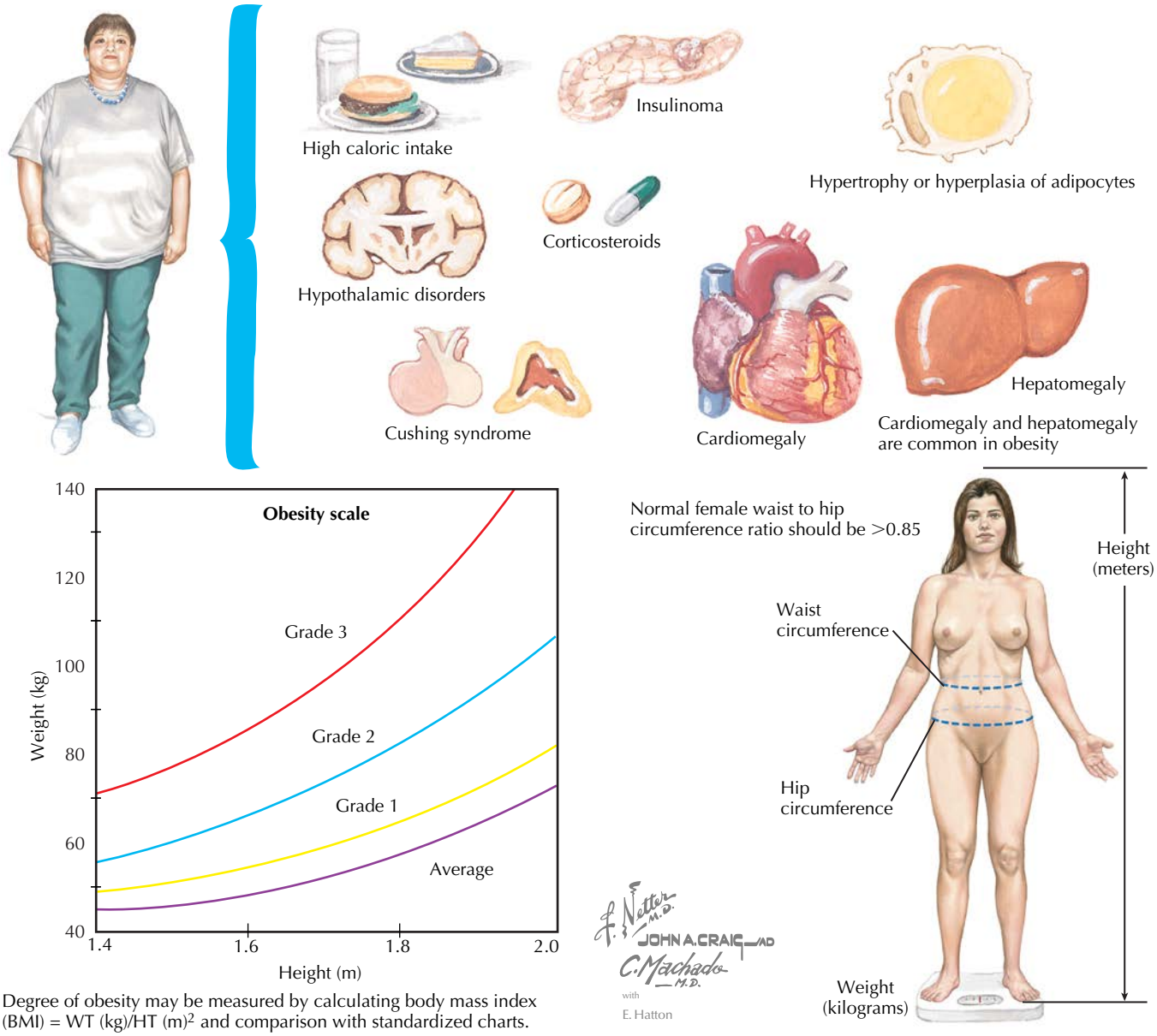
Possible Complications: Significant increase in risk for cardiovascular disease, diabetes mellitus, hypertension, hyperlipidemia, cholelithiasis, cholecystitis, osteoarthritis, gout, thromboembolism, and sleep apnea.

Expected Outcome: Long-term maintenance is difficult, and relapses are common. Individual motivation is the best predictor of success.

MISCELLANEOUS

Pregnancy Considerations: Obesity complicates pregnancy, and pregnancy is often the time of onset of obesity for many women. Weight gain should be monitored and adjusted downward for patients who are obese. Orlistat is a Category B medication (see others for specific pregnancy category).

ICD-10-CM Codes: E66.9 (Obesity, unspecified) and E66.01 (Morbid [severe] obesity due to excess calories).



Degree of obesity may be measured by calculating body mass index (BMI) = WT (kg)/HT (m)^2 and comparison with standardized charts.

Figure 56.1 Obesity

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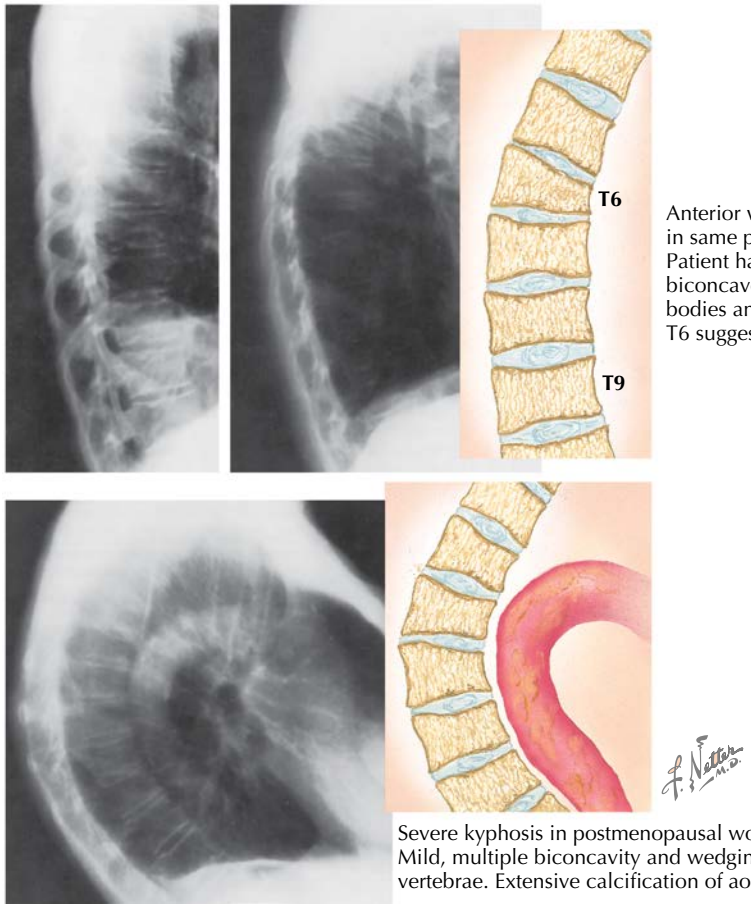
57 OSTEOPOROSIS

INTRODUCTION

Description: Osteoporosis is characterized by the loss of bone mass (calcium) and microarchitectural disruptions that puts the patient at risk for fracture with minimal trauma or during activities of daily living. This process disproportionately affects older women, resulting in significant morbidity and mortality. Estimates of medical costs are as high as $10 billion each year in the United States.

Prevalence: Of women older than 75 years (not undergoing estrogen replacement), 40% have spine, hip, or forearm fractures and 80% of hip fractures occur in this group.

Predominant Age: Postmenopausal.



Mild osteopenia in post-menopausal women. Vertebrae appear "washed-out"; no kyphosis or vertebral collapse

Anterior wedge compression at T6 in same patient 16 1/2 years later. Patient has lymphoma, with multiple biconcave ("codfish") vertebral bodies and kyphosis. Focal lesion at T6 suggests neoplasm

Severe kyphosis in postmenopausal woman. Mild, multiple biconcavity and wedging of vertebrae. Extensive calcification of aorta

Figure 57.1 Radiographic findings in osteoporosis

Genetics: More common in some races (White/Asian) and is considered to be a function of peak bone mass.

ETIOLOGY AND PATHOGENESIS

Causes: Alcohol use/abuse, chronic illness, diabetes mellitus, estrogen loss, especially early menopause, excessive caffeine use, family history of osteoporosis, high parity, high protein intake, inactivity/sedentary lifestyle, inadequate vitamin D intake or sun exposure, low body weight, medical therapy (anticonvulsants, corticosteroids, excess thyroid hormone replacement, long-term heparin or tetracycline use, loop diuretics, chemotherapy), poor diet/inadequate calcium intake (<1000 mg/day), White or Asian race, radiotherapy, smoking.

Risk Factors: Menopause (without estrogen therapy), inactivity, presence of other causes as previously listed. Women suffer roughly a 10-fold increase in the normal rate of bone loss for a period of approximately 10 years beginning with the loss of ovarian function. This results in an average lifetime loss of approximately 35% of cortical bone mass and 50% of the more metabolically active trabecular bone; in comparison, men lose only approximately two-thirds of this amount.

SIGNS AND SYMPTOMS

- Asymptomatic
- Spinal, hip, or forearm fractures (with or without pain, fractures should be suspected in idiopathic back pain in at-risk patients)
- Loss of height (up to 4–8 in.)
- Development of kyphoscoliosis ("dowager's hump")

DIAGNOSTIC APPROACH

Differential Diagnosis

- Metastatic tumor (breast)
- Paget disease (osteitis deformans)
- Multiple myeloma
- Unreported trauma (abuse, elder abuse)
- Cushing syndrome

Associated Conditions: Genitourinary syndrome of menopause (dyspareunia, vulvodynia, atrophic vulvitis), increased risk of cardiovascular disease, hot flashes and flushes, sleep disturbances, urinary incontinence, and others associated with hypoestrogenic states.

Workup and Evaluation

Laboratory: No evaluation specifically indicated.

Imaging: Dual-energy X-ray absorptiometry (DEXA) or quantitative computed tomography. Routine radiographic studies (eg, chest radiograph) do not detect changes until almost 30% of bone has been lost (approximately equal to fracture threshold, 1 g/cm^2).

Special Tests: World Health Organization (WHO) Fracture Risk Assessment Tool (FRAX). Urinary tests for bone metabolites are investigational only.

Diagnostic Procedures: Radiographic assessment of bone mass: T-score of –2.5 or less or a Z-score of –2 or less are diagnostic of osteoporosis.

Pathologic Findings

Loss of bone calcium, thinning of trabeculae, microfractures, macrofractures (spine, hips, forearms).

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Smoking cessation, alcohol and caffeine intake in moderation, weight-bearing exercise (30 minutes three times weekly), adequate dietary calcium and vitamin D (or supplementation).

Specific Measures: Bisphosphonates (oral preferred for cost and long-term safety data), calcitonin (infrequently used, reserved for selected patients as a therapeutic agent, not as prevention), selective estrogen receptor modulators (SERMs). Estrogen therapy (when indicated for other reasons) will provide protection but is no longer considered sufficient to justify risks.

Diet: Adequate dietary intake of calcium (1000–1500 mg/day) and vitamin D (400–800 IU daily). If dietary calcium intake is adequate (≥1200 mg/day) supplementation is not necessary. Supplementation of vitamin D beyond this dose is generally not warranted.

Activity: Weight-bearing exercise or exercise against resistance. Low-impact activities for those with established bone loss.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets: Osteoporosis, 2018

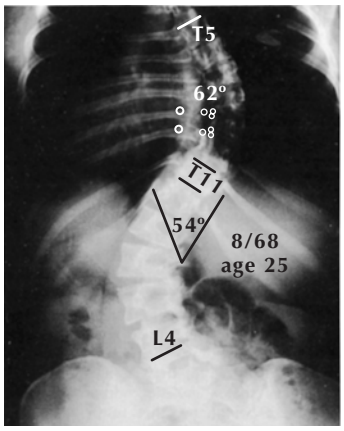
- Staying Active: Physical Activity and Exercise, 2021
- The Menopause Years, 2020

Drug(s) of Choice

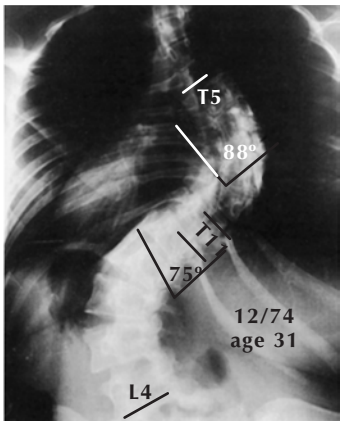
- Bisphosphonates—alendronate sodium (Fosamax) 10 mg PO daily (must be taken on arising for the day with a full glass of water and nothing by mouth for 30 minutes); risedronate sodium (Actonel) 30 mg PO weekly; ibandronate sodium (Boniva) 150 mg PO monthly (must remain upright and with nothing by mouth for 60 minutes) or 3 mg IM every 3 months. Zoledronic acid once-yearly IV therapy. Denosumab (Prolia) and romosozumab (Evenity) are alternatives to intravenous zoledronic acid.
- SERMs (also known as tissue selective estrogens). Many of these agents have bone activity and can protect or increase bone mass. For most, no current data reveal a reduction in the fracture rate, but this is expected to be the case when studies of longer-term use become available.
- Estrogen replacement (with progesterone if indicated). See Chapter 196, Menopause, for dosage options. Estrogen's effect on bone protection appears to depend on obtaining a relatively normal (premenopausal) blood level (40–60 pg/mL) and is not affected by the route of therapy. Data supports empiric estrogen therapy for those with premature ovarian failure or surgery, while postmenopausal estrogen is reserved for symptom relief and not for bone protection.

Contraindications: Oral bisphosphonates are contraindicated in patients with esophageal stricture or difficulty swallowing, an inability to sit or stand for 30–60 minutes, in nursing mothers, and those with chronic kidney disease.

Precautions: Patients must remain upright after the ingestion of bisphosphonates to avoid esophageal irritation. Long-term use may be associated with impaired mineralization; therefore, bisphosphonates should be cyclically administered (infrequent

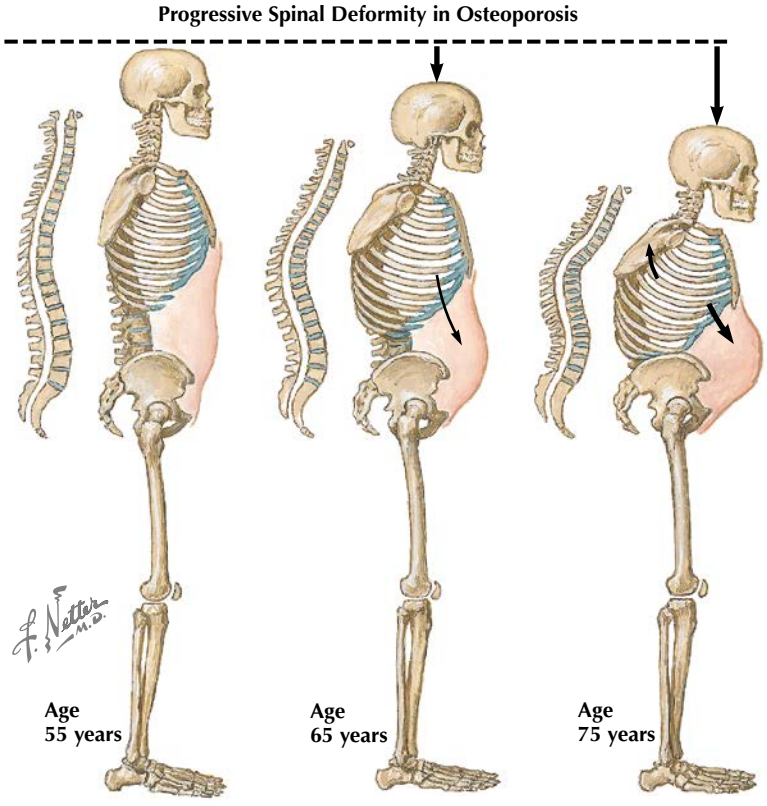


Right thoracic curve of 62° and left lumbar curve of 54° in 25-year-old woman. Curve and grade II spondylolisthesis of L5 detected but not treated during adolescence. Curve increased slowly during adulthood



Increased curves in same woman at age 31 after two closely spaced pregnancies. Thoracic curve progressed to 88° and lumbar curve to 75°. Spondylolisthesis increased to grade III

Reproduced from Keim HA: The Adolescent Spine. New York, Grune & Stratton, 1976.



Compression fractures of thoracic vertebrae lead to loss of height and progressive thoracic kyphosis (dowager's hump). Lower ribs eventually rest on iliac crests, and downward pressure on viscera causes abdominal distention

Figure 57.2 Progression of scoliotic curve in adult

cases of osteonecrosis of the jaw have been reported in bisphosphonate users). Vitamin D should be used judiciously, if at all, because doses that increase calcium absorption are close to doses that result in bone resorption. If calcitonin is used, it must be administered with adequate calcium intake to avoid secondary hyperparathyroidism. Romosozumab may increase the risk of myocardial infarction, stroke, and cardiovascular death.

Interactions: Calcium supplements and antacids may interfere with the absorption of some bisphosphonates and must be taken later in the day.

Alternative Drugs

Calcium supplements should be reserved for those with inadequate intake or a food intolerance that prevents achievement of sufficient dietary levels (<1200 mg/day). Calcium carbonate provides the greatest percentage of elemental calcium, and calcium citrate is highly absorbable, making both acceptable supplements. When used, these should be taken in divided doses over the course of the day. Excessive intake of calcium supplements has been associated with an increased risk of stone formation and should be discouraged.

FOLLOW-UP

Patient Monitoring: Normal health maintenance and continued (lifelong) compliance with medical therapy must be encouraged. Periodic measurement of height may detect asymptomatic spinal fractures.

Prevention/Avoidance: Estrogen replacement therapy at menopause (when otherwise indicated), good diet (adequate calcium and vitamin D intake), and exercise (weightbearing and otherwise). Elimination or reduction of bone toxins (smoking and excess alcohol consumption)

Possible Complications: After hip fracture, half of patients require assistance walking and 15%–30% are institutionalized, often for the rest of their lives. Roughly, one in five patients with a hip fracture dies within 6 months of the fracture. Hip fracture is the 12th leading cause of death in women.

Expected Outcome: The rate of bone loss may be slowed by medical interventions, but these are most successful if instituted early. Estrogen replacement (when started early) is associated with a reduction by approximately 50% in the rate of hip and arm fractures in postmenopausal women. This value has been reported to increase to more than 90% when estrogen is used for more than 5 years. Vertebral fractures may be reduced by as much as 80% for these same women.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy (generally not a consideration). Most bisphosphonates are pregnancy Category C medications.

ICD-10-CM Codes: M81.0 (Age-related osteoporosis without current pathological fracture).

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58 PELVIC MASSES

THE CHALLENGE

Description: A palpable or otherwise discernible mass or swelling in the abdomen or pelvis.

Scope of the Problem: The finding of a mass can be disconcerting to both the patient and the provider. For women from adolescence to senescence, the finding of a mass conjures concerns about reproductive tract pathologies, ranging from the benign to malignant.

Objectives of Management: Identify the type and origin of the finding, then implement treatment in a timely manner to preserve health, fertility, and emotional peace of mind. Therapy, assessment of risk, and likely outcomes are based on the correct diagnosis and proper therapy.

TACTICS

Relevant Pathophysiology: A tumor is a swelling or abnormal growth of tissue, whether benign or malignant. Masses may arise within or on the surface of organs or result in the enlargement of the organ itself. The organ and the character of the growth often affect the clinical characteristics found. For example, ovarian cysts tend to be spherical, whereas distention or growths of the fallopian tube results in a sausage or fusiform shape.

Abdominopelvic masses may be found at any age from infancy to old age. Those found in infants generally are benign and result from in utero hormone stimulation. Functional cysts and teratomas are more common during puberty and adolescence. Fewer than 5% of ovarian cancers occur in children and

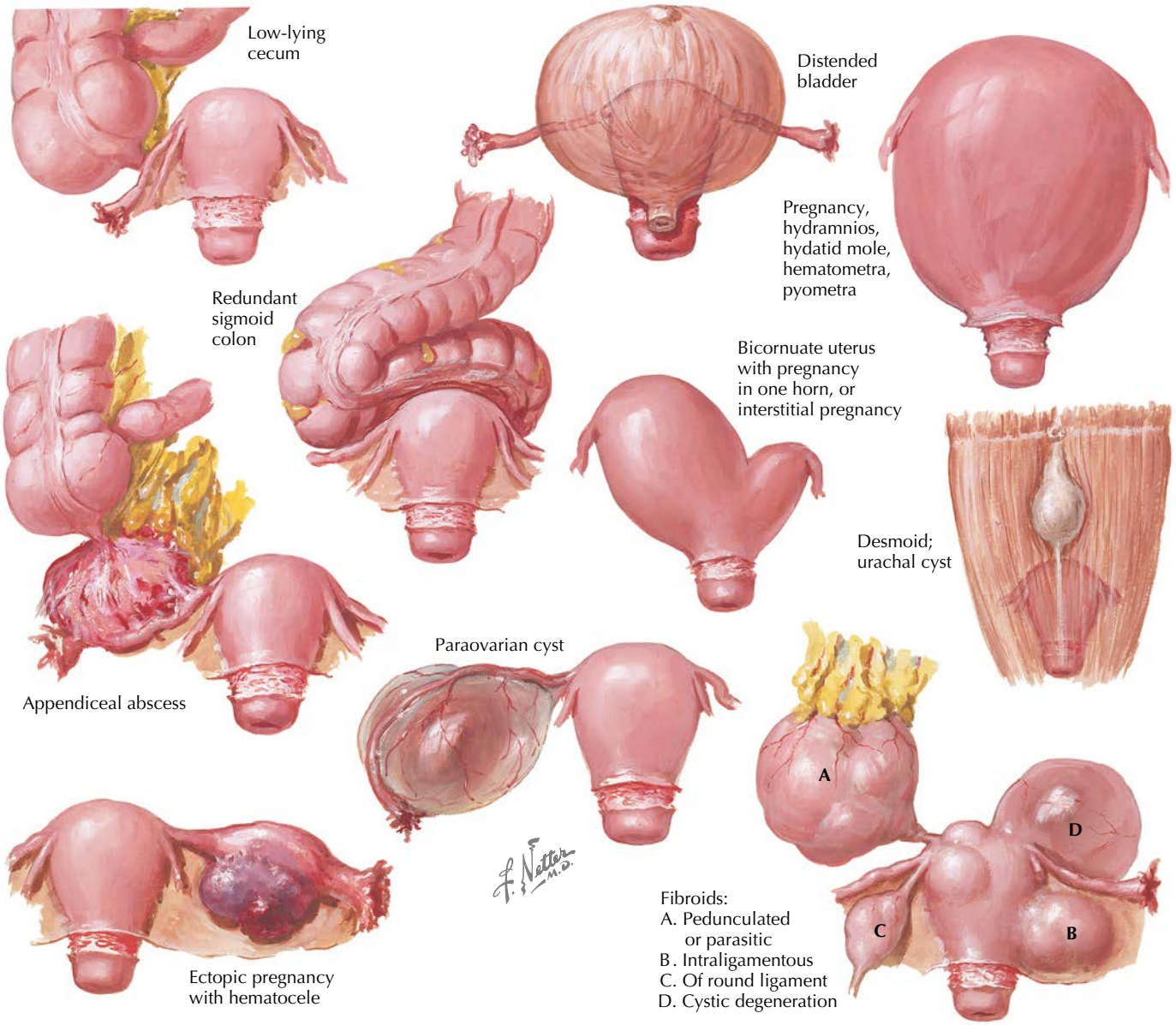

Figure 58.1 Differential diagnosis of pelvic masses

adolescents. Benign ovarian tumors are most frequently diagnosed at the time of routine examination and are asymptomatic. Although ovarian cancer is the most common gynecologic cancer in patients ≤25 years of age (germ cell tumors most common), most masses found in this age group are benign. In patients over age 50, 70% of abdominopelvic masses are benign and 30% malignant.

The presentation of patients with abdominopelvic masses varies with the underlying cause, though many are asymptomatic, found only at the time of physical examination by the patient herself or found by her partner. Symptoms, when present, can include pelvic pain or pressure, abdominal fullness, gastrointestinal distress (eg, nausea, vomiting, constipation, bloating, tenesmus), dysmenorrhea, or dyspareunia. Abnormal vaginal bleeding may prompt care.

The differential diagnosis of an abdominopelvic mass can be easily divided into gynecologic and nongynecologic causes. Because the first clinical encounter with the mass is anatomic, an equally effective classification is by location:

Abdomen and abdominal wall: Abdominal wall hematoma, ascites, constipation, desmoid, hepatomegaly, hernia, lipoma, mesenteric or omental cyst, splenomegaly, toxic megacolon, urachal cyst.

False and True Pelvis: Pregnancy always should be considered in any woman of reproductive age. Adnexal masses (ovarian [physiologic or neoplastic, torsion], peraovarian cyst, tubal [tubo-ovarian abscess/pyosalpinx, hydrosalpinx, ectopic pregnancy]), appendiceal abscess, bladder distention, cervical cancer, colonic cancer, congenital uterine anomalies, constipation, diverticular abscess, endometriosis/endometrioma, hematocolpos, hematometra, low-lying cecum, Meckel diverticulum, metastatic disease, multiple pregnancy, myomas, omental tumors, pelvic kidney, pyometra, redundant sigmoid, retroperitoneal sarcoma.

Strategies: History, general physical, and pelvic examination form the basis of evaluation, if not the source of the finding itself. A pregnancy test is always appropriate for reproductive age women at risk of conception. Although the specific evaluation will be driven by the diagnosis under consideration, ultrasonography (primary modality), computed tomography, and magnetic resonance imaging offer the greatest information short of surgical investigation. Ultimately, histologic findings may be the only way to establish the final diagnosis. Serum biomarkers (eg, cancer antigen 125 [CA 125]) are of limited use in risk assessment for malignancy.

Patient Education: Reassurance and explanation of the evaluation process.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Ovarian Cancer, 2019
- Ovarian Cysts, 2021

IMPLEMENTATION

Special Considerations: There are times when the diagnosis of an abdominopelvic mass is made in the context of acute symptoms. In such cases, stabilization and supportive care take precedence. Ectopic pregnancy, ovarian torsion, ruptured abscesses, bleeding ovarian cysts, and other mass-producing processes can result in potentially life-threatening acute events. In such cases, diagnosis must become secondary to therapeutic interventions.

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59 PESSARY THERAPY

THE CHALLENGE

The challenge is to identify patients who may benefit from pessary therapy and to effectively select, fit, and monitor pessary use.

Scope of the Problem: As the population ages, the prevalence of pelvic relaxation disorders will increase. Pessary therapy offers an attractive, effective, nonsurgical therapy for many of these patients. Patients with symptomatic pelvic relaxation, uterine retroversion, cervical incompetence, or urinary incontinence may benefit from this therapy. It is estimated that 10%–25% of women suffer from anterior vaginal wall support failure, and this increases to 30%–40% after menopause. Up to 11% of women will undergo surgery for pelvic organ prolapse by the age of 80 years.

Objectives of Management: To provide symptomatic relief for patients with pelvic relaxation without causing iatrogenic harm.

TACTICS

Relevant Pathophysiology: Pessaries act either by using existing pelvic support mechanisms or by diffusing the forces acting on pelvic structures over a wide area so that support and reposition are achieved. Available in a variety of types and sizes, the most commonly used forms of pessaries for pelvic relaxation are the ring (or doughnut), ball, and cube. To varying degrees, the pessary occludes the vagina and holds the pelvic organs in a relatively normal position. The type of pessary chosen is based on the indications of the individual patient. Pessaries are available in both latex and polyurethane types. The latex type is often less expensive but tends to deteriorate over time; polyurethane pessaries are less likely to retain odor or cause irritation.

Strategies: Pessaries are fitted and placed in the vagina similar to contraceptive diaphragm (see Chapter 276, Diaphragm Fitting). The pessary is lubricated with a water-soluble lubricant, and most are folded or compressed, and inserted into the vagina. The pessary is next adjusted so that it is in the proper position based on the type: ring and lever pessaries should sit behind the cervix (when present) and rest in the retropubic notch, the Gellhorn pessary should be entirely contained within the vagina with the plate resting above the levator plane, the Gehrung pessary must bridge the cervix with the limbs resting on the levator muscles on each side, and the ball or cube pessaries should occupy and occlude the upper vagina. All pessaries should allow the easy passage of an examining finger between the pessary and vaginal wall in all areas. Examination at 5–7 days after initial fitting is required to confirm proper placement, hygiene, and the absence of pressure-related problems (vaginal trauma or necrosis). Earlier evaluation (in 24–48 hours) may be advisable for patients who are debilitated, have significant atrophic change, or require additional assistance.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Pelvic Support Problems, 2020
- Surgery for Stress Urinary Incontinence, 2021
- Surgery for Pelvic Organ Prolapse, 2018
- Urinary Incontinence, 2020

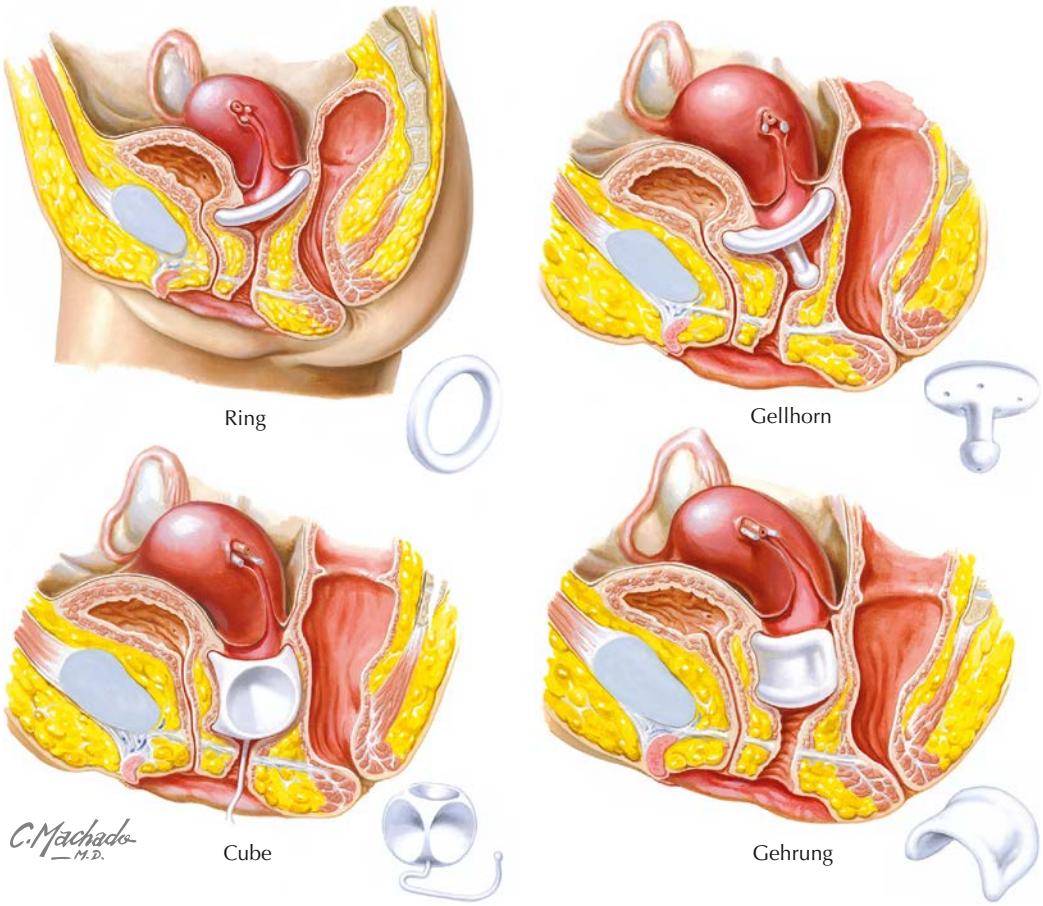

Figure 59.1 Types of pessaries

IMPLEMENTATION

Special Considerations: Pessaries offer an excellent alternative to surgical repair, but the use of a pessary requires the cooperation and involvement of the patient. Patients who are unable or unwilling to manage the periodic insertion and removal of the device are poor candidates. Pessaries are contraindicated in the presence of infection or a known allergy to the pessary material (eg, latex). Pessaries are not well tolerated and do not provide optimal support in patients who have low estrogen levels. For this reason, many suggest a minimum of 30 days of topical estrogen therapy (for those who are not already undergoing estrogen therapy) before a trial of pessary therapy. Patients who are going to use a pessary should be instructed on both proper insertion and removal techniques. Ring pessaries should be removed by hooking a finger into the opening of the pessary, gently compressing the device, and then withdrawing the pessary with gentle traction. Cube pessaries also must be compressed, but the suction created between the faces of the cube and the vaginal wall must be broken by gently separating the device from the vaginal sidewall. The locator string often attached to these pessaries should not be used for traction. Inflatable pessaries should be deflated before removal. The Gellhorn and Gehrung pessaries are removed by reversing their insertion steps.

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POSTCOITAL BLEEDING

60

INTRODUCTION

Description: Postcoital bleeding is vaginal bleeding that occurs following sexual intercourse.

Prevalence: Common (5%–10% women per year, up to 13% of women 20–34 years old).

Predominant Age: Reproductive age and beyond.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Uterine (pregnancy, endometrial polyps, endometrial hyperplasia, endometrial carcinoma, leiomyomata, intrauterine contraceptive device [malpositioned]), cervical (polyps [5%–18% of cases], cervicitis [*Chlamydia* cervicitis 2%], cervical erosion [ectropion, 34% of cases], cervical dysplasia or neoplasia [7%–17% of cases]), vaginal (trauma, infection, atrophy), and perineal (urethral, vulvar lesions, hemorrhoids).

Risk Factors: Hypoestrogenic states (menopause without estrogen therapy), vigorous intercourse, and nonconsensual intercourse (rape).

SIGNS AND SYMPTOMS

- Painless vaginal bleeding related to (after) intercourse.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Pregnancy (normal or abnormal)
- Cervical polyps
- Endometrial polyps
- Uterine leiomyomata
- Cervicitis or cervical lesions (including cancer: 1 in 44,000 women aged 20–24 years, 1 in 5600 aged 25–34 years, 1 in 2800 aged 35–44 years, and 1 in 2400 aged 45–54 years)
- Endometrial cancer
- Endometriosis
- Vaginitis (including atrophic)
- Coagulopathy (acquired or iatrogenic)
- Nongynecologic sources of bleeding (eg, perineal or rectal)

Associated Conditions: Endometrial cancer, endometrial polyps or carcinoma, and uterine leiomyomata. Roughly one-third of patients will also have abnormal uterine bleeding and 15% also report dyspareunia.

Workup and Evaluation

Laboratory: A pregnancy test and screening for sexually transmissible infections are always appropriate. Tests for chlamydia and gonorrhea, trichomoniasis, and bacterial vaginosis as indicated.
Imaging: No imaging indicated.
Special Tests: Biopsy of suspicious lesions, if present.
Diagnostic Procedures: History and physical examination (including speculum examination) often point to possible causes for further evaluation.

Pathologic Findings

Based on the underlying pathologic condition.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation.
Specific Measures: Focused on the underlying cause. If active bleeding is present, expedited evaluation and treatment are required. Cryotherapy for chronic cervicitis has shown efficacy in some studies but is generally not recommended.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Abnormal Uterine Bleeding, 2021

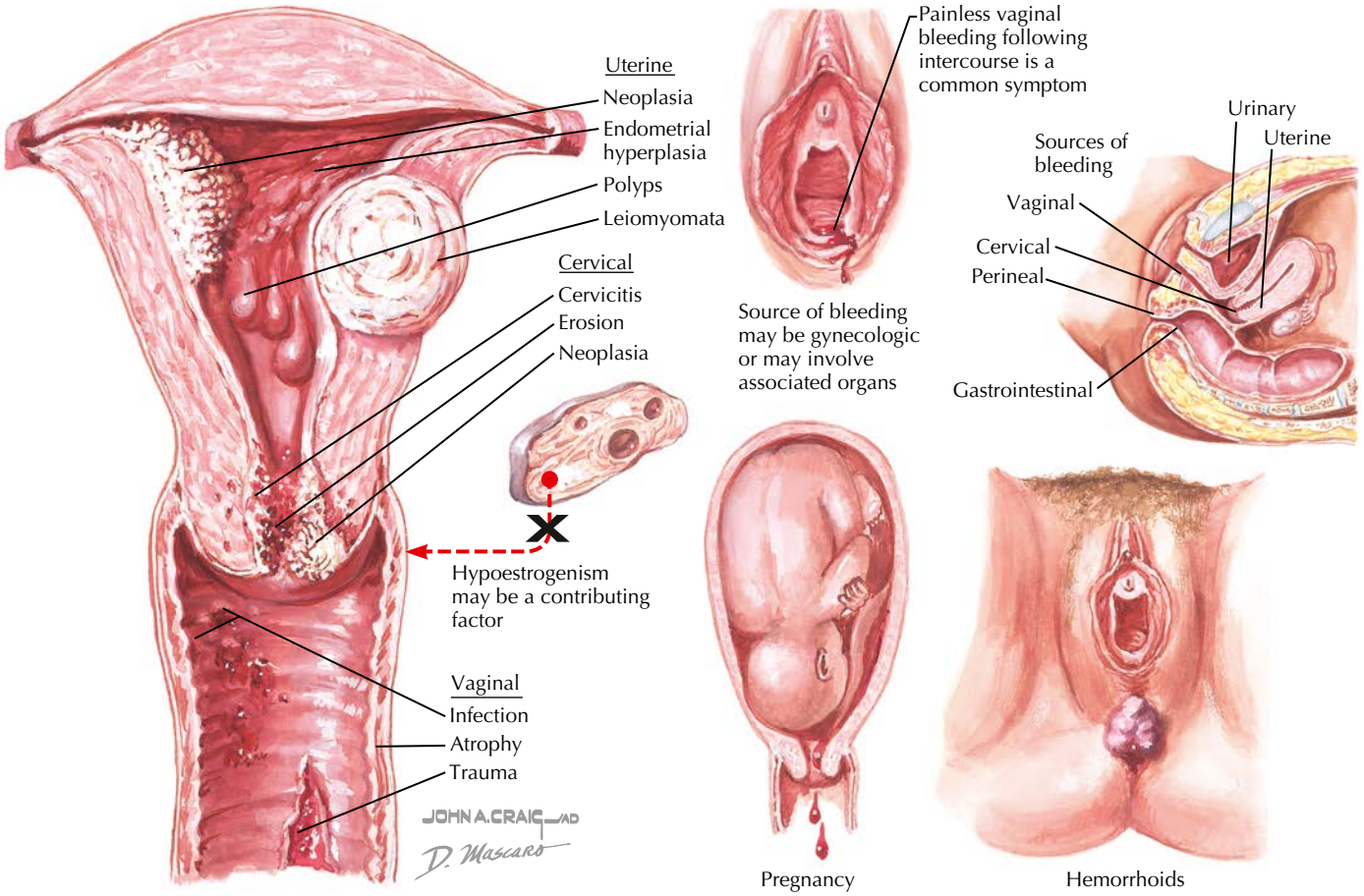

Figure 60.1 Clinical considerations in postcoital bleeding

Drug(s) of Choice

Based on the cause

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: Sexual dysfunction (rare).

Expected Outcome: Return to normal sexual function with reassurance and correction of the causative process.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. Slightly more common during pregnancy.
ICD-10-CM Codes: N93.0 (Postcoital and contact bleeding).

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PREMENSTRUAL DYSPHORIC DISORDER

61

INTRODUCTION

Description: Premenstrual syndrome (PMS) and the more severe variant of premenstrual dysphoric disorder (PMDD) involve physical and emotional symptoms that are characterized by their relationship to menses. Symptoms are confined to a period of not more than 5 days before the onset of menstrual flow with complete resolution at or soon after the end of menstrual flow. Symptoms must persist over three or more consecutive menstrual cycles.
Prevalence: Reproductive age (25%–85%); lifestyle is affected in 5%–10% and 2%–5% meet strict criteria for PMDD. Some authors think that the true prevalence is less if strict diagnostic criteria are applied.
Predominant Age: Reproductive; most commonly 30s and 40s.
Genetics: Family tendency, preliminary evidence suggests that PMDD is associated with variations in *ESR1* (estrogen receptor alpha gene).

ETIOLOGY AND PATHOGENESIS

Causes: The physiologic foundations of PMS, PMDD, and premenstrual magnification (PMM) remain to be established. The most promising research into a cause of PMS has been in the areas of β-endorphins and serotonin, γ-aminobutyric acid (GABA) and the autonomic nervous system.
Risk Factors: Some suggestion of a link to smoking, low educational attainment, traumatic events, or anxiety disorders.

SIGNS AND SYMPTOMS

Physical or emotional symptoms confined to a period of not more than 5 days before the onset of menstrual flow with complete resolution at or soon after the end of menstrual flow. More than 150 different signs and symptoms have been described under the rubric of PMS (the character of the symptoms is not important, only the timing of their appearance). Symptoms that are present at all times but worsen before menses or those that appear at irregular intervals do not meet the criteria for PMS; they should be classified as PMM. The diagnosis of PMDD requires the presence of at least one affective symptom (mood swings, irritability, anger, difficulty concentrating, depression).

DIAGNOSTIC APPROACH

Differential Diagnosis

- Breast disorders (fibrocystic change)
- Chronic fatigue states

- Drug and substance abuse
- Endocrinologic disorders
- Family, marital, and social stress
- Gastrointestinal conditions
- Gynecologic disorders (eg, endometriosis)
- Idiopathic edema
- Psychiatric and psychologic disorders (major, minor, or dysthymic mood disorder)
- Thyroid disorder (hyperthyroid, hypothyroid)

Associated Conditions: Bipolar disorders, sleep disorders, chronic pain states, and somatization.

Workup and Evaluation

Laboratory: Complete blood count, liver enzyme studies, endocrine studies (androgens, follicle-stimulating hormone [FSH]/luteinizing hormone [LH], glucose tolerance test, prolactin, thyroid function studies [highly sensitive thyroid-stimulating hormone, thyronine, thyrotropin-releasing hormone stimulation]), all to rule out other conditions.

Imaging: No imaging indicated.

Special Tests: Prospective menstrual calendar or other diary for a 3-month period to establish the diagnosis.

Diagnostic Procedures: History, physical examination, prospective menstrual calendar or diary. Research has shown that up to 80% of patients who present with self-diagnosed PMS fail to meet strict criteria for this diagnosis. Most are found to have other conditions ranging from mood disorders to irritable bowel syndrome or endometriosis. This observation makes it imperative that no therapy be instituted until the diagnosis can be firmly established.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Lifestyle changes (20–45 minutes of aerobic exercise, three times weekly, smoking cessation, stress reduction), dietary changes and supplementation (adequate protein and complex carbohydrates, avoidance of alcohol, caffeine, and simple sugars, eating frequent small meals and plenty of fresh fruits and vegetables, reduction of dietary fat to <15%, salt restriction, increased dietary or supplemental fiber, calcium 1000 mg daily, magnesium 200 mg daily during luteal phase, vitamin B_6 50–200 mg daily, vitamin E 150–300 IU daily) all have been advocated but with few data to support the recommendations.

Specific Measures: Generally based on specific symptoms. A favorable response should be expected for 80% of patients with PMS and 50% of those with PMM.

Diet: See previous.

Activity: Aerobic exercise (20–45 minutes, three times weekly).

Patient Education: Reassurance.

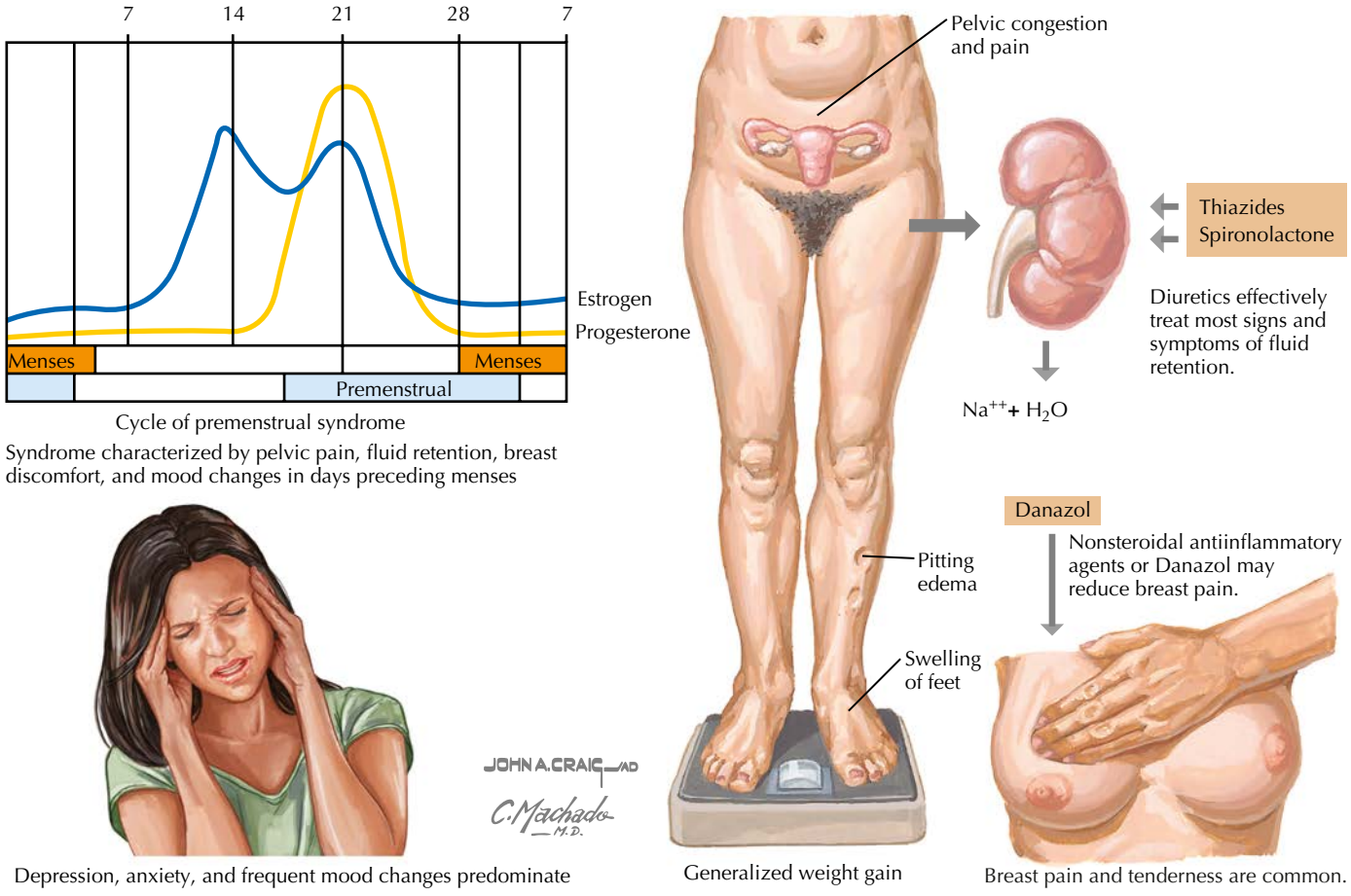

Figure 61.1 Signs and symptoms of premenstrual syndrome

American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Premenstrual Syndrome, 2021
- Depression, 2018

Drug(s) of Choice

- Hydrochlorothiazide 25–50 mg daily, luteal phase (for fluid retention).
- Selective serotonin reuptake inhibitors (SSRIs)—fluoxetine 20 mg daily, sertraline 50–150 mg daily, paroxetine 20–30 mg daily or controlled release 25 mg daily, citalopram 20–30 mg daily.
- Alprazolam 0.25 mg three to four times daily or atenolol 25 mg two to three times daily (for agitation and anxiety).
- Buspirone 5 mg three times daily or fluoxetine 20 mg daily (in the morning) for mood swings.
- Third-generation oral contraceptives (eg, desogestrel containing). These may be given continuously or on a long-cycle dosing pattern.
- Danazol sodium 200 mg daily (luteal phase) or continuous gonadotropin-releasing hormone (GnRH) agonists (depot leuprolide 3.75 mg IM monthly for a maximum of 6 months or nafarelin acetate nasal spray 200 mcg twice daily for a maximum of 6 months).

Contraindications: See individual agents.
Precautions: See individual agents.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: General stress reduction appears to blunt the cyclic symptoms experienced.
Possible Complications: Social withdrawal or isolation, work or family disruption. The rate of suicide increases during the luteal phase.
Expected Outcome: Symptoms can generally be resolved through the process of diagnosis, providing insight and control to the patient, and pharmacologic intervention.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy; symptoms generally disappear during pregnancy, but patients with a history of PMS may have exaggerated response to the hormonal changes associated with pregnancy. Women who retain ovarian function but who lack menstruation (eg, hysterectomy or hormone-containing intrauterine contraceptive system) may still experience cyclic PMS/PMDD symptoms. For these women, the diagnosis is more challenging but still based upon demonstrating cyclicity with prospective symptom documentation.
ICD-10-CM Codes: N94.3 (Premenstrual tension syndrome).

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62 PRURITUS ANI

INTRODUCTION

Description: Pruritus ani is the acute or chronic itching (generally intense) of the anal and perianal skin. Patients also may have complaints of vulvar itching or of a vaginal infection that has not responded to therapy.
Prevalence: Common; 1%–5% of the population.
Predominant Age: All ages.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Anal disease—fissures, fistulae, infection (bacterial, fungal, pinworms, scabies), neoplasia, hemorrhoids, leakage of stool. Dermatologic processes—psoriasis, eczema, fecal irritation, contact dermatitis, seborrheic dermatitis, vulvitis (candida), chemical dermatitis (diarrheal irritation), dietary intolerance (coffee, cola, tomatoes, chocolate), sexually transmitted disease (condyloma, herpes). Systemic disease—diabetes, cholestasis, lymphoma, leukemia, pellagra, renal failure, thyrotoxicosis, hypothyroidism, human immunodeficiency virus (HIV). Other—excessively zealous hygiene, psychologic problems.
Risk Factors: Hemorrhoids, obesity. Skin tags do not contribute to anal pruritus.

SIGNS AND SYMPTOMS

- Anal and perianal itching
- Perianal erythema
- Anal fissures
- Excoriation
- Bleeding after bowel movement

DIAGNOSTIC APPROACH

Differential Diagnosis

- Vulvitis
- Vaginitis
- Pruritus vulvae
- Contact dermatitis
- Psoriasis
- Bacterial or fungal infection
- Parasites (pinworms, scabies)
- Diabetes mellitus
- Liver disease
- Anxiety
- Atopic dermatitis
- Menopausal perineal atrophy
- Hidradenitis suppurativa (acne inversa)

Associated Conditions: Vaginitis, secondary infection, diabetes mellitus, psoriasis, and hemorrhoids.

Workup and Evaluation

Laboratory: No evaluation indicated. Selective testing based on differential diagnosis being considered (eg, fasting and postprandial glucose levels, skin scrapings for fungi, stool for ova and parasites).
Imaging: No imaging indicated.
Special Tests: None indicated. Anoscopy for anal diseases.
Diagnostic Procedures: History and physical examinations.

Pathologic Findings

Excoriation common

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, perineal hygiene, cool sitz baths, moist soaks, or the application of soothing solutions, such as Burow solution (5% aluminum subacetate). Patients should be advised to wear loose-fitting clothing and keep the area dry and well ventilated. Avoid soaps; water-moistened cotton balls or baby wipes provide a portable cleansing option. Nonmedicated powder may be used to absorb moisture. If overnight itching and excoriation are a problem, patients should wear cotton gloves during sleep to avoid excoriation.
Specific Measures: Antihistamines, especially at night when itching is often intense, and sedation may be desirable. Crotamiton (Eurax) may be topically applied twice daily to suppress itching. Occasionally, the use of a topical anesthetic, such as 2% lidocaine (Xylocaine) jelly, may be required. A barrier cream containing zinc oxide may be applied. Other therapies based on the causal agent.
Diet: No specific dietary changes required. If food allergy or irritation is suspected, diet change is indicated (reduce caffeine, spices, citrus, vitamin C, milk products, alcohol). When fecal soiling is a factor, increasing dietary fiber may be of help.
Activity: No restriction.
Patient Education: Reassurance, counseling about perineal hygiene, risk reduction.

Drug(s) of Choice

- Burow solution (Domeboro, aluminum acetate 5% aqueous solution, three to four times daily for 30–60 minutes).
- Crotamiton (Eurax) may be topically applied twice daily.
- Topical analgesic sprays or ointments—benzocaine (Americaine, Hurricaine) 20% spray or gel; dibucaine (Nupercainal) 1% ointment.

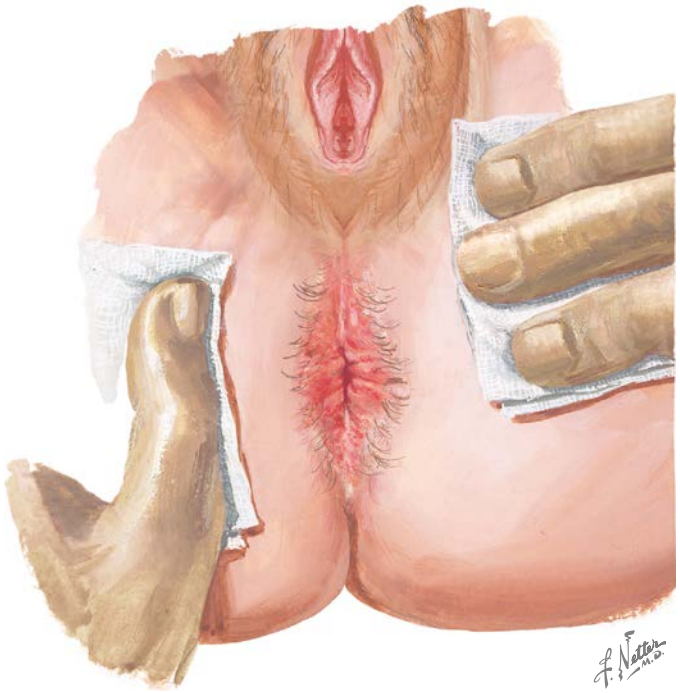

Figure 62.1 Perianal irritation resulting from pruritus ani

- Antipruritics and antiinflammatory agents—hydrocortisone (Anusol-HC, Analpram-HC, Cortenema, Cortifoam, Epifoam, Proctofoam-HC); pramoxine 1% (Fleet rectal pads, Analpram-HC); witch hazel 50% (Tucks pads or gel).
- Astringents—Phenylephrine (Preparation H).
- Topical capsaicin (0.006%) three times daily for 4 weeks.
- Intradermal injection of methylene blue has been used for refractory cases, but no randomized trials have been performed to support its use.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.

Prevention/Avoidance: Perineal hygiene, menopausal hormone therapy, and avoidance of local irritants and laxatives.
Possible Complications: Secondary infection caused by excoriation, lichenification.
Expected Outcome: Good, with identification of underlying causation.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: L29.0 (Pruritus ani).

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PYELONEPHRITIS

63

INTRODUCTION

Description: Pyelonephritis is an infection of the kidney or upper urinary tract.
Prevalence: More than 200,000 cases per year in the United States. Acute pyelonephritis during pregnancy: 0.5%–2%.
Predominant Age: Any.
Genetics: No genetic predisposition known.

ETIOLOGY AND PATHOGENESIS

Causes: Pyelonephritis generally develops when pathogens associated with a bladder infection (most commonly *Escherichia coli*) ascend to the kidneys via the ureters. Seeding of the kidneys may also occur from bacteremia or, in uncommon cases, from lymphatic spread.
Risk Factors: Bladder infection (acute, chronic, recurrent), pregnancy, urologic abnormalities (nephrolithiasis, strictures, stents, urinary diversions), immunocompromising conditions (neutropenia, advanced human immunodeficiency virus [HIV] infection), poorly controlled diabetes mellitus. Pyelonephritis in pregnancy: Age <20 years, nulliparity, smoking, late presentation to care, sickle cell trait.

SIGNS AND SYMPTOMS

- Flank pain, costovertebral angle tenderness
- Fever (>99.9°F [37.7°C]), chills
- Nausea and vomiting (inconsistent)
- Symptoms of cystitis
- Hematuria

DIAGNOSTIC APPROACH

Differential Diagnosis

- Pelvic inflammatory disease
- Acute (uncomplicated) cystitis
- Nephrolithiasis
- Renal tumors

Associated Conditions: Cystitis, septicemia, perinephric abscess

Workup and Evaluation

Laboratory: Urinalysis, urine culture, complete blood count. Pyuria is almost always present; white cell casts confirm upper urinary tract involvement.

Imaging: Not generally needed. When appropriate, computed tomography is the preferred modality. (A normal study does not rule out mild pyelonephritis.)
Special Tests: Renal ultrasonography may be substituted for computed tomography in the setting of pregnancy.
Diagnostic Procedures: History and clinical characteristics.

Pathologic Findings

Renal parenchymal inflammation, infiltrates and microabscesses, papillary atrophy and blunting, interstitial fibrosis.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Empiric antimicrobial therapy should be initiated promptly. Bacterial susceptibility testing will help guide continuation or changes in antimicrobial agents.
Specific Measures: High fever, difficulty controlling pain, inability to maintain hydration or to tolerate oral medications suggest a need for inpatient management.
Diet: No specific dietary changes indicated.
Activity: No restriction except those imposed by ability.
Patient Education: Reassurance.

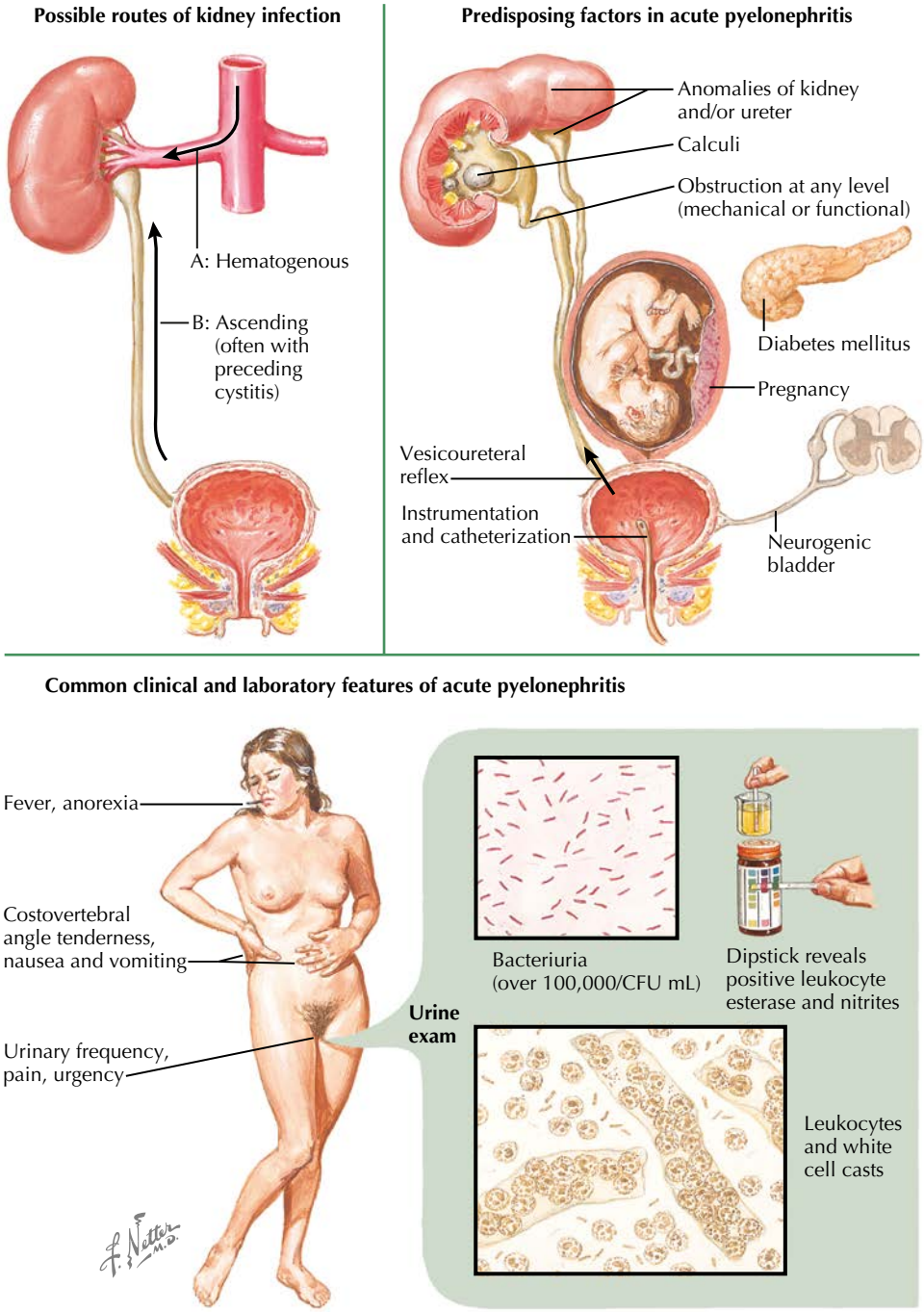

Figure 63.1 Pyelonephritis: risk factors and major findings

American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- Urinary Tract Infections, 2020

Drug(s) of Choice

Outpatient: Ciprofloxacin (500 mg PO twice daily for 5–7 days) or ciprofloxacin extended-release (1000 mg PO once daily for 5–7 days) or levofloxacin (750 mg PO once daily for 5–7 days).
Inpatient: Vancomycin (15–20 mg/kg IV every 8–12 hours with or without a loading dose) plus an antipseudomonal carbapenem: imipenem (500 mg IV every 6 hours) or meropenem (1 g IV every 8 hours) or doripenem (500 mg IV every 8 hours).
Contraindications: See individual agents. Aminoglycosides and tetracyclines are generally contraindicated during pregnancy.
Precautions: See individual agents. Use of trimethoprim/sulfamethoxazole (TMP/SMX) is typically limited to mid-pregnancy.

Alternative Drugs

- One dose of a long-acting parenteral agent: ceftriaxone (1 g IV or IM once) or ertapenem (1 g IV or IM once) or gentamicin (5 mg/kg IV or IM once) or tobramycin (5 mg/kg IV or IM once), followed by one of the following: TMP/SMX (1 double-strength tablet PO twice daily for 7–10 days) or amoxicillin-clavulanate (875 mg PO twice daily for 10–14 days) or cefpodoxime (200 mg PO twice daily for 10–14 days) or cefdinir (300 mg PO twice daily for 10–14 days) or cefadroxil (1 g PO twice daily for 10–14 days).

FOLLOW-UP

Patient Monitoring: Close follow-up of symptoms, response to treatment, and resolution of bacteriuria.
Prevention/Avoidance: Prompt treatment of asymptomatic bacteriuria (pregnancy) or cystitis.
Possible Complications: Bacteremia, sepsis, multiple organ system dysfunction, shock, acute renal failure, perinephric abscess, emphysematous pyelonephritis, papillary necrosis, renal vein thrombosis.
Expected Outcome: Most patients respond to antimicrobial therapy.

MISCELLANEOUS

Pregnancy considerations: Asymptomatic bacteriuria occurs in 2%–7% of pregnant women. Without treatment, 20%–35% will become symptomatic, including the development of pyelonephritis. Infection is more common in the second and third trimesters. Pyelonephritis is associated with an increased risk of preterm birth.
ICD-10-CM Codes: N10 (Acute pyelonephritis), O20.00 (Infections of kidney in pregnancy, unspecified trimester), O86.21 (Infection of kidney following delivery)

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64 RAPE AND RAPE TRAUMA SYNDROME

INTRODUCTION

Description: Rape and sexual assault encompass manual, oral, and genital contact by one person without the consent of the other in a way that would be considered sexual in a consensual situation. It does not require penetration, ejaculation, force, or evidence of resistance—only the lack of consent. The legal definition varies slightly by location, but it often includes elements of fear, fraud, coercion, or threat. In some areas, the mentally incompetent, those under the influence of drugs or alcohol, or minors are deemed incapable of giving consent for any otherwise-consensual sexual activity, resulting in "statutory rape." Sexual coercion is not the same as rape, though no less exploitative; it is conquest and control. Sexual coercion includes explicit attempts to impregnate a partner against her will, control outcomes of a pregnancy, coerce a partner to have unprotected sex, or interfere with contraceptive methods.

Rape trauma syndrome is a well-recognized set of behaviors that occurs after a sexual assault. These responses are organized into three phases: the acute phase, lasting from hours to days; a middle or readjustment phase, lasting from days to weeks; and a final reorganization or resolution phase that involves lifelong changes.

Prevalence: Rape constitutes 5%–10% of violent crime and affects 1 in 6 women (lifetime, 16%–19%, 3% per year) in the United States (89% completed, 11% attempted). An estimated 1.47 million rape-related physical assaults occur against women annually. It is the most underreported crime in the United States. Rape trauma syndrome occurs in virtually every case.

Predominant Age: Any age; highest risk is at the age of 16–24 years (80% first raped <25 years, 41% <18 years)

ETIOLOGY AND PATHOGENESIS

Causes: One-fourth of all rapes occur at home (either the victim's or the attacker's), but only one-third of these involve a male intruder. Most attackers are known to the victims (13% strangers). Of recurrent victims, approximately 25% have been raped by someone well known to them, such as an ex-lover, employer, coworker, neighbor, or relative, and two-thirds are vulnerable because of mental impairment, substance abuse, or a psychiatric disorder. Weapons are used in 30%–50% of sexual assaults (handguns are most common). Approximately 50% of campus rapes occur during dates. Estimates of sexual violence occurring in the setting of a dating relationship indicate that 10%–25% of high school students and 20%–50% of college students have experienced some form of sexual violence or coercion. Rape trauma syndrome can follow rape or other forms of intense physical or emotional trauma.

Risk Factors: History of victimization, youth, greater number of dating or sexual partners. Studies indicate that alcohol use is involved in more than half of all rapes of college students. Use of illicit drugs, including flunitrazepam (Rohypnol), 3,4-methylenedioxymethamphetamine (MDMA or ecstasy), ketamine, and γ-hydroxybutyrate (GHB), increase the risk of rape. Rape trauma syndrome is more common in those older than 40 years, those assaulted in their homes by a stranger, and those with a history of previous mental illness.

SIGNS AND SYMPTOMS

Rape: History of nonconsensual sexual activity

- Physical signs of sexual activity (not limited to vaginal intercourse)
- Physical signs of trauma or coercion (including impairment resulting from drugs, alcohol, or mental abilities)

Rape trauma syndrome—acute: Decompensation, inability to cope, volatile emotions, fear, guilt, anger, depression, and problems concentrating are common; flashbacks are frequent; ideation is often disturbed. Musculoskeletal, genital, pelvic, and/or abdominal pain, anorexia and insomnia.

- Middle or readjustment (resolution of many issues [may not be functional], flashbacks, nightmares, and phobias may develop)
- Reorganization (recognizes that event was an assault over which she could have no control)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Consensual intercourse
- Nonsexual trauma
  - Rape trauma syndrome
  - Depression
  - Mania
  - Psychosis

Associated Conditions: Pregnancy (5% of rapes per year), sexually transmitted infections, and depression. Trauma in other areas of the body is more common than genital trauma (70.4% vs. 26.8%) with bruises, abrasions, or erythema on the thigh, upper arm, face, or neck.

Workup and Evaluation

Laboratory: As outlined in Special Tests, as well as serum pregnancy test, cervical cultures, or DNA-based tests for sexually transmitted infections, a screening serologic test for syphilis and human immunodeficiency virus (HIV), hepatitis antigens, urinalysis (often with culture).

Imaging: No imaging indicated unless the possibility of internal injuries is suspected.

Special Tests: Care by a specially trained provider is optimal, if available. Some states require specific forms for documenting the history and examination. Special rape evaluation kits are available in many jurisdictions and should be used if available. Wood's light (ultraviolet light) causes semen stains to fluoresce. Maintenance of the "chain of custody" of evidentiary material is vital to potential prosecution of the offender(s).

Diagnostic Procedures: Examination under general anesthesia is indicated any time the patient is unable to urinate or there is hematuria, lower abdominal tenderness, or signs of occult blood loss such as hypovolemia. Lacerations of the upper genital tract frequently require surgical exploration.

Pathologic Findings

The physical examination is normal in half of rape victims. Common sites of lacerations are the vaginal wall, lateral fornices, and cul-de-sac.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Major trauma must always be evaluated and treated first. Support should be provided with compassion, care, and sensitivity. The primary goal is to provide reassurance and a return of control. Support and assistance should be provided to move through the stages of resolution. Because one of the pivotal aspects of sexual assault is the loss of control, every effort should be made to allow the patient control over even the most trivial aspect of the physical examination.

Specific Measures: There are three basic responsibilities while caring for someone who may have been raped or abused: The detection and treatment of serious injuries, preservation of evidence, and protection against sequelae. All women deserve intensive follow-up and counseling. Assist in recognizing and adapting to changes that make up the rape trauma syndrome.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Alcohol and Women, 2015
- Emergency Contraception, 2019
- Intimate Partner Violence, 2020

Drug(s) of Choice

- Pregnancy interdiction—ulipristal acetate 30 mg as soon as possible, but within 120 hours (5 days), levonorgestrel 0.75 mg (Plan B) PO every 12 hours for two doses or ethinyl estradiol 0.05 mg plus norgestrel 0.5 mg (Ovral) two tablets PO twice daily for 2–5 days. (The levonorgestrel-only regimen is available without a prescription to women of any age. However, ulipristal requires a prescription.)
- Sexually transmitted infection prophylaxis—ceftriaxone 500 mg IM or spectinomycin 2 g IM, both followed by azithromycin 1 g PO, single dose. Metronidazole or tinidazole 2 g PO, single dose, is also recommended to treat trichomoniasis.
- Prophylaxis—tetanus toxoid should be administered if indicated. Prophylaxis against HIV should be offered. (Antiretroviral therapy must be started within 72 hours of the possible exposure.) Human papillomavirus vaccination status should be reviewed.

Contraindications: Known or suspected allergy, preexisting pregnancy.

Precautions: Nausea is common with high-dose estrogen pregnancy interdiction. Pregnancy interdiction using levonorgestrel is less likely to be effective in overweight women.

Alternative Drugs

- Pregnancy interdiction—ethinyl estradiol 5 mg PO daily for 5 days or conjugated estrogen 10 mg PO four times daily for 5 days. A combined regimen (high doses of ethinyl estradiol and a progestin) also are effective. An intrauterine contraceptive device (copper) may be placed as an alternative to drug therapy for pregnancy interdiction and continuing contraception.
- Sexually transmitted infection prophylaxis—amoxicillin 3 g PO or ampicillin 3.5 g PO plus probenecid 1 g PO as initial therapy, then follow as previous. The Centers for Disease Control and Prevention (CDC) recommends postexposure hepatitis B vaccination with or without hepatitis B immune globulin (HBIG).

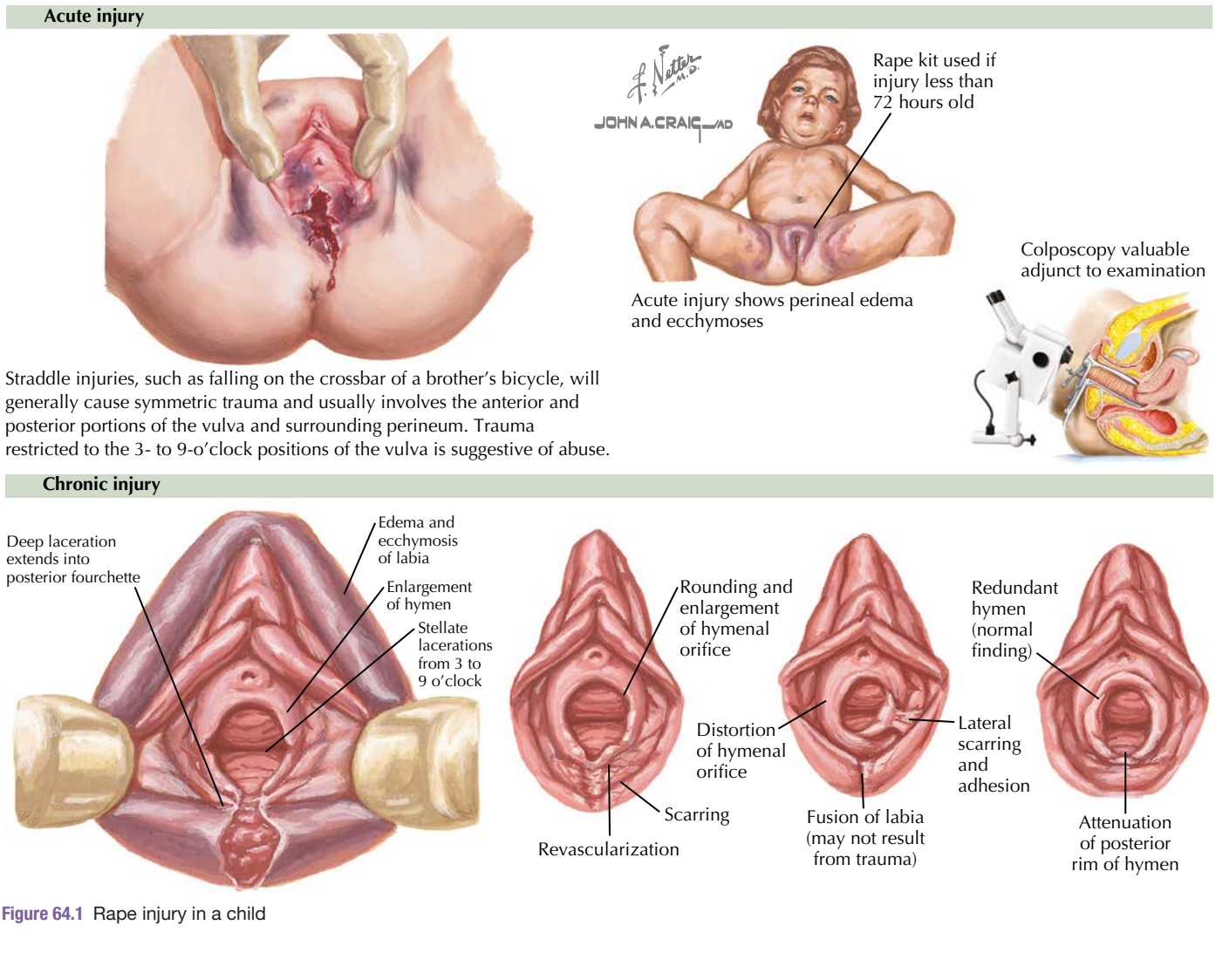

Figure 64.1 Rape injury in a child

- Erythromycin esterase 500 mg PO four times daily for 7 days may be substituted for tetracycline or doxycycline.

FOLLOW-UP

Patient Monitoring: Follow-up contacts by the healthcare provider, social service agencies, or support groups should be made early and often. Contacts at 1–2 weeks, a month, and periodically thereafter provide support and identify evolving problems. Physical re-evaluation should be performed at 1 and 6 weeks to check for delayed symptoms or signs of pelvic infection, bleeding abnormalities, delayed menses, suicidal ideation, or other possible sequelae of the attack. Retesting for syphilis, HIV, and hepatitis B status should be done at 12–18 weeks. Healthcare providers should watch for a failure to move to resolution and the emergence of dysfunctional adaptations.

Prevention/Avoidance: Avoidance of high-risk situations, especially those involving alcohol or drugs.

Possible Complications: The risk of acquiring a sexually transmitted infection is uncertain but is estimated to be 3%–5% or less. The risk of becoming infected with HIV is unknown. When pregnancy interdiction is undertaken within 72 hours, efficacy approaches 90%. Efficacy is greater the earlier the interdiction is instituted; therapy may still be undertaken beyond 72 hours with declining results. Roughly one-third of rape victims suffer long-term psychiatric problems.

Expected Outcome: If both physical and mental traumas are addressed in a proactive manner, results should be good. This must include risk avoidance to reduce the chance of recurrence (up to one-fifth of rape victims have been victims previously). Even with care and support, the last phase of the rape trauma syndrome is often accompanied by painful transitions, frequently involving significant changes in lifestyle, work, or friends. Insomnia, depression, somatic complaints, and poor self-esteem are common during this phase. For some, this phase can be extremely disruptive and prolonged. Roughly one-third of rape victims suffer long-term psychiatric problems. The risk of this is greatest for those older than 40 years, those assaulted in their homes by a stranger, and those with a history of previous mental illness.

MISCELLANEOUS

Pregnancy Considerations: No effect on preexisting pregnancy. If pregnancy interdiction fails, some agents used may be teratogenic and a therapeutic abortion is recommended.

ICD-10-CM Codes: Z04.41 (Encounter for examination and observation following alleged adult rape) and F43.0 (Acute stress reaction).

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SEXUAL DYSFUNCTION: LIBIDINAL AND ORGASMIC DYSFUNCTION (ANORGASMIA)

65

INTRODUCTION

Description: Sexual dysfunction/anorgasmia is the lack of interest in sexual expression or sexual contact or the inability to achieve orgasm. Most studies indicate that only 30%–40% of women are able to experience orgasm during intercourse, and up to 15% of sexually active women have never experienced sexual release. Some limit the appellation of "dysfunction" to only those cases involving personal distress. (Dyspareunia is discussed separately in Chapters 37 and 93.)

Genetics: No genetic pattern.

Prevalence: 40% of women, 10%–12% of women associated with or causing personal or interpersonal distress. Most experience libidinal dysfunction episodically. Of sexually active women, 10%–15% experience orgasmic failure; most experience it episodically. In "happy" or "very happy" marriages, sexual dysfunction occurs in almost two-thirds of women, with three-fourths reporting sexual difficulties that fall short of true dysfunction (such as lack of interest or inability to relax). In one survey, almost half of the women reported trouble becoming sexually excited, one-third had trouble maintaining excitement, and one-third were completely disinterested in sex. Almost half of the women reported difficulties in achieving orgasm.

Predominant age: Reproductive and beyond.

Genetics: No genetic pattern.

SIGNS AND SYMPTOMS

- **Libidinal dysfunction**—disinterest in or avoidance of sexual expression and lack of pleasure from sexual encounters. Dysfunction can occur in any or all of the phases of the sexual response cycle. Low sexual desire is the most common symptom (23%–46%).
- **Orgasmic dysfunction**—failure to obtain sexual release through any means (18%–41% of patients).

Causes: The most common causes of sexual dysfunction are relationship problems, intrapsychic factors, and medical factors. Relationship problems are an obvious source for sexual problems, but both the patient and her provider often overlook them. Marital or relationship stresses may be acted out by sexual distancing, orgasmic failure, or exploitation. Anger, hidden agendas, lack of trust, or infidelity may be expressed through the withdrawal of intimacy. Libidinal mismatches are common, but when combined with poor communication, they lead to dysfunction. Dual-income families may not realize the impact fatigue and a fast-paced lifestyle may be having on their ability to express warmth and be sexually expressive. Medical factors that influence sexual performance include drug and alcohol use, depression, anxiety, chronic illness, pregnancy, untreated menopause, and the effects of surgical therapies. Once proximation (the process of courting, flirting, and desire that begins progress toward physical sexual expression) and arousal have occurred, orgasmic success requires effective stimulation, of a sufficient quality over a sufficient time, provided in a supportive environment. Failures in any of these areas may present as orgasmic problems.

Risk factors: Abuse, restrictive rearing, depression, distorted body image, fatigue, sleep disorders, medical conditions (obesity, thyroid dysfunction, hyperprolactinemia, diabetes, hypertension, genitourinary syndrome of menopause, multiple sclerosis, and Parkinson disease). Nicotine may inhibit sexual arousal.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Depression and affective disorders
- Relational stress
- Physical or sexual abuse (current or past)
- Alcohol or drug use or abuse
- Conditioning (repeated orgasmic failure, restrictive rearing)
- Inappropriate expectations (inaccurate perception of "normal," "correct," or "expected")
- Multiple sclerosis or other neurologic processes
- Other sexual dysfunction (arousal, lubrication, dyspareunia, etc.) presenting as orgasmic failure

Workup and Evaluation

Laboratory: No evaluation indicated.

Imaging: No imaging indicated.

Special Tests: None indicated.

Diagnostic Procedures: History.

Pathologic Findings

None

MANAGEMENT AND THERAPY

General Measures: Reassurance, evaluation, stress reduction, relaxation training, encourage communication, sensate focusing (pleasuring). One of the simplest models for sexual therapy is the PLISSIT model. This model is made up of four levels of intervention: **P**ermission, **L**imited **I**nformation, **S**pecific **S**uggestions, and **I**ntensive **T**herapy. These steps are applied in order. At each step a large number of dysfunctions will be resolved, leaving few patients who require referral for intensive or specialized therapy.

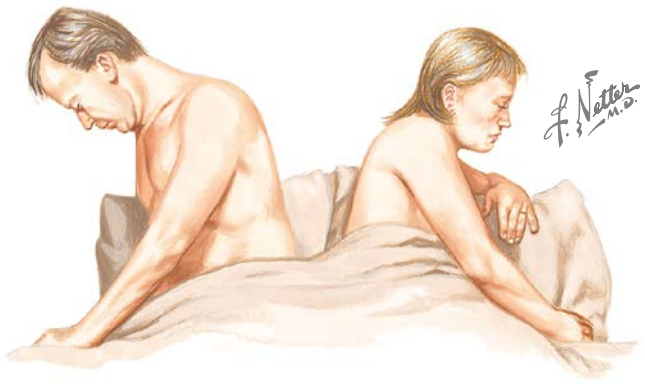
- **Permission:** Many patients only need permission for what they are doing or want to do.
- **Limited Information:** When permission is not enough, providing limited information often will be the solution to the problem.
- **Specific Suggestion:** These do not have to be exotic, complex, or imaginative. In most cases, they will be obvious and suggested by the situation.
- **Intensive Therapy:** When the problem is more complex or deep seated, the intensive, specialized therapy of a trained sexual therapist, psychiatrist, psychologist, or other specialist should be considered.

Specific Measures: Specific suggestions for scheduled time together (including nonsexual time), sexual counseling as needed. Many patients who do not achieve orgasm during intercourse are fully orgasmic with additional manual stimulation, oral–genital stimulation, a vibrator, or masturbation (approximately 30%–40% of women require concurrent clitoral stimulation to achieve orgasm). This is common enough that it should be viewed as a problem only if it is a source of concern for the patient or her partner.

Diet: No specific dietary changes indicated (there are no true aphrodisiacs, but if the patient thinks a food will enhance sexuality, it should not be denied).

Activity: No restriction. Sexual activity limited only by safety, public law, and consent.

Patient Education:



Sex is more than intercourse Look at larger picture of sensuality
Leave each encounter feeling good Feel good—don't ask for orgasm
Give and receive pleasure Enjoy giving and accepting pleasure
Open good communications Listen without feeling criticized, provide cooperative communications
Learn to say "yes" instead of "no" (or at least "maybe") Learn to suggest alternatives, break rejection cycle
Improve the quality, not necessarily the quantity Better sex is better than more sex
Have fun, not work Sex shouldn't be work—requires interesting and interested partners
Allow "space" for each other Allow distance without abandonment
Go slowly, provide reassurance Take your time

Figure 65.1 Goals of sexual counseling or therapy. (Reused with permission from Smith RP. *Gynecology in Primary Care.* Baltimore, MD: Williams and Wilkins; 1997:527.)

American College of Obstetricians and Gynecologists Patient Education Booklets:
- When Sex Is Painful, 2020
- You and Your Sexuality - Especially for Teens, 2015
- Your Sexual Health, 2019

Books:
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- Keeling B. *Sexual Healing: The Complete Guide to Overcoming Common Sexual Problems.* Alameda, CA: Hunter House Publishing; 2006.

Drug(s) of Choice

- None. Hormone replacement therapy for postmenopausal women may improve sexual function, especially if vaginal dryness or atrophy plays a role in the dysfunction. Testosterone treatment improves libido but does not result in improved sexual functioning and is generally not indicated as a treatment for sexual dysfunction except in women who are surgically menopausal. Flibanserin (Addyi) has been approved by the US Food and Drug Administration (FDA) for hypoactive sexual desire disorder. Side effects are common (hypotension), the efficacy is limited (increased satisfying sexual events by 0.51 additional event per month over placebo) and because of potentially serious interactions with alcohol, fluconazole, and antidepressants treatment, flibanserin is available only through certified healthcare professionals and certified pharmacies.

Alternative Therapies

Biofeedback, relaxation therapy, marital or psychologic counseling as needed

Patient Monitoring: Normal health maintenance.

Prevention/Avoidance: Communication, maintenance of general health, adequate rest and exercise. Many patients who do not achieve orgasm during intercourse are fully orgasmic with additional manual stimulation, oral–genital stimulation, a vibrator, or masturbation (approximately 30%–40% of women require concurrent clitoral stimulation to achieve orgasm). This is common enough that it should be viewed as a problem only if it is a source of concern for the patient or her partner. Nicotine and selective serotonin receptor inhibitors (SSRIs) can cause low desire and difficulty with orgasm in women.

Possible Complications: Social withdrawal, depression, marital discord.

Expected Outcome: Generally good with a mixture of reassurance, sexual counseling, stress reduction, and graded exercises as appropriate.

Associated Conditions: Orgasmic dysfunction, dyspareunia, depression.

Pregnancy Considerations: No effect on pregnancy.

ICD-910-CM Codes: F52.0 (Hypoactive sexual desire disorder) and F52.31 (Female orgasmic disorder).

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SEXUALLY TRANSMITTED INFECTIONS: CHANCROID

66

INTRODUCTION

Description: Infection by *Haemophilus ducreyi* results in chancroid, a group of infrequently encountered sexually transmitted infections (STIs). Chancroid is more common than syphilis in some areas of Africa and Southeast Asia, but it is uncommon in the United States.

Prevalence: In the United States, 10–15 cases per year are reported (8 cases in 2019), generally in small, sporadic outbreaks (underreporting and lack of testing may underestimate the actual incidence).

Predominant Age: Younger reproductive age.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: *H. ducreyi* is not capable of infecting intact skin; thus, the lesions of chancroid tend to be found in areas traumatized by sexual activity. Material from the vulvar ulcers is virulent and can infect other body sites.

Risk Factors: Sexual trauma and exposure to the infective agent, prostitution, and human immunodeficiency virus (HIV) infection.

SIGNS AND SYMPTOMS

- One to three painful "soft chancres" 3–10 days after exposure (these break down over approximately 2 weeks to form shallow, progressive ulcers with red, ragged, undermined edges, with little surrounding inflammation; autoinoculation is common, resulting in lesions at various stages of evolution).
- Unilateral adenopathy progressing to massive enlargement and inflammation ("buboes," 50%)
- The combination of a painful ulcer and tender inguinal adenopathy symptoms occurs in one-third of patients and suggests chancroid. When accompanied by suppurative inguinal adenopathy, they are almost pathognomonic. A definitive diagnosis of chancroid requires the identification of *H. ducreyi* on special culture media that are not widely available from commercial sources; even when using these media, sensitivity is ≤80%.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Herpes simplex
- Syphilis
- Granuloma inguinale
- Lymphogranuloma venereum

Associated Conditions: Other STIs, HIV (approximately 10% of persons who have acquired chancroid in the United States are coinfected with *Treponema pallidum* or herpes simplex virus [HSV]. This percentage is higher in persons acquiring chancroid outside the United States.).

Workup and Evaluation

Laboratory: Gram stain and culture of materials from open ulcers. Because of the association with HIV and syphilis, serum testing is highly recommended. Many laboratories do not have the capability of proper microbiologic diagnosis (culture or nucleic acid amplification testing).

Imaging: No imaging indicated.

Special Tests: None indicated.

Diagnostic Procedures: Diagnosis is established on the basis of clinical findings, finding the gram-negative coccobacillus on smears from the primary lesion or (rarely) on culture of aspirates of the bubo. Biopsy is also diagnostic, although not often performed.

Pathologic Findings

The *H. ducreyi* bacillus is a gram-positive, nonmotile, facultative anaerobe that can be seen in chains on Gram stain or in culture. Superficial and deep ulcers with granulomatous inflammation are found on biopsy.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, culture or Gram stain, topical cleansing, and care.

Specific Measures: Antibiotic treatment for patient and her sexual partner(s). Fluctuant nodes may be drained by aspiration through adjacent normal tissue, but incision and drainage delay healing and should not be attempted.

Diet: No specific dietary changes indicated.

Activity: No sexual activity, until lesions have healed.

Patient Education: Patients should be advised to have all sexual partners examined for diagnosis and treatment.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- How to Prevent Sexually Transmitted Diseases, 2020

Drug(s) of Choice

- Azithromycin 1 g PO single dose; ceftriaxone 250 mg IM single dose; ciprofloxacin 500 mg PO twice daily for 3 days; erythromycin 500 mg PO three times daily for 7 days. Treatment must continue for no less than 10 days or until the lesions heal, whichever is longer.

Contraindications: Erythromycin estolate and ciprofloxacin are contraindicated in pregnancy and should not be used. Ciprofloxacin is contraindicated in patients younger than 18 years.

Precautions: See individual agents. The safety of azithromycin in pregnancy has not been established.

Interactions: See individual agents.

Alternative Drugs

- Trimethoprim 160 mg plus sulfamethoxazole 800 mg PO twice daily. Treatment must continue for no less than 10 days or until the lesions heal, whichever is longer.
- Amoxicillin 500 mg plus clavulanic acid 125 mg (Augmentin) PO every 8 hours for 7 days.
- (Increasing resistance has been found for both of these alternative treatments.)

FOLLOW-UP

Patient Monitoring: Follow-up evaluation for cure (improvement in 3–7 days), culture or other tests should be conducted, as well as screening for other STIs. As with all STIs, all sexual partners who have had sexual contact with the patient within the preceding 10 days should be screened and treated for probable infections.

Prevention/Avoidance: Use of barrier contraception (condoms, diaphragm), limitation or elimination of risky behavior (sexual promiscuity).

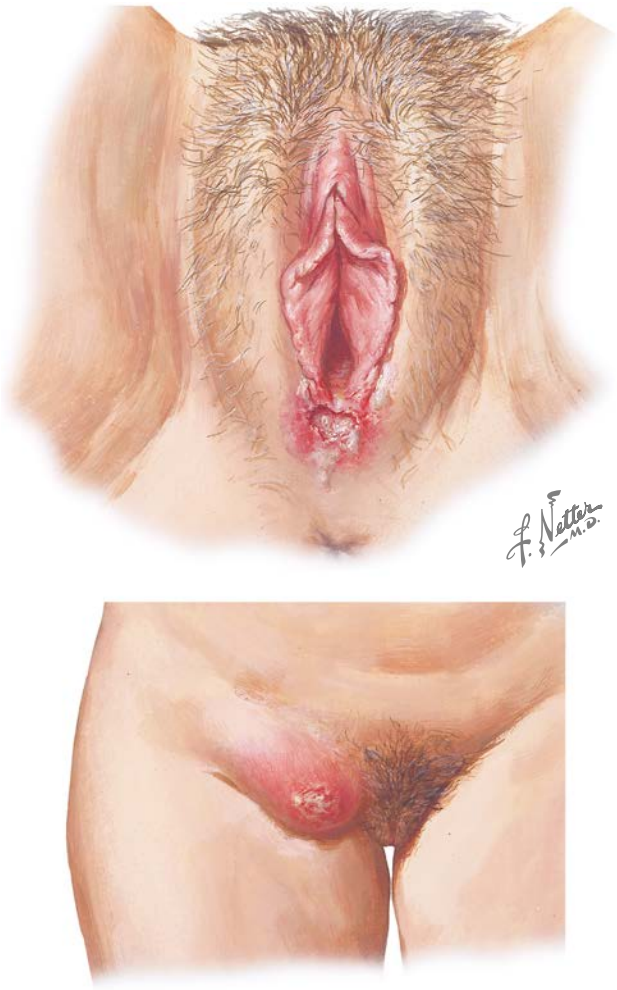

Figure 66.1 Appearance of chancroid

Possible Complications: Buboes may rupture and drain, causing extensive soft-tissue and skin damage. Chronic draining sinus tracts and abscesses may occur. Scarring is common.

Expected Outcome: If detected early, successful treatment with minimal sequelae may be expected. Buboes, if present, may take several weeks to resolve. Up to 10% of patients have a recurrence at the site of old ulcers.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy, although the possibility of vertical transmission of other associated conditions (such as HIV infection) should be considered. Both azithromycin and ceftriaxone can be used during pregnancy.

ICD-10-CM Codes: A57 (Chancroid).

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67 SEXUALLY TRANSMITTED INFECTIONS: *CHLAMYDIA TRACHOMATIS*

INTRODUCTION

Description: The most common bacterial sexually transmitted infection (STI) is that caused by *Chlamydia trachomatis.* More common than *Neisseria gonorrhoeae* by 3-fold, infections caused by *C. trachomatis* can be the source of significant complications and infertility.

Prevalence: 20% of pregnant patients and 30% of sexually active adolescent women. Up to 40% of all sexually active women have antibodies, suggesting prior infection. In 2019 a total of 1,808,703 cases of *C. trachomatis* infection were reported to the Centers for Disease Control and Prevention (CDC) from 50 states and the District of Columbia (694/100,000 females, an increase of 10% from 2015.).

Predominant Age: 15–30 years (85%), peak age 15–24 years (61% of cases). The CDC recommends screening all sexually active women younger than 26 years.

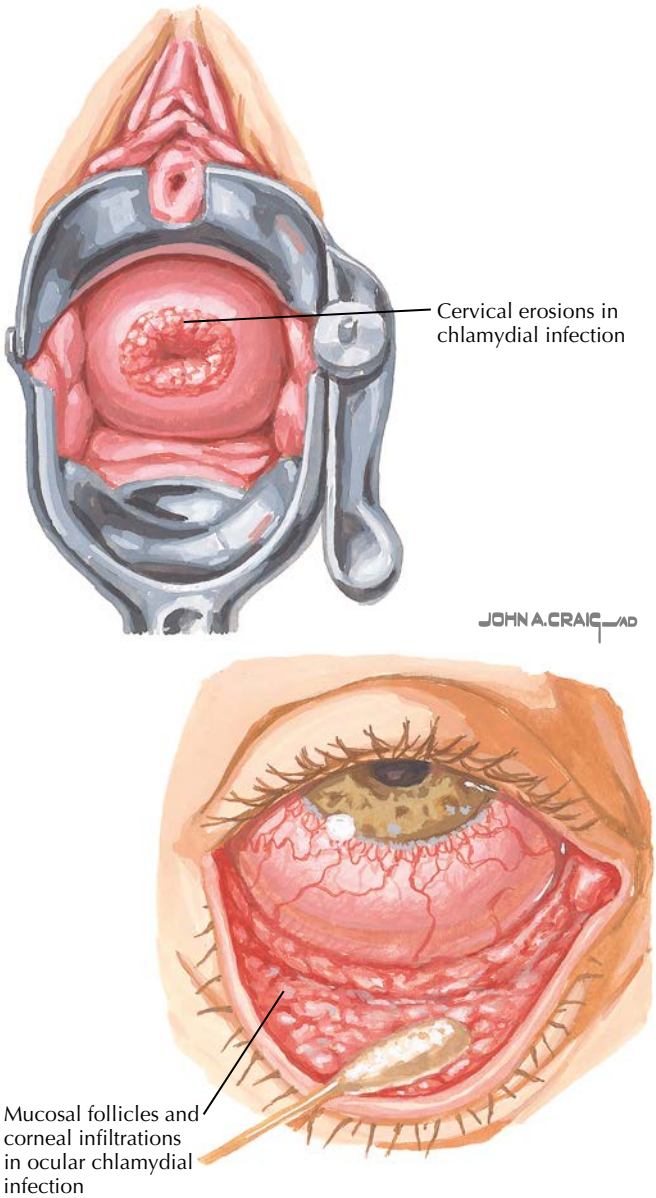

Figure 67.1 Chlamydial infections

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Infection by the obligate intracellular organism *C. trachomatis.* Chlamydia has a long incubation period (average, 10 days) and may persist in the cervix in a carrier state for many years.

Risk Factors: The risk of contracting chlamydial infection is five times greater with three or more sexual partners and four times higher for patients using no contraception or nonbarrier methods of birth control. Other factors are age younger than 26 years, new partner within the preceding 3 months, other STIs, vaginal douching.

SIGNS AND SYMPTOMS

- Frequently asymptomatic (85%)
- Cervicitis; pelvic inflammatory disease (PID); lymphogranuloma venereum (much less common)
- Urethritis; pyuria without bacteriuria (25%)
- Less common: nongonococcal urethritis and inclusion conjunctivitis
- Eversion of the cervix with mucopurulent cervicitis supports the diagnosis but not pathognomonic

DIAGNOSTIC APPROACH

Differential Diagnosis

- Gonorrhea
- PID
- Septic abortion
- Appendicitis
- Gastroenteritis

Associated Conditions: Infertility (tubal), ectopic pregnancy, mucopurulent cervicitis, pelvic inflammatory disease (PID), chronic pelvic pain, and endometritis.

Workup and Evaluation

Laboratory: Nucleic acid amplification tests (NAATs) with respect to overall sensitivity, specificity, and ease of specimen transport are better than that of any other tests. Cultures on cycloheximide-treated McCoy cells are specific and may be used to confirm the diagnosis, but these cultures are expensive, difficult to perform, and often unavailable. When trying to obtain cervical cultures for chlamydia, plastic or metal-shafted rayon or cotton-tipped swabs are preferred.

Imaging: No imaging indicated. Ultrasonography may demonstrate free fluid in the cul-de-sac when pelvic inflammation is present.

Special Tests: None indicated.

Diagnostic Procedures: Physical examination, suspicion, and cervical culture

Pathologic Findings

This infection tends to involve the mucosal layers and not the entire structure. As a result, extensive damage may occur without dramatic symptoms if the fallopian tubes become infected.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and diagnosis.

Specific Measures: Aggressive antibiotic therapy should be instituted in those suspected of infection. Approximately 45% of patients with chlamydial infection have coexisting gonorrhea, and this should be considered when choosing a therapy.

Diet: No specific dietary changes indicated.

Activity: No restriction (sexual continence required until infection is resolved).

Patient Education: Patients should be advised to have all sexual partners seen for diagnosis and treatment.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Chlamydia, Gonorrhea, and Syphilis, 2021
- How to Prevent Sexually Transmitted Diseases, 2020

Drug(s) of Choice

- Doxycycline 100 mg PO twice daily for 7 days is the preferred agent. Delayed-release doxycycline (200 mg daily for 7 days) appears to be as effective and is better tolerated but is more costly.

Contraindications: Quinolones (Ofloxacin), tetracyclines (including doxycycline), and erythromycin estolate are contraindicated in pregnancy and should not be used.

Precautions: Pregnant patients with chlamydial infections should be treated with azithromycin, amoxicillin 500 mg PO three times daily for 7–10 days, erythromycin base, or erythromycin ethylsuccinate.

Alternative Drugs

- Azithromycin 1 g PO, single dose.
- Levofloxacin 500 mg PO daily for 7 days.
- Erythromycin—erythromycin base 500 mg PO four times daily for 7 days or erythromycin ethylsuccinate 800 mg PO four times daily for 7 days may be substituted for tetracycline in patients who are tetracycline sensitive or pregnant.
- Ofloxacin 300 mg PO twice daily for 7 days.

FOLLOW-UP

- **Patient Monitoring:** Follow-up evaluation for cure with culture or other tests (3–4 weeks after therapy) and screening for other STIs should be performed. As with all STIs, all sexual partners within the preceding 30 days should be screened and treated for probable infections. Immunity from infection is short-lived, making reinfection(s) possible.
- **Prevention/Avoidance:** Use of barrier contraception (condoms, diaphragm), limitation or elimination of risky behavior (sexual promiscuity).
- **Possible Complications:** Infertility, chronic pelvic pain. If PID occurs the risk of infertility roughly doubles with each subsequent episode, resulting in a 40% rate of infertility after only three episodes. Women with documented salpingitis have a 4-fold increase in their rate of ectopic pregnancy and 5%–15% of women require surgery because of damage caused by PID.
- **Expected Outcome:** If detected early, successful treatment with minimal sequelae may be expected. Significant permanent damage is common despite treatment because of the indolent course of most infections and, thus, the late institution of therapy. Immunity to infection is not long lived; reinfection or persistent infection is common (up to 26% in 1 year).

MISCELLANEOUS

Pregnancy Considerations: There is an increased risk of premature rupture of the membranes and preterm delivery. Neonatal conjunctivitis and ophthalmia neonatorum may result if an infant does not receive adequate prophylaxis. Even with standard protection (1% $AgNO_3$ or 0.5% erythromycin ointment), complete protection is not ensured.

ICD-10-CM Codes: A56.00 (Chlamydial infection of lower genitourinary tract, unspecified).

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SEXUALLY TRANSMITTED INFECTIONS: CONDYLOMATA ACUMINATA

68

INTRODUCTION

Description: Condylomata acuminata are raised, warty lesions caused by infection by the human papillomavirus (HPV, singular: condyloma acuminatum).

Prevalence: Most common sexually transmitted infection (STI), 500,000 cases per year. Women account for two-thirds of cases. HPV is responsible for >20,500 virus-related cancers in women each year. At least 75% of sexually active adults in the United States have been infected.

Predominant Age: 16–33 years; peak 20–24 years.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Caused by infection by HPV (most frequently serotypes 6 and 11; 90%). This double-stranded nonenveloped DNA virus is found in 2%–4% of all women, and up to 60% of patients have evidence of the virus when polymerase chain reaction techniques are used. The virus is hardy and may even resist drying, making transmission and autoinoculation common. Some evidence suggests that fomite transmission rarely could occur. The virus is most commonly spread by skin-to-skin (generally sexual) contact and has an incubation period of 3 weeks to 8 months, with an average of 3 months. Approximately 65% of patients acquire the infection after intercourse with an infected partner.

Risk Factors: Skin-to-skin contact with an infected person; multiple sexual partners; the presence of other vaginal infections such as candidiasis, trichomoniasis, or bacterial vaginosis; smoking; and oral contraceptive use.

SIGNS AND SYMPTOMS

- Asymptomatic (<2% have condyloma)
- Painless, raised, soft, fleshy growths on the vulva, vagina, cervix, urethral meatus, perineum, and anus (mild irritation or discharge may accompany secondary infections). Symmetric lesions across the midline of the genital area are common (condyloma also may be found on the tongue or within the oral cavity, urethra, bladder, or rectum). Approximately one-third of women with vulvar lesions also have vaginal warts or intraepithelial neoplasia (VAIN), and approximately 40% have cervical involvement. Cervical condyloma are generally flatter and may be identified through colposcopic examination; by Pap test; or through the application of 3%–5% acetic acid to make apparent the raised, white, shiny plaques.
- Abnormal cervical cytologic changes are common.
- Condyloma are occasionally pruritic or may manifest through bleeding, burning, tenderness, vaginal discharge, pain, obstruction of the vagina, or dyspareunia.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Condyloma lata (syphilis)
- Papilloma

Associated Conditions: Other STIs (*Trichomonas* infection or bacterial vaginosis), abnormal cervical cytologic changes, vulvar and vaginal neoplasia. Anal and oropharyngeal cancers when these sites are involved with the infection. Patients are at an increased risk for anogenital and head and neck cancers for more than 10 years following the diagnosis.

Workup and Evaluation

Laboratory: No evaluation indicated; tests for syphilis when indicated.

Imaging: No imaging indicated.

Special Tests: Colposcopic examination; Pap test; or the application of 3%–5% acetic acid to make apparent the raised, white, shiny plaques. Serotyping is not currently indicated when condylomata are the only issue. Biopsy is indicated if the warts are pigmented, indurated, fixed, bleeding, or ulcerated or if the diagnosis is unclear.

Diagnostic Procedures: Physical examination, colposcopy, and biopsy.

Pathologic Findings

Sessile (keratotic) lesions

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Local hygiene.

Specific Measures: The treatment of small, uncomplicated venereal warts is generally by cytolytic topical agents, such as podophyllin (podophyllum resin), bichloracetic or trichloroacetic acid, or physical ablative methods such as laser, cryotherapy, or electrodesiccation. In rare, selected patients, surgical excision or tangential shaving may be used.

Diet: No specific dietary changes indicated.

Activity: Sexual continence until partner(s) is examined and treated.

Patient Education: Patients should be advised to have all sexual partners seen for diagnosis and treatment.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- How to Prevent Sexually Transmitted Infections, 2020
- Human Papillomavirus Vaccination, 2021

Drug(s) of Choice

- Podophyllin (20%–50% in tincture of benzoin, 25% ointment); podophyllotoxin (0.5% solution, Condylox); or bichloracetic or trichloroacetic acid (80%–100% solution, first-line therapy during pregnancy) carefully applied to the warts, protecting the adjacent skin, and allowed to remain for between 30 minutes and 4 hours before being washed off the lesions.
- With most topical therapy, slough of the treated lesions occurs in 2–4 days.
- Treatment may be repeated every 7–14 days as required.
- Patients may self-apply podofilox (0.5% solution or gel, twice daily for 3 days) or imiquimod (5% cream, Aldara, every night three times per week for up to 16 weeks or 3.75% cream once daily for up to 8 weeks).

Contraindications: Podophyllin may not be used during pregnancy because of absorption, potentially resulting in neural or myelotoxicity.

Precautions: To limit toxicity with podophyllin, treatments should be limited to less than 0.5 mL total volume and less than 10 cm^2 in area. Imiquimod should be washed from the vulva in the morning (after 6–10 hours).

Alternative Drugs

- Treatment with 5-fluorouracil 1% or 5% cream is often used as primary therapy or as an adjunct for cervical or vaginal lesions (applied daily until edema, erythema, or vesiculation occurs).
- Therapy with autologous vaccine, dinitrochlorobenzene, sinecatechins (a defined green tea extract), and interferon have been advocated but have yet to gain a significant place in clinical practice.

FOLLOW-UP

Patient Monitoring: Use of sitz baths, mild analgesics, and loose clothing can relieve discomfort and aid healing. The patient should be weekly examined until no further lesions are found. Because these patients are at a higher risk for cervical neoplasia, close follow-up with Pap tests, cervical HPV testing, colposcopy, or a combination, at 6- to 12-month intervals is recommended. Follow-up serologic testing for syphilis and human immunodeficiency virus (HIV) infection as indicated. The sexual partners of patients with HPV also should be screened for genital warts.

Prevention/Avoidance: Limitation or elimination of risky behavior (sexual promiscuity). The use of condoms has not been shown to reduce the spread of HPV but still should be encouraged to reduce the spread of other STIs. 9-valent HPV vaccine (Gardasil 9: types 6, 11, 16, 18, 31, 33, 45, 52, and 58) should provide some measure of protection, although its primary indication is to reduce the risk of cervical cancer. Immunization is recommended for adolescents and adults aged 9–26 years. For women aged 27–45 years who are previously unvaccinated, shared clinical decision making regarding the HPV vaccination should occur. Immunization programs using currently available vaccines have resulted in a drop in the incidence of infection in many studies. There is no evidence that eradication of warts eliminates infectivity.

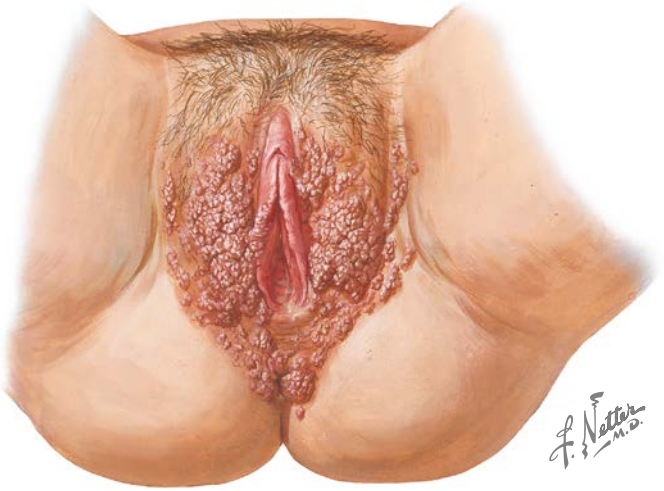

Figure 68.1 Condylomata acuminata

Possible Complications: Those who are immunocompromised, such as patients who have received a transplant, patients with acquired immune deficiency syndrome (AIDS), or pregnant patients may experience rapid and exuberant growth of condyloma. External factors that suppress the immune system (steroids, cigarette smoking, metabolic deficiencies, and infections with other viruses such as herpes) may have similar effects. Several subtypes (16, 18, 31, 33, 35, and others) are associated with the development of cervical neoplasia. Approximately 90% of patients with cervical squamous cell carcinoma have evidence of HPV DNA present in their cervical tissues. It is currently considered that a cocarcinogen, such as smoking, other viruses, or nutritional factors, is required before malignant transformation may occur.

Expected Outcome: In 30%–40% of cases, there is spontaneous resolution of condyloma within 4 months. The success rate for treatment of overt warts is approximately 75%, with a recurrence rate of 65%–80%. If lesions persist or continually recur, cryosurgery, electrodesiccation, surgical excision, or laser vaporization may be required. If cryotherapy is chosen, three to six treatments are often required, but cure rates are higher than those for podophyllin and comparable with those for laser ablation (60%–80%). Even with laser ablation, recurrence rates are reported to vary from 25% to 100%. Scarring is rare. HPV types 16, 18, 31, 33, and 35 are occasionally found in visible genital warts and have been associated with external genital (ie, vulvar, penile, and anal) squamous intraepithelial neoplasia (ie, squamous cell carcinoma in situ, bowenoid papulosis, erythroplasia of Queyrat, or Bowen disease of the genitalia). For this reason, recurrent lesions or those that do not respond as expected should be further investigated.

MISCELLANEOUS

Pregnancy Considerations: Pregnant patients may experience rapid and exuberant growth of condyloma, and lesions are more resistant to therapy. Extensive vaginal or vulvar lesions may require cesarean delivery to avoid extensive lacerations and suturing problems. HPV vaccination is not recommended during pregnancy; however, routine pregnancy testing is not recommended before vaccination. Breastfeeding is not a contraindication to vaccination.

ICD-10-CM Codes: A63.0 (Anogenital [venereal] warts).

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SEXUALLY TRANSMITTED INFECTIONS: GONORRHEA

69

INTRODUCTION

Description: Infection with *Neisseria gonorrhoeae,* a gram-negative intracellular diplococcus, remains common.

Prevalence: In 2019 a total of 616,392 cases of gonorrhea were reported in the United States, and the national gonorrhea rate increased to 152.6 cases per 100,000 women. Before COVID-19, it was the second most commonly reported communicable disease.

Predominant Age: 15–30 years (85%); highest prevalence at ages 15–19 years.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Infection by the gram-negative intracellular diplococcus, *N. gonorrhoeae.*

Risk Factors: It is estimated that the rate of infection with one act of intercourse with an infected partner is 20% for men but 60%–80% for women. For this reason, any patient exposed to gonorrhea within the preceding month should be tested and treated presumptively. This rate increases to 60%–80% for both sexes with four or more exposures. The groups with the highest risk are adolescents, drug users, and sex workers.

SIGNS AND SYMPTOMS

- Asymptomatic (50%)
- Malodorous, purulent discharge from the urethra, Skene duct, cervix, vagina, or anus (even without rectal intercourse) 3–5 days after exposure (40%–60%)
- Simultaneous urethral infection (70%–90%)
- Infection of the pharynx (10%–20%)
- Gonococcal conjunctivitis (can rapidly lead to blindness)
- Polyarthritis
- Septic abortion or postabortal sepsis

DIAGNOSTIC APPROACH

Differential Diagnosis

- Chlamydial infection
- Pelvic inflammatory disease (PID)
- Septic abortion
- Appendicitis
- Gastroenteritis

Associated Conditions: Infertility, ectopic pregnancy, mucopurulent cervicitis, PID (10%–40% of untreated cases), human immunodeficiency virus (HIV), chronic pelvic pain, and endometritis.

Workup and Evaluation

Laboratory: Traditional culturing on Thayer-Martin agar plates maintained in a carbon dioxide–rich environment has been replaced by nucleic acid amplification testing (NAAT) as the preferred method. Cervical tests provide 80%–95% diagnostic sensitivity. Specimens also should be obtained from the urethra and anus, although these additional samples do not significantly increase the sensitivity of testing. A Gram stain of any cervical discharge for the presence of gram-negative intracellular diplococcus supports the presumptive diagnosis but does not establish it (sensitivity, 50%–70%; specificity, 97%). Even when the diagnosis is established by other methods, all cases of gonorrhea should have cultures obtained to assess antibiotic susceptibility, although therapy should not be delayed pending the results.

Imaging: No imaging indicated. Ultrasonography may demonstrate free fluid in the cul-de-sac when pelvic inflammation is present.

Special Tests: None indicated.

Diagnostic Procedures: Physical examination, suspicion, and cervical culture.

Pathologic Findings

Gram-negative intracellular diplococcus associated with diffuse inflammatory reaction (transluminal in the fallopian tube).

MANAGEMENT AND THERAPY

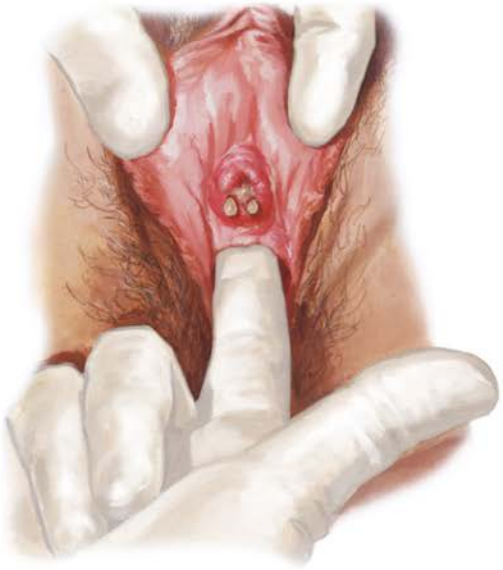
Nonpharmacologic

General Measures: Evaluation and diagnosis.

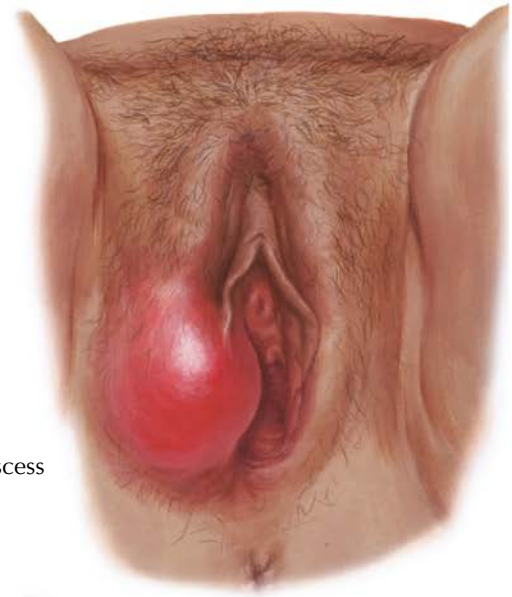
Specific Measures: Aggressive antibiotic therapy should be instituted in patients suspected of having an infection. In 2019, more than half of all infections were estimated to be resistant to at least one antibiotic.

Diet: No specific dietary changes indicated.
Activity: No restriction. Sexual continence is required until the infection has resolved.
Patient Education: Patients should be advised to have all sexual partners examined for diagnosis and treatment.

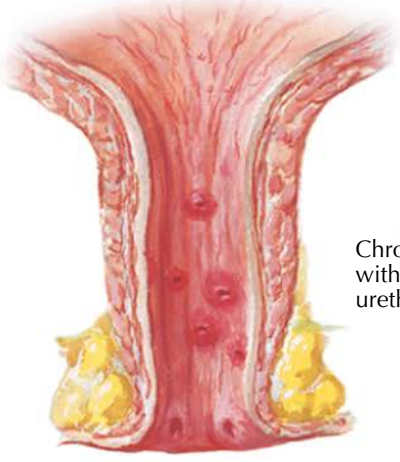
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Chlamydia, Gonorrhea, and Syphilis, 2021
- How to Prevent Sexually Transmitted Diseases, 2020



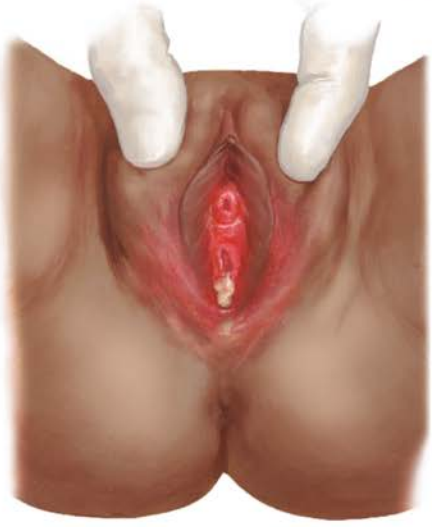
Acute urethritis and skenitis



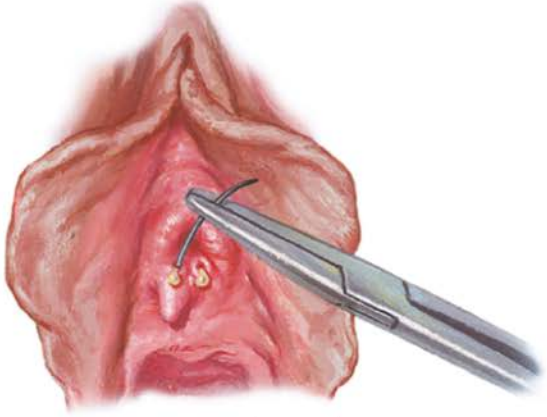
Bartholin abscess



Chronic urethritis with infection of urethral glands



Vulvovaginitis of childhood



Chronic skenitis

Neonatal gonococcal conjunctivitis

Figure 69.1 Gonorrhea

Drug(s) of Choice

- Ceftriaxone 500 mg IM in a single dose.
- Doxycycline 100 mg PO twice daily for 7 days is appropriate for presumptive treatment of chlamydia in nonpregnant patients.

Contraindications: The use of ceftriaxone or cefixime is contraindicated in those patients with a history of an immunoglobulin E–mediated β-lactam allergy, such as anaphylaxis, Stevens-Johnson syndrome, or toxic epidermal necrolysis.

Precautions: For individuals who weigh ≥150 kg, the ceftriaxone dose should be raised to 1 g.

Interactions: See individual agents.

Alternative Drugs

- Cefixime 800 mg PO in a single dose (>35% resistance has been found).
- Gentamicin 240 mg IM once plus azithromycin 2 g PO once (for patients with severe allergies that preclude cephalosporin use).

FOLLOW-UP

Patient Monitoring: When patients are treated with the currently recommended ceftriaxone-azithromycin, therapy failure is rare and a follow-up culture is not necessary. Reexamination of the patient in 1–2 months for the possibility of reinfection may be warranted in patients at high risk. As with all sexually transmitted infections (STIs), all sexual partners within the preceding 30 days should be screened and treated for probable infections.

Prevention/Avoidance: Use barrier contraception (condoms, diaphragm), limitation or elimination of risky behavior (sexual promiscuity).

Possible Complications: Damage caused by *N. gonorrhoeae* infection causes an increased risk of recurrent pelvic infection, chronic pelvic pain, or infertility resulting from tubal damage or hydrosalpinx formation. The impact of a gonorrheal infection is much greater for women than for men. For every three men infected, two women are hospitalized for ≥1 day. For every 18 men infected, 1 woman undergoes surgery. It is estimated that one episode of gonorrhea is associated with a 15% infertility rate and this increases to 75% for three or more infections. The risk of an ectopic pregnancy is increased seven to 10 times in women with a history of salpingitis. Neonatal infections acquired from a mother with gonorrhea may result in conjunctivitis or pneumonia. Pregnant patients are more likely to experience disseminated gonococcal infection. They account for 7%–40% of all cases.

Expected Outcome: If detected early, successful treatment with minimal sequelae may be expected. Significant permanent damage is common despite treatment because of the indolent course of many infections and the late institution of therapy.

MISCELLANEOUS

Pregnancy Considerations: Pregnant patients should be treated as above. Patients with severe penicillin or cephalosporin allergy can be administered dual therapy with a 240-mg dose of IM gentamicin and 2-g oral azithromycin. Neonatal conjunctivitis and ophthalmia neonatorum may result if the infant does not receive adequate prophylaxis.

ICD-10-CM Codes: A54.00 (Gonococcal infection of lower genitourinary tract, unspecified), A54.29 (Other gonococcal genitourinary infections); others based on chronicity and organ involved.

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70 SEXUALLY TRANSMITTED INFECTIONS: GRANULOMA INGUINALE (DONOVANOSIS)

INTRODUCTION

Description: Granuloma inguinale (also called Donovanosis) is relatively common in the tropics, India, Papua New Guinea, South Africa, and Caribbean areas but accounts for fewer than 100 cases per year in the United States. This infection is caused by the intracellular gram-negative bacterium *Klebsiella granulomatis* (formerly known as *Calymmatobacterium granulomatis*).
Prevalence: Uncommon; 100 cases per year in the United States; up to 25% of the population in some subtropical areas.
Predominant Age: Younger reproductive age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Infection is caused by the bipolar, gram-negative bacterium *K. granulomatis.*
Risk Factors: Sexual trauma and exposure to the infective agent.

SIGNS AND SYMPTOMS

- Single or multiple painless subcutaneous papules that evolve to raised, beefy-red, granulomatous lesions that bleed on contact, undergo ulceration and necrosis, and heal slowly (lesions are confined to the genitalia in 80% of patients and generally appear within 2 weeks of exposure).
- Painless papules with rolled borders and friable base
- Marked adenopathy not present
- Hypertrophic, necrotic, or sclerotic variants exist

DIAGNOSTIC APPROACH

Differential Diagnosis

- Chancroid
- Lymphogranuloma venereum
- Herpes simplex
- Syphilis

Associated Conditions: Brawny edema of the external genitalia.

Workup and Evaluation

Laboratory: Gram stain and culture of material from open ulcers. Screening for other sexually transmitted infections (STIs) also should be considered.
Imaging: No imaging indicated.
Special Tests: Samples for biopsy may be taken from the edge of the ulcer to confirm the diagnosis. A crushed tissue smear may be examined for Donovan bodies.
Diagnostic Procedures: Diagnosis is clinically established through the identification of intracytoplasmic bacteria (Donovan bodies) in mononuclear cells.

Pathologic Findings

Granulation tissue associated with an extensive chronic inflammatory cell infiltrate and endarteritis. The ulcer is filled with fibrinous exudate and necrosis; plasma cells and mononuclear cells predominate. Donovan bodies (large vacuolated histiocytes with encapsulated bacilli) are diagnostic. Granuloma inguinale extends by local infiltration and by lymphatic permeation in later stages.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, culture or Gram stain, topical cleansing and care.
Specific Measures: Antibiotic therapy.
Diet: No specific dietary changes indicated.
Activity: No restriction. Sexual continence required until infection is resolved.
Patient Education: Patients should be advised to have all sexual partners examined for diagnosis and treatment.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- How to Prevent Sexually Transmitted Diseases, 2020

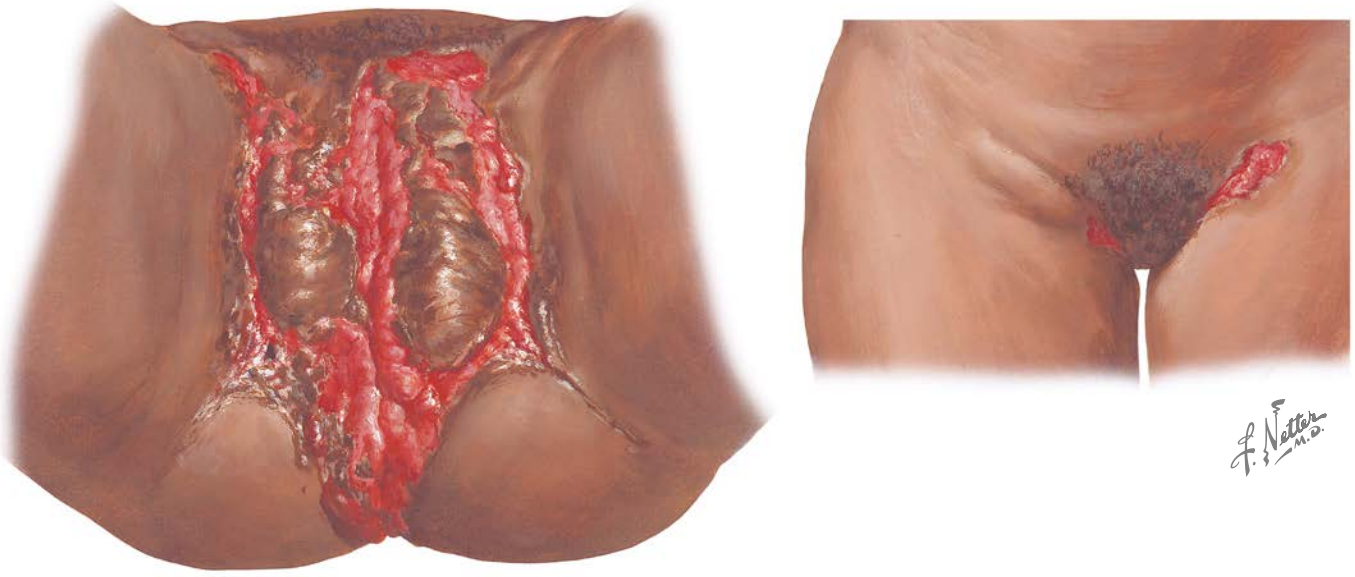

Figure 70.1 Granuloma inguinale

Drug(s) of Choice

- Azithromycin 1 g PO once per week for at least 3 weeks and until all lesions have completely healed *or*
- Azithromycin 500 mg daily for >3 weeks and until all lesions have completely healed

Contraindications: Known or suspected allergy.
Precautions: Tetracyclines should not be used during pregnancy if at all possible because staining of teeth and inhibition of bone growth are both possible. Sulfonamides should not be used during pregnancy.
Interactions: See individual agents.

Alternative Drugs

- Doxycycline 100 mg PO twice daily for a minimum of 3 weeks
- Erythromycin 500 mg PO four times daily for a minimum of 3 weeks.
- Trimethoprim/sulfamethoxazole, one double-strength tablet PO twice daily for a minimum of 3 weeks.
- If lesions fail to show improvement after the first week of treatment, chloramphenicol (500 mg PO three times daily) or gentamicin (1 mg/kg twice daily) should be considered.

FOLLOW-UP

Patient Monitoring: Because of relapse (up to 6–18 months) and late scarring, these patients should be followed carefully for several weeks. Follow-up evaluation for cure with culture or other tests should be carried out, as should screening for other STIs. As with all STIs, all sexual partners within the preceding 30 days should be screened and treated for probable infections as well.
Prevention/Avoidance: None.
Possible Complications: Secondary infection or significant scarring may occur in patients with untreated disease.
Expected Outcome: Gradual healing with antibiotic treatment, but scarring and vulvar stenosis are common and may require surgical treatment.

MISCELLANEOUS

Pregnancy Considerations: No direct effect on pregnancy. Women who are pregnant or lactating should be treated with macrolides (erythromycin or azithromycin). However, because erythromycin estolate has been associated with hepatotoxicity in up to 10% of pregnancies, erythromycin base or erythromycin ethylsuccinate should be used.
ICD-9-CM Codes: A58 (Granuloma inguinale).

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SEXUALLY TRANSMITTED INFECTIONS: HERPES

71

INTRODUCTION

Description: Infection by the herpes simplex virus (HSV) results in recurrent symptoms that range from uncomfortable to disabling. There is a particular risk to neonates when herpes infection occurs during pregnancy.
Prevalence: Most common cause of genital ulcers. 45–50 million recurrent cases; 1.6 million new cases per year; one in four women have been infected. Roughly 12%–21% of individuals 14–49 years.
Predominant Age: 15–30 years (85%).
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Approximately 80% of genital herpes infections are caused by HSV type 2, with the remaining 20% caused by the HSV type 1 virus, though this percentage is rising. (The type is differentiated based on the glycoproteins in the lipid bilayer envelope.) Up to 50% of first-episode cases of genital herpes are caused by HSV-1. Exposure to type 1 virus often happens in childhood and causes oral "cold sores." Previous infection with type 1 virus appears to provide some immunity to type 2 infections. The incubation period from infection to symptoms is approximately 6 days (range, 2–12 days), with first episodes lasting from 10 to 12 days. The majority of patients with symptomatic, first-episode genital HSV-2 infection subsequently have recurrent episodes. Recurrences are less frequent after initial genital HSV-1 infection.
Risk Factors: Approximately 75% of sexual partners of infected individuals contract the disease if intercourse occurs during viral shedding. Patients are infectious during the period from first prodrome through crusting of the lesions. Viral shedding may also occur asymptomatically. Persons unaware that they have the

infection or who are asymptomatic when transmission occurs transmit the majority of genital herpes infections. Nonsexual transmission has not been documented.

SIGNS AND SYMPTOMS

- Prodromal phase—mild paresthesia and burning (beginning approximately 2–5 days after infection)
- Progresses to very painful vesicular and ulcerated lesions, 3–7 days after exposure (may prompt hospitalization in up to 10% of patients)
- Dysuria caused by vulvar lesions, urethral and bladder involvement, or autonomic dysfunction (may lead to urinary retention)
- Malaise, low-grade fever, and inguinal adenopathy (40%)
- Systemic symptoms, including aseptic meningitis, fever, headache, and meningismus, can be found in 70% of patients at 5–7 days after the appearance of genital lesions in primary infections.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Chancroid
- Syphilis
- Granuloma inguinale
- Folliculitis
- Drug eruptions
- Behçet syndrome
- Aphthous ulcers

Associated Conditions: Other sexually transmitted infections, including human immunodeficiency virus (HIV), cervicitis.

Workup and Evaluation

Laboratory: Viral cultures (including type-specific serologic tests) of material taken by swab from the lesions (95% sensitivity). Smears of vesicular material also may be stained with Wright's stain to visualize giant multinucleated cells with characteristic eosinophilic intranuclear inclusions. Nuclear acid amplification testing, polymerase chain reaction (which offers greater sensitivity during viral shedding), and direct fluorescent antibody testing are also available.

Imaging: No imaging indicated.

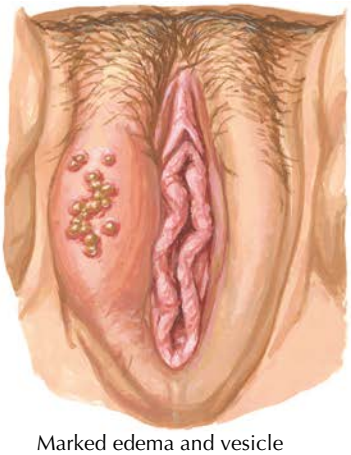
Special Tests: Scrapings from the base of vesicles may be stained using immunofluorescence techniques to detect the presence of viral particles.

Diagnostic Procedures: History, physical examination, viral culture, and serologic testing.

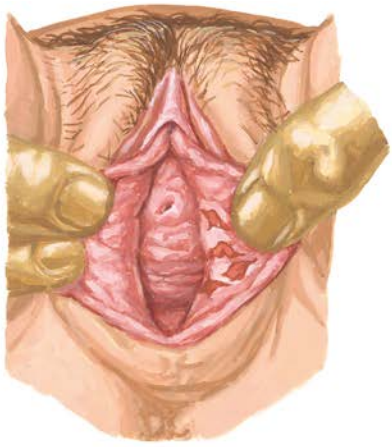
Pathologic Findings

The virus replicates in parabasal and intermediate cells of the skin, causing inflammation and cellular destruction. It passes from cell to cell until it encounters nerve cell endings, providing access to local ganglia, where it becomes latent. Typical skin lesions comprise clear vesicles that lyse, progressing to shallow, painful ulcers with a red border. These may coalesce, becoming secondarily infected and necrotic.

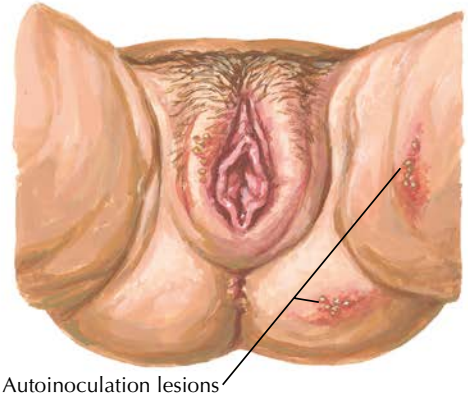
Regional lymphadenopathy, common in genital herpes



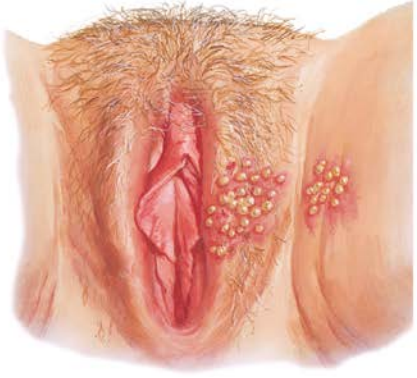
Marked edema and vesicle formation in primary herpes



Ulcerative lesions of genitalia



Autoinoculation lesions



Herpes genitalis

F. Netter M.D.
JOHN A. CRAIG—AD

Figure 71.1 Lesions of herpes simplex

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Topical cleansing, sitz baths followed by drying with a heat lamp or hair dryer, analgesics.

Specific Measures: Topical analgesics (lidocaine [Xylocaine] 2% jelly, nonprescription throat spray with phenol), antiviral agents. If secondary infections occur, therapy with a local antibacterial cream, such as Neosporin, is appropriate.

Diet: No specific dietary changes indicated.

Activity: Pelvic rest until lesions have healed.

Patient Education: Patients should be advised to have all sexual partners examined for diagnosis and treatment. Counseling regarding the natural history of genital herpes, sexual and perinatal transmission, and methods to reduce transmission is integral to clinical management.

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- How to Prevent Sexually Transmitted Diseases, 2020

Drug(s) of Choice

- Acute (begun within 48 hours of onset)—acyclovir 400 mg PO three times daily for 7–10 days, or famciclovir 250 mg PO three times daily for 7–10 days, or valacyclovir 1 g PO two times daily for 7–10 days.
- For frequent recurrences or suppression—acyclovir 400 mg PO twice daily; famciclovir (Famvir) 250 mg PO twice daily; or valacyclovir (Valtrex) 1 g daily is effective in decreasing frequency and severity of flare-ups but use is generally limited to <6 months.

Contraindications: Known or suspected hypersensitivity. Acyclovir is pregnancy category C; famciclovir and valacyclovir are pregnancy category B. Suppressive therapy should not be used for pregnant patients.

Precautions: Thrombotic thrombocytopenic purpura/hemolytic uremic syndrome has been reported in some patients with HIV taking valacyclovir. It has not been encountered in patients who are immunocompetent. Antiviral agents should be used with caution in patients with compromised renal function.

Interactions: Antiviral agents may interact with or enhance the effects of nephrotoxic agents.

Alternative Drugs

- Acyclovir ointment (Zovirax or generic) 5% applied locally every 3 hours. In severe infections, acyclovir 5–10 mg/kg IV every 8 hours for 5–7 days may be required.

FOLLOW-UP

Patient Monitoring: Normal health maintenance. Watch for possible recurrence.

Prevention/Avoidance: Sexual continence during prodrome to full healing, use of condoms to reduce risk, sexual monogamy. Prior HSV-1 infection does not affect the rate of HSV-2 acquisition but increases the likelihood of asymptomatic infection by 3-fold.

Possible Complications: Between 60% and 90% of patients have recurrences of the herpetic lesions in the first 6 months after initial infection. Although generally shorter and milder, these recurrent attacks are no less virulent. Having HSV-2 infection increases the risk of HIV acquisition.

Expected Outcome: Healing of the lesions is generally complete. Inguinal adenopathy may persist for several weeks after the resolution of the vulvar lesions. Suppuration is uncommon. Complete resolution of all symptoms occurs in 2–4 weeks.

MISCELLANEOUS

Pregnancy Considerations: Significant risk to neonate if acute infection or viral shedding occurs at the time of delivery or rupture of the membranes. Infection is also associated with an increased risk of early fetal loss. The risk for transmission to the neonate from an infected mother is high (30%–50%) among women who acquire genital herpes near the time of delivery and is low (<1%) among women with histories of recurrent herpes at term or who acquire genital HSV during the first half of pregnancy. Women with recurrent genital herpetic lesions at the onset of labor should give birth by cesarean delivery to prevent neonatal herpes; however, this does not completely eliminate the risk. Acyclovir may be orally administered to pregnant women with first-episode genital herpes or severe recurrent herpes and should be intravenously administered to pregnant women with severe HSV infection. Acyclovir treatment late in pregnancy (acyclovir 400 mg PO three times daily from 36 weeks of gestation) reduces the frequency of cesarean deliveries among women who have recurrent genital herpes by diminishing the frequency of recurrences at term. Recurrent HSV has not been associated with miscarriage or embryopathy.

ICD-10-CM Codes: A60.04 (Herpesviral vulvovaginitis).

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72 SEXUALLY TRANSMITTED INFECTIONS: HUMAN IMMUNODEFICIENCY VIRUS

INTRODUCTION

Description: Infection by the human immunodeficiency virus (HIV) preferentially involves the immune system and leads to progressive deterioration in immune function. Infection produces a spectrum of disease that progresses from a clinically latent, asymptomatic state to acquired immune deficiency syndrome (AIDS) as a late manifestation. The speed of this progression varies. In untreated patients, the time between infection and the development of AIDS ranges from a few months to 17 years (median, 10 years). Many states have specific laws governing HIV screening, reporting, disclosure, and breach of confidence. All care providers should be familiar with the requirements imposed in their area.

Prevalence: In 2019 an estimated 34,800 new HIV infections occurred in the United States. More than 1.2 million people in the United States are living with HIV infection, and almost one in eight (12.8%) individuals is unaware of his or her infection.

Predominant Age: Median age is 35 years; 84% of cases occur at ages 15–44 years. In the United States, Black/African-American women have a 5-fold greater risk than other women of contracting HIV.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Infection with HIV, a retrovirus that preferentially infects helper lymphocytes but may infect macrophages, cells of the central nervous system, and possibly the placenta. Incubation from infection to clinical symptoms ranges from 5 days to 3 months, with an average of 2–4 weeks.

Risk Factors: Sexual activity (multiple partners or infected partner, 37% of all infections), parenteral exposure to blood (sharing needles, inadvertent needle stick), perinatal exposure of infants. There is no evidence that HIV infection may be transmitted by casual contact, immune globulin preparations, hepatitis B vaccine, or contact with biting insects. HIV infection following donor insemination has been reported.

SIGNS AND SYMPTOMS

- Asymptomatic—some might be asymptomatic or have no recognition of illness.
- Nonspecific symptoms, often mimicking mononucleosis with aseptic meningitis (90%). Febrile pharyngitis is the most common, with fever, sweats, lethargy, arthralgia, myalgia, headache, photophobia, skin rash, and lymphadenopathy lasting up to 2 weeks.
- Signs of loss of immune function—fever, weight loss, malaise, lymphadenopathy, central nervous system dysfunction, abnormal Pap test result, recurrent cervical intraepithelial neoplasia (CIN), oral or vaginal candidiasis. *Pneumocystis jirovecii* pneumonia is the most common AIDS-defining infection.
- Patients are often diagnosed late in the progression of the disease (up to 40% within 1 year of developing AIDS).

DIAGNOSTIC APPROACH

Differential Diagnosis

- Mononucleosis
- Systemic lupus erythematosus

Associated Conditions: Associated with cardiac disease and abnormalities of bone marrow, kidney, and liver function. Psychiatric conditions and neurocognitive problems are common. Gynecologic—abnormal Pap test results, CIN, and cervical or anal cancer, condylomata acuminata, increased risk of pregnancy loss.

Workup and Evaluation

Laboratory: Enzyme-linked immunosorbent assay (ELISA) with positive results confirmed by Western blot analysis and virologic testing (HIV RNA levels; sensitivity and specificity >99%). Informed consent is recommended before testing. False-positive Western blot test results are uncommon and are found on the order of fewer than 1/130,000. Antibodies may not be detectable until 6–12 weeks after infection. Other tests include complete blood count, with differential white count and $CD4^+$ T-cell count, electrolytes, glucose 6-phosphate dehydrogenase, hepatitis B screen, liver and renal function tests, platelet count, Venereal Disease Research Laboratory (VDRL), or rapid plasma reagin test.

Imaging: No imaging indicated.

Special Tests: Tests for tuberculosis (tuberculin skin test with control [*Candida,* mumps, tetanus]) and other infections should be considered in individuals with HIV, Pap test, or cervical HPV screening.

Diagnostic Procedures: ELISA and Western blot analysis.

Pathologic Findings

Reduced CD4 counts and diffuse evidence of immunocompromise.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Health maintenance, avoidance of stress and infection.

Specific Measures: Management is focused on stabilization of HIV disease, prevention of opportunistic infections, and prevention of interpersonal and perinatal transmission. When CD4 counts are <200, antibiotic prophylaxis should be initiated.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education: Patient counseling should include the risk of infections associated with sexual behavior, intravenous drug use, the risk of transmission to an infant, the availability of treatment to reduce that risk, and the risk and benefits of treatment for the patient.

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- How to Prevent Sexually Transmitted Diseases, 2020

Drug(s) of Choice

- Antiretroviral therapy is used to reduce vertical transmission during pregnancy. There are many antiretroviral medications available (abacavir, abacavir/lamivudine, abacavir/lamivudine/zidovudine, atazanavir, bictegravir/emtricitabine/tenofovir alafenamide, cabotegravir/rilpivirine, darunavir, delavirdine, efavirenz, efavirenz/emtricitabine/tenofovir, emtricitabine, emtricitabine/tenofovir, enfuvirtide, etravirine, fosamprenavir calcium, lamivudine, lamivudine/zidovudine, maraviroc, nevirapine, raltegravir, ritonavir, stavudine, tenofovir disoproxil, zidovudine) and multiple-drug therapy is common for individuals with HIV. The best combination remains to be determined, and guidelines are rapidly changing. Referral to a specialist is recommended.

- Prophylactic drugs—trimethoprim 160 mg, sulfamethoxazole 800 mg daily as prophylaxis for those at risk (CD4 counts, <200). Significant infections must be specifically and aggressively treated.

FOLLOW-UP

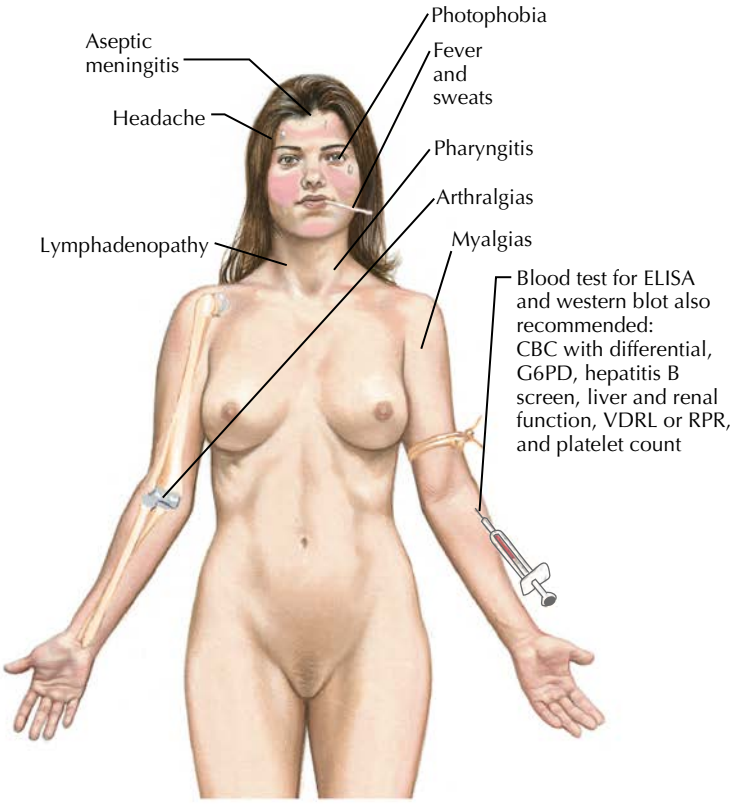
Patient Monitoring: Increased frequency of monitoring, including periodic assessment of blood and CD4 counts. The frequency depends on the stage of HIV infection, use of antiretroviral therapy, and presence of other medical or social comorbidities and complications.

Prevention/Avoidance: Avoidance of risky behaviors such as intravenous drug use or multiple sexual partners, universal precautions for healthcare workers, consistent use of condoms, substance abuse prevention and treatment programs, and counseling programs. Prophylaxis after acute exposure (eg, needle stick) with zidovudine singly or in combination with other agents has been shown to reduce the risk of infection.

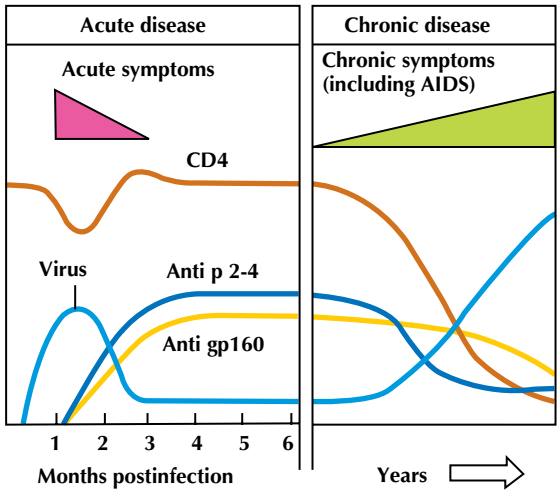
Possible Complications: Opportunistic infections (bacterial, mycotic, and viral), increased risk of malignancy (cervical, Kaposi sarcoma, lymphoma), central nervous system dysfunction. Hormonal contraceptive can interfere with the efficacy of some antiretroviral agents and other medications commonly used.

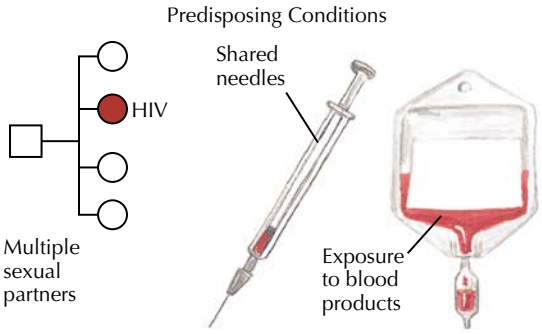
Expected Outcome: After recovery from the initial infection, the patient enters a carrier state during which symptoms are absent, but viral shedding occurs. Immune dysfunction generally becomes apparent approximately 10 years after the initial infection. The development of immunocompromise is rare before 3 years after

Clinical course and features

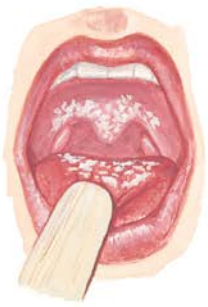


Acute symptoms are often nonspecific, mimicking mononucleosis with weight loss and malaise

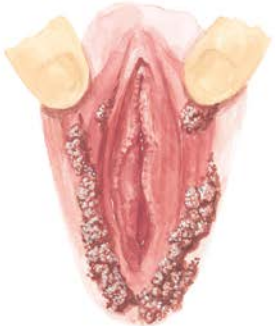




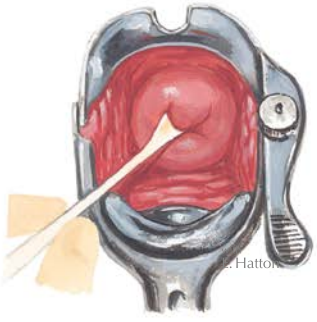
Signs of loss of immune function



Oral or vaginal candidiasis



Condylomata acuminata



Abnormal Pap smear

AIDS, acquired immunodeficiency syndrome; CBC, complete blood count; ELISA, enzyme-linked immunosorbent assay; G6PD, glucose 6-phosphate dehydrogenase, RPR, rapid plasma reagin; VDRL, Venereal Disease Research Laboratory.

Figure 72.1 Clinical course and signs of HIV

infection and <35% develop symptoms of AIDS before 5 years. Effective antiretroviral therapy that suppresses HIV replication to undetectable levels reduces morbidity, provides a near-normal lifespan, and prevents sexual transmission of HIV to others.

MISCELLANEOUS

Pregnancy Considerations: All pregnant women should be tested for HIV during the first prenatal visit. Significant risk of vertical transmission and worsening of maternal disease. Prenatal screening and suppressive strategies have reduced the risk of vertical transmission to approximately 2%. There is potential fetal risk associated with some antiviral medications (eg, efavirenz). Consultation with an infectious disease specialist is recommended.

ICD-10-CM Codes: Z21 (Asymptomatic human immunodeficiency virus [HIV] infection status), B20 (Human immunodeficiency virus [HIV] disease).

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73 SEXUALLY TRANSMITTED INFECTIONS: HUMAN PAPILLOMAVIRUS

INTRODUCTION

Description: Infection by one or more subtypes (of the more than 100 known) of human papillomaviruses (HPVs) causes epithelial proliferations at cutaneous and mucosal surfaces. Some serotypes are associated with warty growths on the hands, feet, and other locations (including genital warts). Some high-risk serotypes are found in more than 99% of cervical cancers.

Prevalence: Considered to be the most common sexually transmitted infection (STI) in the world. Approximately 20 million people (United States) are currently infected with HPV. At least 75% of sexually active people acquire genital HPV infection at some point in their lives. One study estimated that 64%–82% of adolescent girls were infected with at least one strain of HPV (Table 73.1). By the age of 50 years, at least 80% of women will have acquired genital HPV infection. Approximately 6.2 million Americans acquire a new genital HPV infection yearly. HPV is responsible for >20,500 virus-related cancers in women each year. Immunization programs using currently available vaccines have resulted in a drop in the incidence of infection in many studies.

Predominant Age: Reproductive age and beyond.

Genetics: No genetic pattern to infection. The genetic characterization of the virus has led to the identification of those serotypes that are oncogenic.

ETIOLOGY AND PATHOGENESIS

Causes: Exposure to the double-stranded DNA HPV. More than 40 serotypes (of >100) are known to be sexually transmissible. Vertical transmission from mother to child during childbirth can occur and rarely results in laryngeal polyps (approximately 2/100,000 births). Papillomaviruses initiate infection in the basal layer of the epithelium and viral genome amplification

Table 73.1 HPV Serotypes and Common Clinical Conditions

Disease	HPV Strain
Anogenital warts	6 and 11 (90% of cases), 42, 43, 44, 55, and others
Cervical cancer, vulvar squamous cancer	16 and 18 (70% of cases), 31, 33, 35, 39, 45, 51
Bowen disease	16, 18, 31, 32, 34, and others
Common warts	2, 1, 7
Epidermodysplasia verruciformis	More than 15 strains
Flat cutaneous warts	3, 10
Focal epithelial hyperplasia	12, 32
Oral papillomas	6, 7, 11, 16, 32
Oropharyngeal squamous cell carcinoma	16 and others
Plantar warts	1, 2, 4
Respiratory papillomatosis	6 and 11

occurs in differentiating cells. After infection, differentiating epithelial cells that are normally nondividing remain in an active cell cycle. This can result in a thickened, sometimes exophytic, epithelial lesion. The virus is released as cells exfoliate from the epithelium. Research indicates that HPVs produce proteins (designated E5, E6, E7) that interfere with tumor suppressor p53 proteins that arrest the cell cycle when there is DNA damage.

Risk Factors: Direct contact with an infected individual; therefore, having multiple sexual partners or contact with a person with multiple sexual partners increases the risk. Viral persistence is more likely in those with reduced immunity and tobacco smokers. Other epidemiologic factors associated with the risk of cervical cancer include long-term use of oral contraceptives, coinfections such as chlamydia, parity, and nutritional factors.

SIGNS AND SYMPTOMS

- Most infections are asymptomatic and are spontaneously cleared (70% by 1 year and more than 90% within 2 years; median infection, 8 months)
- Persistent infections may be associated with warty growths at the site of infection (condylomata acuminata) and cellular changes associated with dysplasia or cancer (including cancers of the anus, vulva, vagina, cervix, and some cancers of the oropharynx).
- The incubation period required before symptoms appear is highly variable and varies from several weeks to years.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Secondary syphilis (condyloma lata), other viral infections.

Associated Conditions: Other STIs.

Workup and Evaluation

Laboratory: No evaluation indicated (see special tests).
Imaging: No imaging indicated.
Special Tests: HPV serotyping for those with abnormal cervical cytology (Pap tests), colposcopy for those with persistently abnormal cytology or for surveillance of those with high-risk serotypes.
Diagnostic Procedures: Serotyping of HPV obtained from cervical cells. This testing is important for those with abnormal cervical cytology (atypical squamous cells of undetermined significance [ASCUS] or above Pap tests) or may be a part of cotesting to allow a reduced frequency of cervical cytologic screening. These tests will identify 13 high-risk serotypes. Because most young patients will clear even high-risk serotypes with no sequela, recommendations for serotyping and aggressive follow-up of abnormal Pap test results have changed to more conservative management schemes.

Pathologic Findings

Cellular atypia (koilocytotic changes) may be found in infected cells. Research suggests the degree of atypia to be a function of the serotype involved.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: There is no specific therapy available or indicated for HPV infection—most (>90%) infections are cleared by the body with little or no symptoms or sequela.
Specific Measures: Only those directed at the specific symptoms generated by persistent infection; condyloma or cervical epithelial change.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Booklets:

- Abnormal Cervical Cancer Screening Test Results, 2021
- Cervical Cancer, 2021
- Cervical Cancer Screening, 2021
- How to Prevent Sexually Transmitted Infections, 2020
- Human Papillomavirus Vaccination, 2021

Drug(s) of Choice

None.
Contraindications: The HPV vaccines are currently contraindicated in patients with known allergies to any of its components and those who are currently pregnant.
Precautions: None.
Interactions: HPV vaccine can be administered at the same visit as other age-appropriate vaccines, such as the tetanus, diphtheria, and pertussis (Tdap), quadrivalent meningococcal conjugate (MCV4) vaccines, and COVID-19 vaccines.

FOLLOW-UP

Patient Monitoring: Normal health maintenance. Frequent cervical monitoring (cytology and/or colposcopy) for those found to have persistent high-risk serotypes.
Prevention/Avoidance: Abstinence. Condom use is thought to reduce the risk of transmission (a study among newly sexually active college women demonstrated a 70% reduction in HPV infection when their partners used condoms consistently and correctly). Vaccines that provide immunity against high-risk types 16 and 18 (considered to account for 70% of cervical cancers) and low-risk types 6 and 11 (associated with condylomata acuminata). 9-Valent HPV vaccine (Gardasil 9: types 6, 11, 16, 18, 31, 33, 45, 52, and 58) is recommended for female children, adolescents, and adults aged 9–26 years. The currently available vaccine is administered as a series of two injections for those younger than 15 years. For those ≥15 years, three injections over 6 months (0, 2, and 6 months) are indicated.

Injections may be associated with local pain, swelling, itching and redness, fever, nausea, or dizziness.

Possible Complications: Both high- and low-risk types of HPV can cause the growth of abnormal cells, but generally only the high-risk types (16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, 68, 69, and possibly a few others) are associated with cervical cancer. These high-risk types may cause flat condyloma that are often difficult to see compared with the more exuberant warts caused by low-risk types such as types 6 and 11. HPV 16 is the most common high-risk type, found in almost half of all cervical cancers (HPV 18 accounts for 10%–12% of cervical cancers). HPV 16 is also one of the most common types found in women without cancer. High-risk types can be detected in 99% of cervical cancers. It is important to note that most infections by both high- and low-risk types are spontaneously cleared and do not cause clinical problems.

Expected Outcome: Most infections spontaneously clear. For those with persistent infections, warty growths, dysplastic cellular changes, and epithelial cancers may emerge over time.

MISCELLANEOUS

Pregnancy Considerations: No direct effect on pregnancy. Vertical transmission to the infant during delivery may occur. Although vaccination during pregnancy is contraindicated, lactating women may receive the vaccine.

Other Notes: All warts are caused by papillomaviruses, but each type of HPV grows only in specific areas of the body. Those types associated with common warts found on the hands and feet are not sexually transmitted.

Patients with low-grade squamous intraepithelial lesions (LSILs) or high-grade squamous intraepithelial lesions (HSILs) on Pap test results almost always have high-risk HPV on serotyping; thus, typing for these patients does not add anything to their management and is usually not indicated for these individuals. Between 5% and 30% of individuals infected with HPV are infected with multiple serotypes.

ICD-10-CM Codes: B97.7 (Papillomavirus as the cause of diseases classified elsewhere), R87.810 (Cervical high-risk human papillomavirus [HPV] DNA test positive), A63.0 (Anogenital [venereal] warts).

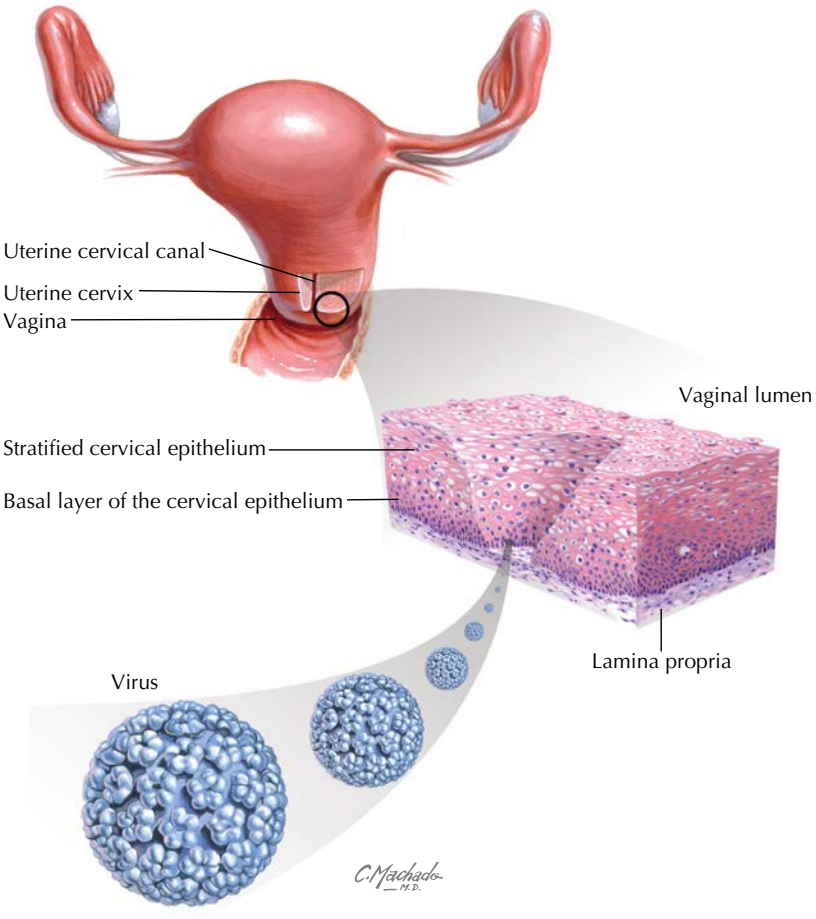

Figure 73.1 Human papillomavirus

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SEXUALLY TRANSMITTED INFECTIONS: LYMPHOGRANULOMA VENEREUM

74

INTRODUCTION

Description: Lymphogranuloma venereum (LVG) is a potentially destructive infection caused by a number of serotypes (L-1, L-2, L-3) of *Chlamydia trachomatis.* Although uncommon in the United States, this infection causes significant morbidity.

Prevalence: Uncommon; <100 cases per year in the United States; endemic in parts of Africa, India, Southeast Asia, South America, and the Caribbean.

Predominant Age: Younger reproductive age.

Genetics: LVG is 20 times more common in men than in women.

ETIOLOGY AND PATHOGENESIS

Causes: LGV is caused by several serotypes of *C. trachomatis.*

Risk Factors: Sexual trauma and exposure to the infective agent.

SIGNS AND SYMPTOMS

- Painless vesicle that quickly heals leaving no scar (3–12 days), generally located on the posterior aspect of the vulva or vestibule.
- Proctitis, tenesmus, or bloody rectal discharge in anorectal infections (anal intercourse).
- Progressive adenopathy with bubo formation (groove sign—the "groove sign" is not specific to LGV; it may also be seen in other inflammatory processes such as acne inversa).
- Severe fibrosis and scarring (elephantiasis, "esthiomene," rectal stenosis may occur).

DIAGNOSTIC APPROACH

Differential Diagnosis

- Granuloma inguinale
- Chancroid
- Herpes simplex
- Syphilis
- Cancer (vulvar or colon)
- Inflammatory bowel disease (proctitis)

Associated Conditions: Other sexually transmitted infections (STIs), human immunodeficiency virus (HIV), dyspareunia, rectal stricture or stenosis.

Workup and Evaluation

Laboratory: Polymerase chain reaction (PCR)-based genotyping. Approximately 20% of patients with LGV will have false-positive Venereal Disease Research Laboratory (VDRL) test results.
Imaging: No imaging indicated.
Special Tests: None indicated. Biopsy of the lesions is not diagnostic because of the nonspecific damage present. Enlarged lymph nodes should not be biopsied or opened as chronic sinuses will result.
Diagnostic Procedures: A definitive LGV diagnosis can be made only with LGV-specific molecular testing (eg, PCR-based genotyping). Complement fixation testing (80% of patients have a titer of 1:16 or greater) but is not generally recommended. Genital and lymph node specimens (ie, lesion swab or bubo aspirate) may be tested for *C. trachomatis* by culture, direct immunofluorescence, or nucleic acid detection. Nucleic acid amplification tests are faster than PCR methods but are less specific, detecting both LGV strains and non-LGV *C. trachomatis* strains.

Pathologic Findings

None (nonspecific inflammatory changes, predominantly a disease of lymphatic tissue).

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, culture or Gram stain, topical cleansing, and care.
Specific Measures: Antibiotic therapy. Treatment should be started even before results of confirmatory tests are received.
Diet: No specific dietary changes indicated.
Activity: No restriction. Sexual continence required until infection is resolved.
Patient Education: Patients should be advised to have all sexual partners examined for diagnosis and treatment.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- How to Prevent Sexually Transmitted Diseases, 2020

Drug(s) of Choice

Doxycycline 100 PO twice a day for 3 weeks.
Contraindications: Erythromycin estolate and tetracyclines are contraindicated in pregnancy and should not be used.
Precautions: Doxycycline is contraindicated in pregnant women.
Interactions: See individual agents.

Alternative Drugs

Azithromycin 1 g PO once weekly for 3 weeks.
Erythromycin 500 mg PO four times a day for 3 weeks.

FOLLOW-UP

Patient Monitoring: Follow-up evaluation for cure with culture or other tests should be carried out at approximately 3 months, as should screening for other STIs. As with all STIs, all sexual partners within the preceding 60 days should be screened and treated for probable infections as well. Asymptomatic partners should be presumptively treated with a chlamydia regimen (doxycycline 100 mg PO two times a day for 7 days).
Prevention/Avoidance: Use of barrier contraception (condoms, diaphragm), limitation or elimination of risky behavior (sexual promiscuity).
Possible Complications: In one-third of patients, abscess formation, rupture, and fistula formation occur. Chronic progressive lymphangitis with chronic edema and sclerosing fibrosis may occur, causing extensive destruction of the vulva. Rectal stenosis also may occur and may be life threatening.
Expected Outcome: If detected early, successful treatment with minimal sequelae may be expected. Long-term scarring and disfigurement are common.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy, although the possibility of vertical transmission of other associated conditions (eg, HIV infection) should be considered. Pregnant and lactating women should be treated with erythromycin (doxycycline use is contraindicated in pregnant women).
ICD-10-CM Codes: A55 (Chlamydial lymphogranuloma [venereum]).

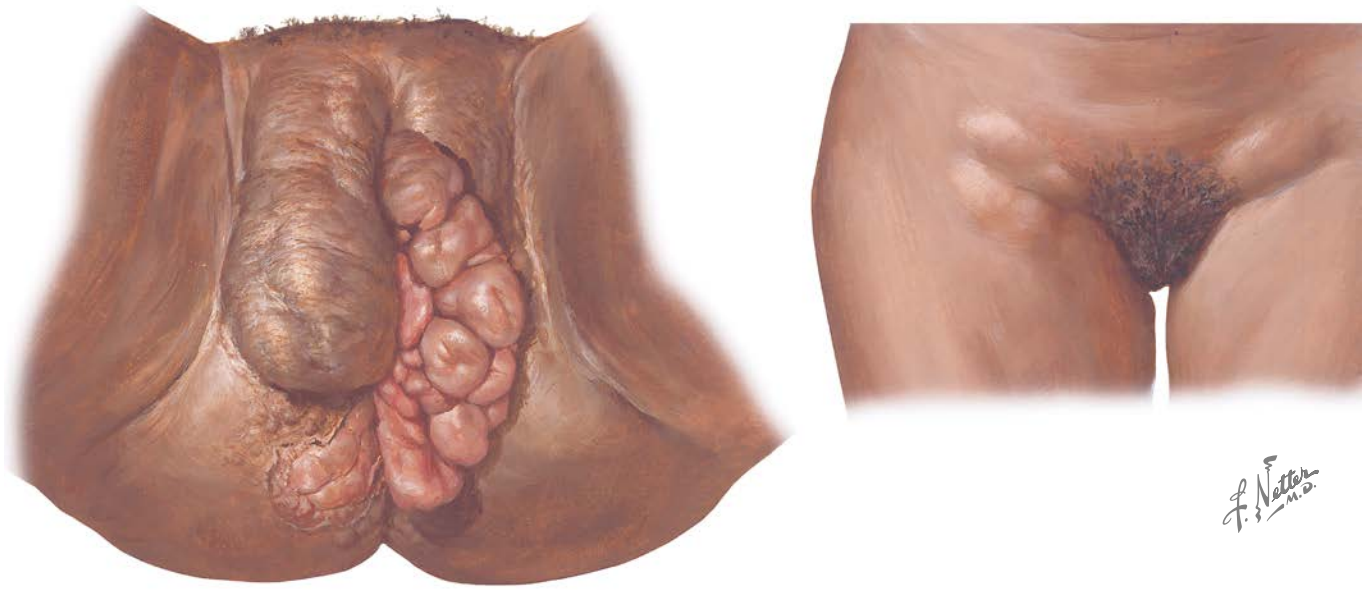

Figure 74.1 Lymphogranuloma venereum

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SEXUALLY TRANSMITTED INFECTIONS: MOLLUSCUM CONTAGIOSUM

75

INTRODUCTION

Description: Molluscum contagiosum is a papillary lesion caused by viral infection (poxvirus) that is spread by skin-to-skin contact, first described in 1817.

Prevalence: 2/100,000; 1 of 40–60 patients with gonorrhea; approximately 1% of all skin disorders in the United States.

Predominant Age: Early reproductive age.

Genetics: No genetic pattern. The virus shares one-half of the genes found in variola and vaccinia viruses.

ETIOLOGY AND PATHOGENESIS

Causes: Molluscum contagiosum is caused by the largest member of the poxvirus group. This mildly contagious DNA virus infects epithelial tissues, and autoinoculation to other sites is common. The appearance of lesions ranges from 1 week to 6 months, with an average incubation period of 2–6 weeks. The virus can also infect other primates and kangaroos.

Risk Factors: Sexual activity and direct exposure to the infective agent. Infection with human immunodeficiency virus (HIV) or immunocompromise increases the risk of infection if exposed.

SIGNS AND SYMPTOMS

- Asymptomatic.
- After several weeks of incubation, a round, umbilicated papule, 1–5 mm in size, with a yellow, waxy core of cheesy material (these lesions may grow slowly for months; they may be solitary or occur in clusters) that may occur anywhere on the body except the palms and soles.
- Eczema (10%).
- The lesions of molluscum are highly contagious, and appropriate precautions should be used when examining the lesions or material from the lesions to avoid infection or spread.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Sebaceous cysts
- Folliculitis
- Herpes simplex
- Dermal papilloma
- Nevus
- Cryptococcosis, histoplasmosis, or *Penicillium marneffei* infection
- Basal cell carcinoma

Associated Conditions: Other sexually transmitted infections (STIs). Molluscum dermatitis; eczematous patches or plaques surrounding molluscum lesions.

Workup and Evaluation

Laboratory: No evaluation indicated. Because patients who are immunosuppressed are at higher risk for molluscum, testing for HIV infection should be considered.

Imaging: No imaging indicated.

Special Tests: Material from the lesions is microscopically examined; inclusion bodies are seen in the material from the core of the lesion (molluscum bodies or Henderson-Paterson bodies).
Diagnostic Procedures: Clinical picture and examination of material from lesion.

Pathologic Findings

Eosinophilic inclusion bodies (intracytoplasmic) in material from the core of the lesion

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Local care.
Specific Measures: Molluscum lesions (mollusca) may go away on their own in 6–12 months (up to 4 years) but can persist, via autoinoculation, for up to 4–5 years. Treatment is based on obliterating the lesion. This is done by desiccation, cryotherapy, curettage, laser ablation, or chemical cautery (AgNO3 [may cause hyperpigmentation and scarring], cantharidin, trichloroacetic acid, or 10% potassium hydroxide solution). Immune modulators (imiquimod 5% cream) also have been used for selected cases. Curettage of the base of the lesion (with the tip of an 18-gauge needle or curette) is also curative. Bleeding may be controlled with Monsel solution (ferric subsulfate solution 20%).
Diet: No specific dietary changes indicated.
Activity: No restriction. Sexual continence required until infection is resolved.
Patient Education: Patients should be advised to have all sexual partners examined for diagnosis and treatment.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- How to Prevent Sexually Transmitted Diseases, 2020

Drug(s) of Choice

- Podophyllotoxin cream (0.5%)

Contraindications: Podophyllotoxin is contraindicated in pregnancy and should not be used.
Precautions: Skin irritation is common.
Interactions: None.

Alternative Drugs

- Topical therapy includes iodine and salicylic acid, potassium hydroxide, tretinoin, cantharidin (a blistering agent), and imiquimod (T cell modifier).

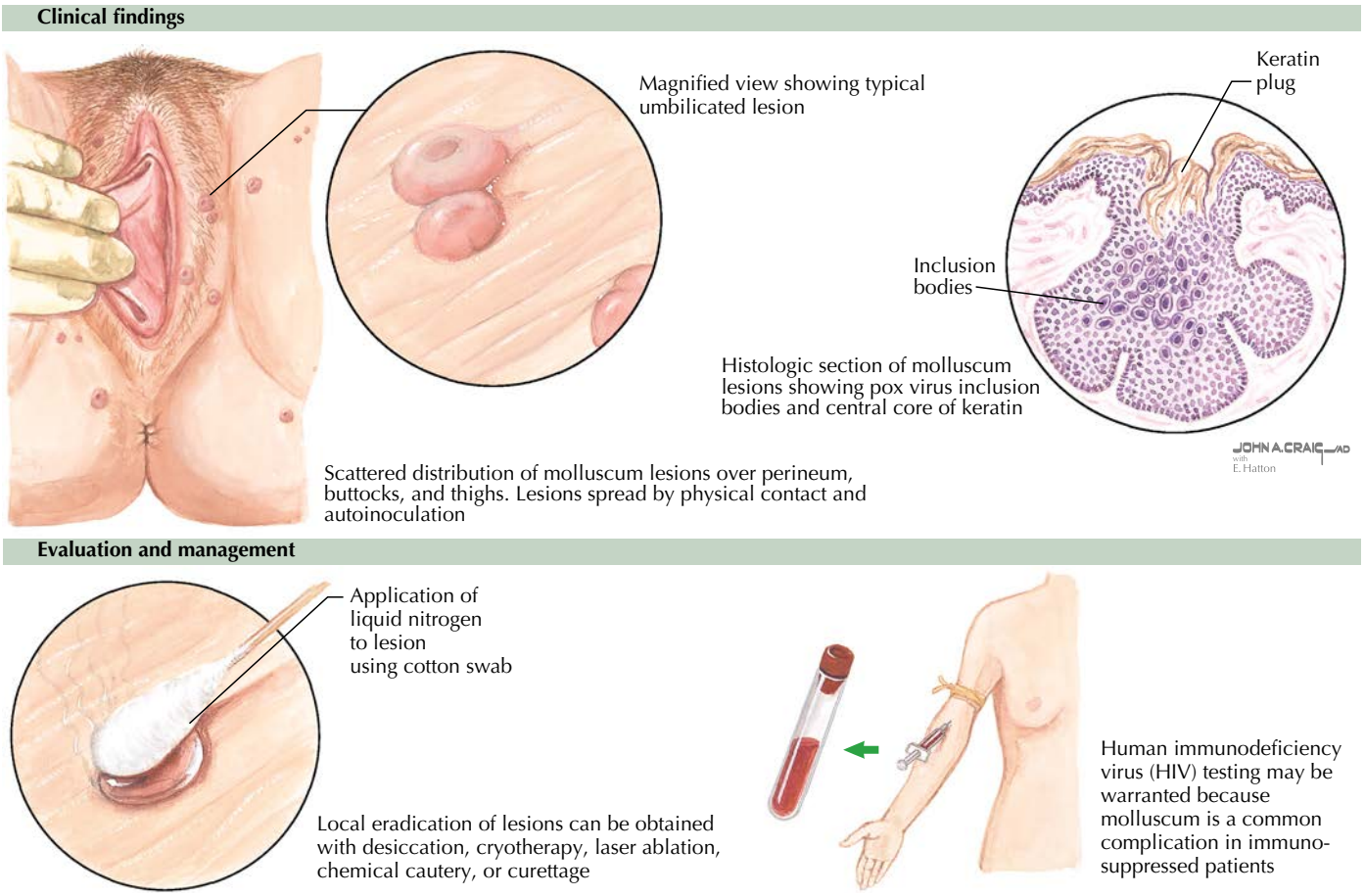

Figure 75.1 Clinical findings and evaluation and management of molluscum contagiosum

FOLLOW-UP

Patient Monitoring: Follow-up should occur in 1 month to look for new lesions.
Prevention/Avoidance: Limitation or elimination of risky behavior (sexual promiscuity).
Possible Complications: Local secondary infection.
Expected Outcome: Good response to lesion destruction (generally heals with little or no scarring).

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. Rare vertical transmission has been reported.
ICD-10-CM Codes: B08.1 (Molluscum contagiosum).

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SEXUALLY TRANSMITTED INFECTIONS: PARASITES 76

INTRODUCTION

Description: *Phthirus pubis* (pubic or crab lice) and *Sarcoptes scabiei* (scabies or itch mite) are parasitic insects that may be transferred through sexual activity or contact with contaminated clothing or bedding.
Prevalence: Three million cases per year in the United States.
Predominant Age: Reproductive age.

ETIOLOGY AND PATHOGENESIS

Causes: Parasitic insects *P. pubis* (pubic or crab lice) and *S. scabiei* (scabies or itch mite). *P. pubis* is a 0.8–1.2 mm long, translucent parasite, with four of its six legs terminating in prominent claws, which are used to grasp pubic hairs. *S. scabiei* var. *hominis* is a whitish-brown, eight-legged mite, measuring approximately 0.4 × 0.3 mm (female).
Risk Factors: Contact (skin-to-skin) with infected person or fomites.
Genetics: No genetic pattern.

SIGNS AND SYMPTOMS

- Intense itching (greatest at night), most frequently in the area of the pubic hair.
- Infestations most frequently occur in the area of the pubic hair. Spread to other hairy areas can and does occur. Scabies infections are not confined to hairy area but may be found in any area of the body, notably the periareolar skin (especially in women).
- Pale, bluish, 0.5–1 cm macules may develop with prolonged louse infestation, resulting from louse anticoagulant saliva introduced during feeding.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Dermatoses
- Contact dermatitis
- Norwegian (crusted) scabies

Associated Conditions: Other sexually transmitted infections (STIs).

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated.
Special Tests: Close inspection of the affected area generally reveals nits, feces, burrows, or the insects themselves. Skin scrapings from multiple sites are used to identify scabies.
Diagnostic Procedures: History and physical examinations, microscopic examination of nits.

Pathologic Findings

Inflammatory reaction to the bite, burrow, and feces of the insect

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Local cleansing, soothing creams, or lotions may be used.
Specific Measures: Topical applications of insecticide. Other family members should be treated and the home disinfected at the same time. Scabies—bedding and clothing should be decontaminated (ie, either machine washed, machine dried using the hot cycle, or dry cleaned) or removed from body contact for at least 72 hours. Fumigation of living areas is unnecessary.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Patients should be advised to have all sexual partners examined for diagnosis and treatment.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- How to Prevent Sexually Transmitted Diseases, 2020

Drug(s) of Choice

- Permethrin cream 5% applied to all areas of the body from neck down and washed off 8–14 hours later.
- Malathion 0.5% lotion applied for 8–12 hours and washed off or ivermectin (only topical ivermectin lotion currently is approved by the US Food and Drug Administration for this use).

Contraindications: Lindane is contraindicated in premature neonates, pregnant or lactating patients, children younger than 2 years, or patients with Norwegian (crusted) scabies. Patients with seizure disorders or known or suspected hypersensitivity should not use the product.
Precautions: Care must be taken to avoid the eyes. The dose of lindane should be reduced in elderly patients because of increased skin absorption. Lindane should not be used immediately after a bath or shower or by people who have extensive dermatitis (seizures have occurred when lindane was applied after a bath or used by patients who had extensive dermatitis). Aplastic anemia after lindane use also has been reported. Lindane is not recommended as a first-line therapy because of toxicity. It should be used as an alternative only if the patient cannot tolerate other therapies or if other therapies have failed.
Interactions: Oils and ointments may increase the rate of absorption and should not be used.

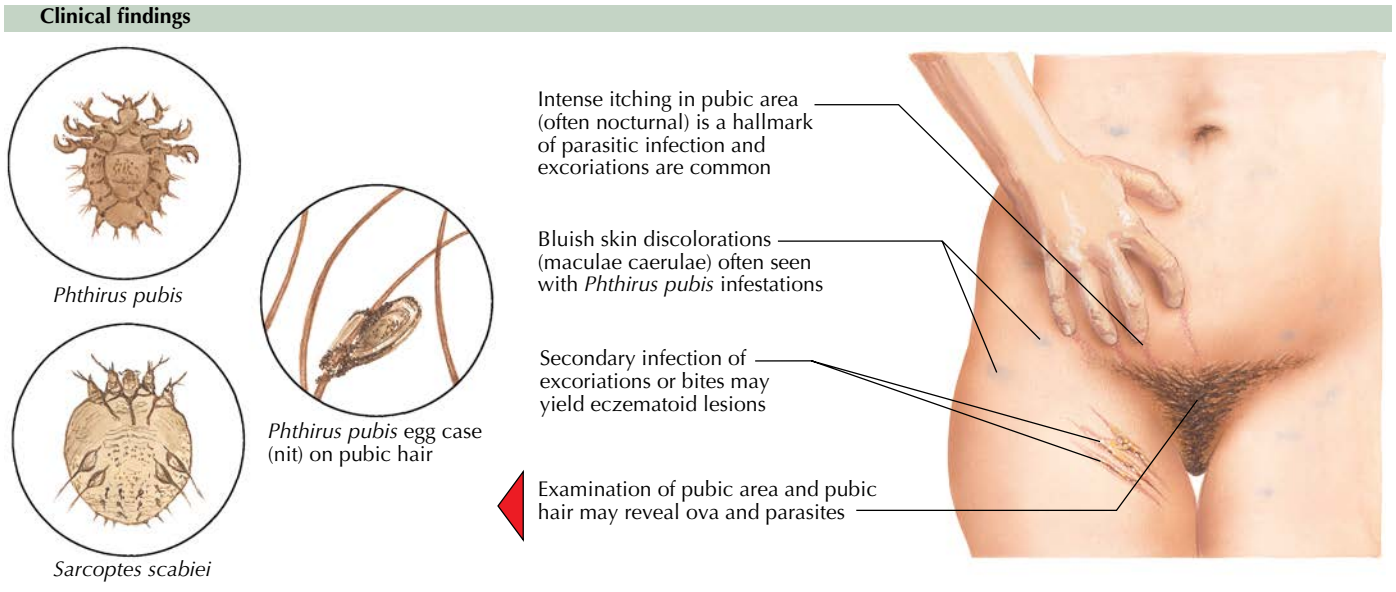

Figure 76.1 Clinical and management in parasites

Alternative Drugs

- Topical applications of lindane 1% (Kwell) lotion and shampoo applied for 4 minutes and then washed off.
- Crotamiton (Eurax) 10% applied to all areas of the body from neck down for 2 nights; on the third night, wash off the medication. Repeat the cycle beginning the fourth night.
- Spinosad 0.9% topical suspension (for the treatment of scabies in adults and children 4 years of age and older).

FOLLOW-UP

Patient Monitoring: Normal health maintenance. Patients should be warned that the rash and pruritus of scabies might persist for up to 2 weeks after treatment.

Prevention/Avoidance: Sexual monogamy. There is some evidence that the practice of pubic hair removal may result in lower risk.
Possible Complications: Secondary skin infection from scratching.
Expected Outcome: Generally good response to insecticide therapy. Reinfection is possible if each partner, family members, and fomites are not all simultaneously treated.

MISCELLANEOUS

Pregnancy Considerations: No direct effect on pregnancy. Lindane and ivermectin are contraindicated during pregnancy and breastfeeding.
ICD-10-CM Codes: B85.3 (*Phthirus pubis*) and 1B86 (Scabies).

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SEXUALLY TRANSMITTED INFECTIONS: SYPHILIS

77

INTRODUCTION

Description: Since antiquity, syphilis has been the prototypic venereal disease. This disease presents with an easily overlooked first stage and, if left untreated, can slowly progress to a disabling disease noted for central nervous system, cardiac, and musculoskeletal involvement.
Prevalence: Increasing; in 2019, 129,813 cases of all stages of syphilis, were reported, including 38,992 cases of primary and secondary (P&S) syphilis reported in the United States, a rate of 3.9 cases (P&S) per 100,000 women. Men account for most cases of syphilis, with most cases occurring among men who have sex with men (56.7% of male cases). It is the second most common of genital ulcers (after herpes).
Predominant Age: 15–30 years (85%).
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: *Treponema pallidum* is a very small group of spirochetes that are virulent for humans. This motile anaerobic spirochete can rapidly invade even intact moist mucosa (epithelium).
Risk Factors: It is estimated that approximately one-third of patients exposed to early syphilis acquire the disease.

SIGNS AND SYMPTOMS (BASED ON STAGE)

- Primary stage—10–60 days (average 21 days) after inoculation—painless chancres (shallow, firm, punched out, with a smooth base and rolled edges; on the vulva, anus, rectum, pharynx, tongue, lips, fingers, or the skin of almost any part of the body)
- Second stage—low-grade fever; headache; malaise; sore throat; anorexia; generalized lymphadenopathy; a diffuse, symmetric,

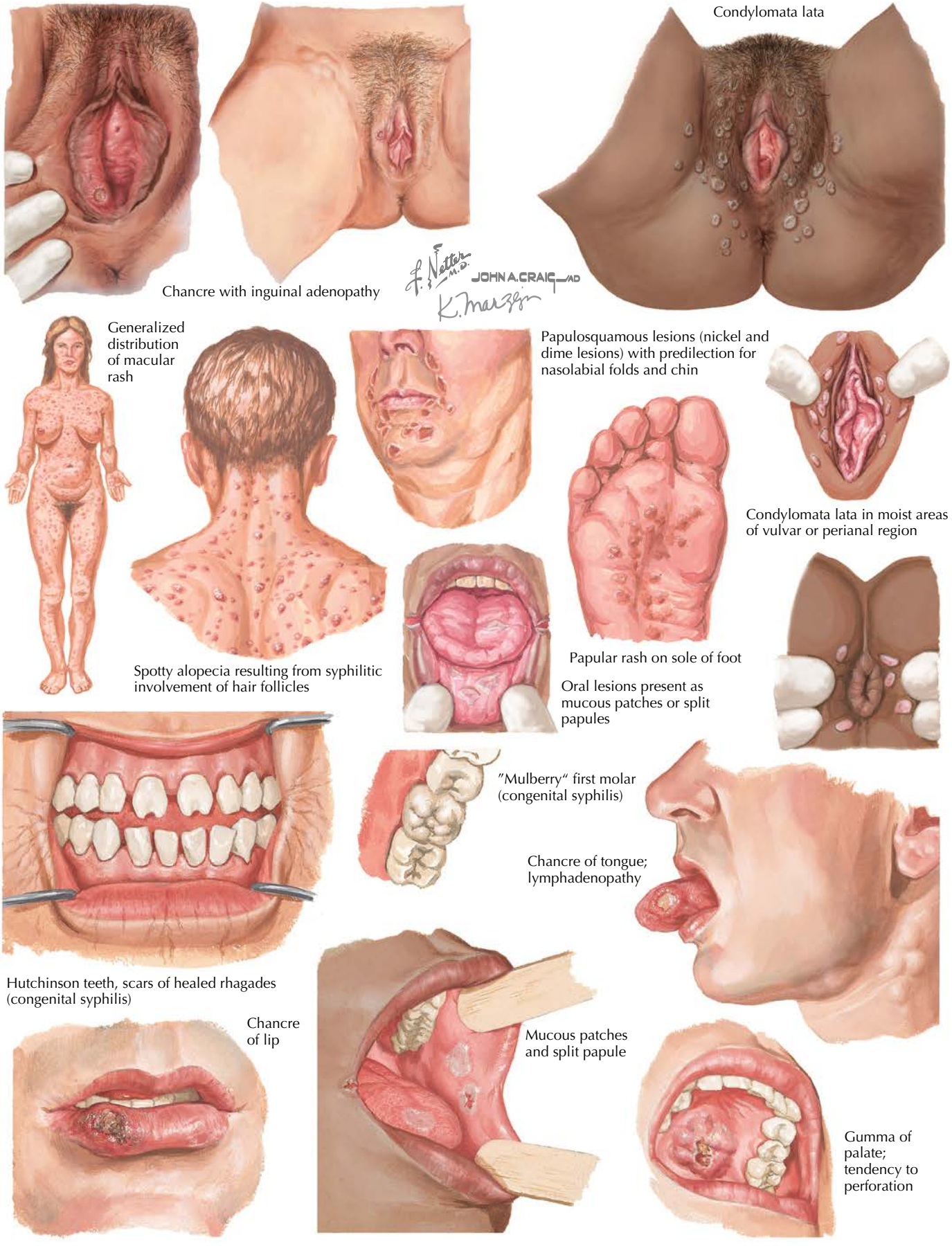

Figure 77.1 Syphilis

asymptomatic maculopapular rash over the palm and soles ("money palms"); mucous patches; condyloma lata, "moth-eaten" alopecia
- Tertiary stage—cardiac or ophthalmic manifestations, auditory abnormalities, or gummatous lesions

DIAGNOSTIC APPROACH

Differential Diagnosis

- Herpes vulvitis
- Condylomata acuminata
- Lymphogranuloma venereum
- Chancroid

Associated Conditions: Tabes dorsalis, aortic aneurysm, and gummas, other sexually transmitted infections (STIs), including human immunodeficiency virus (HIV).

Workup and Evaluation

Laboratory: The Venereal Disease Research Laboratory (VDRL) and rapid plasma reagin (RPR) tests are nonspecific and good screening tests because they are rapid and inexpensive. The fluorescent treponemal antibody absorption or microhemagglutination *T. pallidum* tests are specific treponemal antibody tests that are confirmatory or diagnostic; they are not used for routine screening but are useful to rule out a false-positive screening test result. If neurosyphilis is suspected, a lumbar puncture with a VDRL test performed on the spinal fluid is required (unless clinical signs or symptoms of neurologic or ophthalmic involvement are present, cerebrospinal fluid analysis is not recommended for routine evaluation of patients who have primary or secondary syphilis). Screening for HIV infection also should be strongly considered. False-positive screening results may occur in patients with lupus, hepatitis, sarcoidosis, recent immunization, or drug abuse or during pregnancy. These test results may be falsely negative in the second stage of the disease as a result of high levels of anticardiolipin antibody that interfere with the test (prozone phenomenon). Up to 30% of patients with a primary lesion have negative test results (approximately 15%–25% of patients treated during the primary stage revert to being serologically nonreactive after 2–3 years).

Imaging: No imaging indicated.

Special Tests: The diagnosis may be made by identifying motile spirochetes on dark-field microscopic examination of materials from primary or secondary lesions or lymph node aspirates or through direct fluorescent antibody (DFA) testing. Serologic testing has completely replaced microscopy except in research settings.

Diagnostic Procedures: Physical examination, suspicion, serologic testing.

Pathologic Findings

Based on the stage of the disease

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and diagnosis.

Specific Measures: Antibiotic therapy based on the stage of the disease.

Diet: No specific dietary changes indicated.

Activity: No restriction. Sexual continence required until infection is resolved.

Patient Education: Patients should be advised to have all sexual partners (within 90 days of diagnosis) examined for diagnosis and treatment.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Chlamydia, Gonorrhea, and Syphilis, 2021
- How to Prevent Sexually Transmitted Infections, 2020

Drug(s) of Choice

- Benzathine penicillin G 2.4 million units IM in a single dose.
- Tertiary stage—benzathine penicillin G 7.2 million units total, administered as three doses of 2.4 million units IM each at 1-week intervals.
- Penicillin G, parenterally administered, is the preferred drug for treatment of all stages of syphilis. Dosage is based on the stage of the disease.

  Contraindications: Known or suspected allergy.

Alternative Drugs

- Doxycycline 100 mg PO twice a day or tetracycline 500 mg PO four times day, both for 14 days. Pregnant patients who are allergic to penicillin should be desensitized and then treated with penicillin.
- A single 2-g PO dose of azithromycin may be used but is not generally recommended.

FOLLOW-UP

Patient Monitoring: Screening for other STIs. As with all STIs, all sexual partners within the preceding 90 days should be screened and treated for probable infections as well.

Prevention/Avoidance: Limitation or elimination of risky behavior (sexual promiscuity).

Possible Complications: If untreated, crippling damage to the central nervous or skeletal systems, heart, or great vessels often ensues in the form of destructive, necrotic, granulomatous lesions (gummas), which develop from 1–10 years after the initial infection. Serious cardiovascular or neurologic complications occur in 5%–20% of patients.

Expected Outcome: Early treatment is associated with resolution; permanent damage may occur if the disease is treated at a later stage. The Jarisch-Herxheimer reaction is an acute febrile reaction frequently accompanied by headache, myalgia, and other symptoms that usually occur within the first 24 hours after any therapy for syphilis.

MISCELLANEOUS

Pregnancy Considerations: Parenteral penicillin G is the only therapy with documented efficacy for syphilis during pregnancy. Transplacental spread of syphilis occurs at any time during pregnancy and can result in congenital syphilis. Transplacental infection occurs in approximately 50% of patients with untreated primary or secondary disease. Half of these patients have premature deliveries, growth restriction, or stillbirths. Pregnant women with syphilis in any stage who report penicillin allergy should be desensitized and then treated with penicillin.

ICD-10-CM Codes: A51.0 (Primary genital syphilis), A51.31 (Condyloma latum), A51.39 (Other secondary syphilis of skin); others based on organ system and extent of disease.

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78 SEXUALLY TRANSMITTED INFECTIONS: *TRICHOMONAS VAGINALIS*

INTRODUCTION

Description: Infection by the anaerobic flagellate protozoan *Trichomonas vaginalis* is most often acquired by sexual contact with an infected person.

Prevalence: Approximately 3.7 million cases per year in the United States (2.1% of women); accounts for 25% of "vaginal infections." The most common nonviral sexually transmitted infection (STI).

Predominant Age: 15–50 years, but it may occur at any age. One study found a peak rate at ages 47–53 years.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: *T. vaginalis,* an anaerobic flagellate protozoan. The incubation period for *Trichomonas* infections is considered to be between 4 and 28 days. Humans are the only natural host.

Risk Factors: Multiple sexual partners, vaginal pH that is less acidic. Blood, semen, or bacterial pathogens increase the risk. Of asymptomatic partners of women with *Trichomonas* infections, 30%–80% have a positive culture. *Trichomonas* has been reported (rarely) in virginal patients, supporting the possibility of nonsexual transmission. Transmission from woman to woman is possible, but transmission among men is uncommon.

SIGNS AND SYMPTOMS

- 70% to 85% may be asymptomatic; a carrier state may exist for many years
- Vulvar itching or burning
- Copious discharge with a rancid odor (generally thin, runny, and yellow-green to gray in color, "frothy" in 25%)
- "Strawberry" punctation of the cervix and upper vagina (15%)
- Dysuria
- Dyspareunia
- Edema or erythema of the vulva

DIAGNOSTIC APPROACH

Differential Diagnosis

- Bacterial vaginitis
- Bacterial vaginosis
- Chlamydial cervicitis
- Gonococcal cervicitis
- Retained foreign body

Associated Conditions: Other STIs; specifically, gonorrhea and chlamydial infection). Susceptibility to human immunodeficiency virus (HIV) infection is increased by up to 3-fold. Infection is associated with a 2-fold risk of cervical cancer. Infections during pregnancy are

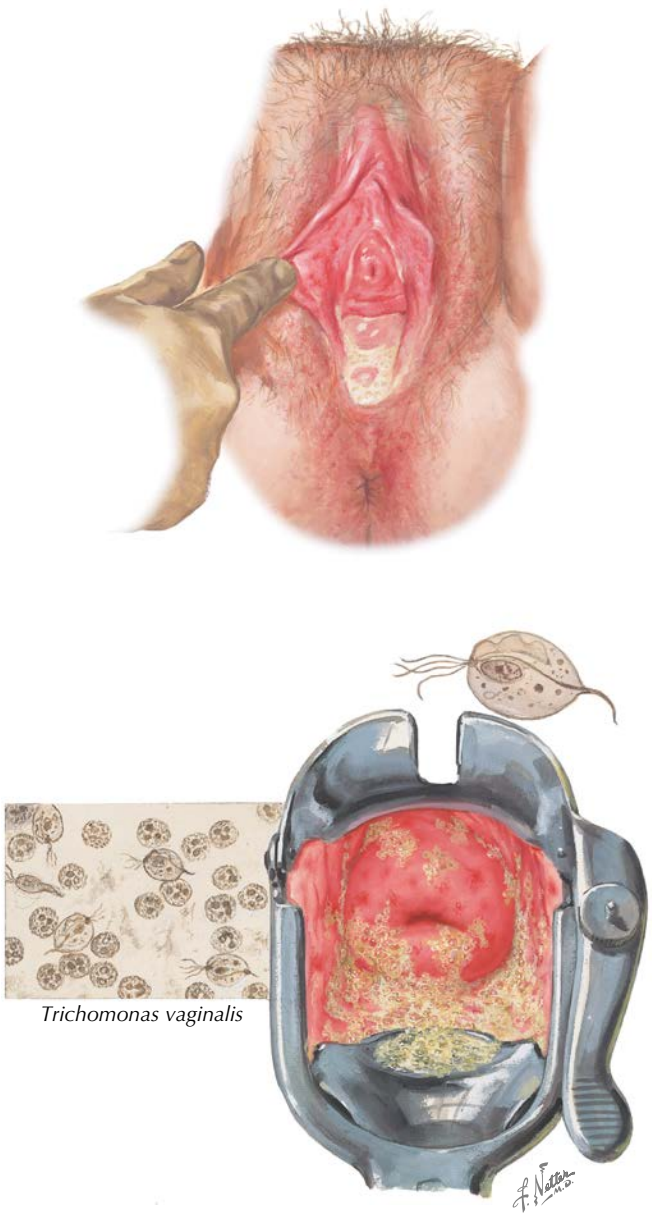

Figure 78.1 Trichomoniasis

associated with an increased risk of preterm birth, premature rupture of membranes, and infants who are small for gestational age.

Workup and Evaluation

Laboratory: Culture or monoclonal antibody staining may be obtained, but they are seldom necessary. Evaluation for concomitant STIs should be strongly considered. Detection of *Trichomonas* by Pap test results in an error rate of 50%. Alternative tests include immunochromatographic capillary flow dipstick and rapid antigen and DNA hybridization probes. These tests have a sensitivity of more than 83% and a specificity of more than 97%, although false-positive results are common when prevalence is low.

Imaging: No imaging indicated.

Special Tests: Vaginal pH 6–6.5 or higher.

Diagnostic Procedures: Physical examination, microscopic examination of vaginal secretions in normal saline (sensitivity of only approximately 60%–70%). Nucleic acid amplification tests are highly sensitive and specific.

Pathologic Findings

T. vaginalis is a fusiform protozoan, slightly larger than a white blood cell, with three to five flagella extending from the narrow end that provide active movement.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Perineal hygiene, education regarding STIs.

Specific Measures: Medical therapy, vaginal acidification.

Diet: No specific dietary changes indicated. Avoid alcohol during metronidazole or tinidazole treatment.

Activity: Sexual continence until partner(s) are examined and treated.

Patient Education: Patients should be advised to have all sexual partners examined for diagnosis and treatment.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- How to Prevent Sexually Transmitted Diseases, 2020
- Vaginitis, 2021
- Vulvovaginal Health, 2020

Drug(s) of Choice

- Metronidazole 500 mg PO twice a day for 7 days.
- For recurrences where reinfection is excluded—tinidazole 2-g PO single dose.
- Treatment of sexual partners is indicated.

Contraindications: Metronidazole is relatively contraindicated in the first trimester of pregnancy (pregnancy category B). Multiple studies and meta-analyses have not demonstrated a consistent association between metronidazole and teratogenic or mutagenic effects. Tinidazole is pregnancy category C.

Precautions: Metronidazole or tinidazole may produce a disulfiram-like reaction, resulting in nausea, vomiting, headaches, or other symptoms if the patient ingests alcohol. Patients should not use these agents if they have taken disulfiram in the preceding 2 weeks. Metronidazole must be used with care, or the dose should be reduced in patients with hepatic disease.

Interactions: Metronidazole may potentiate the effects of warfarin or coumarin and alcohol (as noted earlier).

Alternative Drugs

- Tinidazole 2 g PO in a single dose.
- Secnidazole single 2-g oral dose
- Topical clotrimazole, povidone-iodine (topical), hypertonic 20% saline douches.
- Metronidazole gel is considerably less efficacious for the treatment of trichomoniasis (<50%) than oral preparations of metronidazole and should not be used.
- Hypertonic saline douches also may be offered, which lyse the parasites through osmotic pressure.

FOLLOW-UP

Patient Monitoring: Follow-up serologic testing for syphilis and HIV infection as indicated. Follow-up testing for trichomonas at 3 months is indicated. The Centers for Disease Control and Prevention (CDC) recommends annual screening for asymptomatic colonization in HIV-infected women.

Prevention/Avoidance: Sexual monogamy; use condoms (male or female) during intercourse. All sexual contacts should be presumptively treated.

Possible Complications: Cystitis, infections of the Skene or Bartholin glands, increased risk of pelvic inflammatory disease (PID), pelvic pain, infertility, and other sequelae of STIs.

Expected Outcome: Resistance to metronidazole is uncommon (<5% with low-dose therapy, high-level resistance is rare). Most treatment failures are caused by reinfection or failure to comply with treatment.

MISCELLANEOUS

Pregnancy Considerations: Vaginal infections are associated with an increased risk of premature rupture of membranes, preterm delivery (increased by >40%), and low birthweight. Data do not suggest that metronidazole treatment results in reducing perinatal morbidity. Discontinue breastfeeding during metronidazole treatment and for 12–24 hours after the last dose. While using tinidazole, discontinue breastfeeding during treatment and for 3 days after the last dose.

ICD-10-CM Codes: A59.00 (Urogenital trichomoniasis, unspecified) and A59.01 (Trichomonal vulvovaginitis).

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79 THROMBOPHLEBITIS

INTRODUCTION

Description: Thrombophlebitis is an inflammatory condition of the veins with secondary thrombosis. This may occur in two forms: aseptic or suppurative (septic). The vessels may be either superficial or deep. Risk factors may be present, or the onset may be idiopathic. Risk varies with the location and cause.

Prevalence: Two million cases per year in the United States; 10% of nosocomial infections, intravascular (venous or arterial) catheter-related—88/100,000, 1/1600 during pregnancy. Pulmonary embolism is the seventh leading cause of maternal mortality, accounting for 9% of maternal deaths.

Predominant Age: Septic—childhood; aseptic—ages 20–30 years; superficial—older than 40 years. Average age for women: 58 years.

Genetics: Uncommon—antithrombin III, proteins C and S, and factor XII deficiencies (autosomal dominant with variable penetrance), factor V Leiden or prothrombin C-20210-a genes.

ETIOLOGY AND PATHOGENESIS

Causes: Sepsis (*Staphylococcus aureus* [65%–75%], multiple organisms [14%]), hypercoagulable states (congenital deficiencies, malignancy, pregnancy, high-dose oral contraceptives, Behçet syndrome, Buerger disease, factor V Leiden deficiency), venous stasis (varicose veins), injury to vessel wall. Septic thrombophlebitis may be caused by *Candida albicans* in unusual cases. (Virchow triad: intimal damage [trauma, infection, or inflammation], stasis, or changes in the blood constituents [changes in coagulability].)

Risk Factors: Trauma (general or vascular), prolonged immobility (hospitalization, prolonged air travel), advanced age, obesity, pregnancy or puerperium (higher in multiple gestations), recent surgery, intravascular catheters or drug abuse, steroid or high-dose estrogen therapy (high-dose oral contraceptives), body mass index (BMI) ≥30 kg/m^2, inflammatory bowel disease, high altitude, hemoglobinopathies, malignancy, nephrotic syndrome, urinary tract infection, homocystinuria, congenital abnormality or heritable thrombophilia.

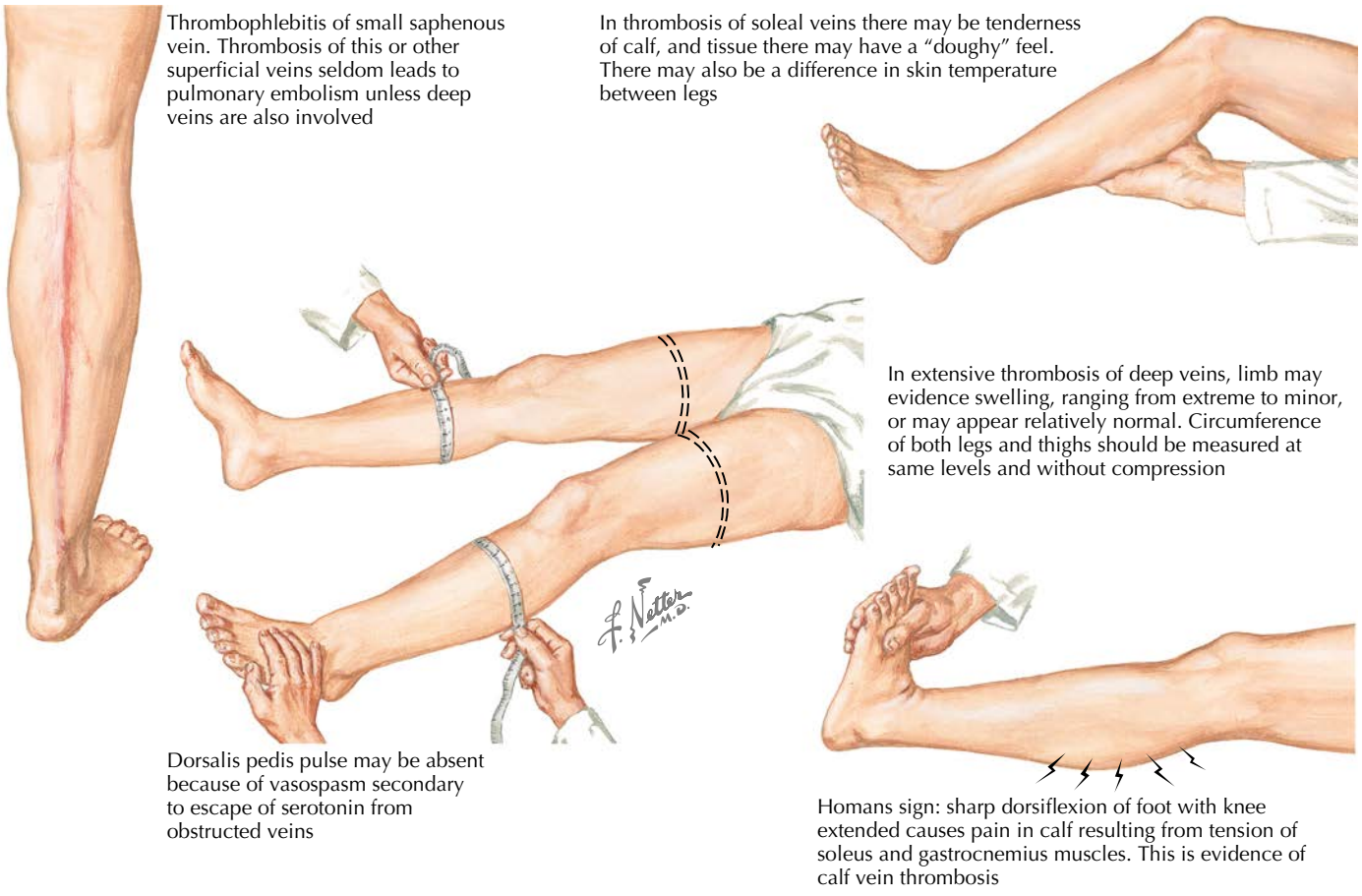

Figure 79.1 Clinical manifestations of leg vein thrombophlebitis

SIGNS AND SYMPTOMS

- Asymptomatic
- Generalized limb pain or swelling
- Swelling, tenderness, redness along the course of the vein
- Fever (70% of patients with septic thrombophlebitis)
- Warmth, erythema, tenderness, or lymphangitis (32%)
- Systemic sepsis (84% in suppurative cases)
- Red, tender cord
- Swelling of collateral veins

DIAGNOSTIC APPROACH

Differential Diagnosis

- Cellulitis
- Erythema nodosa
- Cutaneous polyarteritis nodosa
- Sarcoid
- Kaposi sarcoma
- Ruptured synovial cyst (Baker cyst)
- Lymphedema
- Muscle tear, sprain, strain
- Venous obstruction (secondary to tumor, lymph node enlargement)

Associated Conditions: Pulmonary embolism, Budd-Chiari syndrome (hepatic vein thrombosis), renal vein thrombosis, homocystinuria, hypercoagulability states (antiphospholipid antibody syndrome), Behçet syndrome, and varicose veins.

Workup and Evaluation

Laboratory: Complete blood count, blood culture (positive in 80%–90% of superficial cases), D-dimer assay, coagulation profiles (antithrombin III levels are suppressed during the acute event—evaluations for abnormal levels should await the completion of therapy), activated partial thromboplastin time (APTT), and prothrombin time (PT) to monitor anticoagulant therapy. For patients with septic thrombosis—periodic white blood cell counts.

Imaging: Contrast venography is the "gold standard" for diagnosis. Doppler studies of vascular flow may be effective for some deep vessels. Chest radiography or spiral computed tomography if embolism is suspected.

Special Tests: Impedance plethysmography, I^{125}-fibrinogen scans (not widely available and requires 41 hours), bone or gallium scans for associated periosteal sepsis, ventilation/perfusion scans of the lungs if an embolism is suspected. Duplex ultrasonographic evaluation is becoming the diagnostic study of choice to determine venous thrombosis. Magnetic resonance venography can detect both thigh and pelvic vein thrombosis with sensitivity of nearly 100% in nonpregnant patients.

Diagnostic Procedures: History, physical examination, imaging (duplex ultrasonography, magnetic resonance venography), or other diagnostic studies (impedance plethysmography, I^{125}-fibrinogen scans).

Pathologic Findings

Clot is attached to the vessel wall with variable degrees of inflammation present in the vessel wall. Enlargement of the vessel with thickening is common. Perivascular suppuration or hemorrhage may be seen.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: For superficial aseptic conditions—nonsteroidal antiinflammatory drugs, heat, compression, elevation, observation. For deep or septic thrombophlebitis—hospitalization, anticoagulation, bed rest for 1–5 days with progressive return to normal activity. Patients with deep vein thrombosis confined to the calf (distal to the popliteal system) may be managed as outpatients.

Specific Measures: Initially heparin anticoagulation, followed by oral maintenance therapy (warfarin) for 3–6 months for first episodes or 12 months for recurrent episodes. Filtering devices ("umbrellas") should be considered for those who cannot undergo anticoagulation therapy or those with evidence of emboli. Surgical excision of involved superficial veins (and tributaries) may be required.

Diet: No specific dietary changes indicated.

Activity: Initially bed rest for deep or extensive thrombosis with gradual return to activity in 1–5 days. No restriction once acute episode is resolved.

Patient Education: Patients who have had an episode of thrombosis should be instructed in risk reduction and warning signs that require re-evaluation.

Drug(s) of Choice

- Heparin 5000–10,000 U IV bolus, followed by 1000 U/hr IV (may also use bolus of 80 U/kg, followed by 18 U/kg/hr). Dosage must be titrated on the basis of APTT: target greater than two times control. Low molecular weight heparin (LMWH) also may be used.
- Maintenance with warfarin (Coumadin) starting at 1–5 days. Initial dosage of 5–10 mg PO daily, adjusted on the basis of PT: target >1.3–1.5 times control (international normalized ratio [INR] of 2.0–3.0). Intermittent subcutaneous heparin therapy with 15,000 U twice a day also may be used. The role of newer anticoagulants that do not require the level of monitoring of warfarin remains to be determined but is gaining clinical favor.
- Antibiotic therapy should be added for any patient suspected of sepsis (nafcillin 2 g IV every 6 hours; gentamicin 1–1.7 mg/kg IV).

Contraindications: Acute bleeding, recent neurosurgical procedure, known adverse reaction. Warfarin is contraindicated in pregnancy—these patients must continue heparin therapy. Relative contraindications—recent hemorrhage or surgery, peptic ulcer disease (severe), recent nonembolic stroke.

Precautions: Patients should continue to receive heparin until the target PT level is achieved. Heparin therapy may cause thrombocytopenia. IM injections should be avoided while patients are undergoing anticoagulant therapy. Warfarin therapy may be associated with necrotic skin lesions in a small number of patients (warfarin necrosis). Desogestrel-containing oral contraceptives are associated with a higher incidence of thromboembolism than other oral contraceptive formulations. This difference is small (20–30/100,000 vs. 10–15/100,000 for levonorgestrel and 4/100,000 for nonpregnant women).

Interactions: Agents that prolong or intensify the action of anticoagulants—alcohol, allopurinol, amiodarone, steroids, androgens, many antimicrobials, cimetidine, chloral hydrate, disulfiram, all nonsteroidal antiinflammatory agents, sulfinpyrazone, tamoxifen, thyroid hormone, vitamin E, ranitidine, salicylates. Agents, such as aminoglutethimide, antacids, barbiturates, carbamazepine, cholestyramine, diuretics, griseofulvin, rifampin, and oral contraceptives, reduce the efficacy of oral anticoagulants.

Alternative Drugs

- Thrombolytic agents (urokinase, streptokinase, tissue plasminogen activator) are effective in dissolving clots but remain investigational for the treatment of thrombosis.
- For mild superficial clots, nonsteroidal antiinflammatory agents may be used.

FOLLOW-UP

Patient Monitoring: Patients must be carefully monitored for embolization or further thrombosis. At the start of heparin therapy, the APTT must be monitored several times daily until the dose has been stabilized. The dose of warfarin must be monitored with periodic evaluation of the PT. Monitoring should be done daily until the target has been achieved, weekly for several weeks, and then monthly during maintenance therapy. Periodic checks should be made for hematuria and fecal occult blood.

Prevention/Avoidance: Avoid prolonged immobilization. Active prophylaxis (eg, for patients after surgery) using low-dose subcutaneous heparin, LMWH (enoxaparin), mechanical leg compression, and early ambulation. Changing IV sites every 48 hours reduces the risk of infection and inflammation.

Possible Complications: Pulmonary embolism (fatal in up to 20% of patients), phlegmasia cerulea dolens (rare). Hematuria or gastrointestinal bleeding may occur while patients are receiving anticoagulants. Any bleeding must be investigated and not presumed to be related to therapy; therapy may unmask an underlying condition such as cancer or ulcer disease. After thrombophlebitis, persistent pain and swelling of the limb may occur. Septic thrombophlebitis is associated with bacteremia (85%), septic emboli (45%), or abscess formation or pneumonia (45%).

Expected Outcome: Superficial thrombophlebitis and distal deep disease generally respond to prompt therapy with eventual resolution of symptoms. Up to 20% of proximal thrombosis may lead to embolization.

MISCELLANEOUS

Pregnancy Considerations: The use of warfarin is contraindicated. Patients who must undergo anticoagulant therapy should be administered heparin or LMWH (intermittent subcutaneous therapy). Pregnancy causes a 49-fold increase in the incidence of phlebitis. Risk is increased with increased maternal age, multiparity, multiple pregnancy, hypertension, and pre-eclampsia. The utility of D-dimer testing is limited by the natural increase during pregnancy and slow return to normal after delivery.

ICD-10-CM Codes: Based on the location and type.

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TOXIC SHOCK SYNDROME

80

INTRODUCTION

Description: Toxic shock syndrome (TSS) is caused by toxins produced by an often-asymptomatic infection with *Staphylococcus aureus* defined by sudden onset of shock, organ failure, and frequently death. Although most commonly associated with prolonged tampon use, approximately 50% of TSS cases are now associated with other conditions.

Prevalence: Observed in fewer than 1/100,000 women aged 15–44 years (last active surveillance was conducted in 1987—there are currently approximately 35 cases per month in the United States, and the proportion of cases not associated with menstruation now exceeds 50%).

Predominant Age: 30–60 years; nonmenstrual 65 years and older.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: *S. aureus* (or less frequently *Streptococcus pyogenes*) exotoxins (TSS toxin-1, enterotoxins A, B, and C). For toxic shock to develop, three conditions must be met: there must be colonization by the bacteria, it must produce toxins, and there must be a portal of entry for the toxin. Activation of T cells and massive cytokine cascades contribute to the development of shock or organ failure. The presence of foreign bodies, such as a tampon, is considered to reduce magnesium levels, which promotes the formation of toxins by the bacteria.

Risk Factors: Infection by *S. aureus* or *S. pyogenes* (also called group A *Streptococcus* or group A strep), use of super absorbency tampons, prolonged use of regular tampons, use of barrier contraceptive devices, nasal surgery, and postpartum and postoperative

staphylococcal wound infections (25% of cases). Chronic illness, diabetes mellitus, and alcohol abuse increase the risk on nonmenstrual TSS. Nonmenstrual TSS can arise in a number of settings, including mastitis, sinusitis, osteomyelitis, arthritis, burns, cutaneous and subcutaneous lesions (extremities, perianal area, and axillae), respiratory infections following influenza, and enterocolitis.

SIGNS AND SYMPTOMS

- Most common—rapid onset of fever of >38.9°C (102°F), hypotension (BP <90 mm Hg), diffuse rash (commonly absent in places where clothing presses tightly against the skin). Once initial symptoms occur, hypotension generally develops within 24–48 hours. Hypotension may progress to severe and intractable hypotension and multisystem dysfunction. Case fatality rates in nonmenstrual TSS are approximately 5%.
- Other typical findings—agitation; arthralgias; confusion; diarrhea; erythema of pharynx, vulva, or vagina; conjunctival hyperemia; headache; myalgias; nausea; vomiting.
- Desquamation, particularly on palms and soles, can occur 1–2 weeks after the onset of the illness.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Other exanthems (acute rheumatic fever, bullous impetigo, drug reaction, erythema multiforme, Kawasaki disease, leptospirosis, meningococcemia, Rocky Mountain spotted fever, rubella, rubeola, scarlet fever, viral disease)
- Gastrointestinal illness (appendicitis, dysentery, gastroenteritis, pancreatitis, staphylococcal food poisoning)
- Acute pyelonephritis
- Hemolytic uremic syndrome

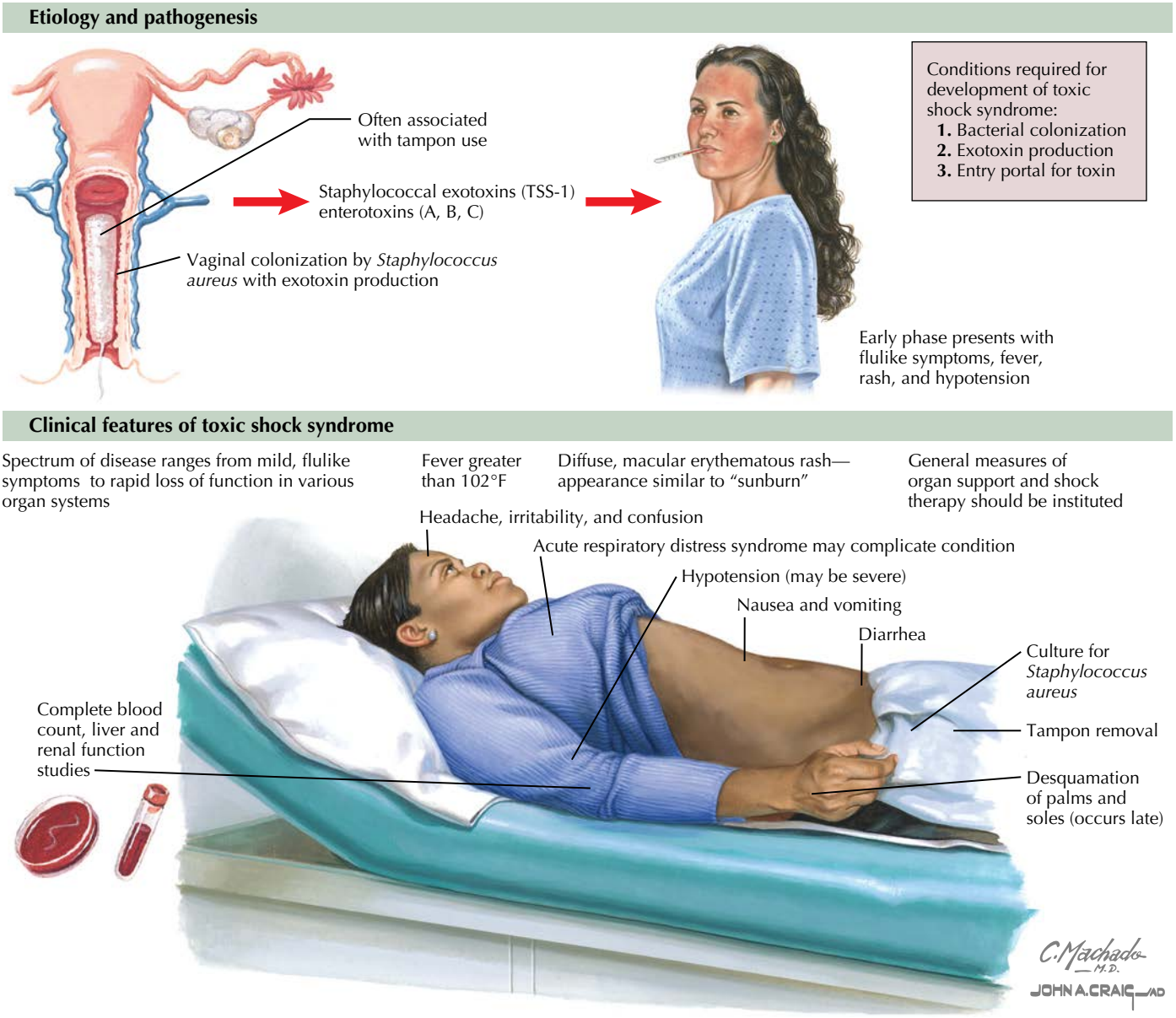

Figure 80.1 Etiology, pathogenesis, and clinical features of toxic shock syndrome

Box 80.1 Characteristics That Define Toxic Shock Syndrome

- Fever >38.9°C (102°F)
- Diffuse, macular, erythematous rash
- Desquamation of palms and soles 1–2 weeks after onset
- Hypotension (<90 torr systolic or orthostatic change)
- Negative blood, pharyngeal, and cerebrospinal fluid culture
- Negative serologic tests for measles, leptospirosis, Rocky Mountain spotted fever
- Three or more of the following organ systems:
  - Cardiopulmonary (respiratory distress, pulmonary edema, heart block, myocarditis)
  - Central nervous (disorientation or altered sensorium)
  - Gastrointestinal (vomiting, diarrhea)
  - Hematologic (thrombocytopenia of ≤100,000/mm^3)
  - Hepatic (>2-fold elevation of total bilirubin or liver enzymes, serum albumin >2 g/dL)
- Mucous membrane inflammation (vaginal, oropharyngeal, conjunctival)
- Musculoskeletal (myalgia, >2-fold elevation of creatine phosphokinase)
- Renal (pyuria, >2-fold elevation of blood urea nitrogen or creatinine)

- Legionnaires disease
- Meningococcemia
- Pelvic inflammatory disease (PID)
- Reye syndrome
- Rocky Mountain spotted fever
- Rhabdomyolysis
- Septic shock
- Stevens-Johnson syndrome
- Systemic lupus erythematosus
- Tick typhus

Associated Conditions: Other sources—surgical wounds (including dilation and curettage), nonsurgical focal infections, cellulitis, subcutaneous abscesses, mastitis, infected insect bites, postpartum (including transmission to the neonate), nonmenstrual vaginal conditions, vaginal infection, PID, steroid cream use. Even the use of laminaria to dilate the cervix has been reported to be associated with rare cases.

Workup and Evaluation

Laboratory: Blood or tissue cultures, complete blood count, liver and renal function studies. Leukocytosis may not be present; thrombocytopenia and anemia are present early. Culture of *S. aureus* is not required to establish the diagnosis; blood cultures are positive in only about 5% of cases, tissue cultures are positive in 80%–90% of cases.
Imaging: No imaging indicated.
Special Tests: None indicated.
Diagnostic Procedures: History and physical findings (Box 80.1).

Pathologic Findings

Lymphocyte depletion, subepidermic cleavage planes, cervical or vaginal ulcers

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Rapid evaluation and supportive intervention. Aggressive support and treatment of the attendant shock are paramount (frank shock is common by the time the patient is first seen for care).
Specific Measures: The site of infection must be identified and drained, most commonly by removing the contaminated tampon, vaginal sponges, or nasal packing. Antibiotic therapy with a β-lactamase-resistant antistaphylococcal agent should be initiated, but it may not alter the initial course of the illness. Other supportive measures (eg, mechanical ventilation, pressor agents) as required.
Diet: As tolerated and dictated by the patient's clinical status during the acute phase.
Activity: Bed rest during initial diagnosis and therapy.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Barrier Methods of Birth Control: Diaphragm, Sponge, Cervical Cap, and Condom, 2018
- Heavy Menstrual Bleeding, 2021
- Your First Period - Especially for Teens, 2018
- Your Changing Body - Especially for Teens, 2018

Drug(s) of Choice

- Clindamycin 900 mg IV every 8 hours **plus** a loading dose of vancomycin 20–35 mg/kg (not to exceed 3 g) followed by 15–20 mg/kg every 8–12 hours **plus** one of the following:
- Piperacillin-tazobactam 4.5 g IV every 6 hours or cefepime 2 g IV every 8 hours or a carbapenem (meropenem 1 g IV every 8 hours or imipenem 1 g IV every 6–8 hours)

Contraindications: Known or suspected allergy.
Precautions: The dose of oxacillin must be reduced if renal failure is present.
Interactions: See individual agents.

Alternative Drugs

- Oxacillin or nafcillin 100 mg/kg daily given in divided doses every 4–6 hours **plus** clindamycin (if susceptible) 900 mg IV every 8 hours.

FOLLOW-UP

Patient Monitoring: Intense monitoring is required during the initial phase of treatment. After resolution, normal health should be maintained.
Prevention/Avoidance: Frequent change of tampons. Use of sanitary pads at night. Although the risk of recurrence is low (10%–15%), patients who have had menstrual TSS should refrain from the use of tampons in the future.
Possible Complications: Acute respiratory distress syndrome is a common sequela of TSS, and patients must be monitored for the development of this complication. Acute renal failure, alopecia, and nail loss may also occur. Mortality from menstrual-related TSS is <2%; nonmenstrual TSS is roughly 6%.
Expected Outcome: Although the prognosis for patients with TSS is generally good, mortality rates of 5%–10% are common.

MISCELLANEOUS

Pregnancy Considerations: Uncommon during pregnancy. May occur postpartum as a complication of operative delivery, endometritis, episiotomy infection, or nursing.
ICD-10-CM Codes: A48.8 (Other specified bacterial diseases).

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81 ULCERATIVE COLITIS

INTRODUCTION

Description: Ulcerative colitis is an inflammatory bowel disease that is characterized by inflammation limited to the mucosa of the large bowel and is primarily found in the descending colon and rectum (although the entire colon may be involved). The disease is also characterized by intermittent bouts of symptoms interspersed by periods of quiescence.

Prevalence: About 1 million people in the United States are affected. The annual incidence is 10.4–12 cases per 100,000 people; the prevalence rate is 35–100 cases per 100,000. Ulcerative colitis is three times more common than Crohn disease.

Predominant Age: 20–50 years; 20% of patients are younger than 21 years. The disease usually starts between the ages of 15 and 30 years and less frequently between the ages of 50 and 70 years.

Genetics: Family history presents in up to 20% (ulcerative colitis or Crohn disease). More common in some ethnic groups (eg, Ashkenazi Jewish).

ETIOLOGY AND PATHOGENESIS

Causes: An inflammatory process limited to the mucosa of the large bowel and primarily found in the descending colon and rectum, although the entire colon may be involved. Genetic, infectious, immunologic, and psychologic factors have been postulated to underlie the process.

Risk Factors: Family history. Negatively related to smoking.

SIGNS AND SYMPTOMS

- Abdominal pain (generally mild to moderate; the pain is frequently relieved by a bowel movement, but many report the sensation of incomplete evacuation) and tenesmus
- Diarrhea (voluminous, watery, with occasional blood)
- Fever and weight loss
- Arthralgias and arthritis (15%–20%)
- Aphthous ulcers of the mouth (5%–10%)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Irritable bowel syndrome (IBS; ulcerative colitis may be differentiated from IBS by the frequent presence of fever or bloody stools in ulcerative colitis)
- Crohn disease
- Hemorrhoids
- Colon carcinoma
- Diverticulitis
- Infectious diarrhea (*Escherichia coli, Salmonella, Shigella, Entamoeba histolytica)*
- Iatrogenic (antibiotic associated, laxative abuse, excessive sucralose ingestion)
- Radiation proctitis/colitis

Associated Conditions: Ocular complications (uveitis, cataracts, keratopathy, corneal ulceration, retinopathy; 4%–10% of patients), liver and biliary complications (cirrhosis, 1%–5%; sclerosing cholangitis, 1%–4%; bile-duct carcinoma), anemia, ankylosing spondylitis, and osteoporosis.

Workup and Evaluation

Laboratory: No specific evaluation indicated. Complete blood count to evaluate blood loss or inflammation. Stool studies: *Clostridioides difficile* toxin, stool cultures (*Salmonella, Shigella, Campylobacter, Yersinia*), and specific testing for *E. coli* O157:H7, microscopy for ova and parasites, *Giardia* stool antigen test if the patient has recently traveled to endemic areas. Albumin and potassium levels may be reduced, or liver function test results may be elevated.

Imaging: Barium enema (air contrast)—not required for the diagnosis.

Special Tests: Sigmoidoscopy, colonoscopy, or rectal biopsy.

Diagnostic Procedures: History, sigmoidoscopy, barium enema, or rectal biopsy.

Pathologic Findings

Superficial inflammation with ulceration is common. Hyperemia and hemorrhage are also common. The rectum is involved in 95% of cases, but the inflammation extends proximally in a continuous manner, at times even involving the terminal ileum.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and control of inflammation, prevention of complications, maintenance of nutrition (including adequate iron intake).

Specific Measures: Severe exacerbations may require hospitalization. Patients whose disease is refractory to medical therapy may require surgical resection (between 25% and 40% of patients with ulcerative colitis eventually undergo colectomy because of massive bleeding, severe illness, rupture of the colon, or risk of cancer).

Diet: No specific dietary changes indicated except for those based on other indications (eg, lactose intolerance).

Activity: No restriction.

Drug(s) of Choice

- Mesalamine (5-aminosalicylic acid derivative) suppository, foam, or enema. May be given PO, 2–3 g daily.
- Sulfasalazine 1–4 g PO daily (useful for both mild flare-ups and chronic suppression; approximately 10% of patients require chronic suppressive therapy).
- Steroid enemas (hydrocortisone) or mesalamine (enemas or suppositories).
- Prednisone 40–60 mg PO daily for flare-ups (tapered off over 2 months).

Contraindications: Known or suspected allergy or intolerance. Women using ozanimod should avoid pregnancy during and for 3 months after treatment.

Precautions: Antidiarrheal agents may precipitate toxic megacolon.

Interactions: See individual agents.

Alternative Drugs

- Azathioprine and 6-mercaptopurine (6-MP) may be administered to patients who have not responded to 5-ASAs or corticosteroids or who are dependent on corticosteroids.
- Other oral 5-ASA derivatives are being studied. Antidiarrheal agents (diphenoxylate-atropine and loperamide) may be used but may precipitate toxic megacolon.
- Sphingosine 1-phosphate receptor modulator (ozanimod [Zeposia]) and human interleukin-12 (IL-12) and IL-23 antagonist (ustekinumab [Stelara]) therapies have been introduced, but cost and side effects limit their use to selected (refractory) patients.

FOLLOW-UP

Patient Monitoring: Normal health maintenance, periodic follow-up to monitor status of the disease and possible complications. Colonoscopy should be performed every 1–2 years beginning at 7–8 years after the onset of the disease to observe for the

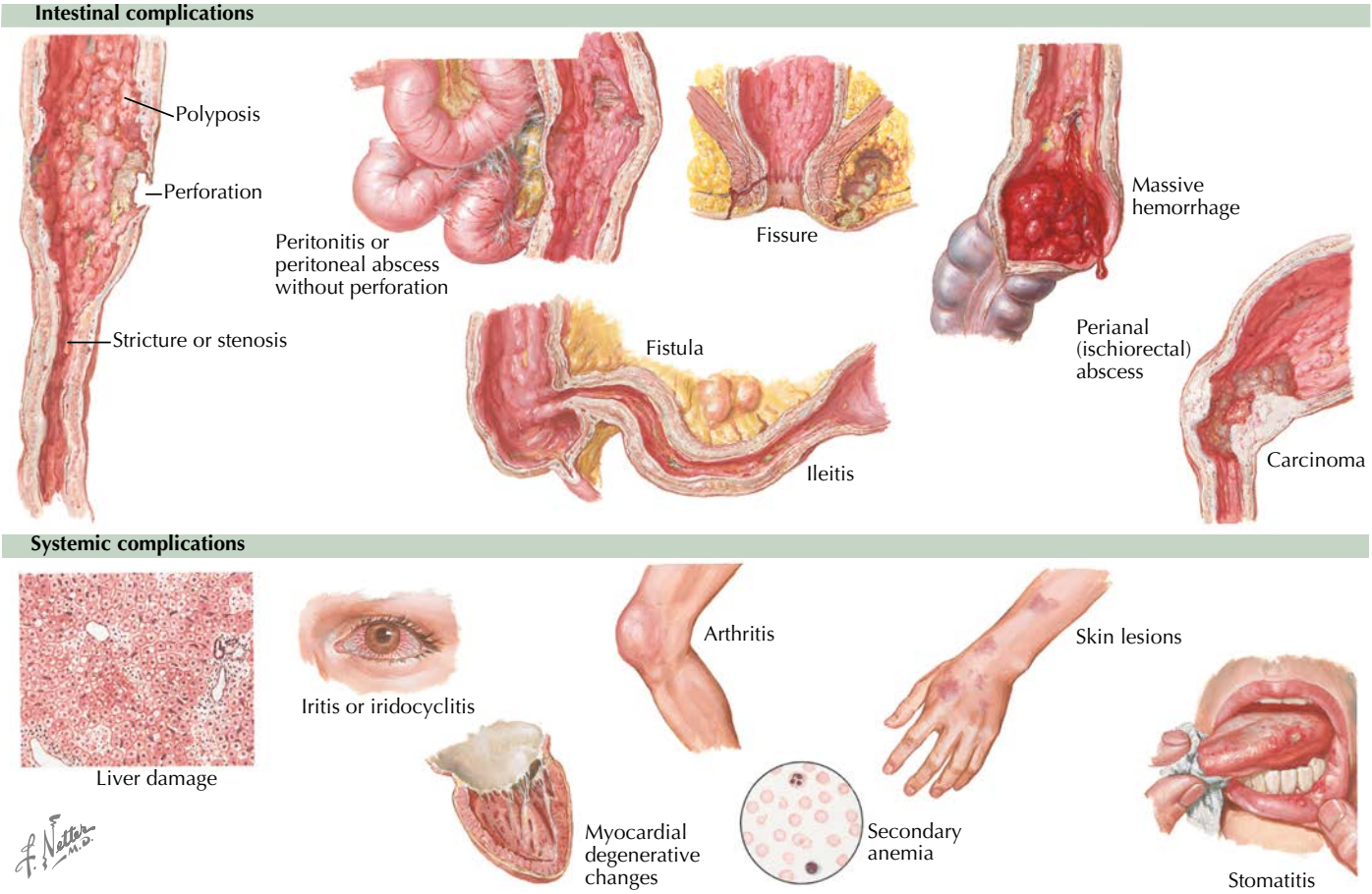

Figure 81.1 Intestinal and systemic complications in ulcerative colitis

possible development of cancer. Annual testing of liver function is desirable.

Prevention/Avoidance: None (prevention of complications as previously mentioned).

Possible Complications: Bleeding can be severe in up to 10% of patients. Perforation, toxic megacolon, hepatic disease, bowel stricture and obstruction, colon cancer (30% after 25 years, less for left-sided disease). Mortality for initial attack is approximately 5%.

Expected Outcome: Highly variable; 75%–85% of patients experience relapse, 20%–30% require colectomy, and extension of disease is observed in up to 20% within 5 years. The risk for colon cancer is the greatest factor that affects long-term prognosis and management.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. Of patients with inactive disease, 30% have relapses during pregnancy, with 15% having them in the first trimester. Treatment with sulfasalazine does not affect pregnancy outcome. It is recommended that pregnancy be delayed until the disease is in remission.

ICD-10-CM Codes: K51.90 (Ulcerative colitis, unspecified, without complications).

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82 URINARY INCONTINENCE: BYPASS AND OVERFLOW

INTRODUCTION

Description: Urinary incontinence is a sign, symptom, and disease all at the same time. Bypass incontinence is continuous incontinence that occurs when normal continence mechanism is bypassed, as with fistulae. Symptoms may be intermittent or continuous, making the establishment of a diagnosis difficult in some patients. Overflow incontinence is the continuous or intermittent insensible loss of small volumes of urine, resulting from an overfilled or atonic bladder.

Prevalence: Of all women who have hysterectomies, 0.05% develop a fistula and subsequent bypass incontinence (up to 10% after radical hysterectomy). Overflow incontinence is uncommon and generally develops after trauma, instrumentation, surgery, or anesthesia.

Predominant Age: Mid-reproductive age and older. Overflow incontinence is more common in later years.

Genetics: No genetic pattern.

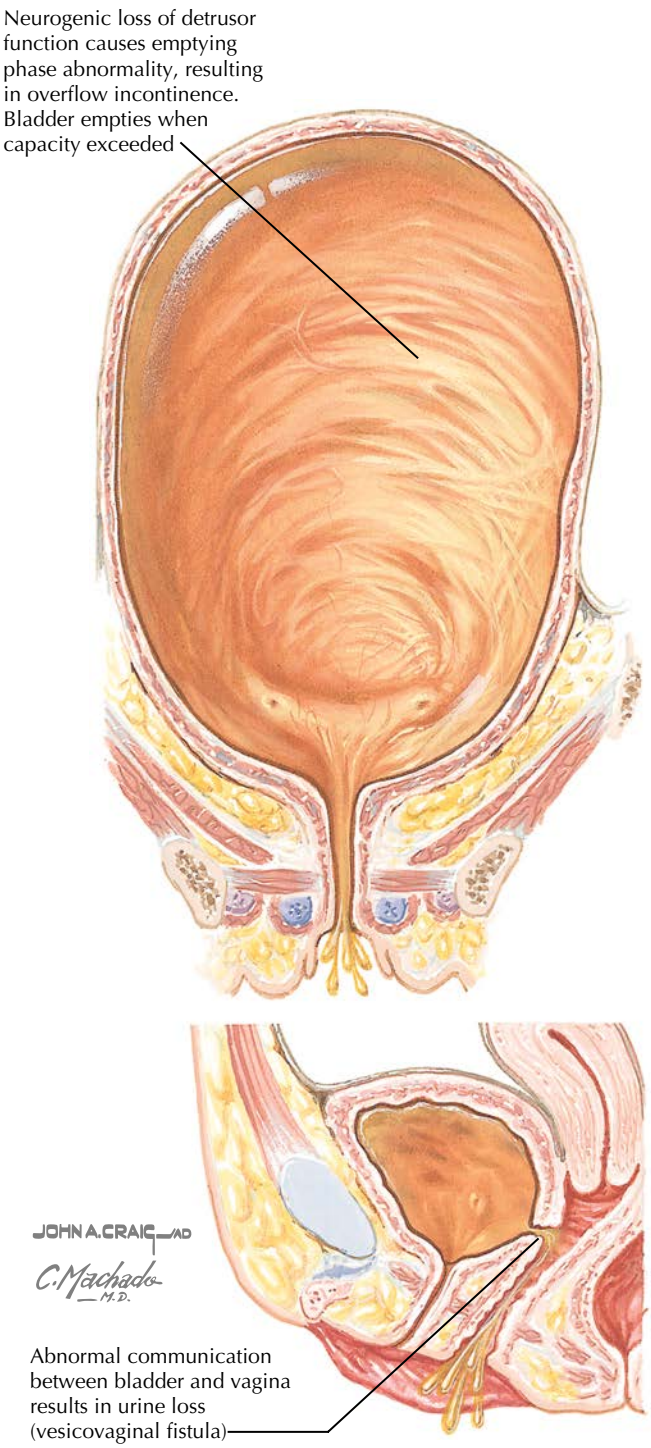

Figure 82.1 Bypass and overflow in urinary incontinence

ETIOLOGY AND PATHOGENESIS

Causes: Bypass incontinence—fistulae may result from surgical or obstetric trauma (in the developing world), irradiation, or malignancy, although the most common cause by far (in developed countries) is unrecognized surgical trauma (obstructed labor in other parts of the world). Approximately 75% of fistulae occur after abdominal hysterectomy. Signs of a urinary fistula (watery discharge) usually occur from 5 to 30 days after surgery, although they may be present in the immediate postoperative period. Erosion of surgically placed mesh may not occur until a month after surgery.

Overflow incontinence—trauma (vulvar, perineal, radical pelvic surgery), irritation/infection (chronic cystitis, herpetic vulvitis, herpes zoster), anesthesia (spinal, epidural, caudal), pressure (uterine leiomyomata, pregnancy), anatomic defect (cystocele, retroversion, or prolapse of the uterus, overcorrection of the urethra from surgery), neurologic disorder (multiple sclerosis, diabetes, spinal cord tumors, herniated disc, stroke, amyloid disease, pernicious anemia, Guillain-Barré syndrome, neurosyphilis, alcoholism), systemic disease (diabetes mellitus, hypothyroidism, uremia), medications (antihistamines, appetite suppressants, β-adrenergic agents, parasympathetic blockers, vincristine, carbamazepine), radiotherapy, behavioral problems (psychogenic, infrequent voiding).

Risk Factors: Bypass incontinence—surgery or radiation treatment. Most common after uncomplicated hysterectomy, although pelvic adhesive disease, endometriosis, or pelvic tumors increase the individual risk. Overflow incontinence—none known other than causes previously listed.

SIGNS AND SYMPTOMS

Bypass Incontinence

- Continuous loss of urine (often from the vagina or rectum).
- Fistulae from the vagina to the bladder (vesicovaginal), urethra (urethrovaginal), or ureter (ureterovaginal). Rarely, communication between the bladder and uterus (vesicouterine) may also occur through the same mechanisms. Multiple fistulae are present in up to 15% of patients.

Overflow Incontinence

- Frequent loss of small volumes of urine (may or may not be related to increases in intraabdominal pressure)
- Hesitancy, frequency, and nocturia
- Midline lower abdominal mass (with or without tenderness) that disappears with catheterization
- Ability for spontaneous voiding may or may not be compromised

DIAGNOSTIC APPROACH

Differential Diagnosis

Bypass Incontinence

- Overflow incontinence
- Urge incontinence
- Ectopic ureter

Overflow Incontinence

- Other forms of incontinence (stress, bypass/fistula)
- Chronic urinary tract infections
- Urinary tract obstruction
- Neurologic conditions presenting as an adynamic bladder

Associated Conditions: Vulvitis, vaginitis.

Workup and Evaluation

- **Laboratory:** No evaluation indicated. Urinalysis is generally recommended, although results are nonspecific. Abrupt-onset incontinence in older patients should suggest infection, which may be confirmed through urinalysis or culture.
- **Imaging:** Ureterovaginal fistulae should be evaluated by excretory urography (intravenous pyelogram [IVP]) to evaluate possible ureteral dilation or obstruction (emerging data suggest that magnetic resonance imaging [MRI] may be more sensitive than IVP or computed tomography [CT]). Retrograde urography, with the passage of ureteral stents, also may be required.

Ultrasonography demonstrates a distended bladder in patients with overflow incontinence.

- **Special Tests:** If a vesicovaginal fistula is found, cystoscopy is required to determine the location of the fistula in relation to the ureteral opening and bladder trigone. For those with overflow incontinence that is either recurrent or unrelated to an obvious cause, urodynamics testing (including a cystometrogram and postvoid residual) should be considered.
- **Diagnostic Procedures:** When a fistula is suspected, the installation of a dilute solution of methylene blue (or sterile milk) into the bladder while a tampon is in place in the vagina documents a vesicovaginal fistula. A ureterovaginal fistula may be documented in a similar fashion using intravenous indigo carmine. For patients with overflow incontinence, physical examination and catheter drainage of the bladder are diagnostic. Urodynamics testing (cystometrogram) generally confirms the diagnosis.

Pathologic Findings

Based on the cause. A distended, often hypotonic bladder is typical of patients with overflow incontinence.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Bypass incontinence—urinary diversion, protection of the vulva from continuous moisture (zinc oxide, diaper rash preparations). Overflow incontinence—treatment of urinary tract infection (if present), evaluate for the presence of a medication that inhibits detrusor tone or activity.

Specific Measures: Bypass incontinence—vesicovaginal fistulae that occur in the immediate postoperative period should be treated by large-caliber transurethral catheter drainage. Spontaneous healing is evident within 2–4 weeks. Similarly, in patients with a ureterovaginal fistula, prompt placement of a ureteral stent, left in place for 2 weeks, enables spontaneous healing for approximately 25% of patients. Surgical repair of genitourinary fistulae is generally delayed by 2–4 months to allow complete healing of the original insult. In all cases, successful surgical repair comprises meticulous dissection of the fistulous tract and careful reapproximation of tissues. Overflow incontinence—prompt and continuous drainage if retention is present, timed voiding to reduce bladder volume, suprapubic pressure or Credé maneuver to reduce residual volume. Intermittent self-catheterization may be necessary. Sacral nerve stimulation may be beneficial for patients with idiopathic or neurogenic underactivity.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Urinary Incontinence, 2020

Drug(s) of Choice

- Bypass incontinence—none.
- Overflow incontinence—pharmacologic therapy for these patients is often unsatisfactory, and many require long-term catheter drainage or intermittent self-catheterization to manage their problem.
- Urinary tract antibiotics if infection is present.
- Acetylcholine-like drugs—bethanechol chloride (Urecholine) 10–50 mg three to four times per day; also may be given as 2.5–5 mg SC. This treatment has shown limited efficacy in nonobstructed chronic urinary retention.

Contraindications: Overflow incontinence—Hyperthyroidism, peptic ulcer, latent or active bronchial asthma, pronounced bradycardia or hypotension, vasomotor instability, coronary artery disease, epilepsy, or parkinsonism.

Precautions: Overflow incontinence—it is preferred that bethanechol be administered when the stomach is empty (1 hour before or 2 hours after meals). The sterile solution must not be administered IM or IV. Bethanechol should not be administered if the integrity of either the bladder wall or gastrointestinal tract is in question or may be mechanically obstructed.

Interactions: Overflow incontinence—bethanechol should be used with extreme care in patients receiving ganglion-blocking compounds.

Alternate Therapies: Overflow incontinence—intermittent self-catheterization, electrical stimulation, reduction cystoplasty, urinary diversion (suprapubic catheter).

FOLLOW-UP

Patient Monitoring: Normal health maintenance. Patients are at increased risk for urinary tract infections, vaginitis, and vulvitis. Patients who have experienced overflow incontinence have an increased risk of recurrence.

Prevention/Avoidance: Careful surgical technique should be used to reduce the risk of fistula formation. Surveillance in situations that predispose patients to retention (eg, after regional anesthesia, childbirth).

Possible Complications: Social isolation and vulvar and perineal irritation are common complications of any type of urinary incontinence. Ascending urinary tract infection (including pyelonephritis) may occur if a fistula or bladder distention is present.

Expected Outcome: Recurrence after surgical repair of a fistula is common, especially in patients who have undergone radiotherapy for malignancies. For patients with time-limited causes for overflow incontinence, a complete resolution with drainage should be expected. For patients with idiopathic retention or retention caused by chronic causation, frequent recurrence, possible dependence on self-catheterization, urinary diversion, and electrical stimulation are possible.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy, although pregnancy (and vaginal delivery) increases the risk of urinary retention and overflow incontinence. Obstructed labor is a major cause of vesicovaginal fistula in developing countries.

ICD-10-CM Codes: Bypass incontinence—R32 (Unspecified urinary incontinence) and N39.45 (Continuous leakage). Overflow incontinence—N39.498 (Other specified urinary incontinence) and R39.14 (Feeling of incomplete bladder emptying), R39.42 (Without sensory awareness).

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URINARY INCONTINENCE: STRESS

83

INTRODUCTION

Description: Urinary incontinence is a sign, symptom, and disease all at the same time. Stress incontinence is almost exclusively limited to women and is the passive loss of urine in response to increased intraabdominal pressure, such as that caused by coughing, laughing, or sneezing, in the absence of bladder contraction. The volume of urine lost is generally proportional to the amount of pressure involved.

Prevalence: Stress incontinence affects 10%–15% of all women and 30%–60% of women after menopause.

Predominant Age: Mid-reproductive age and older. Stress incontinence becomes more common during the 40s and beyond and is most common after menopause.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Unequal transmission of intraabdominal pressure to the bladder and urethra. Generally associated with an anatomic defect such as a cystocele, urethrocele, or cystourethrocele. The degree of incontinence is often not correlated with the scale of pelvic relaxation. Intrinsic sphincteric deficiency can also lead to stress incontinence.

Risk Factors: Multiparity, mode of delivery, obesity, smoking, chronic cough, heavy lifting, intrinsic tissue weakness, or atrophic changes resulting from estrogen loss.

SIGNS AND SYMPTOMS

- Loss of small spurts of urine in association with transient increases in intraabdominal pressure
- Associated cystocele, urethrocele, or cystourethrocele

DIAGNOSTIC APPROACH

Differential Diagnosis

- Mixed incontinence (stress and urge)
- Urge incontinence (detrusor instability)
- Intrinsic sphincter defect (ISD)
- Low pressure urethra
- Urinary tract fistula
- Urinary tract infection
- Urethral diverticulum
- Overflow incontinence

Associated Conditions: Vulvitis, vaginitis, pelvic relaxation, uterine prolapse, other hernias, recurrent urinary tract infection.

Workup and Evaluation

Laboratory: No evaluation indicated. Urinalysis is generally recommended, although results are nonspecific. Abrupt-onset incontinence in older patients should suggest infection, which may be confirmed through urinalysis or culture.

Imaging: Radiographic studies are sometimes performed as a part of complex urodynamics studies but are generally of limited utility.

Special Tests: A "Q-tip test" is historically recommended, although it as a poor predictive value—a cotton-tipped applicator dipped in 2% lidocaine (Xylocaine) is placed in the urethra, and anterior rotation with straining is measured. Greater than 30 degrees is abnormal. An evaluation of urinary function is advisable, especially if surgical therapy is being considered. In the past, the functional significance of a cystourethrocele was gauged by elevating the bladder neck (using fingers or an instrument) and asking the patient to strain (referred to as a Bonney or Marshall-Marchetti

test). This test has fallen out of favor because it is nonspecific and unreliable.

Diagnostic Procedures: The best method to confirm stress incontinence is by pelvic examination—loss is best demonstrated by having the patient strain or cough while the vaginal opening is observed (preferably while the patient is standing). Urodynamics testing (simple or complex) may be used to evaluate other possible causes of incontinence. Presurgical urodynamics testing is not necessary if the postvoid residual urine volume is <150 mL, there is a negative urinalysis result, a positive cough stress test result, and no pelvic organ prolapse beyond the hymen.

Pathologic Findings

Based on the cause. Evidence of a loss of support for the urethra and/or bladder is generally apparent on physical examination in patients with stress urinary incontinence.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Weight reduction, treatment of chronic cough (if present), smoking cessation, timed voiding, topical or systemic estrogen replacement or therapy as indicated (rendered controversial by the Women's Health Initiative [WHI] study).

Specific Measures: Pessary therapy, pelvic muscle exercises (Kegel exercises; can be supplemented by the use of weighted vaginal cones), collagen injections (for ISD), surgical repair. Limited role for medical therapy. Chronic exposure to urine-soaked pads can result in contact dermatitis and skin breakdown.

Diet: No specific dietary changes indicated.

Activity: No restriction, although some reduction in heavy lifting may be prudent.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Pelvic Support Problems, 2020
- Surgery for Urinary Incontinence, 2021
- Urinary Incontinence, 2020

Drug(s) of Choice

- Duloxetine, a potent and relatively balanced serotonin and noradrenaline reuptake inhibitor, has been evaluated in phase II and III clinical trials and was found to be efficacious and safe in treating women with moderate to severe stress urinary incontinence symptoms. Adverse events associated with this medication limits its utility.
- Estrogen, either topically or systemically, is often prescribed to improve tissue tone, reduce irritation, and prepare tissues for surgical or pessary therapy.

Contraindications: Known or suspected sensitivity to medication, undiagnosed vaginal bleeding, breast cancer.

Precautions: Patients treated with angiotensin-converting enzyme inhibitors may develop a cough as a side effect of the medication, worsening incontinence symptoms and accelerating the appearance or worsening of a cystourethrocele.

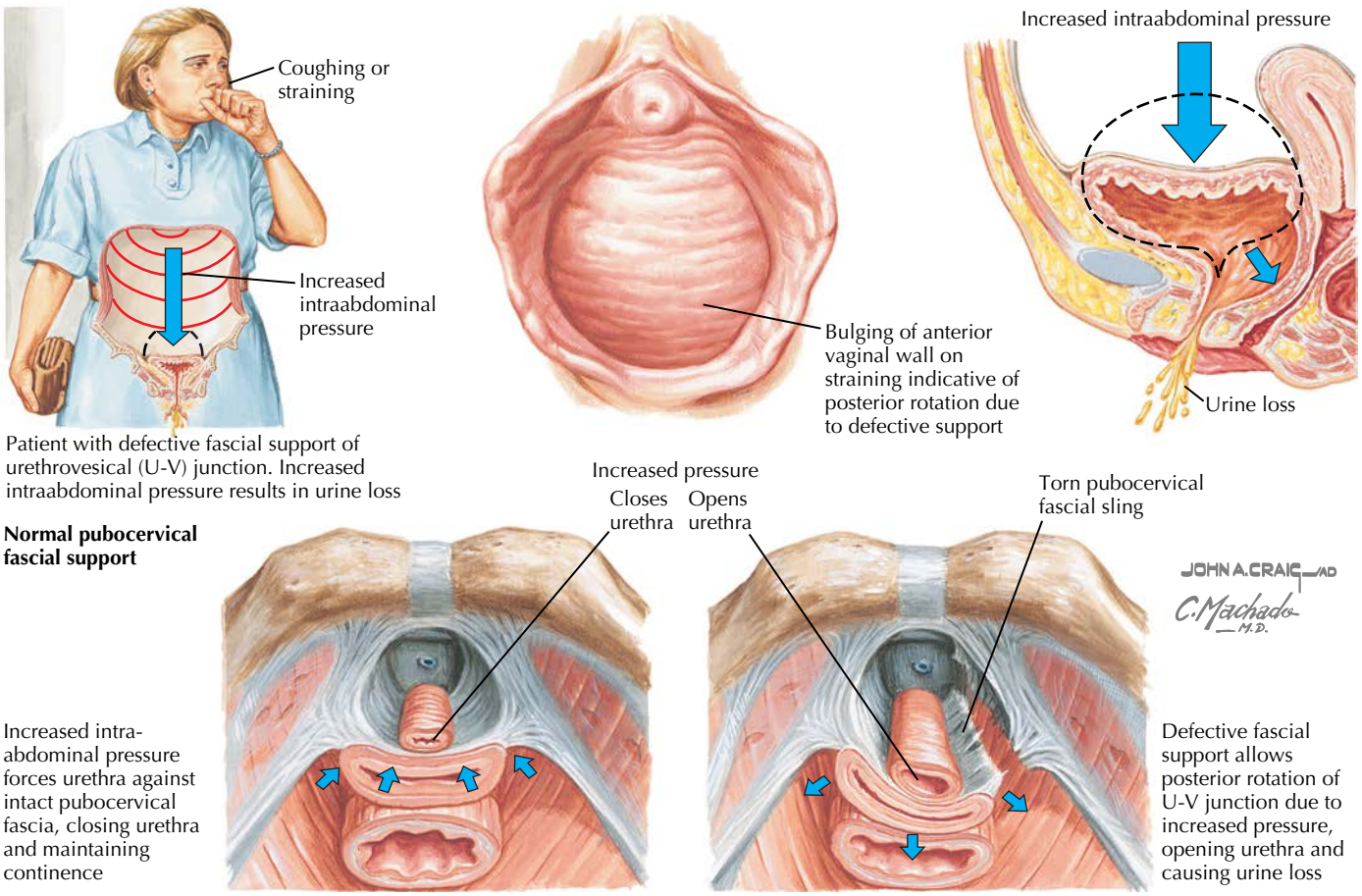

Figure 83.1 Stress incontinence in women

Interactions: See individual agents.
Alternate Therapies: None at this time.

FOLLOW-UP

Patient Monitoring: Normal health maintenance. Patients are at an increased risk for urinary tract infections, vaginitis, and vulvitis.
Prevention/Avoidance: The role of elective cesarean delivery in reducing pelvic floor trauma has been debated, but there are data to suggest that nerve damage in the pelvic floor may occur late in pregnancy without the trauma of vaginal delivery, resulting in an increased risk of eventual stress incontinence even with cesarean delivery.
Possible Complications: Social isolation and vulvar and perineal irritation are common complications of any type of urinary incontinence.
Expected Outcome: Generally favorable results may be obtained for patients with symptoms of stress incontinence through the use of a carefully selected and fitted pessary. Surgical therapy is associated with 40%–95% success in long-term correction of the anatomic defect and the associated symptoms (success rates vary on the basis of the type of procedure performed and duration of follow-up).

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy, although pregnancy (and vaginal delivery) may contribute to a worsening of pelvic support problems.
ICD-10-CM Codes: N39.3 (Stress incontinence [female]).

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84 URINARY INCONTINENCE: URGE

INTRODUCTION

Description: Urinary incontinence is a sign, symptom, and disease all at the same time. Urge incontinence is the involuntary loss of urine accompanied by a sense of urgency or impending loss and is associated with increased bladder activity.
Prevalence: Urge incontinence accounts for 35% of patients with incontinence.
Predominant Age: Mid-reproductive age and older. Urge incontinence becomes more common during the 40s and beyond and is most common after menopause.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Allergy, bladder stone, bladder tumor, caffeinism, central nervous system tumors, detrusor muscle instability, interstitial cystitis, multiple sclerosis, Parkinson disease, radiation cystitis, radical pelvic surgery, spinal cord injury, urinary tract infections (urinary tract infections [UTIs]; acute or chronic).
Risk Factors: Frequent UTIs.

SIGNS AND SYMPTOMS

- Reduced bladder capacity and early, intense sensations of bladder fullness
- Spontaneous and uninhibitable contractions of the bladder muscles, resulting in large-volume, uncontrolled urine loss
- Loss possibly provoked by activities such as hand washing or a change in position or posture or after (not during) changes in intraabdominal pressure such as a cough or sneeze

DIAGNOSTIC APPROACH

Differential Diagnosis

- Mixed incontinence (stress and urge)
- Stress incontinence
- UTIs
- Urinary tract fistula
- Interstitial cystitis
- Urethritis

Associated Conditions: Vulvitis, vaginitis, nocturia, enuresis (bed wetting).

Workup and Evaluation

Laboratory: Urinalysis is generally recommended, although results are nonspecific. Abrupt onset of incontinence in older patients should suggest infection, which may be confirmed through urinalysis or culture.
Imaging: Radiographic studies are sometimes performed as a part of complex urodynamics studies but are generally of limited utility.
Special Tests: Measurement of postvoid urinary residual volume.
Diagnostic Procedures: History and physical examinations, urodynamics testing (simple or complex), and evaluation of sphincter tone and function (as an indication of neurologic function) are the best methods to establish the diagnosis of urge incontinence.

Pathologic Findings

Based on the cause. Patients with urge incontinence have a reduced bladder capacity, early first sensation, and uninhibited bladder contractions.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Treatment of any UTI present, timed voiding (bladder training), smoking cessation.
Specific Measures: Medical therapy. Limited role for surgical repair.
Diet: No specific dietary changes indicated. Reduction in caffeine consumption and other bladder irritants may help some patients with symptoms of urgency incontinence.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- Urinary Incontinence, 2020

Drug(s) of Choice

Antimuscarinic agents are available, including darifenacin, fesoterodine, oxybutynin, solifenacin, tolterodine, and trospium:
- Darifenacin (Enablex) 7.5 mg PO daily (blocks the M3 muscarinic acetylcholine receptor, which is primarily responsible for bladder muscle contractions).
- Fesoterodine (Toviaz) 4 mg once daily; may be increased to a maximum dose of 8 mg once daily.
- Oxybutynin hydrochloride (Ditropan) 5–10 mg PO three to four times a day. Side effects are common (75%), although the patch tends to have fewer side effects (60%–80% effective).
- Solifenacin (Vesicare) 5 mg PO daily (urinary antispasmodic of the anticholinergic class).
- Tolterodine (Detrol) immediate-release tablet 2 mg twice daily, or extended-release capsule 4 mg once daily
- Trospium (MAR-Trospium) immediate-release 20 mg twice a day or extended-release 60 mg once daily in the morning
- Flavoxate hydrochloride (Urispas) 100–200 mg PO three to four times a day (fewer side effects, more expensive than some)
- Imipramine hydrochloride (Tofranil) 25–50 mg PO twice to thrice a day (good for mixed incontinence and enuresis, 60%–75% effective)
- Propantheline bromide (Pro-Banthine) 15–30 mg PO three to four times a day (few side effects, variable absorption, 60%–80% effective)

Contraindications: Most agents are contraindicated in patients with urinary retention, uncontrolled tachyarrhythmias, myasthenia gravis, gastric retention, narrow-angle glaucoma, or known or suspected hypersensitivity.
Precautions: Anticholinergic drugs must be used with caution in patients with obstructive gastrointestinal disease or tachycardia. Dry mouth is experienced by 40%–50% of patients. Darifenacin and solifenacin are contraindicated in urinary retention, gastric retention, or uncontrolled narrow-angle glaucoma and are pregnancy category C. Antimuscarinics have also been associated with dementia and urinary retention. Patients with severe or uncontrolled hypertension should not be prescribed mirabegron.
Interactions: Patients taking cytochrome P450 3A4 inhibitors (macrolide antibiotics or antifungal agents) must reduce their doses of tolterodine tartrate.

Alternative Therapies

β3 Adrenergic agonists; mirabegron (Myrbetriq) 25 mg PO daily (efficacy is evaluated by 8 weeks; may increase dose to 50 mg) not recommended for patients with severe uncontrolled hypertension, end-stage renal disease, or significant liver impairment;

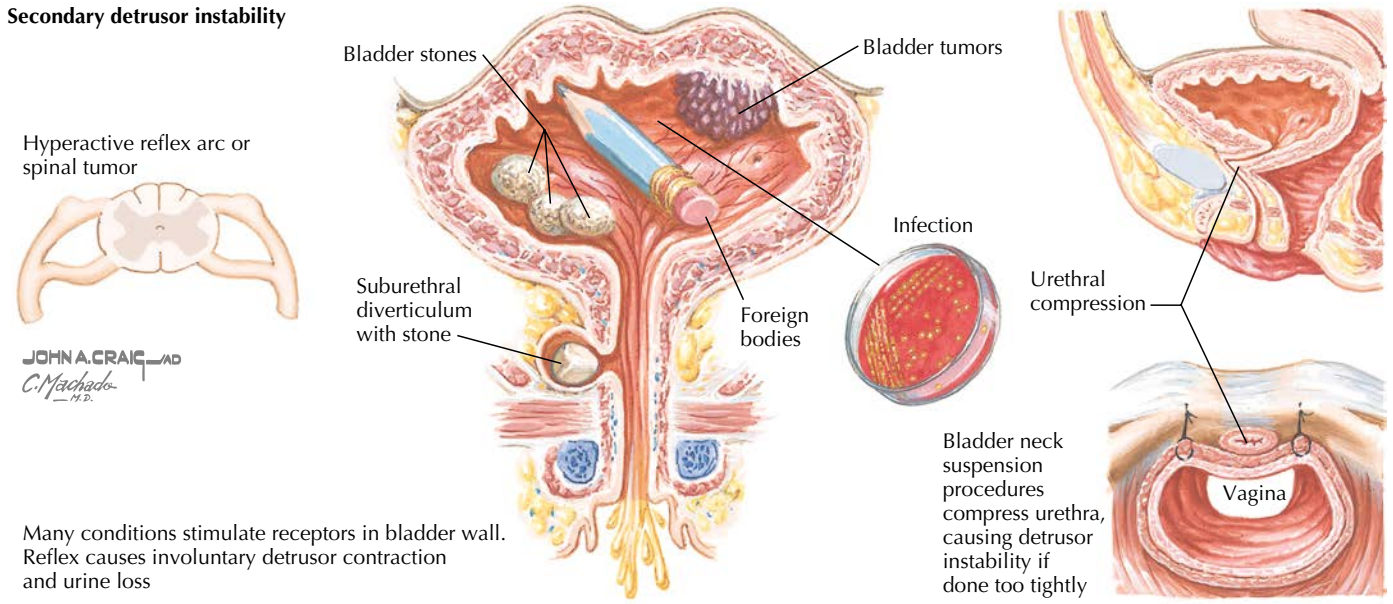

Figure 84.1 Other causes of incontinence

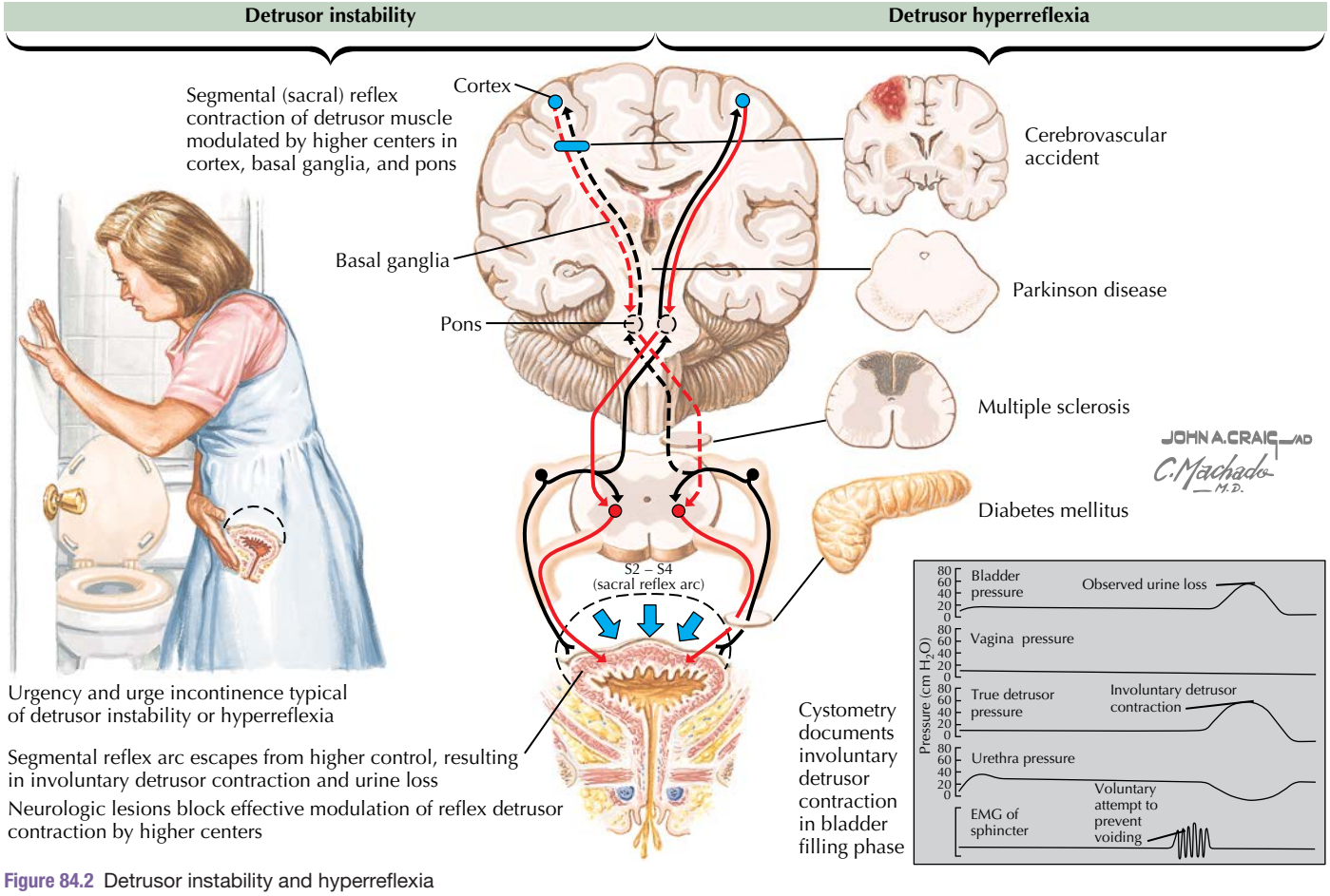

Figure 84.2 Detrusor instability and hyperreflexia

Vibegron (Gemtesa) 75 mg PO once daily. OnabotulinumtoxinA (Botox A) administered by cystoscopic injection in multiple sites of the detrusor muscle. A role for sacral neuromodulation (placement of a wire lead into the S3 foramen that is connected to a stimulation device) has been suggested, but adverse events, including the need for subsequent surgeries, mean that the procedure should be reserved for selected patients with a failure of less invasive options.

FOLLOW-UP

Patient Monitoring: Normal health maintenance. Patients are at an increased risk for UTIs, vaginitis, and vulvitis.

Prevention/Avoidance: Avoidance of and prompt treatment for UTIs are considered to reduce the risk for developing urge incontinence in the future. Reduction in use of alcoholic, caffeinated, and carbonated beverages is recommended.

Possible Complications: Social isolation and vulvar and perineal irritation are common complications of any type of urinary incontinence.

Expected Outcome: Patients with urge incontinence can expect generally good results with medical therapy and timed voiding.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. Pregnancy often induces frequency and urgency because of bladder compression by the fetal presenting part near term. Bethanechol, darifenacin, and solifenacin are pregnancy category C drugs.

ICD-10-CM Codes: R39.41 (Urge incontinence).

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85 URINARY TRACT INFECTION

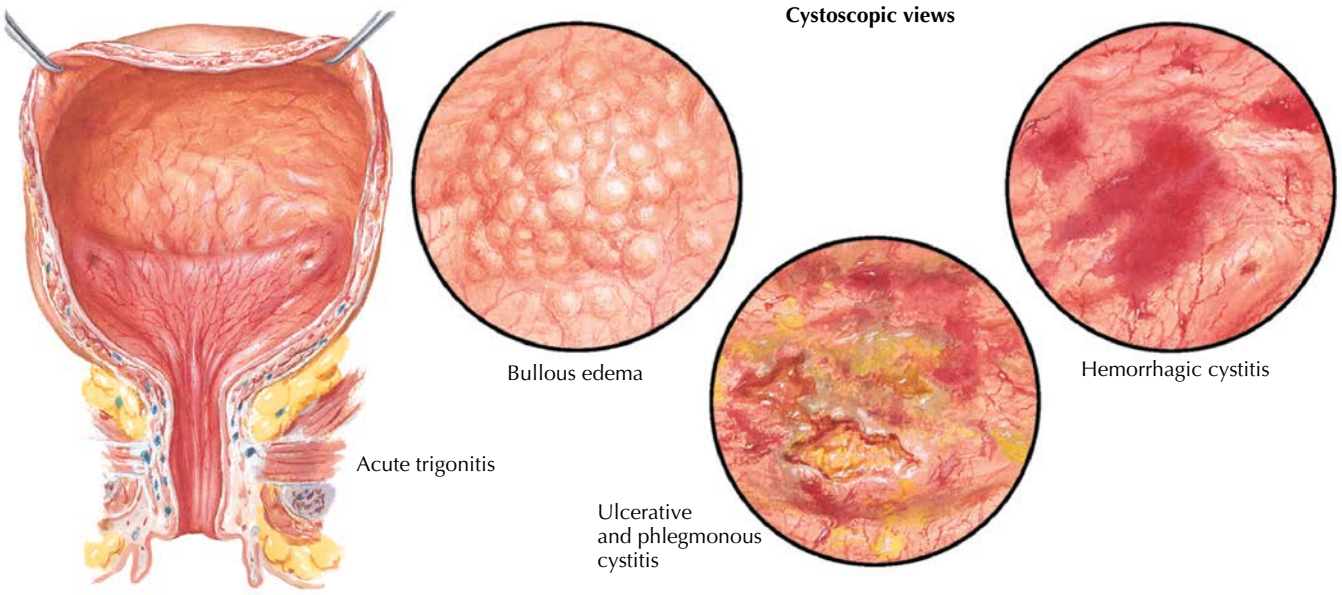
INTRODUCTION

Description: An infection of the urinary tract causes urethritis, cystitis (including trigonitis), or pyelonephritis. Urinary tract infections (UTIs) are much more common in women because of their shortened urethral length and exposure of the urinary tract to trauma and pathogens during sexual activity.

Prevalence: Observed in 3%–8% of patients (second most common type of infection in the body; accounts for 8.3 million visits per year), with approximately 45% of women aged 15–60 years experiencing at least one UTI.

Predominant Age: Any, increases with age.

Genetics: No genetic pattern.



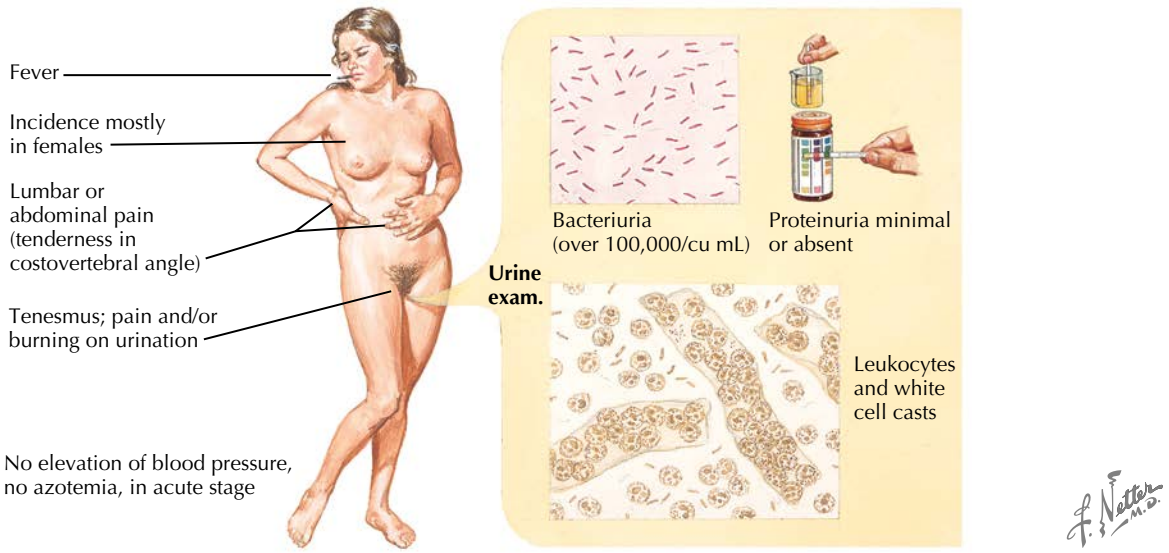


Figure 85.1 Urinary tract infections

ETIOLOGY AND PATHOGENESIS

Causes: Most UTIs in women ascend from the contamination of the urethra, acquired via instrumentation, trauma, or sexual intercourse (a history of intercourse within the preceding 24–48 hours is present in up to 75% of patients with acute UTI). Coliform organisms, especially *Escherichia coli,* are the most common organisms responsible for asymptomatic bacteriuria, cystitis, and pyelonephritis. *E. coli* causes 90% of first infections and 80% of recurrent infections, and between 10% and 20% result from *Staphylococcus saprophyticus.* Infection with other pathogens, such as *Klebsiella* species (5%) and *Proteus* species (2%), accounts for most of the remaining infections. Anaerobic bacteria, *Trichomonas,* and yeasts are rare sources of infections, except in patients with diabetes, those who are immunosuppressed, or those requiring chronic catheterization. Infection with *Neisseria gonorrhoeae, Chlamydia trachomatis, Mycoplasma,* and *Ureaplasma* all should be considered when urethritis is suspected.

Risk Factors: Sexual activity, instrumentation, more virulent pathogens, altered host defenses, infrequent or incomplete voiding, foreign body or stone, obstruction, or biochemical changes in the urine (diabetes, hemoglobinopathies, pregnancy), estrogen deficiency, diaphragm use, and spermicides.

SIGNS AND SYMPTOMS

- Asymptomatic (5%)
- Frequency, urgency, nocturia, or dysuria
- Pelvic pressure or suprapubic pain (cystitis)
- Fever and chills (pyelonephritis)
- Pyuria (more than five white cells per high-power field in a centrifuged specimen)
- Hematuria (infrequent)
- Costovertebral angle tenderness (pyelonephritis)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Traumatic trigonitis
- Urethral syndrome
- Interstitial cystitis
- Bladder tumors or stones
- Vulvitis and vaginitis (may give rise to external dysuria)
- Urethral diverticulum
- Infection in the Skene glands
- Detrusor instability

Associated Conditions: Dyspareunia, urinary urgency

Workup and Evaluation

Laboratory: Nonpregnant women with a first episode of classic symptoms suggestive of UTI do not need laboratory confirmation of the diagnosis; they may be empirically treated (data suggest that this is an acceptable strategy for women with fewer than three episodes per year, those who lack fever or flank pain, and those who have not been treated recently for the same symptoms). Others should have a urinalysis and culture performed. For uncentrifuged urine samples the presence of more than one white blood cell per high-power field gives 90% accuracy in detecting infection. "Dipstick" point of care testing of a clean-voided sample that demonstrates leukocyte esterase, nitrite, or bacteria is supportive of the clinical diagnosis, although not diagnostic (false-positive nitrite test results can occur with substances that turn the urine red, such as the bladder analgesic phenazopyridine or ingestion of beets).

Imaging: No imaging indicated.

Special Tests: When urethritis is suspected, a swab inserted into the urethra may be used to obtain material for culture. Urine culture is helpful if there is reason to suspect antimicrobial resistance.

Diagnostic Procedures: History and physical examinations, urinalysis.

Pathologic Findings

Pyuria with white blood cell casts common

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Fluids, frequent voiding, and antipyretics. Urinary acidification (with ascorbic acid, ammonium chloride, or acidic fruit juices) and urinary analgesics (phenazopyridine [Pyridium)] may be added based on the needs of the individual patient.

Specific Measures: Antibiotic therapy.

Diet: Increased fluids and reduction of caffeine consumption.

Activity: No restriction.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Urinary Tract Infections, 2020

Drug(s) of Choice

- **Nonpregnant patients—single-dose therapy:** Amoxicillin 3 g, ampicillin 3.5 g, cephalosporin (first generation) 2 g, nitrofurantoin 200 mg, sulfisoxazole 2 g, trimethoprim (TMP) 400 mg, TMP/sulfamethoxazole 320/1600 mg, fosfomycin tromethamine (Monurol) 3 g PO, fosfomycin (3-g single dose).
- **3- to 7-day therapy:** Amoxicillin 500 mg every 8 hours, cephalosporin (first generation) 500 mg every 8 hours, ciprofloxacin 250 mg every 12 hours, nitrofurantoin 100 mg every 12 hours, norfloxacin 400 mg every 12 hours, ofloxacin 200 mg every 12 hours, sulfisoxazole 500 mg every 6 hours, tetracycline 500 mg every 6 hours, TMP/sulfamethoxazole 160/800 mg every 12 hours, TMP 200 mg every 12 hours.

Contraindications: Known or suspected hypersensitivity.

Precautions: Urinary analgesics (phenazopyridine [Pyridium]) should be taken for no longer than 48 hours and may stain some types of contact lenses.

Interactions: See individual medications.

Alternative Drugs

- **Pregnant patients:** 7-day therapy—amoxicillin 500 mg every 8 hours, cephalosporin (first generation) 500 mg every 6 hours, nitrofurantoin 100 mg every 12 hours.

FOLLOW-UP

Patient Monitoring: No follow-up is necessary after a single-dose treatment or multiday treatment for nonpregnant women who experience resolution of their symptoms. Confirmation of cure for all other patients should be conducted with urinalysis and culture. Those with recurrent infections should be evaluated for possible causes, and a program of patient-initiated single-dose therapy should be started as required for prophylaxis (after intercourse, daily, or three times weekly based on patient need). Possible causes of recurrent infection include incorrect or incomplete (eg, noncompliant) therapy, mechanical factors (eg, obstruction or stone), or compromised host defenses.

Prevention/Avoidance: Frequent voiding, adequate fluid intake, and voiding after intercourse.

Possible Complications: Urethral syndrome and interstitial cystitis. Bacteremia, septic shock, acute respiratory distress syndrome, and other serious sequelae are associated with pyelonephritis. Recurrence rates may be as high as 20% (90% represents reinfection). Up to one-third of patients may develop pyelonephritis.

Expected Outcome: For most patients, symptoms should resolve within 2–3 days of the initiation of therapy. Some authors estimate that up to 50% of infections resolve without intervention.

MISCELLANEOUS

Pregnancy Considerations: Asymptomatic bacteriuria is more common during pregnancy (5%). Those at high risk (eg, patients with diabetes) should be carefully monitored.

ICD-10-CM Codes: N93.0 (Urinary tract infection, site not specified) and O23.40 (Unspecified infection of urinary tract in pregnancy, unspecified trimester).

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VARICOSE VEINS

86

INTRODUCTION

Description: Varicose veins are dilated, elongated, and tortuous superficial veins with incompetent or congenitally absent valves. Although these may occur anywhere in the body, they are most common in the legs, where gravity produces reverse flow. Varicose veins are five times more common in women than in men.
Prevalence: 20% of adults; one of two people older than 50 years.
Predominant Age: Middle age and older.
Genetics: Familial as an X-linked dominant condition.

ETIOLOGY AND PATHOGENESIS

Causes: Faulty or absent valves in one or more perforating veins that may result in secondary incompetence at the

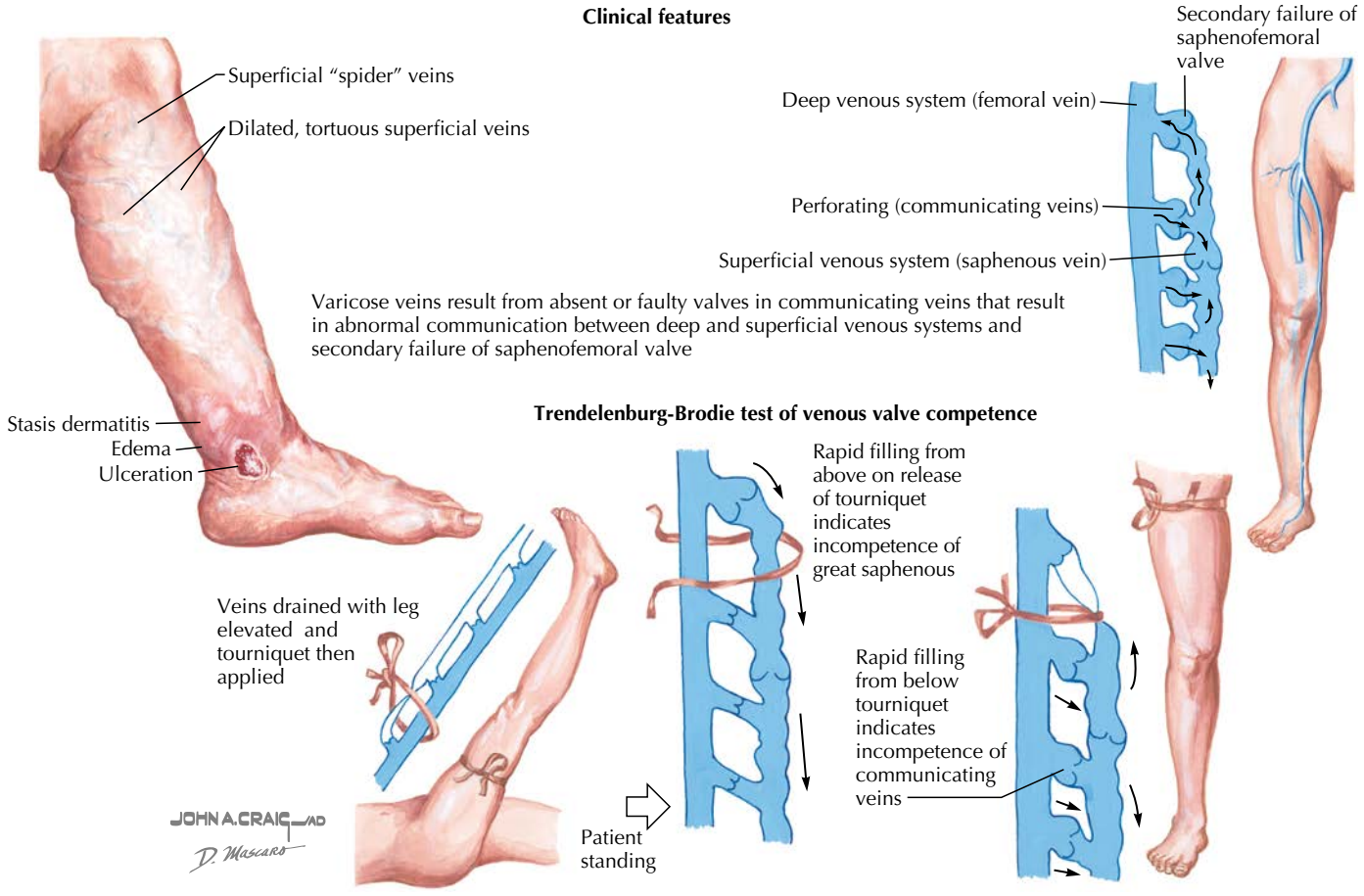

Figure 86.1 Clinical features and testing of varicose veins

saphenofemoral junction. Other causes include deep vein thrombophlebitis, increased venous pressure from any source (eg, obstruction by tumor, pregnancy, pelvic mass), or inadequate muscle pump function.

Risk Factors: Pregnancy, family history, prolonged standing, increased body mass index, smoking, sedentary lifestyle.

SIGNS AND SYMPTOMS

- Asymptomatic
- Leg pain or cramps (worse during menstruation)
- Dilated, tortuous superficial veins
- Spider veins (idiopathic telangiectases)
- Limb edema
- Superficial ulceration

DIAGNOSTIC APPROACH

Differential Diagnosis

- Radiculopathy (nerve root compression)
- Arthritis
- Peripheral neuritis

Associated Conditions: Stasis ulcers and dermatitis.

Workup and Evaluation

Laboratory: No evaluation indicated.

Imaging: Venous duplex ultrasonography or Doppler studies may be used to evaluate the possibility of deep vein thrombosis but are generally not required for diagnosing varicose veins.

Special Tests: Brodie-Trendelenburg (elevate the leg, compress the greater saphenous vein at mid-thigh, and have the patient stand. Rapid refilling of the vein indicates incompetent communicating veins.).

Diagnostic Procedures: History and physical examination.

Pathologic Findings

Elevated venous pressure initiates anatomic, physiologic, and histologic changes leading to vein dilation (subcutaneous veins ≥3 mm diameter), skin changes, and/or ulceration. Elongated, tortuous veins with medial fibrosis and absent or atrophic valves are typical.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Frequent rest, elevation of affected limb, lightweight compression (hosiery), avoidance of proximal compression (girdles).

Specific Measures: Superficial veins may be eliminated with intracapillary injection of hypertonic saline (20%–25%) or 1%–3% solution of sodium tetradecyl sulfate (must be followed by compression for up to 3 weeks). Ligation or stripping of the saphenous veins should be considered in patients with pain, ulcers, recurrent phlebitis, or significant cosmetic problems.

Diet: No specific dietary changes indicated. Weight loss when appropriate.

Activity: Active exercise routines, including walking, using elastic stockings (applied before arising), avoiding prolonged standing or inactivity.

Patient Education: Education about risk factors and avoidance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Skin Conditions During Pregnancy, 2018

Drug(s) of Choice

None

Precautions: Some authors suggest that oral contraceptives should not be used within 6 weeks of sclerotherapy.

Alternative Drugs

- Antibiotic therapy for infected ulcers.

FOLLOW-UP

Patient Monitoring: Normal health maintenance, evaluation for progression of disease or emergence of complications (skin ulcers).

Prevention/Avoidance: Avoidance of prolonged standing or inactivity, use of compression stockings, exercise, weight loss, leg elevation when at rest.

Possible Complications: Petechial hemorrhages, chronic edema, superficial ulceration and infection, chronic pigment change, eczema.

Expected Outcome: Generally a chronic condition with control possible through treatment.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. Pregnancy often worsens existing disease and increases the risk of future occurrence. Use of compression stockings should be encouraged for those at an increased risk.

ICD-10-CM Codes: I83 (Varicose veins of lower extremity).

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WEIGHT CONTROL FOR WOMEN

87

THE CHALLENGE

Description: Excess body weight results in adverse medical, social, economic, and personal outcomes. Women's healthcare providers are frequently the first point of care to identify, counsel, and assist women in achieving a more appropriate body weight.

Scope of the Problem: Obesity is the most common medical condition in women of reproductive age. Roughly 42% of women are obese or very obese. This proportion rises to almost 52% of non-Hispanic Black women. Women who are obese are at increased risk for multiple medical problems ranging from diabetes to heart disease, high blood pressure to depression, spontaneous pregnancy loss to recurrent abortion and stillbirth. Obese mothers are more likely to have pregnancies affected by neural tube defects (eg, spina bifida), hydrocephaly, and cardiovascular, orofacial, and limb reduction anomalies. Patients who are obese are at greater risk for complications of infection by the COVID-19 virus. Obesity is the second leading cause of preventable death behind tobacco use.

Objectives of Management: To assist women to safely achieve and maintain a healthy weight as a part of lifestyle interventions to optimize health.

TACTICS

Relevant Pathophysiology: Obesity is classified based on body mass index (BMI), defined as weight in kilograms divided by height in meters squared (kg/m^2). The World Health Organization organizes BMI ranges into six categories to define underweight, normal weight, overweight (BMI 25–29.9, ≥85th percentile), and obesity, classes I (BMI 30–34.9, ≥95th percentile), II (BMI 35–39.9, ≥99th percentile), and III (BMI ≥40). Metabolic syndrome is the coexistence of risk factors for type 2 diabetes and cardiovascular disease, including abdominal obesity, hyperglycemia, dyslipidemia, and hypertension.

Strategies: Ultimately, weight loss is achieved by ingesting fewer calories per day than are consumed by the body. This is best achieved in a measured, controlled manner that maintains nutritional balance, activities suited to the individual, and realistic goals for weight and timeframe (generally weight loss of no more than 2 lb/week). With lifestyle measures alone, a weight loss of 5%–7% of body weight is typical but often difficult to maintain. Motivational interviewing has been used successfully to promote these goals. Behavioral modification strategies include self-monitoring, stimulus control, goal setting, and positive reinforcement. The US Preventive Services Task Force recommends that all adults aged 18 years and older with a BMI of ≥30 be offered intensive multicomponent behavior interventions for weight loss and weight loss maintenance.

Pharmacotherapy: Over-the-counter dietary supplements have not been proven to be effective, have been associated with significant side effects (including cardiovascular), and should not be recommended. Medications used to assist weight loss include anorectics, which alter the release and reuptake of neurotransmitters that suppress appetite, and drugs that decrease intestinal fat absorption by inhibiting pancreatic lipase (tetrahydrolipostatin [Orlistat]). The glucagon-like peptide-1 (GLP-1) receptor agonists liraglutide (Saxenda, Victoza) and semaglutide (Ozempic, Rybelsus) are approved for the treatment of obesity. The combination of phentermine-topiramate should not be used in reproductive-age women.

Surgical Management: Surgical options are generally reserved for patients in obesity class III (BMI ≥40 kg/m^2) or who have comorbidities. Laparoscopic adjustable gastric banding, intragastric balloon systems, and more extensive procedures such as Roux-en-Y, sleeve gastrectomy, and biliopancreatic diversion may be indicated. These are best managed by a bariatric specialty team.

Patient Education: Reassurance; diet counseling and nutritional education (with referral, if possible)

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Healthy Eating, 2020
- Obesity and Pregnancy, 2021

Centers for Disease Control and Prevention:

- Reproductive Health
- Weight Control: Eating Right and Keeping Fit, 2021
- Weight Gain During Pregnancy

IMPLEMENTATION

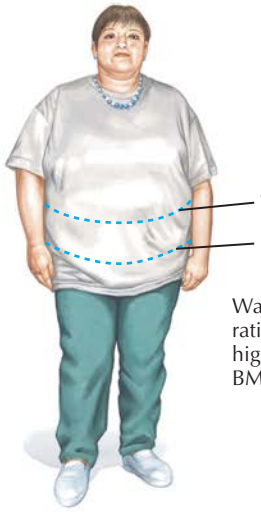
Special Considerations: The primary weight management strategies are dietary control, exercise, and behavior modification. Nutrition counseling is recommended for all overweight and obese women. The use of an Internet-based program has shown utility in some postpartum patients. All overweight and obese patients should be screened for glucose intolerance and obstructive sleep apnea (snoring, excessive daytime sleepiness, witnessed apneas, or unexplained hypoxia).

Pregnancy: Evidence supports associations between excessive gestational weight gain and adverse pregnancy outcomes and postpartum weight retention. Recommended weight gain during pregnancy by prenatal BMI stratification is shown in Table 87.1. Medical weight loss management is not recommended while attempting to become pregnant or during pregnancy because of safety concerns and adverse effects.

Table 87.1 Weight Gain During Pregnancy

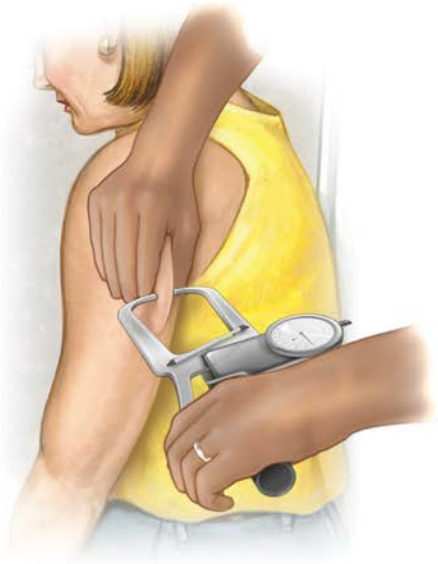
Initial Weight	Weight Gain With Singleton Pregnancy	Weight Gain With Twin Pregnancy
Normal (BMI 18.5–24.9)	25–35 lb	37–54 lb
Overweight (BMI 25.0–29.9)	15–25 lb	31–50 lb
Obese Class I, II, and III (BMI ≥30.0)	11–20 lb	25–42 lb

Modified from Centers for Disease Control and Prevention, Reproductive Health, Weight Gain During Pregnancy. Available at: https://www.cdc.gov/reproductivehealth/maternalinfanthealth/pregnancy-weight-gain.htm. Accessed February 21, 2022.



Waist size more than 35 in. or waist-to-hip ratio more than 0.85 is considered obese with high risks of diseases. Another measure is the BMI = weight (kg)/height^2 (m^2).

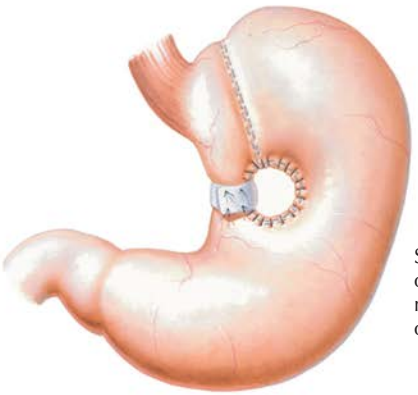
Lifestyle changes should be discussed to lose weight, including a medically supervised diet and exercise program.



A caliper is used to measure skinfold thickness, to determine relative obesity.

Different kinds of exercise appeal to different people.

Obesity can strain lower weight-bearing joints and cause wear-and-tear arthritis in the hips and knees. It also increases risks for many other diseases such as diabetes and heart disease.



Surgery such as stomach stapling or banding (lap band) and medicines may be discussed if other methods do not work.

Figure 87.1 Weight control for women

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SECTION V

Vulvar Disease

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ACNE INVERSA (HIDRADENITIS SUPPURATIVA)

88

INTRODUCTION

Description: Acne inversa (formerly hidradenitis suppurativa, Verneuil disease) is a chronic, unrelenting, refractory infection of the skin and subcutaneous tissue that is initiated by the obstruction and subsequent inflammation of follicles and apocrine glands, with resultant sinus and abscess formation. This process may involve the axilla, vulva, and perineum.

Prevalence: Uncommon. Four to five times more common in females than in males. It is reported to occur in as many as 4% of women in some studies.

Predominant Age: Reproductive age (not observed before puberty). Peak age 18–29 years.

Genetics: Suggestions of a family pattern, but a strong genetic link for most cases remains unproved. (In some studies, as many as 38% of patients have a similarly affected relative and a locus at chromosome 1p21.1-1q25.3 along with mutations in the secretase genes *NCSTN, PSENEN,* and *PSEN1* and others have been reported. Pyogenic arthritis, pyoderma gangrenosum, acne, and hidradenitis suppurativa have been associated with a novel mutation of the *PSTPIP1* gene.)

ETIOLOGY AND PATHOGENESIS

Causes: Recurrent infections that arise in subcutaneous nodules. Proposed—hypersensitivity to androgens and follicular occlusion with rupture. It is likely that dysregulation of the immune system is a contributor.

Risk Factors: Proposed—excessive heat, perspiration, tight clothing, smoking, and obesity.

SIGNS AND SYMPTOMS

- Solitary, painful, deep-seated inflamed nodule (0.5–2 cm in diameter)
- Recurrent and chronic inflammatory and ulcerated portions of labia associated with pain and foul-smelling discharge
- Multiple draining sinuses and abscesses
- Open comedones and scarring

DIAGNOSTIC APPROACH

Differential Diagnosis

- Sexually transmitted infection (granuloma inguinale, lymphogranuloma venereum)
- Crohn disease
- Granuloma inguinale
- Fox-Fordyce disease
- Bacterial folliculitis and furunculosis

Associated Conditions: Dyspareunia, vulvodynia. Associations with chronic pulmonary disease, diabetes, mild liver disease, metabolic syndrome, and Crohn disease have been reported.

Workup and Evaluation

Laboratory: No evaluation indicated.

Imaging: No imaging indicated.

Special Tests: Biopsy of the affected area may be necessary to establish the diagnosis.

Diagnostic Procedures: History, physical, and biopsy of affected area.

Pathologic Findings

Inflammation of the apocrine glands with follicular epithelial hyperplasia of the ductal isthmus leading to the occlusion of ducts, cystic dilation, and inspissation of keratin material. Multiple draining sinuses and abscesses are common.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Perineal hygiene, sitz baths, loose-fitting clothing, smoking cessation, weight reduction, avoidance of trauma, wound care, analgesics, nonsteroidal antiinflammatory agents.

Specific Measures: Most effective therapy is based on early, aggressive, wide excision of affected area. Topical therapy with antibiotics, topical steroids, oral contraceptives, antiandrogens, and isotretinoin may be used in early or mild cases.

Diet: No specific dietary changes indicated.

Activity: No restriction. Patients frequently abandon intercourse because of pain, discharge, odor, or embarrassment.

Patient Education: Reassurance and discussion of the chronic nature of the disease.

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Disorders of the Vulva, 2020

Drug(s) of Choice

- Antibiotics—tetracycline 2 g PO daily, clindamycin topical daily; topical steroids; oral contraceptives (low androgenic formulations); spironolactone 100 mg PO daily; metformin titrated to 1500 mg PO daily in divided doses; antiandrogens—finasteride (Proscar, Propecia, etc.), isotretinoin (Accutane) 0.5–2 mg/kg in two divided doses for 15–20 weeks. A second course may be considered after a 2-month hiatus.

Contraindications: Isotretinoin must not be taken during pregnancy. Therefore, isotretinoin should not be administered to women who are or may become pregnant.

Precautions: Isotretinoin should be given with food. It has been associated with the development of pseudotumor cerebri. Periodic assessment of liver function, cholesterol and triglyceride levels, and white blood counts should be conducted for patients undergoing isotretinoin therapy.

Interactions: See individual agents.

Alternative Drugs

- Dexamethasone or gonadotropin-releasing hormone agonists have been proposed, but costs and side effects limit their use.
- Infliximab (Remicade) and other immunosuppressant agents (adalimumab; Humira) have shown promise but are second-line therapies reserved for resistant cases.
- Antagonist of the interleukin-1 (IL-1) receptor and monoclonal antibodies that inhibits IL-17A have shown promise in preliminary studies.

FOLLOW-UP

Patient Monitoring: Normal health maintenance, watch for periodic worsening or secondary infection.

Prevention/Avoidance: Meticulous perineal hygiene; keep the affected area dry.

Possible Complications: Secondary infection, abscess formation, scarring, sexual dysfunction.

Expected Outcome: Relapses and chronic infections are common. With surgical excision, results are generally good, but scarring and dyspareunia may persist or result.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. Isotretinoin should not be administered to women who are or may become pregnant.

ICD-10-CM Codes: L73.2 (Hidradenitis suppurativa).

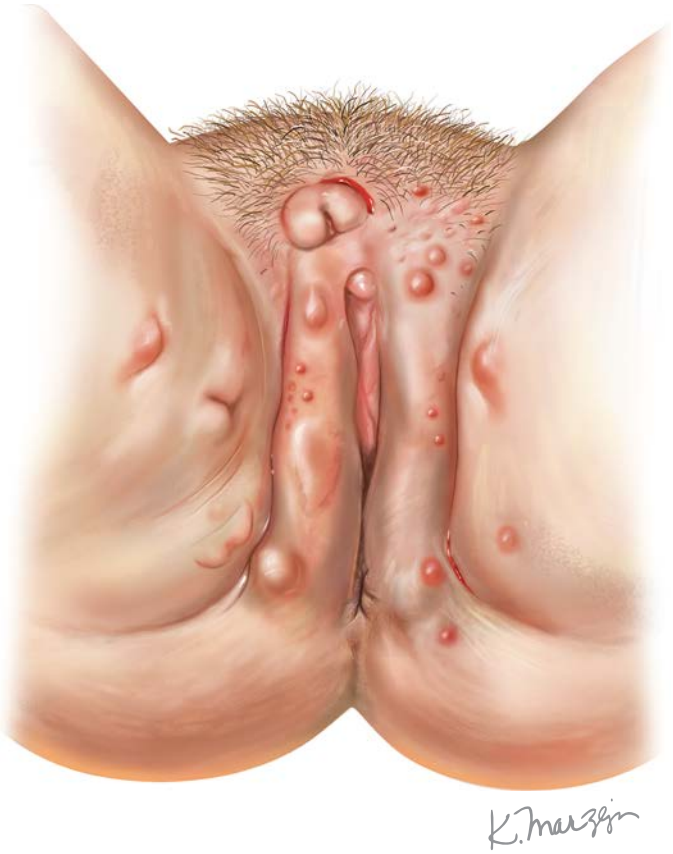

Figure 88.1 Appearance of acne inversa (hidradenitis suppurativa)

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APHTHOUS ULCERS (ACUTE GENITAL ULCERATION, LIPSCHÜTZ ULCERS, NON-SEXUALLY ACQUIRED GENITAL ULCERATION, AND VULVAR APHTHAE)

89

INTRODUCTION

Description: In general, vulvar ulcers are deep defects through the epidermis into the dermis that generally heal with scarring; they are deeper than erosions. They may be of infectious or noninfectious origin. Acute aphthous ulcers (acute genital ulceration, Lipschütz ulcers [named for Benjamin Lipschütz, who first described it in October, 1912], non-sexually acquired genital ulceration [NSAGU], and vulvar aphthae) are like the more common oral ulcers known as canker sores. These ulcers are the result of a localized vasculitis caused, in about one-third of cases, by various infections, most commonly Epstein-Barr virus, *Mycoplasma pneumoniae,* and viral respiratory infections (parvovirus, influenza, paramyxovirus). Other infections include tuberculosis, amebiasis, and leishmaniasis. There have even been reports of cases after COVID-19 infection and vaccination.
Prevalence: Uncommon.
Predominant Age: Most common in adolescent girls and young women, typically ages 8–25 years.
Genetics: No genetic pattern. A family history of autoimmune disorders may be present.

ETIOLOGY AND PATHOGENESIS

Causes: Chronic or recurrent aphthous ulcers are often idiopathic.
Risk Factors: Viral infection.

SIGNS AND SYMPTOMS

- Exquisitely painful ulcers appear quickly, evolving from a purpuric area that rapidly becomes necrotic, then ulcerating over 1–2 days.
- Normally shallow ulcers begin as pale yellow in color, generally turning gray as the condition develops.
- Flulike symptoms (fever, malaise, tonsillitis, lymphadenopathy) precede or accompany the ulcers.
- Multiple, bilateral ulcers are common.

DIAGNOSTIC APPROACH

Differential Diagnosis

- **Noninfectious etiologies**—Noninfectious etiologies of genital ulcers: Fixed drug reactions (Stevens-Johnson syndrome, toxic epidermal necrolysis), Behçet syndrome, neoplasms, Crohn disease, malignancy, trauma, vasculitis (lupus), hidradenitis suppurativa, pyoderma gangrenosum, chemical exposure (topical 20% benzocaine), "neurotic excoriations" or self-inflicted injuries.
- **Non-sexually transmitted infections**—Tuberculosis, amebiasis, schistosomiasis, leishmaniasis.
- **Sexually transmitted infections**—Herpes, granuloma inguinale, syphilis, chancroid, lymphogranuloma venereum.

Associated Conditions: Oral ulcers (half of cases), inflammatory bowel diseases (Crohn disease [most common], ulcerative colitis), hematologic diseases (myeloproliferative disorders, cyclic neutropenia, lymphopenia), Behçet syndrome, human immunodeficiency virus (HIV) infection.

Workup and Evaluation

Laboratory: If the diagnosis is not clear; testing for herpes simplex virus, Gram stain, and bacterial culture.
Imaging: None indicated.
Special Tests: Tests for Epstein-Barr virus or Behçet syndrome if appropriate.
Diagnostic Procedures: History and clinical characteristics to exclude other causes of vulvar ulcers. Although the pain is like that of acute herpetic infections, the absence of vesicles and the larger size (up to 3 cm) of aphthous ulcers make the diagnosis apparent. Biopsy is seldom indicated.

Pathologic Findings

Lesions are sharply marginated (punched out) and may have a white coagulum or adherent, black crust at the base of the ulcer.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Treatment is primarily supportive and includes reassurance, local hygiene, sitz baths, wound care, and pain control. Oral analgesics or topical anesthetics (lidocaine 2% viscous solution) may be required for pain control. Ulcers can take up to 6 weeks to fully heal but generally heal without scarring.
Specific Measures: Voiding in the bath may reduce external dysuria.
Diet: No specific dietary changes indicated.
Activity: No restriction except those imposed by discomfort.
Patient Education: Patients should be advised to have all sexual partners examined for diagnosis and treatment.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- How to Prevent Sexually Transmitted Diseases, 2020

Drug(s) of Choice

- Burow solution (5% aluminum subacetate) to decrease surrounding edema

Contraindications: None
Precautions: None

Alternative Therapies

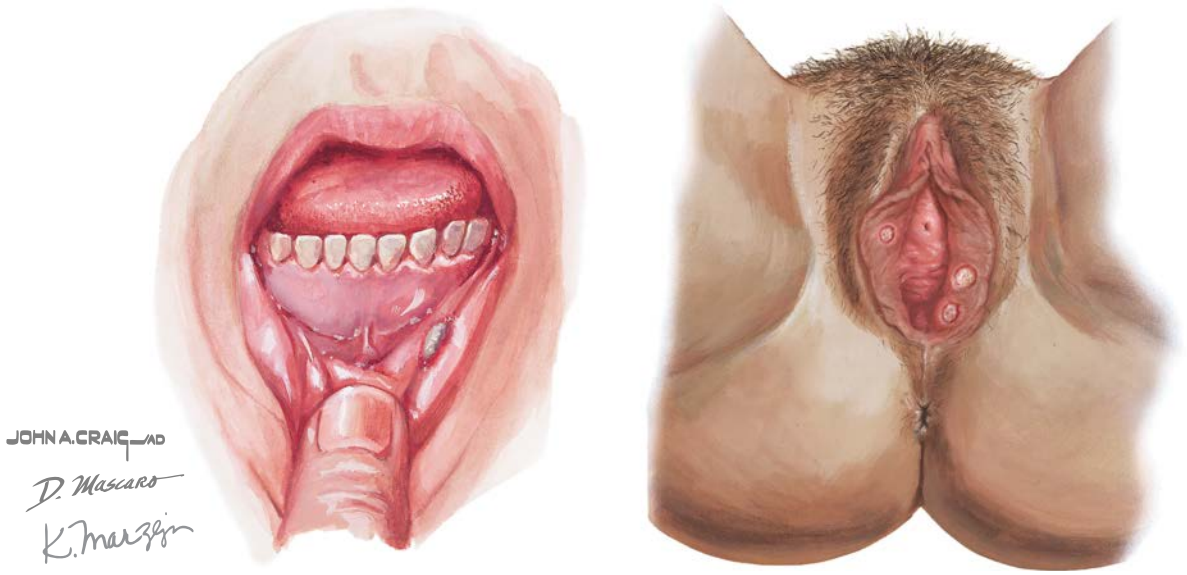
None

FOLLOW-UP

Patient Monitoring: Support and follow-up to monitor resolution of symptoms.
Prevention/Avoidance: None.
Possible Complications: Urinary retention due to painful voiding.
Expected Outcome: Spontaneous healing without scarring over 4–6 weeks.

MISCELLANEOUS

Pregnancy considerations: No effect on pregnancy
ICD-10-CM Codes: N76.6 (Ulceration of vulva), K12.0 (Recurrent oral aphthae), N94.819 (Vulvodynia, unspecified), N76 (Other inflammation of vagina and vulva)



Oral aphthous ulcer

Genital aphthous ulcers

Figure 89.1 Aphthous ulcer

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90 BARTHOLIN GLAND: ABSCESS/INFECTION

INTRODUCTION

Description: An infection may occur in one or both Bartholin glands, resulting in swelling and/or abscess formation. Usually, the process is unilateral and marked by pain and swelling. Systemic symptoms are minimal except in advanced cases.

Prevalence: 2% of adult women develop infection or enlargement of one or both Bartholin glands. Abscesses are almost three times more common than cysts.

Predominant Age: Of all Bartholin gland infections, 85% occur during the reproductive years.

Genetics: No genetic pattern.

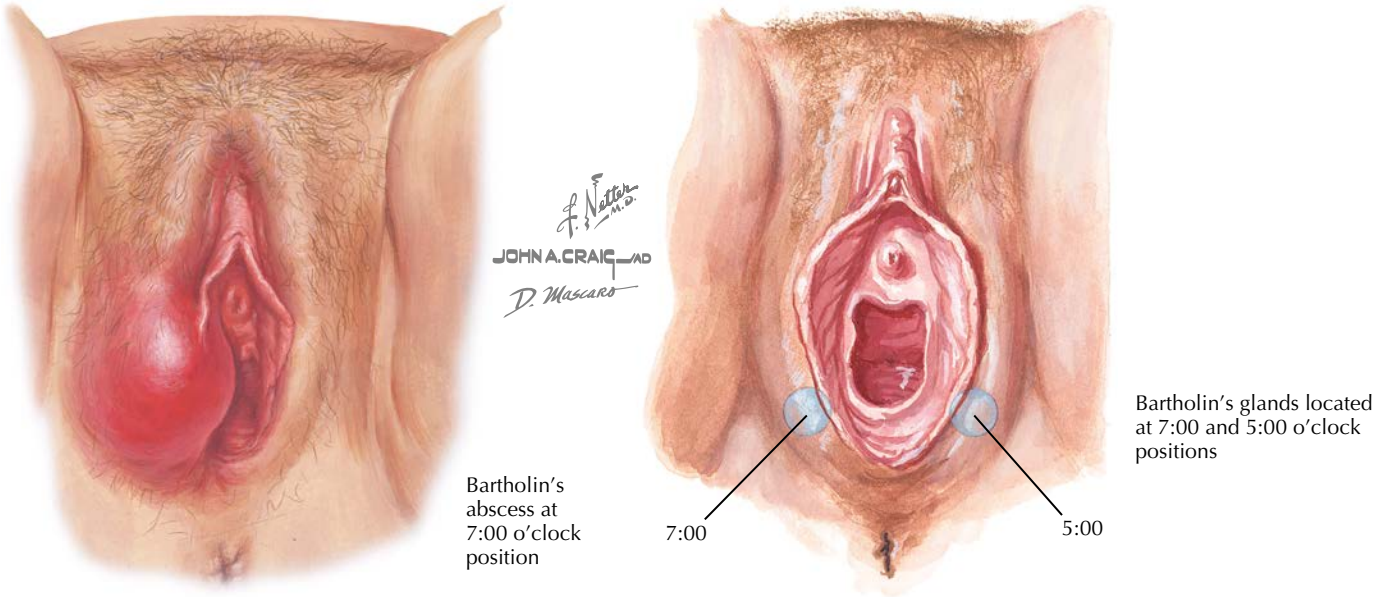

Figure 90.1 Bartholin gland abscess/infection

ETIOLOGY AND PATHOGENESIS

Causes: Infection by *Neisseria gonorrhoeae* (80%), secondary infection by other organisms (eg, *Escherichia coli).* Methicillin-resistant *Staphylococcus aureus* (MRSA) is emerging as a more common infectious agent.
Risk Factors: Exposure to sexually transmitted infection (STI), trauma.

SIGNS AND SYMPTOMS

- Cystic, painful swelling of the labia in the area of the Bartholin gland (at 5 and 7 o'clock positions on the vulva) developing rapidly over 2–4 days; the size of cysts measure 3–6 cm but can grow to >8 cm. The cyst will be warm with overlying erythema and induration.
- Fever and malaise (20% of patients).

DIAGNOSTIC APPROACH

Differential Diagnosis

- Cellulitis
- Necrotizing fasciitis
- Mesonephric cysts of the vagina
- Lipomas
- Fibromas
- Hernias
- Hydrocele
- Epidermal inclusion or sebaceous cyst
- Bartholin gland malignancy (rare)
- Neurofibroma
- Kaposi sarcoma (generally associated with immunocompromise)

Associated Conditions: Dyspareunia.

Workup and Evaluation

Laboratory: Because bartholinitis or Bartholin gland abscess may be gonococcal in origin, further evaluation for another STI is prudent. Most often, culture-positive cysts are secondarily infected by coliform organisms or are polymicrobial, limiting the value of routine culture from the cyst unless there is concern about the possibility of community-associated methicillin-resistant *S. aureus* infection.
Imaging: No imaging indicated.
Special Tests: None indicated.
Diagnostic Procedures: Inspection.

Pathologic Findings

Inflammation, dilation of the Bartholin gland duct, abscess formation

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, perineal hygiene.
Specific Measures: Mild infections may respond to antibiotic or topical therapies. Warm to hot sitz baths provide relief and promote drainage. Spontaneous drainage typically occurs in 1–4 days. Simple drainage is associated with recurrence; therefore, placement of a Word catheter, packing with iodoform gauze, or surgical marsupialization of the gland is desirable.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Disorders of the Vulva, 2020
- Vulvovaginal Health, 2020

Drug(s) of Choice

- Trimethoprim/sulfamethoxazole one double-strength tablet PO twice daily for 7 days.
- Ampicillin 500 mg PO four times a day or other broad-spectrum antibiotic if cellulitis is present.
- For gonorrhea—ceftriaxone 500 mg IM, or cefixime 800 mg PO single dose.

Contraindications: Known hypersensitivity or allergy to agent.

Alternative Therapies

- Excision of the gland is often difficult and is associated with significant risk of morbidity, including intraoperative hemorrhage, hematoma formation, secondary infection, scar formation, and dyspareunia. For these reasons, excision is not generally recommended.

FOLLOW-UP

Patient Monitoring: Follow-up to monitor for spontaneous drainage or the need for surgical intervention.

Prevention/Avoidance: Reduced exposure to STI and vulvar trauma.
Possible Complications: Chronic cyst formation.
Expected Outcome: Recurrences occur in 5%–10% of patients after marsupialization.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: N75.1 (Abscess of Bartholin gland).

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91 BARTHOLIN GLAND: CYSTS

INTRODUCTION

Description: A chronic cystic dilation of the Bartholin gland and duct, generally secondary to past infection.
Prevalence: 2% of adult women develop infection or enlargement of one or both Bartholin glands.
Predominant Age: Of all Bartholin gland cysts, 85% occur during the reproductive years (peak, 20–29 years). Occurrence after the age of 40 years is rare and should raise concerns about malignancy. Abscesses are almost three times more common than cysts.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Bartholin gland infection or abscess leading to obstruction of the duct.
Risk Factors: Exposure to sexually transmitted infection (STI), trauma, previous Bartholin gland abscesses.

SIGNS AND SYMPTOMS

Smaller, more chronic cysts, caused by the obstruction of the Bartholin duct may be identified by gentle palpation at the base of the labia majora. These cysts are unilateral (93%), smooth, firm, 1–3 cm diameter, and tender, with varying degrees of induration and overlying erythema. The cysts may be clear, yellow, or bluish in color. They are typically painless and asymptomatic, and they may be found incidentally during a gynecologic examination, by the patient herself, or her partner.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Epidermal inclusion or sebaceous cyst
- Mesonephric cysts of the vagina
- Lipomas
- Fibromas
- Hernias
- Hydrocele
- Bartholin gland malignancy (rare)
- Neurofibroma
- Kaposi sarcoma (generally associated with immunocompromise)

Associated Conditions: Dyspareunia.

Workup and Evaluation

Laboratory: No evaluation indicated (>80% of cultures of material from Bartholin gland cysts are sterile).
Imaging: No imaging indicated.

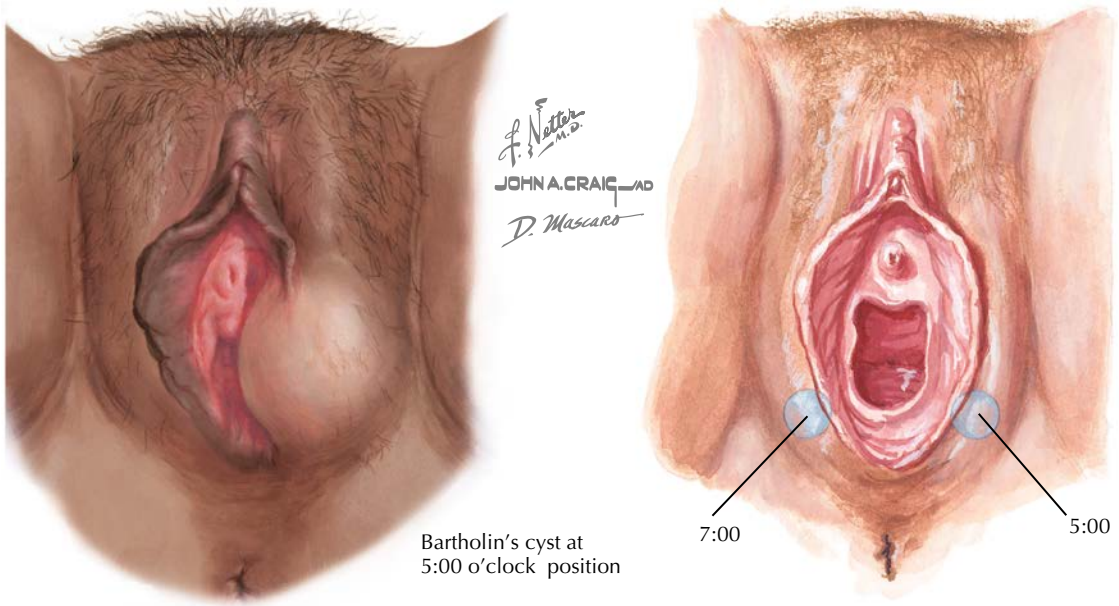

Figure 91.1 Bartholin gland cyst

Special Tests: None indicated.
Diagnostic Procedures: Inspection.

Pathologic Findings

Cystic dilation of the duct and/or gland, often with chronic induration or inflammation

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, perineal hygiene.
Specific Measures: Asymptomatic small Bartholin cysts require no therapy. Larger or symptomatic cysts require surgical marsupialization. If surgery is undertaken, it should be reserved for a time when any infection is quiescent.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- Disorders of the Vulva, 2020
- Vulvovaginal Health, 2020

Drug(s) of Choice

None indicated

Alternative Therapies

- Excision of the gland is often difficult and is associated with significant risk of morbidity, including intraoperative hemorrhage, hematoma formation, secondary infection, scar formation, and dyspareunia. For these reasons, excision is not generally recommended.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: Reduced exposure to STI and vulvar trauma.
Possible Complications: Dyspareunia, recurrent inflammation.
Expected Outcome: Recurrences occur in 5%–10% of patients following marsupialization.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: N75.0 (Cyst of Bartholin gland).

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92 CONTACT VULVITIS

INTRODUCTION

Description: Contact vulvitis is characterized by vulvar irritation caused by contact with an irritant or allergen.
Prevalence: Relatively common. Contact dermatitis accounts for roughly half of cases of vulvar itching.
Predominant Age: Any, but most common in reproductive and menopausal years.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Irritants may be primary or immunologic in character. The list of potential irritants can be extensive, including excessive hygiene ("feminine hygiene" sprays, deodorants and deodorant soaps, wipes, tampons, or pads—especially those with deodorants or perfumes), tight-fitting undergarments or those made of synthetic fabric, colored or scented toilet paper, and laundry soap or fabric softener residues. Even topical contraceptives, latex condoms, lubricants, "sexual aids," or semen may be the source of irritation. Soiling of the vulva by urine or feces can also create significant symptoms. Severe dermatitis of the vulva resulting from contact with poison ivy or poison oak is occasionally observed.
Risk Factors: Exposure to allergen (most often cosmetic or local therapeutic agents), immunosuppression, or diabetes.

SIGNS AND SYMPTOMS

- Diffuse reddening of the vulvar skin accompanied by itching or burning
- Symmetric, red, edematous change in the tissues
- Ulceration with weeping sores and secondary infection possible

DIAGNOSTIC APPROACH

Differential Diagnosis

- Vaginal infection
- Local *Candida* infection (tinea cruris)
- Vulvar dermatoses
- Atrophic vulvitis
- Vulvar dystrophy
- Pinworms
- Psoriasis
- Seborrheic dermatitis
- Neurodermatitis
- Impetigo
- Acne inversa

Associated Conditions: Dyspareunia, dysuria.

Workup and Evaluation

Laboratory: Examination of vaginal secretions under saline and 10% potassium hydroxide (KOH) to rule out possible vaginal infection.
Imaging: No imaging indicated.
Special Tests: Vulvar biopsy rarely required, although it may be diagnostic.
Diagnostic Procedures: A careful history, combined with the withdrawal of the suspected cause, usually both confirms the diagnosis and constitutes the needed therapy.

Pathologic Findings

Vulvar biopsy (if performed) shows chronic inflammatory change and infiltration by histiocytes.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Perineal hygiene (keep the perineal area clean and dry, avoid tight undergarments or those made of synthetic fabric), education regarding prevention, encouragement to complete the prescribed course of therapy.
Specific Measures: Removal of identified (or possible) allergens, topical therapy.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance, education about avoidance or risk reduction.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- Disorders of the Vulva, 2020
- Vulvovaginal Health, 2020

Drug(s) of Choice

- Wet compresses or soaks using Burow solution (aluminum acetate 2.5%–5% solution, three to four times a day for 30–60 minutes), followed by air drying or drying with a hair dryer on cool setting (loose-fitting clothing and the sparing use of a nonmedicated powder may facilitate the drying process).
- Steroid ointments (hydrocortisone 0.5%–1%) or fluorinated corticosteroids (Valisone 0.1%, Synalar 0.01%) applied one to three times a day if needed. Ointments are preferred to other formulations (cream, gel, lotion); these often contain alcohol or preservatives that exacerbate irritation.
- When itching is intense, nonsedating antihistamines (eg, cetirizine, loratadine) for daytime use and sedating antihistamines (eg, hydroxyzine) or a tricyclic antidepressant with antihistamine properties (eg, doxepin) at night may be added while other treatments take effect.

Precautions: Further evaluation is warranted (including biopsy) if initial therapy does not produce significant improvement.

Alternative Drugs

- Eucerin cream may be used to rehydrate the skin and reduce itching.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: Avoidance of possible allergens.

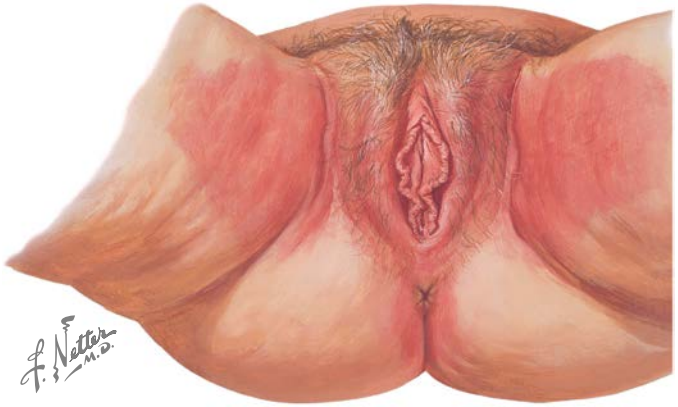

Figure 92.1 Contact vulvitis appearance

Possible Complications: Excoriation, chronic vulvar change (thickening).
Expected Outcome: With removal of the causative agent, complete resolution should be expected.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: N76.2 (Acute vulvitis) and N76.3 (Subacute and chronic vulvitis).

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DYSPAREUNIA: INSERTIONAL

93

INTRODUCTION

Description: Pain that occurs with sexual penetration is insertional dyspareunia. This may be in the form of mild discomfort that may be tolerated, pain that completely prevents intromission, or any level of pain in between. In severe cases, pain may lead to severe vaginal spasms that prevent penetration (vaginismus).
Prevalence: Approximately 15% of women each year (severe, <2% of women).
Predominant Age: Reproductive age and older.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Congenital factors (duplication of the vagina, hymenal stenosis, vaginal agenesis, vaginal septum), cystitis (acute or chronic), hemorrhoids, inadequate lubrication (abuse [current or past], arousal disorders, insufficient foreplay, medication, phobias), pelvic (levator) muscle spasm, pelvic scarring (episiotomy, childbirth injury, surgical repairs [colporrhaphy]), phobias, proctitis, trauma (acute or chronic sequelae), urethral diverticula, urethral syndrome, urethritis (bacterial or chlamydial), vaginismus, vulvar, atrophic vulvitis and genitourinary syndrome of menopause, chancroid, chemical irritation (deodorants, adjuncts, lubricants), herpes vulvitis, hypertrophic vulvar dystrophy, lichen sclerosus, lymphogranuloma venereum, vestibulitis, vulvitis (infectious), vulvodynia. Some medications, including antiestrogenic agents, gonadotropin-releasing hormone agonists, and combination oral contraceptives, can reduce vaginal lubrication.
Risk Factors: Those associated with causal pathologic conditions.

SIGNS AND SYMPTOMS

Sharp, burning, or pinching discomfort felt externally (vulva and perineum) during attempts at vaginal penetration (not limited to the penis). The discomfort is generally localized to the vulva, perineum, or outer portion of the vagina. The symptoms may help localize the cause but are often generalized and nonspecific.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Vulvitis (including condyloma, allergy)
- Vestibulitis
- Vaginitis
- Bartholin gland infection, abscess, cyst
- Atrophic change
- Anxiety, depression, phobia
- Sexual or other abuse
- Postherpetic neuralgia
- Hymenal stenosis
- Hymenal caruncle
- Interstitial cystitis

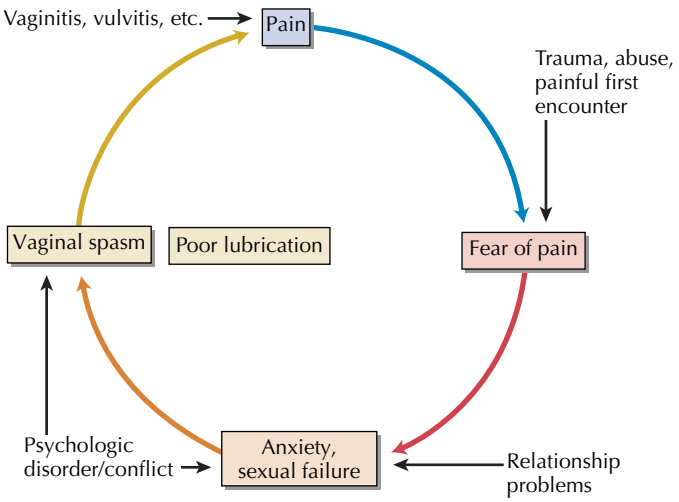

Figure 93.1 Self-perpetuating sexual pain

Associated Conditions: Vaginismus, orgasmic dysfunction. The possibility of intimate partner violence should be considered.

Workup and Evaluation

Laboratory: No evaluation indicated. Urinalysis, microscopic examination of vaginal secretions, and cultures (cervical and urethral) only for the evaluation of specific processes and clinical suspicion.
Imaging: No imaging indicated.
Special Tests: Colposcopic examination of the vulva and introitus if vestibulitis is suspected.
Diagnostic Procedures: History and pelvic examinations.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, reassurance, and relaxation measures. Vaginal lubricants (water-soluble or long-acting agents such as Astroglide, Replens, Lubrin, K-Y Jelly, and others), local anesthetics (for vulvar lesions), or pelvic relaxation exercises may be appropriate while more specific therapy is under way. These may be especially useful during the early phase of therapy when arousal may be compromised by the experience of pain.
Specific Measures: Because dyspareunia is ultimately a symptom, the specific therapy for any form of sexual pain is focused on the underlying cause.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance, relaxation training, progressive desensitization.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Disorders of the Vulva, 2020
- When Sex Is Painful, 2020
- You and Your Sexuality—Especially for Teens, 2015
- Your Sexual Health, 2019

Drug(s) of Choice

- The judicious use of anxiolytics or antidepressant medications for select patients may be appropriate but for short periods of time only.

Alternative Therapies

- Modifying the sexual techniques used by the couple may reduce pain with intercourse. Delaying penetration until maximal arousal has been achieved improves vaginal lubrication, ensures vaginal apex expansion, and provides an element of control for the female partner. Sexual positions that allow the woman to control the direction and depth of penetration (such as woman astride) also may be of help.

FOLLOW-UP

Patient Monitoring: Normal health maintenance. Watch for signs of abuse, anxiety, or depression.
Prevention/Avoidance: None.
Possible Complications: Marital discord, orgasmic or libidinal dysfunction.
Expected Outcome: With diagnosis and treatment of the underlying cause, the response should be good.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. Following delivery, and during lactation, a relative hypoestrogenic state exists that can transiently reduce vaginal lubrication.
ICD-10-CM Codes: N94.1 (Dyspareunia).

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FEMALE CIRCUMCISION (FEMALE GENITAL CUTTING) 94

INTRODUCTION

Description: Female circumcision is the removal of part or all of the external genitalia, including the labia majora, labia minora, clitoris, or all three. Female circumcision (female genital mutilation, infibulation, genital mutilation) is generally performed as a ritual process, often without the benefit of anesthesia and frequently under unsterile conditions. The resulting scarring may preclude intromission. The amount and location of tissue removed determine the type of infibulation:

- Type I—excision of the prepuce, with or without excision of part or the entire clitoris
- Type II—excision of the clitoris with partial or total excision of the labia minora (most common form)
- Type III—excision of part or all of the external genitalia and stitching/narrowing of the vaginal opening (infibulation)
- Type IV—pricking, piercing, or incising of the clitoris, labia, or both; stretching of the clitoris, labia, or both; cauterization by burning of the clitoris and surrounding tissue

Other forms of female genital mutilation include the following:

- Scraping of the tissue surrounding the vaginal orifice (angurya cuts) or cutting of the vagina (gishiri cuts)
- Introduction of corrosive substances or herbs into the vagina to cause bleeding or for the purpose of tightening or narrowing it
- Any other procedure that falls under the definition given previously

Prevalence: Approximately 168,000 women in the United States; approximately 96% of women in some African countries (eg, Somalia). United Nations Children's Fund (UNICEF) found that female circumcision has been performed in at least 200 million females in the 31 countries in Africa and the Middle East.

Predominant Age: Majority performed during childhood or early teens, typically ages 5–12 years.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Performed as part of ritual or religious beliefs, generally without the permission and often without the cooperation of the young girl herself.

Risk Factors: Most common in some African and Southeast Asian cultures.

SIGNS AND SYMPTOMS

- Significant scarring and deformity of the external genital structures, often to the point of complete obliteration of vaginal introitus (varies with the type and extent of the procedure performed)
- Chronic or recurring vaginal infections
- Obstruction may be sufficient to result in amenorrhea or dysmenorrhea
- Dyspareunia
- Orgasmic dysfunction
- Libidinal dysfunction
- Obstruction or hindrance to vaginal delivery

DIAGNOSTIC APPROACH

Differential Diagnosis

- Childhood burn injuries
- Intersex condition
- Imperforate hymen

Associated Conditions: Dyspareunia, libidinal dysfunction, and orgasmic dysfunction.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated.
Special Tests: None indicated.
Diagnostic Procedures: History and physical examinations.

Pathologic Findings

Absent or grossly scarred and deformed external genital tissues

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, support, and culturally sensitive education.

Specific Measures: Surgical opening of fused or scarred genital tissue may be necessary to allow for menstrual hygiene and sexual function. An anterior episiotomy, with or without subsequent repair, may be required at the time of childbirth (see the following).

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education: Culturally sensitive discussion of female anatomy, sexuality, and menstrual hygiene.

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Normal health maintenance. Cervical samples for cytologic examination may be difficult to obtain in patients with extensive scarring until or unless surgical revision is performed.

Prevention/Avoidance: Education of parents of young girls in cultures at risk for the procedure.

Possible Complications: Acutely (at the time of the procedure)—bleeding and infection (including tetanus), urinary retention, pain. Long-term—sexual dysfunction, difficulty with menstrual hygiene, recurrent vaginal or urinary tract infections, retrograde menstruation, hematocolpos, chronic pelvic inflammatory disease.

Expected Outcome: Sexual sequelae are often lifelong despite surgical revision (especially when clitoridectomy has been performed).

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy, but presence may complicate conception and delivery. Delivery may require an anterior episiotomy with attendant increased risk of bleeding. Subsequent repair of the episiotomy is illegal in some locations, such as the United Kingdom and others, because this amounts to reinfibulation.

ICD-10-CM Codes: N90.81 (Female genital mutilation status), N90.811 (Female genital mutilation Type I status), N90.812 (Female genital mutilation Type II status), N90.813 (Female genital mutilation Type III status), and N90.814 (Female genital mutilation Type IV status).

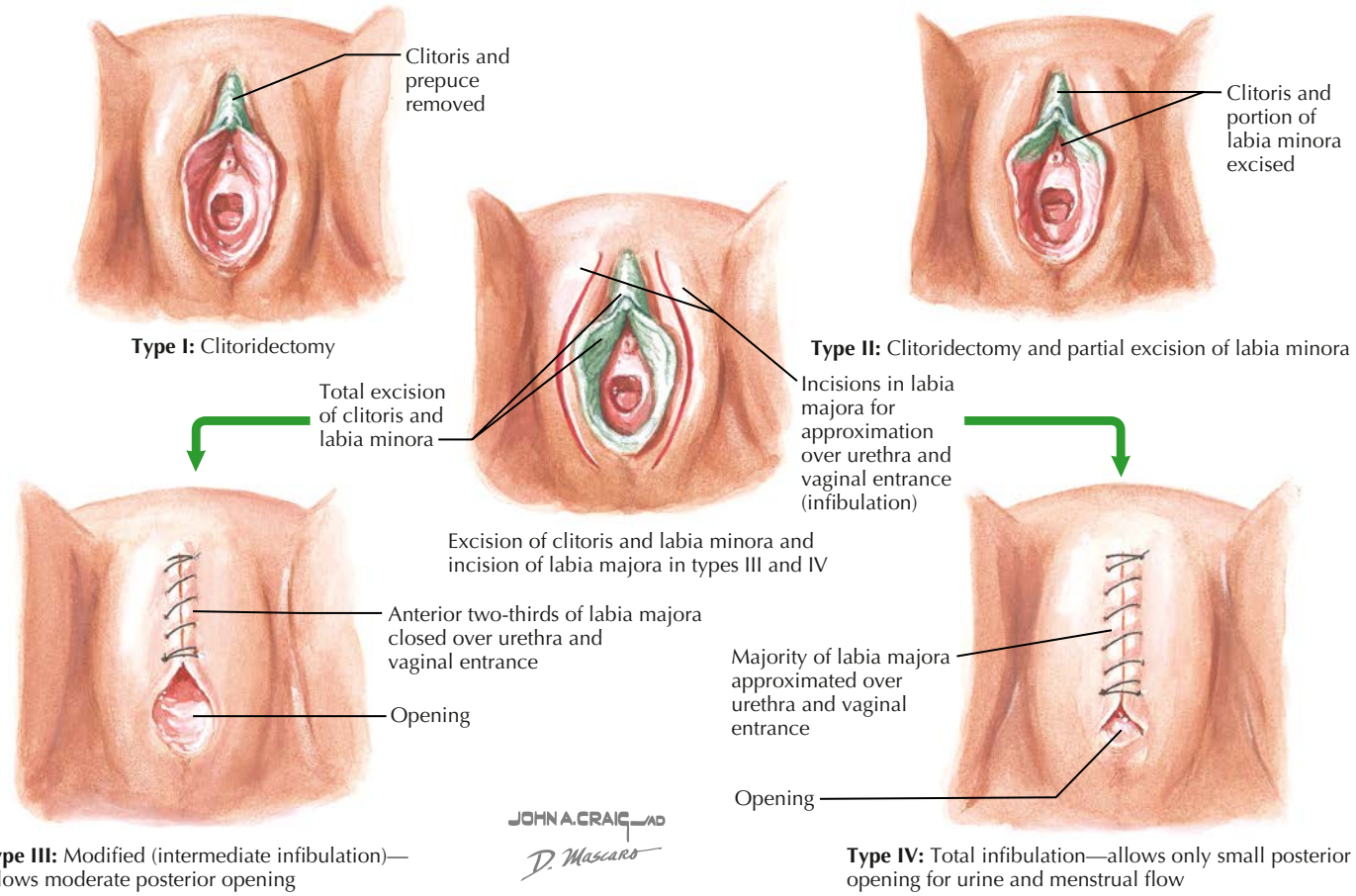

Figure 94.1 Female circumcision

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GENITOURINARY SYNDROME OF MENOPAUSE

INTRODUCTION

Description: A collection of symptoms and changes that occur in the female reproductive tract due to a lack of estrogen. Previously known as vulvovaginal atrophy, urogenital atrophy, or atrophic vaginitis.

Prevalence: Occurs to some extent in 100% of postmenopausal women who do not undergo estrogen therapy; roughly 10%–40% will experience one or more symptoms of vaginal atrophy (eg, vaginal dryness affects up to 85% of patients older than 40 years of age). Up to 70% of symptomatic patients do not seek treatment.

Predominant Age: Generally beginning within 5 years of menopause (natural or surgical).

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Changes in the support and function of the tissues of the reproductive tract due to loss of estrogen stimulation, resulting in changes to the labia majora and minora, clitoris, vestibule, vaginal introitus, vagina, urethra, and bladder.

Risk Factors: Loss of ovarian function because of age, chemotherapy, radiation, or surgery, antiestrogenic drugs, or gonadotropin-releasing hormone agonist therapy. A transient hypoestrogenic state can occur during the postpartum period or while lactating, but generally resolves before significant genital changes can occur.

SIGNS AND SYMPTOMS

- Sensation of vaginal dryness
- Vaginal itching, burning, or irritation
- Loss of vaginal acidity (pH ≥5, may reach 6.8 or higher)
- Insertional dyspareunia, decreased arousal, orgasm, or sexual desire
- Thinning of labia majora and loss of the labia minora
- Dry, inflamed vaginal tissues seen on pelvic examination
- Loss of normal vaginal rugae
- Bleeding, petechiae, and ulceration of the vaginal tissues
- Urethral prolapse/caruncle
- Recurrent urinary tract infections
- Urinary urgency (urge incontinence), frequency, dysuria

DIAGNOSTIC APPROACH

Differential Diagnosis

- Infectious vaginitis or vulvitis (bacterial, fungal, trichomonas, herpetic)
- Urinary tract infection
- Vulvar dermatoses (lichen sclerosus, lichen planus, contact dermatitis)
- Crohn disease
- Vulvodynia
- Changes after radiation exposure

Associated Conditions: Sexual dysfunction. Loss of pelvic organ support (cystocele, rectocele, enterocele, uterine prolapse); stress incontinence; fecal incontinence; increased risk of other menopause-related conditions, including osteoporosis, increased risk of cardiovascular disease, hot flashes and flushes, or sleep disturbances.

Workup and Evaluation

Laboratory: No evaluation indicated.

Imaging: No imaging indicated.

Special Tests: A vaginal maturation index may be performed but is generally not required. Vaginal pH is easily measured.

Diagnostic Procedures: History and clinical characteristics.

Pathologic Findings

Loss of superficial genitourinary epithelial cells and supporting collagen causes thinning of tissue, loss of vaginal rugae and elasticity, with a narrowing and shortening of the vagina. Reductions in vaginal acid mucopolysaccharides and hyaluronic acid, which normally help to maintain vaginal moisture. There is loss of subcutaneous fat in the labia majora, resulting in narrowing of the introitus, fusion of the labia minora, and shrinking of the clitoral prepuce and urethra. Vaginal pH becomes more alkaline, increasing the risk of urogenital infection.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Vaginal moisturizers, smoking cessation (smoking depletes circulating estrogen).

Specific Measures: Hormone therapy (local or systemic) in addition to treatments aimed at specific symptoms.

Diet: No specific dietary changes indicated.

Activity: No restriction except those imposed by ability.

Patient Education: Reassurance and counseling.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Disorders of the Vulva, 2020
- The Menopause Years, 2020
- Urinary Incontinence, 2020
- Vulvovaginal Health, 2020

Drug(s) of Choice

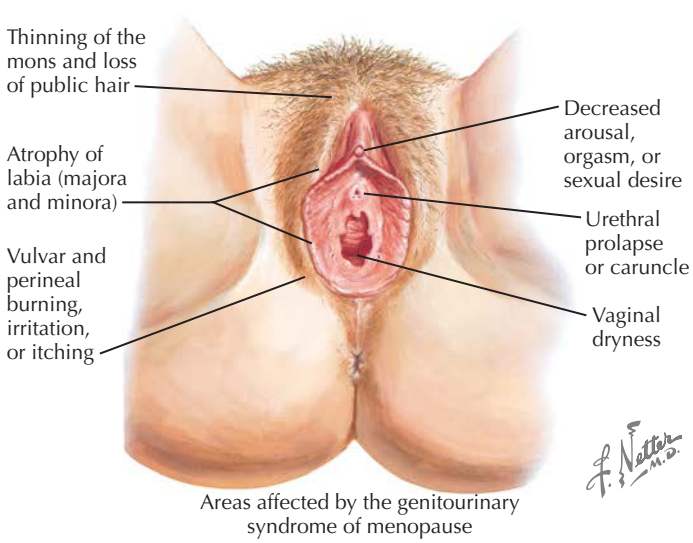
- Estrogen therapy when appropriate (see "Menopause"). Topical therapy (cream, tablet, capsule, ring) is advised for those women with only genital tract symptoms. When topical estrogen alone is used, concomitant use of a progestin to protect the endometrium is not necessary.
- Water-soluble lubricants (eg, Astroglide, Slippery Stuff, K-Y Jelly, K-Y SILK-E) or silicone-based (eg, Pjur, ID Millennium) for dryness, irritation, and intercourse.
- Long-acting emollients (Replens, etc.).

Contraindications: Known or suspected allergy or intolerance to any agent.

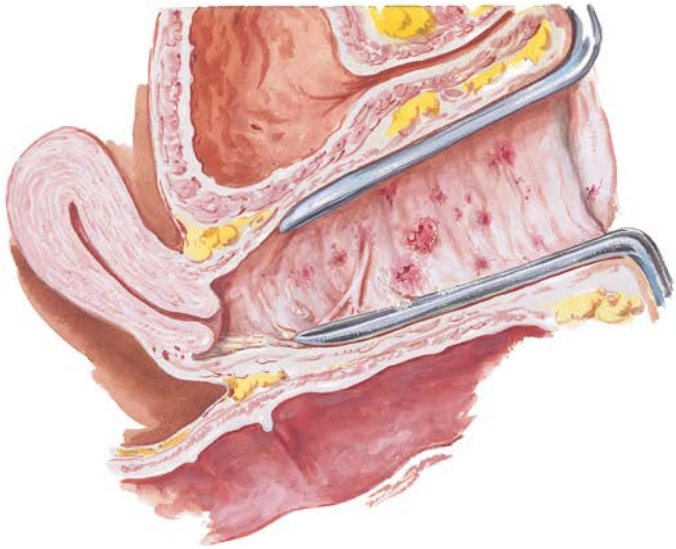
Precautions: If leakage of urine is occurring, protection of the vulvar skin with zinc oxide or diaper rash agents is advisable. Some believe that lubricants containing glycerin may increase the risk of vulvovaginal candidiasis.

Alternative Therapies

- Bioidentical hormones such as micronized progesterone and estradiol. Other compounded preparations, not regulated by the US Food and Drug Administration, may have issues surrounding safety or efficacy, purity, potency, and quality. There are insufficient data to support herbal remedies or soy products for the treatment of vaginal symptoms.
- Preliminary studies suggest that topically applied androgens (dehydroepiandrosterone) may be effective in reducing vaginal atrophy symptoms, including dyspareunia.
- Selective serotonin reuptake inhibitors (SSRIs), selective serotonin-norepinephrine reuptake inhibitors (SSNRIs),



Areas affected by the genitourinary syndrome of menopause



Thinning of the vaginal epithelium, loss of vaginal rugae, petechiae, and ulceration

Figure 95.1 Areas affected by the genitourinary syndrome of menopause

clonidine, and gabapentin are effective for the treatment of vasomotor symptoms but offer no benefit in the treatment of symptoms of genital atrophy.

- Studies suggest that ospemifene (estrogen agonist and estrogen antagonist approved for moderate-to-severe dyspareunia) improves vaginal atrophy without stimulating the endometrium.

FOLLOW-UP

Patient Monitoring: Continued follow-up for efficacy as well as continued health maintenance.

Prevention/Avoidance: Estrogen therapy for symptoms, Kegel muscle exercises to help maintain pelvic support.

Possible Complications: Vaginal dryness (vaginal lacerations, secondary infection), dyspareunia, stress urinary incontinence, fecal incontinence, detrimental effect on a woman's quality of life, self-esteem, and sexual intimacy.

Expected Outcome: Symptoms generally improve with estrogen therapy, supplemented with topical agents, pessary therapy, or surgery.

MISCELLANEOUS

Pregnancy considerations: Not applicable.

ICD-10-CM Codes: N95.1 (Menopausal and female climacteric states), N95.2 (Postmenopausal atrophic vaginitis)

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HYMENAL STENOSIS

96

INTRODUCTION

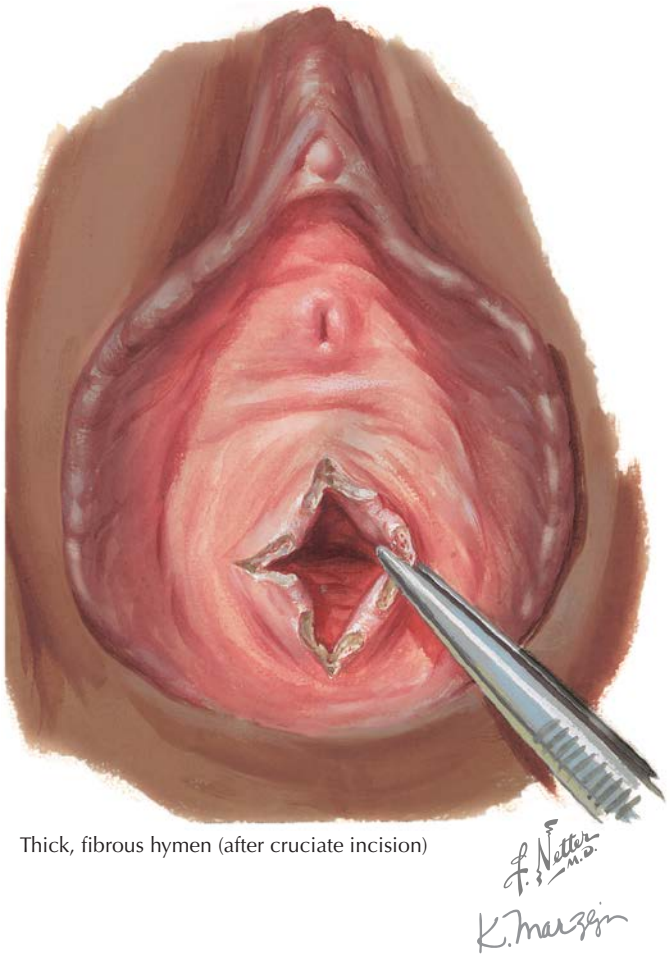
Description: Hymenal stenosis is the thickening or narrowing of the hymenal opening, resulting in difficulty with tampon use and intercourse.
Prevalence: Uncommon.
Predominant Age: Congenital, although generally diagnosed in the early reproductive years.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Congenital narrowing of the hymen or scarring after trauma or surgery (eg, previous excision, trauma).
Risk Factors: Introital surgery (for iatrogenic cases).

SIGNS AND SYMPTOMS

- Insertional dyspareunia
- Difficulty with tampon use
- Narrowing of the vaginal introitus



Thick, fibrous hymen (after cruciate incision)

Figure 96.1 Hymenal stenosis

DIAGNOSTIC APPROACH

Differential Diagnosis

- Vulvar vestibulitis
- Vaginismus
- Other vulvitis
- Cribriform hymen

Associated Conditions: Dyspareunia, orgasmic or libidinal dysfunction.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated.
Special Tests: None indicated.
Diagnostic Procedures: History and physical examinations.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, reassurance.
Specific Measures: Gentle digital dilation, surgical excision.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Sensitive discussion of female anatomy, sexuality, and menstrual hygiene.

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: Sexual dysfunction.
Expected Outcome: Generally good, but secondary problems (such as sexual dysfunction) may often persist.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy once achieved. Generally, no effect on the route of delivery. Delivery (with or without an episiotomy) often results in improvement or resolution of symptoms.
ICD-10-CM Codes: N89.6 (Tight hymenal ring).

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97 HYPERPLASTIC VULVAR DYSTROPHY (SQUAMOUS CELL HYPERPLASIA, LICHEN SIMPLEX CHRONICUS)

INTRODUCTION

Description: Hypertrophic vulvar dystrophy (lichen simplex chronicus) is a thickening of the vulvar skin over the labia majora, outer aspects of the labia minora, and clitoral areas. Eczematous inflammation or hyperkeratosis may be present.

Prevalence: Common, 40%–45% of non-neoplastic epithelial disorders.

Predominant Age: Middle to late reproductive age and older.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown. Dermal reaction to chronic itch-scratch cycle. Often associated with or worsened by stress and can be seen as a localized variant of atopic dermatitis. It represents an end-stage response to a wide variety of possible initiating processes, including environmental factors and dermatologic disease.

Risk Factors: Genital atrophy (postmenopausal), recurrent vulvitis.

SIGNS AND SYMPTOMS

- Vulvar itching (almost always present)
- Dusky-red to thickened-white appearance of the vulva
- Fissuring and excoriations (common)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Vulvar cancer (premalignant or malignant changes)
- Chronic mycotic vulvitis
- Contact vulvitis
- Psoriasis
- Paget disease
- Lichen sclerosus

Associated Conditions: Vulvodynia, vulvar pruritus, and dyspareunia.

Workup and Evaluation

- **Laboratory:** No evaluation indicated.
- **Imaging:** No imaging indicated.
- **Special Tests:** Biopsy may be required to confirm the diagnosis. Cultures for *Candida* or other dermatophytes should be considered.
- **Diagnostic Procedures:** History, physical examination, vulvoscopy, or biopsy of lesions.

Pathologic Findings

Thickening of the epithelium with acanthosis, elongation of the epithelial folds, and chronic inflammatory changes (lymphocytes and plasma cells) occur. Hyperkeratosis may be present.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Perineal hygiene, sitz baths, stress reduction. Reduce or eliminate sources of irritation such as candidiasis or contact allergy. Wearing white cotton gloves (especially at night) reduces the tissue damage caused by scratching.

Specific Measures: Treatment is focused on interrupting the itch-scratch-rash-itch cycle. Topical steroids, perineal soothing agents, and agents to reduce itching are most effective. If significant improvement is not achieved in 3 months, biopsy is indicated.

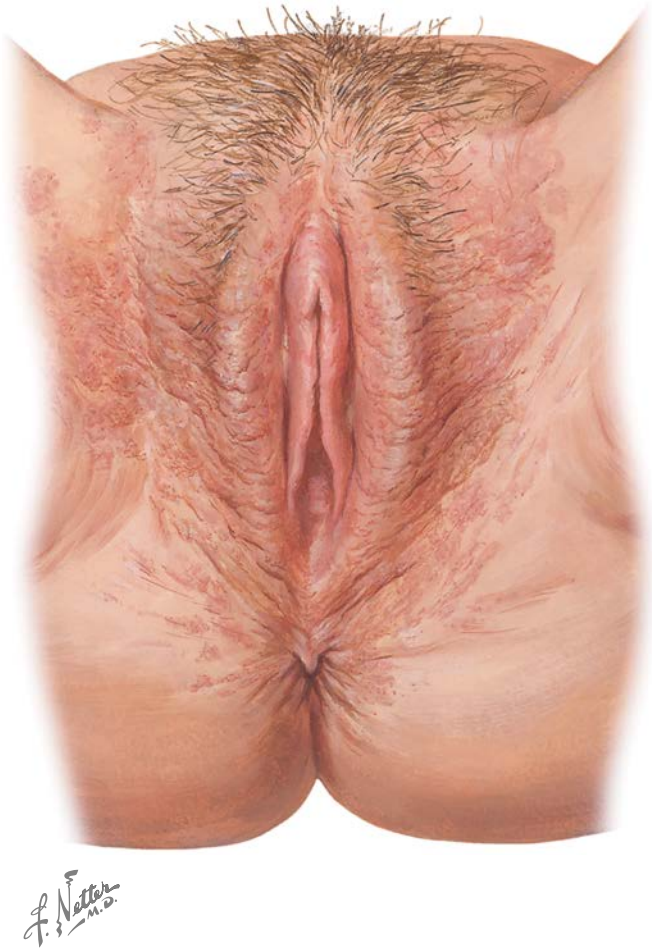

Figure 97.1 Hyperplastic vulvar dystrophy

Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- Disorders of the Vulva, 2020

Drug(s) of Choice

- Fluocinolone acetonide 0.025% or 0.01%, triamcinolone acetonide 0.01% or betamethasone valerate (Valisone) 0.1%, or a similar corticosteroid applied two to three times daily may give relief.
- Once relief is achieved, treatment should switch to hydrocortisone 2.5% cream or ointment.
- For itching: diphenhydramine hydrochloride (Benadryl) or hydroxyzine hydrochloride (Atrax) used at night.

Contraindications: See individual agents.
Precautions: Fluorinated steroids should be used for short periods only and replaced with hydrocortisone or nonsteroidal therapies when possible.
Interactions: See individual agents.

Alternative Drugs

- Topical clobetasol propionate (0.05%) may be used if relief of pruritus is not achieved with less potent agents.
- Subcutaneous injections of triamcinolone (5 mg suspension mixed with 2 mL of saline) or alcohol (0.1–0.2 mL of absolute alcohol) have been reported but should be reserved for the most intractable disease.
- Topical progestins and androgens have been advocated as alternative therapies.

FOLLOW-UP

Patient Monitoring: Constant vigilance is required to watch for possible premalignant or malignant changes that can often mimic these lesions and those of lichen sclerosus.
Prevention/Avoidance: Avoidance of local irritants.
Possible Complications: Vulvar cancer may be overlooked; excoriation is common with secondary infection possible.
Expected Outcome: Generally good if itch-scratch cycle is broken.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: N90.6 (Hypertrophy of vulva).

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98 IMPERFORATE HYMEN

INTRODUCTION

Description: An imperforate hymen is the most commonly encountered anomaly that results from abnormalities in the development or canalization of the müllerian ducts.
Prevalence: Uncommon. Thought to be 1/5000 live-born females.
Predominant Age: Generally not diagnosed until puberty; occasionally diagnosed soon after birth (mucocolpos).
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Failure of the endoderm of the urogenital sinus and the epithelium of the vaginal vestibule to fuse and perforate during embryonic development.
Risk Factors: None known.

SIGNS AND SYMPTOMS

- Vaginal obstruction
- Primary amenorrhea
- Cyclic abdominal pain
- Hematocolpos
- Urinary retention

DIAGNOSTIC APPROACH

Differential Diagnosis

- Vaginal agenesis
- Hermaphroditism

Associated Conditions: Endometriosis, vaginal adenosis, infertility, chronic pelvic pain, sexual dysfunction, renal anomalies, and hematocolpos.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: Ultrasonography to evaluate the upper genital and urinary tracts.
Special Tests: None indicated.
Diagnostic Procedures: History and physical examinations.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, reassurance.
Specific Measures: Incision and resection of hymenal membrane and drainage of vaginal canal, best done after the tissues have undergone estrogen stimulation (neonatal or postpubertal but premenarchal period). A simple incision and drainage is not adequate.
Diet: No specific dietary changes indicated.
Activity: No restriction.

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: Hematocolpos, endometriosis, hymenal scarring and narrowing after surgical excision.
Expected Outcome: Generally good with early resection. Delayed diagnosis is associated with reduced fertility caused by secondary damage (endometriosis).

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy, although often associated with conditions that do affect fertility, such as endometriosis. Reproductive outlook is best when diagnosis and treatment occur early.
ICD-10-CM Codes: Q52.3 (Imperforate hymen).

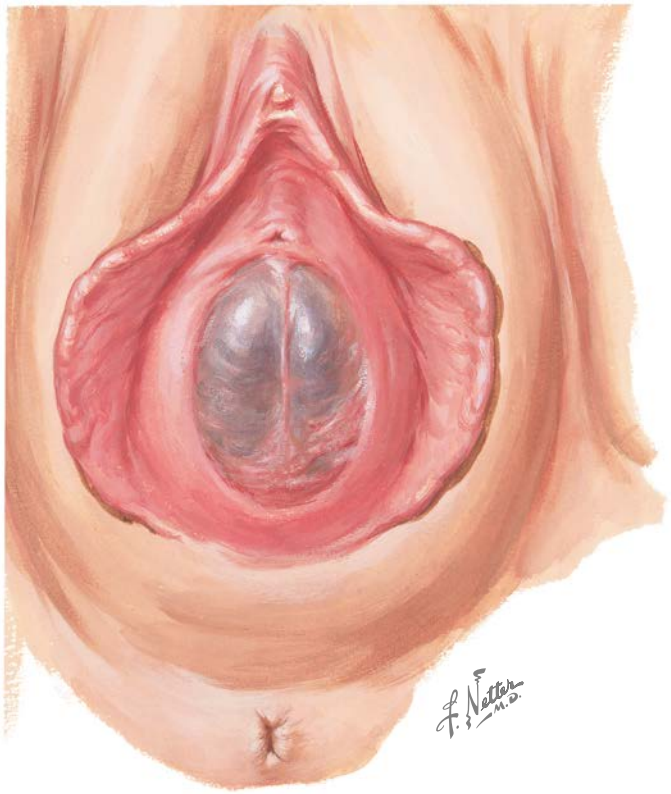

Figure 98.1 Imperforate hymen

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LABIAL ADHESIONS

99

INTRODUCTION

Description: Labial adhesions (synechia vulvae) are agglutination of the labial folds that result in fusion in the midline.
Prevalence: 1%–2% of female children.
Predominant Age: Peak is 2–6 years; may be found at any age up to puberty. May also occur in postmenopausal women with significant vulvar atrophy or lichen sclerosus. May also occur as a complication of cosmetic vaginal or vulvar procedures.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Local inflammation and the hypoestrogenic environment of preadolescence.
Risk Factors: Labial infections or irritation.

SIGNS AND SYMPTOMS

- Fusion of the labia majora in the midline (extends from just below the clitoris to the posterior fourchette)
- May be asymptomatic
- Retention of urine in the vestibule or vagina resulting in dribbling, irritation, discharge, and odor
- Recurrent urinary or vaginal tract infections

DIAGNOSTIC APPROACH

Differential Diagnosis

- Intersex
- Female circumcision
- Sexual abuse

Associated Conditions: Urinary tract infection.

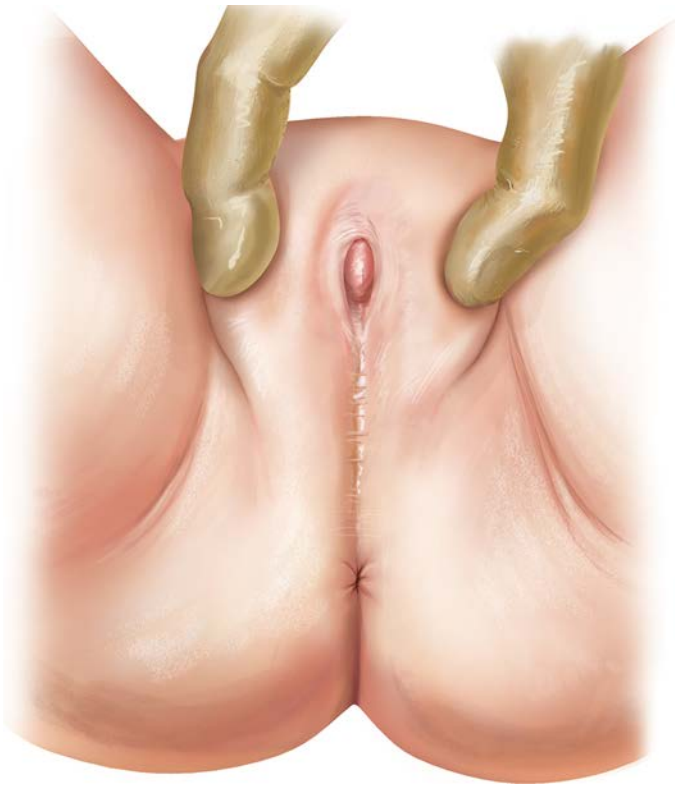

Figure 99.1 Labial adhesion

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated.
Special Tests: None indicated.
Diagnostic Procedures: History and physical examinations.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, reassurance, perineal hygiene, and sitz baths.
Specific Measures: Treatment indicated only if urination is adversely affected, or if they are associated with recurrent infections or pain; otherwise, they will spontaneously regress at puberty with the onset of increased estrogen production. Topical estrogen cream (gentle traction to separate the labia is not necessary and is strongly discouraged). Surgical treatment is almost never required.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- Your Changing Body—Especially for Teens, 2018

Drug(s) of Choice

- Topical estrogen or estradiol cream (Premarin vaginal cream, dienestrol cream)—small portion applied to the vulva twice a day for 7–10 days. May be continued one to three times a week if desired, although generally not necessary. Use beyond 3 months is discouraged.
- Topical betamethasone 0.05% twice daily for 4–6 weeks has been suggested as an alternative or adjunct to topical hormone therapy.

Contraindications: Undiagnosed vaginal bleeding.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: Good perineal hygiene.
Possible Complications: Vaginitis, urinary tract infection, urinary retention, or vaginal cyst formation.
Expected Outcome: Excellent.

MISCELLANEOUS

ICD-10-CM Codes: Q52.5 (Fusion of labia).

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100 LICHEN PLANUS

INTRODUCTION

Description: Lichen planus is a non-neoplastic epithelial disorder that affects glabrous skin, hair-bearing skin and scalp, nails, mucous membranes, or the oral cavity and vulva.
Prevalence: Unknown, but relatively common. Estimated to affect 0.5%–2% of the population.
Predominant Age: 30–60 years; peak age 50–60 years.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown. Proposed—autoimmune disorder, possibly initiated by certain drugs such as β-blockers and angiotensin-converting enzyme (ACE) inhibitors. Considered to arise from a T-cell–mediated autoimmune response against basal keratinocytes.
Risk Factors: None known.

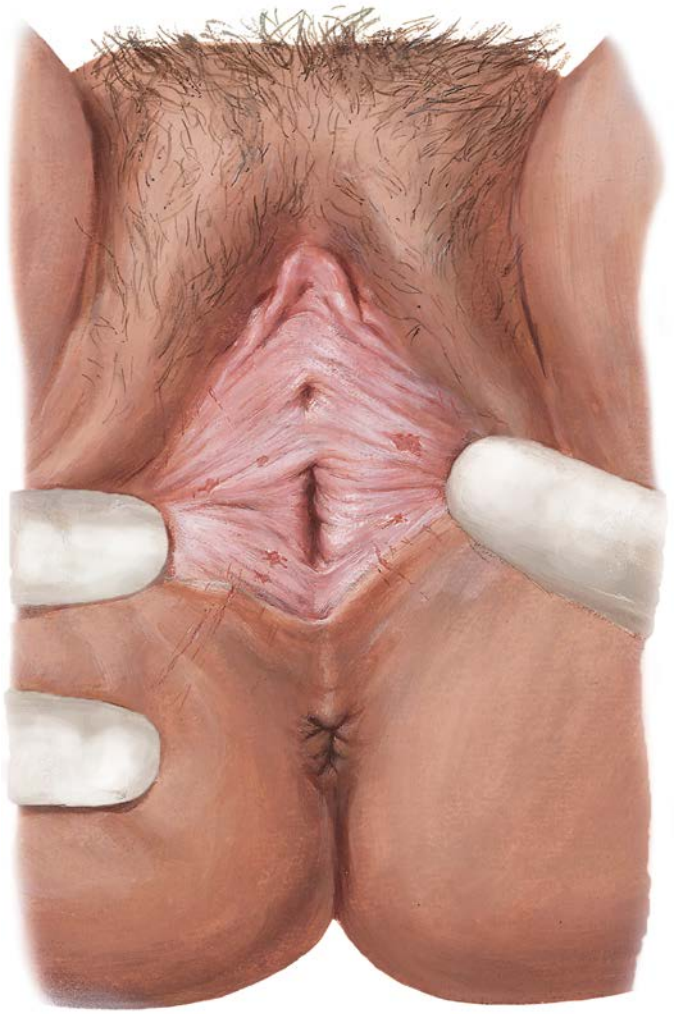

Figure 100.1 Lichen planus

SIGNS AND SYMPTOMS

- Vulvar pain, burning, pruritus, soreness.
- Dyspareunia and postcoital bleeding are common.
- Well-demarcated erosion with erythematous patches and ulceration of the vulva and inner aspects of the labia minora (may precede oral lesions by years; 33% of patients). White striae or a serpentine, white border along the margins are common.
- Loss of the labia minora with scarring, adhesions, and narrowing common (complete obliteration of the vagina possible).
- Oral lesions—reticulated gray, lacy pattern (Wickham striae) with gingivitis (vulvar involvement in 50% of patients with oral lesions).

DIAGNOSTIC APPROACH

Differential Diagnosis

- Amebiasis
- Behçet syndrome
- Candidiasis
- Dermatophyte infection
- Desquamative inflammatory vaginitis (DIV)
- Lichen sclerosus
- Neurodermatitis
- Pemphigus and pemphigoid (cicatricial or bullous type)
- Plasma cell vulvitis
- Psoriasis
- Squamous cell hyperplasia
- Systemic lupus erythematosus
- Vulvar intraepithelial neoplasia (VIN III)

Associated Conditions: Hair loss and a history of papular lesions on the skin (ankle, dorsal surface of the hands, and flexor surfaces of the wrists and forearms). Vaginal involvement is seen in up to 70% of patients. The disorder is often associated with other autoimmune diseases.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated.
Special Tests: Skin biopsy (taken from the nearby intact skin or mucous membranes rather than the ulcer). Direct immunofluorescence testing on fresh tissue. The vaginal pH is increased, usually to approximately 5.0–6.0.
Diagnostic Procedures: History, physical examination, and biopsy.

Pathologic Findings

Chronic inflammatory cell infiltrate (lymphocytes and plasma cells) involving the superficial dermis and the basal and parabasal epithelium. Liquefaction necrosis with colloid bodies may be present. Prominent acanthosis with a prominent granular layer and hyperkeratosis. Ulceration and bullae may be present. Hyperkeratosis is absent in the vulvar tissues. Sometimes labeled as DIV when vaginal discharge predominantly contains inflammatory cells and immature parabasal and basal epithelial cells.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, local cleansing, antipruritics.
Specific Measures: Therapy is often difficult, chronic, and prone to failure or relapse. Therapies include steroids, retinoids, griseofulvin, dapsone, cyclosporine, and surgery. Vaginal dilators may be necessary to maintain vaginal caliber.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- Disorders of the Vulva, 2020

Drug(s) of Choice

- Topical steroids—clobetasol 0.05% ointment, betamethasone valerate 0.1% ointment, or hydrocortisone 25-mg vaginal suppository daily.
- Griseofulvin 250 mg PO twice a day.
- Dapsone 50–100 mg PO daily after negative results of screening for glucose-6-phosphate dehydrogenase.
- Tacrolimus 2-mg suppositories nightly for 30 days.
- Isotretinoin (Accutane) 0.5–1 mg/kg daily in divided doses or etretinate (Tegison) 0.75–1 mg/kg daily in two doses.
- Cyclosporine 1 mg/kg daily, increased weekly by 0.5 mg/kg daily up to 3–5 mg/kg daily.

Contraindications: Vulvar cancer. Isotretinoin and etretinate are teratogenic and must not be given during pregnancy or if there is a potential for pregnancy.

Precautions: Continued or prolonged use of topical steroids may result in thinning of the skin outside the area of lichen sclerosus with subsequent atrophy and traumatic injury (splitting and cracking). The use of dapsone, isotretinoin, etretinate, or cyclosporine requires careful monitoring of complete blood counts, liver function tests, cholesterol, triglycerides, electrolytes, urea nitrogen, creatinine, and creatinine clearance. Reliable contraception must be maintained if isotretinoin or etretinate is used.
Interactions: See individual agents.

FOLLOW-UP

Patient Monitoring: Because malignant change is possible, long-term follow-up is required.

Prevention/Avoidance: None.
Possible Complications: Vulvar lesions are often chronic and may undergo malignant change. Erosive lichen planus (mucosal lichen planus) can result in severe tissue destruction.
Expected Outcome: Chronic therapy required, with relapses common. Scarring may lead to additional problems.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: L43.8 (Other lichen planus) and L66.1 (Lichen planopilaris).

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101 LICHEN SCLEROSUS

INTRODUCTION

Description: Lichen sclerosus is a chronic condition of the vulvar skin that is characterized by thinning, distinctive skin changes, and inflammation. It is non-neoplastic and involves glabrous skin and the vulva. The term *lichen sclerosus et atrophicus* has been dropped because the epithelium is metabolically active and not atrophic. At one time, the condition was also referred to as *kraurosis vulvae.*
Prevalence: Common.
Predominant Age: Late reproductive to early menopausal (however, it may be seen as early as 6 months).
Genetics: No genetic pattern. Familial aggregations have been reported.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown. Proposed—immunologic (autoimmune), genetic, inactive or deficient androgen receptors, epidermal growth factor deficiency.
Risk Factors: None known.

SIGNS AND SYMPTOMS

- Intense itching common (99%)
- Dysuria
- Anal discomfort
- Dyspareunia

Figure 101.1 Lichen sclerosus

- Thinned, atrophic-appearing skin, with linear scratch marks or fissures (the skin often has a "cigarette-paper" or parchment-like appearance). These changes frequently extend around the anus in a figure-eight configuration.
- Perianal involvement can create the classic figure-eight or hourglass shape.
- Atrophic changes result in thinning or even loss of the labia minora and significant narrowing of the introitus.
- Fissures, scarring, and synechiae cause marked pain for some patients.
- Extragenital lesions reported in up to 13% of women with vulvar disease.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Lichen simplex chronicus (hyperplastic vulvar dystrophy)
- Scleroderma
- Vitiligo
- Paget's disease
- Vulvar candidiasis
- Squamous cell hyperplasia or carcinoma (when thickening is present)

Associated Conditions: Vulvodynia, hypothyroidism, vulvar squamous cancer (5% lifetime risk). Vaginal involvement is uncommon.

Workup and Evaluation

Laboratory: Thyroid function studies should be considered because up to one-third of patients have coexisting hypothyroidism.
Imaging: No imaging indicated.
Special Tests: Culture or potassium hydroxide wet preparations of skin scrapings may help to evaluate the possibility of candidiasis. Punch biopsy of the skin will establish the diagnosis but may not be required in most cases.
Diagnostic Procedures: History, physical examination, and biopsy of affected area.

Pathologic Findings

Loss of normal vulvar architecture with loss of rete pegs; a homogeneous dermis with edema, fibrin, and loss of vascularity; elastic fibers; and dermal collagen. Chronic inflammation is common, and spongiosis of the basilar epithelial cells is often present. Ulceration or hypertrophy may be present because of rubbing or scratching.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, perineal hygiene, cool sitz baths, moist soaks, or the application of soothing solutions such as Burow solution. Patients should be advised to wear loose-fitting clothing and keep the area dry and well ventilated. Emollients, such as petroleum jelly, may help in reducing local drying.
Specific Measures: Topical steroid therapy is preferred over the traditional testosterone cream. Surgical excision is occasionally required if medical therapy fails. This is associated with a high rate of recurrence and the risk of postsurgical scarring.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Disorders of the Vulva, 2020
- Vaginitis, 2021
- When Sex Is Painful, 2020

Drug(s) of Choice

- Burow solution (Domeboro) aluminum acetate 5% aqueous solution, three to four times daily for 30–60 minutes.
- Crotamiton 10% (Eurax) may be topically applied twice daily. High-potency prednisolone analogs (clobetasol propionate [Cormax, Temovate]) 0.05% twice a day for 30 days, every night for 30 days, and then daily.
- Fluorinated corticosteroids (betamethasone [Valisone 0.1%], fluocinolone [Synalar 0.01%]) applied two or three times a day for 2 weeks. Lower-potency steroids (hydrocortisone) may be used after initial therapy or in children.
- Testosterone propionate in petrolatum (2%) applied two to three times daily for up to 6 months.

Contraindications: Vulvar cancer.
Precautions: Continued or prolonged use of topical steroids may result in thinning of the skin outside the area of lichen sclerosus with subsequent atrophy and traumatic injury (splitting and cracking). Prolonged testosterone propionate therapy may be associated with clitoral enlargement or pain, local burning, or erythema. Hirsutism may rarely result.

Alternative Drugs

- In select patients, intralesional steroids (Kenalog-10) may be used.
- Topical progesterone 400 mg in oil with 4 oz of Aquaphor applied twice a day may be substituted for testosterone cream in children.
- Topical tacrolimus has been studied in a limited number of patients, but it does not work as fast or as effectively as potent topical corticosteroids.
- Ultraviolet A1 phototherapy may be an additional treatment option.

FOLLOW-UP

Patient Monitoring: Frequent follow-up (3–6 months) is required to watch for recurrence or worsening of symptoms.
Prevention/Avoidance: None.
Possible Complications: Scarring and narrowing of the introitus may be sufficient to preclude intercourse. Excoriation with secondary infections may occur. Areas that become hyperplastic because of scratching are thought to be at increased risk for premalignant or malignant changes.
Expected Outcome: Initial response is generally good, but recurrence is common, often necessitating lifelong therapy.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy (generally not a consideration).
ICD-10-CM Codes: Based on the location and severity of disease.

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102 VULVAR CANCER

INTRODUCTION

Description: Squamous cell cancer of the vulva generally manifests as an exophytic ulcer or hyperkeratotic plaque. It may arise as a solitary lesion or develop hidden within hypertrophic or other vulvar skin changes, making diagnosis difficult and often delayed. Other malignancies (25%) such as sarcoma, melanoma, clitoral malignancy, and metastatic malignancies can also affect the vulva.
Prevalence: Roughly 6330 new cases of and 1560 deaths from vulvar cancer each year; accounts for less than 5% of gynecologic malignancies; less common than cancer of the uterine corpus,

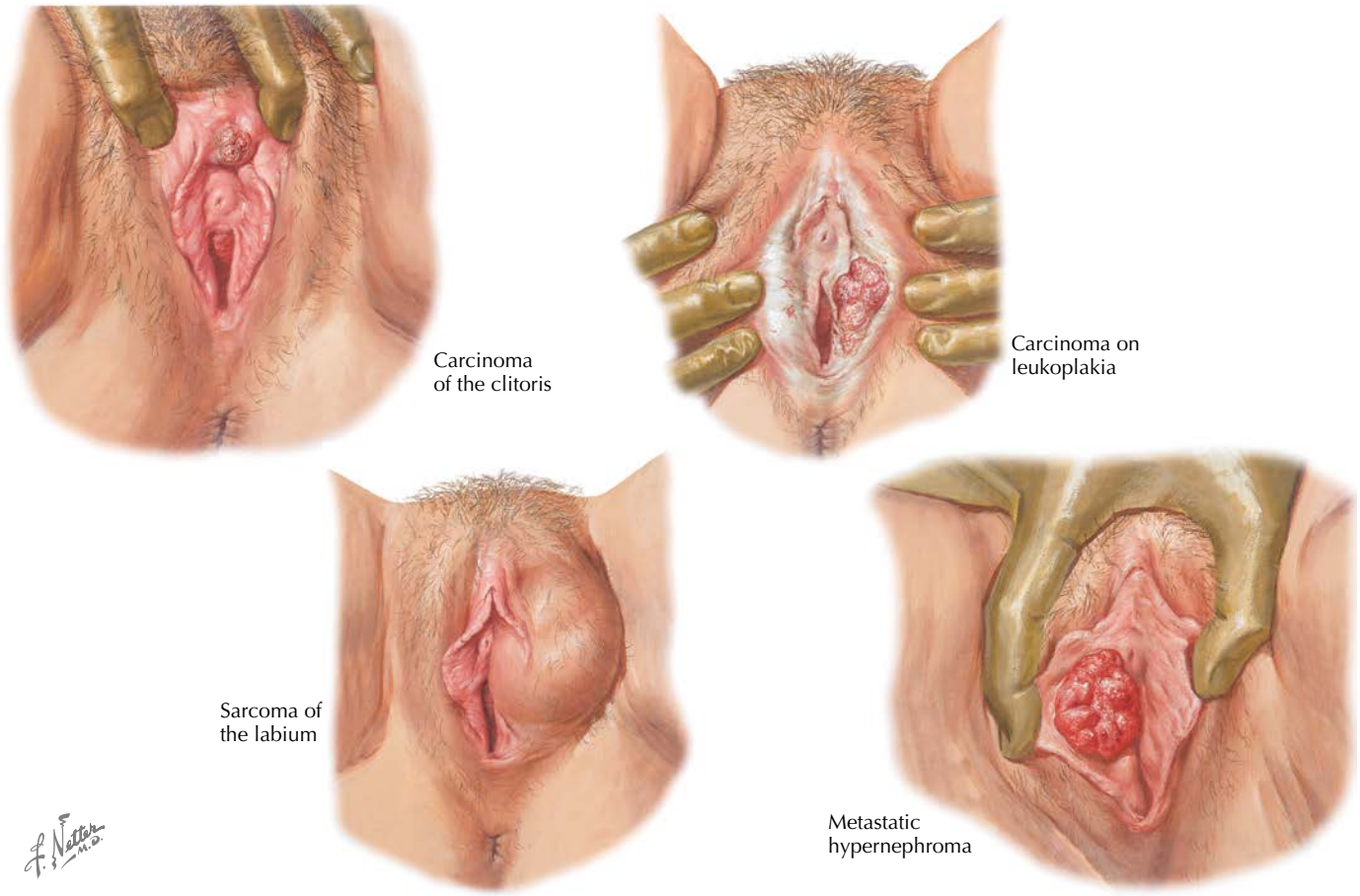

Figure 102.1 Types of vulvar cancer

ovary, cervix, and vagina. Lifetime risk of vulvar cancer is 0.3%. The incidence of vulvar intraepithelial neoplasia increased by approximately 50% in the last 20 years and is likely related to increased exposure to human papillomavirus (HPV).

Predominant Age: In situ, 40–49 years; invasive, 55–70 years; median age at death is 78 years.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown, although strongly associated with HPV.

Risk Factors: Infection with HPV (molecular analysis has detected HPV DNA [types 16, 18, and 33 predominately] in 60% of vulvar cancers), smoking, immunosuppression, lichen sclerosus, chronic irritation, northern European ancestry.

SIGNS AND SYMPTOMS

- Itching, irritation, cracking, or bleeding of the vulva, most common on the posterior two-thirds of the labia majus (the labia minora, perineum, clitoris, and mons are less frequently involved)
- Ulcerated exophytic lesion or hyperkeratotic plaque (late in disease)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Hypertrophic vulvar dystrophy
- Lichen sclerosus
- Epidermal inclusion cysts
- Condyloma acuminata
- Acrochordons
- Seborrheic keratoses

Associated Conditions: Hyperplastic vulvar dystrophy. A synchronous second malignancy, most commonly cervical neoplasia, is found in up to 22% of patients with a vulvar malignancy.

Workup and Evaluation

Laboratory: No evaluation indicated.

Imaging: No imaging indicated, although positron emission tomography with computed tomography can identify regional lymph node metastases when spread is suspected. Magnetic resonance imaging may assist in defining the extent of disease prior to surgery.

Special Tests: Biopsy of any suspicious lesion. A 5% acetic acid solution may be applied, and the vulva is examined by vulvoscopy.

Diagnostic Procedures: History, physical examination, and vulvar biopsy.

Pathologic Findings

Histologic types include squamous cell (90%), melanoma (5%), basal cell (2%–3%), basaloid, warty, verrucous, giant cell, spindle cell, acantholytic squamous cell (adenoid squamous), lymphoepithelioma-like, and Merkel cell. Sarcoma accounts for approximately 2% of vulvar cancers. Metastatic tumors from other sources are rare, but they do occur.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Early evaluation (generally by biopsy). Most women have had symptoms for more than 6 months before a diagnosis is made.
Specific Measures: Initial treatment consists of wide local excision (1-cm margins). Subsequent therapy, including node dissections and adjunctive therapy (radiation), is determined by the stage of disease, cell type, and surgical margins.
Diet: No specific dietary changes indicated.
Activity: No restriction, except as dictated by surgical therapy.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- Disorders of the Vulva, 2020

Drug(s) of Choice

None. Some reviews have suggested that imiquimod is an alternative to surgical management in select patients.

FOLLOW-UP

Patient Monitoring: Careful follow-up for recurrence or additional new lesions. Any patient who has had HPV-related dysplasia should avoid the vulvar use of topical steroids because this may increase the risk of recurrence.
Prevention/Avoidance: Vaccination against HPV is thought to reduce the risk.
Possible Complications: Distant spread and disease progression, secondary infection. Wound breakdown after surgical excision is common.
Expected Outcome: If tumor invasion is less than 1 mm, the risk of lymph node involvement is essentially 0, and high success rates may be expected. The 5-year survival rates decline with advancing stage: 20% with deep node involvement. Overall, the 5-year survival rate is 70%.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy, although the presence of a pregnancy may affect surgical therapeutic options.
ICD-10-CM Codes: Specific to cell type and location.

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103 VULVAR HEMATOMA

INTRODUCTION

Description: Vulvar hematoma is the swelling of one or both labia because of interstitial bleeding, most often after blunt trauma.
Predominant Age: Most common in childhood and teen years but may occur at any age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Blunt trauma (straddle injury, sexual abuse, rape, water skiing), vaginal surgery or delivery, varicose veins of vulva.
Risk Factors: Sports activities; uncommonly, consensual intercourse.

SIGNS AND SYMPTOMS

- Painful swelling of one or both labia. Unilateral and anterior most common with trauma: Mons, clitoral hood, labia minora; most located anterior or lateral to the hymen. Trauma to the hymen or posterior fourchette is uncommon in accidental trauma and suggests, but does not confirm, sexual abuse.
- Dark blue or black discoloration
- Bleeding from vulva if laceration is present

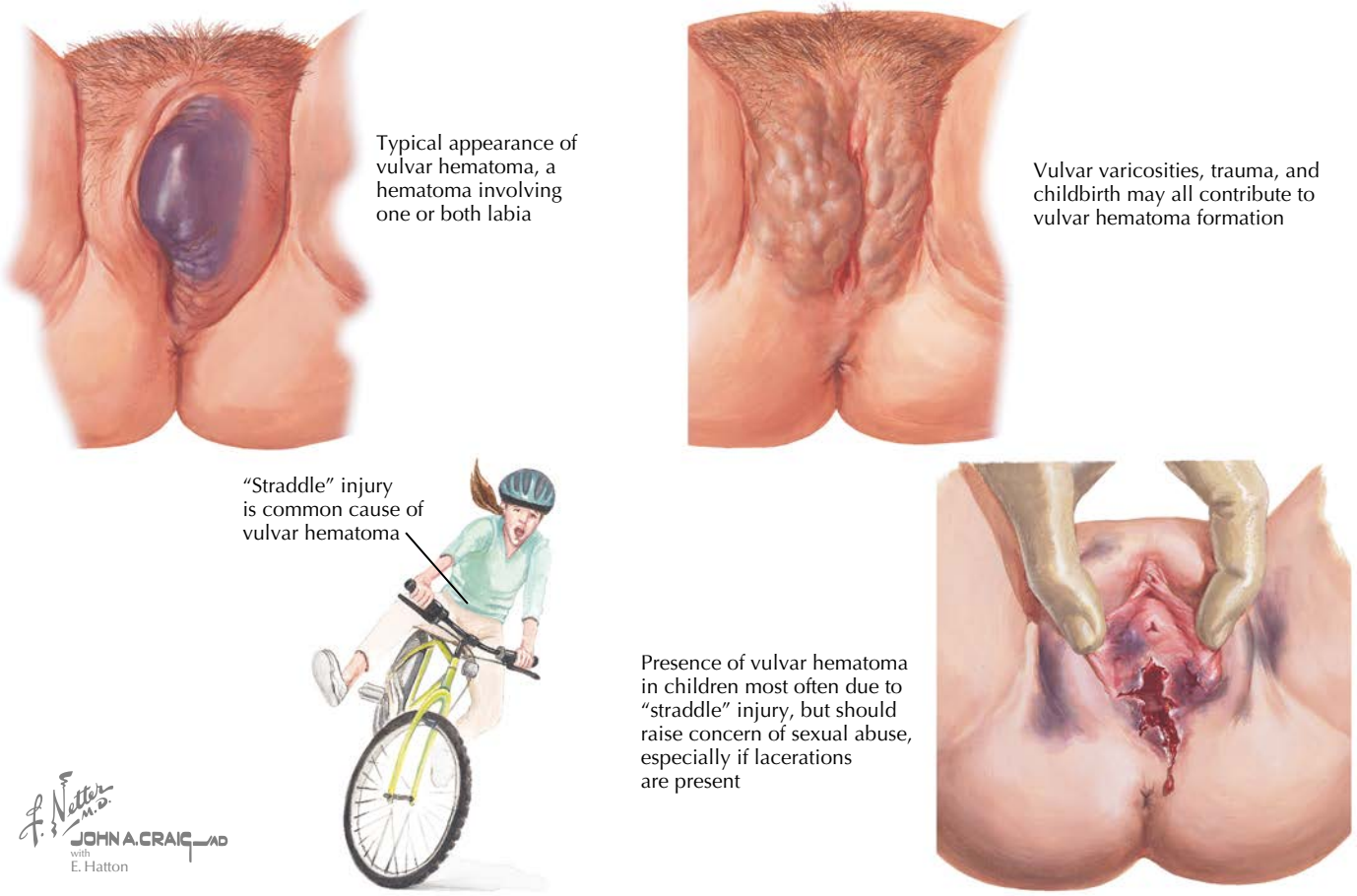

Figure 103.1 Vulvar hematoma

DIAGNOSTIC APPROACH

Differential Diagnosis

- Bartholin gland cyst or abscess
- Varicose veins of vulva
- Lymphogranuloma venereum
- Acne inversa
- Abuse

Associated Conditions: The presence of vaginal lacerations must always be considered, especially when hymeneal damage (suggestive of penetration) is present.

Workup and Evaluation

- **Laboratory:** No evaluation indicated.
- **Imaging:** No imaging indicated.
- **Special Tests:** None indicated.
- **Diagnostic Procedures:** History and gentle visualization, speculum examination if vaginal trauma also suspected or possible.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Analgesics (avoid aspirin), pressure, ice packs.
Specific Measures: Surgical drainage for rapidly expanding hematomas or those more than 10 cm in diameter. Bladder catheterization may be indicated in rare cases. Children with vulvar trauma should have a tetanus toxoid booster if none has been administered in the preceding 5 years.
Diet: No specific dietary changes indicated.
Activity: Bed rest until the condition is stable; return to activity as tolerated.

Drug(s) of Choice

- Nonaspirin analgesics

FOLLOW-UP

Patient Monitoring: Observation for expanding hematoma, hemodynamic monitoring if blood loss severe. Ensure that voiding is not compromised.
Prevention/Avoidance: Proper footwear during sports.
Possible Complications: Chronic expanding hematoma with fibrosis and pain.
Expected Outcome: Most hematomas gradually resolve with conservative management only.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. May rarely complicate delivery if present before or during labor. More often, delivery precedes hematoma formation.
ICD-10-CM Codes: S30.23XA (Contusion of vagina and vulva) and O71.7 (Obstetric hematoma of pelvis).

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104 VULVAR LESIONS

THE CHALLENGE

The skin of the vulva is subject to all the changes that affect skin elsewhere in the body. In addition, the tissues of the vulva represent a rich ecosystem, with interactions among tissues, fluids, hormones, and microbes.

Scope of the Problem: In gynecologic practices, it is normal to see two or more patients a day with these concerns.

Objectives of Management: To establish a timely diagnosis and management plan for those patients with vulvar lesions.

TACTICS

Relevant Pathophysiology: The skin of the vulva is like that of other areas of the body with stratified squamous epithelium; hair follicles; and sebaceous, sweat, and apocrine glands. Just as in other areas of the body, the vulva is susceptible to inflammatory and dermatologic diseases. Intertrigo, acne inversa, psoriasis, seborrheic dermatitis, Fox-Fordyce disease, fifth disease, changes caused by Behçet or Crohn diseases, viral infections, and parasites all may affect the skin of the vulva. The skin of the vulva is also vulnerable to irritation from vaginal secretions, recurrent urinary loss, or contact with external irritants (such as soap residue, perfumes, fabric softeners, or infestation by pinworms). Changes may occur because of the effects of diabetes or hormonal alterations and dermatoses such as hypertrophic dystrophy, lichen sclerosus, and psoriasis.

Strategies: The character of the lesion or vulvar findings may be used to establish a working diagnosis for a patient with a vulvar lesion. Processes that result in lesions that occupy a superficial location are different from those that cause processes deep within the tissues of the vulva. It is important to consider that many conditions that cause vulvar lesions may present in several forms. Consequently, in any decision tree based on lesion morphology, some diagnoses may be represented at the end of more than one branch (eg, seborrheic keratosis or nevus).

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Disorders of the Vulva, 2020

IMPLEMENTATION

Special Considerations: In addition to the diagnoses discussed in the preceding, several other significant possibilities should always be considered when diffuse symptoms and findings are present: atopic dermatitis, contact dermatitis, fixed drug reaction, and factitial vulvitis. When cystic structures are encountered, the possibility of congenital remnants such as mesothelial cysts (cysts of the Canal of Nuck), Wolffian duct remnants, and periurethral cysts must be considered. Lipomas, neurofibromas, rhabdomyomas, schwannomas, and leiomyomas may manifest as fleshy tumors of the vulva. Of special importance are lesions that involve significant necrosis: necrotizing fasciitis and pyoderma gangrenosum. Both of these processes represent a significant threat to the life and health of the patient and require prompt and aggressive treatment.

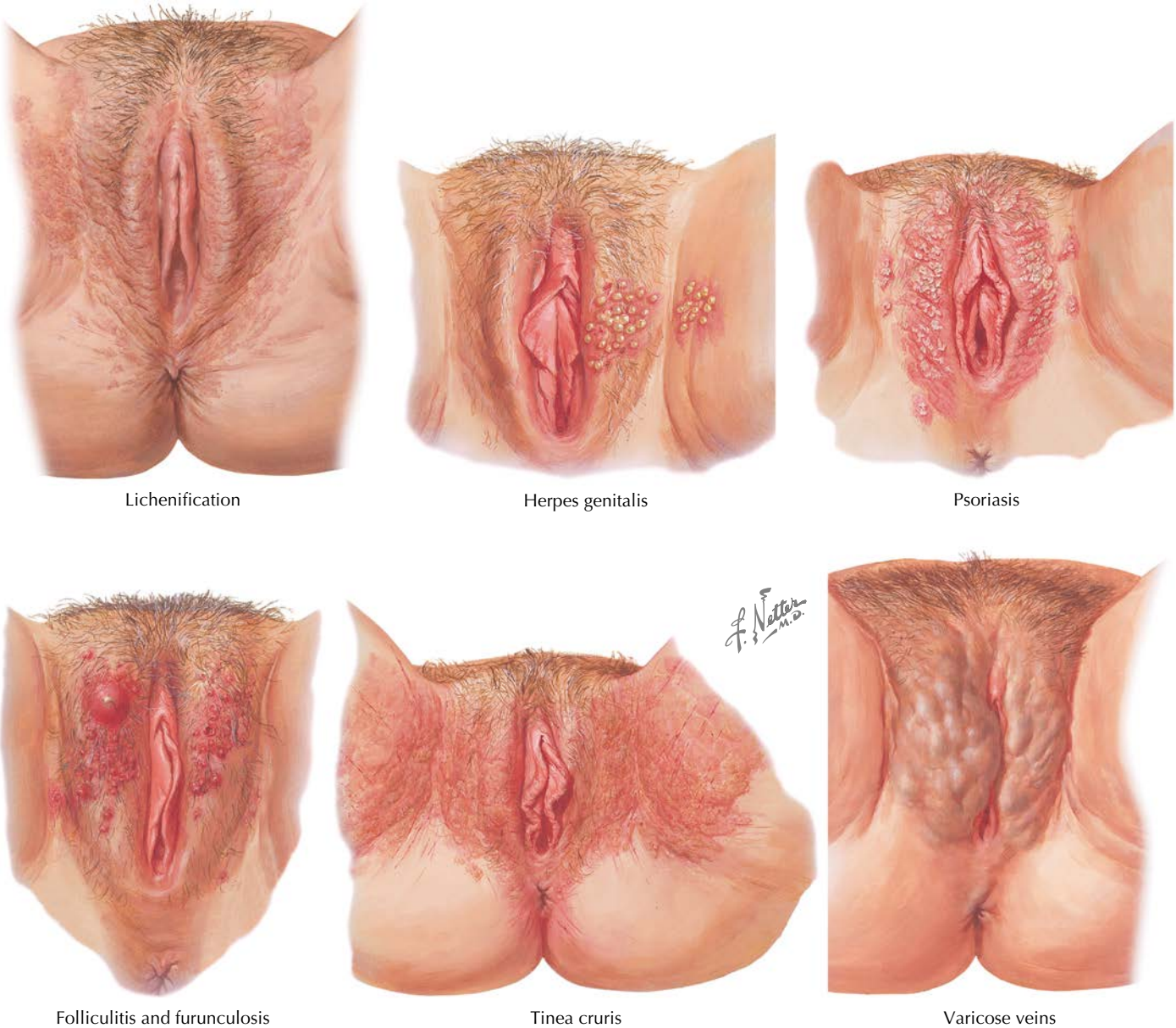


Figure 104.1 Vulvar lesions: Lichenification, herpes genitalis, psoriasis, folliculitis, furunculosis, tinea cruris, varicose veins

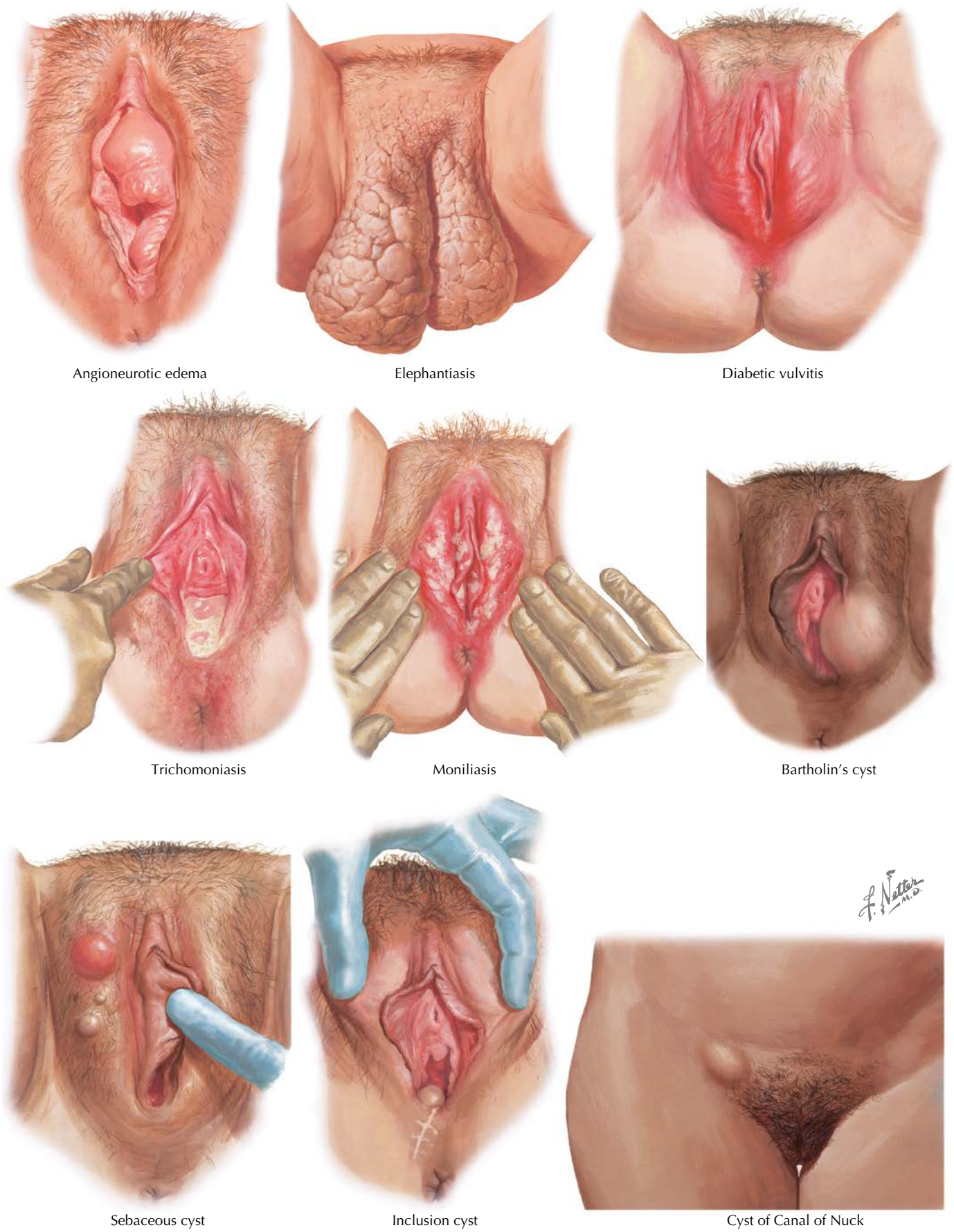
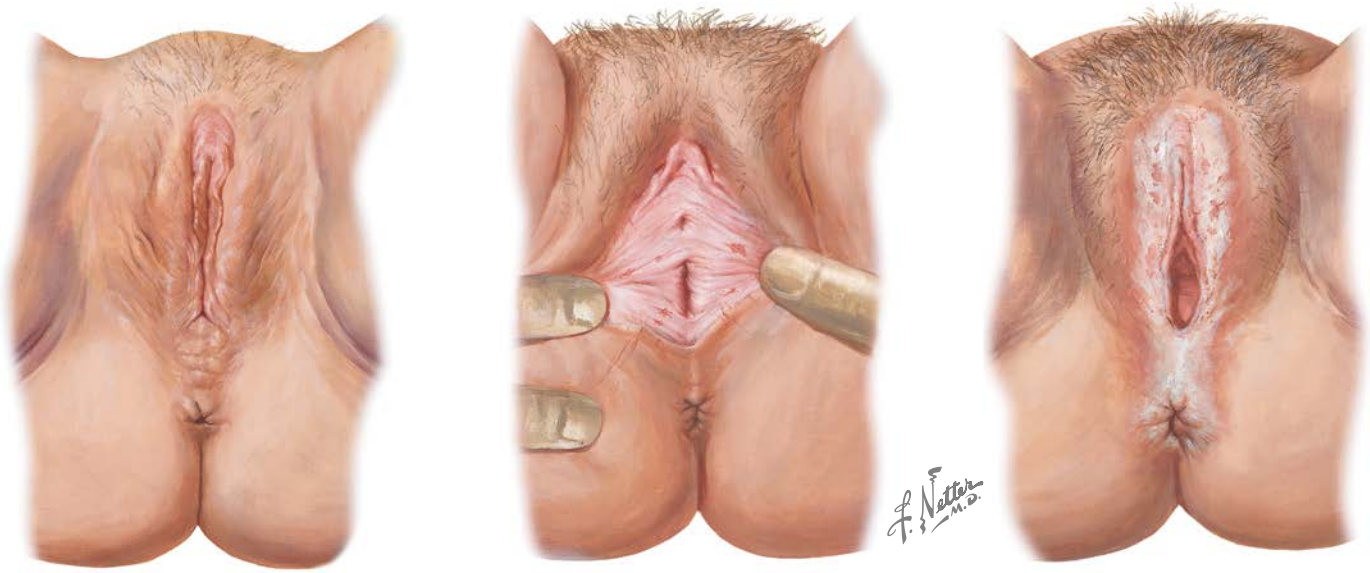


Figure 104.2 Vulvar lesions: Angioneurotic edema, elephantiasis, diabetic vulvitis, trichomoniasis, moniliasis, Bartholin cyst, sebaceous cyst, inclusion cyst, canal of Nuck cyst



Senile atrophy Kraurosis vulvae Leukoplakia

Figure 104.3 Vulvar lesions: Senile atrophy, kraurosis vulvae, leukoplakia

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VULVAR VESTIBULITIS (PROVOKED VULVODYNIA) 105

INTRODUCTION

Description: Vulvar vestibulitis (provoked vulvodynia) is an uncommon syndrome of intense sensitivity of the skin of the posterior vaginal introitus and vulvar vestibule, with progressive worsening, leading to loss of function. Provoked pain in other areas of the vulva is possible, but much less common. Vestibulitis is one possible cause of the broader syndrome of chronic vulvar pain, vulvodynia. Unlike undifferentiated vulvodynia, vestibulitis causes pain mainly when touched (intercourse, examination, tampon insertion) and is better localized to the posterior vulva.

Prevalence: Some estimates place it at 15% of all women, but significant, disabling symptoms are much less common.

Predominant Age: 19–81 years (median age, 36 years).

Genetics: No genetic pattern, although some studies suggest these women are more likely to carry immune-related gene polymorphisms.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown. High degree of association with human papillomavirus (HPV) but no causal link established. Despite the implication of the term, true inflammation is not a characteristic of this process.

Risk Factors: None known. It has been postulated that the use of oral contraceptives increases the risk or severity of vulvar vestibulitis and that users who experience symptoms should switch to

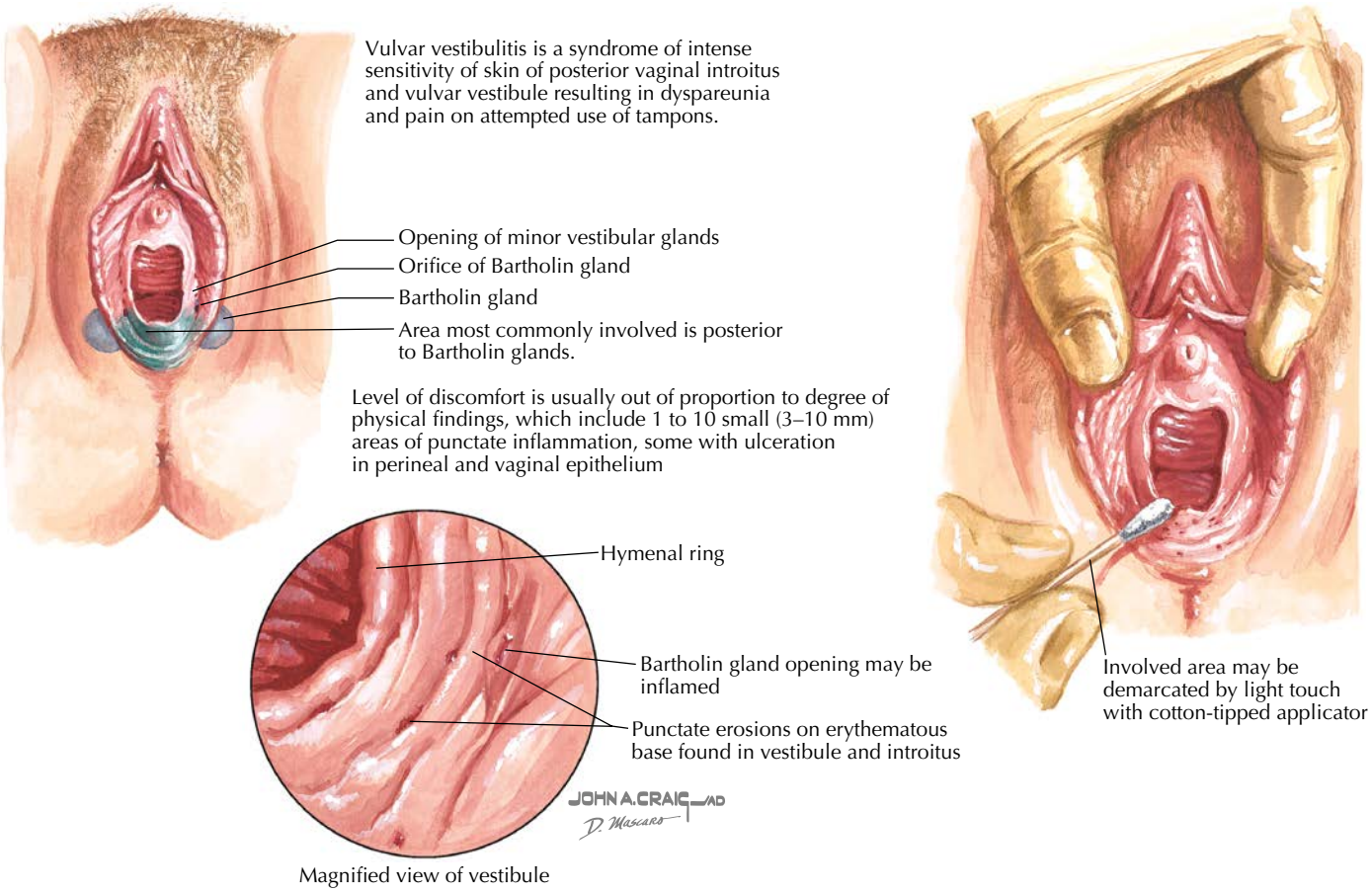

Figure 105.1 Vulvar vestibulitis

other methods of contraception. Strong evidence for either causation or significant improvement is lacking.

SIGNS AND SYMPTOMS

- Intense pain and tenderness at the posterior introitus and vestibule, most often present for 2–5 years (some authors suggest that symptoms should be present for more than 6 months before the diagnosis is made)
- Unable to use tampons (33%) or have intercourse (entry dyspareunia, 100%)
- Focal inflammation, punctation, and ulceration of the perineal and vaginal epithelium. Erythema is not required for the diagnosis.
- Punctate areas (1–10) of inflammation 3–10 mm in size may be seen between the Bartholin glands (75%), hymenal ring, and middle perineum

DIAGNOSTIC APPROACH

Differential Diagnosis

- Vaginismus
- Chronic vulvitis
- Atrophic vaginitis
- Hypertrophic vulvar dystrophy
- Recurrent vaginal infections
- Herpes vulvitis
- Vulvar dermatoses
- Contact (allergic) vulvitis

Associated Conditions: Sexual dysfunction, dyspareunia, and vulvodynia.

Workup and Evaluation

Laboratory: No evaluation indicated except to rule out other causes.
Imaging: No imaging indicated.
Special Tests: Vulvoscopy (using 5% acetic acid) may reveal the characteristic punctate and acetowhite areas. Skin biopsy may be necessary to rule out other dermatologic causes.
Diagnostic Procedures: History, physical examination, mapping of sensitive areas, and vulvoscopy.

Pathologic Findings

Small inflammatory punctate lesions vary in size from 3–10 mm, often with superficial ulceration. The Bartholin gland openings also may be inflamed. The area involved may be demarcated by light touching with a cotton-tipped applicator, although the level of discomfort is often out of proportion to the physical findings. Microscopic inflammation of minor vestibular glands may be seen but is not always present.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, perineal hygiene, cool sitz baths, moist soaks, or the application of soothing solutions such as Burow solution (5% aluminum subacetate). Patients should be advised to wear loose-fitting clothing and keep the area dry and well ventilated.
Specific Measures: Topical anesthetics and antidepressants may reduce pain and itch. Interferon injections may provide relief in

up to 60% of patients. Refractory disease may require surgical resection or laser ablation.

Diet: No specific dietary changes indicated. Reducing urinary oxalate through dietary means has been suggested but remains unproved.

Activity: No restriction (pelvic rest often recommended when symptoms are maximal).

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Disorders of the Vulva, 2020
- Vulvodynia, 2017
- When Sex Is Painful, 2020

Drug(s) of Choice

- Lidocaine (Xylocaine) 2% jelly (or 5% cream) topically as needed.
- Antidepressants—amitriptyline hydrochloride (Elavil) 25 mg PO every night or 10 mg PO three times a day.
- Interferon injections three times weekly for 4 weeks, introducing 1 million U at each of 12 areas (clock face) by the completion of the course.
- Gabapentin 100 mg at bedtime, increasing by 100 mg every 2–7 days to 3600 mg in divided doses three times a day, depending on tolerance.

Contraindications: Interferon injections cannot be administered during pregnancy.

Precautions: Patients should be warned that interferon injections are associated with flulike symptoms and that a clinical response may not be seen for up to 3 months. Patients should abstain from intercourse during the series of injections.

FOLLOW-UP

Patient Monitoring: Frequent follow-up and monitoring are required. Frustration for both the patient and provider is common.

Prevention/Avoidance: None.

Possible Complications: Secondary infection, sexual dysfunction.

Expected Outcome: Spontaneous remission in one-third of patients over the course of 6 months. Chronic, continuing pain most common. Surgical therapy is associated with 50%–60% success.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.

ICD-10-CM Codes: N94.810 (Vulvar vestibulitis), N76.1 or N76.3 (Subacute and chronic vulvitis).

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SECTION VI

Vaginal Disease

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CYSTOCELE/URETHROCELE

106

INTRODUCTION

Description: Loss of support for the anterior vagina, through the rupture or attenuation of the pubovesicocervical fascia, is manifested by the descent or prolapse of the urethra (urethrocele) or bladder (cystocele). Also called anterior compartment prolapse.
Prevalence: 10%–15% of women; 30%–40% after menopause. Anterior compartment failure is more common than posterior compartment failure (rectocele).
Predominant Age: 40 years and older, increasing with age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Loss of normal tissue integrity or tissue disruption as a result of trauma (childbirth, obstetric injury, surgery).
Risk Factors: Multiparity, obesity, chronic cough, heavy lifting, intrinsic tissue weakness or atrophic changes caused by estrogen loss. Many authors include smoking as a risk factor.

SIGNS AND SYMPTOMS

- Asymptomatic
- Pelvic pressure or "heaviness"
- Stress urinary incontinence, frequency, hesitancy, incomplete voiding, or recurrent infections
- Bulging of tissue at the vaginal opening
- Descent of the anterior vaginal wall during straining
- Positive results on "Q-tip test"

DIAGNOSTIC APPROACH

Differential Diagnosis

- Urethral diverticulum
- Skene gland cyst, tumor, or abscess
- Anterior enterocele
- Gartner duct cyst
- Urgency incontinence

Associated Conditions: Stress urinary incontinence, pelvic relaxation, uterine prolapse, and other hernias.

Workup and Evaluation

Laboratory: No evaluation indicated; perform urinalysis if urinary tract infection is suspected.
Imaging: No imaging indicated.
Special Tests: A "Q-tip test" is sometimes recommended, although it has a poor predictive value—a cotton-tipped applicator dipped in 2% lidocaine gel (Xylocaine) is placed in the urethra and anterior rotation with straining is measured. Greater than 30 degrees is abnormal. Either the Baden–Walker Halfway Scoring or the Pelvic Organ Prolapse Quantification System (POPQ) evaluation systems may be used to quantify the degree of prolapse present. An evaluation of urinary function is advisable, especially if surgical therapy is being considered. In the past, the functional significance of a cystourethrocele was gauged by elevating the bladder neck (using fingers or an instrument) and asking the patient to strain (referred to as a Bonney or Marshall-Marchetti test). This test has fallen out of favor as it is nonspecific and unreliable.
Diagnostic Procedures: Pelvic examination—best demonstrated by having the patient strain or cough and observing the vaginal opening through the separated labia. When an urethrocele or cystocele is present, a downward movement and forward rotation of the anterior vaginal wall toward the introitus are demonstrated. A Sims speculum or the lower half of a Graves, Peterson, or other vaginal speculum may be used to retract the posterior vaginal wall, facilitating the identification of the support defect. The bladder should be partially filled (100–250 mL) during this examination.

Pathologic Findings

No characteristic histologic change. Chronic irritation or keratinization secondary to mechanical trauma may be found with complete prolapse.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Weight reduction, treatment of chronic cough (if present), topical or systemic estrogen replacement or therapy as indicated.
Specific Measures: Pessary therapy (the intermittent use of a large or super tampon may suffice for some patients), pelvic muscle exercises, surgical repair; limited role for medical therapy.
Diet: No specific dietary changes indicated.
Activity: Avoiding heavy lifting and straining may slow the rate of progression or risk of recurrence.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Pelvic Support Problems, 2020
- Surgery for Stress Urinary Incontinence, 2021
- Surgery for Pelvic Organ Prolapse, 2018
- Urinary Incontinence, 2020

Drug(s) of Choice

None. When atrophic change is present, estrogen, either topically or systemically, is often prescribed to improve tissue tone, reduce irritation, and prepare tissues for surgical or pessary therapy.
Contraindications: Undiagnosed vaginal bleeding, breast cancer.
Precautions: α-Adrenergic blocking agents used to treat hypertension may reduce urethral tone sufficiently to result in stress urinary incontinence in patients with reduced pelvic support. Patients treated with angiotensin-converting enzyme inhibitors may develop a cough as a side effect of medication, worsening incontinence symptoms, and accelerated appearance or worsening of a cystourethrocele.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: Compromised ureteral drainage may be found in patients with significant downward displacement of the trigone. Recurrent urinary tract infections may occur if the support defect leads to significant residual urine. Vaginal ulceration, bleeding, infection, or pain frequently accompanies complete prolapse. When surgical mesh is used as a part of the repair, the possibility of both acute and delayed complications must be recognized.
Expected Outcome: Generally favorable reduction in symptoms may be obtained with a carefully chosen and fitted pessary. Surgical therapy is associated with 95% success in long-term correction of the anatomic defect and associated symptoms.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy, although pregnancy (and vaginal delivery) may cause or contribute to a worsening of pelvic support problems.

ICD-10-CM Codes: N81.9 (Female genital prolapse, unspecified), N81.10 (Cystocele, unspecified) or N81.11 (midline), and N81.0 (Urethrocele).

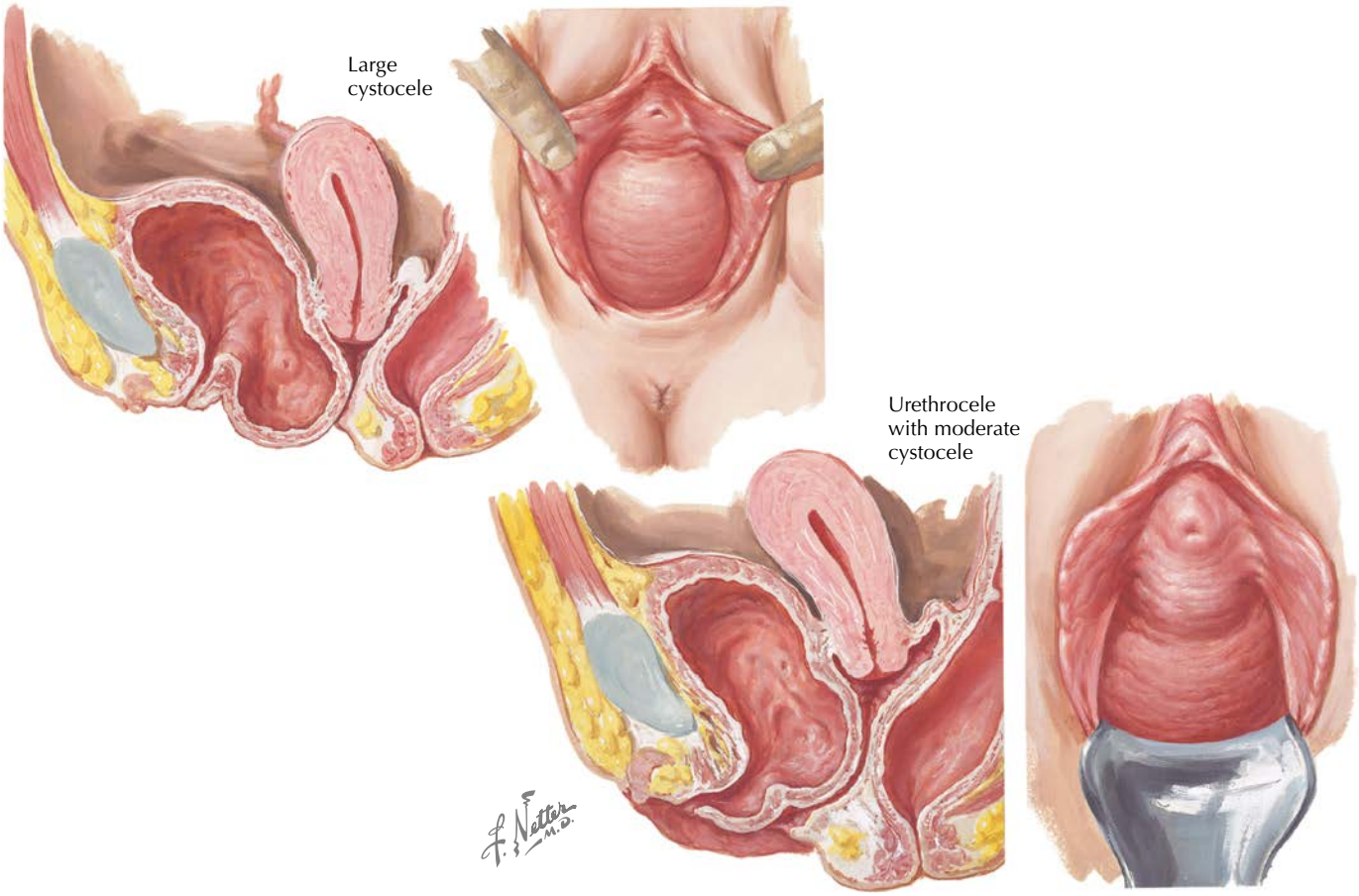

Figure 106.1 Cystocele and urethrocele

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ENTEROCELE

INTRODUCTION

Description: Enterocele is the loss of support for the apex of the vagina through either a rupture or attenuation of the pubovesicocervical fascia, manifested by the descent or prolapse of the vaginal wall and underlying peritoneum, most commonly after abdominal or vaginal hysterectomy. An enterocele may occur when the uterus is present, and tissue damage or weakness allows herniation behind the cervix and between the uterosacral ligaments.
Prevalence: 10%–15% of women; 30%–40% after menopause.
Predominant Age: 40 years and older, increasing with age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Loss or rupture of the normal support mechanisms in the pouch of Douglas. There is true herniation of the peritoneal cavity between the uterosacral ligaments and into the rectovaginal septum. Unlike a cystocele, urethrocele, or rectocele, the herniated tissue contains a true sac lined by parietal peritoneum.
Risk Factors: Multiparity, obesity, chronic cough, heavy lifting, intrinsic tissue weakness, or atrophic changes resulting from estrogen loss. Some authors include smoking as a risk factor.

SIGNS AND SYMPTOMS

- Asymptomatic
- Pelvic pressure or "heaviness"
- Bulging of tissue at the vaginal opening
- Descent of the apical vaginal wall during straining

DIAGNOSTIC APPROACH

Differential Diagnosis

- Urethral diverticulum
- Cystocele
- Rectocele
- Vaginal prolapse (generally includes an enterocele)
- Gartner duct cyst

Associated Conditions: Pelvic relaxation, vaginal prolapse, other hernias, and bowel obstruction (rare).

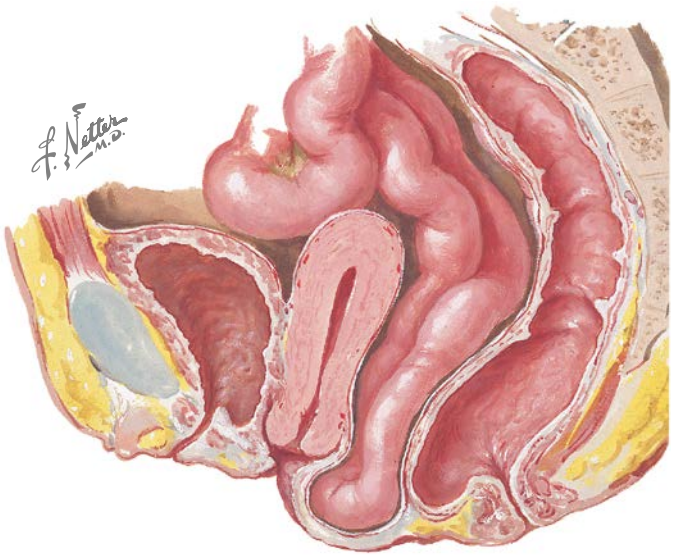

Figure 107.1 Enterocele with rectocele and prolapse of uterus

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated.
Special Tests: When the enterocele prolapses to beyond the introitus, transillumination may reveal loops of small bowel or omentum within the sac.
Diagnostic Procedures: Pelvic examination—best demonstrated by having the patient strain or cough and observing the vaginal opening through the separated labia. Rectovaginal examination differentiates this condition from a rectocele.

Pathologic Findings

No characteristic histologic change. Chronic irritation or keratinization of the vaginal epithelium secondary to mechanical trauma may be found when the enterocele descends to the level of the vulva or beyond.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Weight reduction, treatment of chronic cough (if present), topical or systemic estrogen replacement or therapy as indicated.
Specific Measures: Pessary therapy (generally when the uterus is absent), surgical repair (abdominal or vaginal approach—McCall or Halban repair).
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Pelvic Support Problems, 2020
- Surgery for Pelvic Organ Prolapse, 2018

Drug(s) of Choice

None. Estrogen, either topically or systemically, is often prescribed to improve tissue tone, reduce irritation, and prepare tissues for surgical or pessary therapy when atrophic change is present.
Contraindications: Undiagnosed vaginal bleeding, breast cancer.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: Maintenance of normal weight, use of surgical techniques at the time of hysterectomy that minimize the risk of enterocele formation (most commonly, this is plication of the uterosacral and cardinal ligaments).
Possible Complications: Bowel obstruction (rare).
Expected Outcome: Generally, favorable reduction of symptoms may be obtained with a carefully chosen and fitted pessary. Surgical therapy is associated with 95% success in long-term correction of the anatomic defect and the associated symptoms.

MISCELLANEOUS

Pregnancy Considerations: Generally not a consideration.
ICD-10-CM Codes: N81.5 (Vaginal enterocele).

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108 FISTULAE: GASTROINTESTINAL AND URINARY TRACT

INTRODUCTION

Description: A fistula is an abnormal communication between two cavities or organs. In gynecology, this usually refers to a communication between the gastrointestinal or urinary tract and the genital tract. Connections directly to the skin are not discussed here.

Prevalence: Gastrointestinal fistulae are uncommon; urinary tract fistulae are estimated to occur in 1/200 abdominal hysterectomies.

Predominant Age: Reproductive age and older.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Fistulae between the gastrointestinal tract and vagina may be precipitated by the same injuries that cause genitourinary fistulae; the most common are obstetric injuries and complications of episiotomies or perineal obstetric tears (lower one-third of the vagina). Fistulae may also follow hysterectomy or enterocele repair (upper one-third of vagina). Inflammatory bowel disease or pelvic radiation therapy may hasten or precipitate fistula formation. Urinary tract fistulae may result from surgical or obstetric trauma, irradiation, or malignancy, although the most common cause by far is unrecognized surgical trauma. Approximately 75% of urinary tract fistulae occur after abdominal hysterectomy (0.1%–0.5% following simple hysterectomy; 10% following radical hysterectomy). Signs of a urinary fistula (watery discharge) usually occur from 5–30 days after surgery (average, 8–12 days), although they may be present in the immediate postoperative period.

Risk Factors: Gastrointestinal fistulae—obstetric tears, puncture wounds, inflammatory bowel disease, diverticular disease, improper pessary use, intraabdominal surgery, carcinoma, radiation therapy, perirectal abscess. Although Crohn disease, lymphogranuloma venereum, or tuberculosis are recognized risk factors, these are uncommon. Urinary tract fistulae—surgery or radiation treatment. Urinary tract fistulae are most common after uncomplicated hysterectomy, although pelvic adhesive disease, endometriosis, or pelvic tumors increase the individual risk.

SIGNS AND SYMPTOMS

Gastrointestinal Fistulae

- Foul vaginal discharge
- Marked vaginal and vulvar irritation
- Fecal incontinence and soiling and the passage of fecal matter or gas from the vagina, pathognomonic
- Dyspareunia common
- Dark-red rectal mucosa or granulation tissue apparent in the vaginal canal at the site of the fistula

Urinary Tract Fistulae

- Continuous incontinence (occasionally made worse by position change or an increase in intraabdominal pressure as with a cough or laugh)
- Vaginal and perineal wetness and irritation
- Granulation tissue at site of fistula

DIAGNOSTIC APPROACH

Differential Diagnosis

Gastrointestinal Fistulae

- Inflammatory bowel disease (Crohn disease)
- Pilonidal sinus
- Perianal or other abscess (fistula-in-ano)
- Rectal carcinoma

Urinary Tract Fistulae

- Overflow incontinence
- Urge incontinence

Associated Conditions: Inflammatory bowel disease, bacterial vaginitis, dyspareunia, vaginitis, vulvitis, and urinary tract infection.

Workup and Evaluation

Laboratory: No evaluation indicated. Evaluation of renal function (serum creatinine) is prudent but not diagnostic.

Imaging: If inflammatory bowel disease is suspected, lower gastrointestinal series. Intravenous or retrograde pyelography may be useful.

Special Tests: Gastrointestinal fistulae—methylene blue may be instilled in the rectum with a tampon in the vagina; staining indicates a communication. Sigmoidoscopy should be considered. Urinary tract fistulae—a tampon placed in the vagina with dye instilled into the bladder or dye given, usually intravenously, to be excreted by the kidney may be used to help find a fistula. Cystoscopy may help identify vesicovaginal fistulae.

Diagnostic Procedures: History, physical examination, probe of fistulous tract. Anoscopy, proctoscopy, sigmoidoscopy, or

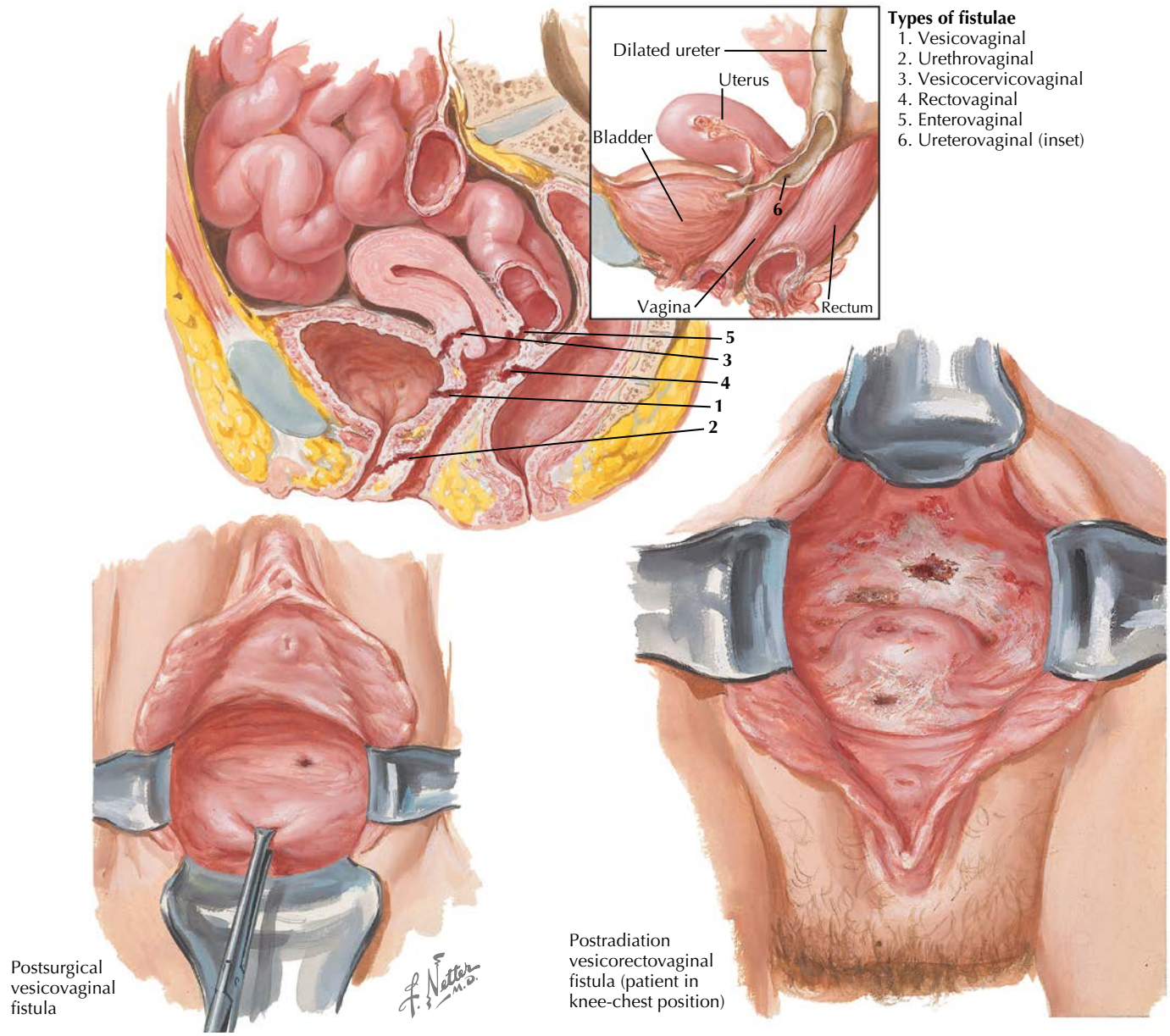

Figure 108.1 Types of fistulae and post-treatment appearance

intravenous or retrograde pyelography may be helpful. Cystoscopy may be required to evaluate the location of a urinary tract fistula in relation to the ureteral opening and bladder trigone and to exclude the possibility of multiple fistulae.

Pathologic Findings

Inflammation and granulation changes from chronic infection. Tract may be single or multiple. Chronic bacterial vaginitis is generally present. Fistulae may be from the vagina to the bladder (vesicovaginal), to the urethra (urethrovaginal), or to the ureter (ureterovaginal). Communication between the bladder and uterus (vesicouterine) may also rarely occur.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Gastrointestinal fistulae—evaluation, stool softening, treatment of vaginitis. Urinary tract fistulae—urinary diversion (see the following text), protection of the vulva from continuous moisture (zinc oxide cream or diaper rash preparations).

Specific Measures: Gastrointestinal fistulae—for those that do not heal spontaneously (75% of fistulae), the only effective treatment is surgical. When the fistula is small, this is often carried out with the patient under general or spinal anesthesia in an ambulatory surgery unit. Fistulectomy or fistulotomy should not be performed in the presence of tissue edema or inflammation, diarrhea, or active inflammatory bowel disease. Urinary tract fistulae—vesicovaginal fistulae that occur in the immediate postoperative period should be treated by large-caliber transurethral catheter drainage. Spontaneous healing is evident within 2–4 weeks (20% of patients). Similarly, in patients with a ureterovaginal fistula, prompt placement of a ureteral stent, left in place for 2 weeks, allows spontaneous healing for approximately 30% of patients. When these conservative therapies fail, full surgical correction is required.

Diet: Low-residue diet advisable for patients with a gastrointestinal fistula.

Activity: No restriction. Pelvic rest after surgical repair, until healing is completed.
Patient Education: Perianal care, sitz baths.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Surgery for Pelvic Organ Prolapse, 2018
- Urinary Incontinence, 2020

Drug(s) of Choice

- Although the only effective treatment is surgical, the use of stool softeners often may be beneficial.
- If diarrhea is present, diphenoxylate hydrochloride (Lomotil) or a similar drug should be used to control symptoms.
- Treatment of coexisting vaginitis should be instituted.
- Urinary antisepsis should be considered when necessary.

FOLLOW-UP

Patient Monitoring: Patients with a gastrointestinal fistula should be closely followed during the postoperative period (hospital discharge is generally delayed until after the first bowel movement). Maintain routine healthcare. When a ureteral fistula has been repaired, follow-up intravenous pyelography should be planned for 3, 6, and 12 months to check for delayed stricture.
Prevention/Avoidance: Careful surgical and obstetric techniques, including preoperative and perioperative bladder drainage, good visualization, careful dissection, and care in the placement of hemostatic sutures. Some authors suggest routine cystoscopy at the close of surgical procedures.
Possible Complications: Upper genital tract infection, recurrence, ascending urinary tract infection (including pyelonephritis).
Expected Outcome: Healing is generally good after surgical excision, although recurrence, when the original fistulae were caused by underlying disease or radiation therapy, is common.

MISCELLANEOUS

Pregnancy Considerations: No direct effect on pregnancy, although some causal processes may result in lower fertility or other effects on reproduction.
ICD-10-CM Codes: N82.4 (Other female intestinal-genital tract fistulae), N82.0 (Vesicovaginal fistula), and N82.1 (Other female urinary-genital tract fistulae).

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109 RECTOCELE

INTRODUCTION

Description: Failure of the normal support mechanisms between the rectum and vagina results in rectocele—herniation of the posterior vaginal wall and underlying rectum into the vaginal canal and eventually to and through the introitus. Also called posterior compartment prolapse.
Prevalence: 10%–15% of women; 30%–40% after menopause.
Predominant Age: Late reproductive to postmenopausal.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Loss of normal tissue integrity or tissue disruption as a result of trauma (childbirth, obstetric injury, surgery).
Risk Factors: Multiparity, obesity, chronic cough, heavy lifting, intrinsic tissue weakness, or atrophic changes resulting from estrogen loss. Many authors include smoking as a risk factor.

SIGNS AND SYMPTOMS

- Bulging of the posterior vaginal wall

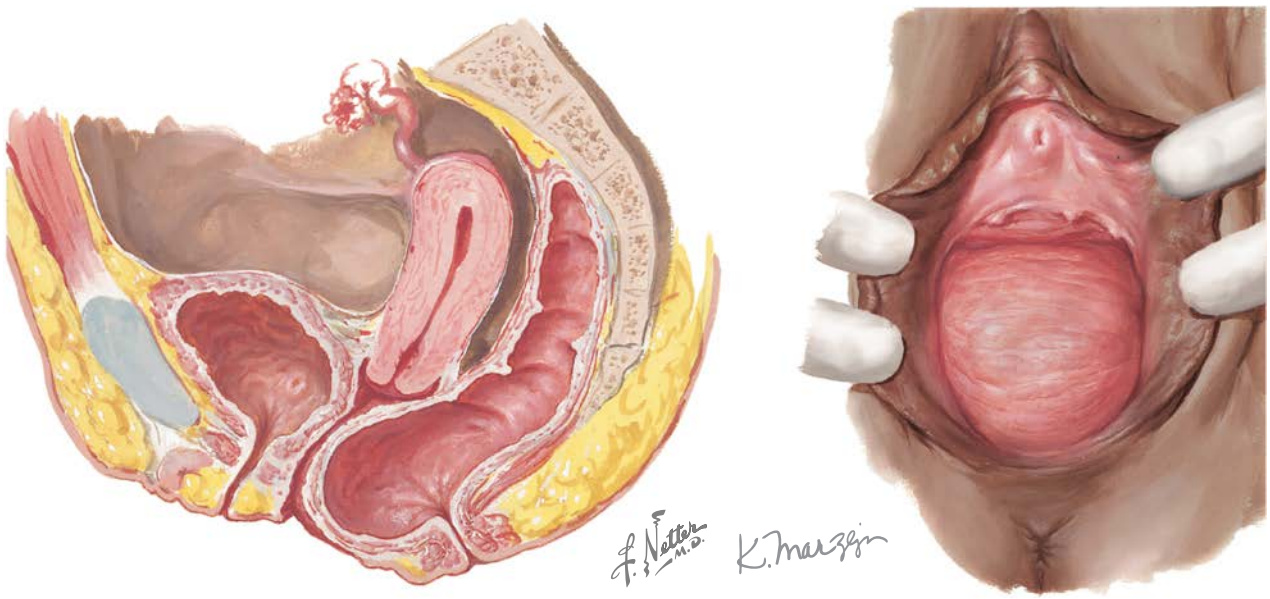

Figure 109.1 Large rectocele

- Difficulty passing stool (25%–50% may require manual splinting of the posterior vaginal wall to have a bowel movement). Fecal incontinence can occur
- Dyspareunia uncommon but may occur

DIAGNOSTIC APPROACH

Differential Diagnosis

- Enterocele
- Rectovaginal hematoma
- Rectal cancer
- Vaginal inclusion cyst (after obstetric trauma or episiotomy)

Associated Conditions: Stress urinary incontinence, pelvic relaxation, uterine prolapse, other hernias, and vaginal outlet relaxation

Workup and Evaluation

Laboratory: No evaluation indicated.

Imaging: Transvaginal ultrasonography may be used to assess the presence of an enterocele if not clinically apparent. Defecography has been used in some research settings but has not gained a major role in routine clinical practice.

Special Tests: None indicated.

Diagnostic Procedures: Pelvic examination—best demonstrated by having the patient strain or cough and observing the vaginal opening through the separated labia. A double-bladed speculum or the lower half of a Graves, Pederson, or other vaginal speculum (inserted upside down) may be used to retract the anterior vaginal wall, facilitating the identification of the support defect.

Pathologic Findings

No characteristic histologic change. Chronic irritation or keratinization of the vaginal epithelium secondary to mechanical trauma may be found with complete prolapse.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Weight reduction, treatment of chronic cough (if present), topical or systemic estrogen replacement or therapy as indicated. Bowel regularity, facilitated by fiber or stool softeners, may reduce symptoms.

Specific Measures: Pessary therapy, pelvic muscle exercises, surgical repair; limited role for medical therapy.

Diet: No specific dietary changes indicated.

Activity: Avoiding heavy lifting and straining may slow the rate of progression or risk of recurrence.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Pelvic Support Problems, 2020
- Surgery for Pelvic Organ Prolapse, 2018

Drug(s) of Choice

None. Estrogen, either topically or systemically, is often prescribed to improve tissue tone, reduce irritation, and prepare tissues for surgical or pessary therapy when atrophic change is present.

Contraindications: Undiagnosed vaginal bleeding, breast cancer.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.

Prevention/Avoidance: None.

Possible Complications: Laxative abuse/dependence. Vaginal ulceration, bleeding, infection, or pain frequently accompanies complete prolapse.

Expected Outcome: Generally favorable reduction of symptoms may be obtained with a carefully selected and fitted pessary. Surgical therapy is associated with 95% success in long-term correction of the anatomic defect and the associated symptoms.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy, although pregnancy (and vaginal delivery) may cause or contribute to a worsening of pelvic support problems.

ICD-10-CM Codes: N81.9 (Female genital prolapse, unspecified), N81.6 (Rectocele), and N81.4 (Uterovaginal prolapse, unspecified).

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110 SARCOMA BOTRYOIDES

INTRODUCTION

Description: Sarcoma botryoides is a rare form of sarcoma (embryonal rhabdomyosarcoma) that is generally found in the vagina of young girls. These tumors may rarely arise from the cervix. Although the cervical form of the sarcoma is histologically similar to the vaginal form, the prognosis for the cervical form is better.
Prevalence: Rare.
Predominant Age: Generally younger than 8 years and two-thirds younger than 2 years; most common neoplasm of the lower genital tract in premenarchal girls.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown. Arises in the subepithelial layers of the vagina, often multicentric.
Risk Factors: None known.

SIGNS AND SYMPTOMS

- Vaginal bleeding
- Vaginal mass (resembles a cluster of grapes, may be hemorrhagic, myxoid, or both)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Urethral prolapse
- Vaginal polyp (pseudosarcoma botryoides)
- Endodermal sinus tumor (yolk sac tumor)
- Precocious puberty

Associated Conditions: None.

Workup and Evaluation

Laboratory: No specific evaluation indicated.
Imaging: No specific imaging indicated and only when necessary to evaluate tumor location and spread.
Special Tests: Biopsy of the mass.
Diagnostic Procedures: Physical examination, histologic tests.

Pathologic Findings

Tumor is often multicentric with loose myxomatous stroma containing malignant pleomorphic cells and eosinophilic rhabdomyoblasts that have characteristic cross striations (strap cells). Subepithelial aggregates of rhabdomyoblasts ("cambrium" layer) are characteristic.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation.
Specific Measures: Surgical excision combined with multiagent chemotherapy. Adjunctive radiotherapy also has been advocated but is generally reserved for patients with residual disease. Some recent studies have suggested that surgery can be delayed until after chemotherapy has been given, although long-term data are lacking.
Diet: No specific dietary changes indicated.
Activity: No restriction.

Drug(s) of Choice

- Adjunctive multiagent chemotherapy only.

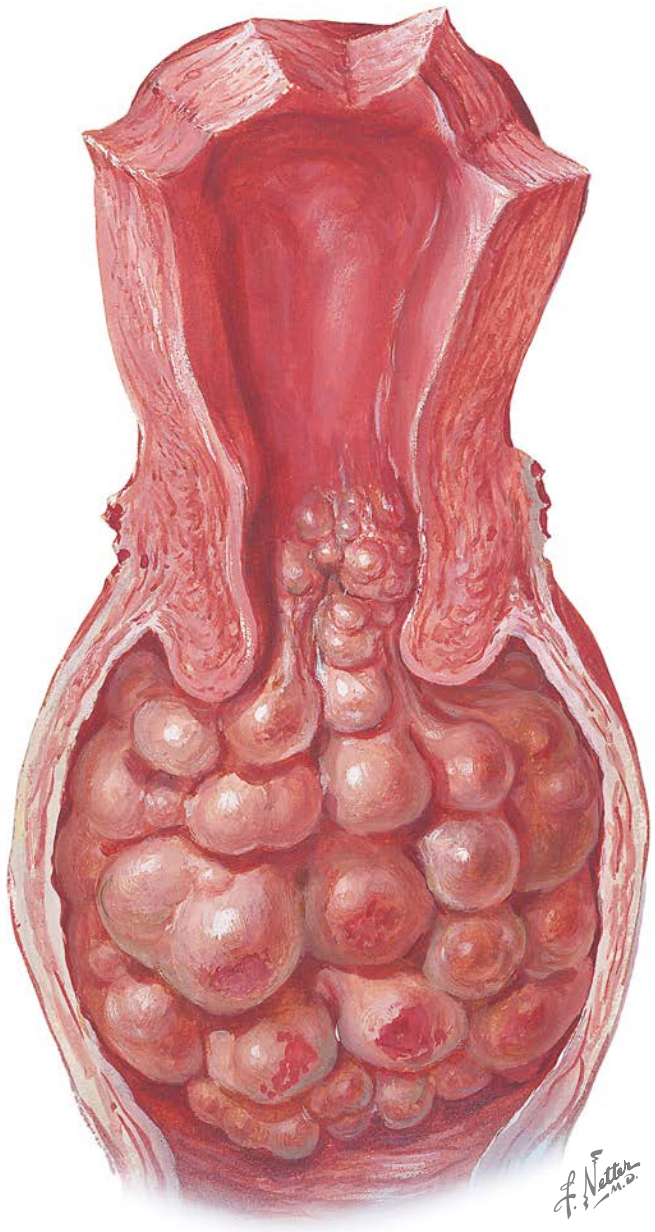

Figure 110.1 Sarcoma botryoides

FOLLOW-UP

Patient Monitoring: Once surgery and chemotherapy have been completed, monitor for recurrence and general health maintenance.
Prevention/Avoidance: None.
Possible Complications: These are aggressive tumors; dissemination and recurrence are common. Spread is through direct invasion and metastasis to lymph nodes and distant sites (by hematogenous routes). The cause of death is generally by direct local extension.
Expected Outcome: Overall the prognosis is poor. Small series suggest that with the combination of surgical resection and combination chemotherapy, survival in more than 80% can be expected. Among those who survive, normal (eventual) pubertal changes and pregnancy have been reported.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy for those who survive and conceive.
ICD-10-CM Codes: C49.5 (Malignant neoplasm of connective and soft tissue of pelvis).

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TRANSVERSE VAGINAL SEPTUM 111

INTRODUCTION

Description: A transverse vaginal septum is a partial or complete obstruction of the vagina and is generally found at the junction of the upper third and lower two-thirds of the vaginal canal. The septum is generally less than 1 cm in thickness and may or may not have a small opening to the upper genital tract (the location and thickness are highly variable).
Prevalence: 1/30,000–80,000 females.
Predominant Age: Present at birth but generally not diagnosed until puberty.
Genetics: No genetic pattern.

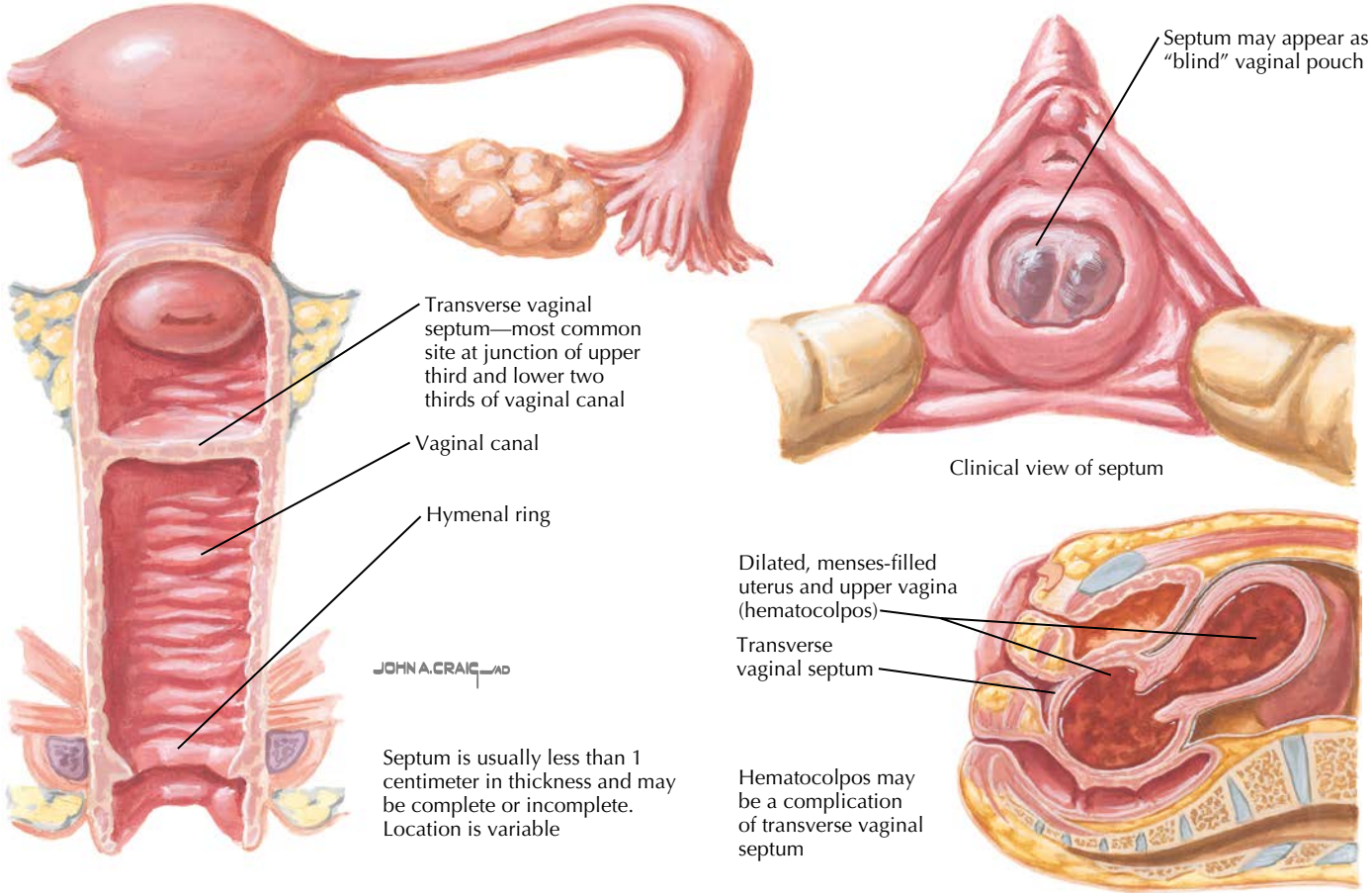

Figure 111.1 Transverse vaginal septum

ETIOLOGY AND PATHOGENESIS

Causes: Incomplete canalization of the Müllerian tubercle and sinovaginal bulb. Canalization is typically complete by 20 weeks gestation.
Risk Factors: Partial septa have been reported in women exposed in utero to diethylstilbestrol.

SIGNS AND SYMPTOMS

- Blind, shortened vaginal pouch
- Primary amenorrhea
- Mucocolpos
- Hematocolpos
- Hematometra
- Foul vaginal discharge (with incomplete septum)
- Vaginal/abdominal mass without bulging of the vaginal outlet (hematocolpos and mucocolpos may be associated with urinary tract obstruction if very large)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Vaginal agenesis
- Imperforate hymen

Associated Conditions: Endometriosis, infertility, amenorrhea, hematocolpos, and dyspareunia.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: Ultrasonography may be used to evaluate the presence and condition of the upper genital tract.
Special Tests: None indicated.
Diagnostic Procedures: Pelvic examination.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, reassurance.
Specific Measures: Transverse vaginal septa must be excised surgically. When the septum is thick, reconstruction with skin grafts or flaps may be required. In extreme cases, a neovagina must be surgically created. Once drainage of the upper tract is obtained, vaginal reconstruction may be delayed to a later date. In the postoperative period patients need to use vaginal dilators to facilitate healing and avoid scarring and stenosis.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance, education about possible effects on fertility and sexual function (for most patients there will be little or no effect).

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Once a normal vaginal canal has been restored, normal health maintenance. Patients must be monitored for narrowing of the vagina at the level of the removed septum or vaginal reanastomosis.
Prevention/Avoidance: None.
Possible Complications: It is rare, but a mucocolpos can cause serious and life-threatening compression of surrounding organs, leading to hydroureter, hydronephrosis, rectal compression and obstruction, restricted diaphragmatic excursion, compression of the vena cava, and cardiorespiratory failure. Fistulae to the urinary tract may occur. Prolonged obstruction of menstrual outflow is associated with the development of endometriosis and pelvic scarring (often extensive); chronic pelvic pain, dyspareunia, and infertility may result. Pregnancy rates for patients with corrected transverse septa range from 25% to 50% based on location of the septum and series report.
Expected Outcome: With timely diagnosis and treatment, prognosis is good.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy once pregnancy is achieved. Pregnancy success is greatest with septa that are lower in the vagina and repaired early. Based on the extent of vaginal reconstruction performed and the degree of subsequent scarring, cesarean delivery may be elected (approximately 50% of reported cases).
ICD-10-CM Codes: Q52.11 (Transverse vaginal septum).

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VAGINAL CYSTS

112

INTRODUCTION

Description: Cystic masses in the vaginal wall are uncommon and may arise from either congenital (Gartner duct cysts) or acquired (epithelial inclusion cysts) processes.
Prevalence: 1/200 women.
Predominant Age: Generally from adolescence to middle reproductive years.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Congenital (Gartner duct cyst or remnant, generally found in the anterior lateral vaginal wall), structural (urethral diverticulum, loss of vaginal wall support), acquired (inclusion cyst; >50% of cysts).
Risk Factors: Episiotomy or obstetric laceration, gynecologic surgery.

SIGNS AND SYMPTOMS

- Asymptomatic
- May be associated with a sense of fullness
- Dyspareunia (uncommon)
- Difficulty with tampon insertion or retention
- Cystic mass lesion (1–5 cm) generally found in the lateral vaginal wall (congenital) or in midline posteriorly (acquired)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Urethral diverticulum
- Cystocele
- Urethrocele
- Rectocele
- Bartholin gland cyst
- Vaginal adenosis
- Vaginal endometriosis
- Perirectal abscess
- Vaginal fibromyoma

Associated Conditions: Slightly higher rate of upper genital tract malformations when embryonic remnants persist.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated.
Special Tests: Vaginal adenosis may be excluded by staining with Lugol solution (adenosis will not stain).
Diagnostic Procedures: History and physical examination.

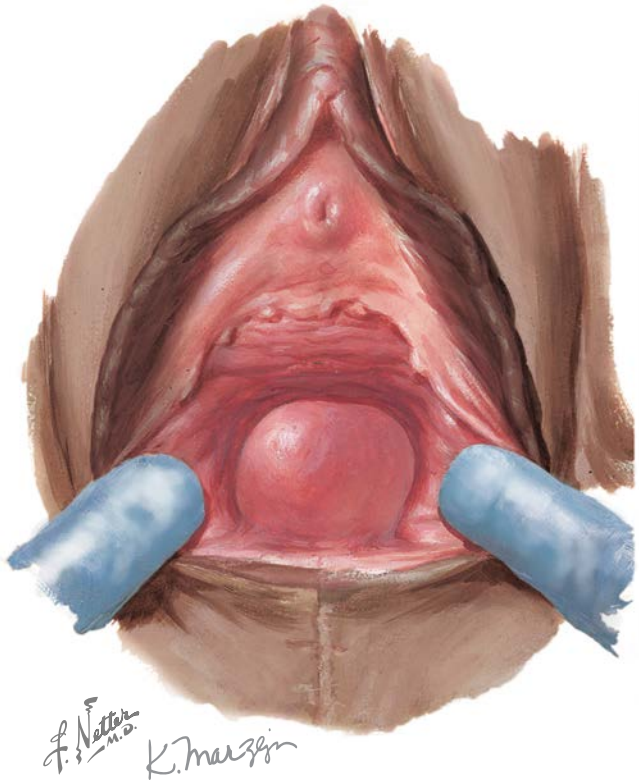

Figure 112.1 Inclusion cyst

Pathologic Findings

Most embryonic cysts are lined with cuboidal epithelium. Stratified epithelium suggests an inclusion (acquired) cyst.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and reassurance.
Specific Measures: Surgical excision or marsupialization if the mass is symptomatic or its cause is uncertain; otherwise, no therapy is required.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- Disorders of the Vulva, 2020

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: Mechanical irritation or interference with intercourse or childbirth (rare), infection (rare).
Expected Outcome: Some care must be used in the excision of large cysts so that vaginal scarring and stenosis do not occur; otherwise, surgical therapy should be successful.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: N89.8 (Other specified noninflammatory disorders of vagina) and Q52.4 (Other congenital malformations of vagina, Embryonal).

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113 VAGINAL DRYNESS

INTRODUCTION

Description: Vaginal dryness is characterized by the loss of normal vaginal moisture resulting in irritation, itching, or pain with intercourse. This loss may result from alterations in vaginal physiology caused by an infection or the loss of estrogen stimulation (atrophic change). This may also occur situationally because of inadequate or inappropriate sexual stimulation, sexual phobia, or pain.
Prevalence: Common in menopausal women not undergoing estrogen therapy. Estimated to affect one in five women around the time of menopause and in more than half of women after 5 years without normal estrogen levels.

Predominant Age: Postmenopausal.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Loss of estrogen stimulation (menopause), vaginitis, vaginismus, arousal disorders.
Risk Factors: Loss of ovarian function because of age, chemotherapy, radiation, or surgery, vaginal infection, arousal disorders.

SIGNS AND SYMPTOMS

- Sensation of vaginal dryness
- Vaginal itching or irritation
- Insertional dyspareunia
- Dry, inflamed vaginal tissues seen on pelvic examination
- Loss of normal vaginal rugae

DIAGNOSTIC APPROACH

Differential Diagnosis

- Lichen sclerosus
- Vaginitis
- Vulvar vestibulitis
- Libidinal dysfunction/arousal disorders

Associated Conditions: Dyspareunia, vaginitis, and menopause.

Workup and Evaluation

Laboratory: Microscopic examination of vaginal secretions if infection is suspected.
Imaging: No imaging indicated.
Special Tests: A vaginal maturation index may confirm atrophic change but is seldom required.
Diagnostic Procedures: History and physical examination.

Pathologic Findings

Postmenopausal—thinned, pale vaginal epithelium with the loss of rugations, low moisture content, increased pH (usually >5), inflammation, and small petechiae. Infection—based on organism present.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, topical moisturizers, or lubricants (as needed or long-acting moisturizers).
Specific Measures: Estrogen replacement therapy or treatment of vaginal infection (when appropriate). Counseling regarding sexuality, arousal, foreplay, and coital technique (if needed).
Diet: No specific dietary changes indicated.
Activity: No restriction.

Figure 113.1 Vaginal dryness can cause, or be the result of, sexual dysfunction

Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Disorders of the Vulva, 2020
- The Menopause Years, 2020
- Vulvovaginal Health, 2020
- Vaginitis, 2021
- When Sex Is Painful, 2020
- Your Sexual Health, 2019

Drug(s) of Choice

- Estrogen replacement therapy when appropriate (see "Menopause")
- Water-soluble lubricants for intercourse
- Long-acting emollients (Replens, etc.)

Contraindications: Known or suspected allergy or intolerance to any agent.
Precautions: Petroleum-based products (eg, Vaseline) are difficult to remove and may lead to additional irritation.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: Estrogen therapy after menopause (for select patients).
Possible Complications: Vaginal lacerations and secondary infection, vulvar excoriations, sexual dysfunction.
Expected Outcome: Generally good results with topical or systemic therapy for estrogen loss. Good response to therapy for vaginitis.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy (generally not an issue).
ICD-10-CM Codes: Based on the cause.

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114 VAGINAL LACERATIONS

INTRODUCTION

Description: Nonobstetric lacerations of the vaginal wall or introitus are most often the result of sexual trauma (80%; consensual or otherwise); sports and straddle injuries make up most of the rest.
Prevalence: Uncommon, but specific prevalence is unknown.
Predominant Age: Reproductive age (most common in females younger than 25 years).
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Intercourse (80%), saddle or sports injury (bicycling, water skiing, snowboarding), sexual assault, penetration by foreign objects.
Risk Factors: Virginity, vaginismus, postpartum and postmenopausal vaginal atrophy, hysterectomy, alcohol or other drug use.

SIGNS AND SYMPTOMS

- Vaginal bleeding (may be profuse and prolonged)

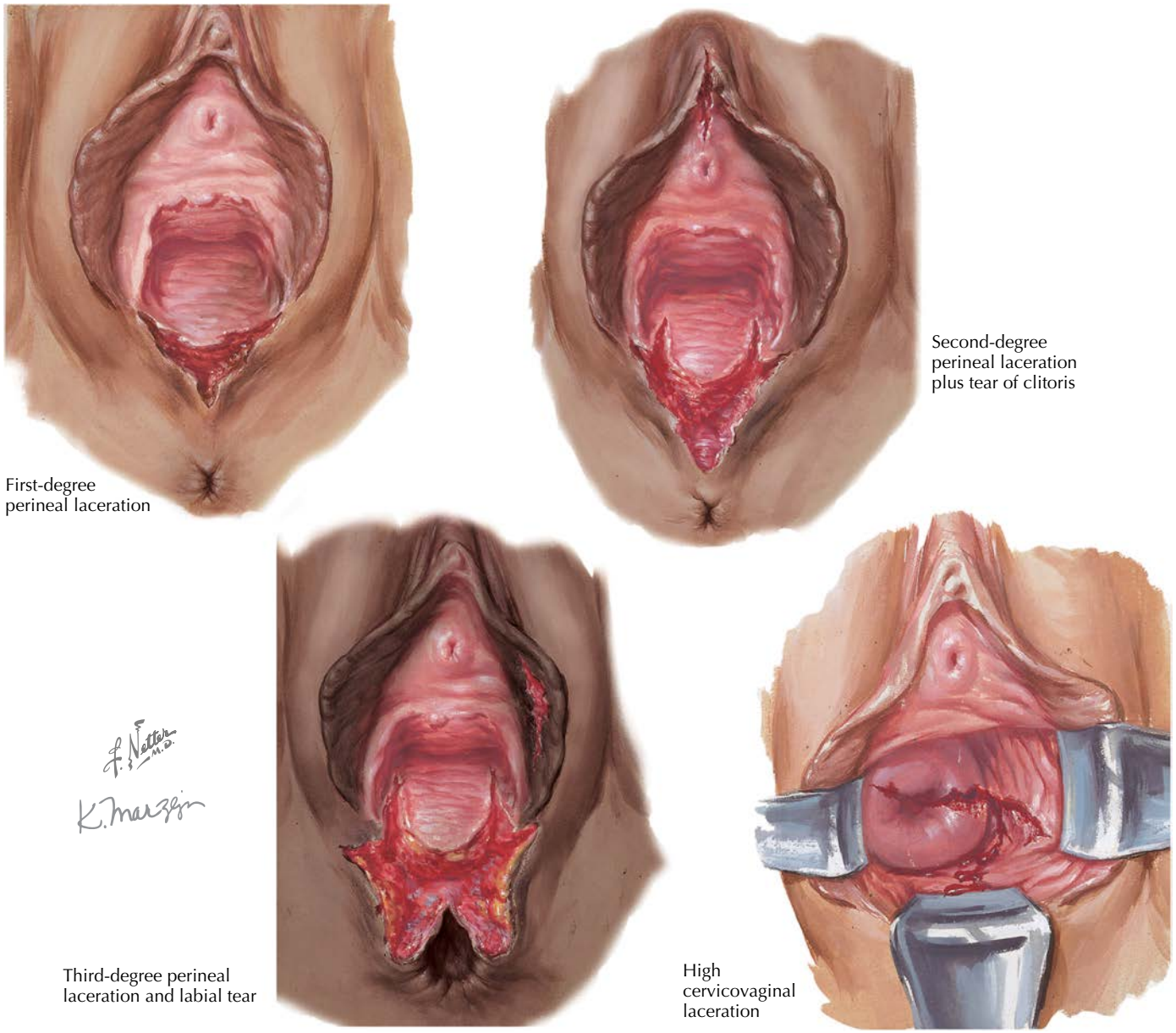

Figure 114.1 Vaginal lacerations (first, second, and forth degrees)

- Acute pain during intercourse (25%; lacerations of the distal vagina or introitus)
- Persistent pain after intercourse (the location of the pain is somewhat dependent on the location of the laceration)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Cervical polyp (as source of bleeding)
- Menstrual bleeding
- Threatened abortion
- Granulation tissue in healing incision (obstetric injury, other vaginal surgery)
- Sexual abuse/rape

Associated Conditions: Vulvar hematoma, vaginal atrophy, sexual dysfunction, intimate partner violence, alcohol or drug use/abuse.

Workup and Evaluation

Laboratory: Complete blood count.
Imaging: No imaging indicated.
Special Tests: None indicated.
Diagnostic Procedures: History and physical examination (history is often misleading or false).

Pathologic Findings

The most common sites of coital laceration are the posterior fourchette, posterior fornix, the right and left fornices.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Rapid assessment and hemodynamic stabilization (when appropriate).
Specific Measures: Surgical closure of the laceration, evaluation of the integrity of the urinary and gastrointestinal tracts; may include exploratory laparotomy or laparoscopy in cases of evisceration or peritoneal breach.
Diet: No specific dietary changes indicated.
Activity: Pelvic rest (no tampons, douches, or intercourse) until healing has occurred.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Intimate Partner Violence, 2020
- When Sex Is Painful, 2020

Drug(s) of Choice

- Local or general anesthesia for surgical repair.
- Treatment with an antibiotic is generally not required, except if a peritoneal breach is present.

FOLLOW-UP

Patient Monitoring: Normal health maintenance after healing has been completed.
Prevention/Avoidance: Avoidance of alcohol or drug use, careful consensual intercourse, adequate vaginal lubrication.
Possible Complications: Vaginal evisceration, excessive blood loss. In rare cases, death has been reported.
Expected Outcome: Generally good healing; the risk of recurrence is based on cause.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy unless the health or safety of the mother is compromised.
ICD-10-CM Codes: Based on the location and cause.

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115 VAGINAL PROLAPSE

INTRODUCTION

Description: Vaginal prolapse is the loss of the normal support mechanism, resulting in descent of the vaginal wall down the vaginal canal. In the extreme, this may result in the vagina becoming everted beyond the vulva to a position outside the body. Vaginal prolapse is generally found only after hysterectomy and is a special form of enterocele.

Prevalence: Depends on the severity of the original defect, type of surgery originally performed, and other risk factors (estimated to be between 0.1% and 18.2% of patients who have undergone hysterectomy).

Predominant Age: Late reproductive age and older.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Loss of normal structural support because of trauma (childbirth), surgery, chronic intraabdominal pressure elevation (eg, obesity, chronic cough, or heavy lifting), or intrinsic weakness. A recurrence within 1–2 years of surgery is considered a failure of technique.

Risk Factors: Birth trauma, chronic intraabdominal pressure elevation (eg, obesity, chronic cough, or heavy lifting), intrinsic tissue weakness, or atrophic changes resulting from estrogen loss.

SIGNS AND SYMPTOMS

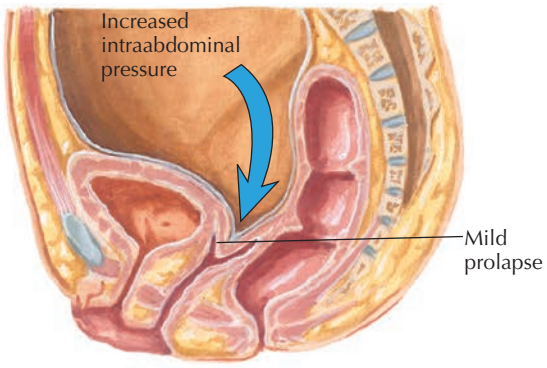
- Pelvic pressure or heaviness, backache
- Mass or protrusion at the vaginal entrance
- New-onset or paradoxical resolution of urinary incontinence

DIAGNOSTIC APPROACH

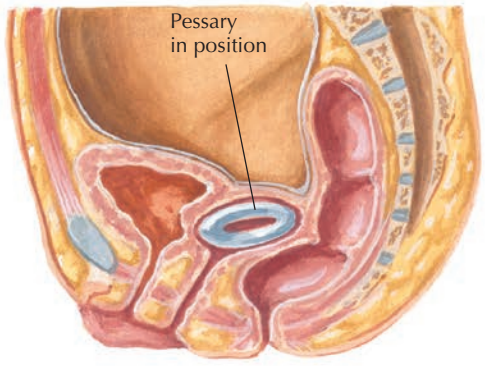
Differential Diagnosis

- Cystocele
- Urethrocele
- Rectocele
- Bartholin cyst
- Vaginal cyst or tumor

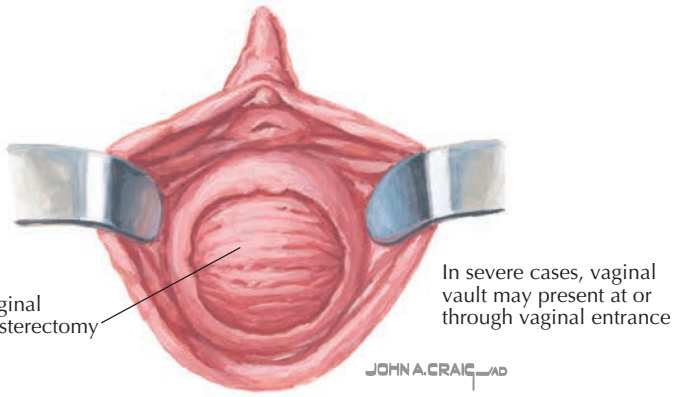
Associated Conditions: Urinary incontinence, pelvic pain, dyspareunia, intermenstrual or postmenopausal bleeding. A cystourethrocele, rectocele, and/or enterocele are almost always present when complete prolapse has occurred.



Increased intraabdominal pressure, such as coughing, may result in prolapse of vagina in patients with poor pelvic support and in posthysterectomy patients



In mild cases, the use of a pessary may help maintain vaginal vault in proper position



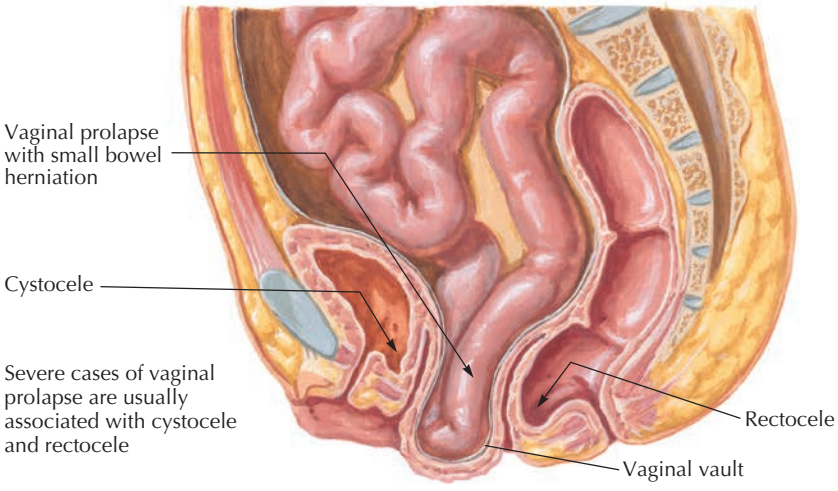


Figure 115.1 Vaginal prolapse

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated.
Special Tests: Urodynamics testing may be considered if there is altered voiding or continence.
Diagnostic Procedures: History and physical examinations. Either the Baden–Walker Halfway Scoring evaluation system or the Pelvic Organ Prolapse Quantification System may be used to quantify the degree of prolapse present.

Pathologic Findings

Tissue changes common because of mechanical trauma and desiccation.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Weight reduction, modification of activity (lifting); address factors such as chronic cough.
Specific Measures: Pessary therapy, surgical repair (culdoplasty, plication of the uterosacral ligaments, sacrospinous ligament fixation, mesh-based support, or colpocleisis). When surgical repair is undertaken, attention must also focus on the correction of any anterior or posterior vaginal wall support problems.
Diet: No specific dietary changes indicated.
Activity: No restriction, although heavy lifting or strenuous activities may predispose to the development or recurrence of prolapse.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Pelvic Support Problems, 2020
- Surgery for Pelvic Organ Prolapse, 2018
- Urinary Incontinence, 2020

Drug(s) of Choice

- Estrogen therapy (for symptomatic postmenopausal patients) improves tissue tone and healing.
- Topical therapy is often prescribed before surgical repair or as an adjunct to pessary therapy.

Contraindications: Estrogen therapy should not be used if undiagnosed vaginal bleeding is present.

FOLLOW-UP

Patient Monitoring: Normal health maintenance. If a pessary is used, frequent follow-up (both initially and long term) is required.
Prevention/Avoidance: Maintenance of normal weight, avoidance of known (modifiable) risk factors.
Possible Complications: Thickening or ulceration of vaginal tissues, urinary incontinence, kinking of the ureters, and obstipation. Complications of surgical repair include intraoperative hemorrhage, nerve damage (sciatic), damage to the rectum or uterus, postoperative infection, and complications of anesthesia. The placement of a surgical mesh carries the risk for both acute and delayed complications and should be reserved for selected patients.
Expected Outcome: Vaginal prolapse tends to worsen with time. If uncorrected, complete prolapse is associated with vaginal skin changes, ulceration, and bleeding.

MISCELLANEOUS

ICD-10-CM Codes: N81.9 (Female genital prolapse, unspecified) and N99.3 (Prolapse of vaginal vault after hysterectomy).

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116 VAGINITIS: ATROPHIC (GENITOURINARY SYNDROME OF MENOPAUSE)

INTRODUCTION

Description: Atrophic vaginitis is characterized by the degeneration (atrophy) of vaginal tissues caused by the loss of ovarian steroids. It is part of the broader issue of genitourinary syndrome of menopause.
Prevalence: Occurs to some extent in 100% of postmenopausal women who do not undergo estrogen therapy.
Predominant Age: 50 years and older (or after surgical menopause).
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Loss of estrogen stimulation as a result of surgery, chemotherapy (alkylating agents), radiation, natural cessation of ovarian function (menopause), antiestrogenic drugs, or gonadotropin-releasing hormone agonist therapy.
Risk Factors: Loss of ovarian function because of age, chemotherapy, radiation, or surgery.

SIGNS AND SYMPTOMS

- Vaginal dryness, burning, and itching
- Pain or bleeding with intercourse (may be associated with lacerations)
- Thin, shiny, red epithelium with a smooth surface (loss of rugae)

DIAGNOSTIC APPROACH

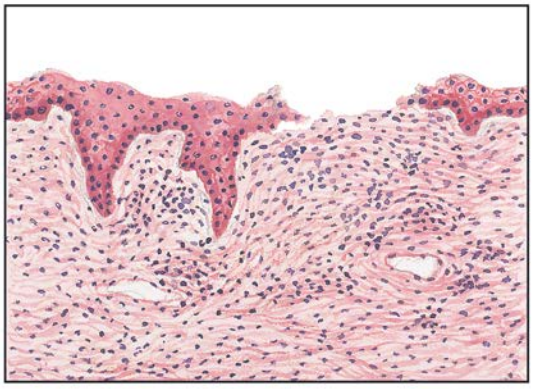
Differential Diagnosis

- Vaginal infections
- Vulvitis (including dermatologic causes)
- Chemical vaginitis
- Changes after radiation exposure
- Lichen sclerosus

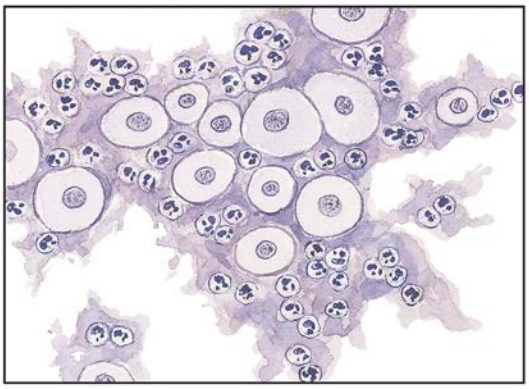
Associated Conditions: Menopause, dyspareunia, vulvodynia, atrophic vulvitis, urinary frequency, urinary urgency, urgency incontinence, increased risk of other menopause-related conditions, including osteoporosis, increased risk of cardiovascular disease, hot flashes and flushes, or sleep disturbances.

Workup and Evaluation

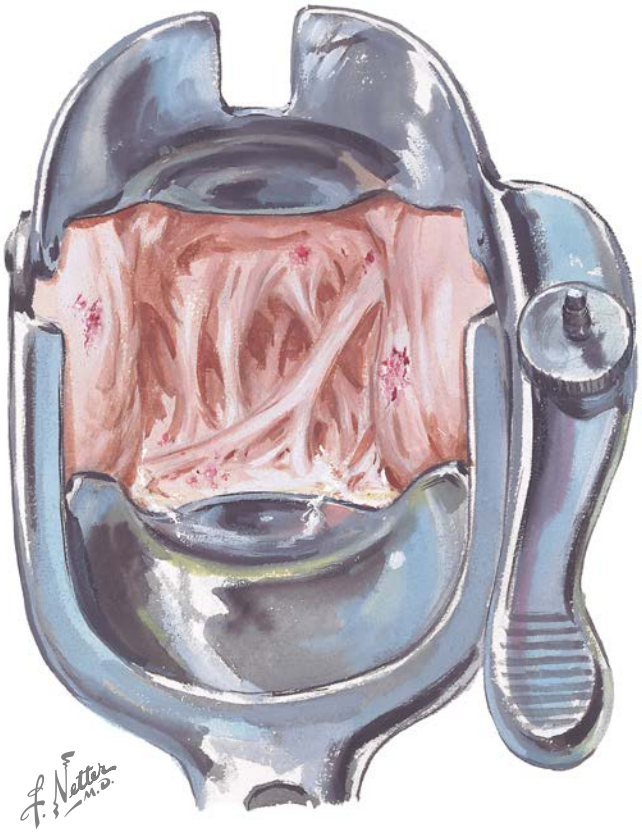
Laboratory: No evaluation indicated.
Imaging: No imaging indicated.
Special Tests: A vaginal maturation index may be performed but is generally not required.
Diagnostic Procedures: History and clinical inspection generally sufficient.



Histology of vagina after menopause



Smear from postmenopausal vagina



Advanced stage with extensive adhesions

Figure 116.1 Atrophic vaginal changes

Pathologic Findings

Thinned epithelium with the loss of rugae and rete pegs (on biopsy).

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Vaginal moisturizers (Replens, Me Again, Vagisil Feminine Moisturizer, Feminease, and K-Y SILK-E), smoking cessation (smoking depletes circulating estrogen).
Specific Measures: Topical or systemic estrogen (estrogen/progestin) therapy.
Diet: No specific dietary changes indicated.
Activity: No restriction, supplemental lubricants for intercourse (if necessary).
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Disorders of the Vulva, 2020
- The Menopause Years, 2020
- Vaginitis, 2021
- Vulvovaginal Health, 2020
- When Sex Is Painful, 2020
- Your Sexual Health, 2019

Drug(s) of Choice

- Most common drug dosages are shown. Note that nonhormonal and topical estrogen therapies are preferred over oral estrogen therapy unless otherwise indicated.
- Topical—17β-estradiol (transdermal) 0.05–0.10 mcg/day, conjugated equine estrogens 0.625 mg/g, estradiol 0.1 mg/g, estropipate 1.5 mg/g.
- Oral estrogens—conjugated equine estrogens 0.625–1.25 mg/day, diethylstilbestrol, esterified estrogens 0.625–1.25 mg/day, ethinyl estradiol 0.05 mg/day, micronized estradiol 0.5–1 mg/day, piperazine estrone sulfate, estropipate, quinestrol.

Contraindications (Systemic Therapy): Active liver disease, carcinoma of the breast (current), chronic liver damage (impaired function), known sensitivity to topical vehicles, endometrial carcinoma (current), recent thrombosis (with or without emboli), unexplained vaginal bleeding.
Precautions: Continuous systemic estrogen exposure without periodic or concomitant progestins increases the risk of endometrial carcinoma by 6-fold to 8-fold when the uterus is present. When topical estrogen alone is used, concomitant use of a progestin to protect the endometrium is not necessary.
Interactions: See individual agents.

Alternative Drugs

- Ospemifene (a selective estrogen receptor modulator [SERM]) acts as an estrogen agonist in the vagina but has no clinically significant estrogenic effect on the endometrium or breast. It was approved in 2013 for treating vaginal atrophy. Systemic side effects (hot flashes, increased risk of thromboembolism) and the need for daily dosing limit use of this therapy to selected patients.
- Preliminary studies suggest that topically applied androgens (dehydroepiandrosterone) may be effective in reducing vaginal atrophy symptoms, including dyspareunia.

FOLLOW-UP

Patient Monitoring: Normal health maintenance. Patients may be at slightly greater risk for vaginal infections or trauma.
Prevention/Avoidance: Estrogen therapy for menopausal symptoms.
Possible Complications: Reduced resistance to infection, dyspareunia, and traumatic injury during intercourse.
Expected Outcome: Reversal of symptoms, reestablishment of normal physiology.

MISCELLANEOUS

Pregnancy Considerations: Menopause is associated with the loss of fertility.
ICD-10-CM Codes: N95.2 (Postmenopausal atrophic vaginitis).

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117 VAGINITIS: BACTERIAL (NONSPECIFIC) AND BACTERIAL VAGINOSIS

INTRODUCTION

Description: Bacterial vaginitis is a vaginal infection that is caused by an overgrowth of normal or pathogenic bacteria, resulting in a rise in pH (>4.5), irritation, inflammation, and clinical symptoms. Bacterial vaginosis is a change in the vaginal ecology caused by an overgrowth of anaerobic bacteria, often with an absence of clinical symptoms. It should be noted that bacterial vaginosis does not engender an inflammatory response and, thus, is technically not a type of vaginitis.

Prevalence: Approximately 6 million cases per year; accounts for 50% of "vaginal infections" and up to 50% of asymptomatic women in some studies. There is a higher prevalence in Black, Hispanic, and Mexican American women compared with White non-Hispanic women.

Predominant Age: 15–50 years (may occur at any age).

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Bacterial vaginitis—overgrowth of normal or pathologic bacteria with an inflammatory response (which distinguishes this from bacterial vaginosis). Bacterial vaginosis—a polymicrobial process that involves the loss of normal lactobacilli, an increase in anaerobic bacteria (especially *Gardnerella vaginalis, Bacteroides* sp., *Peptococcus* sp., *Mobiluncus* sp., and others), and a change in the chemical composition of the vaginal secretions. There is a 1000-fold increase in the number of bacteria present and a 1000:1 anaerobic/aerobic bacteria ratio (normally 5:1), high levels of mucinases; phospholipase A_2, lipases, proteases, arachidonic acid, and prostaglandins are all present. Amines (cadaverine and putrescine) are made through bacterial decarboxylation of arginine and lysine. These amines are more volatile at an alkaline pH, such as that created by the addition of 10% potassium hydroxide (KOH) or semen (approximately a pH of 7), giving rise to odor found with the "whiff test" or as reported by these patients after intercourse.

Risk Factors: Systemic processes—diabetes, pregnancy, and debilitating disease. Anything that alters the normal vaginal flora—smoking, numbers of sexual partners, vaginal contraceptives used, some forms of sexual expression such as oral sex, antibiotic use, hygiene practices and douching, menstruation, and immunologic status.

SIGNS AND SYMPTOMS

Bacterial Vaginitis

- Vulvar burning or irritation
- Increased discharge (often with odor)
- Dysuria
- Dyspareunia
- Edema or erythema of the vulva

Bacterial Vaginosis

- Asymptomatic (20%–50% of patients)
- Increased discharge
- Vaginal odor (often more pronounced after intercourse)
- Vulvar burning or irritation

Uncommon

- Dysuria
- Dyspareunia
- Edema or erythema of the vulva

DIAGNOSTIC APPROACH

Differential Diagnosis

- Chlamydial cervicitis
- Gonococcal cervicitis
- *Trichomonas vaginalis* infection
- Vaginal candidiasis
- Genitourinary syndrome of menopause

Associated Conditions: Other vaginal or sexually transmitted infections (STIs), cervicitis, and vulvitis. Ascending infections, including endometritis, pelvic inflammatory disease, human immunodeficiency virus, transmission, postoperative vaginal cuff cellulitis, preterm rupture of the membranes and endomyometritis, increased early pregnancy loss, and decreased success with in vitro fertilization.

Workup and Evaluation

Laboratory: Culture or monoclonal antibody staining may be obtained to evaluate other causes but are seldom necessary. Evaluation for concomitant STIs should be considered.

Imaging: No imaging indicated.

* **Special Tests:** Vaginal pH 5–5.5, "whiff" test—the addition of 10% KOH to vaginal secretions to liberate volatile amines, causing a "fishy" odor (bacterial vaginosis).

Diagnostic Procedures: Physical examination, microscopic examination of vaginal secretions in normal saline. For bacterial vaginosis, the diagnosis requires three of the following (Amsel criteria): homogeneous discharge, pH 5–5.5, clue cells (>20%), positive "whiff" test. Commercial tests (such as for proline aminopeptidase activity, automated DNA probe assays, or chromogenic diagnostic tests) exist but are generally not necessary to establish the diagnosis. Gram staining with Nugent scoring of vaginal discharge is the gold standard.

Pathologic Findings

Increased white blood cells and number of bacteria when vaginal secretions are viewed under normal saline suggest vaginitis. Clue cells may be present but are often absent in vaginitis. For bacterial vaginosis, clue cells must represent 20% or more of epithelial cells seen.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Perineal hygiene, education regarding STIs.

Specific Measures: Medical therapy, vaginal acidification, cessation of douching.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- How to Prevent Sexually Transmitted Infections, 2020
- Vaginitis, 2021
- Vulvovaginal Health, 2020

Drug(s) of Choice

- Oral—metronidazole (Flagyl, Protostat) 500 mg twice daily for 7 days (90%–100% cure), oral clindamycin 300 mg twice daily for 7 days.
- Topical—clindamycin (5 g of cream, 100 mg of clindamycin) every night at bedtime for 7 days, metronidazole (5 g of cream, 37.5 mg of metronidazole) twice a day for 5 days.

Contraindications: Metronidazole is relatively contraindicated in the first trimester of pregnancy.

Precautions: Oral metronidazole is associated with the potential for systemic side effects, including a metallic taste in the mouth and stomach upset. Topical metronidazole is currently available in two forms: One for dermatologic use and one for intravaginal use. The pH of these two preparations is quite different, making it important to specify the form on the prescription to avoid significant chemical irritation. Some concerns have been raised about the risk of inducing antibiotic resistance through the use of topical clindamycin, although the clinical significance is uncertain.

Interactions: Because of a disulfiram-like reaction, patients must be warned to avoid alcohol intake during metronidazole therapy.

Alternative Drugs

- Oral—tinidazole and secnidazole are second-generation nitroimidazoles that are considered as alternative regimens.
- Topical—topical triple sulfa (cream or suppositories) twice a day for 7–10 days, vaginal acidification (Aci-Jel, Amino-Cerv, boric acid), povidone-iodine as a douche or gel. Efficacy of these options is low and they are generally discouraged.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.

Prevention/Avoidance: Bacterial vaginosis is considered to develop 5–10 days after exposure to the involved bacteria. *Gardnerella* may be found in 90% of male partners of women with bacterial vaginosis. Hence, sexual transmission is postulated, although bacterial vaginosis can occur in virginal women. The role of condoms in prevention is debated. Treatment of sexual partners has not been shown to be effective in reducing recurrence rates.

Possible Complications: Cystitis, cervicitis, infections of Skene or Bartholin glands, increased risk of pelvic inflammatory disease, pelvic pain, and infertility. Increased risk of upper genital tract infections and postoperative infections if surgery is performed while bacterial vaginosis is present. Increased risk of premature delivery, premature rupture of the membranes, and chorioamnionitis when bacterial vaginosis is present during pregnancy.

Expected Outcome: Most treatment failures are actually caused by reinfection or failure to comply with treatment.

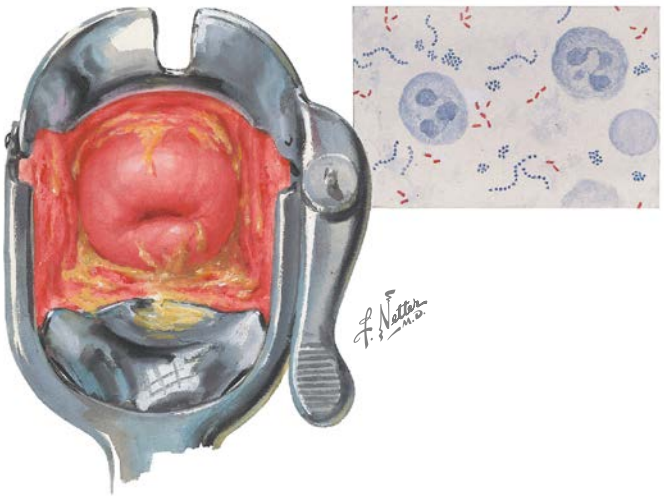

Figure 117.1 Bacterial vaginosis

MISCELLANEOUS

Pregnancy Considerations: Vaginal infections are associated with an increased risk of prematurity and premature rupture of the membranes.

ICD-10-CM Codes: N76.0 (Acute vaginitis) and N76.1 (Subacute and chronic vaginitis).

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118 VAGINITIS: MONILIAL

INTRODUCTION

Description: Monilial vaginitis is a vaginal infection caused by ubiquitous fungi found in the air or as common inhabitants of the vagina, rectum, and mouth.
Prevalence: 25%–40% of "vaginal infections"; 30%–50% of women experience one or more lifetime occurrences; *Candida* species may be found in the lower genital tract in 10%–25% of healthy, reproductive-aged women.
Predominant Age: 15–50 years (rare outside this range except for females undergoing estrogen therapy after menopause).
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: *Candida albicans* (80%–95%), *C. glabrata, C. tropicalis,* or others (5%–20%).
Risk Factors: Altered vaginal ecosystem (stress, antibiotic use, pregnancy, diabetes, depressed immunity, topical contraceptives, and a warm and moist environment).

SIGNS AND SYMPTOMS

- 15%–25% asymptomatic carrier rate
- Vulvar itching or burning (intense)
- External dysuria, dyspareunia
- Tissue erythema, edema, and excoriations
- Thick, adherent, plaque-like discharge with a white to yellow color (generally odorless)
- Vulvar excoriations

DIAGNOSTIC APPROACH

Differential Diagnosis

- Bacterial vaginitis
- Bacterial vaginosis
- *Trichomonas* vaginal infection
- Contact vulvitis (allergic vulvitis)
- Genitourinary syndrome of menopause
- Vulvar dermatoses
- Pinworms

Associated Conditions: Diabetes, immunosuppression or compromise (as risk factors for infection), chronic vulvitis.

Workup and Evaluation

Laboratory: Culture (Nickerson or Sabouraud media) or monoclonal antibody staining may be obtained but are seldom necessary. Culture is most appropriate for recurrent (≥4 episodes in 12 months) or resistant cases. Yeast cells found on Papanicolaou smear are not diagnostic and require clinical correlation and confirmation.
Imaging: No imaging indicated.
Special Tests: Vaginal pH 4–4.5.
Diagnostic Procedures: Physical examination, microscopic examination of vaginal secretions in normal saline and 10% potassium hydroxide (KOH).

Pathologic Findings

Branching and budding of vaginal monilia distinguish monilial vaginitis from lint or other foreign material. The use of 10% KOH lyses white blood cells and renders epithelial cells "ghost like," enabling easier identification.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Perineal hygiene (keep the perineal area clean and dry, avoid tight undergarments or those made of synthetic fabric), education regarding prevention, encouragement in completing the prescribed course of therapy.
Specific Measures: Medical therapy.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Vaginitis, 2021
- Vulvovaginal Health, 2020

Drug(s) of Choice

- Imidazoles—miconazole (Monistat) 200-mg suppositories every night at bedtime for 3 days or 2% cream 5 g every night at bedtime for 7 days; clotrimazole (Femcare, Gyne-Lotrimin, Mycelex) 100-mg inserts every night at bedtime for 7 days or 1% cream 5 g every night at bedtime for 7 days; butoconazole (Femstat) 2% cream 5g every night at bedtime for 3 days; tioconazole (Vagistat) 6.5% ointment 4.6 g every night at bedtime.
- Triazoles—terconazole (Terazol) 80-mg suppositories every night at bedtime for 3 days or 0.8% cream 5 g every night at bedtime for 3 days or 0.4% cream 5 g every night at bedtime for 7 days; fluconazole (Diflucan) 150 mg PO single dose. Oral therapy is often considered more convenient than intravaginal agents, but cure rates are comparable.
- Triterpenoids—ibrexafungerp (Brexafemme) 300 mg every 12 hours for two doses (inhibits fungal growth by inhibiting formation of fungal cell walls).

Contraindications: Known or suspected hypersensitivity or allergy. Imidazoles are contraindicated during the first trimester of pregnancy. Fluconazole is a pregnancy category C drug. Ibrexafungerp should not be given to pregnant individuals because of concern for fetal harm.
Precautions: Topical steroid preparations should be avoided. Use of oral ketoconazole requires baseline and follow-up liver function studies. Gastrointestinal side effects are common with oral therapies. Contact dermatitis (localized burning and irritation) may occur in approximately 5% of users of topical antifungal agents.
Interactions: Oral fluconazole should be used with caution in patients taking oral hypoglycemics, coumarin-type anticoagulants, phenytoin, cyclosporine, rifampin, or theophylline.

Alternative Drugs

- Povidone-iodine (topical), gentian violet (1%), and boric acid (600-mg capsules placed high in the vagina twice daily; can be fatal if swallowed).

FOLLOW-UP

Patient Monitoring: Normal health maintenance; frequent recurrences should suggest host compromise (eg, diabetes, human immunodeficiency virus, anemia).
Prevention/Avoidance: Good perineal hygiene, clothing and activities that allow perineal ventilation (cotton underwear, loose clothing). Over-the-counter agents and oral supplements aimed at reducing infection are unregulated and insufficiently studied and are discouraged.

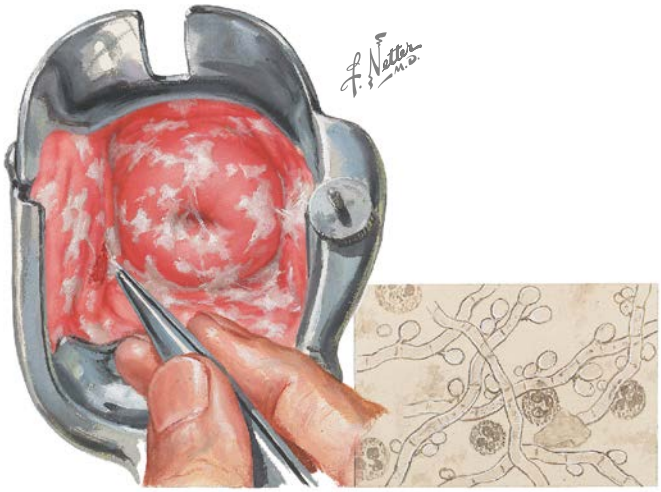

Figure 118.1 *Candida albicans*

Possible Complications: Vulvar excoriation caused by scratching, chronic vulvitis, secondary vaginal or vulvar infections.

Expected Outcome: A small number (<5%) of fungal infections are resistant to imidazole therapy and an increasing number of cases of fluconazole resistance have been reported. Organisms causing these infections are generally susceptible to triazoles. Approximately 30% of patients experience a recurrence of symptoms within a month (related to a continuing exposure, a change in host defenses [such as altered cellular immunity], or the ability of the fungus to burrow beneath the epithelium of the vagina).

MISCELLANEOUS

Pregnancy Considerations: Vaginal infections are associated with an increased risk of premature delivery and premature rupture of the membranes. The use of fluconazole has been associated with an increased risk of early pregnancy loss.

ICD-10-CM Codes: B37.3 (Candidiasis of vulva and vagina).

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VAGINITIS: *TRICHOMONAS*

119

INTRODUCTION

Description: *Trichomonas* vaginitis is a vaginal infection caused by an anaerobic flagellate protozoan, *Trichomonas vaginalis.*

Prevalence: Approximately 3.7 million cases per year in the United States (2.1% of women); accounts for 25% of "vaginal infections." The most common nonviral sexually transmitted infection (STI).

Predominant Age: 15–50 years (may occur at any age). One study found a peak rate at ages 47–53 years.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: *Trichomonas vaginalis,* an anaerobic flagellate protozoan in humans as the only natural host. The incubation period for *Trichomonas* infections is considered to be between 4 and 28 days.

Risk Factors: Multiple sexual partners, vaginal pH that is less acidic (blood, semen, or bacterial pathogens increase the risk).

SIGNS AND SYMPTOMS

- Asymptomatic (70%–85%)

- Vulvar itching or burning
- Copious discharge with a rancid odor (generally thin, runny, and yellow-green to gray in color; "frothy" in 25%)
- "Strawberry" punctation of the cervix and upper vagina (up to 15%, pathognomonic when present)
- Dysuria
- Dyspareunia
- Edema or erythema of the vulva

DIAGNOSTIC APPROACH

Differential Diagnosis

- Bacterial vaginitis
- Bacterial vaginosis
- Chlamydial cervicitis
- Gonococcal cervicitis
- Retained foreign body

Associated Conditions: Other STIs (specifically gonorrhea, chlamydia, and human immunodeficiency virus [HIV]). Infection is associated with a 2-fold risk of cervical cancer. Infections during pregnancy are associated with an increased risk of preterm birth, premature rupture of membranes, and infants who are small for gestational age.

Workup and Evaluation

Laboratory: Culture, nucleic acid amplification tests (NAATs), or positive rapid antigen or nucleic acid probe tests may be obtained and are most useful when microscopy is negative and suspicion is high. These tests have a sensitivity of more than 83% and a specificity of more than 97% but require 10–45 minutes to complete (false-positive results may occur in low-prevalence populations).
Imaging: No imaging indicated.
Special Tests: Vaginal pH 6–6.5 or higher.
Diagnostic Procedures: Physical examination, microscopic examination of vaginal secretions in normal saline (sensitivity of 60%–70%). NAATs are highly sensitive and specific.

Pathologic Findings

Trichomonas is a fusiform protozoan slightly larger than a white blood cell with three to five flagella, which provide active movement, extending from the narrow end.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Perineal hygiene, education regarding STIs.
Specific Measures: Medical therapy, vaginal acidification.
Diet: No specific dietary changes indicated. Avoid alcohol during metronidazole treatment.
Activity: Sexual abstinence until partner(s) are examined and treated.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- How to Prevent Sexually Transmitted Infections, 2020
- Vaginitis, 2021
- Vulvovaginal Health, 2020

Drug(s) of Choice

- 5-Nitroimidazole drugs—metronidazole 500 mg twice daily for 7 days; tinidazole 2 g orally (PO) in a single dose. All sexual partners should be treated at the same time.

Contraindications: Metronidazole and tinidazole are relatively contraindicated in the first trimester of pregnancy.
Precautions: Metronidazole and tinidazole may produce disulfiram-like reactions, resulting in nausea, vomiting, headaches, or other symptoms if the patient ingests alcohol. Patients should not use metronidazole or tinidazole if they have taken disulfiram in the preceding 2 weeks. Metronidazole and tinidazole must be used with care, or the dose must be reduced in patients with hepatic disease.
Interactions: Metronidazole and tinidazole may potentiate the effects of warfarin, coumarin, or alcohol (as noted previously).

Alternative Drugs

- Secnidazole single 2-g PO dose
- Topical clotrimazole, povidone-iodine (topical), hypertonic (20%) saline douches. Metronidazole gel is considerably less efficacious (<50%) compared with oral preparations and is unlikely to achieve therapeutic levels in the urethra or perivaginal glands; therefore, the use of the gel is not recommended.

FOLLOW-UP

Patient Monitoring: Follow-up serologic testing for syphilis and HIV infection as indicated. Follow-up testing for trichomonas at 3 months is indicated. The Centers for Disease Control and Prevention recommends annual screening for asymptomatic colonization in HIV-infected women.
Prevention/Avoidance: Sexual monogamy, condom use (male or female) for intercourse. All sexual contacts should be presumptively treated.
Possible Complications: Cystitis, urethritis, infections of Skene or Bartholin glands, increased risk of pelvic inflammatory disease, pelvic pain, infertility, and other sequelae of STIs.
Expected Outcome: Resistance to metronidazole is uncommon. Most treatment failures are caused by reinfection or failure to comply with treatment.

MISCELLANEOUS

Pregnancy Considerations: Vaginal infections are associated with an increased risk of prematurity, premature rupture of the membranes, and low-birthweight infants. Discontinue breastfeeding during metronidazole treatment and for 12–24 hours after the last dose. While using tinidazole, discontinue breastfeeding during treatment and for 3 days after the last dose.
ICD-10-CM Codes: A59.01 (Trichomonal vulvovaginitis).

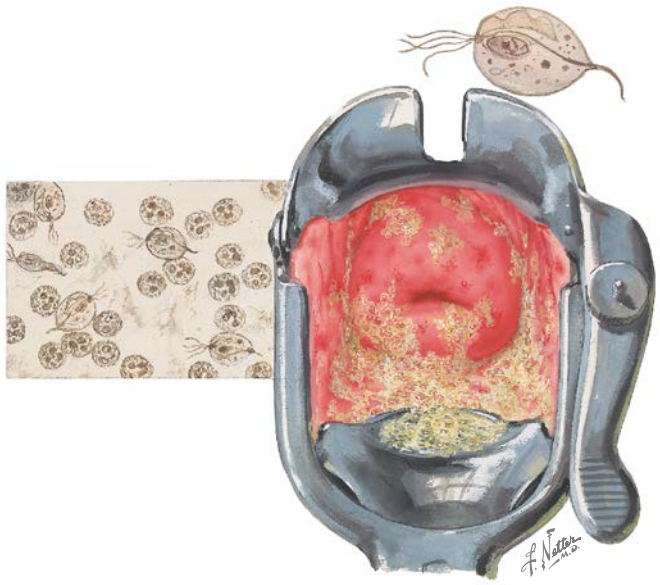

Figure 119.1 *Trichomonas vaginalis*

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SECTION VII

Cervical Disease

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ABNORMAL PAP SMEAR: ATYPICAL SQUAMOUS OR GLANDULAR CELLS OF UNDETERMINED SIGNIFICANCE

120

INTRODUCTION

Description: One of the most perplexing aspects of management under the Bethesda reporting system is how to interpret smears reported as showing atypical squamous or glandular cells (ASCUS, ASCH, or AGC). The atypical squamous cell (ASC) diagnosis has been developed to describe squamous cell changes that are more severe than reactive changes but not as marked as those found in squamous intraepithelial lesions (SIL, high and low grade [HSIL and LSIL]). The ASC designation has been subdivided into "atypical squamous cells of undetermined significance" (ASCUS) and "atypical squamous cells cannot exclude HSIL" (ASCH). The latter includes the cytologic changes suggestive of HSIL but insufficient for a definitive diagnosis. The category of atypical glandular cells (AGC) includes a range of findings from benign reactive changes in endocervical or endometrial cells to adenocarcinoma.

Prevalence: ASC—approximately 3% of all Pap tests; AGC—0.2% of all Pap tests.

Predominant Age: Reproductive age.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: If not all, most of the changes seen result from infection by the human papillomavirus (HPV). The AGC diagnosis reflects benign reactive changes in endocervical or endometrial cells, endometrial hyperplasia, or adenocarcinoma.

Risk Factors: ASC—exposure to high-risk HPV. AGC—none known, except for those affecting possible pathologic causes (eg, unopposed estrogen therapy as a risk factor for endometrial carcinoma).

SIGNS AND SYMPTOMS

- Asymptomatic

DIAGNOSTIC APPROACH

Differential Diagnosis

- ASC—inflammatory change (cervicitis)
  - LSIL change
- AGC—benign reactive changes in endocervical or endometrial cells
  - Endometrial hyperplasia or adenocarcinoma
  - Endometritis secondary to an intrauterine contraceptive device
  - Tuberculous endometritis
  - Tubal carcinoma

Associated Conditions: ASC—HPV infection, vaginitis, cervicitis. AGC—dysfunctional uterine bleeding (may be present but is most often absent).

Workup and Evaluation

Laboratory: No evaluation indicated.

Imaging: No imaging indicated.

Special Tests: HPV serotyping followed by colposcopy if high-risk subtypes are found. In women younger than 25 years of age with high-risk subtypes, a repeat Pap test in 12 months or high-risk HPV test alone in 12 months is an acceptable alternative. If low-risk serotypes are the only finding, a repeat cervical cytology examination (Pap test) should be performed in 12 months. Ultrasonography (including sonohysterography using saline infusion into the uterine cavity) may be considered for the evaluation of Pap test results classified as AGC.

Diagnostic Procedures: Colposcopy, with or without cervical biopsy and endocervical curettage, should be considered if high-risk HPV serotypes are identified, high-risk factors are present, or the abnormality is persistent or recurrent. Endocervical or endometrial biopsy and/or hysteroscopy may be indicated for AGC results because between 9% and 38% of patients will have significant neoplasia eventually found (varying with age).

Pathologic Findings

Minimal gross findings, mildly elevated numbers of nucleated squamous cells with varying degrees of maturation when ASC is present.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation of comments made by the cytopathologist. Increased frequency of Pap tests until the abnormality is resolved or further diagnosis is established (for a follow-up Pap test result to be "negative," it must have normal or benign findings, but it also must be "satisfactory for interpretation").

Specific Measures: Treatment of infection or inflammation (if present). Treatment of atrophic change (if present). If the cytology report accompanying the AGC test indicates a probability of carcinoma, the endocervical canal and endometrial cavity should be evaluated. Cone biopsy, hysteroscopy, or both may be required to adequately evaluate these patients.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Abnormal Cervical Cancer Screening Test Results, 2021
- Cervical Cancer, 2021
- Cervical Cancer Screening, 2021
- Colposcopy, 2021
- Human Papillomavirus Vaccination, 2021

Drug(s) of Choice

Based on specific indications.

FOLLOW-UP

Patient Monitoring: Normal health maintenance, increased frequency of Pap tests. If only low-risk serotypes are found, normal schedules for cervical cytology may be followed.

Prevention/Avoidance: Avoidance of HPV infection (ASC) through vaccination (Gardasil 9).

Possible Complications: Progression to more severe squamous abnormalities or occult disease unless a diagnosis is established and treatment is instituted. Data suggest that for women well into their 20s, virtually all ASC- and low-grade HPV-mediated changes are transitory and that regression to normal is to be expected without intervention.

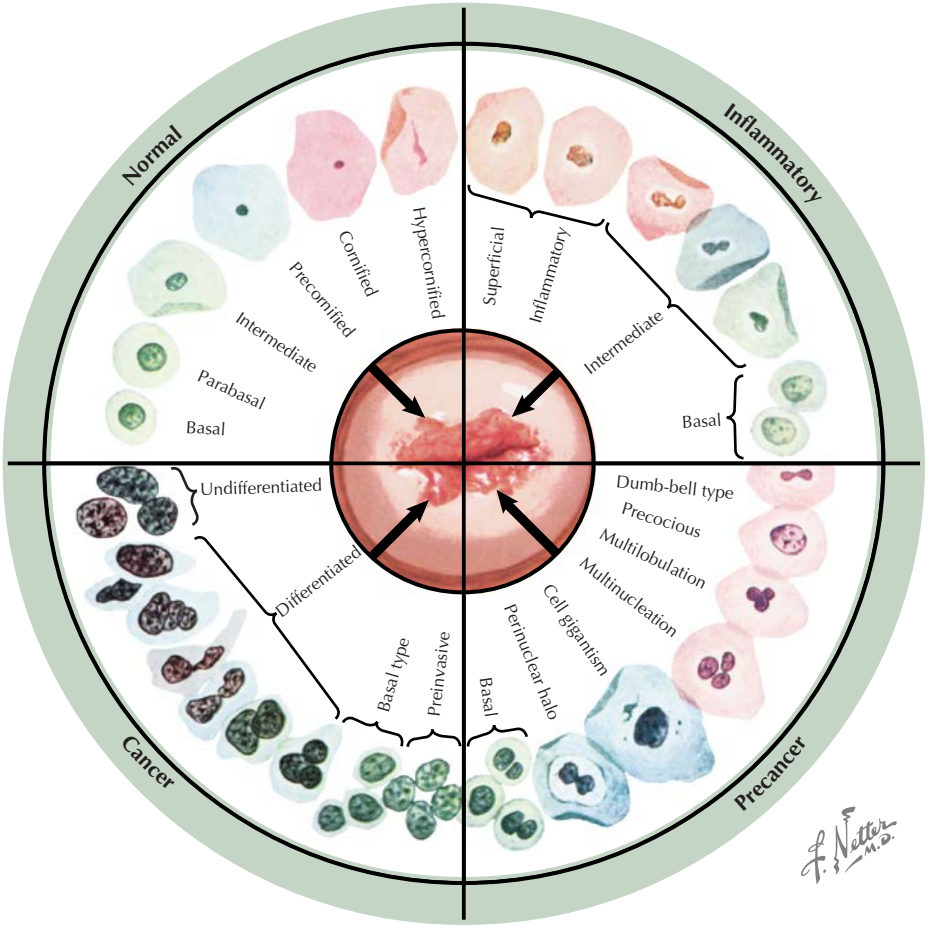

Figure 120.1 Cervical cell pathology in squamous tissue

Expected Outcome: Most patients with ASC experience a spontaneous return to normal, as seen if their Pap tests are closely followed (the average length of detectable HPV is 13 months; >90% will clear the infection within 24 months). When a treatable condition is identified, this response rate is even better.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. The likelihood of significant pathologic changes with ASC abnormalities is small enough that no proscription against pregnancy during the evaluation process is necessary. Although the possibility of significant complications is small in AGC, the underlying causes may be of sufficient concern to delay pregnancy until a diagnosis is established.

ICD-10-CM Codes: R87.610 (Atypical squamous cells of undetermined significance on cytologic smear of cervix), ASC-US, N87.9 (Dysplasia of cervix uteri, unspecified), and N87.619 (Unspecified abnormal cytological findings in specimens from cervix uteri [ACGUS]).

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ABNORMAL PAP SMEAR: LOW-GRADE SQUAMOUS INTRAEPITHELIAL LESIONS AND HIGH-GRADE SQUAMOUS INTRAEPITHELIAL LESIONS

121

INTRODUCTION

Description: Low-grade squamous intraepithelial lesions (LSILs) encompass changes associated with human papillomavirus (HPV), mild dysplasia, and cervical intraepithelial neoplasia (CIN) 1. High-grade squamous intraepithelial lesions (HSILs) include CIN 2 and 3 and carcinoma in situ (CIS). Patients with low-grade CIN are unlikely to develop cervical malignancy, whereas those with high-grade lesions are at high risk of progression to malignancy.
Prevalence: Less than 1% of Pap tests for low-grade abnormalities and 0.2% for high-grade abnormalities.
Predominant Age: Reproductive age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: HPV appears to be responsible for the development of cervical dysplasia. Although as many as 70% of invasive cervical cancers have HPV serotypes 16 or 18 present, these types also may be detected in patients with LSILs. Unaffected patients have HPV prevalence rates that vary from 10%–50%, depending on the study technique and population evaluated.
Risk Factors: Exposure to HPV and other sexually transmitted infections; smoking is associated with a higher risk. Smoking and immunosuppression are associated with a higher risk of progression.

SIGNS AND SYMPTOMS

- Asymptomatic

DIAGNOSTIC APPROACH

Differential Diagnosis

- LSILs—inflammatory change (cervicitis)
  - Cervical carcinoma
- HSILs—cervical CIS
  - Invasive cervical carcinoma

Associated Conditions: HPV infection, vaginitis, cervicitis, cervical dysplasia, CIS, invasive carcinoma of the cervix, endocervical adenocarcinoma.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated.
Special Tests: Cotesting, combining traditional cytology with HPV detection and reflex serotyping, has become widely accepted for women in the early to mid-reproductive years.
Diagnostic Procedures: For many patients with LSILs, colposcopy, colposcopically directed biopsy, and endocervical curettage are appropriate to establish the source of the cytologic abnormality. For compliant women younger than 25 years of age, a repeat Pap test in 12 months or high-risk HPV test alone in 12 months is an acceptable alternative. If colposcopy is inadequate to delineate lesions present, or the entire transformation zone cannot be seen, diagnostic conization may be needed. Colposcopy, colposcopically directed biopsy, and endocervical curettage should be used to evaluate all patients with HSILs.

Pathologic Findings

Acetowhite areas on colposcopy, early vascular changes leading to mosaicism and punctation. Microscopic—loss of normal maturation, increased nuclear-to-cytoplasmic ratio, nuclear atypia (mild). Vascular changes leading to mosaicism and punctation (severe) are more typical of HSILs. Nuclear atypia (moderate to severe) is also a feature of HSILs. Cytopathic effects from HPV (koilocytotic atypia) are often present.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation of comments made by the cytopathologist. Increased frequency of Pap tests until the abnormality is resolved or further diagnosis is established (for a follow-up Pap test to be "negative," it must have normal or benign findings, but it also must be "satisfactory for interpretation").

Specific Measures: Compliant patients with LSILs and who have low-risk HPV serotypes may be followed by serial Pap tests. For those with no serotyping or high-risk types, colposcopy is indicated. If colposcopy is adequate and the histologic abnormality found is mild, obtaining follow-up Pap tests at 6-month intervals for 2 years or three normal tests is suitable. When HSILs are present, risk evaluation determines therapy: cryotherapy, electrocautery, electrosurgical loop excision, laser ablation, or conization. Treatment must be based on an accurate diagnosis and the extent of the lesion involved. Treatment of CIN 1 in women younger than 21 years is not recommended, even if the lesion persists. Virtually all are manifestations of a transient HPV infection and will resolve, although complete resolution may take 36 months or more.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Abnormal Cervical Cancer Screening Test Results, 2021
- Cervical Cancer, 2021
- Cervical Cancer Screening, 2021
- Colposcopy, 2021
- Human Papillomavirus Vaccination, 2021
- Loop Electrosurgical Excision Procedure, 2021

Drug(s) of Choice

Based on specific indications, most therapy is surgical or ablative in nature.

FOLLOW-UP

Patient Monitoring: Normal health maintenance, increased frequency of Pap tests.

Prevention/Avoidance: Avoidance of HPV infection through multivalent vaccination (Gardasil 9).

Possible Complications: Progression to more severe squamous abnormalities. Data suggest that for young women, virtually all atypical squamous cells of undetermined significance and low-grade

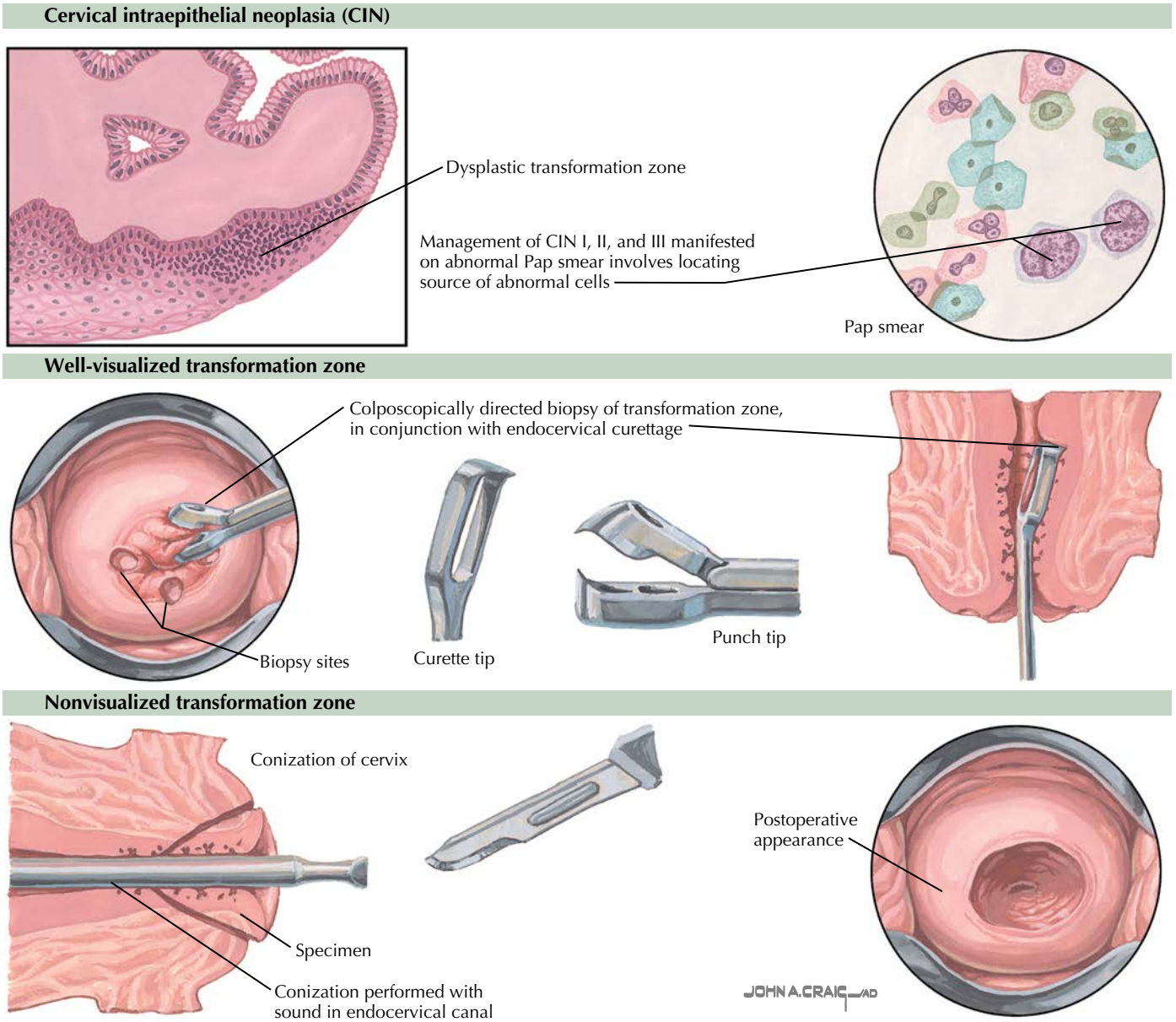

Figure 121.1 Abnormal Pap smear: Cervical intraepithelial neoplasia and transformation zones

HPV-mediated changes are transitory and that regression to normal is to be expected without intervention (80%–90% resolve in 2–5 years).

Expected Outcome: Of patients with these findings, 60% or more undergo spontaneous regression of the underlying process, resulting in a return to normal Pap test results. Only 15% of patients with LSILs progress to HSILs. HSIL abnormalities are more likely to progress and warrant more aggressive evaluation and treatment.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. Because of the potential significance of the HSIL abnormality and pathologic conditions that cause it, a delay in pregnancy while evaluation is ongoing may be advisable.

ICD-10-CM Codes: N87.0 (Mild cervical dysplasia), N87.9 (Dysplasia of cervix uteri, unspecified), D06.9 (Carcinoma in situ of cervix, unspecified).

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CARCINOMA IN SITU (CERVIX)

122

INTRODUCTION

Description: Carcinoma in situ of the cervix is characterized by morphologic alteration of the cervical epithelium in which the full thickness of the epithelium is replaced with dysplastic cells (cervical intraepithelial neoplasia [CIN] 3). This change is generally associated either spatially or temporally with invasive carcinoma. Patients with low-grade CIN (CIN 1) are unlikely to develop cervical malignancy, whereas those with high-grade lesions (CIN 2–3) are at high risk of progression to malignancy.

Prevalence: Less than 2% of Pap tests.

Predominant Age: Early 30s (approximate peak age, 32 years).

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Linked to certain serotypes of human papillomavirus (HPV; 99.7% of cancers contain high-risk HPV serotypes).

Risk Factors: Infection by HPV, herpes virus, or cytomegalovirus; early sexual activity; multiple sexual partners; cigarette smoking (1.5 times risk); oral contraceptive use (two to four times risk); early childbearing; intrauterine diethylstilbestrol exposure; immunosuppression.

SIGNS AND SYMPTOMS

- Asymptomatic
- Abnormal cervical cytology
- Abnormal colposcopy

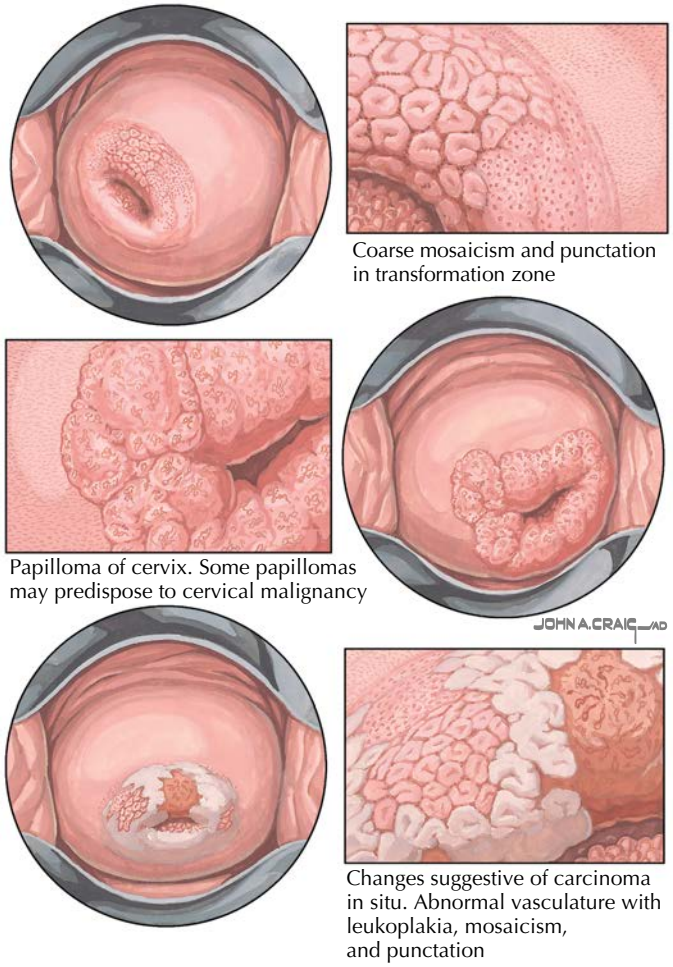

Figure 122.1 Colposcopic views of abnormal cervical changes

DIAGNOSTIC APPROACH

Differential Diagnosis

- Moderate dysplasia
- Microinvasive and invasive carcinoma

Associated Conditions: HPV infection, condyloma acuminata.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated.
Special Tests: Colposcopy, colposcopically directed biopsy, and endocervical curettage.
Diagnostic Procedures: Cervical cytologic examination, colposcopy, and biopsy.

Pathologic Findings

The entire thickness of the epithelium is replaced with abnormal (dysplastic) cells, but there is no invasion of the underlying stroma.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation of comments made by the cytopathologist.
Specific Measures: Management is directed by an assessment of the risk of advancement to invasive disease. Cervical conization and endocervical curettage is used to confirm the absence of invasion or a more extensive lesion. In those wishing to preserve fertility, this may be curative; in others, standard hysterectomy may be considered. Ablative therapy can be considered only when the entire lesion is visible and invasion has been ruled out.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Abnormal Cervical Cancer Screening Test Results, 2021
- Cervical Cancer, 2021
- Cervical Cancer Screening, 2021
- Colposcopy, 2021
- Human Papillomavirus Vaccination, 2021
- Loop Electrosurgical Excision Procedure, 2021
- Preparing for Surgery, 2021

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Follow-up cervical cytologic examination at 6 and 12 months or high-risk HPV test at 12 months, colposcopy for any abnormality.
Prevention/Avoidance: Reduction or avoidance of known risk factors. Vaccination against HPV with multivalent vaccine (Gardasil 9).
Possible Complications: Advancement of disease or recurrence. Untreated disease is anticipated to progress to invasive carcinoma over the course of 12–86 months in 15%–40% of patients.
Expected Outcome: Low recurrence rates (<10%) for most therapies. When recurrence is found, 75% occur in 21 months.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. The presence of pregnancy complicates both the diagnosis and treatment: endocervical curettage is generally omitted and definitive therapy is delayed until after delivery; colposcopy is usually repeated every 6–10 weeks until term. In the absence of invasion, vaginal delivery is appropriate.
ICD-10-CM Codes: D06.9 (Carcinoma in situ of cervix, unspecified).

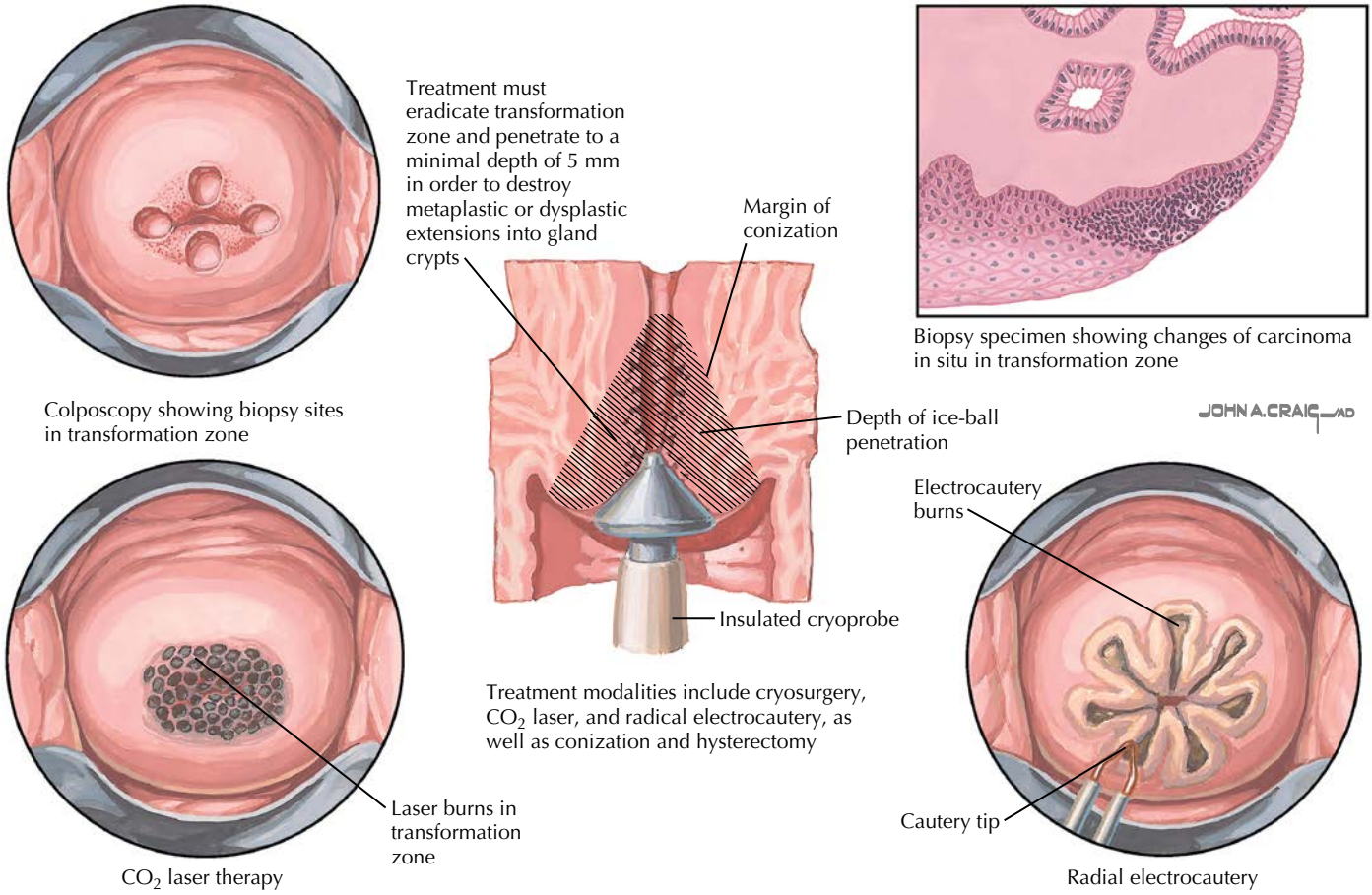

Figure 122.2 Management of carcinoma in situ (CIN 3)

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123 CERVICAL CANCER

INTRODUCTION

Description: Almost all cancers of the cervix are carcinomas—85%–90% are squamous carcinoma and 10%–15% are adenocarcinoma.
Prevalence: 13,800 cases and 4290 deaths annually (2020 data). Lifetime risk: 1/135.
Predominant Age: 40s–60s; median age is 52 years.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Strongly linked to certain serotypes of human papillomavirus (HPV; 99.7% of all cancers have oncogenic HPV DNA detectable) and is associated with early sexual activity and multiple partners. Of the more than 150 HPV genotypes, 13 genotypes have been shown to cause cervical cancer (among them 16, 18, 31, 33, 45, 52, and 58). It is currently considered that a cocarcinogen, such as smoking, other viruses, or nutritional factors, is required before malignant transformation caused by HPV may occur. High-risk HPV integrates itself into the human genome, whereas low-risk types tend to stay sequestered outside the nucleus.
Risk Factors: Early sexual activity, multiple sexual partners, HPV, Black race, smoking, immunocompromised, minimal or neglected medical care (Pap test screening) associated with advanced disease. (Cancer found typically 8–13 years after a diagnosis of a high-grade lesion.)

SIGNS AND SYMPTOMS

- None until late in the disease
- Abnormal Pap test result
- Late: vaginal bleeding, dark vaginal discharge, postcoital bleeding, ureteral obstruction, back pain, loss of appetite, weight loss
- Exophytic, friable, bleeding lesion
- Late: supraclavicular or inguinal lymph nodes, leg swelling, ascites, pleural effusion, hepatomegaly

DIAGNOSTIC APPROACH

Differential Diagnosis

- Cervical eversion
- Cervical erosion
- Cervical polyp
- Condyloma acuminata
- Nabothian cyst

Associated Conditions: HPV, condyloma acuminata, abnormal vaginal bleeding.

Workup and Evaluation

Laboratory: An assessment of renal function is appropriate if ureteral compromise is suspected (advanced disease).
Imaging: Chest radiograph, intravenous pyelogram, and computed tomography or magnetic resonance imaging (MRI) are used to assess the extent of disease and to assist in staging. MRI has displaced other imaging modalities because of its ability to assess lymph nodes (72%–93% accuracy) and possible tumor spread. Staging is clinical and primarily relies on clinical examination and the status of the ureters.
Special Tests: Colposcopy and cervical biopsy (conization preferred), biopsy of vaginal or paracervical tissues may be required to assess extent of disease.
Diagnostic Procedures: History, physical examination, and histologic diagnosis. Barium enema, flexible sigmoidoscopy, or cystoscopy (or both) may be performed in the cases of large tumors or for those who may undergo radiotherapy.

Pathologic Findings

Squamous cell carcinomas (large cell [keratinizing or nonkeratinizing], small cell, verrucous), adenocarcinoma (endocervical, endometrioid, clear cell, adenoid cystic, adenoma malignum), mixed carcinomas (adenosquamous, glassy cell).

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Timely evaluation and treatment.
Specific Measures: Therapy is based on the stage of the disease. Radical surgery is used for select patients with stages I and II disease. Radiotherapy (brachytherapy, teletherapy) is used for stages IB and IIA disease or greater. Postoperative radiotherapy reduces the risk of recurrence by almost 50%.
Diet: No specific dietary changes indicated.
Activity: No restriction except those imposed by therapies.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Abnormal Cervical Cancer Screening Test Results, 2021
- Cervical Cancer, 2021
- Cervical Cancer Screening, 2021
- Colposcopy, 2021
- Human Papillomavirus Vaccination, 2021
- Loop Electrosurgical Excision Procedure, 2021
- Preparing for Surgery, 2021

Drug(s) of Choice

- Chemotherapy does not produce long-term cures, but response rates of up to 50% have been obtained with multiagent combinations (cisplatin, doxorubicin, and etoposide; other combinations also have been successful).

FOLLOW-UP

Patient Monitoring: Normal health maintenance, 90% of recurrences occur in the first 5 years.
Prevention/Avoidance: Vaccination with multivalent HPV vaccines. According to the Centers for Disease Control and Prevention, if HPV vaccination rates in eligible recipients reached 80% in the target age range (age 11–12), an additional 53,000 cases of cervical cancer could be prevented during the lifetimes of those younger than 12. Two doses of HPV vaccine are sufficient for those younger than 15 years of age; three doses are required for all others. Adherence to screening guidelines enables diagnosis and treatment of premalignant changes.

Possible Complications: Risk of nodal involvement is based on the stage of the disease—pelvic nodes: stage I, 15%; stage II, 29%; stage III, 47%; paraaortic nodes: stage I, 6%; stage II, 19%; stage III, 33%.

Expected Outcome: Survival is based on the stage of the disease—stage IA, 99% at 5 years; stage IB, 85%–90%; stage IIA, 73%–80%; stage IIB, 68%; stage IIIA, 45%; stage IIIB, 36%; stage IVA, 15%; stage IVB, 2%. One-third of patients develop recurrences, half within 3 years after primary therapy (best prognosis for later recurrences). Short-term serious complications will occur in 1%–5% of surgical cases.

MISCELLANEOUS

Pregnancy Considerations: Rare in pregnancy. Pregnancy and vaginal delivery do not appear to alter the course of disease, although delivery is associated with hemorrhage. Early stages diagnosed late in pregnancy may be watched until after delivery. Advanced disease may require early delivery or interruption of pregnancy to allow aggressive therapy to begin.

ICD-10-CM Codes: C53.9 (Malignant neoplasm of cervix uteri, unspecified).

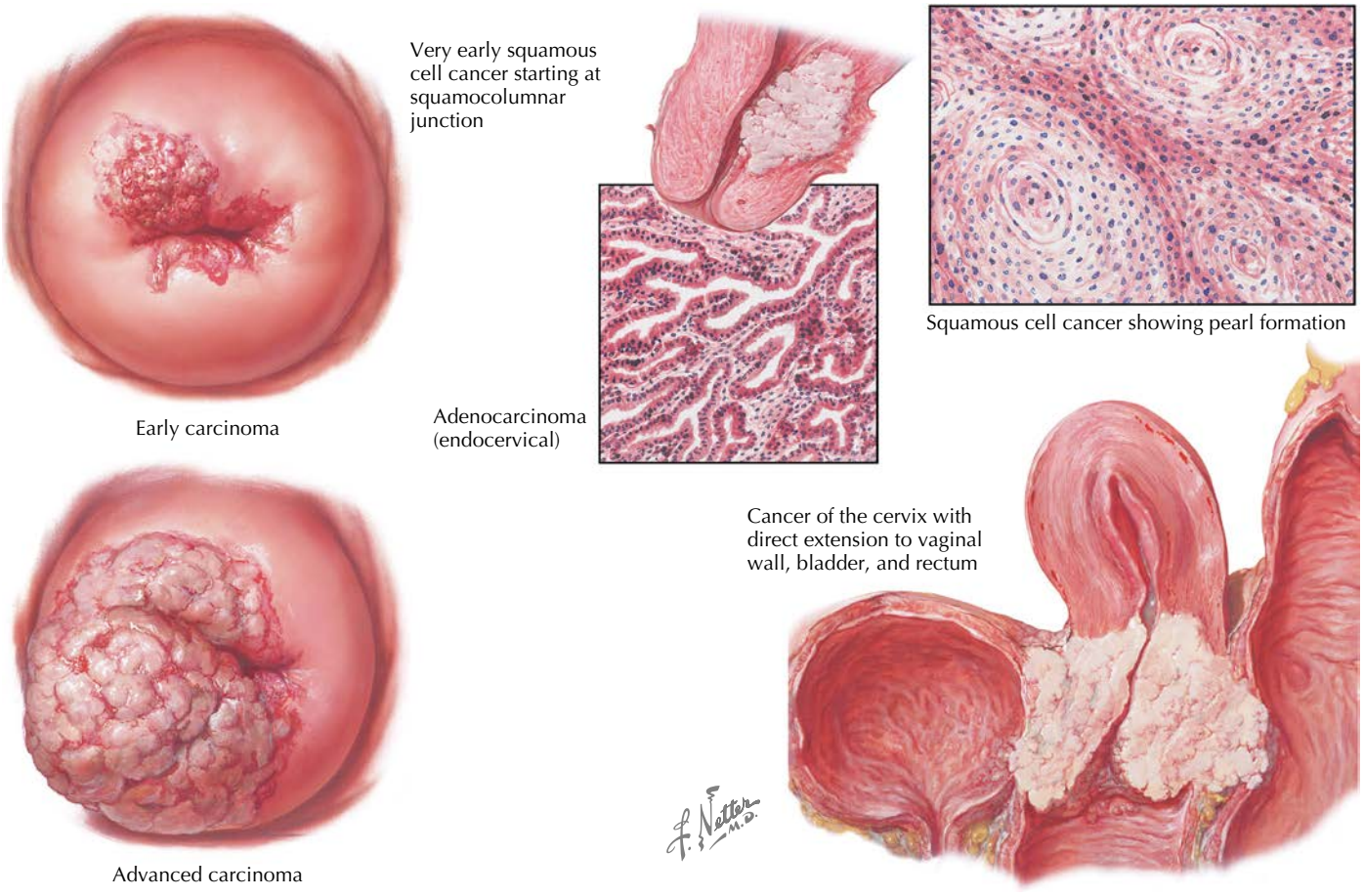

Figure 123.1 Early and advanced carcinoma

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124 CERVICAL EROSION

INTRODUCTION

Description: Cervical erosion is the loss of the epithelial surface on the vaginal portion of the cervix, resulting in the exposure of the underlying cervical stroma. Cervical eversion (exposing the dark-red columnar epithelium of the endocervix, ectropion) is often mistaken for or incorrectly labeled as cervical erosion.
Prevalence: Uncommon. Ectropion is common in adolescents, pregnant patients, and those using combination oral contraceptives.
Predominant Age: Reproductive age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Generally traumatic. May occur through sexual trauma (fingernail, sexual appliances), iatrogenic process (diaphragm, pessary, biopsy, or other instrumentation), tampon use, or pelvic organ prolapse, resulting in the exposure of the cervix outside the introitus.
Risk Factors: None known.

SIGNS AND SYMPTOMS

- Irregularly shaped, depressed lesion with a red base and sharp borders
- Bleeding generally absent, although tissues may bleed when touched, resulting in postcoital spotting
- Increased mucoid (clear) discharge may be present

DIAGNOSTIC APPROACH

Differential Diagnosis

- Cervical eversion (ectopy)
- Herpes simplex cervicitis
- Carcinoma under the surface of the epithelium (barrel lesion)
- Syphilis (primary lesion)
- Chronic cervicitis
- Cervical polyp
- *Chlamydia trachomatis* infection

Associated Conditions: Chronic cervicitis.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated.
Special Tests: Colposcopy can be used to confirm the diagnosis but is seldom indicated.
Diagnostic Procedures: Inspection of the cervix.

Pathologic Findings

Loss of surface epithelium. Evidence of inflammation is often present during the healing phase.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and reassurance.
Specific Measures: The use of acidifying agents and topical antibiotics is controversial and generally not necessary. Ablative or other measures aimed at reversing an ectropion carry the risk of cervical stenosis and should be avoided.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.

Drug(s) of Choice

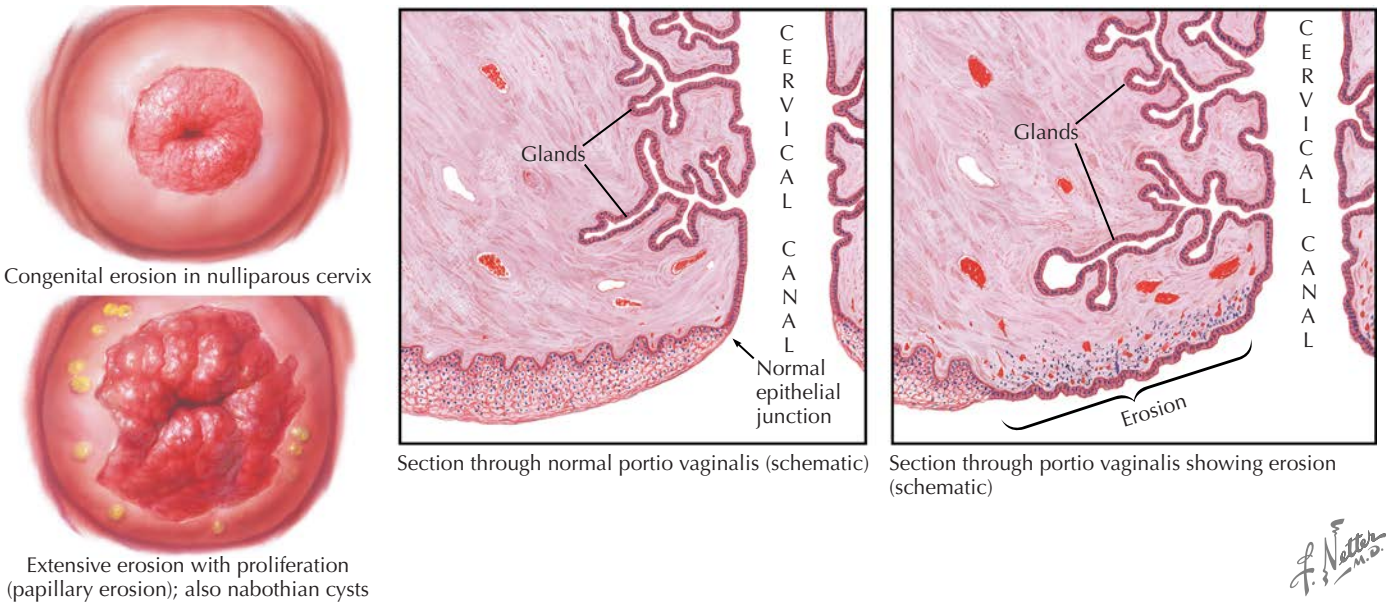
None

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: Both overdiagnosis and underdiagnosis; treatment and intervention are generally not warranted and may create additional problems; failure to recognize a more sinister process (cancer) may lead to a delay in treatment.
Expected Outcome: Spontaneous and complete healing is the rule.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: N86 (Erosion and ectropion of cervix uteri) and N72 (Inflammatory disease of cervix uteri).



Congenital erosion in nulliparous cervix

Extensive erosion with proliferation (papillary erosion); also nabothian cysts

Section through normal portio vaginalis (schematic)

Section through portio vaginalis showing erosion (schematic)

F. Netter M.D.

Figure 124.1 Congenital and extensive cervical erosion s

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Level III

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CERVICAL EVERSION

125

INTRODUCTION

Description: Cervical eversion is a turning outward of the endocervical canal so that it is visible and appears as a red, inflamed mass at the cervical opening.
Prevalence: Common, especially in adolescents, pregnant patients, and those using combination oral contraceptives.
Predominant Age: Reproductive age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Chronic cervicitis, estrogen exposure (oral contraceptives, pregnancy). In parous women, the external cervix is sometimes sufficiently patulous to give the false appearance of eversion when the vaginal apex is widely opened during speculum examination.
Risk Factors: Cervicitis, increased estrogen.

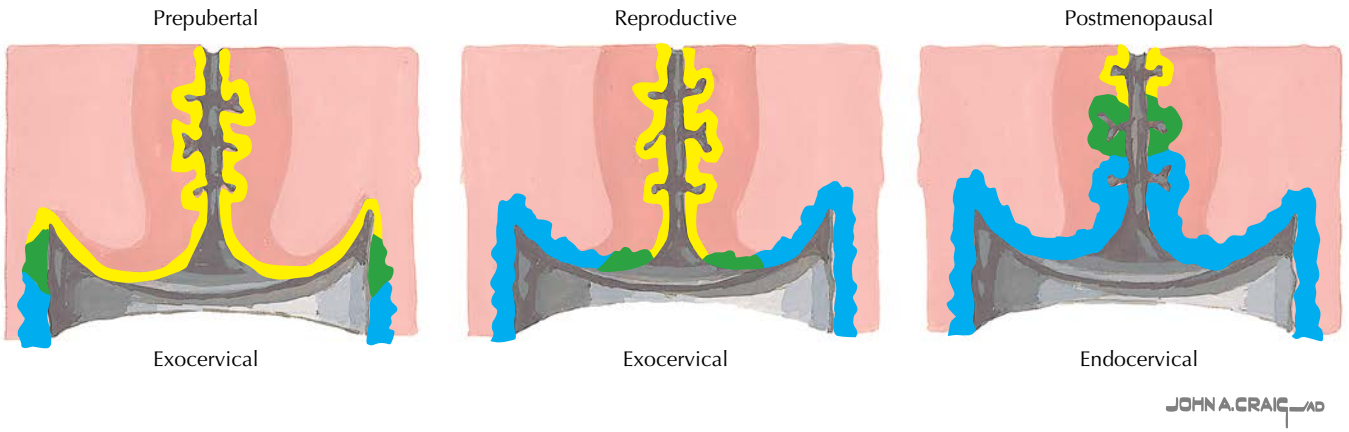

Figure 125.1 Cervical eversion: Variations in location of transformation zone

SIGNS AND SYMPTOMS

- Generally asymptomatic
- Intermenstrual or postcoital bleeding

DIAGNOSTIC APPROACH

Differential Diagnosis

- Endocervical polyp
- Endocervical cancer
- Cervicitis
- *Chlamydia trachomatis* infection

Associated Conditions: Cervicitis, intermenstrual and postcoital bleeding.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated.
Special Tests: Colposcopy confirms the diagnosis but is not required.
Diagnostic Procedures: History and speculum inspection of the cervix.

Pathologic Findings

Normal columnar endocervical epithelium.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and reassurance.
Specific Measures: No therapy required once diagnosis is established. Ablative or other measures aimed at reversing an ectropion carry the risk of cervical stenosis and should be avoided.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: Cervicitis, postcoital bleeding.
Expected Outcome: Normal function without therapy.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: N86 (Erosion and ectropion of cervix uteri) and N72 (Inflammatory disease of cervix uteri).

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CERVICAL POLYPS

126

INTRODUCTION

Description: Cervical polyps are benign fleshy tumors that arise from the cells of the endocervical canal (most common) or the ectocervix.
Prevalence: 4% of gynecologic patients, most common benign growth of the cervix.
Predominant Age: 40s–50s (multiparous women). Ectocervical polyps predominate in postmenopausal women.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Considered to arise because of inflammation and the focal hyperplasia and proliferation that it causes.
Risk Factors: More common in multiparous women, history of cervical infection, oral contraceptive use.

SIGNS AND SYMPTOMS

- Asymptomatic (found on routine examination)
- Intermenstrual spotting
- Postcoital spotting
- Smooth, soft, reddish-purple to cherry-red, friable mass at the cervical os, varying from a few mm to 4 cm in size; may bleed when touched
- Leukorrhea (uncommon)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Endometrial polyp
- Cervical cancer
- Prolapsed leiomyomata (3%–8% of myomas are cervical)
- Cervical eversion
- Cervical erosion
- Retained products of conception

Associated Conditions: Intermenstrual bleeding, postcoital bleeding, leukorrhea.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated.
Special Tests: None indicated.
Diagnostic Procedures: Physical examination.

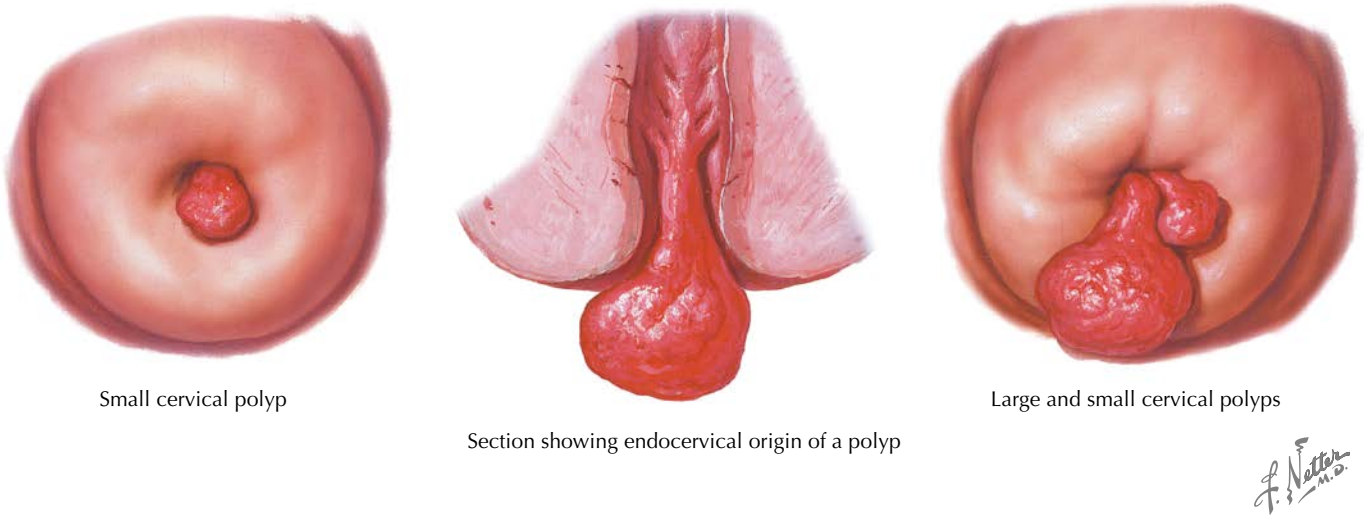
Pathologic Findings

Polypoid growth with a surface epithelium made up of columnar or squamous epithelial cells. The stalk is made up of edematous, loose, often inflamed connective tissue with rich vascularization. The surface may be ulcerated (leading to bleeding). Six histologic types have been described: adenomatous (80%), cystic, fibrous, vascular, inflammatory, and fibromyomatous. Malignant degeneration of an endocervical polyp is extremely rare (<1/200).

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, Pap, and human papillomavirus (HPV) testing as indicated by normal screening guidelines.
Specific Measures: Removal of polyp by gentle traction, twisting, or excision. The base of the polyp then may be treated with chemical cautery, electrocautery, or cryocautery. A polyp also may be cauterized with chemical agents ($AgNO_3$), cryosurgery, or a loop electrosurgical excision procedure. Curettage of the endocervical canal should be considered to rule out a coexisting hyperplasia or cancer. For women older than 40 years, endometrial sampling to rule out additional pathology (present in approximately 5% of patients) should be considered.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- Abnormal Uterine Bleeding, 2021



Small cervical polyp

Section showing endocervical origin of a polyp

Large and small cervical polyps

F. Netter M.D.

Figure 126.1 Cervical polyps

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Normal health maintenance, no change in Pap or HPV testing recommendations.
Prevention/Avoidance: None.

Possible Complications: Malignant change is extremely rare.
Expected Outcome: Excision or cautery is curative.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: N84.1 (Polyp of cervix uteri).

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127 CERVICAL STENOSIS

INTRODUCTION

Description: Cervical stenosis is the narrowing of the cervical canal, either congenital or acquired, which may result in complete or partial obstruction. Stenosis occurs most often in the region of the internal cervical os.
Prevalence: Uncommon.
Predominant Age: 30–70 years.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Operative damage (cone biopsy [up to 8% of patients], electrocautery, cryocautery [<1% of patients]), radiation, infection, neoplasia, atrophy, congenital (rare).
Risk Factors: Operative therapy (cone biopsy, cautery), radiation, chronic infection, neoplasia, untreated menopause.

SIGNS AND SYMPTOMS

Premenopausal

- Dysmenorrhea, abnormal bleeding, amenorrhea, infertility
- Boggy uterine enlargement

Postmenopausal

- Asymptomatic
- Hematometra, hydrometra, or pyometra

DIAGNOSTIC APPROACH

Differential Diagnosis

- Endocervical cancer
- Endometrial cancer
- Uterine leiomyomata

Associated Conditions: Endometriosis, adenomyosis, dysmenorrhea, chronic pelvic pain, and infertility.

Workup and Evaluation

Laboratory: Ultrasonography may demonstrate uterine enlargement or hematometra.
Imaging: No imaging indicated.
Special Tests: Inability to pass a 1- to 2-mm probe beyond the inner cervical os.
Diagnostic Procedures: History, physical examination, sounding of the endocervical canal with a small probe.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, analgesics (nonsteroidal antiinflammatory drugs) for dysmenorrhea.

Specific Measures: Dilation of the cervix with progressive dilators under ultrasound guidance. Placement of a cervical stent for several days after dilation has been advocated but is not universally accepted.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Dilation and Curettage, 2018
- Dysmenorrhea: Painful Periods, 2020

Drug(s) of Choice

- Symptomatic therapy until definitive surgical dilation.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: Care with surgical technique when cone biopsy or cautery of the cervix is used.
Possible Complications: Retrograde menstruation with the subsequent development of endometriosis, infertility, and chronic pelvic pain. In older patients, the development of hematometra or pyometra.
Expected Outcome: The risk of recurrence is small after dilation (based on causation).

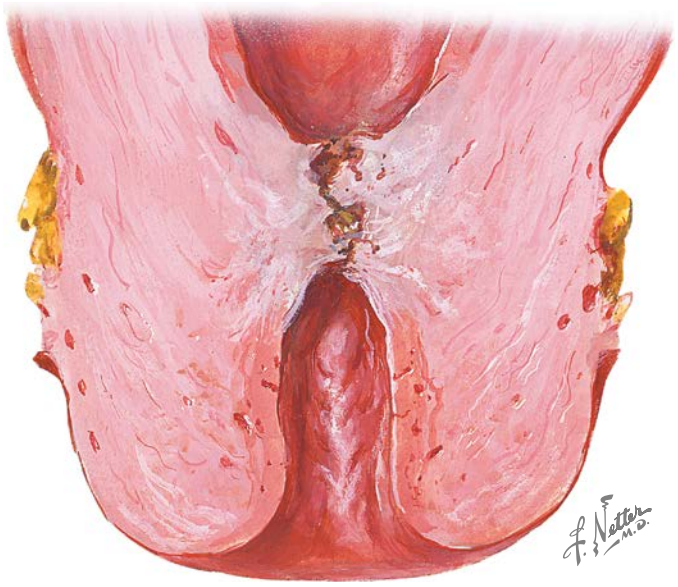

Figure 127.1 Stricture

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: N88.2 (Stricture and stenosis of cervix uteri) and Q51.828 (Other congenital malformations of cervix).

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CERVICITIS

128

INTRODUCTION

Description: Cervicitis is the inflammation (acute or chronic) of the endocervical glands or the ectocervix. Less commonly it can affect the squamous epithelium of the ectocervix.
Prevalence: 10%–40% of women.
Predominant Age: Reproductive age; highest rate in adolescents to early 20s.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Endocervical—*Chlamydia trachomatis* (up to 60% of cases in some studies), *Neisseria gonorrhoeae.* Almost 50% of patients will not have an identifiable infection. Ectocervical—herpes simplex, human papillomavirus (HPV), *Mycoplasma* species (*Mycoplasma hominis, Ureaplasma urealyticum*), *Trichomonas vaginalis.*
Risk Factors: Exposure to sexually transmitted infections (STIs; multiple sexual partners), postpartum period.

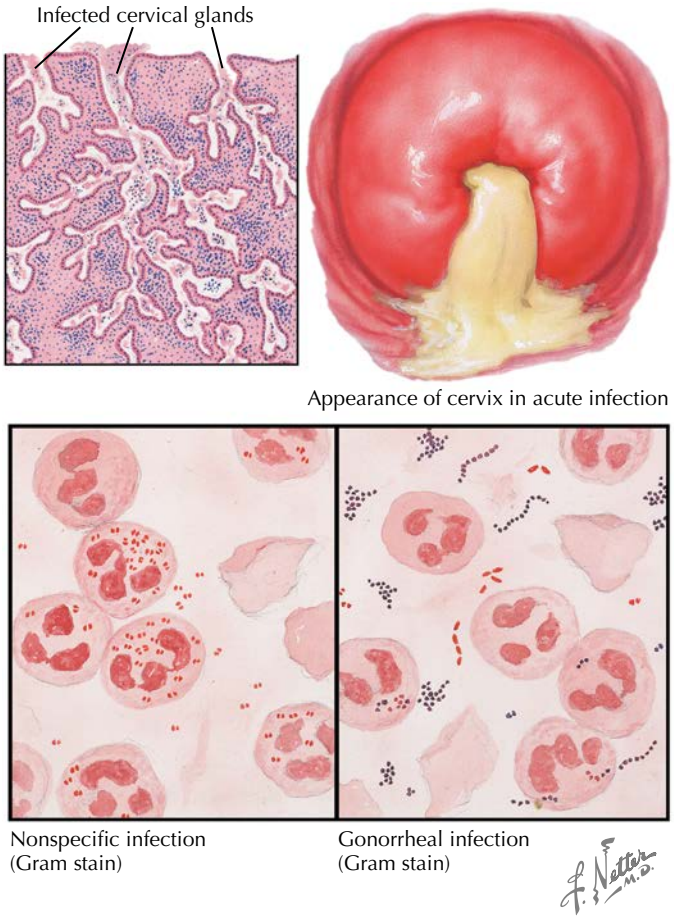

Figure 128.1 Cervicitis

SIGNS AND SYMPTOMS

- May be asymptomatic (60%)
- Mucopurulent discharge (yellow discharge with ≥10 white blood cells at magnification ×1000)
- Cervical erythema or edema, ulceration, and friability
- Deep-thrust dyspareunia
- Postcoital or intermenstrual bleeding
- Urinary tract infection and dysuria may occur

DIAGNOSTIC APPROACH

Differential Diagnosis

- Vaginitis
- Cervical neoplasia
- Cervical metaplasia
- Cervical erosion
- Cervical eversion

Associated Conditions: Cervical neoplasia, dyspareunia, postcoital bleeding, pelvic inflammatory disease, human immunodeficiency virus infection, premature rupture of the membranes in pregnancy, premature labor, and prematurity.

Workup and Evaluation

Laboratory: Cervical culture, Gram stain of cervical material, enzyme-linked immunosorbent assay (ELISA), or fluorescent monoclonal antibody testing for *Chlamydia.* Consider serum testing for other STIs.

Imaging: No imaging indicated.
Special Tests: None indicated.
Diagnostic Procedures: Inspection, Gram stain, culture, ELISA, or fluorescent monoclonal antibody testing. Colposcopy may be of assistance in selected cases. Nucleic acid amplification tests are the method of choice for detecting *C. trachomatis* or *N. gonorrhoeae.*

Pathologic Findings

Diffuse inflammatory changes, koilocytic changes with HPV infection. Chronic inflammatory changes are extremely common during the reproductive years and by themselves are not indicative of a pathologic state.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Diagnosis and management of causal agent.
Specific Measures: In rare patients with consistently negative cultures, cryosurgery of the cervix has been advocated, although this could result in cervical stricture or other postsurgical complications.
Diet: No specific dietary changes indicated.
Activity: No restriction. Sexual continence for 7 days after a single-day therapy or the completion of 7 days of treatments.
Patient Education: Infectious nature of the problem, need for partner evaluation, avoidance of STI.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Gonorrhea, Chlamydia, and Syphilis, 2021
- How to Prevent Sexually Transmitted Diseases, 2020
- Vaginitis: Causes and Treatments, 2021

Drug(s) of Choice

- Without gonorrhea—Doxycycline 100 mg PO twice daily for 7 days is the preferred agent. Delayed-release doxycycline (200 mg/day for 7 days) appears to be as effective and is better tolerated but is more costly.
- With gonorrhea—ceftriaxone 500 mg IM in a single dose plus azithromycin 1 g PO in a single dose.

Contraindications: Known or suspected allergy to medication. Doxycycline should not be used during pregnancy or nursing.
Precautions: Doxycycline should not be taken with milk, antacids, or iron-containing preparations.
Interactions: Doxycycline may interact with warfarin or oral contraceptives to reduce their effectiveness.

Alternative Drugs

- Without gonorrhea—ofloxacin 300 mg PO twice a day for 7 days or erythromycin ethylsuccinate 800 mg PO four times a day for 7 days.

FOLLOW-UP

Patient Monitoring: Repeat cultures for test of cure, routine cervical cancer screening.
Prevention/Avoidance: Use of condoms to reduce the risk of infection.
Possible Complications: Cervical atypia and neoplasia.
Expected Outcome: With treatment, good.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: N72 (Inflammatory disease of cervix uteri), A54.03 (Gonococcal cervicitis, unspecified), and A74.89 (Other chlamydial diseases).

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NABOTHIAN CYSTS

129

INTRODUCTION

Description: Nabothian cysts are retention cysts of the cervix that are made up of endocervical columnar cells and that result from the closure of a gland opening, tunnel, or cleft by the process of squamous metaplasia.
Prevalence: Normal feature of the adult cervix.
Predominant Age: Reproductive age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: A cervical gland opening, tunnel, or cleft that is covered by the process of squamous metaplasia.
Risk Factors: Chronic inflammation of the cervix.

SIGNS AND SYMPTOMS

- Asymptomatic
- Translucent or opaque, white to blue to yellow, raised bumps on the ectocervix (3 mm to 3 cm in diameter)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Cervical cancer (barrel or undermining type) uncommon
- Mesonephric cyst
- Endometriosis

Associated Conditions: None.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated.
Special Tests: None indicated.
Diagnostic Procedures: Pelvic (speculum) examination.

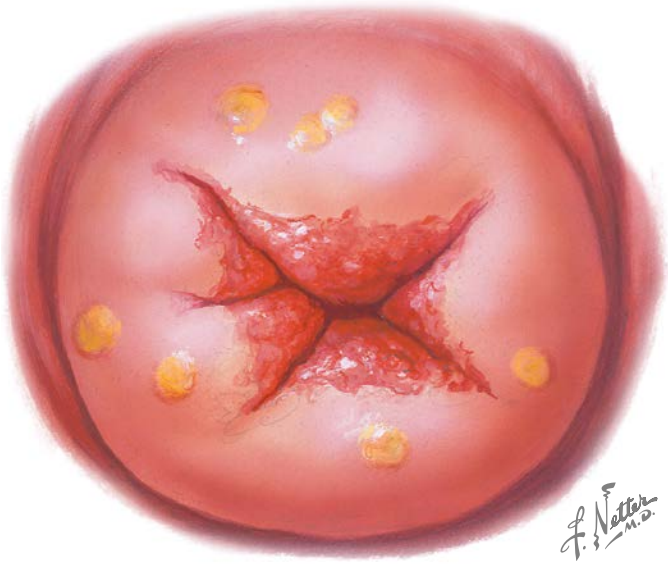

Figure 129.1 Stellate laceration with nabothian cysts

Pathologic Findings

Mucus-filled cysts lined with columnar epithelium.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and reassurance.
Specific Measures: None necessary. Rarely, cysts may become of a sufficient size to be symptomatic. Drainage or electrosurgical ablation is curative.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: Distortion or enlargement of the cervix is possible but unlikely.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: N72 (Inflammatory disease of cervix uteri).

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SECTION
VIII

Uterine Pathology

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ADENOMYOSIS

130

INTRODUCTION

Description: Adenomyosis is characterized by islands of endometrial glands and stroma found in the uterine wall (myometrium) and causing hypertrophy of the surrounding myometrium.
Prevalence: 10%–35% of women; may be present in 60% of aged women 40–50 years.
Predominant Age: 35–50 years.
Genetics: Familial predisposition (polygenic or multifactorial inheritance pattern).

ETIOLOGY AND PATHOGENESIS

Causes: Adenomyosis is derived from aberrant glands of the basalis layer of the endometrium. These grow by direct extension into the myometrium. A metaplastic process or de novo growth from Müllerian rests may also account for glandular growth.
Risk Factors: High levels of estrogen (postulated), parity, postpartum endometritis (postulated). Local endometrial invasion may be seen following cesarean delivery, myomectomy, or curettage.

SIGNS AND SYMPTOMS

- Asymptomatic (40%)
- Menorrhagia (40%–50%) often increasing in severity
- Dysmenorrhea
- Symmetric "boggy" or "woody" enlargement of the uterus (up to two to three times normal)
- Uterine tenderness that varies with the cycle (worst just before menstruation)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Uterine leiomyomata (most often resulting in asymmetric uterine changes)
- Endometrial polyp
- Endometrial hyperplasia
- Endometrial cancer
- Endometriosis (when pain is predominant symptom)
- Early pregnancy

Associated Conditions: Coexistent endometriosis (15%), uterine leiomyomata, dyspareunia, salpingitis isthmica nodosa.

Workup and Evaluation

Laboratory: No evaluation indicated, complete blood count if anemia is suspected. A pregnancy test is always appropriate in reproductive age women.
Imaging: No imaging indicated except to rule out other possible pathologic conditions. Either transvaginal ultrasonography or magnetic resonance imaging (MRI) may demonstrate abnormalities (during ultrasonography, the uterus will have a heterogeneous texture, without focal abnormalities). MRI (T2 weighted or contrast-enhanced T1 weighted) will be more specific than ultrasonography.
Special Tests: Endometrial biopsy is seldom of help in establishing the diagnosis of adenomyosis, although it may be useful to rule out a possible endometrial cancer when that is a consideration.
Diagnostic Procedures: The characteristic history of painful, heavy periods, accompanied by a generous, symmetric, firm, or "woody" uterus, suggests, but does not confirm, the diagnosis. Only histologic examination can confirm the diagnosis.

Pathologic Findings

In adenomyosis, endometrial implants (glands and stroma) develop deep within the myometrial wall. Adenomyosis is, therefore, the intramural equivalent of extrauterine endometriosis. Diagnostic criteria require glands to be identified more than 2.5 mm below the basalis layer of the endometrium.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Analgesics (nonsteroidal antiinflammatory drugs), cyclic or long-cycle hormone therapy, levonorgestrel-releasing intrauterine device, gonadotropin-releasing hormone agonists.
Specific Measures: Hysterectomy is the definitive treatment for adenomyosis. Uterine artery embolization has been suggested but success is variable and not ensured.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Dysmenorrhea: Painful Periods, 2020
- Hysterectomy, 2021

Drug(s) of Choice

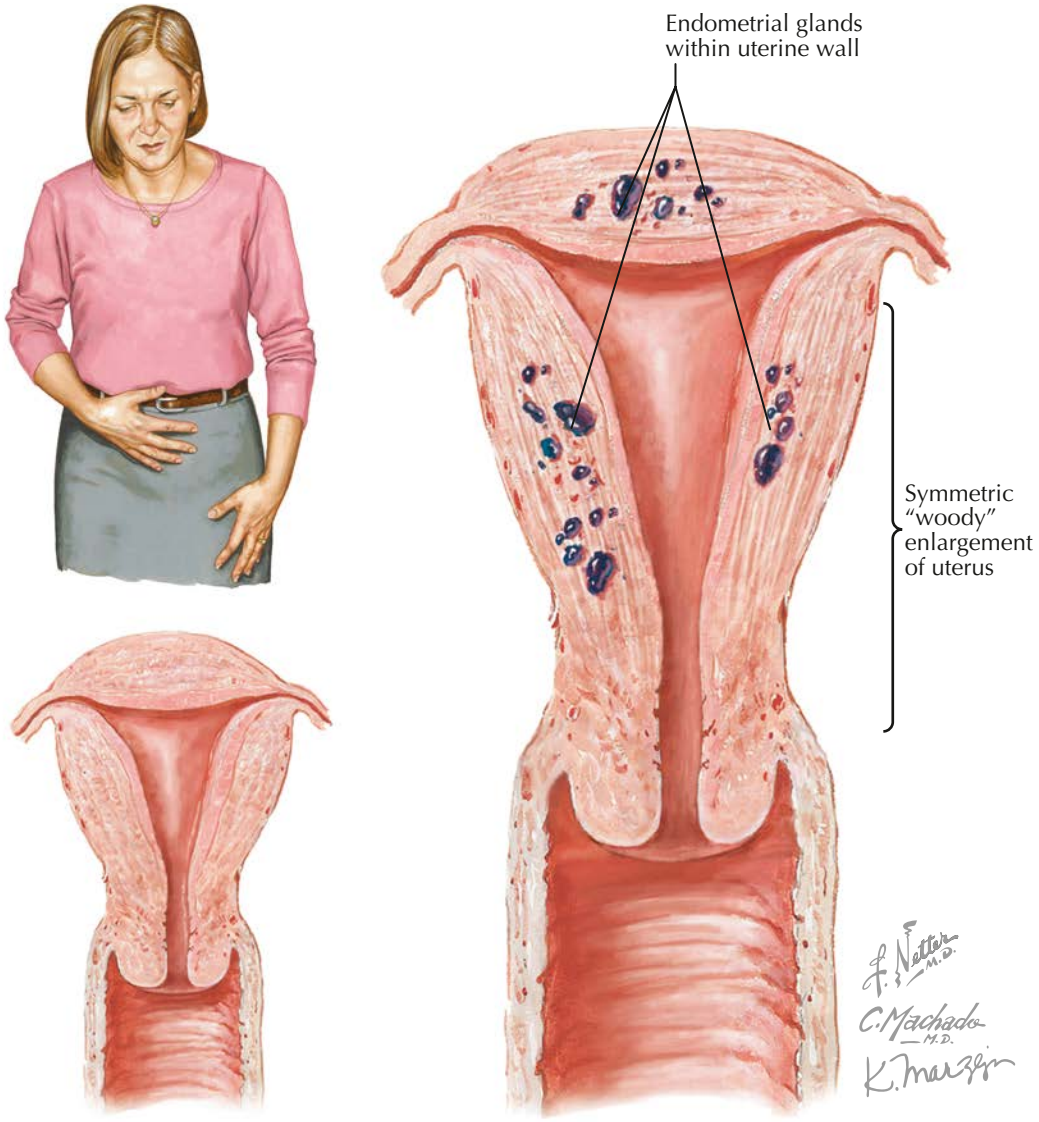
- There is no satisfactory medical treatment for adenomyosis. All medical therapy is aimed at ameliorating the symptoms or delaying the progression of the condition.
- Symptoms generally resolve with the loss of ovarian function.
- Hormonal and other treatments for endometriosis have been attempted with variable success.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: Progressive menorrhagia, anemia, chronic pelvic pain. Some studies have suggested that these patients have a higher level of antiphospholipid autoantibodies, but the clinical significance of this is unknown. A link to infertility has been postulated but remains controversial.
Expected Outcome: Unless associated with endometriosis, surgical therapy (hysterectomy) is curative. Symptoms resolve with the loss of menstrual function at menopause.

MISCELLANEOUS

Pregnancy Considerations: An increased risk of preterm labor, small for gestational age infants, and premature rupture of the membranes has been reported.
ICD-10-CM Codes: N80.0 (Endometriosis of uterus).



Treatment for adenomyosis symptoms

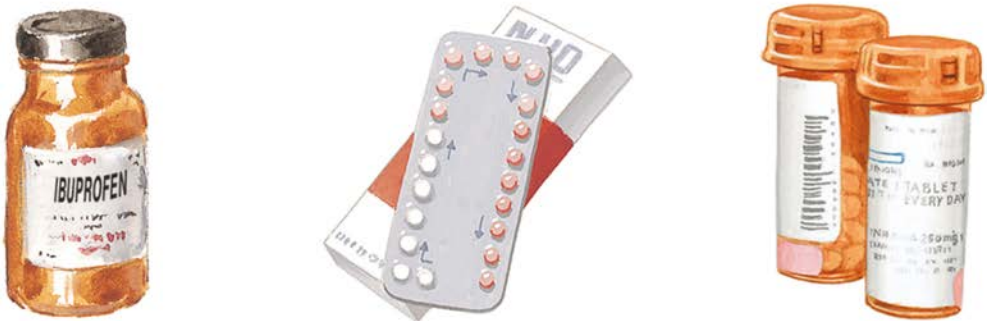


Figure 130.1 Adenomyosis

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ASHERMAN SYNDROME (UTERINE SYNECHIA) 131

INTRODUCTION

Description: Asherman syndrome is characterized by the scarring or occlusion of the uterine cavity after curettage, especially when performed after septic abortion or in the immediate postpartum period. Although the same changes occur following therapeutic endometrial ablation, the term is generally not applied in that setting.

Prevalence: Uncommon (1.5% of women undergoing hysterosalpingography, up to 20% with a history of uterine curettage).

Predominant Age: Reproductive age.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Endometrial damage (excessive curettage, curettage when infection is present or in the immediate postpartum period—some intrauterine adhesions form in 30% of patients treated by curettage for missed abortion), endometrial infection (tuberculosis or schistosomiasis), scarring after myomectomy or metroplasty. A severe pelvic infection unrelated to surgery may also lead to Asherman syndrome. Uterine compression sutures used in severe postpartum hemorrhage have been associated with intrauterine adhesions.

Risk Factors: Instrumentation of the uterine cavity complicated by infection. Endometrial infection unrelated to instrumentation, such as tuberculosis or schistosomiasis.

SIGNS AND SYMPTOMS

- Amenorrhea or hypomenorrhea
- Abnormal uterine bleeding
- Cyclic pelvic pain
- Infertility
- Recurrent pregnancy loss

DIAGNOSTIC APPROACH

Differential Diagnosis

- Amenorrhea (primary or secondary)
- Cervical stenosis
- Adenomyosis

Associated Conditions: Amenorrhea, infertility.

WORKUP AND EVALUATION

Laboratory: No evaluation indicated.

Imaging: Sonohysterography or hysterosalpingography.

Special Tests: None indicated.

Diagnostic Procedures: Hysteroscopy.

Pathologic Findings

Intrauterine scarring.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and support.

Specific Measures: Resection of intrauterine scars under hysteroscopic control, followed by intrauterine contraceptive device insertion or intrauterine balloon (pediatric Foley) and estrogen therapy.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Dilation and Curettage, 2018

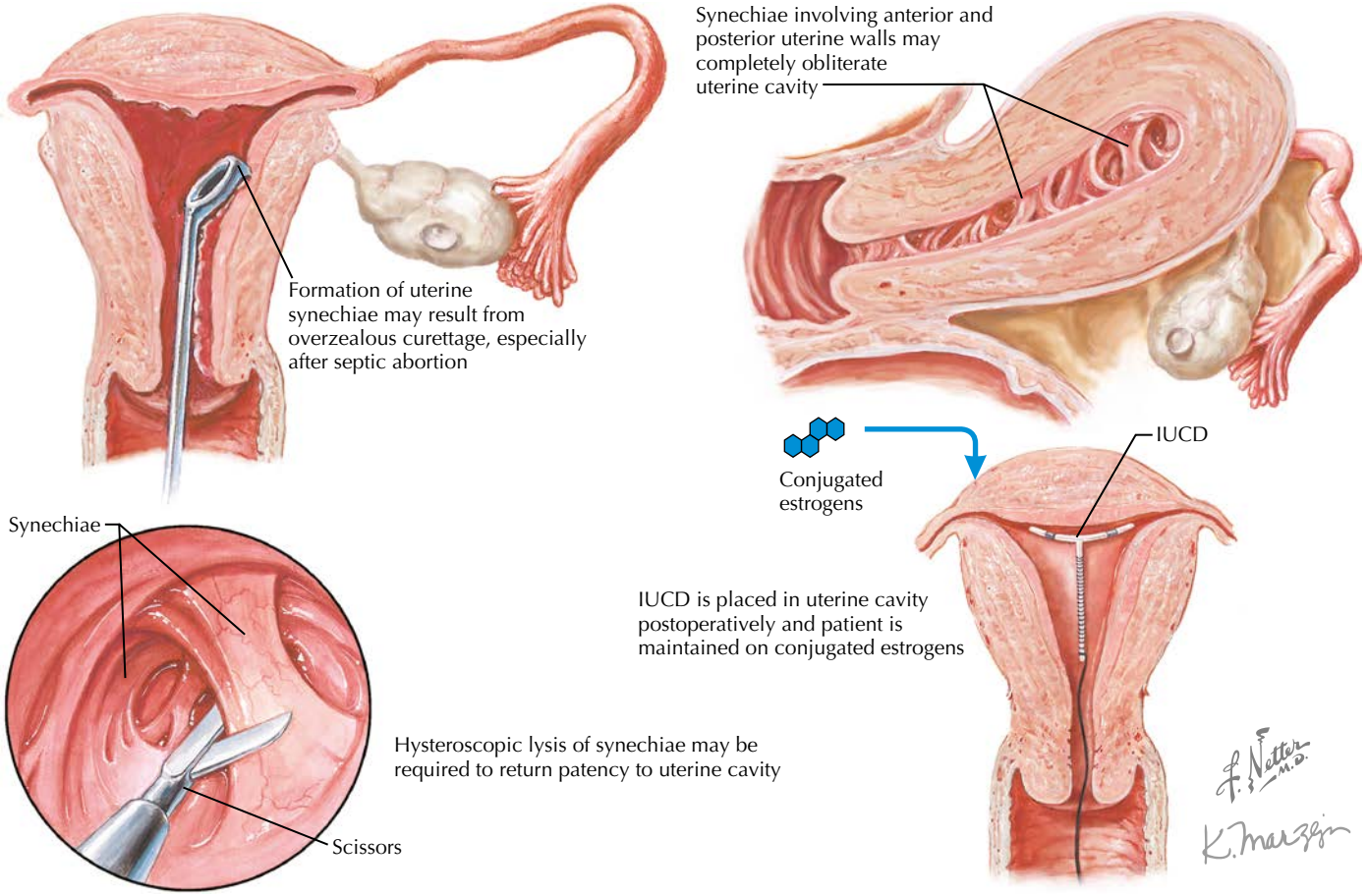

Figure 131.1 Asherman syndrome (uterine synechia)

Drug(s) of Choice

- Estrogen therapy for 1–2 months.
- Oral—conjugated estrogen 1.25 mg/day, diethylstilbestrol 1 mg/day, esterified estrogens 1.25 mg/day, ethinyl estradiol 0.05 mg/day, micronized estradiol 1 mg/day, piperazine estrone sulfate, estropipate 1.25 mg/day.

Contraindications: Undiagnosed vaginal bleeding.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.

Prevention/Avoidance: Avoidance of excessive curettage, prompt treatment of endometritis after dilation and curettage.
Possible Complications: Hematocolpos, infertility.
Expected Outcome: Return to normal fertility and menstrual function after treatment.

MISCELLANEOUS

Pregnancy Considerations: Once treated, no effect on future pregnancy, though a case of placenta accreta has been reported.
ICD-10-CM Codes: N85.6 (Intrauterine synechiae).

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DYSFUNCTIONAL (ABNORMAL) UTERINE BLEEDING 132

INTRODUCTION

Description: Dysfunctional (abnormal) uterine bleeding is irregular or is intermenstrual bleeding with no clinically identifiable underlying cause. The bleeding may be abnormal in schedule, duration, or quantity.

Prevalence: 10%–35% of all gynecologic visits involve menstrual disturbances.

Predominant Age: Reproductive age; highest in adolescents and patients experiencing climacteric changes.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: The causes of abnormal uterine bleeding have been summarized by the PALM-COEIN system (Figure 132.1). Anovulatory patients—chemotherapy, chronic illness, climacteric changes, endometrial carcinoma, endometrial hyperplasia, hormonal contraception (oral, injectable, intrauterine), iatrogenic (anticoagulation, hormone replacement), idiopathic, medications (anticholinergic agents, monoamine oxidase inhibitors, morphine, phenothiazines, reserpine), nutritional disruption (anorexia, bulimia, excess physical activity), obesity, pituitary–hypothalamic–ovarian axis immaturity, pituitary tumor, polycystic ovary syndrome, stress, systemic disease (hepatic, renal, thyroid). Ovulatory patients—anatomic lesions (adenomyosis, cervical neoplasia, cervical polyps, endometrial carcinoma, endometrial polyps, leiomyomata, sarcoma), bleeding at ovulation, coagulopathies (natural or iatrogenic), endometritis, fallopian tube disease (infection, tumor), foreign body (intrauterine contraceptive device, pessary, tampon), idiopathic, ingested substances (estrogens, ginseng), leukemia, luteal phase dysfunction, pelvic inflammatory disease (including tuberculosis), pregnancy related (abortion, ectopic, hydatidiform mole, retained products of conception), repeated trauma, systemic disease (hepatic, renal, thyroid).

Risk Factors: Prolonged anovulation.

PALM - Structural

- ***P***olyp (AUB-P)
- ***A***denomyosis (AUB-A)
- ***L***eiomyomata (AUB-L)
  - Submucosal (AUB-L_{sm})
  - Other (AUB-L_o)
- ***M***alignancy/Hyperplasia (AUB-M)

COEIN - Nonstructural

- ***C***oagulopathy (AUB-C)
- ***O***vulatory dysfunction (AUB-O)
- ***E***ndometrial (AUB-E)
- ***I***atrogenic (AUB-I)
- ***N***ot yet classified (AUB-N)

Figure 132.1 PALM-COEIN classification of abnormal uterine bleeding. (Modified from Munro MG, Critchley HO, Broder MS, Fraser IS. FIGO classification system [PALM-COEIN] for causes of abnormal uterine bleeding in nongravid women of reproductive age. FIGO Working Group on Menstrual Disorders. *Int J Gynaecol Obstet*. 2011 Apr;113(1):3–13)

SIGNS AND SYMPTOMS

- Intermenstrual bleeding (painless)
- Irregular menstrual cycles (typically prolonged interval)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Pregnancy
- Climacteric changes
- Anovulation
- Endometrial polyps
- Uterine leiomyomata
- Endometrial cancer
- Endometriosis
- Nonuterine sources of bleeding (eg, cervical, vaginal, vulvar, or perineal)
- Iatrogenic causes (hormones, oral contraceptives)

Associated Conditions: Anovulation, infertility, endometrial cancer, endometrial polyps or carcinoma, uterine leiomyomata, obesity.

Workup and Evaluation

Laboratory: Testing should be selected on the basis of the differential diagnoses under consideration.

Imaging: Pelvic ultrasonography or sonohysterography may be useful in select patients.

Special Tests: A menstrual calendar helps document the timing and character of the patient's bleeding. Endometrial biopsy, curettage, or hysteroscopy may be indicated.

Diagnostic Procedures: The diagnosis of dysfunctional uterine bleeding is one of exclusion. History and physical examination often point to possible causes for further evaluation. When the bleeding represents a single, isolated episode, and the patient is hemodynamically stable, no workup is needed beyond a pregnancy test.

Pathologic Findings

Proliferation of the endometrial tissues with irregular shedding is evident in some patients; in other patients the endometrium is thin and atrophic.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation.

Specific Measures: Focused on underlying causation and desires of patient. If anovulation is the cause and fertility is not desired, periodic progestin therapy may be used to stabilize menstrual cycles and suppress intermenstrual bleeding. Suppression of menstrual cycling (gonadotropin-releasing hormone agonists, long-acting progestin, long-cycle combination oral contraceptives), endometrial ablation, or hysterectomy may be required for a small number of patients. The choice of hormonal therapies is often driven by the anticipated endometrial thickness: If the

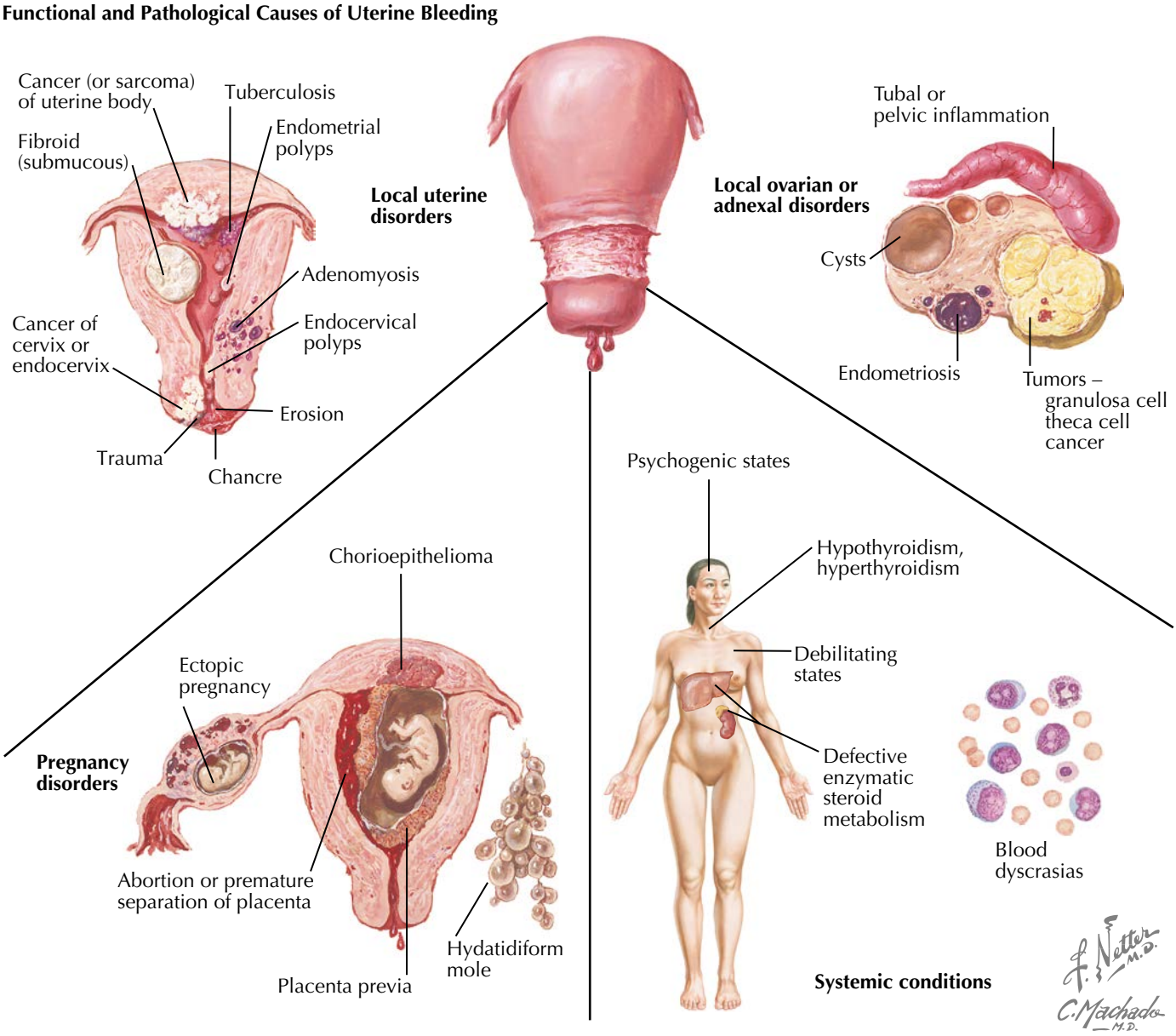

Figure 132.2 Functional and pathologic causes of uterine bleeding

endometrium is thought to be thick, combination estrogen–progesterone therapy is used. If the endometrium is thought to be disorganized, progestins are used. If the endometrium is thought to be thin or atrophic, estrogens will help stabilize and regrow it.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Abnormal Uterine Bleeding, 2021
- Endometrial Hyperplasia, 2021
- Perimenopausal Bleeding and Bleeding After Menopause, 2020
- Your First Period-Especially for Teens, 2018

Drug(s) of Choice

- Medroxyprogesterone acetate 5–10 mg for 1–14 days each month. In approximately 85% of patients who have ovulated in the past, a single cycle provides adequate response.

Contraindications: Undiagnosed amenorrhea or bleeding.

Precautions: Progestins should not be used until pregnancy has been ruled out.

Alternative Drugs

- Norethindrone acetate 5–10 mg for 10–14 days each month.
- The levonorgestrel intrauterine system (a polydimethylsiloxane sleeve containing 52 mg of levonorgestrel on the stem that releases 20 mcg of levonorgestrel daily) may be inserted or combination oral contraceptives may be used.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.

Possible Complications: Anemia (may occur in up to two-thirds of patients), endometrial hyperplasia or carcinoma if anovulation or simple hypertrophy is left untreated.
Expected Outcome: Return to normal menstrual pattern with the correction of underlying pathologic condition or periodic progestin therapy.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy once established, aside from that resulting from causative conditions.
ICD-10-CM Codes: N93.3 (Abnormal uterine and vaginal bleeding, unspecified).

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ENDOMETRIAL CANCER

133

INTRODUCTION

Description: Endometrial cancer is characterized by malignant changes of the endometrial tissues. These are generally of the adenocarcinoma (endometrioid, also called type 1 tumors, 80%), adenosquamous, clear cell, or papillary serous cell types.
Prevalence: 2%–3% lifetime risk. The most frequent malignancy of the female reproductive tract in developed countries, approximately 65,950 cases per year in the United States; 12,550 deaths each year (2022 estimate), eighth leading site of cancer-related death among American women.
Predominant Age: 55–65 years; less common below the age of 45 years (<10% of cases).
Genetics: No genetic pattern known except for conditions such as hereditary nonpolyposis colorectal cancer (HNPCC; Lynch syndrome). Cancers found in younger women are associated with mutations in the *K-ras*, *PTEN* (Cowden syndrome), or *MLH1* genes.

ETIOLOGY AND PATHOGENESIS

Causes: Unopposed (without progestins) estrogen stimulation (polycystic ovary syndrome, obesity, chronic anovulation, and estrogen therapy without concomitant progestin) in 90% of cases. Selective estrogen receptor modulators with uterine activity (tamoxifen).
Risk Factors: Unopposed estrogen stimulation of the uterus (chronic anovulation, estrogen therapy, poly cystic ovary syndrome, and obesity), tamoxifen use, early menarche, late menopause, nulliparity, breast or colon cancer, diabetes, Black race (2.3-fold increased risk).

SIGNS AND SYMPTOMS

- Postmenopausal bleeding (90%)
- Abnormal glandular cells on Pap test (cervical cytologic tests detect only approximately 20% of known endometrial carcinomas)

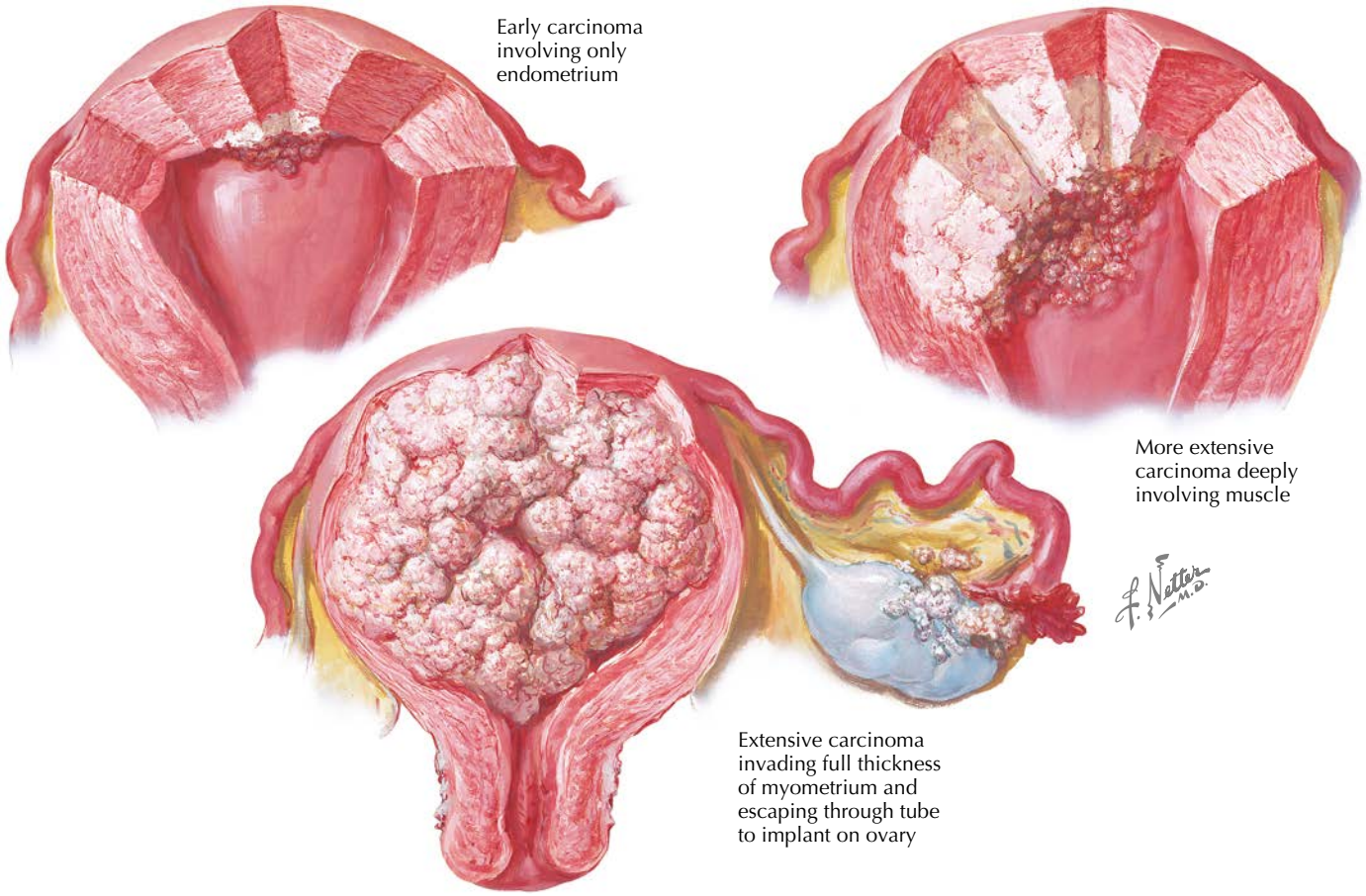

Figure 133.1 Uterine endometrial carcinoma stages and types

DIAGNOSTIC APPROACH

Differential Diagnosis

- Endometrial hyperplasia (complex, atypical)
- Cervical cancer
- Endometrial or cervical polyp
- Ovarian cancer metastatic to the endometrium
- Metachronous Müllerian tumor
- Endometriosis
- Early pregnancy (younger women)
- Granulosa cell tumors

Associated Conditions: Obesity, irregular menstrual bleeding, infertility, breast or colon cancer.

Workup and Evaluation

Laboratory: No evaluation indicated, except for preoperative screening, or others based on the differential diagnosis being considered.

Imaging: Chest radiograph (for metastases), transvaginal ultrasonography or sonohysterography may be useful (although concerns have been raised regarding the possibility of extrauterine spread induced by tubal spill of fluid during sonohysterography). An endometrial thickness of ≥11 mm carries an almost 3-fold risk of endometrial hyperplasia or cancer.

Special Tests: Endometrial biopsy (>90% accurate). Patients with endometrial cancer should be screened for heritable cancer syndromes (Lynch).

Diagnostic Procedures: History, physical examination, and endometrial biopsy.

Pathologic Findings

Atypical, hyperplastic glands with little or no stroma. Mitosis common.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and staging.

Specific Measures: Surgical exploration (staging) with hysterectomy, bilateral salpingo-oophorectomy, cytologic examination of the abdomen and diaphragm, para-aortic node sampling. Radiation to the vaginal cuff reduces local recurrence. Distant metastatic disease is treated with high-dose progestins, cisplatin, and doxorubicin (Adriamycin). The use of adjuvant radiotherapy and chemoradiation in women with disease limited to the uterus based on systematic surgical staging is controversial.

Diet: No specific dietary changes indicated except as dictated by surgical therapy.

Activity: No restriction except as dictated by surgical therapy.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Abnormal Uterine Bleeding, 2021
- Endometrial Ablation, 2021

- Endometrial Cancer, 2018
- Endometrial Hyperplasia, 2021
- Hysterectomy, 2021
- Preparing for Surgery, 2021

Drug(s) of Choice

- Hyperplasia and distant metastatic disease: megestrol (Megace) 160 mg/day PO for 3 months. This is generally followed by curettage or other evaluation to assess response.
- Doxorubicin (Adriamycin) or cisplatin chemotherapy.

Contraindications: See individual agents.
Precautions: High-dose progestins should be used with caution in patients with congestive heart failure because they may cause fluid retention.
Interactions: See individual agents.

FOLLOW-UP

Patient Monitoring: Follow-up cytology from vaginal cuff every 3 months for 2 years, then every 6 months for 3 years, then yearly. Chest radiograph annually.
Prevention/Avoidance: Correction of unopposed estrogen states or the addition of progestin.
Possible Complications: Distant spread with progression to death.
Expected Outcome: 5-Year survival based on the stage and grade—stage I, 85%–90%; stage II, 80%; stage III, 50%; stage IV, 20%; 90% of cases are stage I at diagnosis with a 90% 5-year survival.

MISCELLANEOUS

Pregnancy Considerations: Generally not considered because they are unlikely to coexist.
ICD-10-CM Codes: Specific to cell type and location.

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134 ENDOMETRIAL HYPERPLASIA: SIMPLE AND COMPLEX

INTRODUCTION

Description: Endometrial hyperplasia is caused by the abnormal proliferation of both the glandular and stromal elements of the endometrium with characteristic alteration in the histologic architecture of the tissues. It is this architectural change that differentiates hyperplasia from normal endometrial proliferation. Simple hyperplasia represents the least significant form of alteration. Complex hyperplasia represents the most significant form of alteration. The World Health Organization classification of endometrial hyperplasia assigns hyperplasia into four groups: simple or complex and with or without atypia. Endometrial hyperplasia with atypia is also called endometrial intraepithelial neoplasia (EIN).

Prevalence: 5% of patients with postmenopausal bleeding have endometrial hyperplasia.

Predominant Age: Late reproductive and early menopausal age; peak age 50–54 years.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown.

Risk Factors: Unopposed estrogen stimulation of the uterus (chronic anovulation, estrogen therapy [4- to 8-fold risk], obesity [3-fold risk]), nulliparity (2- to 3-fold risk), diabetes (2- to 3-fold risk), polycystic ovarian syndrome, tamoxifen use.

SIGNS AND SYMPTOMS

- Asymptomatic
- Intermenstrual bleeding
- Menorrhagia
- Postmenopausal bleeding
- Incidental finding on imaging or at hysterectomy for other causes

DIAGNOSTIC APPROACH

Differential Diagnosis

- Endometrial adenocarcinoma
- Endocervical or endometrial polyps
- Endocervical carcinoma

Associated Conditions: Endocervical or endometrial polyps, squamous metaplasia, endometrial carcinoma. When nuclear atypia is present, more than 30% of patients will have a coexisting endometrial cancer.

Workup and Evaluation

Laboratory: No evaluation indicated.

Imaging: Ultrasonography may detect thickening of the endometrial stripe (no standard has emerged for a threshold of endometrial thickness that carries ideal positive and negative predictive values. It does not take the place of histologic evaluation). Magnetic resonance imaging may also diagnose endometrial thickening, but cost and low specificity argue against its use as a diagnostic tool.

Special Tests: Endometrial biopsy, hysteroscopy, or dilation and curettage.

Diagnostic Procedures: Endometrial biopsy. The diagnosis is histologic.

Pathologic Findings

- **Simple hyperplasia**—proliferation of both glandular and stromal elements with no atypia. The glands form simple tubules with wide variations in size from small to large cysts. There is little or no outpouching of the epithelium lining the cysts.
- **Complex hyperplasia**—proliferation of both glandular and stromal elements. Cellular atypia (characterized by disordered maturation, high nuclear-to-cytoplasmic ratio, nuclear pleomorphism, mitoses) may be present or absent. Glands are crowded with a "back-to-back" appearance. May be found with coexisting adenocarcinoma (17%–52% in various studies). Outpouching in glands is common. It should be noted that the reliability of histologic diagnosis of these two conditions has been questioned, with concordance between reviewers generally below 50%.

MANAGEMENT AND THERAPY

Nonpharmacologic

- **General Measures:** Prompt evaluation.
- **Specific Measures:** Simple hyperplasia—medical therapy (high-dose progestin) is generally adequate. Many use dilation and curettage alone or in combination with progestin therapy. Complex hyperplasia—for patients with hyperplasia without atypia or for selected patients who wish to preserve fertility, high-dose prolonged progestin therapy may be used. All others are treated by hysterectomy (with bilateral salpingo-oophorectomy).
- **Diet:** No specific dietary changes indicated.
- **Activity:** No restriction.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Abnormal Uterine Bleeding, 2021
- Endometrial Cancer, 2018
- Endometrial Hyperplasia, 2021
- Dilation and Curettage, 2018

Drug(s) of Choice

Simple Hyperplasia—Medroxyprogesterone acetate (Provera, Cycrin) 10 mg/day PO for 10 days each month, norethindrone acetate (Aygestin) 10 mg/day PO for 10 days each month. The levonorgestrel-releasing intrauterine device 20 mcg/day (LNG20; Mirena) offers a good response and compliance rates.

Complex Hyperplasia—Depot medroxyprogesterone acetate (Depo-Provera) up to 200–1000 mg IM weekly for 5 weeks, followed by 100–400 mg IM monthly, megestrol acetate (Megace) 40–160 mg PO daily for 6–12 weeks (some authors have advocated therapy for up to 48 months). Estrogen replacement therapy may be safely administered to those treated by hysterectomy.

Contraindications: Undiagnosed vaginal bleeding, thrombophlebitis, markedly impaired liver function, known or suspected breast cancer.

Precautions: Progestins should not be used during the first trimester of pregnancy.

Alternative Drugs

- Combination oral contraceptives may be used for simple hyperplasia.
- Metformin has been proposed as an adjunct treatment, but data are inconsistent.

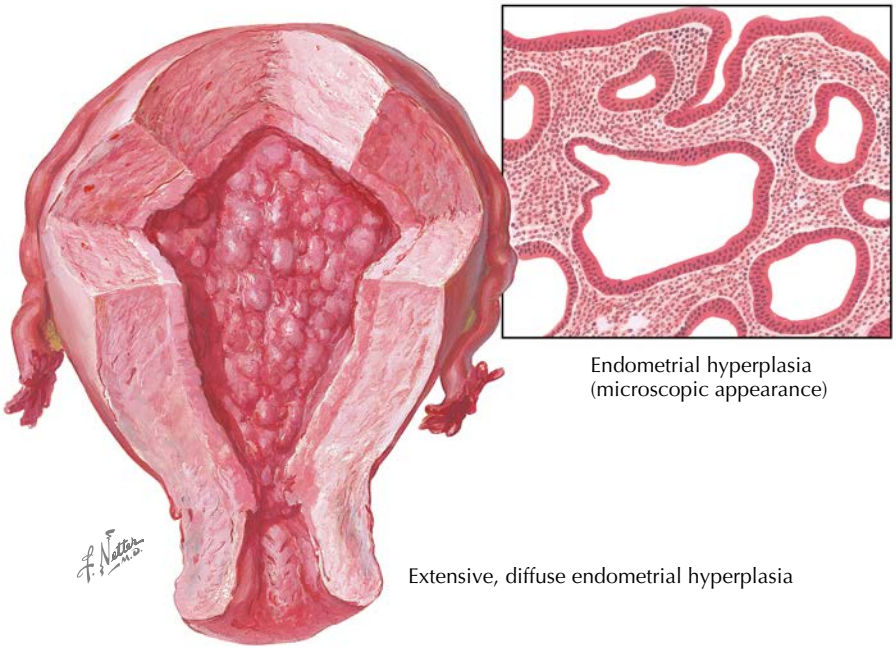

Figure 134.1 Endometrial hyperplasia

FOLLOW-UP

Patient Monitoring: With simple hyperplasia or for complex hyperplasia managed medically, a follow-up endometrial sampling must be performed after 3 months, then every 6–12 months thereafter.

Prevention/Avoidance: None.

Possible Complications: Progression is uncommon with simple hyperplasia (1% to cancer, 3% to complex hyperplasia). A slight risk is associated with endometrial sampling (infection, perforation). Complex hyperplasia, especially with atypia, is associated with coexistent malignancy (40%) or the risk of progression to malignant changes (75% of patients) when untreated. The more atypical the cellular architecture, the greater the risk of malignancy; without atypia, 25% of hyperplasia will progress and 50% will persist without treatment.

Expected Outcome: Good response to medical therapy can be anticipated for patients with hyperplasia. Progression and recurrence are uncommon but increased in women older than 50 years and those with body mass index greater than 25 kg/m^2, diabetes, or an endometrial lesion greater than 2 cm.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.

ICD-10-CM Codes: N85.00 (Endometrial hyperplasia, unspecified), N85.01 (Benign endometrial hyperplasia), and N85.02 (EIN).

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135 ENDOMETRIAL POLYPS

INTRODUCTION

Description: Endometrial polyps are fleshy tumors that arise as local overgrowths of the endometrial glands and stroma and project beyond the surface of the endometrium. They are most common in the fundus of the uterus but may occur anywhere in the endometrial cavity. They are generally small (a few millimeters) but may enlarge to fill the entire cavity.
Prevalence: Up to 10% of women (from autopsy studies); 20% of uteruses removed because of cancer.
Predominant Age: 40–50 years; infrequent after menopause.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown. A role for unopposed estrogen is hypothesized.
Risk Factors: Unopposed estrogen use, obesity, tamoxifen therapy (up to 36% of tamoxifen users), Lynch and Cowden syndromes.

SIGNS AND SYMPTOMS

- Asymptomatic (most).
- Abnormal bleeding (most common intermenstrual bleeding and menorrhagia, perimenopausal bleeding). One-fourth of women with abnormal bleeding patterns have an endometrial polyp.
- Polyps with long pedicles may protrude from the cervix.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Endocervical polyp
- Endometrial cancer
- Prolapsed leiomyomata
- Retained products of conception
- Retained (and forgotten) intrauterine contraceptive device

Associated Conditions: Endometrial cancer (2-fold increase).

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: Sonohysterography generally identifies the polyp. Special attention should be directed to the fundus, where most polyps arise.
Special Tests: None indicated.
Diagnostic Procedures: History, physical examination, endometrial sampling, hysteroscopy, or curettage. Often not diagnosed until the uterus is removed for other reasons.

Pathologic Findings

Velvety surface with a rich central vascular core. Endometrial glands, stroma, and vascular channels are present with the epithelium identified on three sides to establish the pedunculated nature. Smooth muscle is occasionally present. The endometrial glands are often immature in appearance, with a "Swiss cheese" cystic character that is independent of the phase of the cycle. Infection or metaplasia may be present.

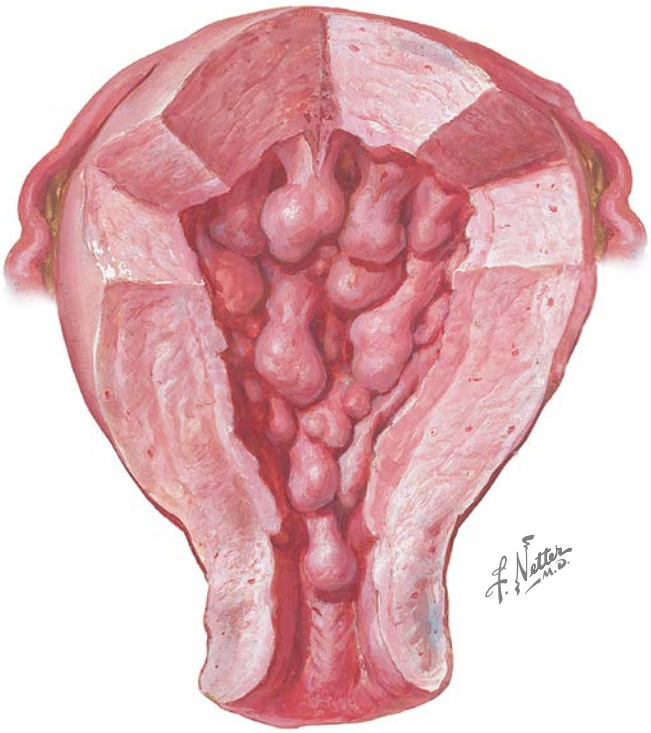

Figure 135.1 Multiple endometrial polyps

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation.
Specific Measures: Removal by curettage or operative hysteroscopy. All polyps removed should be histologically examined, although less than 5% contain malignancy.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Abnormal Uterine Bleeding, 2021
- Dilation and Curettage, 2018

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: Evaluation and treatment of prolonged amenorrhea, treatment of unopposed estrogen states. Some have advocated prophylaxis for those taking tamoxifen by the placement of an intrauterine progesterone delivery system.
Possible Complications: Up to 0.5% of polyps undergo malignant transformation (low grade and stage).
Expected Outcome: Removal is generally curative even when malignant transformation is present.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: N84.0 (Polyp of corpus uteri).

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136 ENDOMETRITIS

INTRODUCTION

Description: Endometritis is an acute or chronic inflammation, usually of infectious origin, of the lining of the uterus. This is a general term that is used for this condition in either nonpregnant or not recently pregnant patients; chorioamnionitis or endomyometritis are the terms commonly used for pregnant or recently pregnant patients. Acute endometritis is often characterized as an intermediate state in infections ascending from the cervix to the fallopian tubes, ovaries, and pelvis, characterized by the presence of microabscesses or neutrophils within the endometrial glands. Chronic endometritis is notable for variable numbers of plasma cells within the endometrial stroma. The clinical signs and symptoms of both are similar.
Prevalence: 75% of patients with pelvic inflammatory disease; 40% of patients with mucopurulent cervicitis.
Predominant Age: Reproductive age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Aseptic inflammation of the endometrium is commonly found in users of intrauterine contraceptive devices (IUDs). Infection by organisms ascending from the cervix and lower tract are common (most often *Chlamydia trachomatis, Neisseria gonorrhoeae, Ureaplasma urealyticum*, and *Streptococcus agalactiae*). Less common are infections by *Actinomyces israelii* or tuberculosis. Salpingitis is associated with a 70%–90% chance of acute endometritis. In approximately one-third of cases of chronic endometritis no cause can be established.
Risk Factors: IUD use, intrauterine instrumentation (biopsy, hysterosalpingography), cervicitis, sexually transmitted infection (STI), retained products of conception.

SIGNS AND SYMPTOMS

- Asymptomatic
- Dysfunctional uterine bleeding (typically intermenstrual)
- Postcoital bleeding
- Foul-smelling cervical/vaginal discharge
- Pelvic inflammatory disease
- Chronic pelvic pain
- Tubo-ovarian abscess
- Infertility (rare cause)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Accidents of pregnancy
- Trophoblastic disease
- Endometrial cancer
- Estrogen-producing tumors or exogenous estrogen
- Leiomyomata
- Cervical lesion/cervicitis
- Forgotten IUD

Associated Conditions: Chronic pelvic pain, tubo-ovarian abscess, cervicitis, and STI.

Workup and Evaluation

Laboratory: Complete blood count, cervical testing for *C. trachomatis* and *N. gonorrhoeae.* Tests for other STIs as indicated.
Imaging: No imaging indicated. Ultrasonography with saline contrast may demonstrate a thickened endometrium but risks spreading an infection to the fallopian tubes, ovaries, and peritoneal cavity. Consequently, this should be reserved until the possibility of active infection has been evaluated.
Special Tests: Endometrial biopsy is generally confirmatory but not necessary for clinical management.
Diagnostic Procedures: Endometrial biopsy and culture.

Pathologic Findings

Inflammatory infiltrates (monocytes and plasma cells) in the basal layers and stroma of the endometrium. Acute endometritis—microabscesses or neutrophils within the endometrial glands. Chronic endometritis—variable numbers of plasma cells within the endometrial stroma. Sulfur granules may be present in *Actinomyces* infections.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, counseling about STIs (cervicitis).
Specific Measures: Antibiotic therapy (see later), removal of IUD (if present).
Diet: No specific dietary changes indicated.
Activity: Pelvic rest (no tampons, douches, or intercourse) until therapy has been completed.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Abnormal Uterine Bleeding, 2021
- Chronic Pelvic Pain, 2014
- Pelvic Inflammatory Disease, 2019

Drug(s) of Choice

- Doxycycline (Vibramycin) 200 mg PO initially, 100 mg PO twice daily plus metronidazole 500 mg PO twice daily for 14 days. If pelvic inflammatory disease is present, a single intramuscular dose of a long-acting cephalosporin (eg, ceftriaxone 500 mg) should be added.
- If *Actinomyces* is found in a tubo-ovarian abscess, oral penicillin therapy should be continued for 12 weeks. When treating chronic endometritis, doxycycline alone is sufficient.

Contraindications: Known or suspected allergy to tetracycline.
Precautions: Photosensitivity may occur in patients taking doxycycline.
Interactions: Doxycycline may enhance the effect of warfarin. Doxycycline absorption is inhibited by most antacids and bismuth subsalicylate (Pepto-Bismol).

Alternative Drugs

- Erythromycin may be substituted for doxycycline.

FOLLOW-UP

Patient Monitoring: Normal health maintenance, screening for STIs as needed.

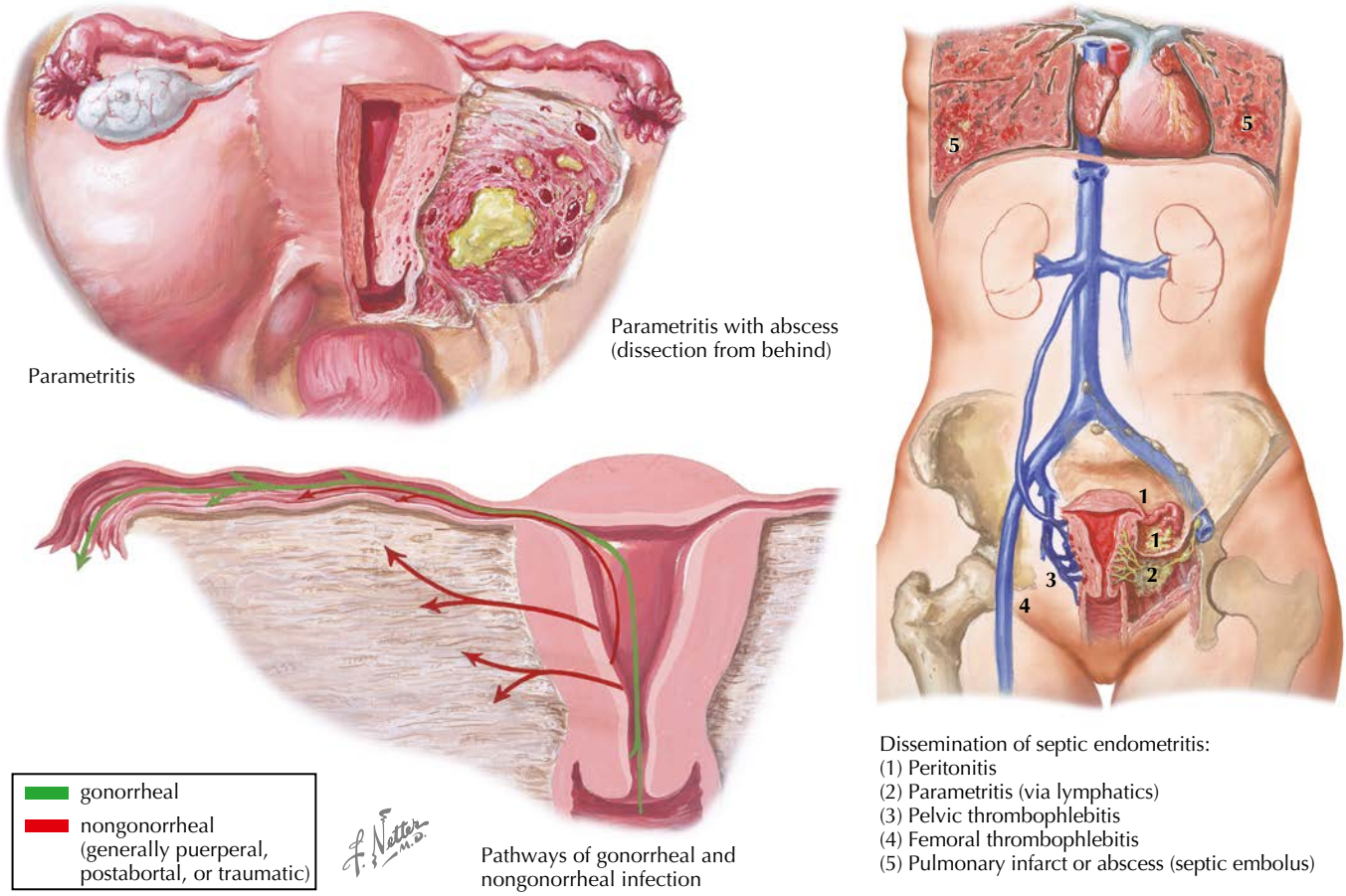

Figure 136.1 Endometritis: Parametritis and septic endometritis

Prevention/Avoidance: Reduce risk of cervicitis or STIs, asepsis during intrauterine procedures.
Possible Complications: Ascending infection resulting in salpingitis, tubo-ovarian abscesses, hydrosalpinx, peritonitis, and chronic pelvic pain.
Expected Outcome: Good with treatment.

MISCELLANEOUS

Pregnancy Considerations: Generally not applicable. *U. urealyticum* infection has been implicated as a rare cause of early pregnancy loss.
ICD-10-CM Codes: N71.0 (Acute inflammatory disease of uterus) and N71.1 (Chronic inflammatory disease of uterus). Codes for infections following pregnancy are specific to trimester and other factors.

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137 HEMATOMETRA

INTRODUCTION

Description: Hematometra is a collection of blood in the body (cavity) of the uterus, resulting from the obstruction of the normal outflow tract. This obstruction may result from congenital abnormalities, acquired cervical stenosis, iatrogenesis (dilation and curettage, endometrial ablation), or obstruction by neoplasia.
Prevalence: Uncommon.
Predominant Age: Early reproductive and postmenopausal age most common.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Obstruction or atresia of the uterine outflow tract (congenital malformation; most common are imperforate hymen and transverse vaginal septum, acquired causes; cervical stenosis from senile atrophy of the endocervix and endometrium, scarring by synechiae, scarring after surgery, endometrial ablation, radiation, cryocautery, electrocautery, neoplasia).
Risk Factors: Previous cervical surgery (cone biopsy, cryocoagulation, or electrocautery), menopausal atrophy, cervical neoplasia, incomplete endometrial ablation.

SIGNS AND SYMPTOMS

- Asymptomatic (especially in postmenopausal women)
- Uterine enlargement (often soft and slightly tender)
- Dysmenorrhea, abnormal bleeding, amenorrhea and infertility in premenopausal women
- Cyclic abdominal pain

DIAGNOSTIC APPROACH

Differential Diagnosis

- Endometrial hyperplasia/cancer
- Endocervical cancer
- Pyometra
- Leiomyomata
- Ovarian neoplasia

Associated Conditions: Cervical cancer, endometrial cancer, tuboovarian abscess, and endometriosis.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: Ultrasonography can confirm uterine enlargement and the presence of fluid but cannot define the character of the fluid. The presence of a cervical mass occasionally may be confirmed.
Special Tests: Endometrial biopsy or hysteroscopic evaluation of the uterine cavity should be considered. Gentle probing with a 1- to 2-mm probe confirms cervical obstruction or stenosis.
Diagnostic Procedures: History, physical examination, ultrasonography, cervical dilation or probing.

Pathologic Findings

Based on the cause.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation.
Specific Measures: Cervical dilation with or without curettage provides drainage, although it may have to be repeated several times. Antibiotics should be provided to protect against possible colonization by *Bacteroides,* anaerobic *Staphylococcus* and *Streptococcus,* and aerobic coliform bacteria. A mushroom or Foley catheter may be placed to facilitate drainage but may itself become a source of infection. Definitive therapy is based on the cause.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Dilation and Curettage, 2018
- Endometrial Cancer, 2018
- Hysteroscopy, 2020

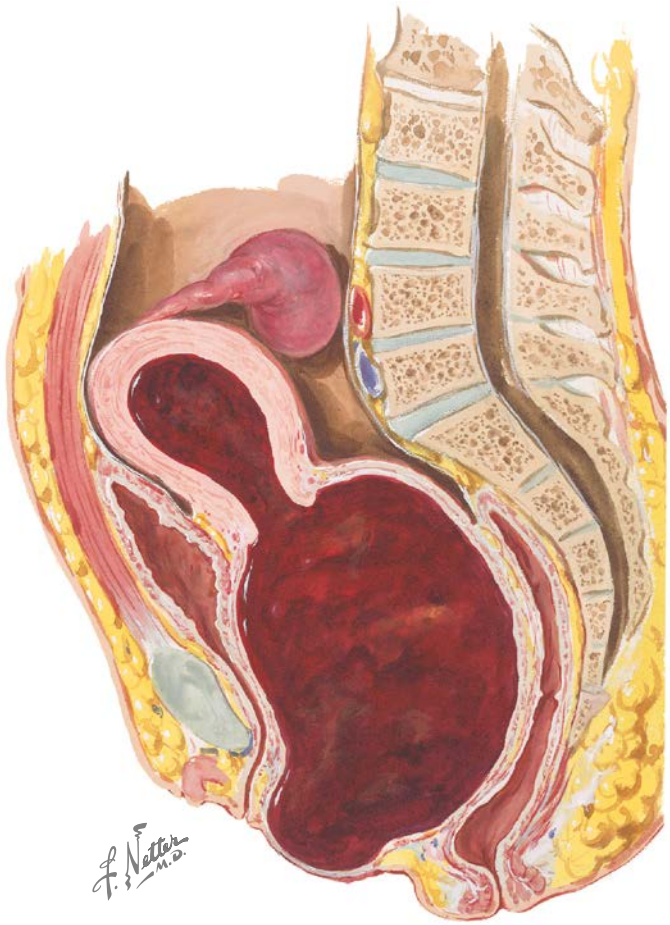

Figure 137.1 Hematocolpos with hematometra and hematosalpinx

Drug(s) of Choice

- None. Therapy is based on the cause and clinical situation.
- Antibiotic treatment if infection is suspected (the antibiotic chosen should provide protection against possible colonization by *Bacteroides,* anaerobic *Staphylococcus* and *Streptococcus,* and aerobic coliform bacteria).

Contraindications: See individual agents.
Precautions: See individual agents.
Interactions: See individual agents.

FOLLOW-UP

Patient Monitoring: Normal health maintenance and periodic reassessment of the cervix and uterus.
Prevention/Avoidance: Avoid unnecessary cervical procedures and limit the scope of therapy when such procedures are necessary. Some authors suggest cervical sounding after such procedures to assess patency, although this has not been shown to reduce the incidence of stenosis.
Possible Complications: Infection (leading to pyometra), progression of underlying disease.
Expected Outcome: Based on the cause.

MISCELLANEOUS

Pregnancy Considerations: Incompatible with pregnancy.
ICD-10-CM Codes: N85.7 (Hematometra).

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INTERMENSTRUAL BLEEDING

138

INTRODUCTION

Description: Bleeding between otherwise normal menstrual cycles. Constitutes a special form of dysfunctional (abnormal) uterine bleeding.
Prevalence: 10%–15% of all gynecologic visits involve menstrual disturbances.
Predominant Age: Reproductive age; highest in adolescents and patients who are climacteric.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Uterine (pregnancy, endometrial polyps, endometrial hyperplasia, endometrial carcinoma, endometrial hypoplasia [atrophy, hormonal contraception] leiomyomata, intrauterine contraceptive device [IUD]), cervical (polyps, cervicitis, cervical erosion, cervical dysplasia/neoplasia), vaginal (trauma, infection, atrophy), perineal (vulvar lesions, hemorrhoids).
Risk Factors: None known. The purported relationship to surgical sterilization has been disproved.

SIGNS AND SYMPTOMS

- Intermenstrual bleeding (painless)
- Bleeding after intercourse (common)

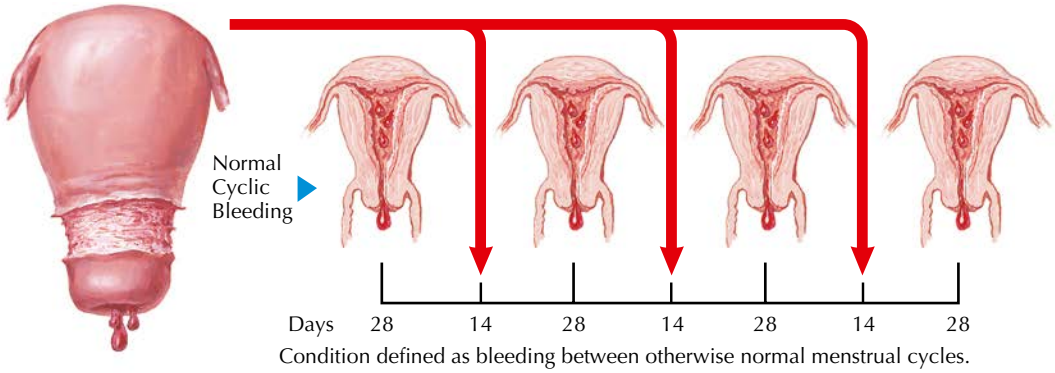
DIAGNOSTIC APPROACH

Differential Diagnosis

- Pregnancy
- Climacteric changes
- Anovulation
- Endometrial polyps
- Uterine leiomyomata
- Cervical polyps, lesions, or cervicitis
- Endometrial cancer
- Endometriosis
- Nonuterine sources of bleeding (eg, vaginal, vulvar, or perineal)
- Coagulopathy (congenital or acquired)
- Iatrogenic (IUD use, medications)

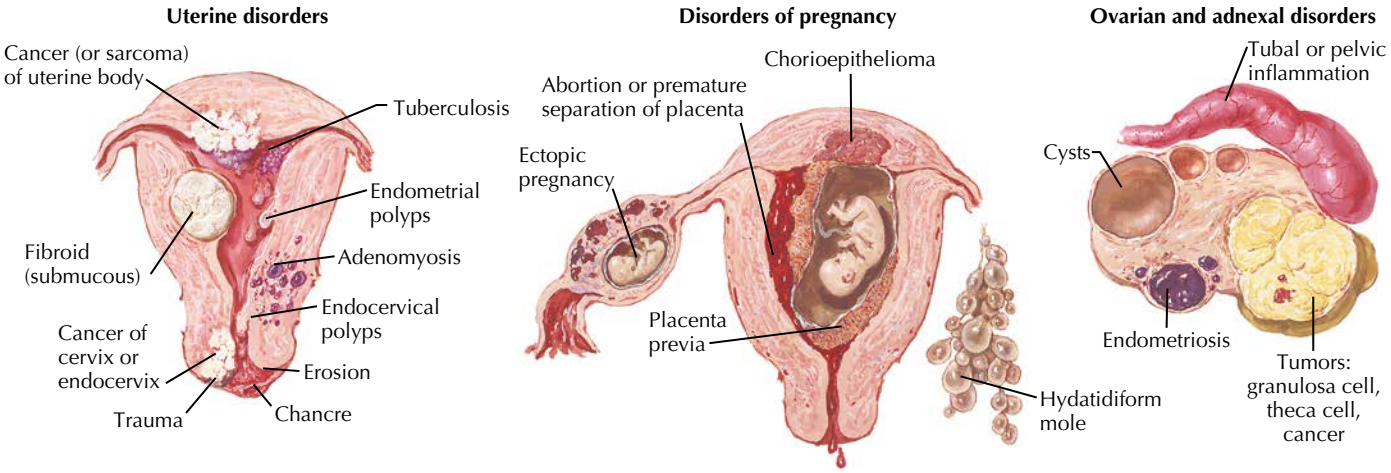
Associated Conditions: Endometrial hyperplasia, endometrial cancer, endometrial polyps, endocervical polyps or carcinoma, uterine leiomyomata.

Intermenstrual Bleeding



Condition defined as bleeding between otherwise normal menstrual cycles.

Clinical Considerations in Intermenstrual Bleeding



Management Flow Chart for Intermenstrual Bleeding

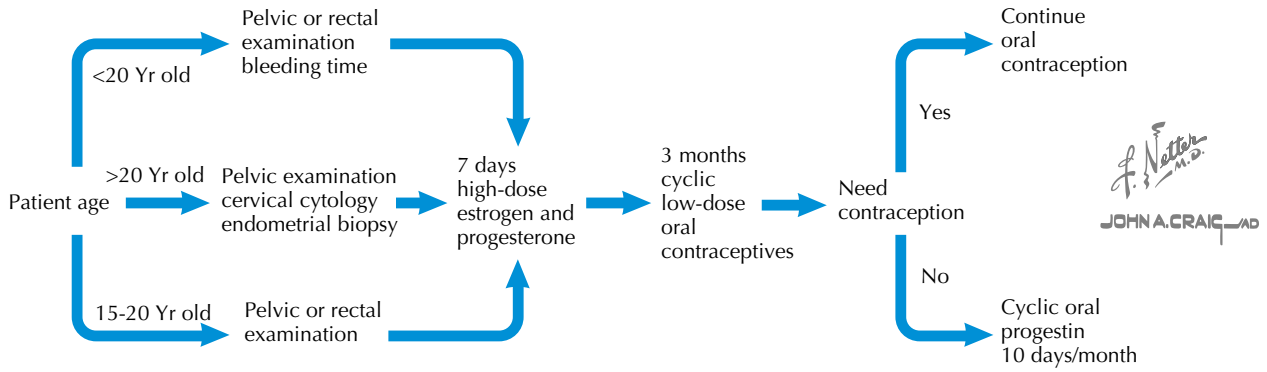


Figure 138.1 Clinical considerations and management of intermenstrual bleeding

Workup and Evaluation

Laboratory: Testing should be selected on the basis of diagnoses being considered.
Imaging: No imaging indicated.
Special Tests: A menstrual calendar helps to document the timing and character of the patient's bleeding. Endometrial biopsy, curettage, or hysteroscopy may be indicated.
Diagnostic Procedures: History and physical examinations often point to possible causes for further evaluation.

Pathologic Findings

Based on the underlying pathologic conditions.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation.
Specific Measures: Focused on underlying causation, age of the patient, and contraceptive needs.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Abnormal Uterine Bleeding, 2021
- Cervical Cancer, 2021
- Perimenopausal Bleeding and Bleeding After Menopause, 2020

Drug(s) of Choice

- Based on the cause. Hormonal agents that produce endometrial thinning (such as combination contraceptives or long-acting progestins) can be useful in select patients when conception is not desired.
- Placement of levonorgestrel-releasing IUD may be appropriate if contraception is desired but is frequently associated with random, intermenstrual bleeding during the early months of use.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.

Prevention/Avoidance: None.
Possible Complications: Anemia.
Expected Outcome: Return to normal menstrual pattern with the correction of the underlying pathologic condition or periodic progestin therapy.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy aside from that resulting from causative conditions.
ICD-10-CM Codes: N92.1 (Excessive and frequent menstruation with irregular cycle) and N93.0 (Postcoital and contact bleeding).

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IRREGULAR MENSTRUAL PERIODS

139

INTRODUCTION

Description: Menstrual cycles that do not follow a rhythmic pattern or have a pattern significantly differing from that expected as "normal" are considered irregular. This represents a special form of dysfunctional (abnormal) uterine bleeding.
Prevalence: 10%–15% of all gynecologic visits; annual prevalence rate of approximately 5%.
Predominant Age: Reproductive age; highest in adolescents and patients who experience climacteric changes.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Anovulation or oligo-ovulation, climacteric or menopause, hypogonadism (including exercise induced: excessive, associated with low body weight and anovulation), excess estrogen (obesity, polycystic ovary disease, exogenous estrogen), elevated prolactin, psychosocial conditions (anorexia, bulimia, stress), chronic illness, renal or hepatic failure, thyroid disease.
Risk Factors: Those associated with possible causes.

SIGNS AND SYMPTOMS

- Irregular menstrual interval
- Variable character of menstrual flow

DIAGNOSTIC APPROACH

Differential Diagnosis

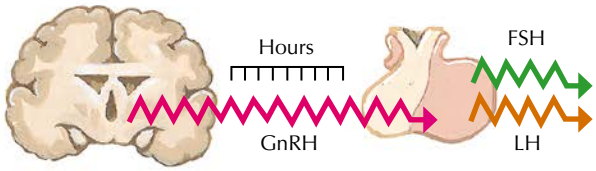
- Climacteric changes
- Anovulation
- Pregnancy
- Ovarian tumors (rare)

Associated Conditions: Anovulation, infertility, and obesity.

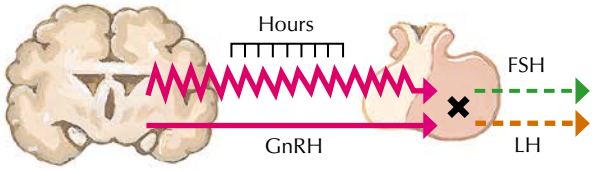
Workup and Evaluation

Laboratory: Testing should be selected on the basis of the different diagnoses under consideration.
Imaging: No imaging indicated.
Special Tests: A menstrual calendar helps to document the timing and character of the patient's bleeding to differentiate cyclic and noncyclic causes. Endometrial biopsy, curettage, or hysteroscopy may be indicated in selected patients.

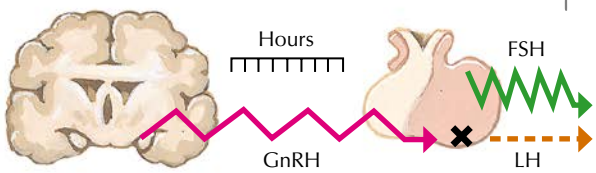
Hypothalamic regulation of pituitary gonadotropin production and release



Pulsed release of GnRH by hypothalamus (1 pulse/1–2 hr) permits anterior pituitary production and release of FSH and LH (normal)

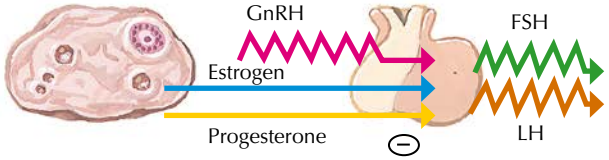


Continuous, excessive, absent, or more frequent GnRH release inhibits FSH and LH production and release (downloading)

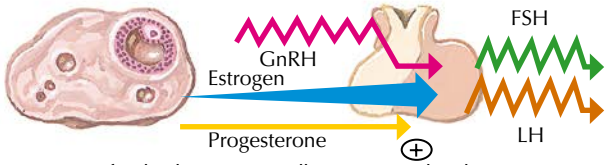


Decreased pulsed release of GnRH decreases LH secretion but increases FSH secretion (slow-pulsing model)

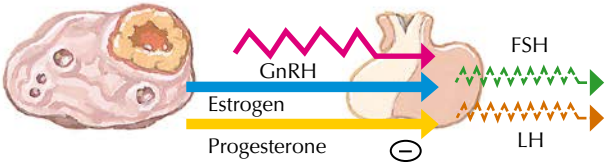
Ovarian feedback modulation of pituitary gonadotropin production and release



Presence of pulsed GnRH and low estrogen and progesterone levels result in increased levels of pulsed LH and FSH (negative feedback)

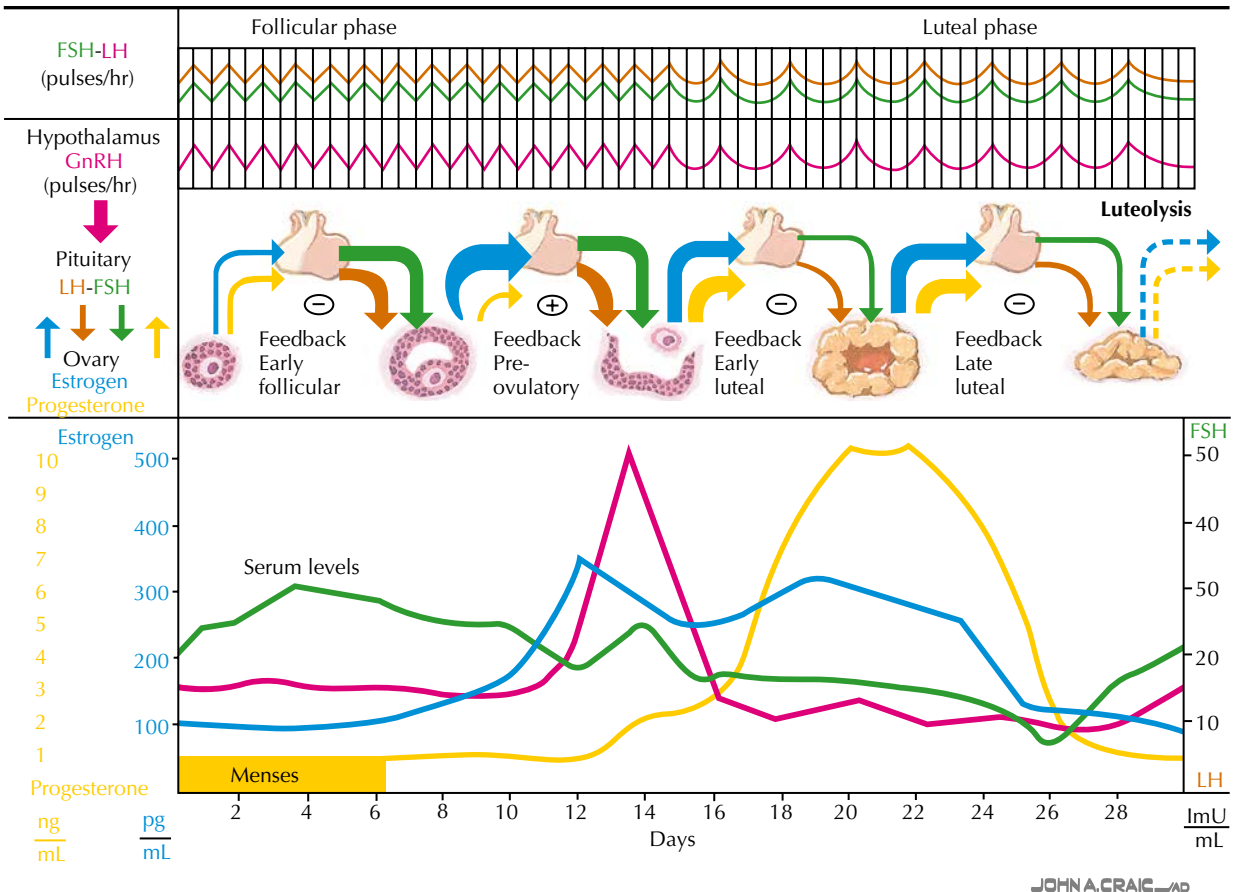


Presence of pulsed GnRH, rapidly increasing levels of estrogen, and small amounts of progesterone results in high pulsed LH and moderately increased pulsed FSH levels (positive feedback)



Presence of pulsed GnRH and high levels of estrogen and progesterone results in decreased LH and FSH levels (negative feedback)

Figure 139.1 Neuroendocrine regulation of menstrual cycle



FSH, follicle-stimulating hormone; GnRH, gonadotropin-releasing hormone; LH, luteinizing hormone.

Figure 139.2 Correlation of serum gonadotropic and ovarian hormone levels and feedback mechanisms

Diagnostic Procedures: History and physical examinations often indicate possible causes for further evaluation.

Pathologic Findings

Endometrial biopsy may indicate anovulation.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation.
Specific Measures: Focused on the underlying cause and desires of the patient. If anovulation is the cause and fertility is not desired, periodic progestin therapy may be used to stabilize the cycles and suppress intermenstrual bleeding.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Abnormal Uterine Bleeding, 2021
- Perimenopausal Bleeding and Bleeding After Menopause, 2020
- Your First Period—Especially for Teens, 2018

Drug(s) of Choice

Medroxyprogesterone acetate 5–10 mg for 10–14 days each month, timed to the last half of the anticipated cycle, if possible.
Contraindications: Undiagnosed amenorrhea or bleeding.
Precautions: Progestins should not be used until pregnancy has been ruled out.

Alternative Drugs

- Norethindrone acetate 5–10 mg for 10–14 days each month.
- Combination oral contraceptives or long-acting progestational agents, including intrauterine systems, may also be used.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: Endometrial hyperplasia or carcinoma if anovulation is left untreated.
Expected Outcome: Return to normal menstrual pattern with correction of underlying pathologic condition or periodic progestin therapy.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy once pregnancy is achieved.
ICD-10-CM Codes: N92.6 (Irregular menstruation, unspecified) and N92.5 (Other specified irregular menstruation).

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MENORRHAGIA

140

INTRODUCTION

Description: Menorrhagia—heavy menstrual flow—is generally divided into primary and secondary. Secondary is caused by (secondary to) some clinically identifiable cause; primary is caused by a disturbance in prostaglandin production. Menorrhagia is generally distinguished from acute vaginal bleeding (most often associated with pregnancy and pregnancy complications). Menorrhagia is classified as heavy menstrual bleeding under the terminology used for dysfunctional (abnormal) uterine bleeding.
Prevalence: 10%–15% of women experience excessive menstrual flow; 5% of women between the ages of 30 and 49 years consult a clinician for evaluation of menorrhagia annually.
Predominant Age: Reproductive age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Secondary—see Differential Diagnosis in the following section. Primary—overproduction or an imbalance in the relative ratios of uterine prostaglandins (prostaglandin E_2, prostaglandin

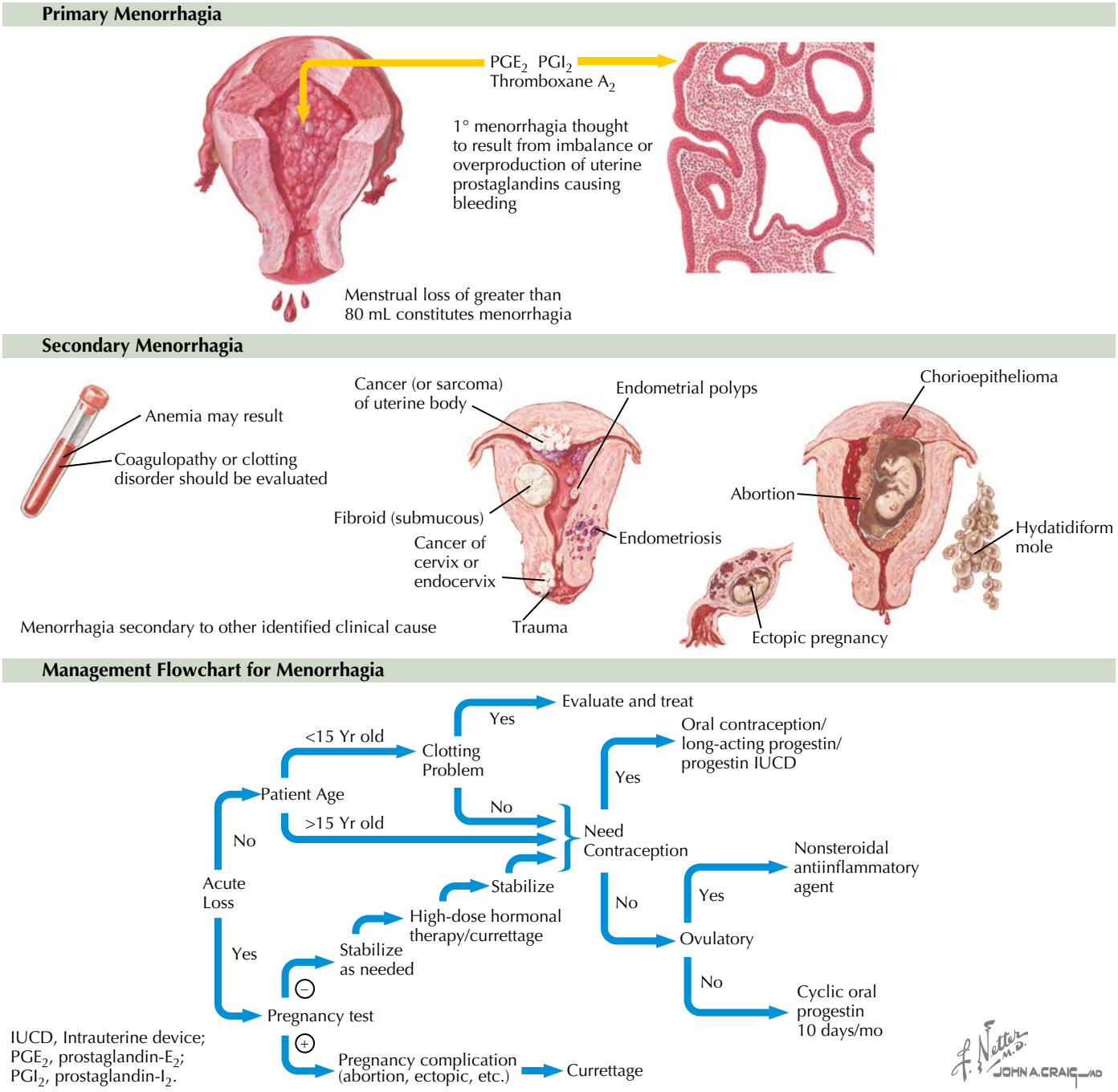

Figure 140.1 Primary and secondary menorrhagia and management

I_2, and thromboxane A_2). Some evidence suggests that patients with primary menorrhagia also have increased fibrinolysis, further enhancing a tendency to bleed.

Risk Factors: Diabetes, obesity, or chronic anovulation (which places the patient at a higher risk for endometrial hyperplasia or malignancy), systemic disease, or metabolic disturbances associated with bleeding dyscrasias.

SIGNS AND SYMPTOMS

- Menstrual loss of greater than 80 mL, which may result in anemia
- Excessive soiling or numbers of menstrual hygiene products used (objective studies have shown a poor correlation with the actual measured blood loss)
- Anemia (in the absence of other causes of anemia, anemia is diagnostic for menstrual volumes of greater than 80 mL per cycle)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Uterine leiomyomata (one-third of patients will have menorrhagia)
- Adenomyosis (40%–50% have menorrhagia)
- Endometrial or cervical polyp(s)
- Endometrial hypertrophy or hyperplasia
- Endometrial cancer
- Cervical lesions (including cancer)

- Infection (cervicitis, chronic endometritis)
- Intrauterine contraceptive device use
- Chronic anovulation
- Nongynecologic causes include blood dyscrasia or coagulopathy, hypothyroidism, leukemia, hepatic or renal disease, systemic lupus erythematosus, thyroid disease
- Benign or malignant hormone producing tumors of ovary (rare)

Associated Conditions: Anemia, toxic shock syndrome (prolonged tampon use).

Workup and Evaluation

Laboratory: Complete blood count, pregnancy test, clotting profile (as indicated).
Imaging: Pelvic ultrasonography (based on the diagnosis being considered—limited to the detection of secondary sources).
Special Tests: None indicated.
Diagnostic Procedures: History, physical, and laboratory evaluations.

Pathologic Findings

Based on the cause.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, nutritional support.
Specific Measures: Based on the cause. Nonsteroidal antiinflammatory drugs have been shown to reduce menstrual loss in primary menorrhagia. When taken for this indication, they must be taken continuously for the duration of flow. In patients with intractable menorrhagia or patients being prepared for extirpative surgery or endometrial ablation, therapy with gonadotropin-releasing hormone (GnRH) agonists may be considered. The availability of orally administered, nonpeptide small molecule GnRH receptor antagonists (Elagolix) may make this alternative more attractive. Uterine artery embolization has been advocated for select patients.
Diet: No specific dietary changes indicated. Iron supplementation if indicated (either ferrous sulfate or gluconate, 300 mg PO two to three times a day).
Activity: No restriction.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Abnormal Uterine Bleeding, 2021
- Dysmenorrhea—Painful Periods, 2020
- Heavy Menstrual Bleeding, 2020

Drug(s) of Choice

- Conjugated estrogen 20–25 mg IV or IM progestins have been widely advocated for acute bleeding.
- Oral estrogen (conjugated estrogen 2.5 mg, micronized estradiol 3–6 mg) may be acutely administered every 2 hours until the bleeding slows or stops. Estrogen therapy is then maintained for 20–25 additional days, with a progestin added for the last 10 days of treatment.
- Combination oral contraceptives containing estradiol and norgestrel (Ovral) four tablets a day for 3–5 days or until bleeding stops, followed by one daily for the duration of the pack or four tablets the first day, followed by three for 1 day, two the next day, and then one daily for the remainder of the package.
- For long-term therapy, levonorgestrel-releasing intrauterine systems have been shown to be effective in reducing menstrual blood loss.

Contraindications: Therapy should not be instituted until the possibility of pregnancy has been evaluated and a working diagnosis has been established.
Precautions: See individual agents.
Interactions: See individual agents.

Alternative Drugs

- When the endometrium is reasonably intact, high-dose progestin may be used to stop acute uterine bleeding (medroxyprogesterone acetate 10 mg PO three times a day or medroxyprogesterone acetate 150–300 mg IM depot).
- Nonsteroidal antiinflammatory agents have been shown to reduce menstrual loss by 30%–50% when taken for the duration of flow (eg, meclofenamate sodium [Meclomen] 100 mg PO three times a day during flow, mefenamic acid [Ponstel] 250 mg PO three times a day during flow).
- Levonorgestrel-releasing intrauterine systems have been shown to provide a comparable reduction in menstrual blood loss.

FOLLOW-UP

Patient Monitoring: Normal health maintenance. Watch for anemia. Patients who are at risk for endometrial hyperplasia or neoplasia or those who do not respond to initial therapy may require endometrial biopsy, hysteroscopy, or diagnostic curettage.
Prevention/Avoidance: Based on the cause. If contraception is desired, oral combination contraceptives, continuously dosed progestins (orally, by injection, or as a medicated intrauterine device), or oral contraceptives (either monophasic or polyphasic) are reasonable options. In patients with intractable menorrhagia or those being prepared for extirpative surgery or endometrial ablation, therapy with GnRH agonists may be considered for a maximum of 6 months. Cost and side effects limit this approach.
Possible Complications: Anemia, hypovolemia (acute loss).
Expected Outcome: Based on the cause; most patients respond to conservative therapy. The most successful therapy is directed at the underlying cause. Once acute control has been gained, cyclic estrogen/progestin therapy should be continued for an additional 3 months. During this interval, additional diagnostic studies may be considered, and plans may be laid for long-term management, should it be necessary.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: N92.0 (Excessive and frequent menstruation with regular cycle), N92.2 (Excessive menstruation at puberty), and N92.4 (Excessive bleeding in the premenopausal period).

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141 POSTMENOPAUSAL VAGINAL BLEEDING

INTRODUCTION

Description: As a symptom only, postmenopausal bleeding—vaginal bleeding that occurs in women who have passed menopause—requires evaluation to rule out processes that may threaten the long-term health of the patient.

Prevalence: Common, up to 10% of postmenopausal women.

Predominant Age: 50 years or older. Most common near the age of menopause; declines thereafter.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Systemic—estrogen, estrogen/progesterone, thrombocytopenia. Uterine—endometrial polyp (most common, 35%–40%), endometrial atrophy (second most common, 30%), endometrial cancer (approximately 6%–10%), endometrial hyperplasia, endometritis, submucous leiomyomata. Cervical sources—carcinoma, cervical eversion, cervicitis, condyloma, polyps. Vaginal sources—adenosis, atrophic change, carcinoma, foreign bodies (condom, pessary, tampon), infection, lacerations (coital injury, trauma). Vulvar and extragenital sources—atrophy, condyloma, cystitis/urethritis, gastrointestinal (cancer, diverticulitis, inflammatory bowel disease), hematuria, hemorrhoids, infection, labial varices, neoplasm, trauma, urethral caruncle, urethral diverticula, urethral prolapse/eversion.

Risk Factors: Estrogen therapy, others based on specific pathologic conditions.

SIGNS AND SYMPTOMS

- Painless vaginal bleeding (spontaneous or iatrogenic)
- Pink or dark discharge noted on the underwear or when wiping after urination

DIAGNOSTIC APPROACH

Differential Diagnosis

- Pregnancy (in the climacteric period or early menopause)
- Iatrogenic bleeding (estrogen, estrogen/progestin)
- Endometrial cancer
- Endometrial disease (hyperplasia, endometritis)
- Vaginal atrophy
- Endometrial polyps
- Cervicitis or cervical lesions (including polyps and cancer)
- Vaginitis
- Retained intrauterine contraceptive device
- Nongynecologic sources of bleeding (eg, perineal or rectal)

Associated Conditions: See differential diagnosis.

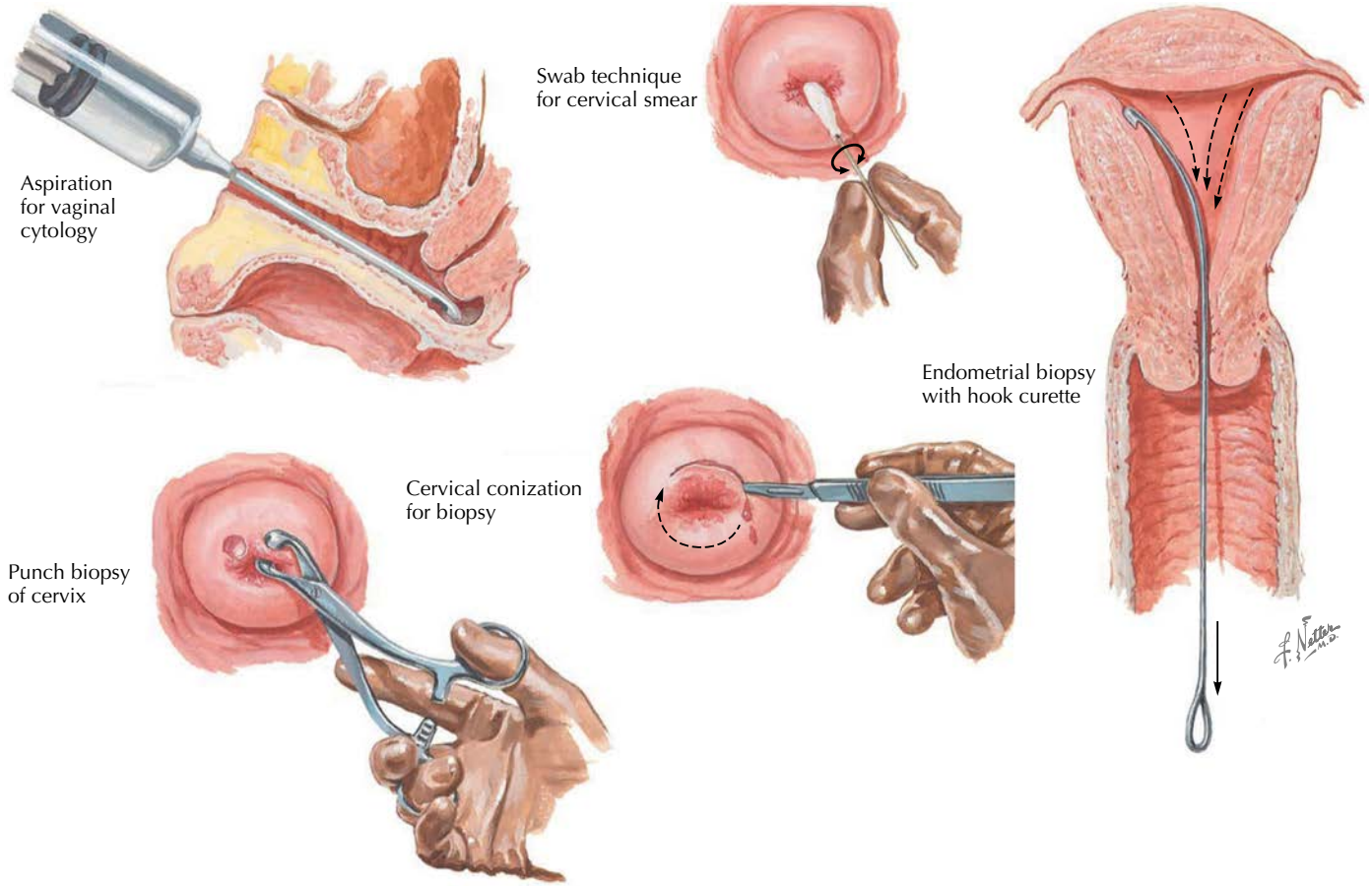

Figure 141.1 Evaluation of postmenopausal bleeding

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: Saline infusion ultrasonography (sonohysterography) may allow measurement of endometrial thickness and the possibility of endometrial polyps. Transvaginal ultrasonography by itself may be used to assess endometrial thickness (no standard has emerged for a threshold of endometrial thickness that carries ideal positive and negative predictive values. Published data suggest that when the endometrial thickness is less than 5 mm, endometrial biopsy is not required).
Special Tests: Endometrial biopsy should be strongly considered to evaluate the cause and to check for the possibility of a malignancy even though the risk is low.
Diagnostic Procedures: History and physical examinations, cervical cytologic examination, endometrial sampling.

Pathologic Findings

Varies with the cause.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation.
Specific Measures: Based on the cause identified.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Perimenopausal Bleeding and Bleeding After Menopause, 2020
- The Menopause Years, 2020
- Ultrasound Exams, 2017

Drug(s) of Choice (Based on the Pathophysiologic Condition Present)

- In many cases of postmenopausal bleeding, the endometrium is thin and atrophic. This endometrium is prone to irregular slough, resulting in erratic, although generally light, bleeding.
- Because the endometrial tissue is so denuded, it does not respond well to progestational agents.
- Estrogen, alone initially or in combination with progestin therapy, is required to induce initial growth and the development of progestin receptors to effect endometrial stabilization.

FOLLOW-UP

Patient Monitoring: Postmenopausal bleeding should be presumed to indicate the presence of a malignancy, until proved otherwise. The only exception to this is the withdrawal bleeding that occurs as a part of cyclic estrogen-progesterone hormone therapy.
Prevention/Avoidance: None.
Possible Complications: Progression of undiagnosed malignancy.
Expected Outcome: If diagnosis is prompt and appropriate therapy is instituted, the outcome should be excellent.

MISCELLANEOUS

Pregnancy Considerations: Not applicable.
ICD-10-CM Codes: N95.0 (Postmenopausal bleeding).

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142 SARCOMA (UTERINE)

INTRODUCTION

Description: Uterine sarcoma is characterized by a sarcomatous change in the tissues of the Müllerian system, including the endometrial stroma and myometrium. Mixed Müllerian sarcomas may include elements not native to the genital tract such as cartilage or bone (heterologous type).

Prevalence: Less than 10% of uterine malignancies, 1/800 smooth muscle tumors, 2.8/100,000 women aged 30–79 years.

Predominant Age: 40–70 years; mean age is 60 years. Reported in patients as young as 20 years of age.

Genetics: No genetic pattern. Leiomyosarcoma is found 2-fold more often in Black women, although there is no racial predisposition for other sarcomas. A small increase in risk for patients with hereditary leiomyomatosis and renal cell carcinoma syndrome, a rare autosomal dominant disorder, has been proposed but is unproven.

ETIOLOGY AND PATHOGENESIS

Causes: Etiology unknown.

Risk Factors: Leiomyomata, tamoxifen use. Estrogen, radiation exposure, and obesity have also been proposed. Oral contraceptive use is associated with a reduced risk.

SIGNS AND SYMPTOMS

- Bleeding (40%) and passage of tissue
- Lower abdominal pain and mass (15%)
- Rapid enlargement of the uterus (doubling in 3–6 months)
- Uterine growth after menopause

DIAGNOSTIC APPROACH

Differential Diagnosis

- Benign leiomyomata
- Cervical cancer
- Ovarian cancer metastatic to the endometrium
- Metachronous müllerian tumor

Associated Conditions: Breast or colon cancer.

Workup and Evaluation

Laboratory: No evaluation indicated except for preoperative screening.

Imaging: Chest radiograph or computed tomography (for metastases; present in up to a third at the time of diagnosis), transvaginal ultrasonography, or sonohysterography may be useful.

Special Tests: None. Endometrial biopsy results are rarely positive.

Diagnostic Procedures: Diagnosis rarely made before surgery.

Pathologic Findings

Based on the cell type and tissue involved. Most often soft, fleshy tumors with a gray–yellow or pink character. Areas of necrosis and hemorrhage are common (75%). Vascular invasion is present in 10%–20% of patients. Higher mitotic rates are associated with greater atypia.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and staging.

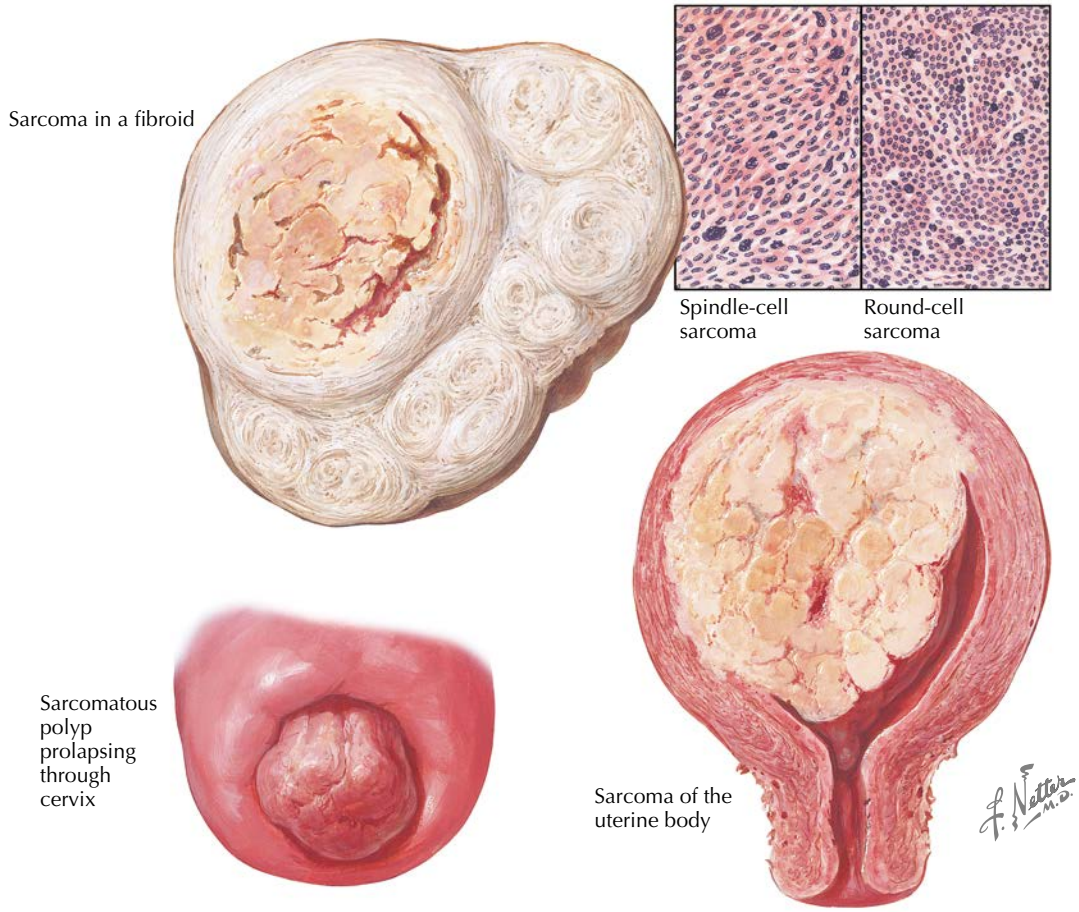

Figure 142.1 Types of sarcomas

Specific Measures: Surgical exploration with hysterectomy, bilateral salpingo-oophorectomy, cytologic examination of the abdomen and diaphragm, and para-aortic node sampling. Radiation to the vaginal cuff reduces local recurrence (although objective evidence of improved survival is lacking). Because of the risk for unanticipated malignancy, intraperitoneal morcellation of uterine leiomyomata has been discouraged.

Diet: No specific dietary changes indicated except as dictated by surgical therapy.

Activity: No restriction except as dictated by surgical therapy.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Abnormal Uterine Bleeding, 2021
- Hysterectomy, 2021
- Preparing for Surgery, 2021
- Uterine Fibroids, 2020

Drug(s) of Choice

- None.
- Adjuvant chemotherapy (vincristine, actinomycin D, docetaxel and gemcitabine, and cyclophosphamide or doxorubicin [Adriamycin]) has been advocated, but an improvement in prognosis has not been demonstrated.
- Temozolomide (an imidazotetrazine derivative) has been explored as an additional option.

FOLLOW-UP

Patient Monitoring: Follow-up cytology from vaginal cuff every 3 months for 2 years, then every 6 months for 3 years, then yearly. Chest, abdomen, and pelvic imaging every 3–4 months for 2–3 years, then every 6–12 months.

Prevention/Avoidance: None.

Possible Complications: Distant spread.

Expected Outcome: Depends on stage of tumor and number of mitotic figures present. Overall survival is approximately 20% at 5 years. Patients with stage I and II disease have better survival rates (75% and 60%, respectively).

MISCELLANEOUS

Pregnancy Considerations: Generally not a consideration because they are unlikely to coexist.

ICD-10-CM Codes: Specific to cell type and location.

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143 UTERINE ANOMALIES: BICORNUATE, SEPTATE, AND UNICORNUATE UTERUS

INTRODUCTION

Description: Uterine abnormalities are characterized by the incomplete formation of the uterus, resulting in one or two separate halves or horns or a single uterus with a central septum. The central septum may divide the uterine cavity either partially or completely. The two resulting halves may be of unequal size or volume. In its most extensive form, duplication of the cervix and vaginal canal also may occur. These abnormalities are associated with renal agenesis and blind vaginal pouches that may become filled with menstrual fluid after puberty, resulting in a painful mass.

Prevalence: Estimated to be 0.1% of female births. Septate or arcuate uterine anomalies may be present in 3%–5% of women.

Predominant Age: Congenital.

Genetics: May be transmitted through polygenic or multifactorial pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Failure of the fusion of the Müllerian ducts, which normally occurs near the beginning of the 10th week of gestation. This may vary from septation of the uterus to complete duplication of the uterus, cervix, and vaginal canal. Most septations are because of a failure of the normal processes of the development of the Müllerian system between the 10th and 13th weeks of gestation, when the lower portion of the median septum of the uterus is resorbed, or between the 13th and 20th week, when the upper septum (in the uterine body) is resorbed. In utero exposure to diethylstilbestrol has been associated with a T-shaped uterine cavity similar to the arcuate form of a septate uterus. A unicornuate uterus may result from a failure of the normal formation or the destruction of one of the Müllerian ducts. This may occur if there is a lack of development of the mesonephric system on the affected side resulting in a failure of the associated Müllerian system (in these patients, the ipsilateral kidney and ureter are usually absent).

Risk Factors: None known.

SIGNS AND SYMPTOMS

- Asymptomatic
- Recurrent abortion (15%–25% of patients with recurrent abortions have uterine abnormalities; there is a 50% risk of pregnancy loss when the uterus is unicornuate)
- Premature labor (20% risk for unicornuate uterus)
- Uterine pain or rupture in early pregnancy
- Abnormal presentation in labor (breech or transverse position)
- Inability to stop menstrual flow using tampons (when there is duplication of the vagina as well)
- When outflow is obstructed—hematometra
- Dysmenorrhea, abdominal pain, pelvic mass, abrupt blood discharge

DIAGNOSTIC APPROACH

Differential Diagnosis

- Leiomyomata
- Adnexal mass
- Endometriosis
- Chromosomal abnormality resulting in recurrent abortion

Associated Conditions: Endometriosis (75% when outflow obstruction is present), pelvic adhesions, recurrent abortion,

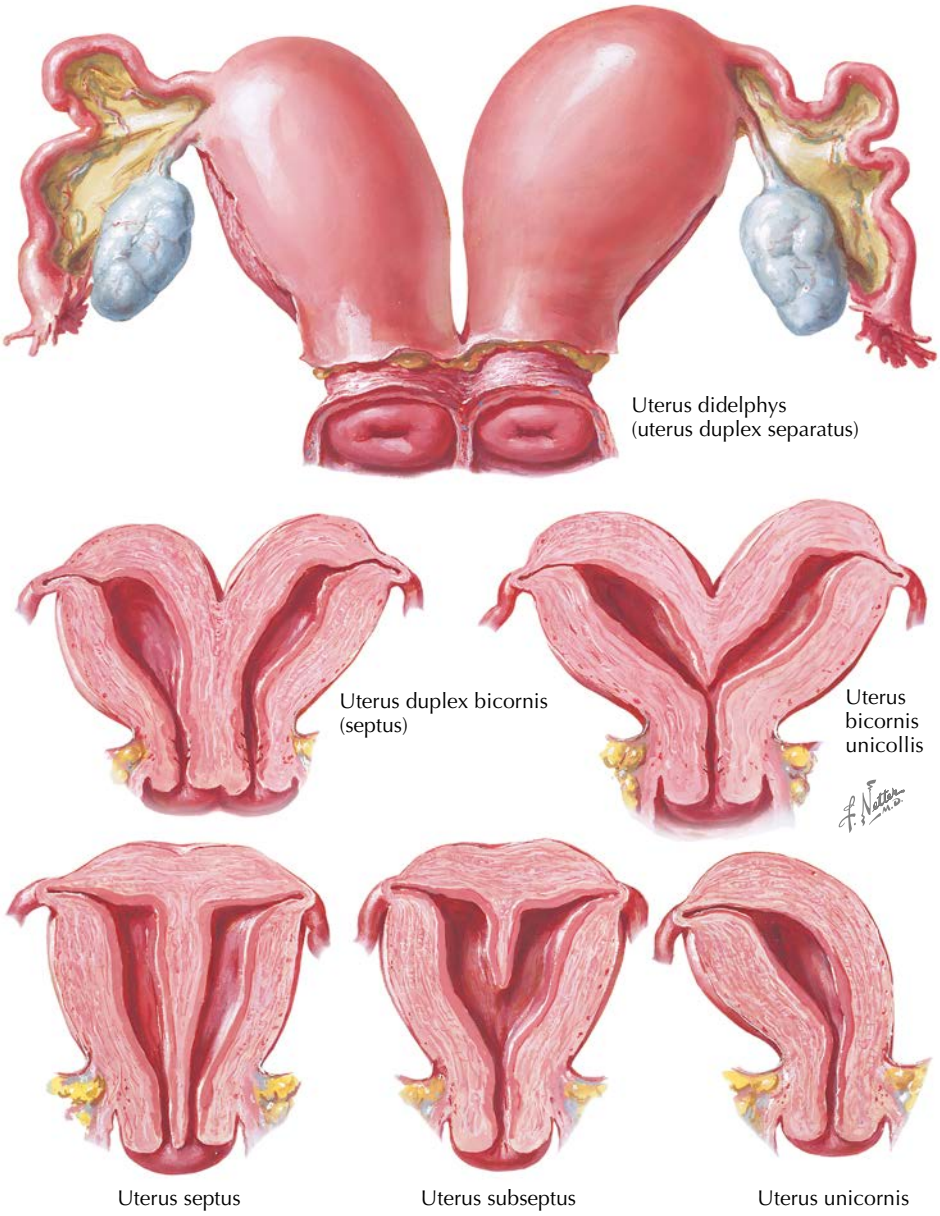

Figure 143.1 Uterine anomalies: Bicornuate, septate, and unicornuate uterus

infertility, dysmenorrhea, dyspareunia, hematocolpos, renal anomalies (contralateral pelvic, horseshoe, or absent kidney, found in 20%–30% of patients), skeletal and abdominal wall abnormalities (inguinal hernia).

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: Hysterosalpingography, ultrasonography, or sonohysterography. Magnetic resonance imaging may be used, but expense and availability limit its utility.
Special Tests: Hysteroscopy or laparoscopy may be required to complete the evaluation.
Diagnostic Procedures: Physical examination, imaging, and direct observation by hysteroscopy, laparoscopy, or both. Differentiation between septate and bicornuate uterine anomalies requires visualization of the uterine fundus.

Pathologic Findings

In patients with a unicornuate uterus, a normal ovary and tube are generally present. A normal ovary may be present on the opposite side as well. The septate uterus is characterized by the presence of a fibrous septum of variable length with poor vascularization (Table 143.1).

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and education.
Specific Measures: Patients with nonobstructive abnormalities require no therapy. Patients with recurrent fetal wastage may be considered for uterine reunification (metroplasty) procedures or the excision of any septum, usually by operative hysteroscopy. Patients with a unicornuate deformity and recurrent fetal wastage should be counseled about adoption or the possibilities of in vitro fertilization with implantation into a host uterus.

Table 143.1 The European Society of Human Reproduction and Embryology (ESHRE) and European Society for Gynaecological Endoscopy (ESGE) Classification of Congenital Uterine Anomalies*

Class U0	Normal uterus
Class U1	Dysmorphic uterus a. T-shaped b. Infantilis c. Others
Class U2	Septate uterus Partial Complete
Class U3	Bicorporeal uterus a. Parial b. Complete c. Bicorporeal septate
Class U4	Hemi-uterus a. With rudimentary cavity (communicating or not horn) b. Without rudimentary cavity (communicating or not horn)
Class U5	Aplastic a. With rudimentary cavity (bi- or unilateral horn) b. Without rudimentary cavity (bi- or unilateral horn)
Class U6	Unclassified malformations

*The American Society for Reproductive Medicine (ASRM) has also proposed a classification system placing the anomalies into six categories: müllerian agenesis or hypoplasia, unicornuate uterus, uterus didelphys, uterus bicornuate, septate uterus, and diethylstilbesterol-related anomalies. Their descriptive terminology includes müllerian agenesis, cervical agenesis, unicornuate uterus, uterus didelphys, bicornuate uterus, septate uterus, longitudinal vaginal septum, transverse vaginal septum, and other complex anomalies. (Adapted from Grimbizis GF, Gordts S, Di Spiezio Sardo A, et al. The ESHRE-ESGE consensus on the classification of female genital tract congenital anomalies. *Gynecol Surg*. 2013;10[3]:199–212. http://doi:10.1007/s10397-013-0800-x. PMID: 23894234; PMCID: PMC3718988.)

Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Early Pregnancy Loss, 2021
- Hysterosalpingography, 2020
- If Your Baby Is Breech, 2019
- Repeated Miscarriage, 2016

Drug(s) of Choice

None. Estrogen therapy is often administered for 1–2 months after the resection of a uterine septum, although the need for this is still debated.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: Obstruction of the outflow of menstrual blood is associated with a 75% chance of endometriosis with resultant pelvic scarring and infertility. There is an increased risk of ectopic pregnancy and early pregnancy loss (33%–35%).
Expected Outcome: Normal reproduction is frequently possible without intervention (25% of cases) for patients with a bicornuate uterus; metroplasty is associated with an increased likelihood of success when pregnancy failures have occurred (80%–90%). When the only abnormality is a uterine septum, normal reproduction is generally possible without intervention (85% success). For patients with a unicornuate uterus, a live birth rate of 40% may be expected; outcomes are not statistically different from those experienced by women with didelphic uteri.

MISCELLANEOUS

Pregnancy Considerations: Increased risk of pregnancy loss, premature delivery, or fetal malpresentation. The risk of ectopic pregnancy is increased for patients with a unicornuate uterus.
ICD-10-CM Codes: Q51.10 (Doubling of uterus with doubling of cervix and vagina without obstruction), Q51.2 (Other doubling of uterus), Q51.3 (Bicornate uterus), and Q51.4 (Unicornate uterus).

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UTERINE LEIOMYOMATA (FIBROIDS, MYOMA) 144

INTRODUCTION

Description: A uterine leiomyoma is a benign monoclonal connective tissue tumor found in or around the uterus, which may be disseminated in rare cases.

Prevalence: 50%–70% of women older than 50 years (one study has demonstrated a rate of more than 80% in African Americans older than 50 years). Leiomyomata account for approximately 30% of all hysterectomies.

Predominant Age: 35–50 years or older.

Genetics: Chromosome shattering and reassembly resembling chromothripsis (a single genomic event that results in focal losses and rearrangements in multiple genomic regions) has been documented in leiomyomata.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown; considered to arise from a single smooth muscle cell (of vascular origin), resulting in tumors that are each monoclonal. Estrogen, progesterone, and epidermal growth factor are all considered to stimulate growth.

Risk Factors: Nulliparity, early menarche, African Americans (4- to 10-fold increase in risk), increasing age, obesity, alcohol use, reduced vitamin D levels, high-fat or high-protein diet (proposed). The use of oral contraceptive or depot medroxyprogesterone acetate reduces the risk.

CLINICAL CHARACTERISTICS

Signs and Symptoms

- 30%–50% symptomatic
- Uterine enlargement and distortion
- Pelvic or abdominal heaviness, low back pain
- Pressure on bowel or bladder (ie, frequency, infrequently causing urinary retention or rarely hydroureter to develop)
- Dysmenorrhea, menorrhagia, intermenstrual bleeding (30%–40% of patients)
- Acute pain (with torsion or degeneration)
- Submucous fibroids may prolapse through the cervix
- Recurrent pregnancy loss

DIAGNOSTIC APPROACH

Differential Diagnosis

- Pregnancy
- Adnexal mass
- Other pelvic or abdominal tumor
- Pelvic kidney
- Urachal cyst
- Urinary retention

Associated Conditions: Dysmenorrhea, menorrhagia, miscarriage, and infertility (rare).

Workup and Evaluation

Laboratory: No evaluation indicated, hemoglobin or hematocrit if anemia suspected.

Imaging: Ultrasonography only when the diagnosis is uncertain.

Special Tests: None indicated.

Diagnostic Procedures: Pelvic examination is generally sufficient; it may be augmented by ultrasonography, but this is generally not required.

Pathologic Findings

Localized proliferation of smooth muscle cells surrounded by a pseudocapsule of compressed muscle fibers. Of uterine fibroids, 70%–80% are found within the wall of the uterus, with 5%–10% lying below the endometrium and less than 5% arising in or near the cervix. Multiple fibroids are found in up to 85% of patients. Myomas may weigh up to 100 lb.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Reassurance, observation.

Specific Measures: Surgical therapy (hysterectomy or myomectomy) for uncontrollable symptoms, rapid growth, or uncertain diagnosis. Medical therapy with gonadotropin-releasing hormone (GnRH) agonists may be temporarily used to prepare for surgery, pregnancy, or menopause. Uterine artery embolization may be used for patients who are not surgical candidates or those who wish to preserve fertility. Successful pregnancy is possible, but uterine embolization has been associated with a number of both short- and long-term complications, making its role limited. Ablation by focused ultrasound energy has been reported but is not widely available or used.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Hysterectomy, 2021
- Uterine Fibroids, 2020

Drug(s) of Choice

- GnRH agonists (therapy limited to 6 months)—buserelin (Lupron Depot) 3.75 mg IM monthly or 22.5 mg IM every 3 months; goserelin (Zoladex) 3.6 mg implant SC monthly or 3-month implant SC every 3 months; elagolix (Orilissa) 150 mg once daily; relugolix, with estradiol and norethindrone acetate add back (Myfembree) tablets 40 mg/1 mg/0.5 mg once daily.

Contraindications: Pregnancy or possible pregnancy.

Precautions: Must exclude possibility of pregnancy before medical therapy. GnRH agonists may produce significant symptoms of estrogen withdrawal (menopause). Add back therapy with estrogens and progestins increase the risk of thromboembolic complications.

Interactions: None known.

Alternative Drugs

- Synarel nasal solution 2 mg/mL one spray in alternate nostril in the morning and evening (not labeled for the treatment of leiomyomata).
- Nonsteroidal antiinflammatory drugs may be used to reduce menorrhagia.
- Medroxyprogesterone acetate (depot) 100–300 mg IM every 1–3 months may be used to suppress menstruation.
- The antiprogestin mifepristone (RU-486) is effective but not approved for this indication in the United States.

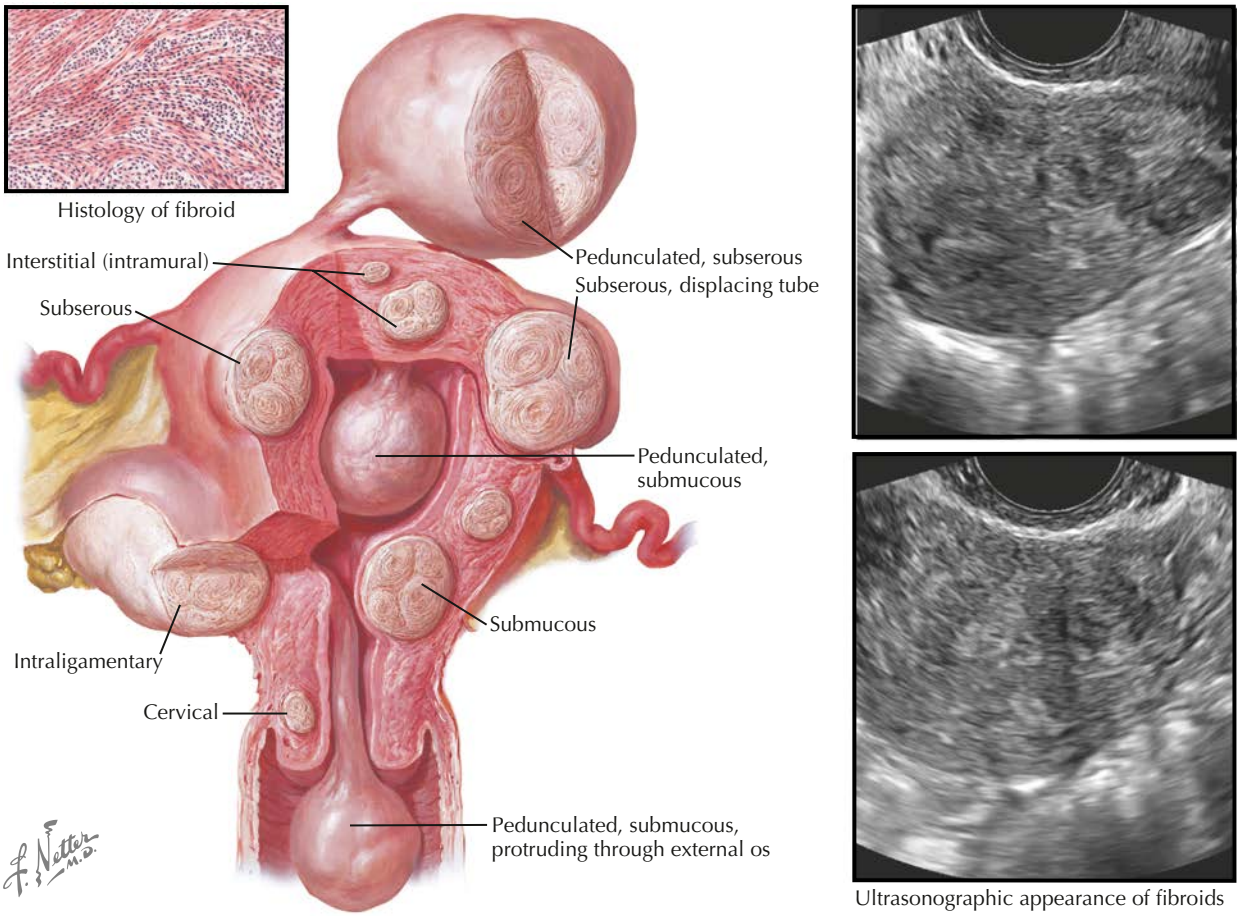

Figure 144.1 Uterine leiomyomata (fibroids, myoma) locations

FOLLOW-UP

Patient Monitoring: Watch for the development of symptoms. Monitor uterine size.

Prevention/Avoidance: None.

Possible Complications: Possibility of bone loss with prolonged GnRH or progestin therapy. Leiomyomata may undergo degeneration (hyaline, 65%; myxomatous, 15%; calcific, 10%), rarely causing acute symptoms of pain.

Expected Outcome: Leiomyomata generally stop growing after menopause (even with estrogen replacement). Recurrence after myomectomy is common (25%).

MISCELLANEOUS

Pregnancy Considerations: May (rarely) interfere with early pregnancy or obstruct delivery. Fibroids may grow rapidly or undergo hemorrhage or necrosis and may occasionally even be a cause for disseminated intravascular coagulopathy. Cesarean delivery should be considered for subsequent deliveries if the endometrial cavity is entered during myomectomy.

ICD-10-CM Codes: D25.0 (Submucous leiomyoma of uterus), D25.1 (Intramural leiomyoma of uterus), D25.2 (Subserosal leiomyoma of uterus), and D25.9 (Leiomyoma of uterus, unspecified).

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UTERINE PROLAPSE

145

INTRODUCTION

Description: Uterine prolapse is the loss of the normal support mechanism, resulting in descent of the uterus down the vaginal canal. In the extreme, this may result in the uterus descending beyond the vulva to a position outside the body (procidentia).
Prevalence: Some degree of uterine descent is common in parous women.
Predominant Age: Late reproductive age and older. Incidence increases with the loss of estrogen.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Loss of normal structural support because of trauma (childbirth), surgery, chronic intraabdominal pressure elevation (eg, obesity, chronic cough, or heavy lifting), or intrinsic weakness. Most common sites of injury are the cardinal and uterosacral ligaments, and the levator ani muscles that form the pelvic floor, which may relax or rupture. Increased intraabdominal pressure from a pelvic mass or ascites may rarely weaken the pelvic support and result in prolapse. Injury to or neuropathy of the S1-S4 nerve roots may also result in decreased muscle tone and pelvic relaxation.
Risk Factors: Birth trauma, chronic intraabdominal pressure elevation (eg, obesity, chronic cough, or heavy lifting), intrinsic tissue weakness, or atrophic changes, resulting from estrogen loss.

SIGNS AND SYMPTOMS

- Pelvic pressure or heaviness (a sense of "falling out")
- Mass or protrusion at or beyond the vaginal entrance
- New-onset or paradoxical resolution of urinary incontinence
- Drying, thickening, chronic inflammation, and ulceration of the exposed tissues, which may result in bleeding, discharge, or odor

DIAGNOSTIC APPROACH

Differential Diagnosis

- Cystocele
- Urethrocele
- Rectocele
- Enterocele
- Prolapsed uterine leiomyomata
- Bartholin cyst
- Vaginal cyst or tumor
- Cervical hypertrophy (with normal uterine support)

Associated Conditions: Urinary incontinence, pelvic pain, dyspareunia, intermenstrual or postmenopausal bleeding. Almost always associated with a cystocele, rectocele, and enterocele.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated.
Special Tests: Urodynamics testing may be considered if voiding or continence is altered. Either the Baden-Walker Halfway Scoring

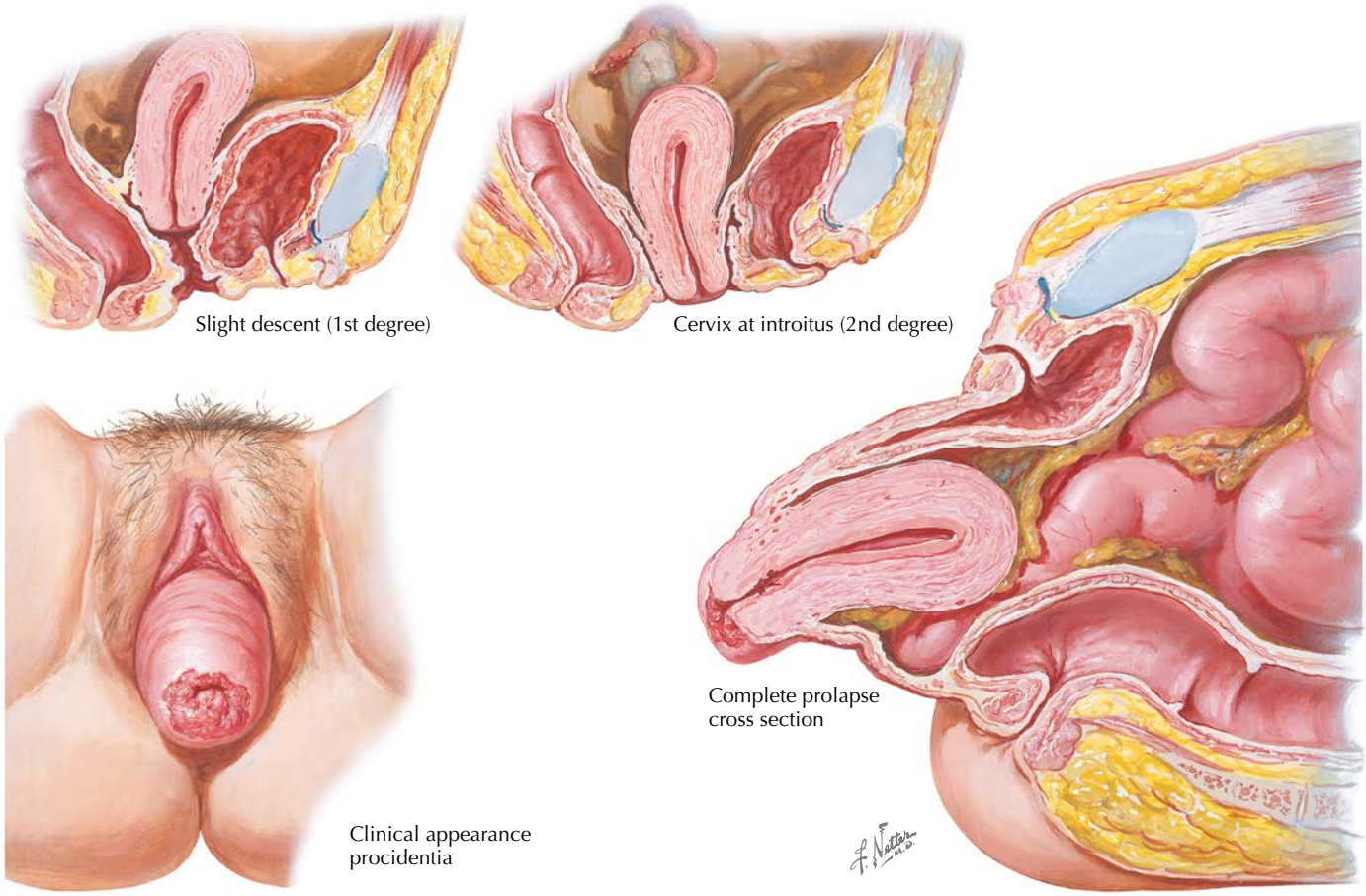

Figure 145.1 Types of uterine prolapses

evaluation system or the Pelvic Organ Prolapse Quantification System (POP-Q) may be used to quantify the degree of prolapse present.

Diagnostic Procedures: History and physical examinations.

Pathologic Findings

Tissue change is common because of mechanical trauma and desiccation.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Weight reduction, modification of activity (lifting), addressing factors such as chronic cough.

Specific Measures: Minimal prolapse does not require therapy. For those with more severe prolapse or symptoms, pessary therapy (Smith-Hodge, doughnut, cube, or inflatable ball), surgical repair, or hysterectomy (with colporrhaphy) should be considered. Postmenopausal women should receive estrogen and progesterone therapy for at least 30 days before pessary fitting or surgical repair. Colpocleisis may be appropriate for selected patients.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Pelvic Support Problems, 2020
- Surgery for Pelvic Organ Prolapse, 2018
- Surgery for Stress Urinary Incontinence, 2021
- Urinary Incontinence, 2020

Drug(s) of Choice

- Estrogen and progesterone therapy (for postmenopausal patients) improves tissue tone and healing and is often prescribed before surgical repair or as an adjunct to pessary therapy.

Contraindications: Estrogen therapy should not be used if undiagnosed vaginal bleeding is present.

FOLLOW-UP

Patient Monitoring: Normal health maintenance. If a pessary is used, frequent follow-up (both initially and long term) is required. Most recommend monthly checks of the vaginal epithelium for lesions and to reassess pessary placement and fit.

Prevention/Avoidance: Maintenance of normal weight, avoidance of known (modifiable) risk factors.

Possible Complications: Thickening or ulceration of the vaginal tissues and cervix, urinary incontinence, kinking of the ureters, obstipation, sexual dysfunction.

Expected Outcome: Uterine descent tends to worsen with time. If uncorrected, complete prolapse is associated with vaginal and cervical skin changes, ulceration, and bleeding. With surgical or pessary therapy results are good.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy, though these conditions rarely coexist.

ICD-10-CM Codes: N81.2 (Incomplete uterovaginal prolapse), N81.3 (Complete uterovaginal prolapse), N81.9 (Female genital prolapse, unspecified), N81.4 (Uterovaginal prolapse, unspecified).

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SECTION
IX

Adnexal Disease

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ADENOFIBROMA

146

INTRODUCTION

Description: An adenofibroma is an epithelial tumor that consists of glandular elements and large amounts of stromal (fibrous) elements. Adenofibromas are most commonly found as ovarian masses. They may also occur in the cervix or uterine body. Adenofibromas are closely related to cystadenofibromas, which have cystic areas but still contain more than 25% fibrous connective tissue.
Prevalence: Uncommon.
Predominant Age: Perimenopausal and postmenopausal.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown.
Risk Factors: None known.

SIGNS AND SYMPTOMS

- Asymptomatic (often an incidental finding at oophorectomy)
- Adnexal mass (adenofibromas are bilateral in 25% of cases)
- Fibrous cervical or endometrial polyp
- Acute abdominal pain if torsion occurs (rare)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Thecoma (fibroma)
- Stromal and germ cell tumors
- Brenner tumor
- Endometrioma
- Benign cystic teratoma
- Serous or mucinous cystadenoma
- Metastatic tumors
- Pedunculated leiomyomata
- Endocervical polyp

Associated Conditions: None.

WORKUP AND EVALUATION

Laboratory: No specific evaluation indicated. Evaluate as with other adnexal or cervical masses.
Imaging: Ultrasonography suggests a solid tumor.

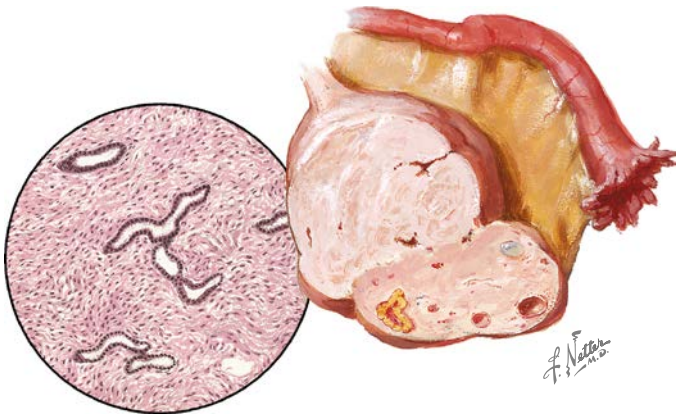

Figure 146.1 Serous adenofibroma

Special Tests: None indicated.
Diagnostic Procedures: Histopathology.

Pathologic Findings

Fibrous and epithelial elements make up this tumor. The epithelial components may be serous, mucinous, clear cell, or endometrioid. Epithelial or fibrous elements may predominate, changing the gross character of the tumor. Size is generally 1–15 cm in diameter.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and diagnosis.
Specific Measures: Simple surgical excision. Adenofibromas that are borderline or of low malignant potential do exist. These tumors must be treated on the basis of their size, location, and histologic evaluation, but they may require more extensive surgical therapy.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Ovarian Cancer, 2019
- Ovarian Cysts, 2021

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: Torsion of solid ovarian tumors. Adenofibromas that are borderline or of low malignant potential may spread or recur.
Expected Outcome: Surgical excision is generally curative.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: Based on location and predominant cell type.

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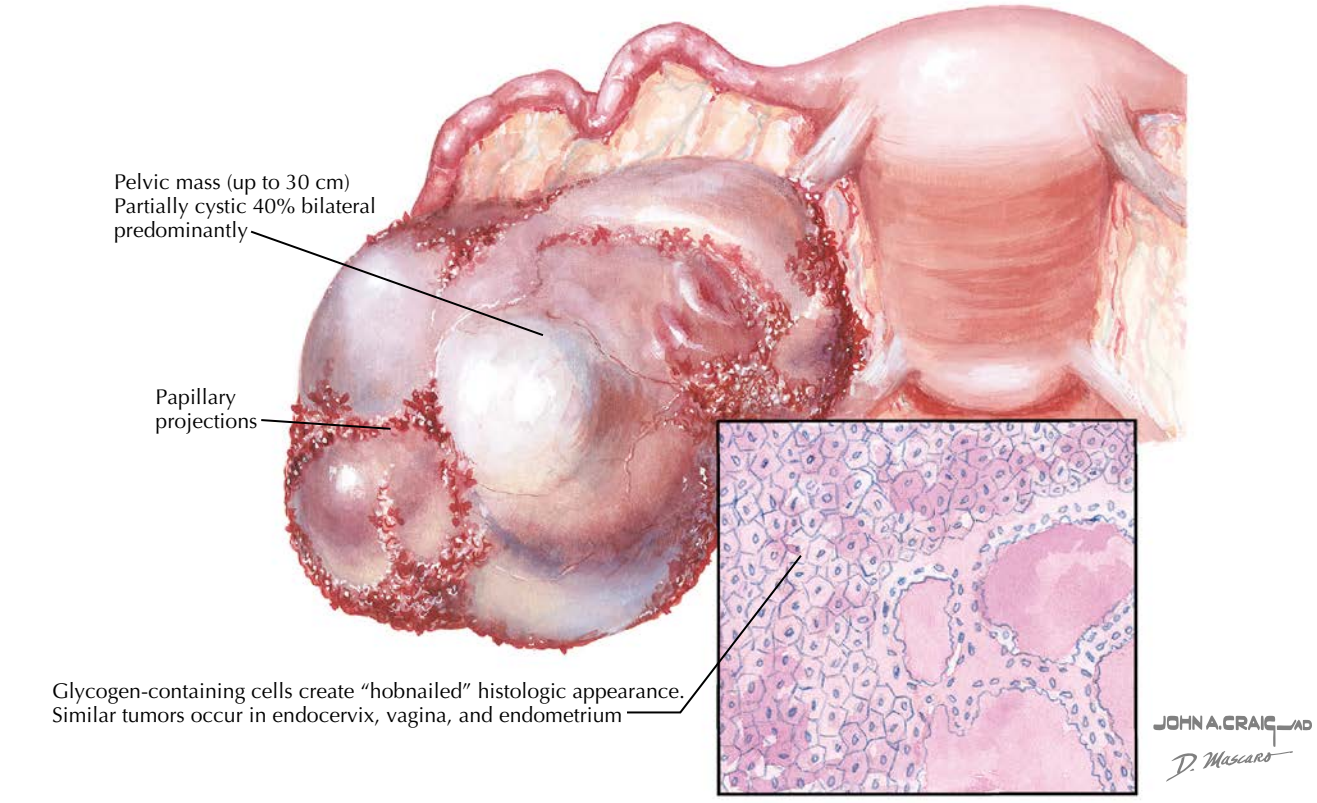
147 CLEAR CELL CARCINOMA

INTRODUCTION

Description: A clear cell carcinoma is an ovarian epithelial tumor comprising cells containing large amounts of glycogen, giving them a clear or "hobnailed" appearance. These tumors may also arise in the endocervix, endometrium, and vagina. Cervical and vaginal tumors have been linked to in utero exposure to diethylstilbestrol (DES).

Prevalence: 5%–11% of ovarian cancers.
Predominant Age: 40–78 years.
Genetics: No genetic pattern. The AT-rich interactive domain 1A (ARID1A) may play a role as a tumor suppressor gene in ovarian clear cell carcinoma.



Surgical Management

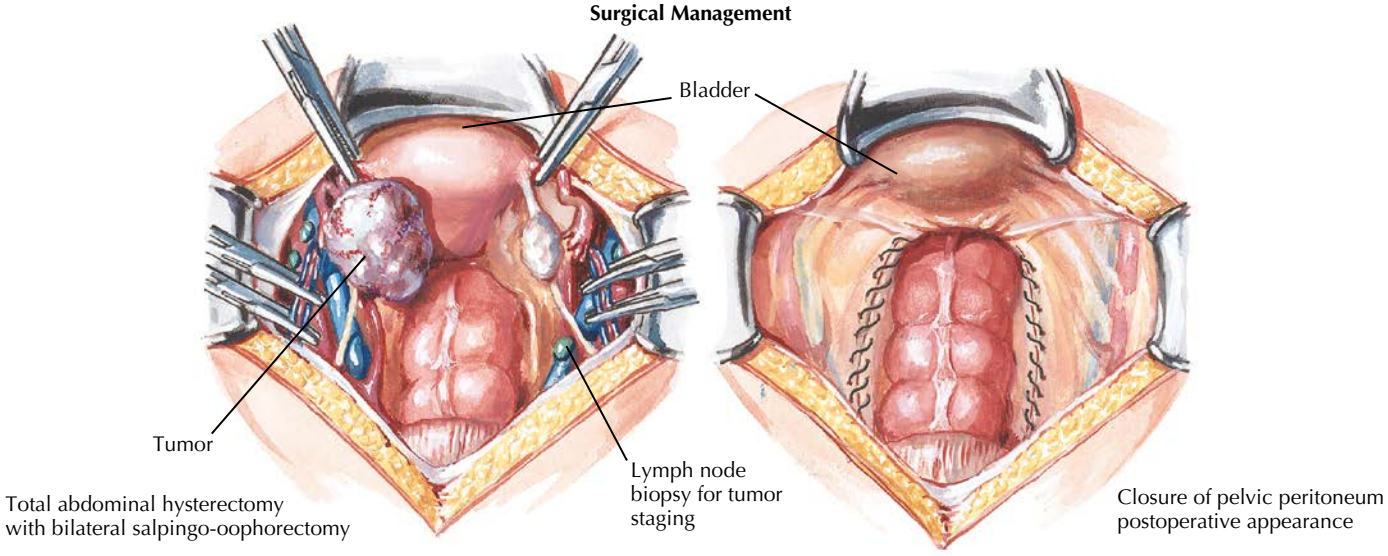


Figure 147.1 Clear cell carcinoma of ovary appearance and surgical management

ETIOLOGY AND PATHOGENESIS

Causes: Unknown. May arise from mesonephric or Müllerian elements.
Risk Factors: None known. Endometriosis has been postulated.

SIGNS AND SYMPTOMS

- Asymptomatic
- Pelvic mass (up to 30 cm)—partially cystic with yellow, gray, and hemorrhagic areas
- Papillary projections generally present, giving the mass a velvety appearance; 40% of tumors are bilateral

DIAGNOSTIC APPROACH

Differential Diagnosis

- Benign adnexal masses (corpus luteum, follicular cyst)
- Nongynecologic pelvic masses
- Hepatic, renal, or cardiac disease resulting in weight loss and ascites
- Endometriosis
- Hydrosalpinx
- Ectopic pregnancy (reproductive-age women)
- Pedunculated leiomyomata
- Pelvic or horseshoe kidney
- Gastrointestinal malignancy

Associated Conditions: Increased risk of vascular thrombotic events and paraneoplastic hypercalcemia.

Workup and Evaluation

Laboratory: As indicated before surgery. Serum testing for tumor markers, such as CA-125, lipid-associated sialic acid, carcinoembryonic antigen, and α-fetoprotein, should be reserved for following the progress of patients with known malignancies and not for prognostic evaluation.
Imaging: No imaging indicated.
Special Tests: A frozen-section histologic evaluation should be considered for any ovarian mass that appears suspicious for malignancy.
Diagnostic Procedures: History, physical examination, and imaging. Final diagnosis is established by histologic evaluation.

Pathologic Findings

Usually found as a malignant tumor. Despite the presence of hobnail cells that are similar to those observed in the endometrium, cervix, and vagina of women exposed to DES in utero, there is no evidence that DES has a role in clear cell ovarian tumors.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, supportive therapy based on symptoms.
Specific Measures: Requires surgical exploration and extirpation, including the uterus and contralateral ovary. Adjunctive chemotherapy (platinum-based and paclitaxel [Taxol]) or radiation therapy is often included, based on the location and stage of the disease. However, clear cell carcinoma is not as sensitive to platinum-based chemotherapy as the other histologic subtypes of ovarian cancers. The use of monoclonal antibodies (immunomodulators) and manipulation of cellular proteins are being reported in limited trials.
Diet: No specific dietary changes indicated, except those imposed by advanced disease.
Activity: No restriction except that imposed by advanced disease.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Ovarian Cancer, 2019
- Ovarian Cysts, 2021

Drug(s) of Choice

None, except as adjunctive or symptomatic therapy.
Contraindications: See individual agents.
Precautions: Alkylating agents are associated with an increased risk for future leukemia (10% by 8 years after therapy).
Interactions: See individual agents.

FOLLOW-UP

Patient Monitoring: Careful follow-up for recurrent pelvic disease or enlargement of the remaining ovary (if any). This is generally performed by pelvic examination, augmented with ultrasonography in selected patients. In those suspected of having recurrent disease and other selected patients, second-look surgery may be desirable to assess progress and discover occult disease.
Prevention/Avoidance: None. Tubal ligation appears to reduce risk (by reducing the risk of endometriosis).
Possible Complications: Rapid spread and progressive deterioration of the patient's condition.
Expected Outcome: Typically aggressive course with rapid disease progression and spread. Clear cell ovarian carcinoma has the worst prognosis of all ovarian malignancies, with a 5-year survival rate of less than 40%. The 5-year survival rate is modified by stage of disease at diagnosis: limited to one ovary, 80%; higher stage disease, 11%.

MISCELLANEOUS

Pregnancy Considerations: No direct effect on pregnancy (generally not an issue).
ICD-10-CM Codes: C56 (Malignant neoplasm of ovary).

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148 DERMOID CYST (TERATOMA)

INTRODUCTION

Description: The most common ovarian tumor in young, reproductive-aged women is the cystic teratoma or dermoid, which originates from a germ cell and contains elements from all three germ cell layers. These tumors may be benign or malignant (1%–2% malignant, usually in women older than 40 years). Dermatoid cysts account for 20%–25% of all ovarian tumors, one-third of all benign tumors, and 70% of tumors in young women aged 10–30 years.
Prevalence: 15%–25% of ovarian tumors.
Predominant Age: 20s–30s (75%); most patients are younger than 40 years.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown. Considered to arise from a single germ cell during the first meiotic division at approximately 13 weeks of fetal life. They routinely have a chromosomal makeup of 46,XX.
Risk Factors: None known.

SIGNS AND SYMPTOMS

- Asymptomatic (50%–60%).
- Adnexal mass (<10 cm in diameter in 80% of patients; bilateral in 10%–15% of patients)—the contents of cystic teratomas are of low density; they are often found "floating" anterior to the uterus or broad ligament, displacing the uterus posteriorly.
- May manifest with pain secondary to torsion (approximately 10%) or bleeding into the cyst, a sense of pelvic heaviness, or dysmenorrhea.
- Thyroid storm (when thyroid tissue predominates: struma ovarii) or carcinoid syndrome (rare).

DIAGNOSTIC APPROACH

Differential Diagnosis

- Functional cysts (follicle, corpus luteum)
- Epithelial tumors (cystic or solid)
- Ectopic pregnancy
- Tubo-ovarian abscess
- Endometrioma
- Hydrosalpinx
- Paratubal cyst
- Appendiceal abscess

Associated Conditions: None.

WORKUP AND EVALUATION

Laboratory: No evaluation indicated. Some serum markers (human chorionic gonadotropin, alpha fetoprotein (AFP), lactate dehydrogenase) may be elevated but are of little use in diagnosis.

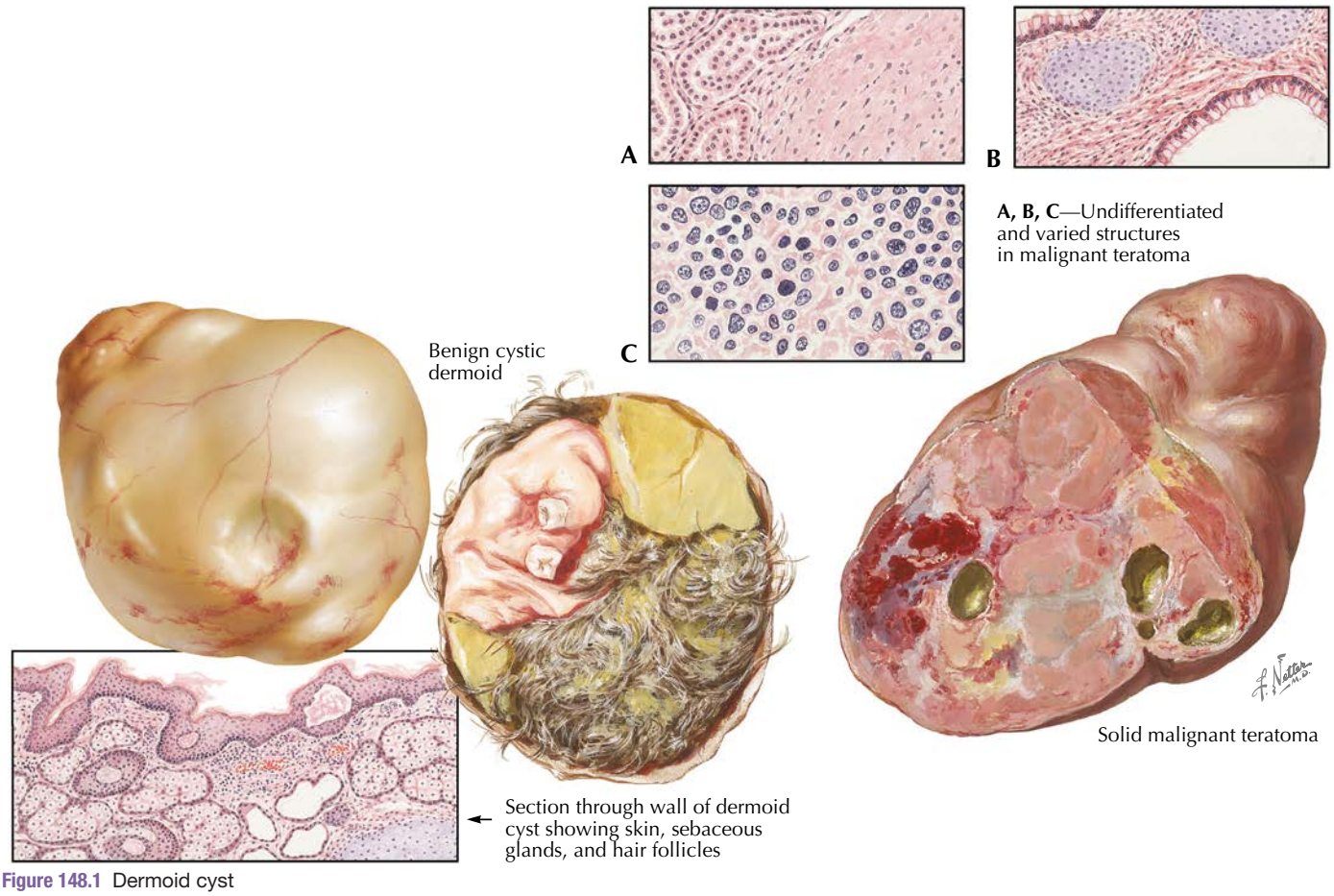

Figure 148.1 Dermoid cyst

Imaging: Ultrasonography (abdominal or transvaginal may be of assistance but usually is not required; when used, it has a 95% positive predictive value). Of teratomas, 30%–50% have calcifications and may be detected by radiographic examination.
Special Tests: None indicated.
Diagnostic Procedures: History, physical examination, imaging. May be found incidentally at laparotomy or laparoscopy.

Pathologic Findings

These tumors are derived from primary germ cells and include tissues from all three embryonic germ layers (ectoderm, mesoderm, and endoderm). Consequently, they often contain hair, sebaceous material, cartilage, bone, teeth, or neural tissue. On some occasions, functional thyroid tissue may be present (up to 12% of cases). Cystic teratomas contain malignant elements in only approximately 1%–2% of cases.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, support for acute symptoms.
Specific Measures: Surgical exploration and resection.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- Ovarian Cysts, 2021.

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: Most common—torsion (3%–12%). Possible—infection, rupture, and malignant transformation (squamous carcinoma, 1%–2%). The risk of malignant transformation is greatest when these tumors are found in postmenopausal women. Recurrence of teratomas is as high as 3.4% in some studies. Rupture of a dermoid cyst can result in an intense chemical peritonitis and is a surgical emergency. Slow leakage may mimic disseminated carcinoma. Anti–N-methyl-D-aspartate receptor (NMDAR) encephalitis has been reported to be associated with teratomas.
Expected Outcome: Based on the size and location of the tumor, it is often possible to conserve some or most of the ovary while the tumor itself is resected.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. Of teratomas, 10% are diagnosed during pregnancy and account for 20%–40% of ovarian tumors found during pregnancy. Rupture of the cyst, although rare, is more common during pregnancy.
ICD-10-CM Codes: D27.9 (Benign neoplasm of unspecified ovary).

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DYSGERMINOMA

149

INTRODUCTION

Description: A dysgerminoma is an ovarian tumor that is made up of germ cells and stroma that appears analogous in structure to the seminomas found in the male testes. Although rare, these tumors are the most common malignant germ cell tumors.
Prevalence: Rare; 1%–2% of ovarian malignancies; one-third of ovarian germ cell tumors.
Predominant Age: Older than 30 years (10% in prepubertal girls).
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown. May differentiate from primitive germ cells.
Risk Factors: Pure gonadal dysgenesis 46XY, mixed gonadal dysgenesis 45X/46XY, complete androgen insensitivity (46XY), or those with Turner syndrome (45X, 45X/46XX, or 45X/46XY).

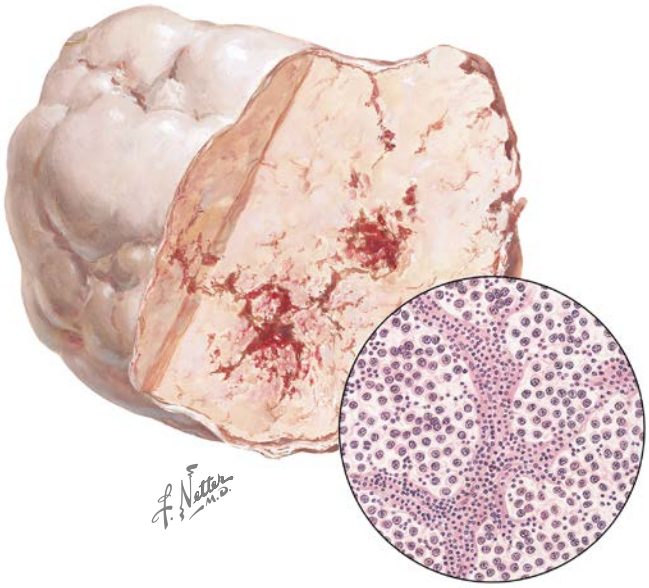

Figure 149.1 Dysgerminoma

SIGNS AND SYMPTOMS

- Asymptomatic.
- Adnexal mass (bilateral in 5%–10%), lobulated, solid and soft or firm, with a gray-white or cream-colored cut surface, often with rapid growth.
- These tumors may produce either testosterone or estrogens.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Benign adnexal masses (corpus luteum, follicular cyst)
- Endometriosis
- Hydrosalpinx
- Paratubal cyst
- Appendiceal abscess
- Ectopic pregnancy
- Pedunculated leiomyomata
- Pelvic or horseshoe kidney
- Nongynecologic pelvic masses

Associated Conditions: None.

WORKUP AND EVALUATION

Laboratory: As indicated before surgery. β-Human chorionic gonadotropin is often elevated (several thousand units), as is lactic dehydrogenase. Serum testing for tumor markers, such as CA-125, lipid-associated sialic acid, carcinoembryonic antigen, and α-fetoprotein, should be reserved for following the progress of patients with known malignancies and not for prognostic evaluation.

Imaging: Preoperative evaluation (computed tomography or ultrasonography) for possible lymph node enlargement or intraabdominal spread is indicated for patients in whom malignancy is a significant possibility.

Special Tests: None indicated.

Diagnostic Procedures: History, physical examination, and imaging. Final diagnosis is established by histologic evaluation.

Pathologic Findings

Primitive germ cells with stroma infiltrated by lymphocytes (analogous to seminomas in the testes). Areas of malignant cells are found in 10%–15% of tumors, though the degree of histologic atypia is variable and only approximately one-third behave aggressively.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and supportive therapy based on symptoms.

Specific Measures: Surgical exploration and resection. When the tumor is confined to one ovary, preservation of the uterus and other ovary is possible to preserve fertility. These tumors are very sensitive to radiotherapy, which may be used as an adjunct or to treat recurrent disease. Multiagent chemotherapy has fewer side effects and is often the preferred adjunct.

Diet: No specific dietary changes indicated, except those imposed by advanced disease.

Activity: No restriction except that imposed by advanced disease.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Ovarian Cancer, 2019
- Ovarian Cysts, 2021

Drug(s) of Choice

- Adjunctive or symptomatic therapy. Combination chemotherapy in selected patients (vincristine, actinomycin D, and cyclophosphamide or bleomycin, etoposide, and cisplatin).

FOLLOW-UP

Patient Monitoring: Careful follow-up for recurrent pelvic disease or enlargement of the remaining ovary (if any). This is generally performed by pelvic examination, augmented with ultrasonography in selected patients. In patients suspected of having recurrent disease and other selected patients, second-look surgery may be desirable to assess progress and discover occult disease.

Prevention/Avoidance: None.

Possible Complications: Tumor progression or growth. These tumors tend to spread by lymphatic channels. Recurrence of tumor is found in 20% of patients, but recurrent disease generally responds well to additional surgery, chemotherapy, or radiation.

Expected Outcome: The prognosis is good for patients with pure dysgerminomas less than 15 cm in size. With limited disease and no indication of spread at the time of surgery (stage I), the 5-year survival rate is greater than 90%.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. May be discovered during pregnancy because of age distribution.

ICD-10-CM Codes: Specific to cell type and location.

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ECTOPIC PREGNANCY

150

INTRODUCTION

Description: An ectopic pregnancy is one in which the fertilized egg is implanted outside of the endometrial cavity (fallopian tube [98%], ovary, abdominal cavity, or cervix). This is the leading cause of pregnancy-related maternal death in the first trimester (4%–10% of all pregnancy-related deaths).

Prevalence: 10–20/1000 pregnancies; varies with age, race, and location (highest in Jamaica and Vietnam). The risk of simultaneous intrauterine and extrauterine pregnancies (heterotopic pregnancy) in naturally conceived pregnancies is estimated to be 1/4000 to 1/30,000 and as much as 1/100 for those resulting from assisted reproduction technologies.

Predominant Age: 25–34 years (>50%).

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Tubal damage or altered motility that causes the fertilized egg to be improperly transported, resulting in implantation outside the uterine cavity. The most common cause is acute salpingitis (50%). In the majority of the remaining patients (40%), no risk factor is apparent. Abnormal embryonic development may play a role.

Risk Factors: Tubal damage (pelvic infections; 6-fold increased risk), prior ectopic pregnancy (10-fold increased risk), prior female sterilization, age 35–44 years (3-fold greater rate of extrauterine gestations than for women aged 15–24 years), non-White race (1.5-fold increased risk), assisted reproduction (2-fold increased risk), cigarette smoking (30+/day: 3- to 5-fold increased risk), intrauterine contraceptive device (IUD) use (up to 50% of pregnancies conceived while the IUD is in place), and endometriosis. More than half of cases occur in women who have been pregnant three or more times.

SIGNS AND SYMPTOMS

- Normal signs and symptoms of pregnancy (amenorrhea, uterine softening)
- Vaginal bleeding (75% of cases)
- Acute abdominal pain (dull, crampy, or colicky; 65% of cases)
- Evidence of intraabdominal bleeding, including hypotension and collapse
- Adnexal mass (with or without tenderness)
- Signs of peritoneal irritation
- Absence of a gestational sac on ultrasonography with β-human chorionic gonadotropin (β-hCG) level greater than 3500 mIU/mL is highly suspicious but not diagnostic
- Abdominal pregnancy may be asymptomatic until near term

DIAGNOSTIC APPROACH

Differential Diagnosis

- Appendicitis
- Degenerating fibroid
- Dysfunctional uterine bleeding

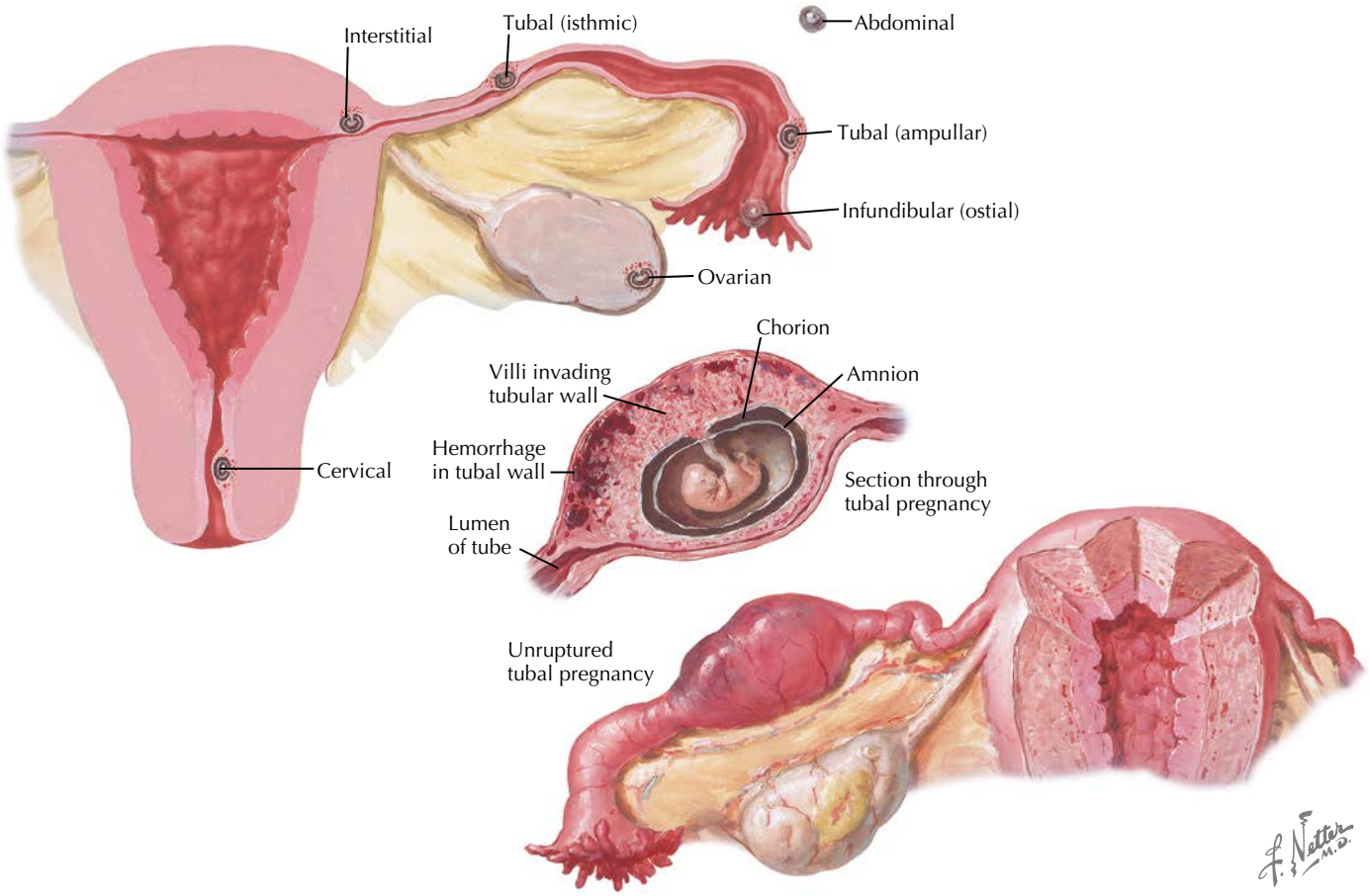
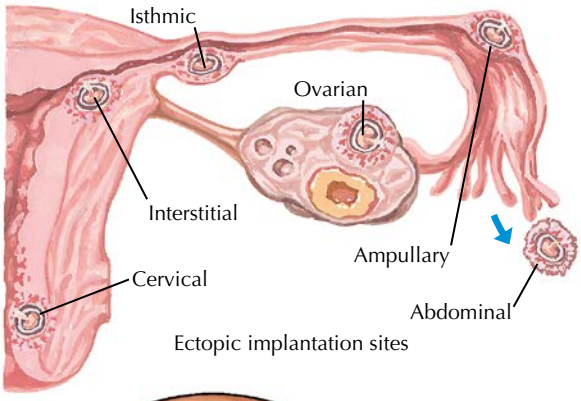
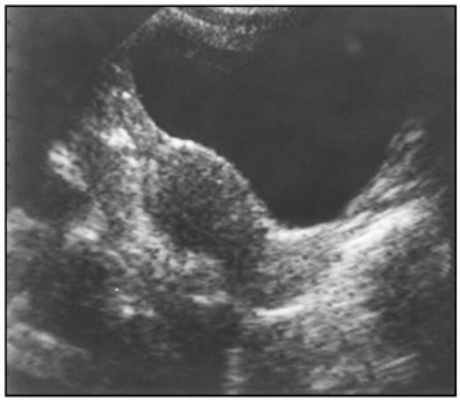
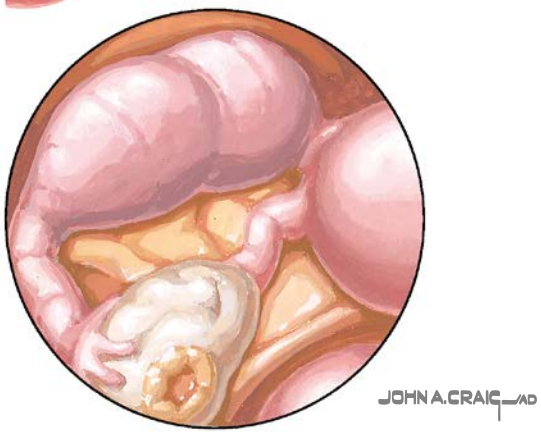


Figure 150.1 Site of ectopic implantation



Ectopic implantation sites


Sonogram of empty uterine cavity



Laparoscopy may be used to confirm diagnosis of ectopic pregnancy

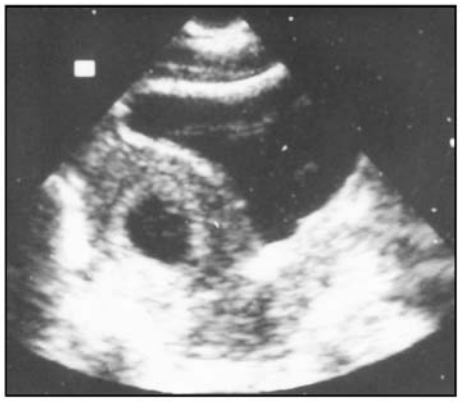

Sonogram of gestational sac

Figure 150.2 Diagnosis of ectopic pregnancy

- Endometriosis
- Gastroenteritis
- Mesenteric thrombosis
- Ovulation
- Ruptured corpus luteum cyst
- Salpingitis
- Septic abortion (fever >38°C (100.4°F) or a white blood count of >20,000 WBC/dL is rare in patients with ectopic pregnancies; the presence of either should suggest a pelvic infection, including septic abortion)
- Threatened or incomplete abortion
- Torsion of an adnexal mass

Associated Conditions: Pelvic inflammatory disease, infertility, and recurrent abortion.

Workup and Evaluation

Laboratory: Serial quantitative β-hCG levels (if patient's condition permits; 85% of viable pregnancies, demonstrate a rise of at least 66% every 48 hours during the first 40 days of pregnancy). A normal rate of rise does not rule out an ectopic implantation. Declining levels are indicative of a failed pregnancy but are not specific for location. Levels are lower than 3000 mIU/mL in approximately half of ectopic pregnancies. Serum progesterone (low) may be of diagnostic help if less than 6 weeks gestation (almost 90% of patients with an ectopic pregnancy have levels less than 30 nM/L [10 ng/mL]). A hematocrit level of less than 30% is found in approximately one-fourth of women with ruptured ectopic pregnancy.

Imaging: Ultrasonography (transvaginal preferred) may be augmented by color-flow Doppler studies.

Special Tests: Culdocentesis has largely been replaced by ultrasonography.

Diagnostic Procedures: History and physical examination, serum β-hCG level and ultrasonography. When laparoscopy is used as a diagnostic tool, there is a 2%–5% chance of a false-positive or false-negative diagnosis.

Pathologic Findings

Placental villi invading tissue other than the endometrium. Most ectopic pregnancies are tubal, with the ampulla (approximately 80%) and isthmus (12%) being the most common locations and 5% in the fimbrial region.

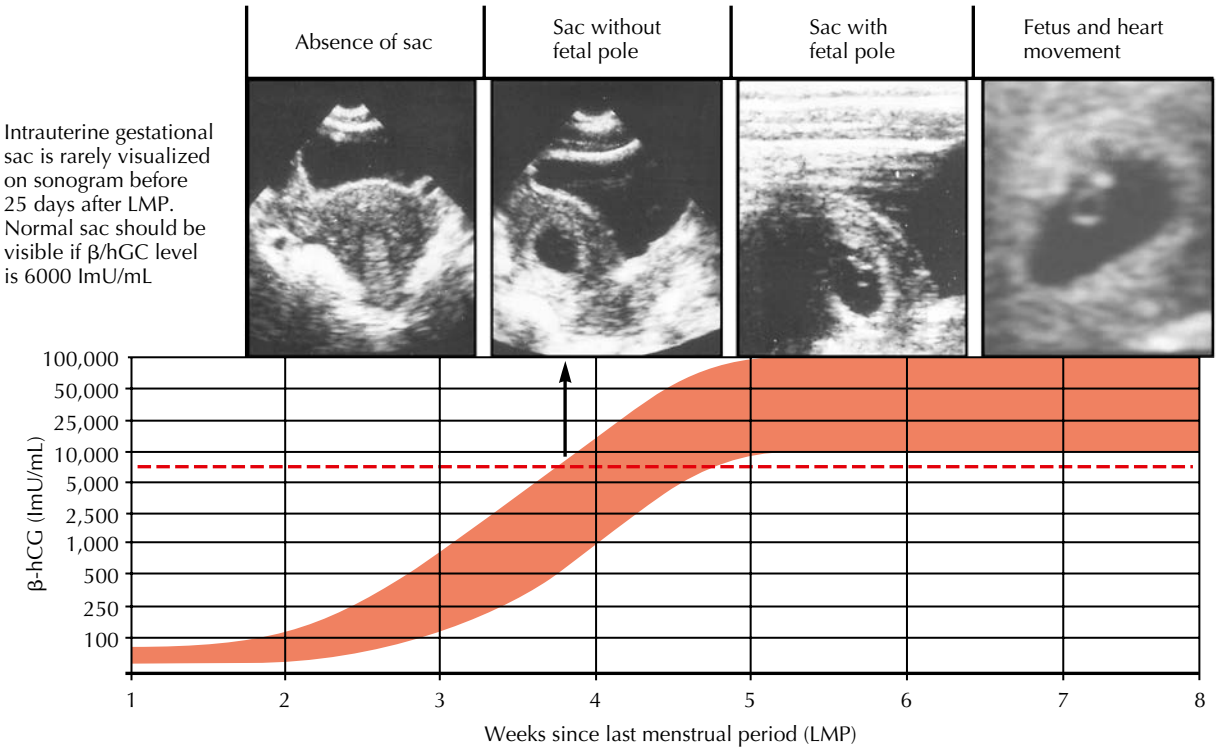
MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Rapid assessment and general support when intraabdominal bleeding is present.

Specific Measures: Expeditious diagnosis (diagnostic delay is a factor in approximately half of all deaths associated with ectopic pregnancy; 50% of patients have had one or more visits to a healthcare provider before the diagnosis is made, even in nonfatal cases). Surgical intervention generally is required for symptomatic patients (salpingostomy, salpingectomy). Medical therapy may be considered for asymptomatic or mildly symptomatic patients.

Diet: In acute rupture, nothing by mouth in anticipation of possible surgical intervention. If medical therapy is used, avoid folate supplements and folate-containing preparations (eg, multivitamins, prenatal vitamins).



hCG, human chorionic gonadotropin.

Figure 150.3 Pregnancy monitoring with serial sonograms and β-hCG determinations

Activity: No restriction except those dictated by the patient's status.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- Pelvic Inflammatory Disease, 2019

Drug(s) of Choice

- Methotrexate IM 50 mg/m^2 surface area with a maximum of 80 mg. A second does is given on day 4 if a fixed multiday regimen is chosen.

Contraindications: Methotrexate should not be used if the β-hCG level is greater than 5000 mIU/mL, the adnexal mass is greater than 3–4 cm, or the patient's hemodynamic status is unstable. Patients with a history of active hepatic or renal disease, fetal cardiac activity demonstrated in the ectopic gestation, active ulcer disease, or significant alterations in blood count (white blood cell count <3000, platelet count of <100,000) are generally not candidates for this therapy.

All women with ectopic pregnancies who are Rh-negative and unsensitized should receive Rh immunoglobulin at a dose of 50 mcg if the gestation is of less than 12 weeks duration and 300 mcg if it is beyond 12 weeks.

Precautions: A transient increase in abdominal symptoms is often encountered 48–72 hours after methotrexate therapy. Approximately 5%–10% of medically managed patients experience complications before medical therapy can be effective, necessitating surgical intervention.

Interactions: If patients are receiving methotrexate therapy, they should not take multivitamins with folic acid (eg, prenatal vitamins) because this counteracts the effects of the methotrexate.

FOLLOW-UP

Patient Monitoring: Follow-up assessment of serum β-hCG level to confirm a decline toward normal.

Prevention/Avoidance: Reduce modifiable risk factors, such as pelvic infections.

Possible Complications: Rupture of an ectopic pregnancy dooms the pregnancy and may result in catastrophic intraabdominal bleeding that jeopardizes the life of the mother. It is the most common cause of maternal death in the first half of pregnancy. Maternal mortality from ectopic pregnancy has declined with earlier detection made possible by laboratory and ultrasonography diagnosis. Current statistics suggest a rate of 3.8/10,000 patients (varies with age and race—African Americans have a 5-fold greater risk). Maternal death is most often associated with blood loss and delay in diagnosis.

Expected Outcome: With prompt diagnosis, the prognosis for the patient is good, although infertility rates are high (40%) and the likelihood of a successful pregnancy is reduced (50%). The prognosis for the current pregnancy is uniformly bad. Methotrexate therapy is associated with an approximately 90% efficacy rate.

MISCELLANEOUS

Pregnancy Considerations: Poor outcomes for future pregnancy, including increased risk of subsequent ectopic implantation and spontaneous pregnancy loss.

ICD-10-CM Codes: O00.1 (Tubal pregnancy), O00.0 (Abdominal pregnancy), O00.2 (Ovarian pregnancy), and O00.8 (Other ectopic pregnancy).

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151 ENDOMETRIOSIS

INTRODUCTION

Description: Endometriosis is a benign but progressive condition characterized by endometrial glands and stroma that are found in locations other than the endometrium (may be found outside of the pelvis in the abdomen, thorax, brain, and skin).

Prevalence: 5%–15% of women; 20% of gynecologic laparotomies; 30% of patients with chronic pain (50% of teens with pain); 30%–50% of patients experiencing infertility.

Predominant Age: Third and fourth decades of life; 5% diagnosed after menopause, generally in women taking estrogen.

Genetics: Familial predisposition (polygenic or multifactorial inheritance pattern postulated but unproven). There are reported somatic mutations in 79% of endometrial implants (least six genomic regions associated with endometriosis) and mutations in the cancer driver genes *ARID1A, PIK3CA, KRAS,* and *PPP2R1A* in 26% of implants.

ETIOLOGY AND PATHOGENESIS

Causes: Endometriosis may arise by one of several proposed mechanisms—lymphatic spread, metaplasia of celomic epithelium or Müllerian rests, seeding by retrograde menstruation, or direct hematogenous spread. Instances of presumed iatrogenic spread (surgical) have been reported. A role for an immunologic defect is debated but remains to be conclusively established.

Risk Factors: Obstructive anomalies such as an unrecognized double uterus or a cervical and/or vaginal outflow-tract obstruction. Approximately 10% of teenagers diagnosed with endometriosis have associated congenital outflow obstruction. High parity, extended lactation, and late menarche are associated with reduced risk.

SIGNS AND SYMPTOMS

- Asymptomatic (up to 30%)
- Cyclic pelvic pain or dyspareunia (both worst 36–48 hours before menses), premenstrual and menstrual pain, dyschezia, midcycle (ovulatory) pain—often the pain reported by patients seems inversely proportional to the amount of disease; small implants seem to be exquisitely painful, and large endometriomata may be asymptomatic
- Infertility
- Intermenstrual bleeding (15%–20%)
- Anovulation (15%)
- Intermittent constipation or diarrhea
- Adnexal mass(es)
- Uterine retroversion, scarring and nodularity of the posterior cul-de-sac
- Pneumothorax when the thoracic cavity is involved

DIAGNOSTIC APPROACH

Differential Diagnosis

- Pelvic adhesive disease (secondary to pelvic infection, surgery)
- Uterine fibroids

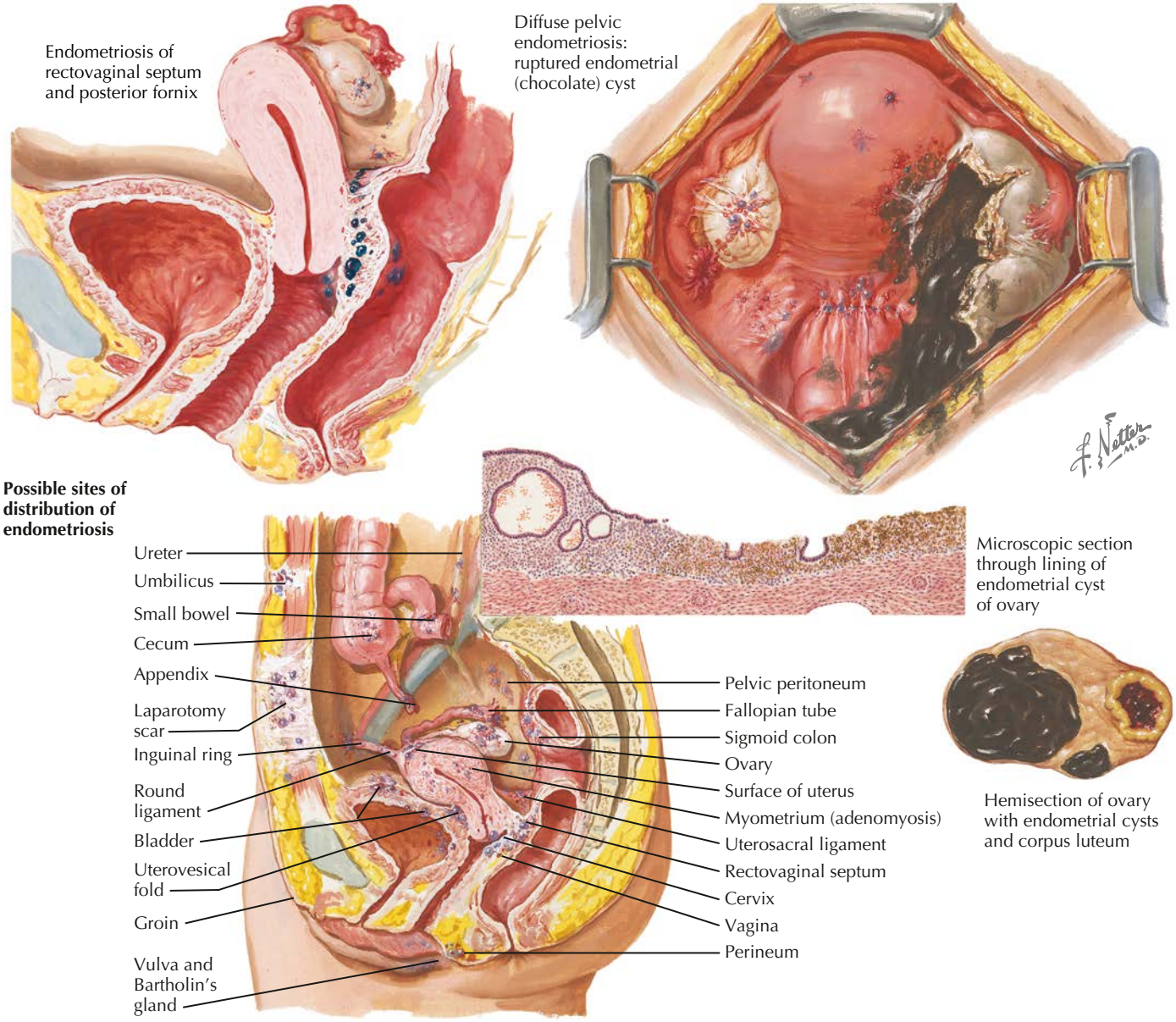

Figure 151.1 Appearance of and possible sites of distribution of endometriosis

- Tubo-ovarian abscess
- Gastrointestinal, urologic, or musculoskeletal problems
- Corpus luteum cysts
- Ovarian neoplasia
- Adenocarcinoma of the large bowel (endometrial implants may be difficult to differentiate grossly from a primary neoplasm of the large bowel)

Associated Conditions: Infertility, nulliparity, pelvic pain, dyspareunia (deep thrust), uterine retroversion, premenstrual and menstrual pain, intermenstrual bleeding, and adenomyosis (20% of these patients).

WORKUP AND EVALUATION

Laboratory: No evaluation indicated. CA-125 is not useful for screening or follow-up.

Imaging: No imaging indicated; pelvic or transvaginal ultrasonography, or magnetic resonance imaging (MRI), may demonstrate endometriomas or signs of scarring (nonspecific, a detection ratio and specificity of approximately 78% for implants, sensitivity and specificity of 91%–95%).

Special Tests: None indicated.

Diagnostic Procedures: The ultimate diagnosis of endometriosis rests on direct inspection of the involved area (laparoscopy or laparotomy), supported by histologic confirmation.

Pathologic Findings

Endometriosis is characterized by endometrial glands and stroma found in locations other than the endometrium. In addition to these elements, implants often contain fibrous tissue, blood, and cysts. Nests of endometrial glands and stroma may occur in many distant locations throughout the body, although they are most common in the pelvis (67% on the surfaces of the ovaries; both ovaries are involved in over 35% of cases). Vulva implants occur in 1 in 500 patients with endometriosis, generally at the site of an episiotomy or obstetric laceration. Evidence of old hemorrhage (hemosiderin-laden macrophages) is often present.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Analgesics (nonsteroidal antiinflammatory drugs), modification of periods (oral contraceptives), suppression

of periods (gonadotropin-releasing hormone [GnRH] agonists, danazol sodium, oral progestins, long-acting progestins, continuous oral contraceptives).

Specific Measures: The selection of therapy depends on many factors—reliability of diagnosis, the extent of disease and symptoms, the patient's desire for fertility, and degree of involvement with other organs. Endometriomata greater than 5 cm generally require surgical therapy. Surgical therapy may be conservative (resection of lesions) or definitive (hysterectomy, salpingo-oophorectomy), though efficacy against pain is often disappointing.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Endometriosis, 2021
- Evaluating Infertility, 2020
- Treating Infertility, 2019

Drug(s) of Choice

- Nonsteroidal antiinflammatory drugs are effective for the treatment of both the dysmenorrhea and pelvic pain associated with endometriosis. These represent a reasonable first step in management.
- Continuous combination oral contraceptives (monophasic or long-cycle formulation) taken daily for 6–9 months (if breakthrough bleeding occurs, the dose is doubled for 5 days). Long-acting progestin contraceptives (eg, medroxyprogesterone acetate 30 mg PO daily or 150 mg IM every 3 months for 6–9 months) are also effective.
- GnRH agonists for 6 months—leuprolide acetate (Lupron) 3.75 mg IM monthly; nafarelin acetate (Synarel) 200 mcg intranasal in morning and in opposite nostril at bedtime; goserelin acetate (Zoladex) 3.6-mg implant monthly; elagolix (Orilissa) 150 mg once daily.

Contraindications: Known or suspected pregnancy, breastfeeding, undiagnosed vaginal bleeding.

Precautions: A decrease in bone mass of 5%–7% during a 6-month course of therapy with GnRH agonists has been documented. This is thought to be reversible.

Add-Back Therapy: Progestins, low-dose estrogens, or both may be used to suppress bothersome side effects without reducing efficacy.

Alternative Drugs

- Danazol sodium 200 mg PO four times a day for 6–9 months (80% of patients experience side effects and 10%–20% discontinue therapy because of them)
- Levonorgestrel-releasing intrauterine contraceptive device has been reported to be effective in reducing pain, as has anastrozole treatment for 6 months.
- For patients refractory to other agents but not candidates for GnRH agonist treatment, anastrozole 1 mg PO once daily or letrozole 2.5 mg PO once daily have been used.

FOLLOW-UP

Patient Monitoring: Any therapy must be reevaluated at no less than 6-month intervals. History and physical evaluations are usually sufficient.

Prevention/Avoidance: None.

Possible Complications: Pelvic scarring, chronic pelvic pain, erosion into bowel or urinary tract resulting in hematochezia or hematuria. Endometriosis has been associated with an increased risk of ovarian epithelial tumors.

Expected Outcome: Endometriosis is never considered to be "cured." Symptoms may be resolved and progression of the disease may be halted through medical or surgical therapy, but 5%–15% of patients have a recurrence after 1 year and 40%–50% have a recurrence by 5 years. The success of therapy and the risk of recurrence are proportional to the extent of the initial disease. Up to 40% of patients may eventually conceive with therapy. Endometriosis generally regresses after menopause (natural or surgically induced).

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy once pregnancy is achieved. Pregnancy may actually resolve symptoms of endometriosis and promote regression of implants in some patients.

ICD-10-CM Codes: N80.9 (Endometriosis, unspecified) (Codes N80.0-N80.8 used for specific sites).

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EPITHELIAL STROMAL OVARIAN TUMORS

152

INTRODUCTION

Description: The most common type of ovarian tumors (65% of ovarian tumors, 95% of ovarian malignancies). Epithelial stromal tumors are derived from the surface (celomic) epithelium and the ovarian stroma and include serous (20%–50%), mucinous (15%–25%), endometrioid (5%), clear cell (<5%), and Brenner (2%–3%) types. Epithelial tumors are categorized as benign (adenoma), malignant (adenocarcinoma), or of an intermediate form (borderline malignant adenocarcinoma or tumors of low malignant potential). Some have proposed that these tumors originate in the fallopian tubes (unproven).

Prevalence: Two of three ovarian tumors and 95% of ovarian malignancies; 12.7/100,000 women.

Predominant Age: Benign tumors—age 20–29 years; malignant tumors—half are in women older than 50 years (average age is 63 years).

Genetics: No genetic pattern, though mutations of the *BRCA1* and *BRCA2* genes impart a 2- to 3-fold increase in risk. Other genes have been implicated but represent a small number of cases.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown.

Risk Factors: Family history, high-fat diet, advanced age, endometriosis, nulliparity, early menarche, late menopause, White race, higher economic status, cigarette smoking (mucinous type only). Oral contraception, high parity, and breastfeeding reduce risk.

SIGNS AND SYMPTOMS

- Asymptomatic
- Weight loss
- Increasing abdominal girth despite constant or reduced caloric intake
- Ascites
- Adnexal mass (multilocular or partly solid masses in patients older than 40 years are likely to be malignant; the risk of a mass being malignant is one in three for women older than 45 years versus less than 1% for women 20–45 years of age)
- Vague lower abdominal discomfort
- Pleural effusion and shortness of breath

DIAGNOSTIC APPROACH

Differential Diagnosis

- Functional cyst (corpus luteum, follicular)
- Endometriosis
- Hydrosalpinx
- Paratubal cyst
- Appendiceal abscess
- Ectopic pregnancy
- Pedunculated leiomyomata
- Pelvic or horseshoe kidney
- Gastrointestinal malignancy (colon, stomach)

Associated Conditions: None. In patients with advanced malignant disease, bowel obstruction, ascites, and inanition are common.

WORKUP AND EVALUATION

Laboratory: As indicated before surgery. β-Human chorionic gonadotropin or α-fetoprotein levels may be elevated in some tumors. The CA-125 level may be useful for monitoring disease response to treatment or progression, but it is not a good prognostic test. Only 80% of epithelial ovarian tumors express CA-125, and many benign and other malignant processes (lung, breast, and pancreas) may cause CA-125 to become higher than normal.

Imaging: Preoperative evaluation (computed tomography or ultrasonography) for possible lymph node enlargement or intraabdominal spread is indicated for patients in whom malignancy is a significant possibility.

Special Tests: A frozen-section histologic evaluation (intraoperative consultation) should be considered for any ovarian mass that appears suspicious for malignancy.

Diagnostic Procedures: History, physical examination, and imaging. Final diagnosis is established by histologic evaluation.

Pathologic Findings

Varies with cell type. Malignant epithelial tumors are more likely to be bilateral than are benign epithelial neoplasms.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, supportive therapy based on symptoms.

Specific Measures: Generally, requires surgical exploration and extirpation. In benign disease or tumors of borderline malignant potential, the uterus and other ovary generally may be spared. Adjunctive chemotherapy (platinum-based and paclitaxel [Taxol]) or radiation therapy is often included, based on the location and stage of the disease. It currently is not recommended that a grossly normal opposite ovary be bisected to look for a contralateral mass.

Diet: No specific dietary changes indicated, except those imposed by advanced disease.

Activity: No restriction, except that imposed by advanced disease.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Ovarian Cancer, 2019
- Ovarian Cysts, 2021

Drug(s) of Choice

None, except as adjunctive or symptomatic therapy.

Contraindications: See individual agents.

Precautions: Alkylating agents are associated with an increased risk of future leukemia (10% by 8 years after therapy).

Interactions: See individual agents.

FOLLOW-UP

Patient Monitoring: Careful follow-up for recurrent pelvic disease or enlargement of the remaining ovary (if any). This is generally performed by pelvic examination, augmented with ultrasonography in selected patients. In patients suspected of having recurrent disease and other selected patients, second-look surgery may be desirable to assess progress and discover occult disease. Estrogen therapy does not have a negative influence on the disease-free interval and overall survival in women who have had ovarian carcinoma.

Prevention/Avoidance: None. Prophylactic bilateral salpingo-oophorectomy for those with known *BRCA* mutations.

Possible Complications: Spread and advancement of malignant tumors.

Expected Outcome: Generally good.

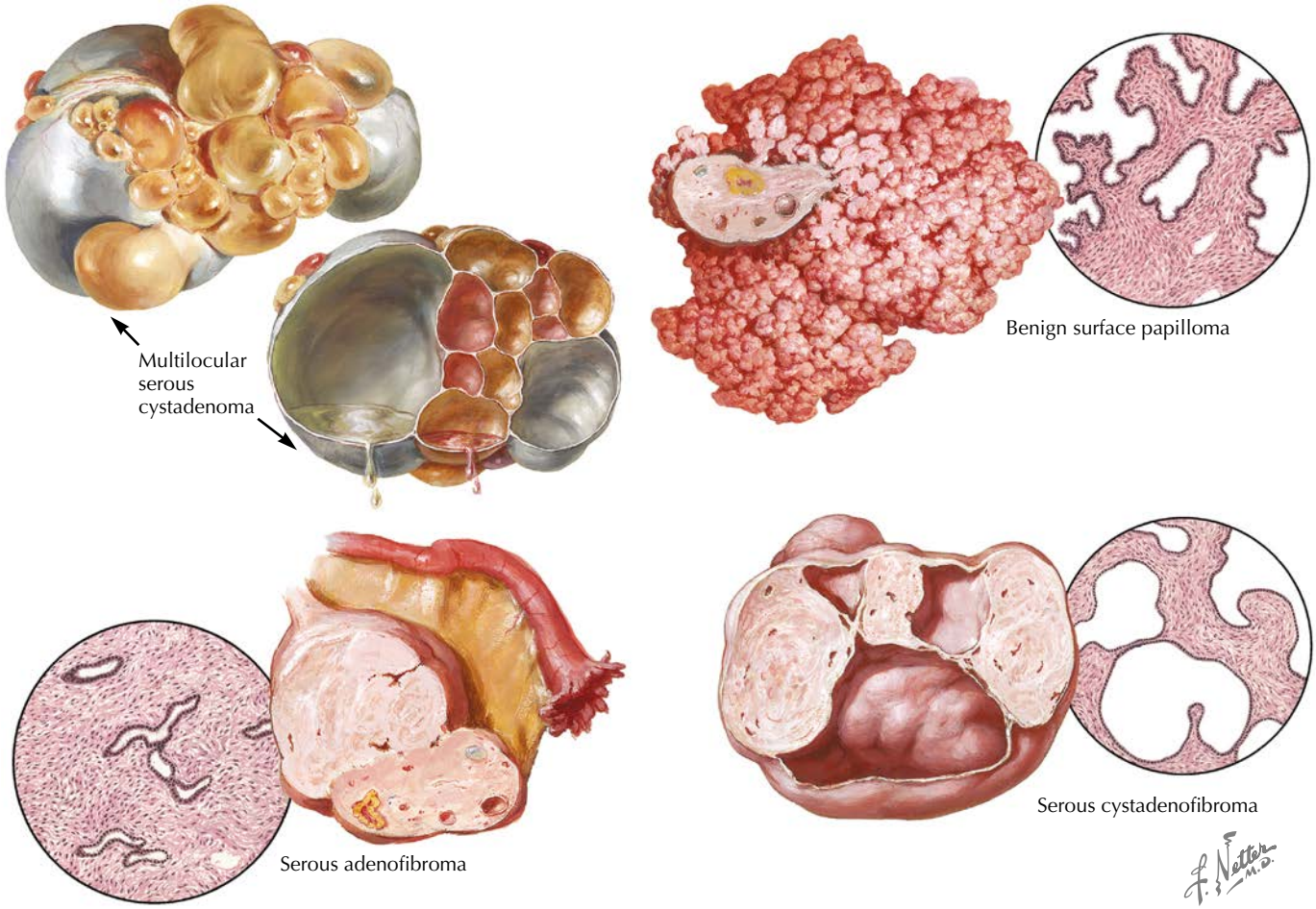

Figure 152.1 Cystadenoma, adenofibroma, papilloma, and cystadenofibroma

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: Based on the cause and type.

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GERM CELL TUMOR

153

INTRODUCTION

Description: Germ cell tumors contain cells that echo the three layers of embryonic tissue (ectoderm, mesoderm, and endoderm) or extraembryonic elements.
Prevalence: Second most frequent ovarian neoplasm (25% of tumors) and the most common ovarian tumor in women younger than 30 years (70%).
Predominant Age: Younger than 30 years; most common malignancy in women in their teens and 20s (75% of cases are in this age range).
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown (may differentiate from primitive germ cells).
Risk Factors: None known.

SIGNS AND SYMPTOMS

- Asymptomatic
- Ovarian enlargement (ovarian masses in premenarchal girls are most often germ cell tumors)
- Abdominal pain or fullness (tumor growth is rapid)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Benign adnexal masses (corpus luteum, follicular cyst)
- Endometriosis
- Hydrosalpinx
- Paratubal cyst
- Appendiceal abscess
- Ectopic pregnancy
- Pedunculated leiomyomata
- Pelvic or horseshoe kidney
- Nongynecologic pelvic masses

Associated Conditions: Varies with the cell type.

WORKUP AND EVALUATION

Laboratory: As indicated before surgery. β-Human chorionic gonadotropin or α-fetoprotein may be elevated in some tumors (dysgerminoma, primary choriocarcinoma). The CA-125 level may be useful for monitoring disease response to treatment or progression, but it is not a good prognostic test. Only 80% of epithelial ovarian tumors express CA-125, and many benign and other malignant tumors (lung, breast, and pancreas) may also cause an increase in the CA-125 level that is higher than normal.
Imaging: Preoperative evaluation (computed tomography or ultrasonography) for possible lymph node enlargement or intraabdominal spread is indicated for patients in whom malignancy is a significant possibility.
Special Tests: None indicated.
Diagnostic Procedures: History, physical examination, imaging. Final diagnosis is established by histologic evaluation.

Pathologic Findings

Germ cell tumors include dysgerminoma (45% of malignant germ cell tumors, but only about 2% of ovarian neoplasia), endodermal sinus tumors (10%), embryonal carcinoma, choriocarcinoma, teratomas (immature, mature, solid and cystic, struma ovarii, carcinoid), and mixed forms. Approximately one-third of germ cell tumors in women younger than 21 years are malignant.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, supportive therapy based on symptoms.
Specific Measures: Surgical exploration and resection (often with salvage of the ovary in the case of teratomas). Immature (malignant) teratomas are often treated with an adjunctive chemotherapy (vincristine, actinomycin D, and cyclophosphamide); endodermal sinus tumors should all be treated with chemotherapy after surgical resection.
Diet: No specific dietary changes indicated, except those imposed by advanced disease.
Activity: No restriction, except that imposed by advanced disease.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Ovarian Cancer, 2019
- Ovarian Cysts, 2021

Drug(s) of Choice

- Vincristine 1.5 mg/m^2 IV weekly for 12 weeks, actinomycin D, and cyclophosphamide (0.5 mg of actinomycin D with 5–7 mg/kg/day cyclophosphamide IV daily for 5 days every 4 weeks).
- Adjunctive or symptomatic therapy.

Contraindications: See individual agents.
Precautions: Alkylating agents are associated with an increased risk for future leukemia (10% by 8 years after therapy).
Interactions: See individual agents.

Alternative Drugs

- Chemotherapy for endodermal sinus tumors may alternately include actinomycin D, 5-fluorouracil, and cyclophosphamide.

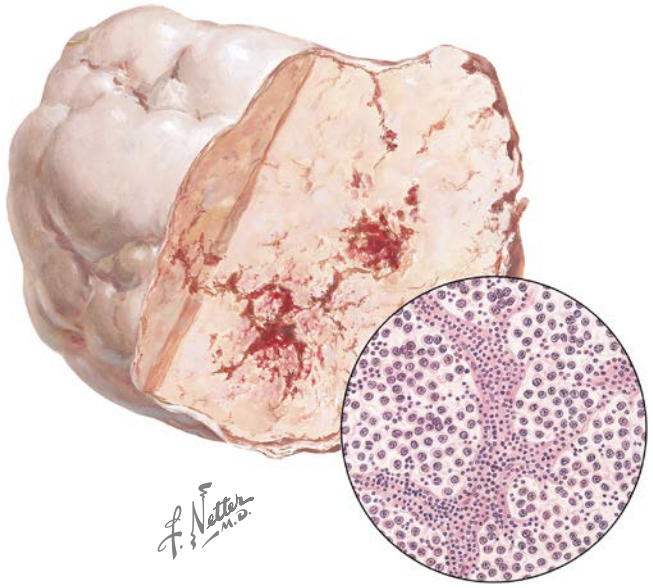

Figure 153.1 Dysgerminoma

FOLLOW-UP

Patient Monitoring: Approximately 75% of cases are stage I when found; the contralateral ovary is involved in 10%–15% of cases. Careful follow-up for recurrent pelvic disease or enlargement of the remaining ovary (if any). This is generally performed by pelvic examination, augmented with ultrasonography in selected patients. In patients suspected with recurrent disease and other selected patients, second-look surgery may be desirable to assess progress and discover occult disease.
Prevention/Avoidance: None
Possible Complications: Spread and advancement in the case of malignant tumors.
Expected Outcome: Generally good.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: Based on the cause and type.

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154 GRANULOSA CELL TUMORS

INTRODUCTION

Description: A granulosa cell tumor is a sex cord stromal tumor of the ovary made up of granulosa cells (sex cord) and stromal cells (thecal cells or fibroblasts). The tumor often secretes estrogen.
Prevalence: 2%–5% of ovarian neoplasms and the majority of hormonally active tumors. Absolute rate of less than 0.2/100,000 women.
Predominant Age: Any; 5% before puberty; most before the age of 40 years.
Genetics: No genetic pattern. Somatic mutations in *FOXL2* have been identified in 97% of adult subtype granulosa cell tumors. No association with the *BRCA* germline mutations.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown.
Risk Factors: Obesity, family history of breast or ovarian cancer, non-White race. Oral contraception, parity, and smoking reduce the risk.

SIGNS AND SYMPTOMS

- Asymptomatic.
- Enlarging or ruptured adnexal mass (may present with acute pain and an acute abdomen with hemoperitoneum, 6%); 10%–15% are not palpable; tumors are bilateral in less than 2% of cases; average size at diagnosis is 12 cm.
- Ascites (10%).
- Precocious (pseudoprecocious) puberty in young children (5%; granulosa tumors are responsible for 10% of precocious puberty cases).
- Abnormal menstrual patterns, menorrhagia, amenorrhea.
- Postmenopausal bleeding.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Benign adnexal masses (corpus luteum, follicular cyst)
- Endometriosis
- Hydrosalpinx
- Paratubal cyst
- Appendiceal abscess
- Pedunculated leiomyomata
- Pelvic or horseshoe kidney
- Nongynecologic pelvic masses
- Hepatic, renal, or cardiac disease resulting in weight loss and ascites
- Ectopic pregnancy (reproductive-age women)
- Gastrointestinal malignancy (colon, stomach)

Associated Conditions: Evidence of increased estrogen (eg, breast tenderness, menstrual disturbances, isosexual pseudoprecocity, complex endometrial hyperplasia, endometrial cancer [5%]). Virilization rarely occurs.

WORKUP AND EVALUATION

Laboratory: As indicated before surgery. Serum testing for tumor markers, such as CA-125, lipid-associated sialic acid, carcinoembryonic antigen, α-fetoprotein, inhibin, and Müllerian-inhibiting substance, should be reserved for following the progress of patients with known malignancies and not for prognostic evaluation.
Imaging: Preoperative evaluation (computed tomography or ultrasonography) for possible lymph node enlargement or intraabdominal spread is indicated for patients in whom malignancy is a significant possibility.
Special Tests: None indicated.
Diagnostic Procedures: History, physical examination, and imaging. Final diagnosis is established by histologic evaluation.

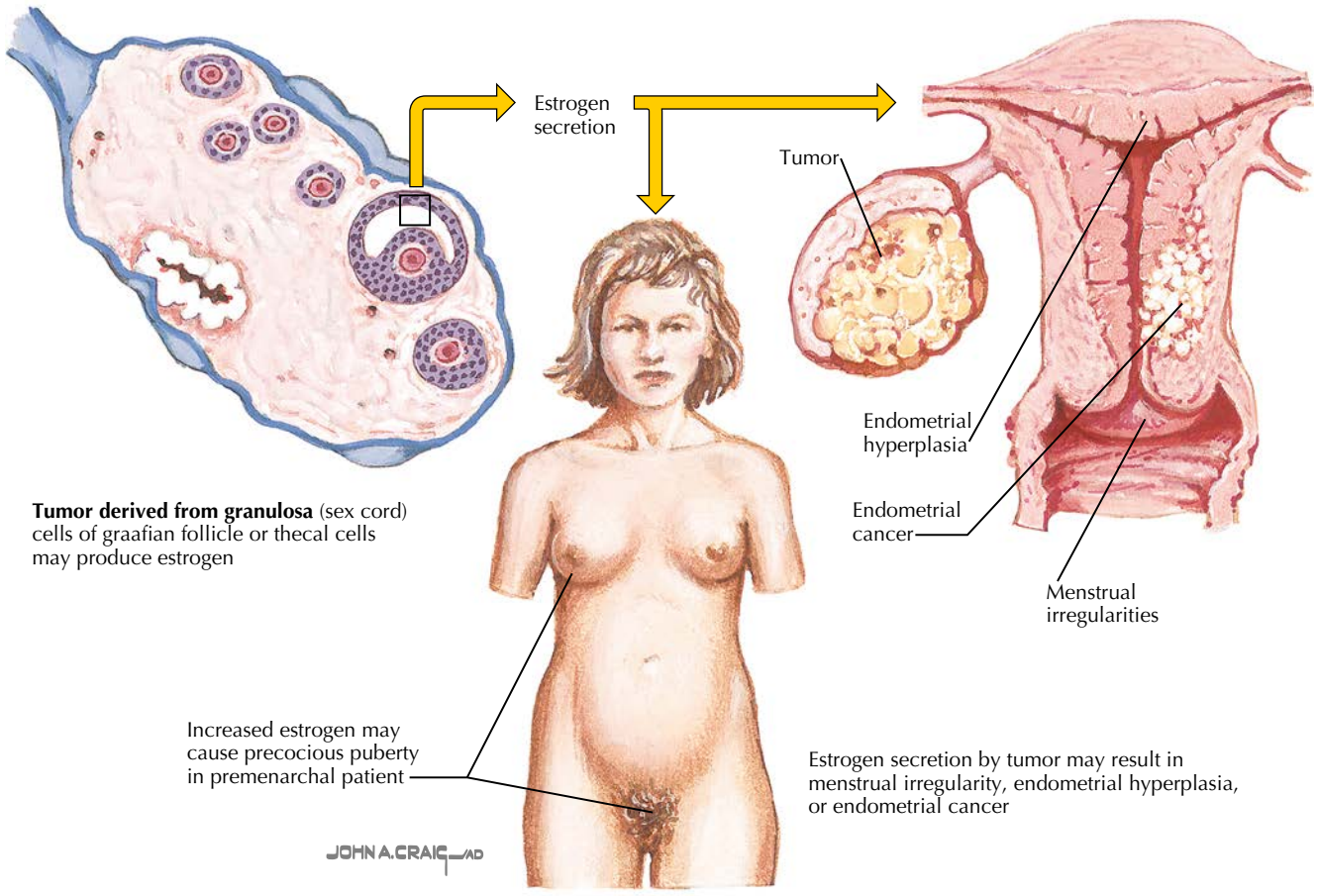

Figure 154.1 Stromal (sex cord) ovarian tumor

Pathologic Findings

Derived from the sex cords of the ovary and stroma of the developing gonad, these tumors have a predominance of granulosa cells with a classic "coffee-bean" grooved nuclei. Classically, these tumors contain eosinophilic bodies surrounded by granulosa cells (Call-Exner bodies). Theca cells are present in approximately 70% of cases. Poorly differentiated tumors may be confused with adenocarcinomas (especially small cell carcinoma).

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, supportive therapy based on symptoms.
Specific Measures: Surgical exploration and resection. Because fewer than 5% of these tumors are bilateral, conservative surgery is generally indicated for tumors at stage IA or lower. Chemotherapy (cisplatin, doxorubicin) and radiotherapy have been used for recurrent disease.
Diet: No specific dietary changes indicated, except those imposed by advanced disease.
Activity: No restriction, except that imposed by advanced disease.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Ovarian Cancer, 2019
- Ovarian Cysts, 2021

Drug(s) of Choice

- Adjunctive (unproved benefit) or symptomatic therapy.

Contraindications: See individual agents.
Precautions: Alkylating agents are associated with an increased risk of future leukemia (10% by 8 years after therapy).
Interactions: See individual agents.

Alternative Drugs

- Chemotherapy with alternative use of actinomycin D, 5-fluorouracil, and cyclophosphamide.

FOLLOW-UP

Patient Monitoring: Careful follow-up for recurrent pelvic disease or enlargement of the remaining ovary (if any). This is generally performed by pelvic examination, augmented with ultrasonography in selected cases. In those suspected of having recurrent disease and other selected patients, second-look surgery may be desirable to assess progress and discover occult disease.
Prevention/Avoidance: None.
Possible Complications: Recurrences are frequent, even 5 years after initial therapy. In 10% of patients the tumor is diagnosed when it ruptures, causing pain or intraperitoneal bleeding.
Expected Outcome: Prognosis does not correlate with the histologic pattern of the tumor: 90% of tumors found are stage I and the prognosis is good (90% 10-year survival). A poorer prognosis is associated with tumors more than 15 cm in size that have ruptured or that have a high mitotic rate or aneuploidy.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: Specific to cell type and location.

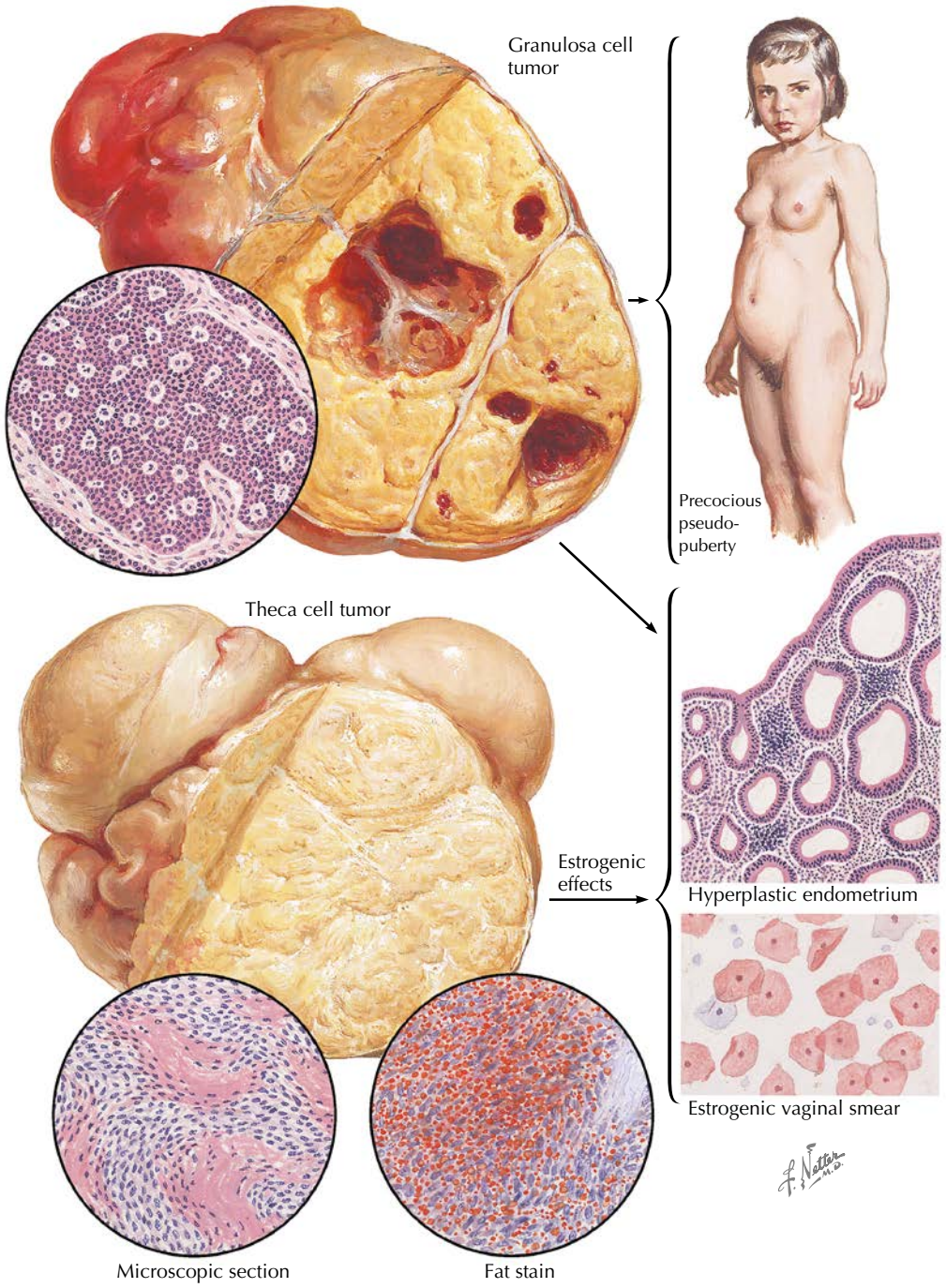

Figure 154.2 Granulosa and theca cell tumors

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HYDROSALPINX (CHRONIC PELVIC INFLAMMATORY DISEASE)

INTRODUCTION

Description: Recurrent or chronic adnexal infections may result in a cystic dilation of the fallopian tube (hydrosalpinx), which may present as an adnexal mass.
Prevalence: 40% of female infertility is a result of tubal damage, including the most severe form, hydrosalpinx.
Predominant Age: 15–25 years.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Recurrent or chronic adnexal infection. This is the end stage condition of pyosalpinx.
Risk Factors: Early (age) sexual activity, multiple sexual partners, pelvic inflammatory disease, sexually transmitted infections (STIs; *Chlamydia,* gonorrhea), uterine instrumentation (hysterosalpingography, intrauterine contraceptive device placement, endometrial biopsy, dilation and curettage), and douching. Damage from previous surgery or adhesions can also cause hydrosalpinx.

SIGNS AND SYMPTOMS

- Asymptomatic (most common).
- Vague lower abdominal pressure or chronic pelvic pain.
- Infertility.
- Unilateral or bilateral cystic masses (often elongated or sausage-shaped). Data indicate that a clinical diagnosis of symptomatic pelvic inflammatory disease has a positive predictive value for salpingitis of only 65%.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Functional cysts (follicle, corpus luteum)
- Epithelial tumors (cystic or solid)
- Ovarian cysts
- Paratubal or paraovarian cysts
- Uterine leiomyomata
- Ectopic pregnancy
- Tubo-ovarian abscess
- Endometrioma
- Appendiceal abscess

Associated Conditions: Pelvic pain, infertility, and STIs.

WORKUP AND EVALUATION

Laboratory: Complete blood count or erythrocyte sedimentation rate if active infection is suspected. Screening for coexistent STIs should be strongly considered.
Imaging: Ultrasonography (abdominal or transvaginal). Computed tomography, or magnetic resonance imaging may be used but are more expensive without providing greater specificity.
Special Tests: None indicated.
Diagnostic Procedures: History, physical examination, and ultrasonography.

Pathologic Findings

Chronic induration and inflammation with cystic dilation of the fallopian tube and flattening and atrophy of the epithelial lining. The fluid found is generally sterile.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, including screening for other STIs.
Specific Measures: Generally requires surgical evaluation and therapy (laparoscopy or laparotomy).
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education:

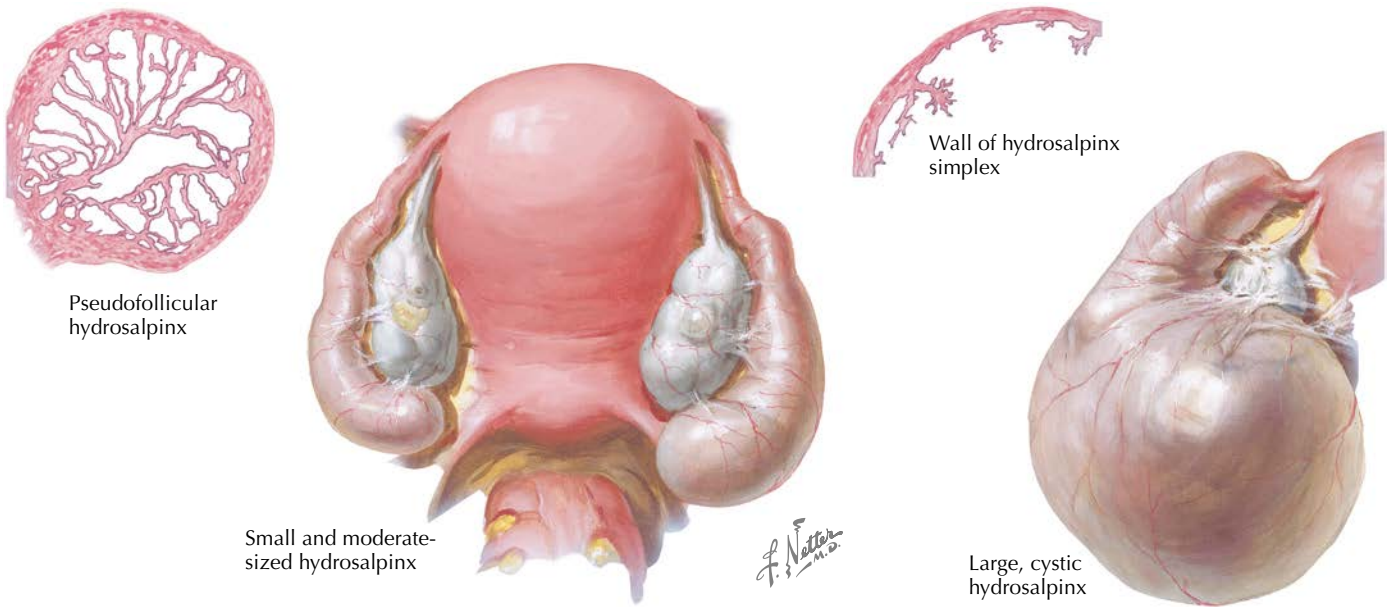

Figure 155.1 Cystic dilation of the fallopian tube

American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Chronic Pelvic Pain, 2014
- Evaluating Infertility, 2020
- Gonorrhea, Chlamydia, and Syphilis, 2021
- How to Prevent Sexually Transmitted Infections, 2020
- Pelvic Inflammatory Disease, 2019
- Treating Infertility, 2019
- When Sex Is Painful, 2020

Drug(s) of Choice

- Broad-spectrum antibiotics if active infection is suspected.
- Most hydrosalpinges are sterile and are the inactive end-stage disease.

FOLLOW-UP

Patient Monitoring: Normal health maintenance, periodic surveillance for other STIs.

Prevention/Avoidance: Avoidance of STIs (barrier contraception, "safe sex"), screening for those at risk, and aggressive treatment when infection is found.

Possible Complications: Chronic pelvic pain, infertility, increased risk of hysterectomy and oophorectomy, 2-fold increase in ovarian cancer.

Expected Outcome: Surgical therapy (salpingectomy or salpingo-oophorectomy) is curative. Neosalpingostomy may be considered when fertility is to be maintained, but the success of this procedure is inversely proportional to the size of the hydrosalpinx and is generally less than 15%. More often, in vitro fertilization (IVF), bypassing the damaged tubes, is recommended, although the success rates are lower in these patients. Patients undergoing IVF have lower rates of conception, implantation, and live delivery with higher rates of early pregnancy loss and preterm birth. For this reason, some advocate surgical excision of the damaged tubes before undertaking IVF.

MISCELLANEOUS

Pregnancy Considerations: Successful pregnancy is much less likely because of the increased risk of infertility and ectopic pregnancy.

ICD-10-CM Codes: N70.11 (Chronic salpingitis), N70.12 (Chronic oophoritis), and N70.13 (Chronic salpingitis and oophoritis).

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156 KRUKENBERG TUMOR

INTRODUCTION

Description: A Krukenberg tumor is a metastatic tumor (generally from the gastrointestinal tract) that is characterized by large signet-ring cells. The most common site of origin is the stomach or large intestine. Named after Friedrich Ernst Krukenberg (1871–1946), who reported the ovarian malignancy in 1896.

Prevalence: Constitutes 1%–2% of all ovarian neoplasms.

Predominant Age: Late reproductive to postmenopausal, average age 45 years.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Metastatic spread of carcinoma from the gastrointestinal tract (most commonly the stomach or colon). Metastatic breast cancer may appear similar histologically.

Risk Factors: None known.

SIGNS AND SYMPTOMS

- Asymptomatic.
- Adnexal enlargement (bilateral solid adnexal masses in an older patient should always suggest the possibility of a gastrointestinal tract source).
- Metastatic tumors from the gastrointestinal tract to the ovary can be associated with sex hormone production, usually estrogen.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Benign adnexal masses (corpus luteum, follicular cyst)
- Endometriosis
- Hydrosalpinx
- Paratubal cyst
- Appendiceal abscess
- Ectopic pregnancy

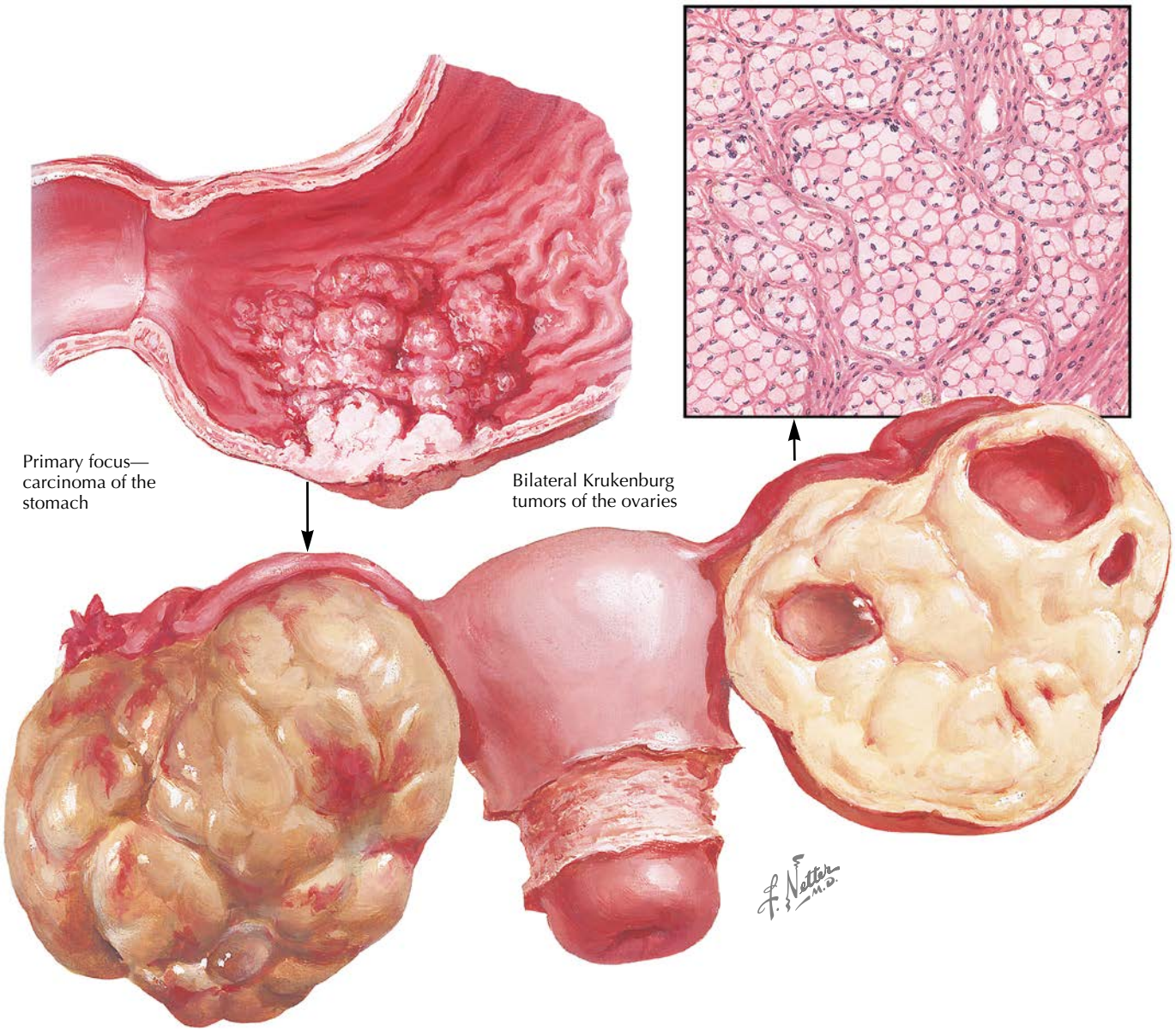

Figure 156.1 Krukenburg tumors of stomach and ovaries

- Pedunculated leiomyomata
- Pelvic or horseshoe kidney
- Nongynecologic pelvic masses
- Breast cancer
- Lung cancer

Associated Conditions: Gastrointestinal or breast malignancy.

Workup and Evaluation

Laboratory: As indicated before surgery.
Imaging: Preoperative evaluation (computed tomography or ultrasonography) for possible lymph node enlargement or intraabdominal spread is indicated for patients in whom malignancy is a significant possibility. Radiographic evaluation of the gastrointestinal tract. Mammography as indicated based on differential diagnosis and routine screening needs.
Special Tests: Esophagoscopy, gastroscopy, sigmoidoscopy, or colonoscopy should be considered as a part of the evaluation when a gastrointestinal source is being sought.
Diagnostic Procedures: History, physical examination, and imaging. Final diagnosis is established by histologic evaluation.

Pathologic Findings

Nests of mucin-filled signet-ring cells in a cellular stroma. Tumors are bilateral in more than 80% of cases.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, establishment of location of primary tumor (most often stomach or large intestine).
Specific Measures: Therapy of the original tumor; surgical removal of the ovarian metastasis.
Diet: No specific dietary changes indicated except those dictated by the original tumor and its therapy.
Activity: No restrictions except those dictated by the original tumor and its therapy.

Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- Ovarian Cancer, 2019
- Ovarian Cysts, 2021

Drug(s) of Choice

- None (based on primary tumor and its therapy).
- These tumors are generally not responsive to chemotherapy.

FOLLOW-UP

Patient Monitoring: Based on primary tumor.
Prevention/Avoidance: None.
Possible Complications: Progression and spread of the primary tumor is generally well under way when the ovarian sites are discovered.
Expected Outcome: Generally poor, with an unlikely 5-year survival rate. Median survival is 14 months.

MISCELLANEOUS

Pregnancy Considerations: Does not directly threaten pregnancy except by the jeopardy caused to the mother.
ICD-10-CM Codes: C79.60 (Secondary malignant neoplasm of unspecified ovary).

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157 MUCINOUS OVARIAN CYSTS

INTRODUCTION

Description: A group of benign and malignant epithelial tumors of the ovary that are characterized by mucin secretion. These tumors tend to be the largest types of ovarian masses encountered and may be 30 cm or greater in size.
Prevalence: 15%–25% of ovarian cysts and 6%–10% of ovarian cancers. Although ovarian cysts are common in younger women, mucinous cysts account for approximately 50% of those that occur in women older than 20 years.
Predominant Age: Reproductive age (benign); 30–60 years (malignant tumors).
Genetics: No genetic pattern, although mutations of the *BRCA1* and *BRCA2* genes impart a 2- to 3-fold increase in risk. Other genes have been implicated but represent a small number of cases.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown. May represent a monomorphic endodermal differentiation of a teratoma or a tumor of Müllerian origin.
Risk Factors: Family history, high-fat diet, advanced age, endometriosis, nulliparity, early menarche and late menopause, White race, higher economic status. Oral contraception, high parity, and breastfeeding reduce the risk.

SIGNS AND SYMPTOMS

- Asymptomatic
- Vague lower abdominal symptoms
- Adnexal mass (bilateral in 5% of benign and 10%–20% of malignant lesions) up to 50 cm in diameter (average, 15–30 cm)
- Pleural effusion and shortness of breath

DIAGNOSTIC APPROACH

Differential Diagnosis

- Benign adnexal masses (corpus luteum, follicular cyst)
- Endometriosis
- Hydrosalpinx
- Paratubal cyst
- Appendiceal abscess
- Ectopic pregnancy
- Pedunculated leiomyomata
- Pelvic or horseshoe kidney
- Nongynecologic pelvic masses

Associated Conditions: Pseudomyxoma peritonei.

WORKUP AND EVALUATION

Laboratory: As indicated before surgery. CA-125 levels may be useful for monitoring disease response to treatment or progression, but this is not a good prognostic test. Only 80% of epithelial ovarian tumors express CA-125, and many benign and other malignant processes (lung, breast, and pancreas) may also cause an increase in CA-125 levels that are higher than normal.
Imaging: No imaging indicated.
Special Tests: A frozen-section histologic evaluation should be considered for any ovarian mass that appears suspicious for malignancy.

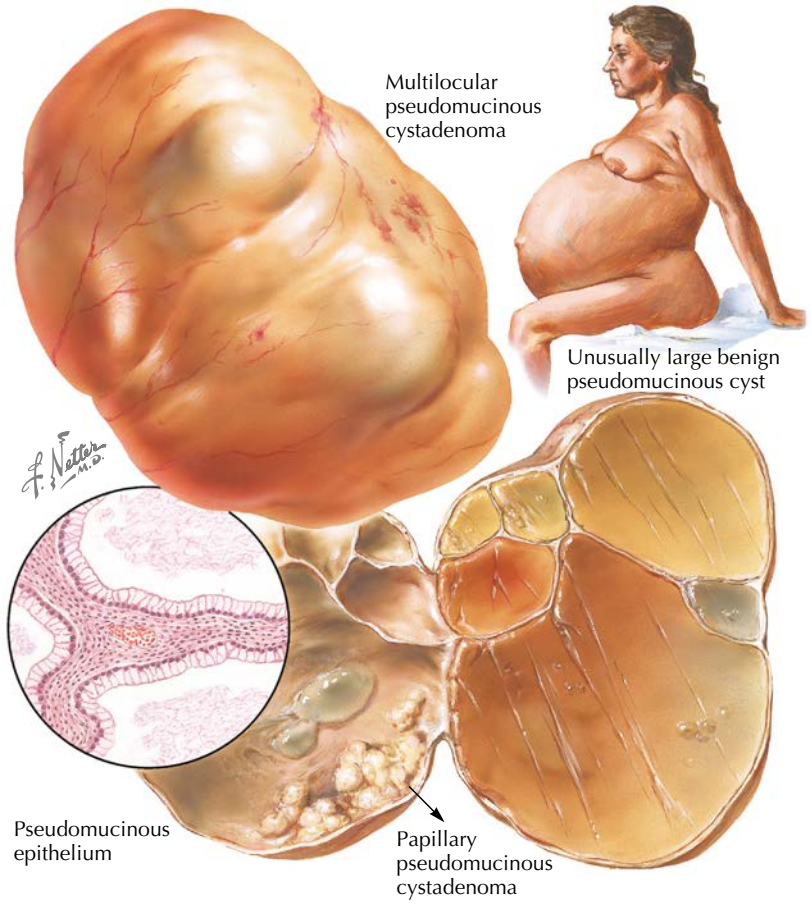

Figure 157.1 Pseudomucinous cystadenoma

Diagnostic Procedures: History, physical examination, and imaging. Final diagnosis is established by histologic evaluation.

Pathologic Findings

Gross—smooth translucent cyst wall with infrequent papillary areas. Microscopic—epithelial cells filled with mucin that resemble cells of the endocervix or intestinal epithelium. Mucinous tumors have a higher chance of being of borderline malignant potential (grade 0) than do other epithelial tumors.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, supportive therapy based on symptoms.
Specific Measures: Generally require surgical exploration and extirpation. In benign disease or tumors of borderline malignant potential, the uterus and other ovary generally may be spared. Adjunctive chemotherapy (platinum-based and paclitaxel [Taxol]) or radiotherapy is often included, based on the location and stage of malignant disease.
Diet: No specific dietary changes indicated, except those imposed by advanced disease.
Activity: No restriction, except that imposed by advanced disease.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Ovarian Cancer, 2019
- Ovarian Cysts, 2021

Drug(s) of Choice

- None, except as adjunctive or symptomatic therapy.

Contraindications: See individual agents.
Precautions: Alkylating agents are associated with an increased risk of future leukemia (10% by 8 years after therapy).
Interactions: See individual agents.

FOLLOW-UP

Patient Monitoring: Careful follow-up for recurrent pelvic disease or enlargement of the remaining ovary (if any). This is generally performed by pelvic examination, augmented with ultrasonography in selected patients. In those suspected of having recurrent disease and other selected patients, second-look surgery may be desirable to assess progress and discover occult disease.
Prevention/Avoidance: None. Prophylactic bilateral salpingo-oopherectomy for those with known *BRCA* mutations.
Possible Complications: Perforation of the tumor capsule with rupture, which may lead to the seeding of the peritoneal cavity (pseudomyxoma peritonei, 2%–5% of patients).
Expected Outcome: Tumors with borderline malignant potential tend to grow slowly, and patients have prolonged survival with these tumors (the 20-year survival rate of patients with stage III disease is 40%). Of ovarian malignancies, mucinous cystadenocarcinoma has one of the best 5-year survival rates (40%).

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. More than 10% of tumors with borderline malignant potential are discovered during pregnancy.
ICD-10-CM Codes: Specific to the cell type and location.

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158 OVARIAN CANCER

INTRODUCTION

Description: Ovarian cancer is a malignancy that arises in the ovary and generally has an epithelial origin. This represents the second most common malignancy of the genital tract (after endometrial cancer), but it is the most common fatal gynecologic cancer.

Prevalence: Annually, 19,880 women will receive a new diagnosis of ovarian cancer, with 12,810 deaths in the United States (estimated for 2022). Ovarian cancer is the most common cause of gynecologic cancer death. The lifetime risk for developing ovarian cancer is approximately 1/78. It is the fifth most common cause of cancer fatality in women.

Predominant Age: Postmenopausal (50%), average is 59 years, highest rate is observed at 60–64 years, and median age is 63 years. Only one-fourth to one-third of ovarian tumors in postmenopausal women are malignant.

Genetics: Familial pattern recognized in a small percentage of cases. Association with abnormalities of the breast cancer gene (*BRCA1* and *BRCA2*). Hereditary ovarian cancers are rare but usually fatal; 95% of ovarian cancers are sporadic.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown.

Risk Factors: Family history (greatest risk in those few women with an inheritable cancer syndrome, such as Lynch II), high-fat diet, advanced age, endometriosis, nulliparity, early menarche, late menopause, White race, higher economic status, and the use of talc on the perineum. More than 95% of patients with ovarian cancer have no risk factor. Oral contraception, high parity, tubal ligation, hysterectomy, and breastfeeding reduce risk.

SIGNS AND SYMPTOMS

- Asymptomatic until late in the disease (most diagnosed at stage III or IV)
- Weight loss
- Increasing abdominal girth despite constant or reduced caloric intake
- Ascites
- Adnexal mass (multilocular or partly solid masses in patients older than 40 years likely to be malignant; ovarian masses in premenarchal girls are most often germ cell tumors)
- Vague lower abdominal discomfort (severe pain uncommon)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Benign adnexal masses (corpus luteum, follicular cyst)
- Nongynecologic pelvic masses
- Hepatic, renal, or cardiac disease, resulting in weight loss and ascites
- Endometriosis
- Hydrosalpinx
- Ectopic pregnancy (reproductive-aged women)
- Pedunculated leiomyomata
- Pelvic or horseshoe kidney
- Gastrointestinal malignancy

Associated Conditions: Breast cancer, endometrial cancer.

WORKUP AND EVALUATION

Laboratory: Serum testing for tumor markers, such as CA-125, lipid-associated sialic acid, carcinoembryonic antigen, α-fetoprotein, and lactate dehydrogenase, should be reserved for following the progress of patients with known malignancies and not for prognostic evaluation.

Imaging: Ultrasonography, magnetic resonance imaging (MRI), and computed tomography (CT) are helpful in evaluating patients suspected of having ovarian cancer. The normal postmenopausal ovary is typically 1.5–2 cm in size. Asymptomatic simple cysts of less than 5 cm diameter can be generally conservatively followed. Routing screening using transvaginal ultrasonography has not been shown to be cost effective without the presence of significant risk factors or symptoms.

Special Tests: A frozen-section histologic evaluation (intraoperative consultation) should be considered for any ovarian mass that

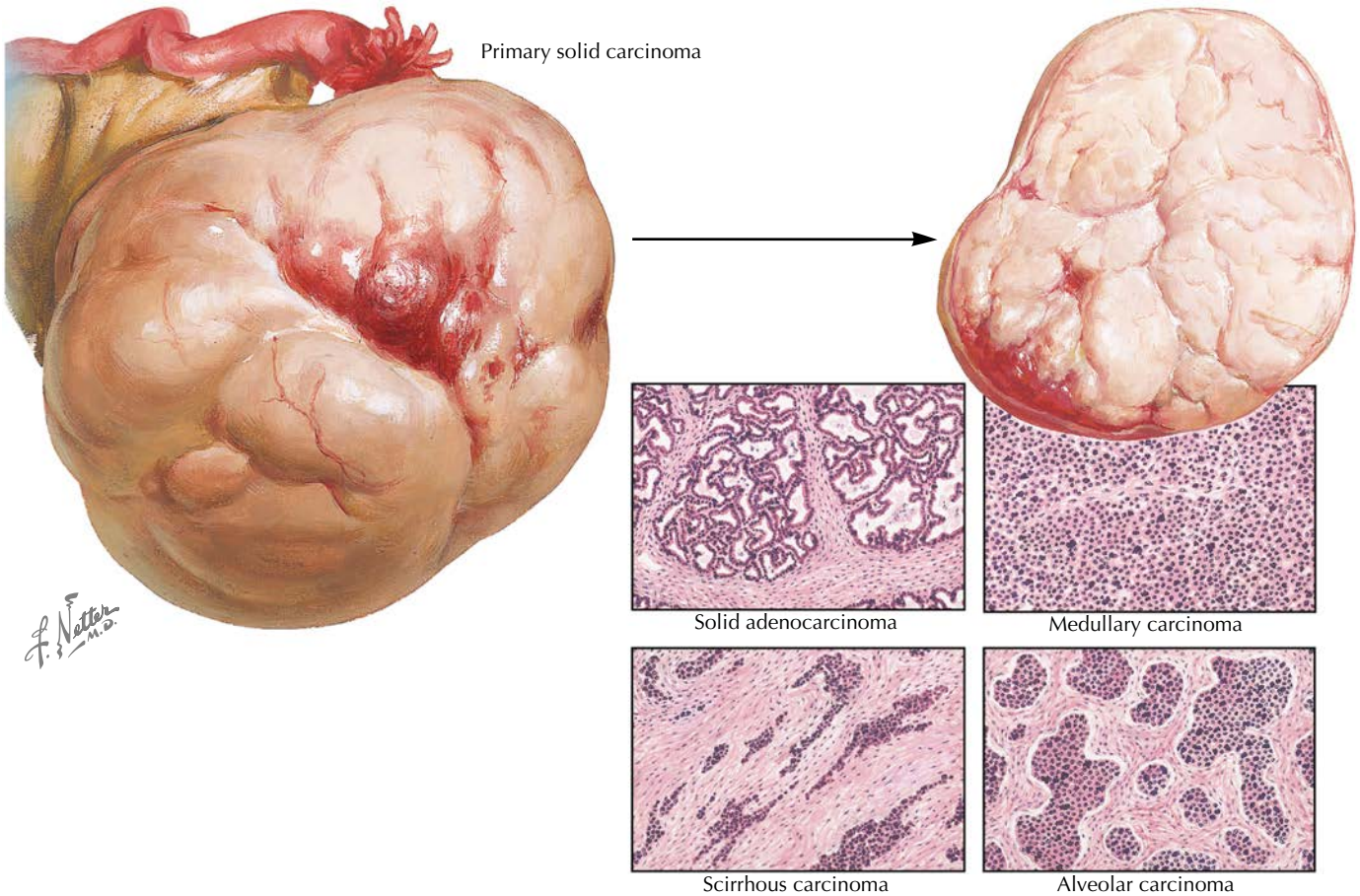

Figure 158.1 Primary solid, medullary, scirrhous, and alveolar ovarian carcinomas

appears suspicious for malignancy. Flow cytometry may be of prognostic value.

Diagnostic Tests: History, physical examination, and imaging. Final diagnosis is established by histologic evaluation.

Pathologic Findings

More than 90% of ovarian cancer is of the epithelial cell type, thought to arise from pluripotential mesothelial cells of the visceral peritoneum of the ovarian capsule or the fallopian tube. Lymphatic spread occurs in approximately 20% of tumors that appear grossly confined to the ovary.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, supportive therapy based on symptoms.

Specific Measures: Ovarian cancer is a disease that requires surgical exploration and extirpation (generally including the uterus and contralateral ovary). Adjunctive chemotherapy (platinum-based and paclitaxel [Taxol]) or radiotherapy is often included based on the location and stage of the disease. Immune modulator therapy is being evaluated but remains unproven.

Diet: No changes except those imposed by advanced disease. Parenteral nutrition may be required before or after surgery in advanced disease.

Activity: No restriction, except that imposed by advanced disease.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Ovarian Cancer, 2019
- Ovarian Cysts, 2021

Drug(s) of Choice

None, except as an adjunctive therapy.

Precautions: Alkylating agents are associated with an increased risk for future leukemia (10% by 8 years after therapy).

FOLLOW-UP

Patient Monitoring: As yet there are no effective screening tools for the early detection of primary ovarian cancer. Ultrasonography, MRI, CT, and biochemical markers such as CA-125, which are useful for evaluating a suspicious mass or following the progress of treatment, are not of value for mass screening. In those suspected of having recurrent disease and other selected patients, second-look surgery may be desirable to assess progress and discover occult disease. When second look surgery is negative, the associated 5-year survival is approximately 50%.

Prevention/Avoidance: For those few patients at a truly high risk (familial cancer syndromes), prophylactic salpingo-oophorectomy, performed after childbearing is completed, is preferable to any attempt at prolonged surveillance with current technology. Even this aggressive step does not preclude the development of ovarian cancer; up to 10% of ovarian cancers are found in women who have had bilateral oophorectomies.

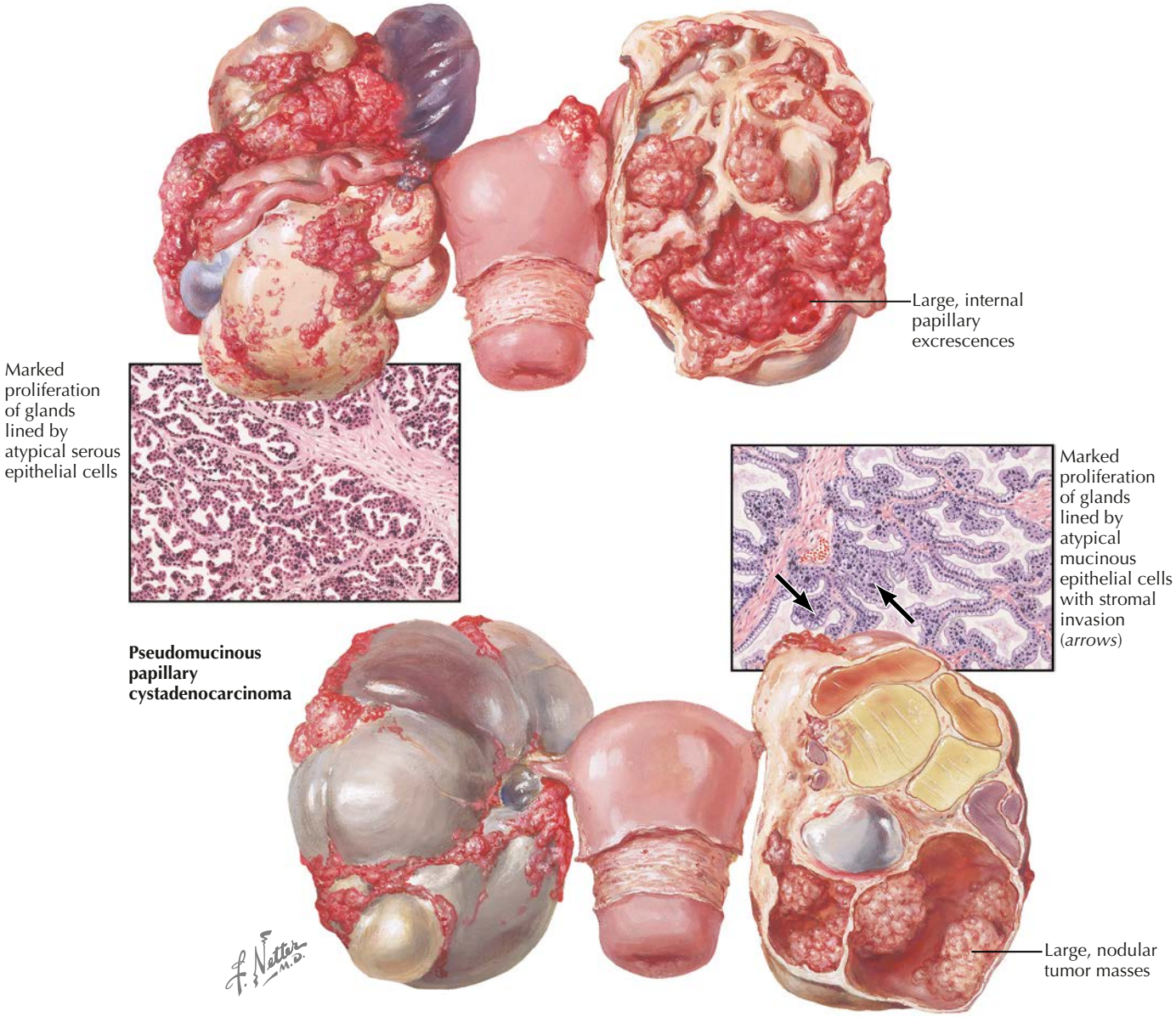

Figure 158.2 Papillary serous cystadenocarcinoma

Possible Complications: Ascites, pulmonary effusion, small bowel obstruction, disease progression, and death.

Expected Outcome: Ovarian cancer has the highest mortality of any gynecologic cancer, resulting in more deaths annually than cervical and endometrial cancer combined. If discovered early in the process and treated with aggressive surgical resection and adjunctive therapy, disease-free survival is possible. Survival is affected by stage, grade, cell type, and residual tumor after surgical resection. Survival (5-year) by stage: stage I, 80%; stage II, 60%; stage III, 25%; stage, IV 15%. Serous adenocarcinoma has the poorest prognosis of the epithelial types.

MISCELLANEOUS

Pregnancy Considerations: Does not threaten pregnancy except by the jeopardy caused to the mother.

ICD-10-CM Codes: Based on the type and stage.

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159 OVARIAN CYSTS

THE CHALLENGE

Description: An ovarian cyst is a cystic growth within the ovary, generally arising from epithelial components and most often benign.

Scope of the Problem: Benign ovarian tumors are most frequently diagnosed at the time of routine examination and are asymptomatic. When symptoms do occur, they generally are either catastrophic (as when bleeding, rupture, or torsion occur) or indolent and nonspecific (such as a vague sense of pressure or fullness).

Objectives of Management: The most important objective of managing an ovarian cyst is the timely diagnosis of its type and origin. Subsequent therapy and assessment of risk are based on the correctness of the diagnosis. For acutely symptomatic cysts, rapid evaluation and intervention may be necessary.

TACTICS

Relevant Pathophysiology: Approximately 90% of ovarian tumors encountered in younger women are benign and metabolically inactive. More than 75% of the benign adnexal masses are functional. Functional cysts are not true neoplasms; rather, they are anatomic variants, resulting from the normal function of the ovary. Follicular cysts occur when ovulation fails to occur, leaving the developing follicle to continue beyond its normal time. In a similar manner, the corpus luteum may persist or, through internal bleeding, enlarge and become symptomatic. Approximately 25% of ovarian enlargements in reproductive-aged women represent true neoplasia, with only approximately 10% being malignant. The largest group of benign ovarian tumors are those that arise from the epithelium of the ovary and its capsule. Despite the diversity of tumors with epithelial beginnings, the most common ovarian tumor in young reproductive-aged women is the cystic teratoma or dermoid, which originates from a germ cell. These tumors are derived from primary germ cells and include tissues from all three embryonic germ layers (ectoderm, mesoderm, and endoderm).

Strategies: History and physical examinations are generally sufficient to establish the presence of the mass. No laboratory tests are of specific help in the global diagnosis of ovarian cysts. Laboratory investigations may support specific diagnoses. Ultrasonography, computed tomography, and magnetic resonance imaging are of limited value in evaluating asymptomatic masses

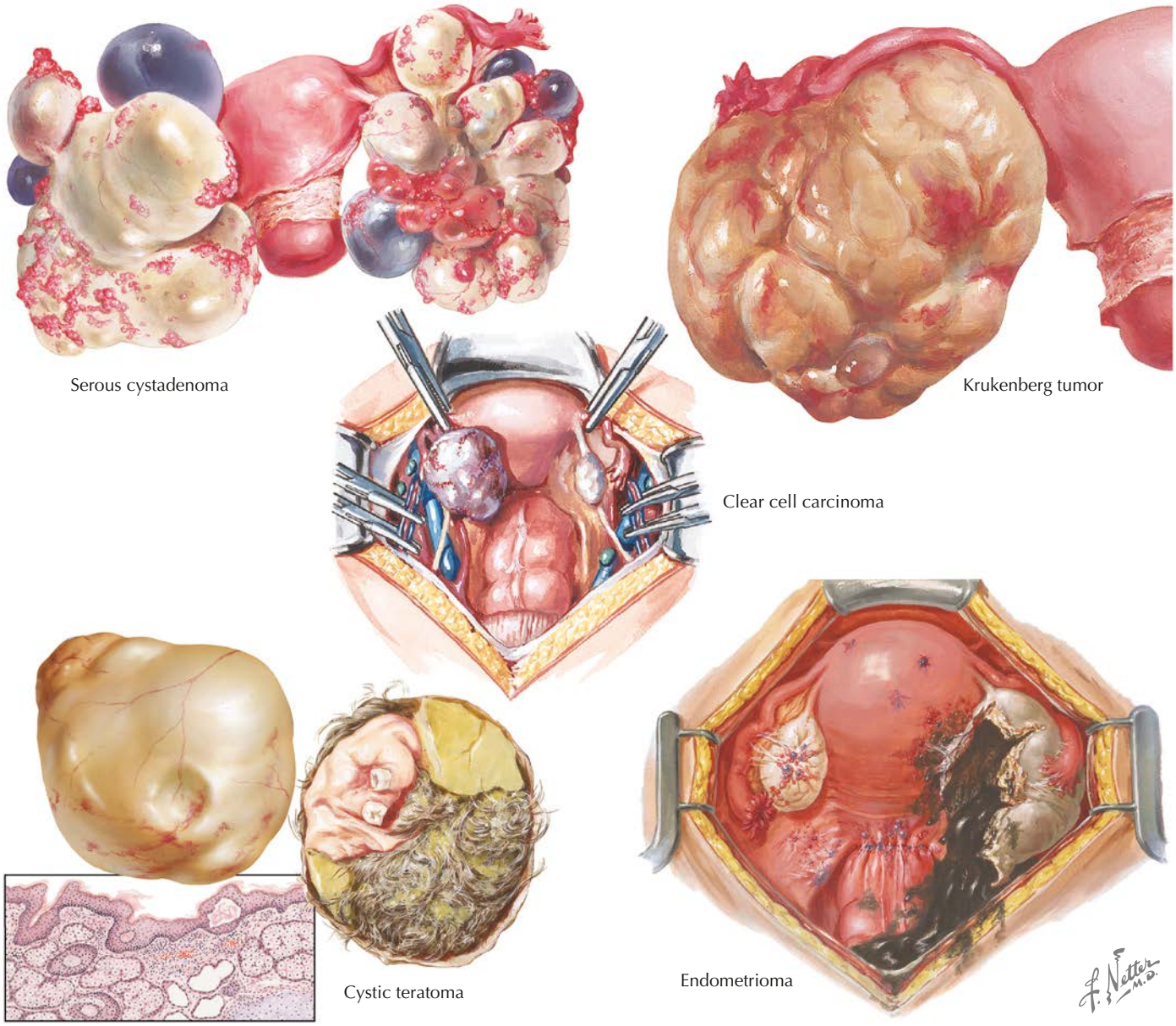

Figure 159.1 Differential diagnosis of ovarian cysts

in young patients. Exceptions to this are Doppler flow measurements when adnexal torsion or ectopic pregnancy is suspected, in patients in whom clinical assessment is impractical or inadequate (eg, massive obesity), or in those in whom malignancy is suspected. Serum testing for tumor markers, such as CA-125, lipid-associated sialic acid, carcinoembryonic antigen, α-fetoprotein, and lactate dehydrogenase, should be reserved for following the progress of patients with known malignancies and not for prognostic evaluation.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Ovarian Cysts, 2021

IMPLEMENTATION

Special Considerations: Some authors favor giving young patients with small, presumably benign, cystic masses ovulation suppression therapy, such as oral contraceptives, to hasten the process of regression. Regression rates of 65%–75% are often cited for this approach, but this strategy is largely a matter of personal choice because definitive studies are lacking. Physiologic ovarian enlargements, including follicular or corpus luteum cysts, should not be present if a patient is using oral contraceptives (ovulation may not be fully suppressed in women using some progestin-only contraceptives). For this reason, patients who are already using oral contraceptives and develop adnexal masses are more likely to have pathologic conditions that will not regress, increasing the possibility that eventual surgical exploration is required. Perimenopausal and postmenopausal patients may still have benign processes as a cause of an adnexal mass, but the likelihood of a malignant process is increased (up to one-third of cases), altering management. In these patients, masses larger than 6 cm generally prompt surgical exploration and excision, although some authors suggest this threshold should be increased to 10 cm. Transvaginal ultrasonography to measure and track masses has allowed masses that once would have required exploration to be conservatively followed. As in younger patients, the size, shape, mobility, and consistency of the mass should be estimated. Irregular, immobile, or mixed-character masses (solid and cystic) are more likely to be malignant and deserve immediate consultation with a surgeon for exploration. The final diagnosis of ovarian cancer must be surgically made.

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OVARIAN FIBROMA

160

INTRODUCTION

Description: The most common benign ovarian tumor is the ovarian fibroma, which is composed of stromal cells (fibroblasts). Although benign, these tumors are sometimes associated with ascites and hydrothorax (Demons syndrome, Meigs syndrome, 1% of patients).

Prevalence: 4% of all ovarian tumors, most common solid tumor.

Predominant Age: Any; most common in perimenopausal and menopausal women; average age is 48 years; less than 10% are younger than 30 years.

Genetics: No genetic pattern and no known association with *BRCA* germline mutations or a genetic predisposition to breast cancer, with the exception of Gorlin syndrome.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown. Ascites and pleural effusion are thought to be related to vascular endothelial growth factor, which raises capillary permeability.

Risk Factors: None known.

SIGNS AND SYMPTOMS

- Asymptomatic (may grow to a large size without detection)
- Adnexal mass (average size is 6 cm, and weight is as much as 50 lb)
- Ascites (40% if the tumor is >10 cm)
- Hydrothorax (Meigs syndrome, regresses after removal of the tumor)
- Estrogen secretion (when theca cells predominate)
- Bilateral masses in less than 10% of patients

DIAGNOSTIC APPROACH

Differential Diagnosis

- Benign adnexal masses (corpus luteum, follicular cyst)
- Endometriosis
- Hydrosalpinx
- Paratubal cyst
- Appendiceal abscess
- Ectopic pregnancy
- Pedunculated leiomyomata
- Pelvic or horseshoe kidney
- Nongynecologic pelvic masses
- Fibromatosis
- Stromal hyperplasia
- Fibrosarcoma

Associated Conditions: Ascites, hydrothorax, basal cell nevus syndrome (Gorlin syndrome—early basal cell carcinomas, keratosis of the jaw, calcification of the dura, mesenteric cysts, and bilateral ovarian fibromas).

WORKUP AND EVALUATION

Laboratory: As indicated before surgery. CA-125 is frequently, but not always, elevated.

Imaging: Preoperative evaluation (computed tomography or ultrasonography) for possible lymph node enlargement or intraabdominal spread is indicated for patients in whom malignancy is a significant possibility.

Special Tests: None indicated.

Diagnostic Tests: History, physical examination, and imaging. Final diagnosis is established by histologic evaluation.

Pathologic Findings

These tumors contain fibroblasts and spindle cells and may grow to a large size without detection. The cut surface reveals hard, flat, chalky-white surfaces with a whorled appearance. Small cyst formation is relatively common.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, supportive therapy based on symptoms.

Specific Measures: Surgical exploration and resection are adequate. In older women, hysterectomy and removal of the contralateral ovary are generally performed. Fibromas of low malignant potential are rare.

Diet: No specific dietary changes indicated.

Activity: No restriction.

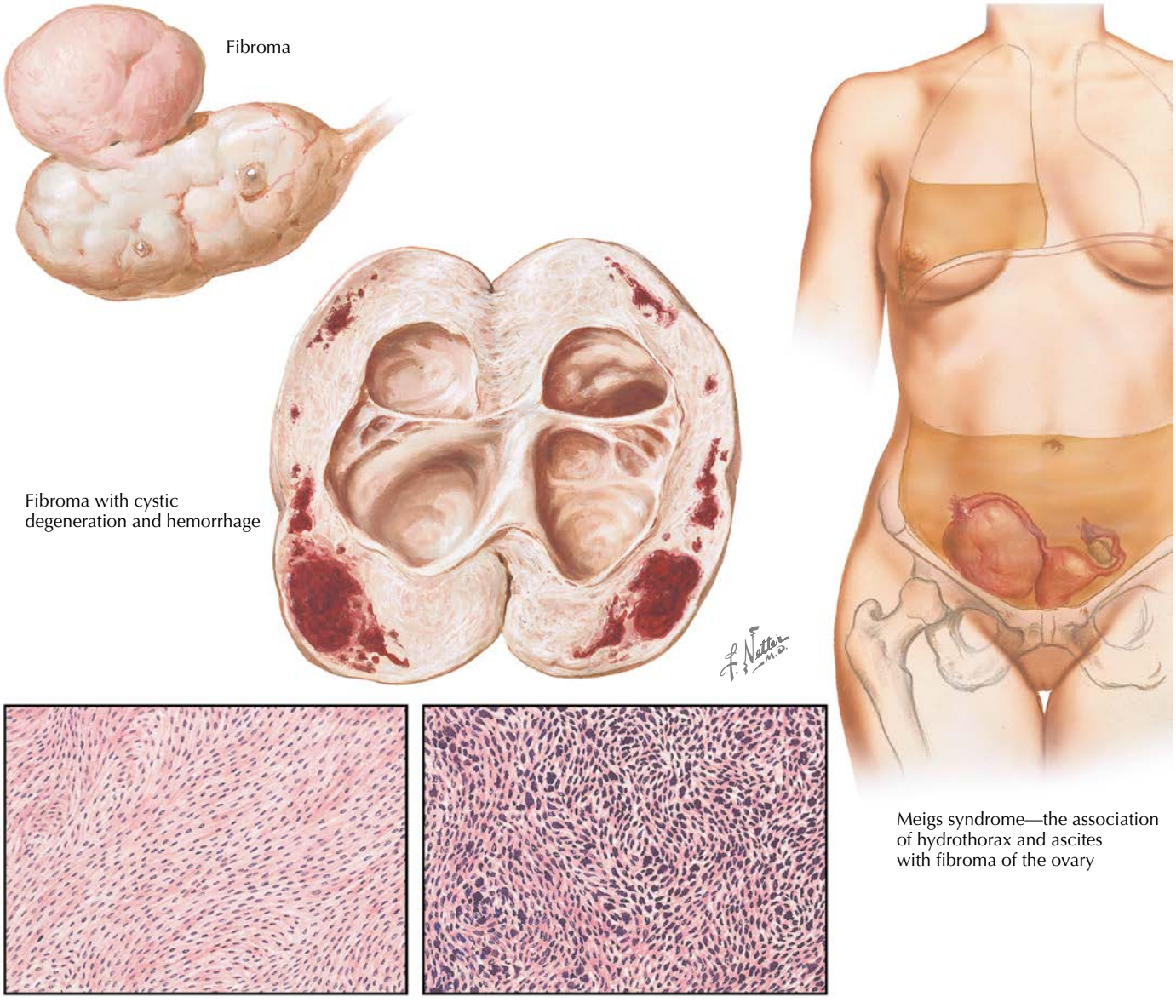

Figure 160.1 Ovarian fibroma

Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Ovarian Cancer, 2019
- Ovarian Cysts, 2021

Drug(s) of Choice

Adjunctive or symptomatic therapy.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: Uncommon. Torsion or bleeding may occur. Fibromas of low malignant potential that are adherent or that are ruptured may recur.
Expected Outcome: Simple surgical excision is generally curative.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. Hormonally active tumors (thecoma) may disrupt menstrual patterns and ovulation, leading to reduced fertility.
ICD-10-CM Codes: D27.9 (Benign neoplasm of unspecified ovary).

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OVARIAN TORSION

161

INTRODUCTION

Description: Ovarian torsion involves the twisting of a part or all of the adnexa on its mesentery, resulting in tissue ischemia and frank infarction. This usually involves the ovary but may also include the fallopian tube.

Prevalence: Uncommon; 2%–3% of gynecologic operative emergencies; fifth most common gynecologic emergency; 5/100,000 in ages 1–20 years. Slightly more common on the right side (64%).

Predominant Age: Mid- to late-20s.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Spontaneous twisting of the ovary on its mesentery, generally associated with ovarian enlargement (50%–60% have an ovarian tumor [benign teratoma] or functional cyst).

Risk Factors: Torsion of the adnexa is usually associated with the presence of an ovarian, tubal, or paratubal mass (generally >5 cm). Risk of torsion is higher during pregnancy or after ovulation induction.

SIGNS AND SYMPTOMS

- Pain (90%; generally abrupt, intense, and unilateral. The pain of adnexal torsion generally comes and goes with a periodicity that varies from hours to days or longer; this is in contrast to the variable pain caused by obstruction of the bowel, ureter, or common bile duct, which is more regular and frequent.)
- Unilateral palpable (tender) mass (90% of patients)
- Nausea and vomiting (60%–70%)
- Fever (up to 20%)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Ectopic pregnancy
- Bleeding into an ovarian cyst
- Ruptured corpus luteum
- Adnexal abscess
- Acute appendicitis
- Small bowel obstruction

Associated Conditions: Adnexal mass.

WORKUP AND EVALUATION

Laboratory: Pregnancy test to evaluate the possibility of an ectopic pregnancy.

Imaging: Ultrasonography may demonstrate a cystic adnexal mass, but the acute character and intensity of symptoms usually encountered and the nonspecific nature of ultrasonographic findings mean that the diagnosis is most often made at the time of surgery. Doppler flow studies are insufficient by themselves to establish or reject the diagnosis.

Special Tests: None indicated.

Diagnostic Tests: History, physical examination, and imaging (if the patient's condition permits). Torsion is a surgical diagnosis.

Pathologic Findings

Ischemia and infarction in ovarian or tubal tissues, other pathologic conditions based on a coexistent mass (50%–60% of patients have a mass).

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, stabilization (when acute symptoms are present).

Specific Measures: Surgical exploration (conservative operative management may be possible in almost all patients).

Diet: Nothing by mouth pending surgical exploration.

Activity: Bed rest.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Ovarian Cysts, 2021

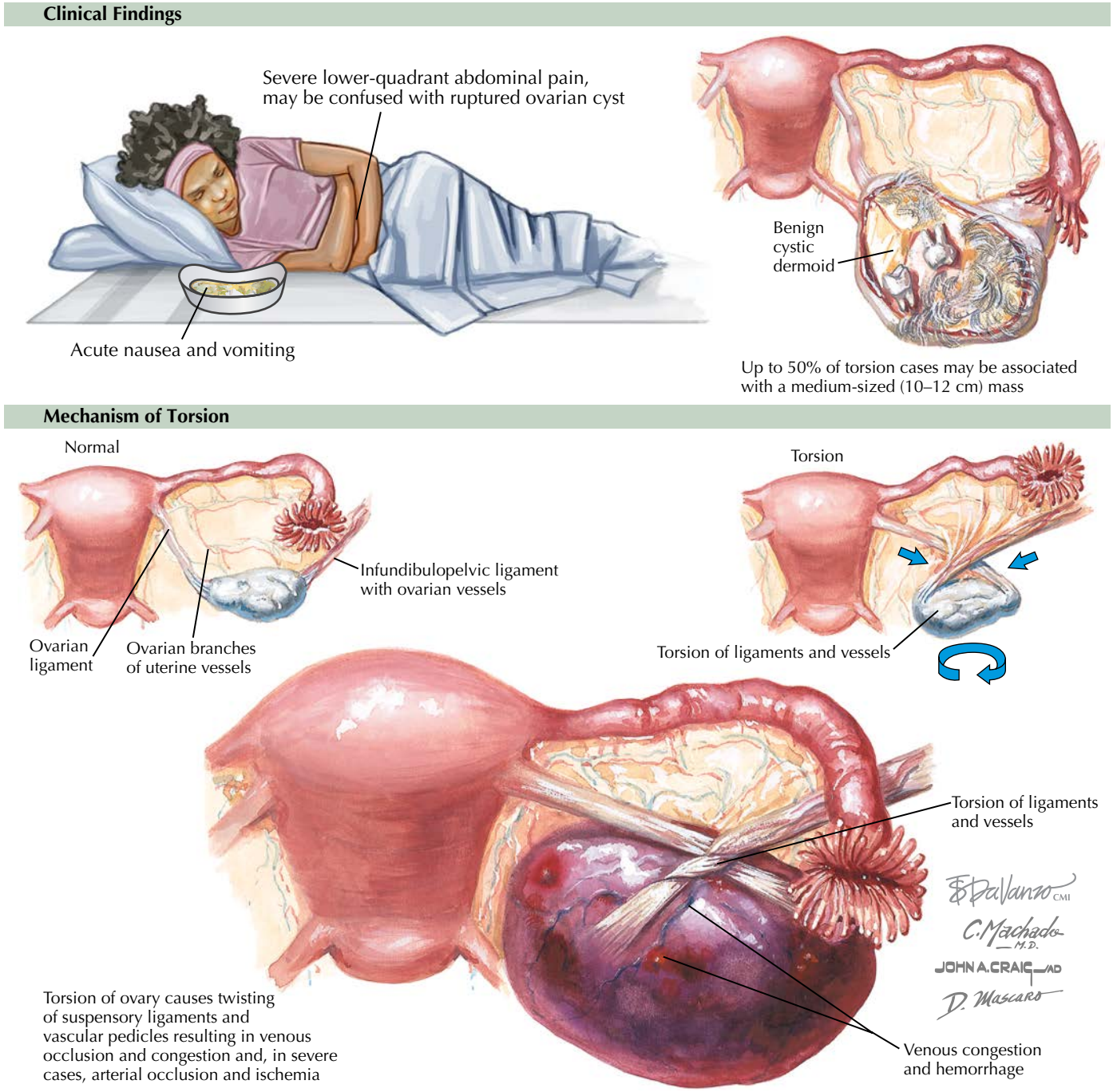

Figure 161.1 Clinical findings and mechanism of ovarian torsion

Drug(s) of Choice

- Analgesics (based on patient condition).

Contraindications: No analgesics (which could mask evolving symptoms) should be administered until diagnosis is established and the patient's condition is stabilized.

FOLLOW-UP

Patient Monitoring: Normal health maintenance as follow-up.
Prevention/Avoidance: None.

Possible Complications: Complete loss of the involved ovary.
Expected Outcome: A part or all of the ovary should be salvaged in most patients.

MISCELLANEOUS

Pregnancy Considerations: 20% of cases occur during pregnancy; peak risk 10–17 weeks gestation.
ICD-10-CM Codes: N83.53 (Torsion of ovary, ovarian pedicle, and fallopian tube).

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PELVIC INFLAMMATORY DISEASE

162

INTRODUCTION

Description: Pelvic inflammatory disease (PID) is a serious, diffuse, frequently multiorganism infection of the pelvic organs that results in significant morbidity. The term refers to a spectrum of inflammatory disorders of the upper female genital tract, including any combination of endometritis, salpingitis, tubo-ovarian abscess, and pelvic peritonitis.

Prevalence: 1%–3% of women; most common gynecologic reason for emergency visits for women aged 15–44 years. Approximately 106,000 hospitalizations annually.

Predominant Age: 16–25 years; 85% of cases are found in sexually active women of menstrual age.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: In approximately one-third of cases the causative organism is *Neisseria gonorrhoeae* alone. One-third of cases involve infection with *N. gonorrhoeae* and additional "mixed" infections with other organisms. The last third of infections result from mixed aerobic and anaerobic bacteria, including respiratory and vaginal pathogens such as *Haemophilus influenzae, Streptococcus pneumoniae, Streptococcus pyogenes, Gardnerella vaginalis,* and *H. influenzae* found in up to 10% of patients. Polymicrobial infections are present in more than 40% of patients with laparoscopically proven salpingitis, with one study reporting an average of 6.8 bacterial types per patient. Only approximately 15% of women with cervical *N. gonorrhoeae* infections develop acute pelvic infections. Orgasmic uterine contractions or the attachment of *N. gonorrhoeae* to sperm may provide transportation to the upper genital tract. *Chlamydia* is involved in approximately 20% of patients, with this rate increasing to approximately 40% among hospitalized patients. Infection of the upper genital tract by *Chlamydia* causes a milder form of salpingitis with more insidious symptoms and greater damage.

Risk Factors: Multiple sexual partners, uterine or cervical instrumentation, douching. Because many of the anaerobic bacteria found in mixed infections mimic those found in the vagina of patients with bacterial vaginosis, bacterial vaginosis has been considered a risk factor for the development of pelvic infections, but some published studies suggest that this is not the case. Of cases, 15% occur after instrumentation such as endometrial biopsy, hysterosalpingography, intrauterine contraceptive device placement (IUD), or the like. The risk for PID associated with IUD use is primarily confined to the first 3 weeks after insertion.

SIGNS AND SYMPTOMS

- Pelvic pain and tenderness (100%), muscular guarding, or rebound tenderness
- Fever (up to 39.5°C, 40%) or chills
- Elevated white blood cell count
- Irregular vaginal bleeding or discharge
- Tachycardia, nausea, and vomiting
- Purulent cervical discharge is often demonstrated (should be sampled for Gram staining and culture)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Ectopic pregnancy
- Adnexal accident (torsion, bleeding)
- Appendicitis
- Endometriosis
- Cholecystitis
- Enteritis
- Septic incomplete abortion
- Diverticular abscess

Associated Conditions: Tubal factor infertility, ectopic pregnancy, and chronic abdominal pain.

WORKUP AND EVALUATION (TABLE 162.1)

Laboratory: Complete blood count, including differential, white blood cell count, and erythrocyte sedimentation rate. Cervical culture (although there is only a 50% correlation between cervical culture and upper-tract organisms) and Gram staining. Human immunodeficiency virus (HIV) screening should be undertaken in all patients suspected of having PID.

Imaging: Ultrasonography may demonstrate free fluid in the posterior cul-de-sac (supportive but not diagnostic).

Special Tests: Confirmation by laparoscopy should be considered for any patient who does not respond in a timely manner or for whom the diagnosis is uncertain. In 35% of patients no infection is found. Data indicate that a clinical diagnosis of symptomatic PID has a positive predictive value for salpingitis of 65%–90% compared with laparoscopy.

Diagnostic Tests: History, physical examination, and ultrasonography. Diagnostic criteria are shown in the following table. Empiric treatment of PID should be started in sexually active women at risk for sexually transmitted infections (STIs) if they are experiencing pelvic or lower abdominal pain, if no cause for the illness other than PID can be identified, and if they have cervical motion or cervical or uterine tenderness. The gold standard for establishing the diagnosis is endometrial biopsy, transvaginal sonography, or magnetic resonance imaging techniques showing thickened, fluid-filled tubes with or without free pelvic fluid or tubo-ovarian complex, but these are used almost exclusively in the research setting.

Table 162.1 Diagnostic Criteria for Pelvic Inflammatory Disease

Must have all three*:	• Abdominal tenderness • Adnexal tenderness • Cervical tenderness
Must have at least one:	• Positive Gram stain or laboratory documentation of cervical infection with *N. gonorrhoeae* or *C. trachomatis* • Temperature >38°C (100.4° F) • White blood cell count >10,000 • Elevated erythrocyte sedimentation rate • Elevated C-reactive protein • Mucopurulent cervical discharge • Cervical friability • Increased white blood cells in vaginal fluid • Pus on culdocentesis or laparoscopy • Tubo-ovarian abscess

*Some advocate treating solely based on the presence of any one of these to reduce the risk of undertreatment.

Pathologic Findings

Inflammation of the fallopian tubes, ovaries, and surrounding peritoneal surfaces.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Rapid evaluation, cervical cultures, supportive therapy (fluids, analgesics, and antipyretics).

Specific Measures: Aggressive antibiotic therapy. Inpatient treatment should be implemented for those patients who are pregnant, those with surgical emergencies or signs of tubo-ovarian abscess, temperature greater than 38.5°C (101.3°F), or nausea, vomiting or illness sufficient to make outpatient care impractical. If no clinical improvement has occurred less than 72 hours after outpatient intramuscular or oral therapy, the patient should be hospitalized with reassessment of the antibiotics chosen. For a rare few, hysterectomy may be required. Rupture of a tubo-ovarian abscess, with subsequent septic shock, may be life threatening.

Diet: No specific dietary changes indicated.

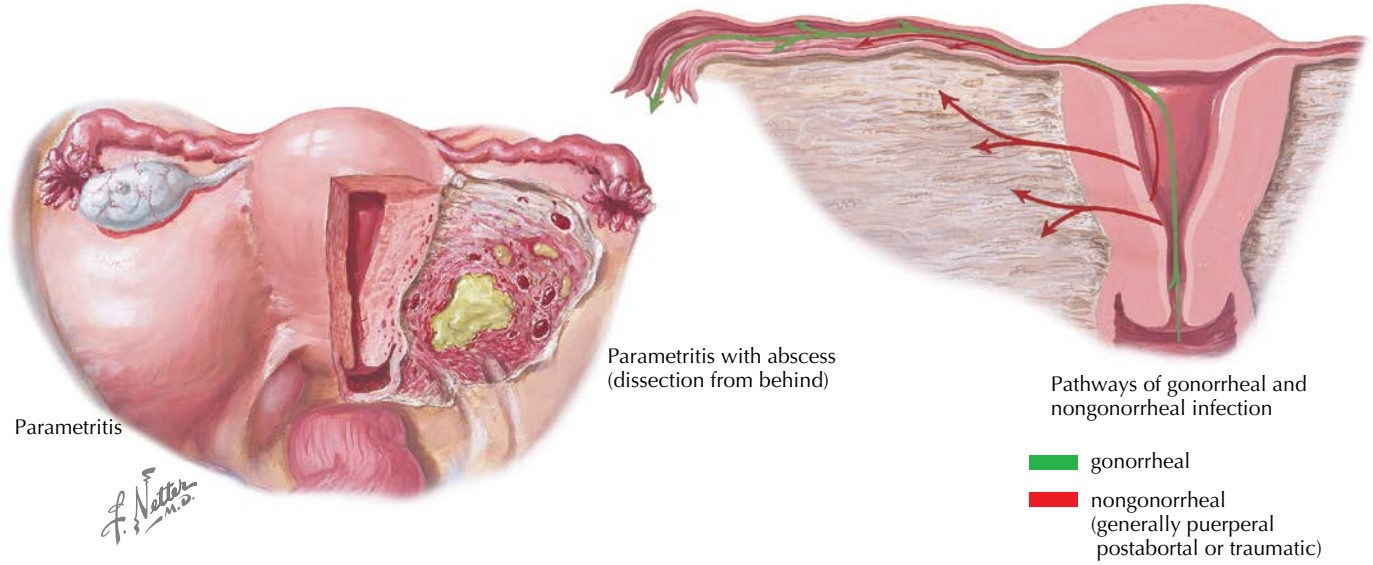

Figure 162.1 Parametritis and gonorrheal/nongonorrheal infection

Activity: Pelvic rest. Ambulatory care is possible with early mild infections; hospitalization may be required.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Chlamydia, Gonorrhea, and Syphilis, 2021
- Chronic Pelvic Pain, 2014
- How to Prevent Sexually Transmitted Infections, 2020
- Pelvic Inflammatory Disease, 2019
- When Sex Is Painful, 2020

Drug(s) of Choice

- Ambulatory care—ceftriaxone 1 g IM in a single dose plus doxycycline 100 mg PO twice a day for 14 days, with metronidazole 500 mg twice a day for 14 days. Fluoroquinolone-resistant gonorrhea is now widespread in the United States, making this class of antibiotics no longer appropriate for the treatment of gonorrhea and, hence, PID.
- Hospitalized patients—cefotetan 2 g IV every 12 hours or cefoxitin 2 g IV every 6 hours with doxycycline 100 mg every 12 hours PO or IV is recommended. For mixed infections, clindamycin 900 mg IV every 8 hours plus an aminoglycoside such as gentamicin 2 mg/kg loading doses then 1.5 mg/kg every 8 hours will give better protection.
- After discharge—doxycycline 100 mg PO twice a day or clindamycin 450 mg four times a day for 14 days.

Contraindications: See individual agents.

Precautions: See individual agents.

Interactions: See individual agents.

Alternative Drugs

- Cefoxitin 2 g IM plus probenecid 1 g PO combined with a 14-day course of doxycycline 100 mg twice daily with metronidazole 500 mg PO twice daily.
- Cefotetan 2 g IM plus probenecid 1 g PO combined with a 14-day course of doxycycline 100 mg twice daily with metronidazole 500 mg PO twice daily.
- Ampicillin-sulbactam 3 g IV every 6 hours plus doxycycline 100 mg PO or IV every 12 hours.
- Clindamycin 900 mg IV every 8 hours plus gentamicin 2 mg/kg loading dose IV or IM followed by 1.5 mg/kg every 8 hours.
- Excellent results have been reported with the combination of clindamycin and aztreonam 2 g IM every 8 hours.
- Piperacillin 4 g combined with tazobactam 500 mg given IV every 8 hours also may be used but has given cure rates of only 90% (5% improved).

FOLLOW-UP

Patient Monitoring: Hospitalized care is indicated when differential diagnosis includes ectopic pregnancy or appendicitis, HIV, immunosuppression, IUD use, nulliparity, paralytic ileus, peritonitis or toxicity, pregnancy, previous treatment failure, significant gastrointestinal symptoms, significant morbidity, temperature greater than 39°C (102.2°F), tubo-ovarian abscess, uncertain or complicated differential diagnosis, unreliable patient, or white blood cell count greater than 20,000 or less than 4000.

Prevention/Avoidance: Prevention of these sequelae is based on prevention of infection (barrier contraception, safe sex practices), screening for those at risk, and aggressive treatment. As with most STIs, the partners of patients with PID should be screened for gonococcal, chlamydial, or HIV infections and treated accordingly.

Possible Complications: Approximately one in four women with acute PID experiences medical sequelae. PID often leads to tubal factor infertility (8%), ectopic pregnancy (9%), and chronic abdominal pain (18%). The risk of infertility approximately doubles with each subsequent episode, resulting in a 40% rate of infertility after only three episodes. Women with documented salpingitis have a 4-fold increase in their rate of ectopic pregnancy, and 5%–15% of women require surgery because of damage caused by PID. Peritoneal involvement may spread to include perihepatitis (Fitz-Hugh-Curtis syndrome). Rupture of a tubo-ovarian abscess, with subsequent septic shock, may be life threatening. Death from pelvic infections or their complications (for women aged 15–45 years) is reported to be 0.29/100,000.

Expected Outcome: Early, aggressive therapy is generally associated with resolution, but the possibility of recurrence or sequelae is significant.

MISCELLANEOUS

Pregnancy Considerations: Often associated with reduced fertility and an increased risk of ectopic pregnancy. Once pregnancy is established, the risk of new infection is reduced because of obstruction of the upper genital tract by the gestation. Scarring from previous infections may cause pain when stretched by the enlarging uterus.

ICD-10-CM Codes: N73.0 (Acute parametritis and pelvic cellulitis), others based on chronicity, structures involved, and relation to pregnancy.

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163 PSEUDOMYXOMA PERITONEI

INTRODUCTION

Description: Pseudomyxoma peritonei is the intraperitoneal spread of a mucin-secreting tumor (either a mucinous cystadenoma or carcinoma), which results in recurrent abdominal masses, often-massive ascites, and multiple bowel obstructions. This tumor most frequently begins in the appendix.
Prevalence: Roughly 3500 cases per year (male and female). 2/10,000 laparotomies and 2%–5% of ovarian mucinous tumors (16% in mucinous cystadenocarcinomas).
Predominant Age: Middle to late reproductive age and early postmenopausal years.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Spread, rupture, spill, or leakage of a primary appendiceal tumor or other gastrointestinal or ovarian tumor. Recent histologic studies suggest that in the majority of patients the appendix is the primary tumor source. In rare cases, metaplasia by the cells of the peritoneal surface may account for this tumor.
Risk Factors: Rupture or leakage of an ovarian mucinous tumor at the time of surgical resection. This role has been debated in recent literature.

SIGNS AND SYMPTOMS

- Accumulation of large amounts of mucinous material in the peritoneal cavity
- Recurrent bowel obstruction
- Implants of tumor on the omentum, undersurface of the diaphragm, pelvis, right retrohepatic space, left abdominal gutter, and ligament of Treitz. (In contrast to carcinoma the peritoneal surface of the bowel is generally spared; metastasis outside the peritoneal cavity does not occur.)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Disseminated ovarian cancer
- Metastatic colon cancer
- Disseminated leiomyomata
- Ascites

Associated Conditions: Gastrointestinal tumors, bowel obstruction.

Workup and Evaluation

Laboratory: As indicated before surgery. Serum testing for tumor markers, such as CA-125, lipid-associated sialic acid, carcinoembryonic antigen, and α-fetoprotein, should be reserved for following the progress of patients with known malignancies and not for prognostic evaluation.
Imaging: Ultrasonography or computed tomography may be helpful in determining the extent of disease.
Special Tests: None indicated.
Diagnostic Tests: History, physical examination, and imaging. Final diagnosis is established by histologic evaluation.

Pathologic Findings

Perforation of the capsule of a mucinous tumor with rupturing and seeding of the peritoneal cavity. Most often associated with malignant tumors, although benign mucinous neoplasms may perforate and result in pseudomyxoma peritonei as well. Tumors of the ovary and appendix may be synchronous, making the determination of origin difficult or impossible.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, supportive therapy based on symptoms.
Specific Measures: Surgical exploration and extirpation. Extensive bowel resection is often required because of diffuse peritoneal implants of tumor. Reoperation is common.
Diet: No specific dietary changes indicated, except those imposed by advanced disease.
Activity: No restriction, except that imposed by advanced disease.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

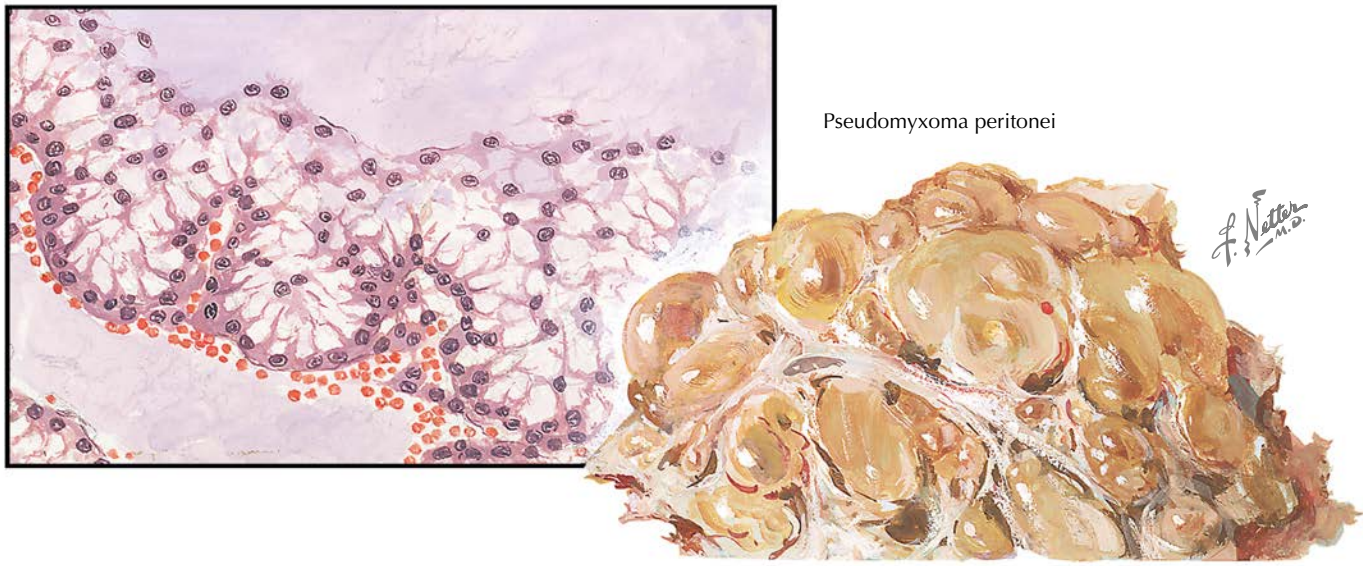

Figure 163.1 Pseudomyxoma peritonei

- Ovarian Cancer, 2019
- Ovarian Cysts, 2021
- Preparing for Surgery, 2021

Drug(s) of Choice

- None, except as an adjunctive or symptomatic therapy.
- Chemotherapy (systemic or intraperitoneal alkylating agents) and mucolytic agents have not been shown to be effective.
- One publication has advocated intraperitoneal hyperthermic perfusion, but efficacy has not been established.

Precautions: Alkylating agents are associated with an increased risk of future leukemia (10% by 8 years after therapy).

FOLLOW-UP

Patient Monitoring: Careful follow-up for recurrent pelvic disease or enlargement of the remaining ovary (if any). This is generally performed by pelvic examination, augmented with ultrasonography in selected patients.

Prevention/Avoidance: Care in the handling and surgical removal of ovarian masses.

Possible Complications: Generally follows an indolent course with progressive bowel dysfunction, intercurrent infection, inanition, and death.

Expected Outcome: The prognosis is better for the patient when the tumor arises from adenomas (appendiceal or ovarian; 5-year survival rate is 85%) than if it comes from a carcinoma (5-year survival is <60%) or peritoneal carcinomatosis (<10%).

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.

ICD-10-CM Codes: C78.6 (Secondary malignant neoplasm of retroperitoneum and peritoneum).

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SEROUS OVARIAN CYSTS

164

INTRODUCTION

Description: Serous ovarian cysts are a group of benign and malignant epithelial tumors of the ovary that are characterized as serous cells. These tumors are the most commonly encountered epithelial ovarian tumors. When malignant, these tumors tend to be high grade and virulent.

Prevalence: 20% of all benign ovarian neoplasms.

Predominant Age: Reproductive age.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown.

Risk Factors: Family history, high-fat diet, advanced age, endometriosis, nulliparity, early menarche and late menopause, White race, higher economic status. Oral contraception, high parity, and breastfeeding reduce risk.

SIGNS AND SYMPTOMS

- Asymptomatic
- Vague lower abdominal symptoms
- Adnexal mass (bilateral in 5% of benign and in 33%–66% of malignant lesions), cystic and filled with a clear serous fluid. Benign tumors tend to be unilocular and smooth with a mean size of 10 cm; malignant tumors are more often multilocular with papillary projections over much of the surface.

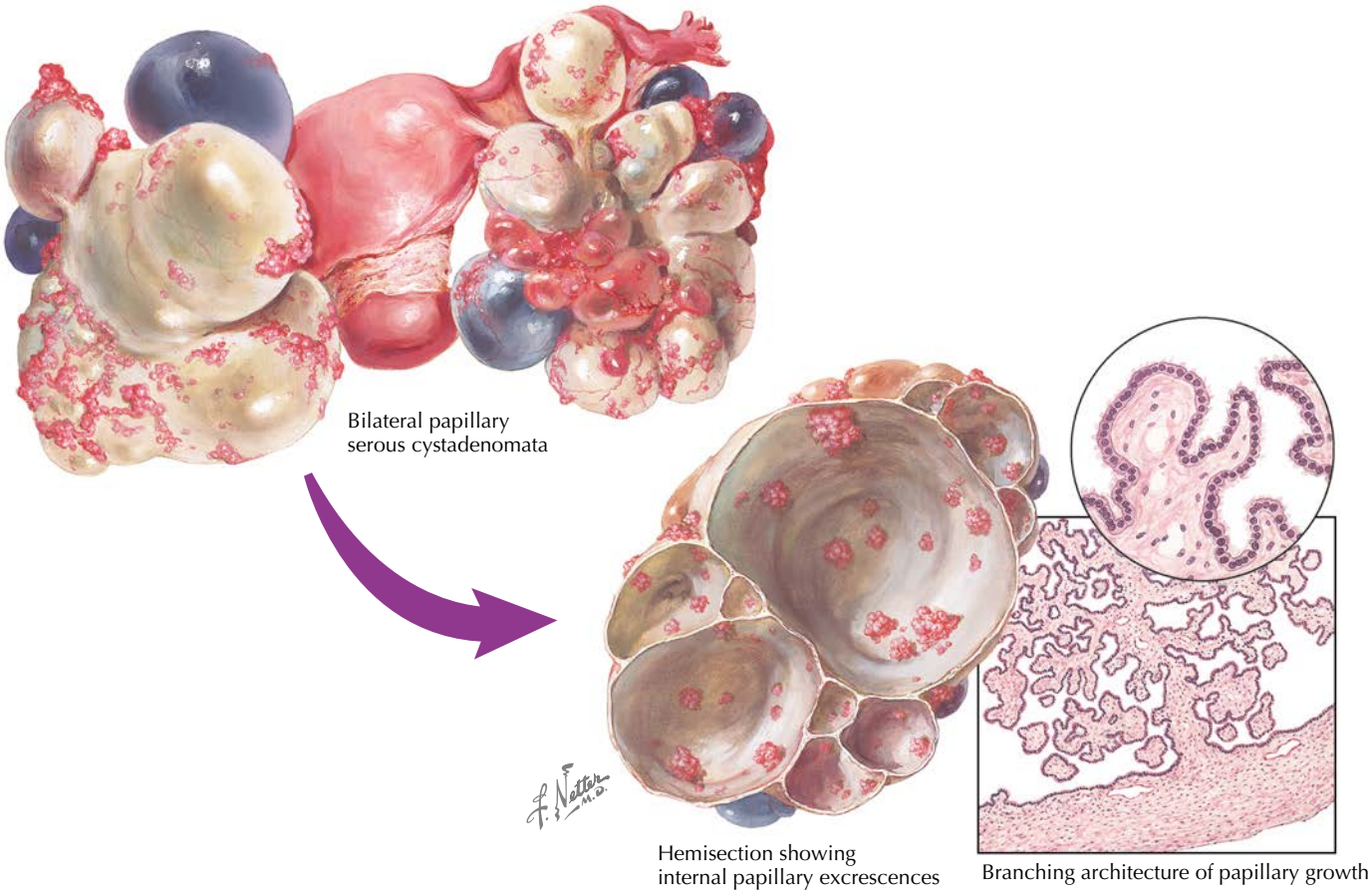

Figure 164.1 Serous cystadenomata

DIAGNOSTIC APPROACH

Differential Diagnosis

- Benign adnexal masses (corpus luteum, follicular cyst)
- Endometriosis
- Hydrosalpinx
- Paratubal cyst
- Appendiceal abscess
- Ectopic pregnancy
- Pedunculated leiomyomata
- Pelvic or horseshoe kidney
- Nongynecologic pelvic masses

Associated Conditions: None.

WORKUP AND EVALUATION

Laboratory: As indicated before surgery. CA-125 levels may be useful for monitoring disease response to treatment or progression, but this is not a good prognostic test. Only 80% of epithelial ovarian tumors express CA-125, and many benign and other malignant processes (lung, breast, and pancreas) may also cause an increase in CA-125 levels that are higher than normal.

Imaging: No imaging indicated.

Special Tests: A frozen-section histologic evaluation should be considered for any ovarian mass that appears suspicious for malignancy.

Diagnostic Tests: History, physical examination, and imaging. Final diagnosis is established by histologic evaluation.

Pathologic Findings

Serous tumors are more likely to be found with poorer differentiation and discovered late in the disease process. Papillary surface carcinomas of the ovary are most likely to be serous in type. The diagnosis is made on the basis of the histologic analysis of the cyst wall and not on the characteristics of the cyst fluid.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, supportive therapy based on symptoms.

Specific Measures: Generally require surgical exploration and extirpation. In benign disease or tumors of borderline malignant potential the uterus and other ovary may be generally spared. Adjunctive chemotherapy (platinum-based and paclitaxel [Taxol]) or radiotherapy is often included based on the location and stage of the disease.

Diet: No specific dietary changes indicated, except those imposed by an advanced disease.

Activity: No restriction, except that imposed by advanced disease.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Ovarian Cancer, 2019
- Ovarian Cysts, 2021

Drug(s) of Choice

None, except as adjunctive or symptomatic therapy.
Precautions: Alkylating agents are associated with an increased risk of future leukemia (10% by 8 years after therapy).

FOLLOW-UP

Patient Monitoring: Careful follow-up for recurrent pelvic disease or enlargement of the remaining ovary (if any). This is generally performed by pelvic examination, augmented with ultrasonography in selected patients. In patients suspected of having a recurrent disease and other selected patients, second-look surgery may be desirable to assess progress and discover occult disease.
Prevention/Avoidance: None.
Possible Complications: Torsion, hemorrhage, progression, and spread of malignant disease.
Expected Outcome: Generally good for benign tumors; the prognosis for malignant tumors is based on stage. Overall, the 5-year survival rate for malignant serous carcinomas is approximately 20%. Of malignant serous carcinomas, 75% are at an advanced stage at the time of diagnosis.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: Specific to cell type and location.

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SERTOLI-LEYDIG CELL TUMOR (ARRHENOBLASTOMA)

165

INTRODUCTION

Description: A Sertoli-Leydig cell tumor is a rare sex cord tumor of the ovary that comprises male elements and may be associated with virilization. Tumors vary in size but are generally 5–15 cm in diameter when incidentally found.
Prevalence: Very rare (<0.5% of ovarian tumors).
Predominant Age: Younger than 40 years (75%); mean age is 25 years; <10% of women are older than 50 years.
Genetics: Two gene mutations associated with Sertoli-Leydig cell tumors have been reported: *FOXL2* (a somatic missense point mutation) and *DICER1* (a germline mutation). There is a slight predisposition to Sertoli-Leydig cell tumors in patients with Peutz-Jeghers syndrome.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown.
Risk Factors: None known.

SIGNS AND SYMPTOMS

- Asymptomatic
- Adnexal enlargement (1.5% bilateral), typically larger than 15 cm when symptomatic
- Abdominal swelling or pain
- Ascites (4%)
- Oligomenorrhea or amenorrhea
- Loss of female secondary sex characteristics (breast atrophy, loss of body contours)
- Virilization or masculinization (one-third of patients; acne, hirsutism, temporal balding, deepening of voice, clitoral enlargement)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Adrenal virilizing tumors
- Benign adnexal masses (corpus luteum, follicular cyst)
- Endometriosis
- Hydrosalpinx
- Paratubal cyst
- Appendiceal abscess
- Ectopic pregnancy
- Pedunculated leiomyomata
- Pelvic or horseshoe kidney
- Nongynecologic pelvic masses

Associated Conditions: Virilization, hirsutism, clitoral enlargement.

WORKUP AND EVALUATION

Laboratory: As indicated before surgery. Plasma levels of testosterone, androstenedione, and other androgens may be elevated, whereas urinary 17-ketosteroid values are usually normal. Androgen secretion by the tumor may result in erythrocytosis. Laboratory studies cannot reliably differentiate between virilization

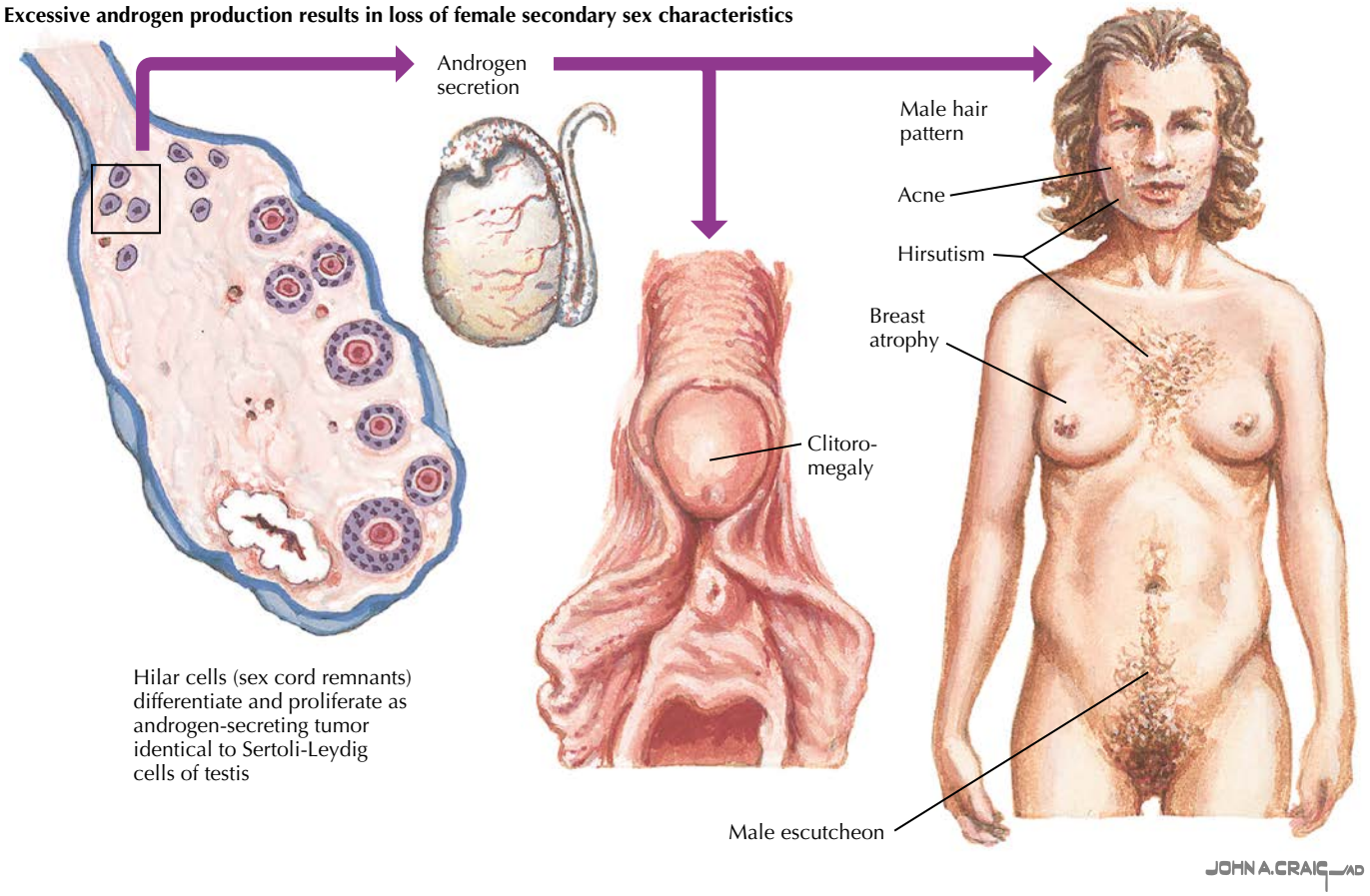

Figure 165.1 Excessive androgen production

caused by adrenal tumors and virilization caused by ovarian sources, unless samples are obtained by selective ovarian vein catheterization.

Imaging: Preoperative evaluation (computed tomography or ultrasonography) for possible lymph node enlargement or intraabdominal spread is indicated for patients in whom malignancy is a significant possibility.

Special Tests: None indicated.

Diagnostic Tests: History, physical examination, and imaging. Final diagnosis is established by histologic evaluation.

Pathologic Findings

Variable gross appearance but typically form a firm, solid, lobulated mass with a smooth surface. Sex cord (Sertoli) cells and stromal (Leydig) cells are present in varying proportion, but tubular patterns predominate with rare or no Leydig cells. Individual cells may appear immature. Lipochrome pigments (crystalloids of Reinke) are present in 20% of tumors, giving the tumors a yellow appearance. These tumors may be hard to differentiate from granulosa cell tumors and may mimic endometrioid or Krukenberg tumors. At discovery, 80% of tumors are stage IA.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, supportive therapy based on symptoms.

Specific Measures: Surgical exploration and resection. Young patients with stage IA disease may be treated with unilateral salpingo-oophorectomy. Undifferentiated tumors or advanced-stage disease require a more aggressive surgical resection and may be treated with adjunctive chemotherapy (vincristine, actinomycin D, and cyclophosphamide) or radiotherapy.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Ovarian Cancer, 2019
- Ovarian Cysts, 2021.

Drug(s) of Choice

- Vincristine 1.5 mg/m^2 IV weekly for 12 weeks; actinomycin D and cyclophosphamide (0.5 mg of actinomycin D plus 5–7 mg/kg/day of cyclophosphamide) IV daily for 5 days every 4 weeks. Adjunctive or symptomatic therapy as required.
- **Precautions**—alkylating agents are associated with an increased risk for future leukemia (10% by 8 years after therapy).

FOLLOW-UP

Patient Monitoring: Careful follow-up and normal health maintenance.

Prevention/Avoidance: None.

Possible Complications: Disease progression or spread (<20%). Recurrence occurs within 1 year in two-thirds of patients with advanced-stage disease.

Expected Outcome: These tumors behave as low-grade malignancies and have 5-year survival rates of 70%–90%. Survival is poor for higher stage and poorly differentiated tumors. Menses may be anticipated to return approximately 4 weeks after tumor removal. Excessive hair often regresses but does not disappear; clitoral enlargement and voice changes (if present) are unlikely to reverse.

MISCELLANEOUS

Pregnancy Considerations: Pregnancy unlikely in the presence of these tumors. No direct effect on the pregnancy, if they coexist. Hormonal effects on the fetus could be postulated, but tumors with significant hormonal function generally preclude pregnancy.
ICD-10-CM Codes: Based on the location and tumor character.

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TUBO-OVARIAN ABSCESS

166

INTRODUCTION

Description: Tubo-ovarian abscess is an inflammatory mass involving the fallopian tube, ovary, and, occasionally, other adjacent pelvic organs. These abscesses most often occur as a complication of pelvic inflammatory disease (PID), though spread from other sites is possible. Rupture of a tubo-ovarian abscess (15% of cases) represents a life-threatening surgical emergency. The presence of active infection differentiates tubo-ovarian abscesses from a sterile hydrosalpinx.
Prevalence: Roughly 30%–40% of patients hospitalized for PID have a tubo-ovarian abscess.
Predominant Age: Reproductive age; most common age 15–40 years.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Infection of the fallopian tube by ascending infection from sexually transmitted infections or vaginal flora. Less frequently, abscesses can form as secondary infections from gastrointestinal sources (inflammatory bowel disease, appendicitis), adnexal surgery, or hematologic spread.
Risk Factors: Multiple sexual partners, prior history of PID, uterine or cervical instrumentation, douching. Well-designed studies indicate that intrauterine contraceptive devices are not a risk factor for abscess, though they are associated with a slightly increased risk of pelvic infection during the first 3 weeks following insertion.

SIGNS AND SYMPTOMS

- Adnexal fullness and tenderness in the setting of a clinical diagnosis of PID
- Pelvic pain and tenderness (may be acute or indolent), muscular guarding, or rebound tenderness
- Fever (up to 39.5°C, 40%) or chills; may not be present (40%)
- Tachycardia, nausea, and vomiting
- Elevated white blood cell (WBC) count (in 25% of cases the WBC count is normal)
- Irregular vaginal bleeding or discharge
- Purulent cervical discharge may be present in PID but is not specific or required for the diagnosis of tubo-ovarian abscess

DIAGNOSTIC APPROACH

Differential Diagnosis

- Functional cysts (follicle, corpus luteum)
- Epithelial tumors (cystic or solid)
- Ovarian cysts
- Paratubal or paraovarian cysts
- Uterine leiomyomata
- Ectopic pregnancy
- Hydrosalpinx
- Endometrioma
- Appendiceal abscess

Associated Conditions: PID, septic shock, tubal factor infertility, ectopic pregnancy, and chronic abdominal pain.

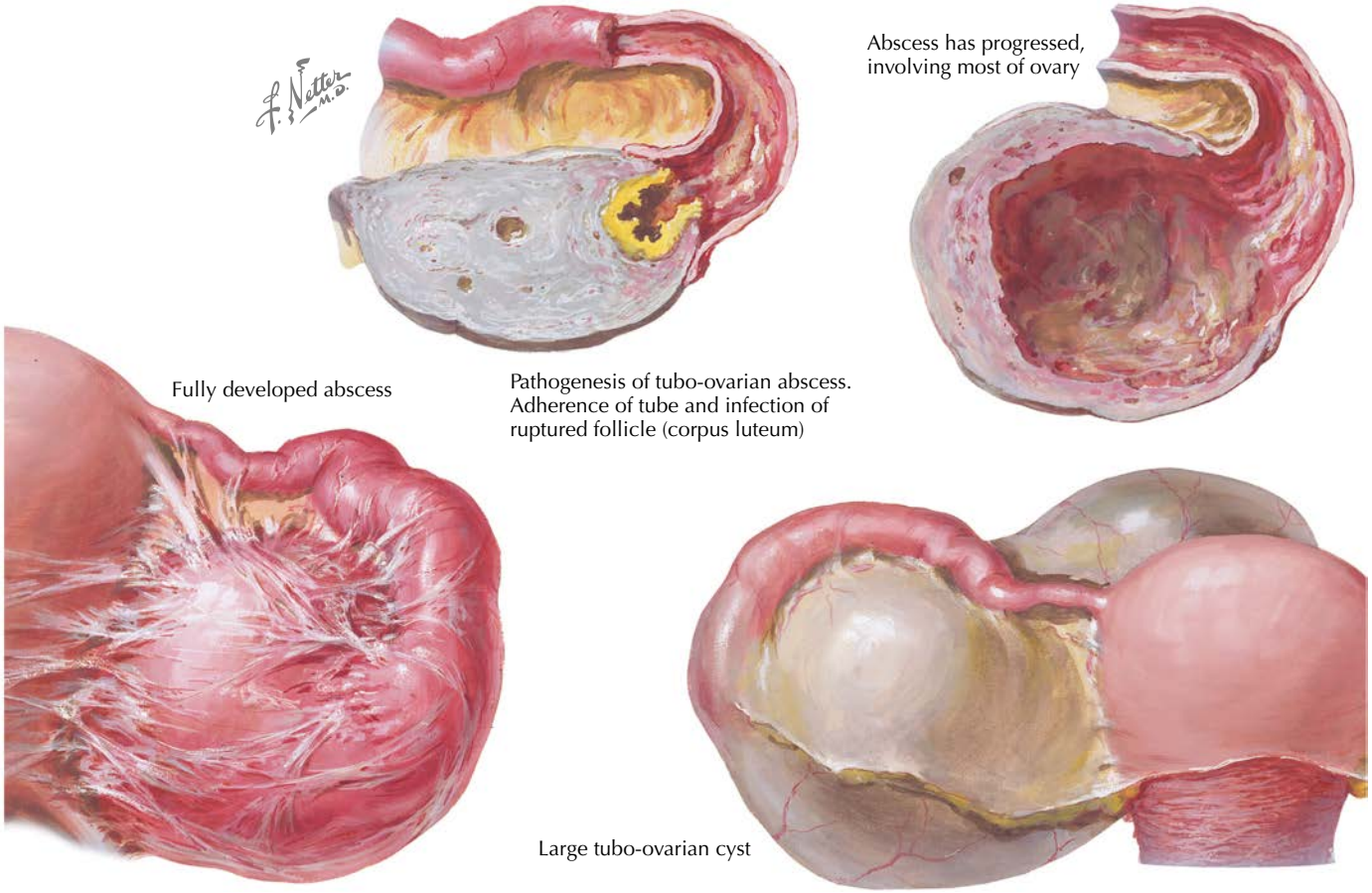

Figure 166.1 Progression of tubo-ovarian abscesses

Workup and Evaluation

Laboratory: As with PID: Complete blood count, including differential, WBC count, and erythrocyte sedimentation rate, blood culture. Cervical culture (although there is only a 50% correlation between cervical culture and upper-tract organisms) and Gram staining. Human immunodeficiency virus (HIV) screening should be undertaken in all patients suspected of having PID.

Imaging: Pelvic ultrasonography or computed tomography. Depending on local availability, imaging-guided drainage procedures are a possibility.

Special Tests: Diagnostic laparoscopy can confirm the diagnosis and establish access for surgical therapy.

Diagnostic Procedures: History and clinical characteristics. A definitive diagnosis of tubo-ovarian abscess is made with direct visualization of the abscess. Culture of the infected material is appropriate but does not inform immediate treatment.

Pathologic Findings

Tubo-ovarian abscesses are typically polymicrobial. Abundant signs of inflammation, focal necrosis, and microabscess and macroabscess cavities are found. Purulent exudates and tissue edema abound.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Aggressive medical and/or surgical therapy is required.

Specific Measures: High-dose broad-spectrum antibiotics for stable patients with adnexal masses less than 7 cm in diameter; early surgical intervention or image-guided aspiration to drain or remove the abscess for those who are sicker or do not quickly respond to antibiotics. Because of the different mechanism of disease and the possibility of malignancy, tubo-ovarian abscesses in postmenopausal patients should be managed surgically.

Diet: No specific dietary changes indicated except those dictated by the illness or plans for surgical intervention.

Activity: No restriction except those imposed by the illness.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Chlamydia, Gonorrhea, and Syphilis, 2021
- How to Prevent Sexually Transmitted Infections, 2020
- Pelvic Inflammatory Disease, 2019

Drug(s) of Choice

- Ceftriaxone 1 g IV every 24 hours plus doxycycline 100 mg every 12 hours PO or IV plus metronidazole 500 mg IV or PO every 12 hours is recommended
- Cefotetan 2 g IV every 12 hours or cefoxitin 2 g IV every 6 hours with doxycycline 100 mg every 12 hours PO or IV
- Once the patient is transitioned to ambulatory care:
  - Metronidazole 500 mg PO twice daily plus doxycycline 100 mg PO twice daily
  - Clindamycin 450 mg PO four times daily plus doxycycline 100 mg PO twice daily

Contraindications: See individual agents

Precautions: Doxycycline given orally has fewer side effects.

Alternative Therapies

- Ampicillin-sulbactam 3 g IV every 6 hours plus doxycycline 100 mg PO or IV every 12 hours
- Clindamycin 900 mg IV every 8 hours plus gentamicin 2 mg/kg loading dose IV or IM followed by 1.5 mg/kg every 8 hours

FOLLOW-UP

Patient Monitoring: Inpatient treatment and monitoring for 24–72 hours is necessary for all but the mildest cases. Close follow-up for improvement and resolution of symptoms while on antibiotics is necessary to inform the need for surgery. Daily WBC counts, and C-reactive protein levels may be helpful. Antibiotic treatment should be continued for 14 days. Serial ultrasonography to monitor resolution of the adnexal mass is appropriate.

Prevention/Avoidance: Prevention is based on prevention of PID (barrier contraception, safe sex practices), screening for those at risk, and aggressive treatment when PID is suspected. The partners of patients with tubo-ovarian abscesses thought to be related to PID should be screened for gonococcal, chlamydial, or HIV infections and treated accordingly.

Possible Complications: Rupture or leakage of a tubo-ovarian abscess may precipitate fulminant sepsis. Effective treatment with antibiotics, conservative surgery, or image-guided drainage may still leave significant pelvic scarring with attendant sequelae such as chronic pain, dyspareunia or dyschezia.

Expected Outcome: Antibiotic therapy alone is associated with a roughly 70% success rate.

MISCELLANEOUS

Pregnancy considerations: Often associated with reduced fertility and an increased risk of ectopic pregnancy. Once pregnancy is established, the risk of new infection and abscess formation is reduced because of obstruction of the upper genital tract by the gestation. Scarring from previous infections may cause pain when stretched by the enlarging uterus.

ICD-10-CM Codes: N70.93 (abscess of fallopian tube)

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TRANSITIONAL CELL (BRENNER) TUMOR 167

INTRODUCTION

Description: A transitional cell (Brenner) tumor is an epithelial tumor that is composed of cells that resemble urothelium and Walthard cell nests, intermixed with the ovarian stroma. Most Brenner tumors are benign (95%).

Prevalence: 1%–3% of ovarian tumors.

Predominant Age: 40–80 years; average age is 50 years.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown. Most are derived from ovarian surface epithelium that undergoes metaplasia to form the typical urothelial-like components.

Risk Factors: None known.

SIGNS AND SYMPTOMS

- Asymptomatic (often an incidental finding after oophorectomy)
- Adnexal mass, generally solid. Most are smaller than 2 cm and 6% are bilateral (unilateral lesions are more common in the left ovary).

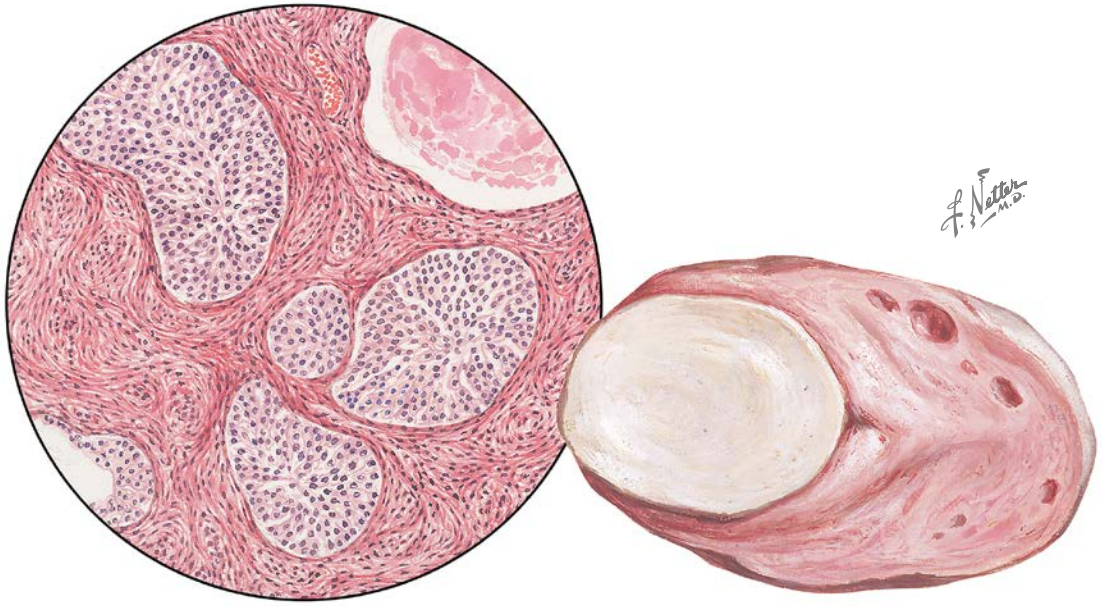

Figure 167.1 Brenner tumor

- Abdominal pain and swelling, with abnormal uterine bleeding (20%) if malignant disease. Malignant masses are more likely to be large (10–30 cm) and contain cystic areas. When the ovary is palpably enlarged, the risk for malignancy is approximately 5%.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Thecoma (fibroma)
- Stromal and germ cell tumors
- Endometrioma
- Benign cystic teratoma
- Serous or mucinous cystadenoma
- Metastatic tumors
- Pedunculated leiomyomata

Associated Conditions: Malignant tumors are associated with endometrial hyperplasia.

WORKUP AND EVALUATION

Laboratory: No specific evaluation indicated.
Imaging: No imaging indicated. Ultrasonography may be used to differentiate solid and cystic adnexal masses, but it does not establish the diagnosis.
Special Tests: None indicated.
Diagnostic Tests: Histopathologic evaluation.

Pathologic Findings

Cells that resemble transitional epithelium of the bladder and Walthard cells of the ovary with abundant stroma. The cut surface of the tumor is generally whorled or lobulated. The nests of cells often demonstrate nuclei with obvious nucleoli-containing longitudinal grooves, giving them a "coffee-bean" appearance. Atypia and mitoses are rare. Occasionally, small transitional cell tumors may be found in the walls of otherwise-typical mucinous cystadenomas. Atypical or malignant forms may be associated with similar bladder tumors.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and diagnosis.
Specific Measures: Simple surgical excision. When changes associated with borderline malignant potential are present, bilateral oophorectomy with hysterectomy is sufficient, and unilateral oophorectomy may be considered in younger patients.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Ovarian Cancer, 2019
- Ovarian Cysts, 2021

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: The rare malignant form has a poor prognosis despite surgical therapy. Chemotherapy has not been proved to be effective.
Expected Outcome: Most Brenner tumors are benign and are cured by simple oophorectomy.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: D27.9 (Benign neoplasm of unspecified ovary), D39.10 (Neoplasm of uncertain behavior of unspecified ovary), C56.9 (Malignant neoplasm of unspecified ovary).

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SECTION X

Breast Diseases and Conditions

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ACCESSORY NIPPLES (POLYTHELIA)

168

INTRODUCTION

Description: Accessory nipples are supernumerary nipples found along defined developmental lines known as the "milk lines."
Prevalence: Observed in 0.22%–2.5% of women and in up to 5%–6% of Asian women.
Predominant Age: Congenital in origin. Present in 1% of births (both males and females)
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Developmental abnormality.
Risk Factors: More common in males and in African-Americans.

SIGNS AND SYMPTOMS

- Asymptomatic.
- Most commonly found below a normal left breast. It is more common to have one or more extra nipples (polythelia) than to have true accessory breasts (polymastia). When accessory breast tissue is present, it is most often found in the axilla.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Skin papilloma
- Nevis

Associated Conditions: Polymastia, duplicate renal arteries.

WORKUP AND EVALUATION

Laboratory: No evaluation indicated.
Imaging: No imaging indicated. Some advocate ultrasonographic evaluation of the renal system for possible associated anomalies.
Special Tests: None indicated.
Diagnostic Procedures: History, physical examination.

Pathologic Findings

None.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and reassurance.
Specific Measures: None. Rarely, accessory breast tissue is surgically excised because of symptomatic swelling with the menstrual cycle or pregnancy, for cosmetic reasons, or to reduce the small risk of fibroma or other tumor formation.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Benign Breast Conditions, 2021

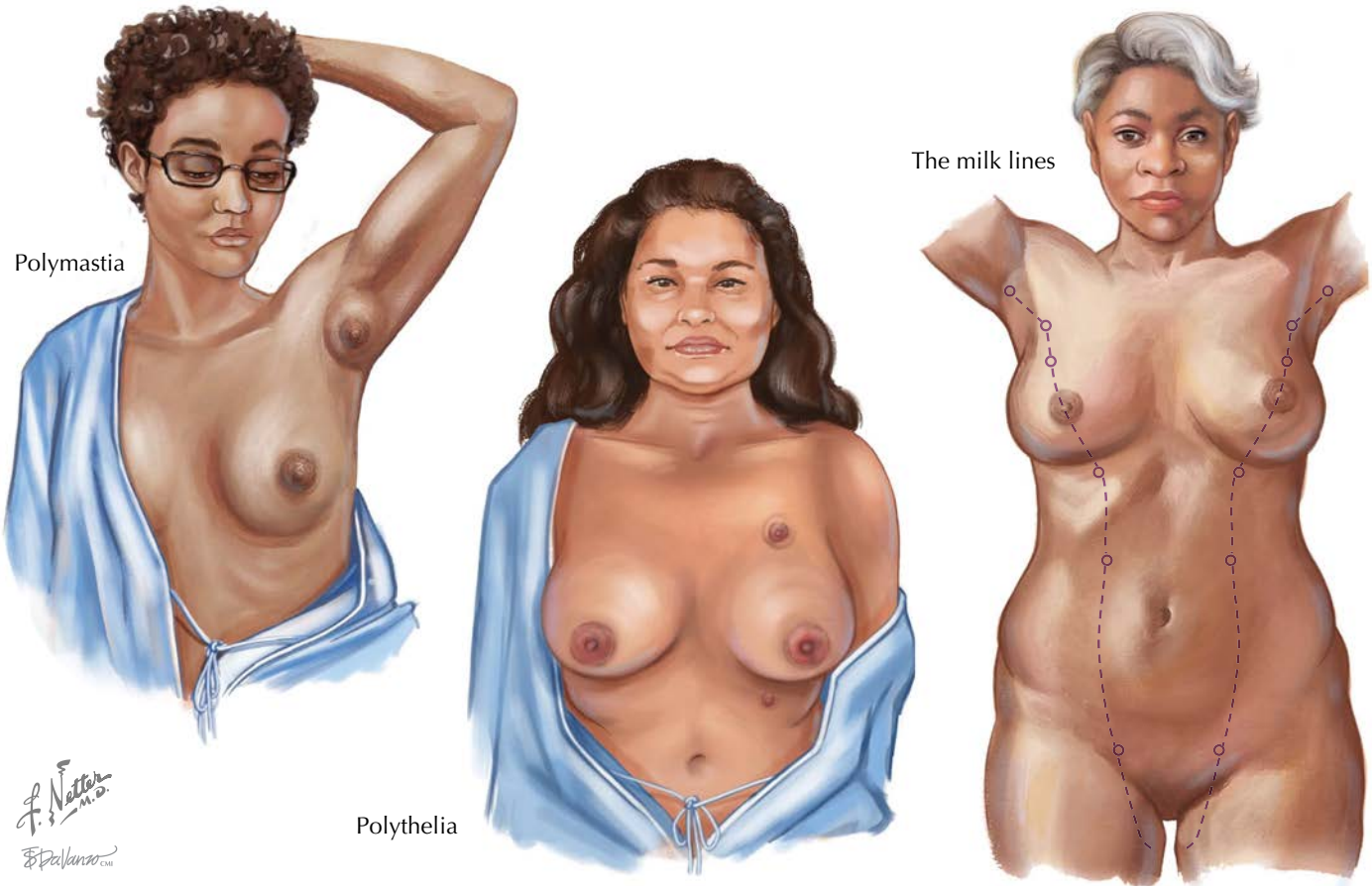

Figure 168.1 Accessory nipples (polythelia and polymastia)

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy, although occasionally accessory nipples or breast tissue undergo hypertrophy during pregnancy.
ICD-10-CM Codes: Q83.3 (Accessory nipple) and Q83.1 (Accessory breast).

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169 *BRCA1* AND *BRCA2* MUTATIONS

THE CHALLENGE

Description: In normal cells, the *BRCA1* and *BRCA2* genes encode for double-strand DNA repair proteins that keep the cells from abnormally growing. Although hundreds of mutations to these genes have been identified, only a limited number are associated with an increased tumor risk. A lack of *BRCA1* function seems to lead to nonfunctional X-chromosome inactivation, preferentially leading to breast and ovarian cancers. When abnormal, these genes are the most common cause of hereditary breast cancer. Breast cancers linked to these mutations occur in younger women and more often affect both breasts. Women with these inherited mutations also have an increased risk for developing ovarian (5-fold increase) and fallopian tube cancer (up to a 30-fold increase). In males, *BRCA* mutations can increase the risk of other cancers, such as colon, pancreatic, and prostate cancer.
Scope of the Problem: Up to 20% of women with a family history of breast cancer have a mutation in a major gene, most often in the breast cancer susceptibility genes, *BRCA1* and *BRCA2.* Mutations are more common in Jewish people of Ashkenazi (Eastern Europe) origin than in other racial and ethnic groups (mutation frequency approximately is 1/400 unselected patients). Women with *BRCA1* mutations have a 60% lifetime risk for breast cancer, and *BRCA2* mutations carry an 85% risk for breast cancer and up to 30% risk for ovarian cancer. In some families with *BRCA1* mutations, the lifetime risk for breast cancer is as high as 80%. Only 5%–10% of patients with breast cancer have a family history of breast cancer.
Objectives of Management: To identify patients for whom *BRCA* gene testing is warranted and to provide appropriate counseling on the basis of those test findings.

TACTICS

Relevant Pathophysiology: *BRCA1/2* genes are tumor suppressor genes that produce proteins used in an enzymatic pathway that makes very precise, perfectly matched repairs to DNA that has double-stranded breaks. The pathway requires proteins produced by several other genes, including *CHK2, FANCD2,* and *ATM.* Harmful mutations in any of these genes disable the gene or the protein that it produces, allowing harmful DNA breaks to accumulate. Because they are inherited, these mutations are classified as hereditary or germline rather than acquired or somatic.
Strategies: Genetic counseling is commonly recommended to people whose personal or family health history suggests a greater than average likelihood of a mutation. Based on the likelihood of a positive result, risks and benefits of being tested, limitations of the tests, practical meaning of the results, and risk-reducing actions that could be taken if the results are positive can be determined. Relative indications for testing for a mutation in *BRCA1* or *BRCA2* include a family history among first-, second-, or third-degree relatives in either lineage with any of the conditions shown in Box 169.1. A positive test

BOX 169.1 Familial Historical Indicators Suggestive Of Increased Risk For *BRCA1* Or *BRCA2* Mutations

- Breast cancer below the age of 50 years
- Two or more relatives with breast cancer; one under the age of 50 years
- Three or more relatives with breast cancer at any age
- Multiple (metachronous or otherwise) breast cancers in an individual
- Triple-negative breast cancers (little or no expression of the estrogen receptor [ER-] and progesterone receptor [PR-] and no increased epidermal growth factor receptor 2 [HER2]) below the age of 60 years
- Male breast cancer at any age
- Invasive ovarian, fallopian tube, or primary peritoneal cancer in one or more relatives
- Pancreatic and/or prostate cancer (particularly aggressive types) at any age in two or more relatives
- Ashkenazi Jewish ancestry
- A previously identified *BRCA1* or *BRCA2* mutation in the family

result for a known deleterious mutation is a proof of a predisposition but does not guarantee that the person will develop cancer. Similarly, a negative test result shows that the person does not have a *BRCA*-related predisposition for cancer but does not guarantee against a nonhereditary cancer (the majority of such cancers). For those with a positive result, enhanced screening or the implementation of prophylactic medical or surgical strategies should be considered. This may include a breast magnetic resonance imaging alternating with normal breast imaging every 6 months, beginning between ages 20 and 30 years, depending on the youngest age at which any relatives were diagnosed with breast cancer. Ovarian cancer screening currently consists only of pelvic examination and ultrasonography every 6–12 months. Screening with serum markers, such as CA-125, has not been proven effective because of an unacceptable false-positive rate.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Benign Breast Conditions, 2021
- Mammography and Other Screening Tests for Breast Problems, 2017

IMPLEMENTATION

Special Considerations: Although *BRCA* testing is covered by many health insurance policies, the long-term impact on insurance coverage in the face of a positive test is unclear.

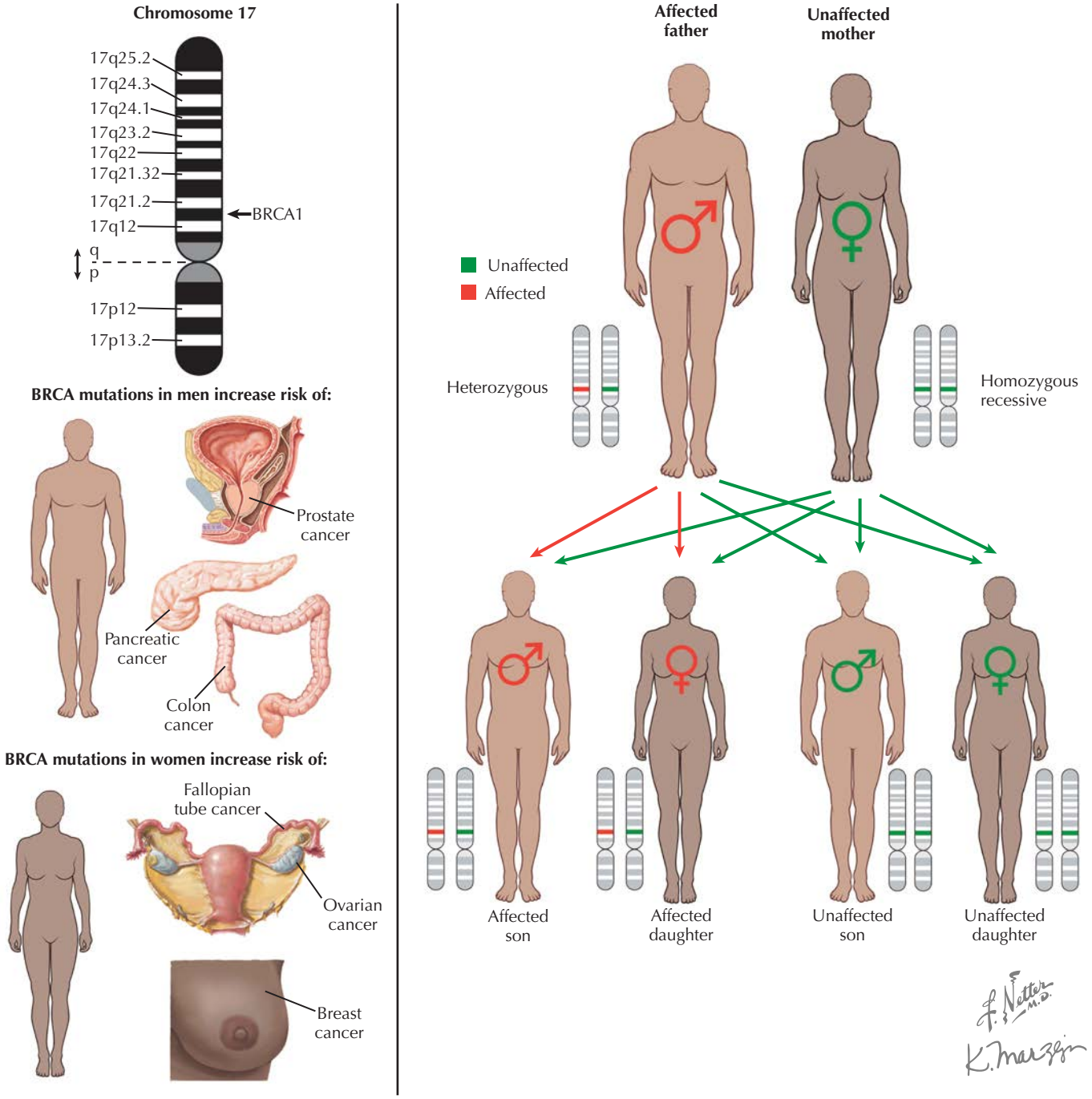

Figure 169.1 *BRCA1* and *BRCA2* mutations

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170 BREAST CANCER

INTRODUCTION

Description: Breast cancer is a malignant neoplasm of the breast that is classified with respect to the cell type, location, and degree of invasion. Breast cancer is the second most common malignancy in women (second to skin cancers), accounting for almost one-third of all women's malignancies. Breast cancer accounts for approximately 18% of cancer deaths (second to lung cancer) and results in approximately the same number of deaths per year as auto accidents.

Prevalence: Lifetime risk of one in eight by the age of 90 years; lifetime risk of death is 13%; more than 287,850 new cases and 43,250 deaths annually (2022).

Predominant Age: Of all breast cancer cases, 85% occur after the age of 40 years and 75% occur after the age of 50 years, median age 62 years.

Genetics: Women with *BRCA1* mutations have a 60% lifetime risk for breast cancer (*BRCA2* mutations carry an 85% risk for breast cancer and up to 20% risk for ovarian cancer). Only 5%–10% of patients with breast cancer have a family history of breast cancer. African-American women have a lower incidence of breast cancer, but they have a higher mortality rate. Mutations in other genes (*ATM, TP53, CHEK2, PTEN,* and others) also may convey increased risk.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown.

Risk Factors: First-degree relative with breast cancer (relative risk [RR] = 2.3; RR = 10.5 with bilateral disease), moderate alcohol use (3–5 drinks/day, RR = 1.41), early menarche, late menopause, nulliparity, or late first pregnancy (older than 30 years), prior history of breast cancer (5%/year), estrogen use (RR = 1.12). Only 21% of patients with breast cancer who are aged 30–54 years are identified by risk factors. Abortion, caffeine use, and breast implants do not affect the risk for breast cancer.

SIGNS AND SYMPTOMS

- Palpable mass (55%); 60% located in the upper outer quadrant of the breast
- Abnormal mammogram without a palpable mass (35%)
- Skin change—color or dimpling (peau d'orange)
- Nipple retraction, nipple discharge (bloody or otherwise]), skin changes, or ulceration are late occurrences and portend a bad prognosis
- Axillary mass
- Breast pain is present in fewer than 10% of women with early breast cancer

DIAGNOSTIC APPROACH

Differential Diagnosis

- Benign breast disease (abscess, fat necrosis, fibrocystic disease, fibroadenomas).

Associated Conditions: Metastatic spread to other organs (bone, brain, and ovaries).

Workup and Evaluation

Laboratory: Complete blood count and assessment of liver and bone enzymes after diagnosis is made.

Imaging: Mammography (detects 80% of all tumors), ultrasonography (may help to differentiate between solid and cystic masses), bone scan, and chest radiograph after diagnosis is established. Preinvasive breast cancer now accounts for 25%–30% of all mammographically detected breast cancers. Evidence suggests that for women with a lifetime risk that exceeds 20%, magnetic resonance imaging as an adjunct to screening is beneficial. Digital radiography, thermal imaging (thermography), transillumination, mammoscintigraphy, ductography, and other techniques have not been shown to be comparable or superior to mammography.

Special Tests: Fine needle aspiration of cells from a breast mass can provide histologic confirmation of malignancy and help direct definitive therapy.

Diagnostic Procedures: Up to one-fourth of all breast cancers are detected during routine examination. Excisional biopsy with or without radiographic control provides the only definitive diagnosis.

Pathologic Findings

Based on the cell type. At the time of diagnosis, 70% of breast cancers show signs of invasion. Ductal carcinoma is the most common type, accounting for 65%–85% of cases.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and staging. If surgical treatment affects pectoralis muscles, physical or occupational therapy may speed return to function.

Specific Measures: Surgical resection with or without adjunctive chemotherapy.

Diet: Moderation in alcohol use recommended to reduce risk.

Activity: No restriction.

Patient Education: Instruction on breast self-awareness.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Benign Breast Conditions, 2021
- Mammography and Other Screening Tests for Breast Problems, 2017

Drug(s) of Choice

- Adjuvant chemotherapy considered for stages I and II disease (cyclophosphamide, methotrexate, fluorouracil, anthracyclines, or taxanes, single agent or in combination).

Contraindications: Strict guidelines for hepatic and renal function before chemotherapy.

Precautions: Increased risk of infection during chemotherapy.

Alternative Therapies

- Adjunctive or palliative radiotherapy is often recommended.
- Agents that suppress cancer growth by interfering with surface proteins that are involved with cell division are under evaluation. An example of this approach is trastuzumab (Herceptin). Ribociclib (Kisqali, Kryxana) is an inhibitor of cyclin *D1/CDK4* and *CDK6* and is used for the treatment of certain kinds of breast cancer.
- A number of studies suggest that estrogen therapy (for other indications) can actually reduce the mortality of patients who are being treated for breast cancer.

FOLLOW-UP

Patient Monitoring: Watch for recurrence (60% risk in first 5 years).

Prevention/Avoidance: Reduced dietary fat and alcohol have been suggested, but effects are unproven. Routine mammography. Prophylactic use of tamoxifen was approved by the US Food and Drug Administration late in 1998 for use in women at high risk. Selective estrogen receptor modulators and aromatase inhibitors have been effective in reducing the incidence of recurrence or the development of primary lesions for those at increased risk. Prophylactic mastectomy for those at highest risk should be considered.

Possible Complications: Postoperative lymphedema, seroma, wound infections, or breakdown. Chemotherapy is associated with nausea, vomiting, alopecia, leukopenia, stomatitis, fatigue, and infections. Tamoxifen therapy is associated with hot flashes, menstrual irregularity, endometrial hyperplasia, or carcinoma. Radiotherapy associated with fibrosis and scarring, brachial neuropathy, and pulmonary fibrosis.

Expected Outcome: Breast cancer disseminates through vascular and lymphatic routes, in addition to direct infiltration. Many view breast cancer as a multifocal disease. Breast cancer survival depends less on a cell type than it does on the size of the tumor and stage of disease. The 10-year survival rate is based on the stage: stage I, 95%; stage II, 40%; stage III, 15%; and stage IV (metastatic), 0%. More than 60% of cases are stage I at diagnosis.

MISCELLANEOUS

Pregnancy Considerations: Breast cancer occurs infrequently during pregnancy, accounting for only 2%–3% of all cancers: no effect on pregnancy. Pregnancy often results in a delay in diagnosis but does not appreciably affect clinical course.

ICD-10-CM Codes: C50.XXX (subcodes based upon gender and location), Z17.0 (Estrogen receptor positive status [ER+]), and Z17.1 (Estrogen receptor negative status [ER–]).

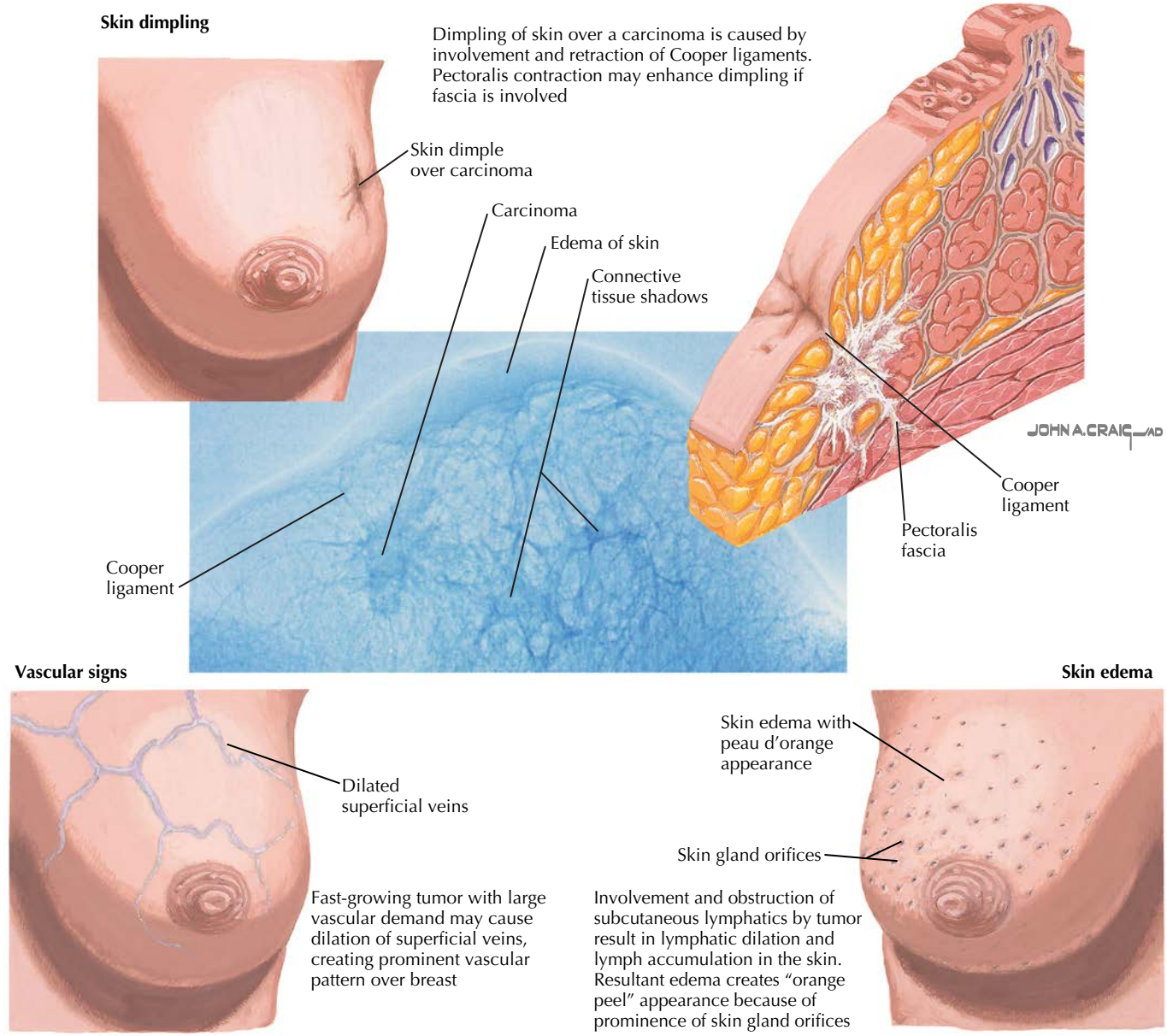

Figure 170.1 Clinical signs of breast cancer

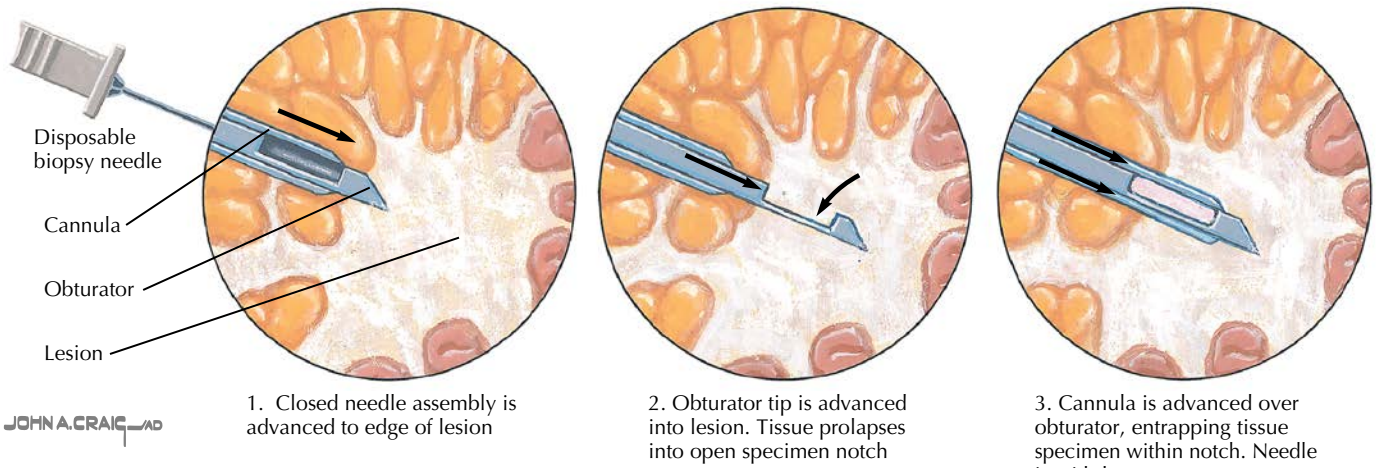

Figure 170.2 Needle breast biopsy

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171 BREAST CYST

THE CHALLENGE

Cystic breast masses are frequently encountered during the clinical care of women. The challenge is sorting out those that represent a threat from those that may be conservatively followed up.

Scope of the Problem: Some authors estimate that cysts form in the breasts of approximately 50% of women during their reproductive years. Roughly one in four women requires medical attention for some form of breast problem; often this takes the form of a palpable mass. The most common cause of a palpable breast cyst is fibrocystic change, which is estimated to be found in one-third to three-fourths of all women. Dilation of ducts and complications of breastfeeding (galactoceles, abscess) may also cause cysts. About 70% of cysts will regress in 5 years.

Objectives: To appropriately diagnose and treat patients with a cystic breast, allay fear, and protect health.

TACTICS

Relevant Pathophysiology: The pathogenesis is not clear for the most common types of cystic changes (those associated with fibrocystic change). Cyclic changes in hormones induce stromal and epithelial changes that may lead to fibrosis and cyst formation. Cysts may be single or in clusters, with some as large as 4 cm in diameter. Small cysts have a firm character and are filled with clear fluid, giving the cyst a bluish cast. Larger cysts may have a brown color resulting from hemorrhage into the cyst. Inspissated secretions or milk may form a cystic dilation of ducts (galactocele, ductal ectasia) that may be palpable as a cystic mass. Variable degrees of fibrosis and inflammation may be seen in the surrounding stroma. Leakage of cyst fluid into the surrounding tissue induces an inflammatory response that may alter physical findings and imitate cancer. The microscopic findings associated with breast cysts depend on the pathophysiologic changes involved.

Strategies: The diagnosis and management of cystic masses in the breast are based on history, physical examination, and aspiration, with the occasional adjunctive use of mammography and ultrasonography. (Ultrasonography is useful in differentiating solid and cystic breast masses, but it has limited spatial resolution and cannot be used to differentiate benign and malignant tissues). Needle aspiration with a 22- to 25-gauge needle may be both diagnostic and therapeutic. If the cyst disappears completely and does not re-form by 1-month follow-up examination, no further therapy is required. Fluid aspirated from patients with fibrocystic changes is customarily straw colored. Fluid that is dark brown or green occurs in cysts that have been present for a long time, but it is innocuous. Bloody fluid requires further evaluation. Cytologic evaluation of the fluid obtained is of little value. After aspiration of a cyst, the patient should be rechecked in 2–4 weeks. Recurrence of the cyst or the presence of a palpable mass should prompt additional evaluation, such as fine needle aspiration, core biopsy, or open biopsy.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Benign Breast Conditions, 2021
- Mammography and Other Screening Tests for Breast Problems, 2017

IMPLEMENTATION

Special Considerations: Whereas most cystic changes in the breast are not associated with malignancy and are not premalignant, the presence of atypia in any of the cellular components requires special attention because this is associated with an approximately 5-fold increased risk for malignancy. In women older than 35 years, mammography before aspiration should be considered because of the increased incidence of malignancy. Once aspiration has been attempted, mammography should be delayed by several weeks because of artifactual changes induced by the manipulation, making mammograms difficult to interpret. Patients with a history of multiple cysts or diffuse fibrocystic change or a strong family history of breast disease should have close follow-up, including mammography, to delve for other occult lesions.

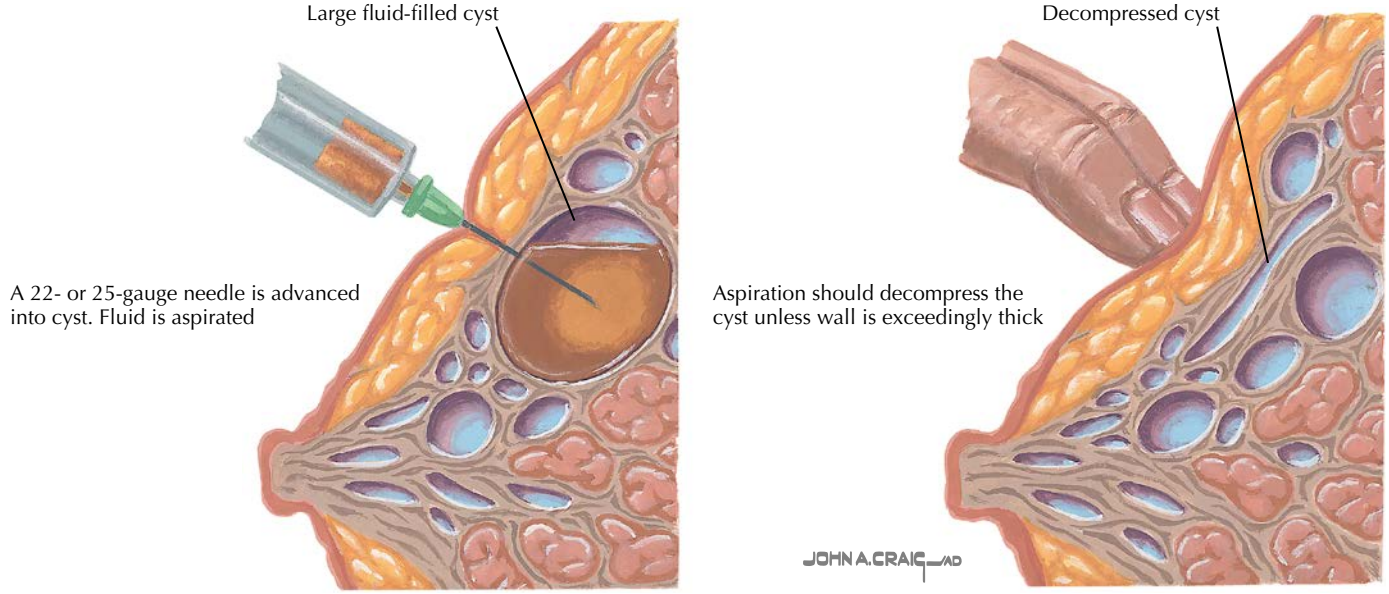

Figure 171.1 Aspiration of breast cyst

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BREAST DUCT ECTASIA

172

INTRODUCTION

Description: Duct ectasia is the dilation of the ducts of the breast with the inspissation of normal secretions, arising from chronic intraductal and periductal inflammation.
Prevalence: Relatively common in asymptomatic form. Up to one-third of cases of pathologic nipple discharge.
Predominant Age: Older than 50 years, although it may occur in children and adolescents.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Chronic intraductal and periductal inflammation.
Risk Factors: Mastitis, breast abscess, chronic irritation.

SIGNS AND SYMPTOMS

- Thick gray to black sticky nipple discharge
- Pain and nipple tenderness
- Thickening is often present and may be difficult to distinguish from cancer (firm, rounded, and fixed, with skin retraction)
- Nipple retraction common (ductal ectasia is the most common cause of an acquired nipple inversion)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Galactocele
- Lipoma
- Fibrocystic change
- Fibroadenoma
- Breast abscess

Associated Conditions: Mastitis, galactocele, and nipple discharge.

Workup and Evaluation

Laboratory: No evaluation indicated. Nipple smear cytology is of limited diagnostic accuracy and is not recommended.
Imaging: No imaging indicated. If performed, ultrasonography will demonstrate the cystically dilated ducts.
Special Tests: None indicated.
Diagnostic Procedures: History and physical examination. Biopsy confirms the diagnosis. The characteristic discharge may be easily demonstrated during clinical examination.

Pathologic Findings

Dilation of the ducts with the atrophy of the epithelium, thickening of the underlying wall, and inflammatory reaction in the duct wall and surrounding tissue.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and reassurance. If pain is present, warm compresses and good support may provide relief.
Specific Measures: No further therapy is needed unless warranted by the patient's symptoms. When therapy is required, surgical excision with a cone of tissue surrounding the duct is curative.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Instruction on breast self-awareness.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Benign Breast Conditions, 2021
- Mammography and Other Screening Tests for Breast Problems, 2017

Drug(s) of Choice

- Dexamethasone combined with metronidazole has shown efficacy when used in combination.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.

Possible Complications: Secondary infection, mastitis, and abscess formation.
Expected Outcome: Gradual resolution of symptoms, complete resolution with surgical excision.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: N60.49 (Mammary duct ectasia of unspecified breast).

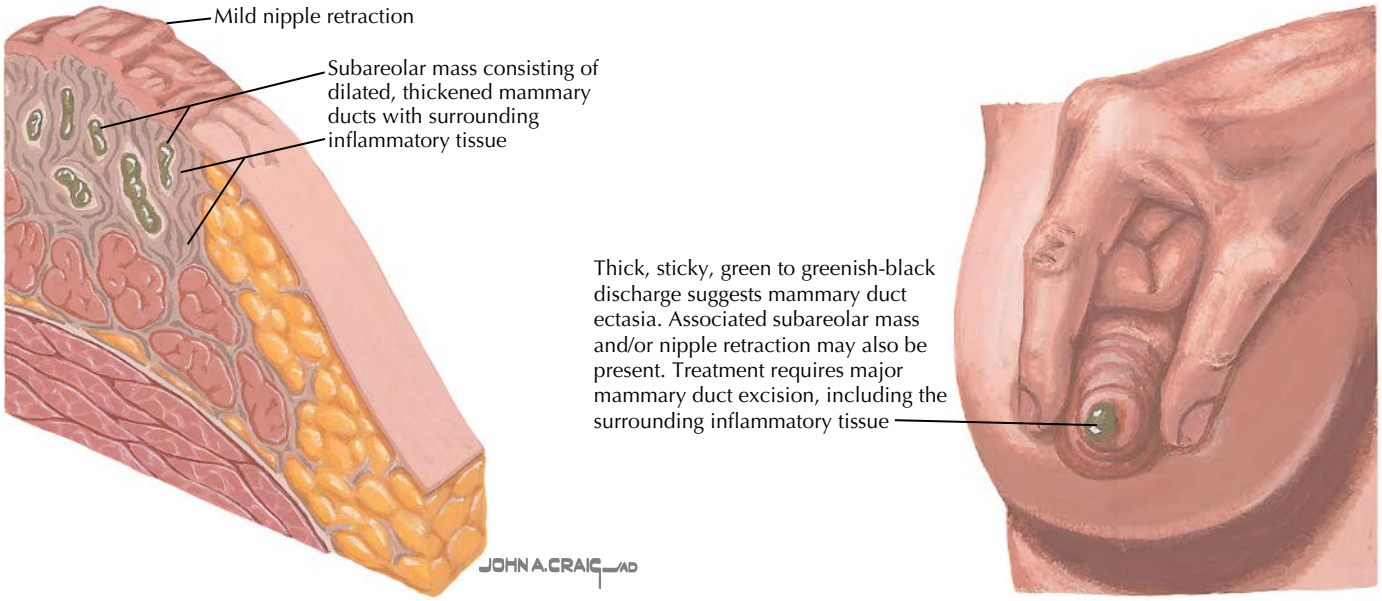

Figure 172.1 Breast (mammary) duct ectasia

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BREAST FAT NECROSIS

INTRODUCTION

Description: Trauma to the breast may result in necrosis of fatty tissues, leading to an ill-defined mass that can mimic cancer.
Prevalence: Uncommon. Fat necrosis manifests in 0.8% of breast tumors and 1%–9% of breast reduction surgeries.
Predominant Age: Reproductive age. Most at risk are middle-aged women; peak age 50 years.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Fat necrosis is most often the result of trauma, although the causative event cannot be identified (or recalled) in approximately half of patients. May also follow surgical intervention in the breast, such as biopsy or augmentation, or after radiation therapy for other indications.
Risk Factors: Trauma to the breast.

SIGNS AND SYMPTOMS

- Solitary, irregular, ill-defined, tender mass that is easily confused with cancer
- Skin retraction sometimes present
- Fine, stippled calcification and stellate or infiltrative fibrosis often seen on mammograms

DIAGNOSTIC APPROACH

Differential Diagnosis

- Cancer
- Lipoma
- Fibroadenoma
- Phyllodes tumor
- Tuberculosis of the breast

Associated Conditions: Mastalgia.

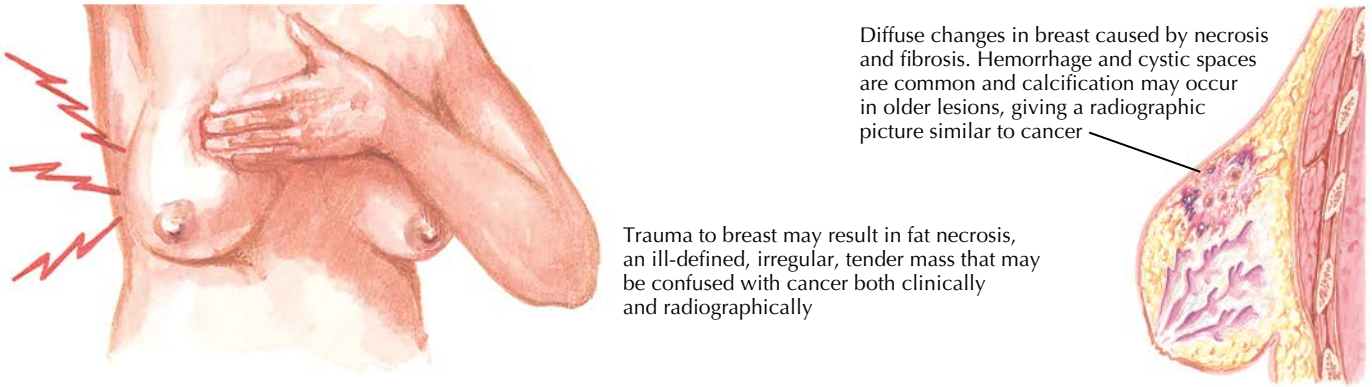
Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: Mammography findings mimic those of cancer. Ultrasonography or magnetic resonance imaging may add additional information, but definitive diagnosis requires histologic evaluation.
Special Tests: Open biopsy often required to establish the diagnosis.
Diagnostic Procedures: Even with a history of trauma, the commonality of findings between fat necrosis and cancer with physical examination, mammography, and ultrasonography generally mandates further evaluation and biopsy.

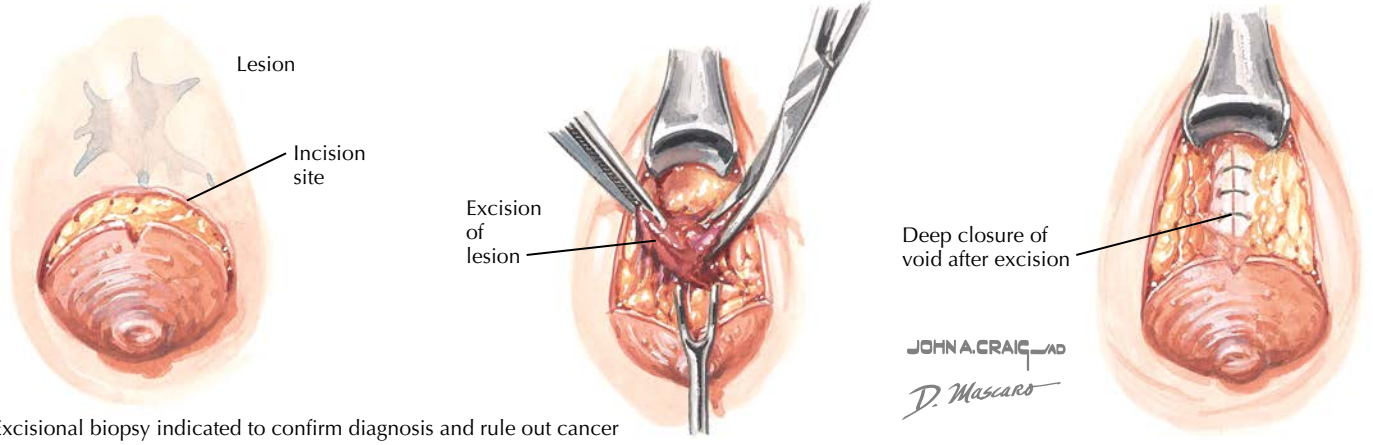
Pathologic Findings

Diffuse changes consistent with necrosis and fibrosis of tissue. Hemorrhage and cystic spaces ("oil cysts") are common

Fat Necrosis of Breast



Excision Biopsy for Fat Necrosis



Excisional biopsy indicated to confirm diagnosis and rule out cancer

Figure 173.1 Appearance and excisional biopsy for fat necrosis

early in the process. Calcification of older lesions may occur. Histiocytic foam cells with mitotic figures and pleomorphism are common.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation.
Specific Measures: Core or excisional biopsy.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Instruction on breast self-awareness.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Benign Breast Conditions, 2021
- Mammography and Other Screening Tests for Breast Problems, 2017

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Normal health maintenance, periodic mammography screening.
Prevention/Avoidance: Minimize the risk of trauma.
Possible Complications: Pain, infection, or breast deformity. An occult malignancy may be missed if a mass is presumed to be fat necrosis without tissue evaluation for confirmation.
Expected Outcome: With excision, complete resolution.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: N64.1 (Fat necrosis of breast).

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174 BREAST FIBROADENOMA

INTRODUCTION

Description: Fibroadenomas are the second most common form of breast disease and the most common breast mass.
Prevalence: 2%–3% of women (some state as many as 25% of all women).
Predominant Age: 15–35 years; most are younger than 30 years.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown.
Risk Factors: Twice as common in Black women (30% of breast complaints), patients with high hormone states (adolescence, pregnancy), and patients undergoing unopposed estrogen therapy.

SIGNS AND SYMPTOMS

- Firm, painless, mobile, rubbery, solitary breast mass that may grow rapidly during adolescence or in high estrogen states (pregnancy, estrogen therapy)
- Usually discovered incidentally or during breast self-examination and average 2–3 cm in diameter; fibroadenomas may grow to as large as 6–10 cm
- Multiple fibroadenomas in 15%–20% of patients; bilateral in 10%–20% of patients
- Generally do not undergo cyclic change

DIAGNOSTIC APPROACH

Differential Diagnosis

- Fibrocystic change

- Solitary cyst

Associated Conditions: None.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: Mammography is generally avoided but can be diagnostic if needed. Breast ultrasonography can distinguish between solid and cystic masses, although it is often not required.
Special Tests: Fine needle aspiration or core biopsy of the mass may be performed in the office.
Diagnostic Procedures: History and physical examinations.

Pathologic Findings

Centrifugal nodule with sharply circumscribed, fleshy, and homogeneous character, usually spherical or ovoid in shape. Pink or tan-white fibrous whorls bulge from the surface when cut. Hemorrhagic infarcts are common. The mass is made up of glandular and fibrous tissue.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Reassurance and observation may be sufficient for small, asymptomatic tumors.

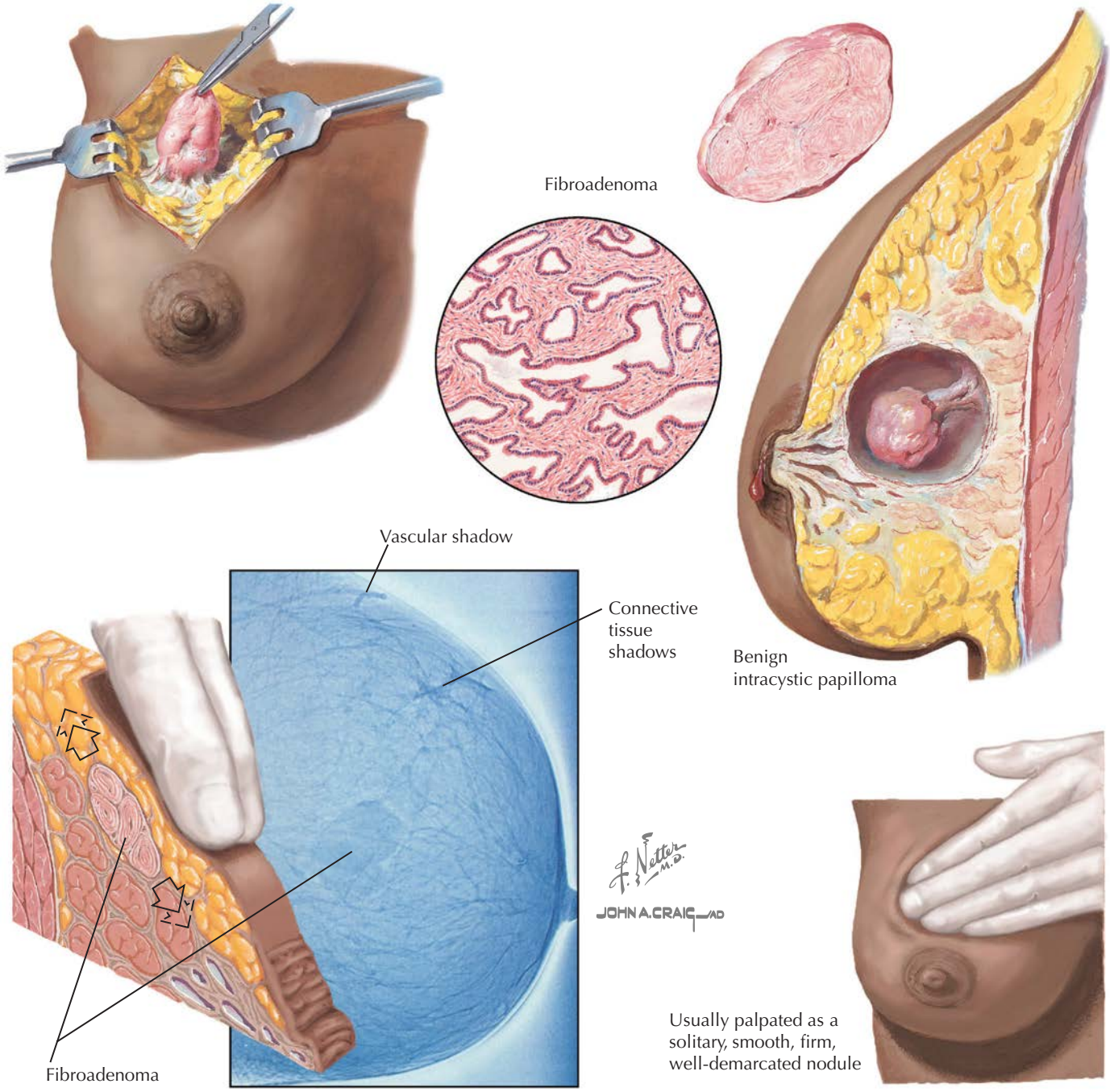

Figure 174.1 Fibroadenoma

Specific Measures: Primary therapy is surgical excision, although metformin, tamoxifen, and danazol have been used. Cryoablation therapy has been evaluated but has not displaced surgery as the primary management.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Instruction on breast self-awareness.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Benign Breast Problems and Conditions, 2021
- Mammography and Other Screening Tests for Breast Problems, 2017

Drug(s) of Choice

- Danazol sodium 50–200 mg PO twice a day (therapy should start during menstruation or pregnancy must be ruled out). Side effects may be significant, and recurrence is likely after therapy is discontinued.

Contraindications: Danazol sodium is contraindicated in pregnancy (Category X drug). It may also worsen epilepsy, migraine headaches, and cardiac or renal function.
Interactions: Danazol sodium may prolong prothrombin time in patients receiving warfarin.

Alternative Drugs

- Tamoxifen and metformin have been advocated in some studies.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: Combination oral contraceptives provide some protection when taken for more than 1 year.
Possible Complications: Hemorrhage into the fibroadenoma may result in pain or rapid growth of the tumor. Malignant change is extremely rare.
Expected Outcome: Lesions tend to grow over time without treatment. Prognosis with surgical excision is excellent and fair with medical therapy. After menopause, fibroadenomas tend to regress and become hyalinized, but they may remain unchanged or grow with estrogen therapy.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy; fibroadenomas may grow rapidly during pregnancy.
ICD-10-CM Codes: N60.2 (Fibroadenoma of breast).

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175 BREAST INTRADUCTAL PAPILLOMA

INTRODUCTION

Description: Intraductal papilloma involves polypoid fibrovascular tumors that are covered by benign ductal epithelium and that arise in the ducts of the breast.
Prevalence: Found in 0.4% of the general population and up to 20% of women older than 70 years.
Predominant Age: Median age is 40 years; most common just before menopause.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown.
Risk Factors: None known.

SIGNS AND SYMPTOMS

- Spontaneous, intermittent, bloody, serous, or cloudy unilateral nipple discharge (approximately 50%–75% of patients), varying from a few drops to a few milliliters of fluid; serosanguineous or

bloody nipple discharge is associated with malignancy in between 7%–17% of cases, but the color or clarity of the fluid cannot diagnose or rule out carcinoma
- Sense of fullness below the nipple, relieved by the passage of discharge
- Mass rare—tumors from 2–5 mm in diameter typically are not palpable

DIAGNOSTIC APPROACH

Differential Diagnosis

- Breast cancer
- Galactocele
- Ductal ectasia
- Fibrocystic change

Associated Conditions: Fibrocystic change, fibroadenoma.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: Ductogram or galactogram is diagnostic.
Special Tests: Cytologic evaluation of the nipple discharge is associated with a false-negative result rate of almost 20% and thus is of little value.
Diagnostic Procedures: History, physical examination, and excisional biopsy.

Pathologic Findings

A pedunculated wart-like proliferation of duct epithelium that generally arises within 1 cm of the areola and rarely is greater than 5 mm in size. The associated duct is generally dilated. The epithelium is friable, with a delicate villus structure made up of fibrovascular tissue covered by epithelial cells. Intraductal papilloma is difficult to differentiate from papillary carcinoma, especially on frozen section.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and reassurance.
Specific Measures: Intraductal papillomas are most often benign, but the similarity of symptoms to those of carcinoma and a sometimes-confusing histologic picture mandate excisional biopsy for most patients. If core biopsy has established that there is no atypia present, conservative management is now being considered.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Benign Breast Conditions, 2021
- Mammography and Other Screening Tests for Breast Problems, 2017

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: Atypia of the epithelial cells may rarely occur and increases the possibility of malignancy.
Expected Outcome: Surgical excision is both diagnostic and therapeutic.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: N60.2 (Fibroadenosis of breast), D24.X (Benign neoplasm of breast; Right breast X = 1, Left breast X = 2, Unspecified side X = 9)

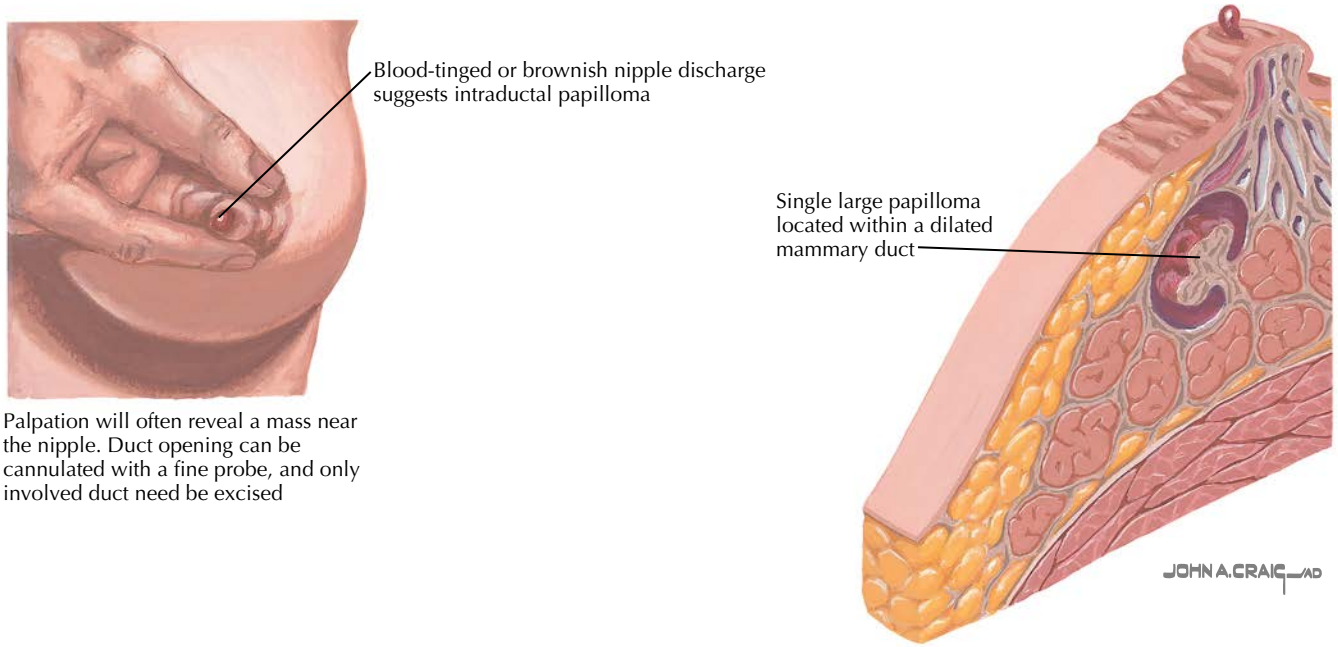

Figure 175.1 Solitary intraductal papilloma

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176 FIBROCYSTIC BREAST CHANGE

INTRODUCTION

Description: Fibrocystic breast changes are characterized by stromal and ductal proliferation that results in cyst formation, diffuse thickening, cyclic pain, and tenderness. The term *fibrocystic change* encompasses a multitude of different processes and older terms, including fibrocystic disease. It is the most common of all benign breast conditions, accounting for its linguistic demotion to "change" from the designation "disease."

Prevalence: 60%–75% of all women.

Predominant Age: Most common between the ages of 30–50 years; 10% of women younger than 21 years.

Genetics: A family history of fibrocystic change is often present, but causality is difficult to establish.

ETIOLOGY AND PATHOGENESIS

Causes: The cause or causes of fibrocystic change are unknown, but it is postulated to arise from an exaggerated response to hormones. A role for progesterone has been suggested based on the common occurrence of premenstrual breast swelling and tenderness. Other proposed sources for fibrocystic changes are altered ratios of estrogen and progesterone or an increased rate of prolactin secretion, but none of these has been conclusively established.

Risk Factors: Methylxanthine intake has been proposed, but hard data are lacking. There is no evidence that oral contraceptive use increases the risk of these changes. Postmenopausal estrogen therapy, however, has been associated with a 70% increased risk of fibrocystic change, whereas antiestrogen therapy results in a 28% reduction.

SIGNS AND SYMPTOMS

- Asymptomatic (50%)
- Cyclic, diffuse, bilateral pain and engorgement, with worst symptoms that occur just before menses (the pain associated with fibrocystic change often radiates to the shoulders or upper arms)
- Multiple cysts and nodules intermixed with scattered bilateral nodularity typical, ropy thickening, especially in the upper outer quadrants of the breast

DIAGNOSTIC APPROACH

Differential Diagnosis

- Fibroadenoma
- Carcinoma
- Fat necrosis
- Lipoma
- Radiculitis (Tietze syndrome)

Associated Conditions: Mastalgia, fibroadenoma.

Workup and Evaluation

Laboratory: No evaluation indicated.

Imaging: Mammography may be used to assist with the diagnosis or to provide a baseline, but it is not necessary for diagnosis. Mammography is more difficult in the younger women who predominantly have these complaints. Ultrasonography may be of more help when imaging is deemed necessary.

Special Tests: If the patient has a cystic breast mass, needle aspiration with a 22- to 25-gauge needle may be both diagnostic and therapeutic. Fine needle aspiration (FNA) or core biopsy may be required if malignancy is suspected.

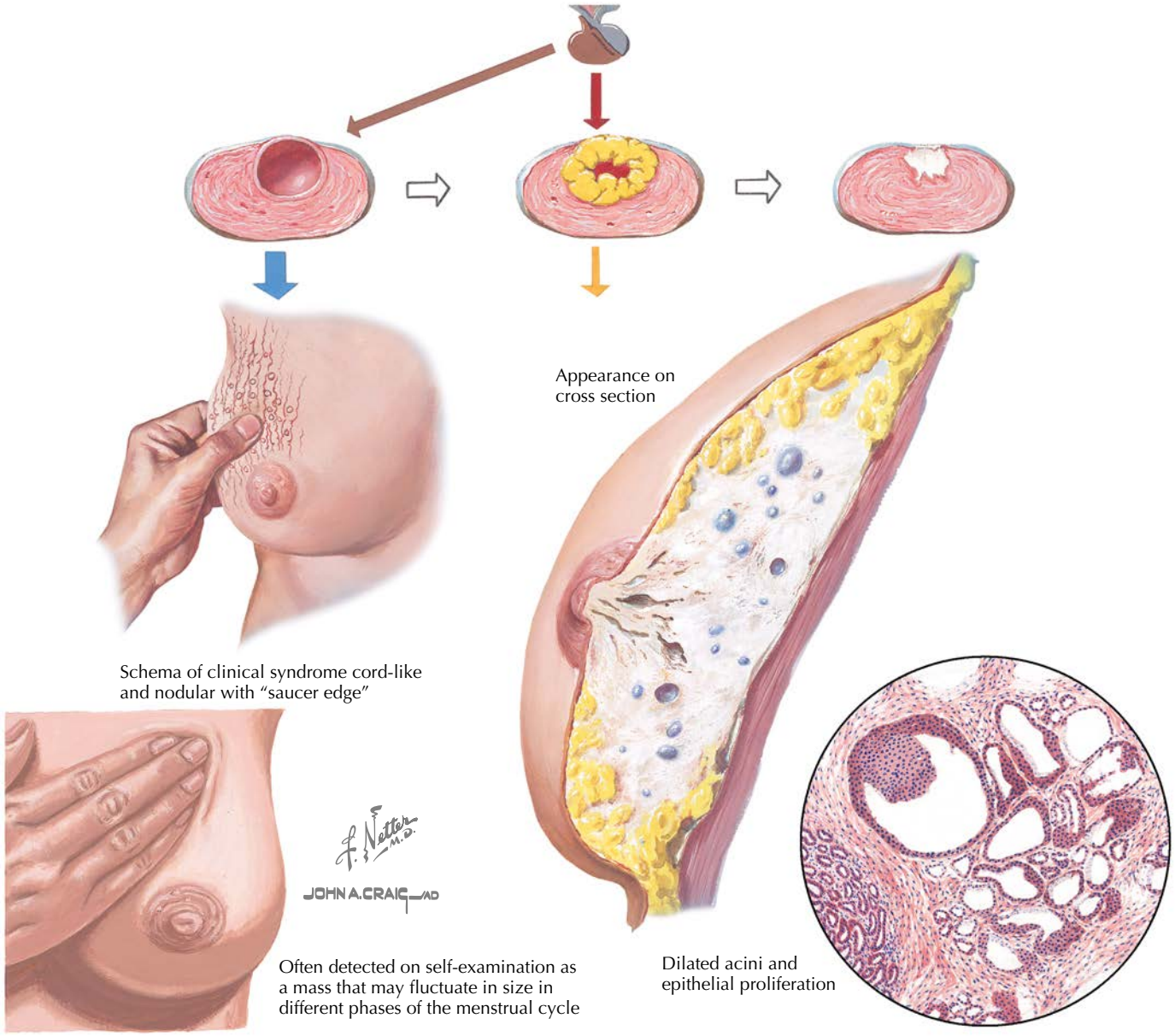

Figure 176.1 Fibrocystic breast change

Diagnostic Procedures: Diagnosis is based on symptoms and physical findings rather than histologic evaluation.

Pathologic Findings

Fibrocystic changes appear in three steps: (1) proliferation of stroma, especially in the upper outer quadrants of the breast, is observed; (2) proliferation of the ducts and alveolar cells occurs, adenosis ensues, and cysts are formed; and (3) larger cysts are found and pain generally decreases. Proliferative changes may be extensive (although usually benign) in any of the involved tissues.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Mechanical support (a well-fitting brassiere worn day and night), analgesics, and reassurance. Cold compresses or ice may be helpful for acute exacerbations.

Specific Measures: Diuretics (such as spironolactone or hydrochlorothiazide administered before menstrual periods) and nonsteroidal antiinflammatory agents for analgesia may be necessary. For severe symptoms, danazol, bromocriptine, tamoxifen, or gonadotropin-releasing hormone (GnRH) agonists may be required. Patients with intractable pain refractory to medical management may rarely require subcutaneous mastectomy.

Diet: Reduction in methylxanthine intake is often beneficial, but objective data are lacking. Premenstrual restriction of salt or fluids is useful for selected patients. The roles of vitamins A and E are unknown.

Activity: No restriction. To reduce discomfort, good breast support is recommended during vigorous activity.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Benign Breast Conditions, 2021
- Mammography and Other Screening Tests for Breast Problems, 2017

Drug(s) of Choice

- Combination oral contraceptives (70%–90% chance of success).
- Metformin (500 mg PO twice daily) has been suggested to reduce excessive cell proliferation caused by associated hormones.
- Spironolactone 50 mg PO twice a day given 7–10 days before periods.
- Bromocriptine 2.5 mg PO daily (with food) may be increased after 3–7 days if required.

Contraindications: Spironolactone is contraindicated in the presence of anuria, renal insufficiency, or hyperkalemia. Bromocriptine is contraindicated in patients with uncontrolled hypertension or in those known to be sensitive to ergot alkaloids.

Precautions: Diuretics must be used with care to avoid fluid and electrolyte disturbances. Bromocriptine may cause hypotension during the first several days of therapy. Care also should be used with patients who have compromised hepatic or renal function.

Interactions: Spironolactone enhances the action of other diuretics and increases digoxin levels. Danazol sodium may prolong prothrombin time in patients being administered warfarin.

Alternative Drugs

- Hydrochlorothiazide 25 mg PO at bedtime for 7–10 days before menses. GnRH agonists (Lupron) 3.75 mg IM monthly for no more than 6 months.
- Tamoxifen has had a response rate of up to 70% in some trials.

FOLLOW-UP

Patient Monitoring: Patients with mastalgia but no dominant mass may be safely rechecked at a different portion of the next menstrual cycle. After aspiration of a cyst (yielding clear fluid and complete loss of the mass), the patient should be rechecked in 2–4 weeks. Recurrence of the cyst or the presence of a palpable mass should prompt additional evaluations, such as FNA or core or open biopsy.

Prevention/Avoidance: None.

Possible Complications: When atypia is found in hyperplastic ducts or apocrine cells, there is a 5-fold increase in the risk of developing carcinoma in the future; without atypia there is no increased rate of cancer

Expected Outcome: Symptomatic relief can be generally achieved with a combination of diet changes, analgesics, and specific medications. The underlying pathologic features remain unchanged or progress.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. The hormonal changes of pregnancy may worsen symptoms.

ICD-10-CM Codes: N60.19 (Diffuse cystic mastopathy of unspecified breast).

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177 GALACTOCELE

INTRODUCTION

Description: Galactocele is the cystic dilation of a duct or ducts, with inspissated milk and desquamated epithelial cells that may become infected, resulting in acute mastitis or an abscess.

Prevalence: Common in asymptomatic form.

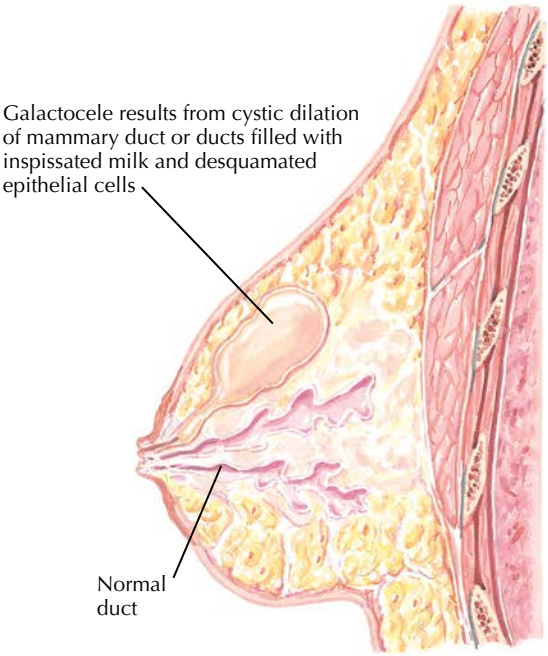
Predominant Age: Reproductive (lactating) age.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Ductal obstruction and inflammation during or soon after lactation may lead to cystic dilation of a duct or ducts and the subsequent development of a galactocele. Galactocele is generally associated with breastfeeding, but it may on rare occasions be associated with galactorrhea or oral contraceptive use.

Ductal obstruction resulting in galactocele formation usually occurs during or soon after lactation or abrupt weaning



Clinical Findings

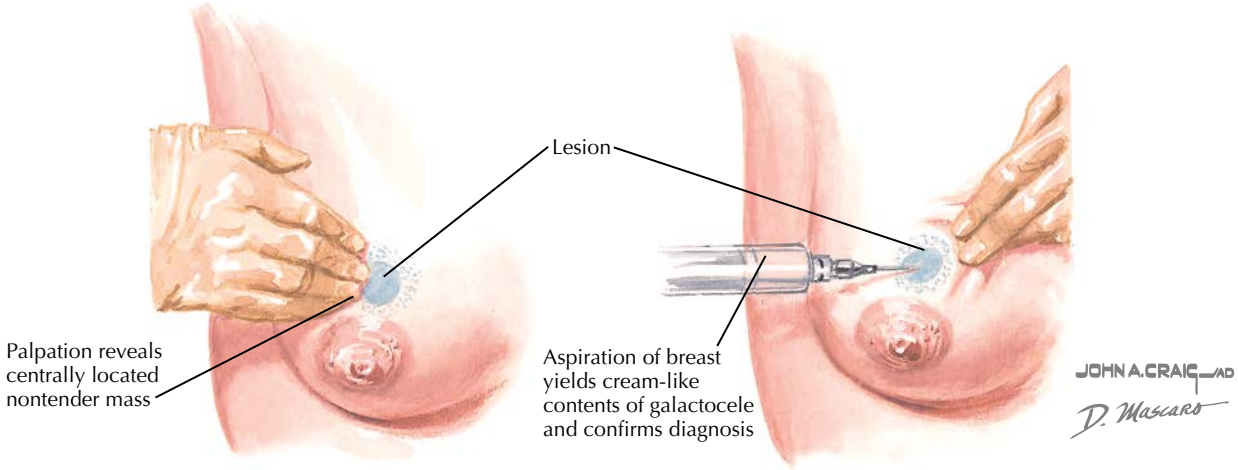


Figure 177.1 Clinical findings in galactocele

Risk Factors: Breastfeeding and abrupt weaning, mastitis, galactorrhea. There are data that suggest a weak association with periareolar incisions, subglandular breast implants, prior hormonal contraceptive use, and increased gravidity.

SIGNS AND SYMPTOMS

- Painless mass palpable in the central portion of the breast

DIAGNOSTIC APPROACH

Differential Diagnosis

- Duct ectasia
- Lipoma
- Fibrocystic change
- Fibroadenoma
- Breast abscess

Associated Conditions: Mastitis, ductal ectasia, and nipple discharge.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated. Ultrasonography may be used if the diagnosis is in doubt.
Special Tests: Aspiration produces thick, creamy material.
Diagnostic Procedures: History and physical examinations, needle aspiration.

Pathologic Findings

Cystic dilation of ducts with milky-white material made of lipid-rich foam cells and ductal epithelial cells, granular eosinophilic secretions, and lipids.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and reassurance.
Specific Measures: No specific therapy is required for a galactocele, and the mass will subside in a few weeks. When uncomplicated by infection, needle aspiration or drainage by gentle pressure is diagnostic and decompression is curative. Excision may be required for recurrences.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Benign Breast Conditions, 2021
- Breastfeeding Your Baby, 2021
- Mammography and Other Screening Tests for Breast Problems, 2017

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: Secondary infection and abscess formation. Rupture or leakage may result in significant inflammatory response and scarring mimicking cancer.
Expected Outcome: The mass will subside in a few weeks with no therapy.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. Breastfeeding generally can continue during aspiration or excision.
ICD-10-CM Codes: N64.89 (Other specified disorders of breast).

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178 GALACTORRHEA

INTRODUCTION

Description: Spontaneous, bilateral nipple discharge (milky fluid only) unrelated to pregnancy or breastfeeding.
Prevalence: Uncommon, but reports vary from 1%–30%, depending on the population studied.
Predominant Age: Reproductive age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Pituitary adenoma (generally <10 mm), disruptions in thyroid or prolactin hormone levels, pharmacologic (most often those drugs that affect dopamine or serotonin), second-generation histamine 2 receptor antagonists (cimetidine), autoimmune disease (sarcoid, lupus), Cushing disease, herpes zoster, chest wall/breast stimulation or irritation, physiologic changes during pregnancy or after childbirth and/or breastfeeding, specific foods (licorice). No cause may be found in up to 50% of cases.
Risk Factors: None known.

SIGNS AND SYMPTOMS

- Bilateral, spontaneous, milky discharge from both breasts
- Often symptoms of underlying pathologic condition (eg, hypothyroidism, Cushing disease, or pituitary enlargement)
- Amenorrhea common

DIAGNOSTIC APPROACH

Differential Diagnosis

- Pregnancy
- Breast cancer
- Chronic nipple stimulation
- Hypothyroidism
- Sarcoidosis
- Lupus
- Cirrhosis or hepatic disease

Associated Conditions: One-third of patients with an elevated prolactin level experience amenorrhea or infertility. Prolonged amenorrhea is associated with an increased risk for osteoporosis,

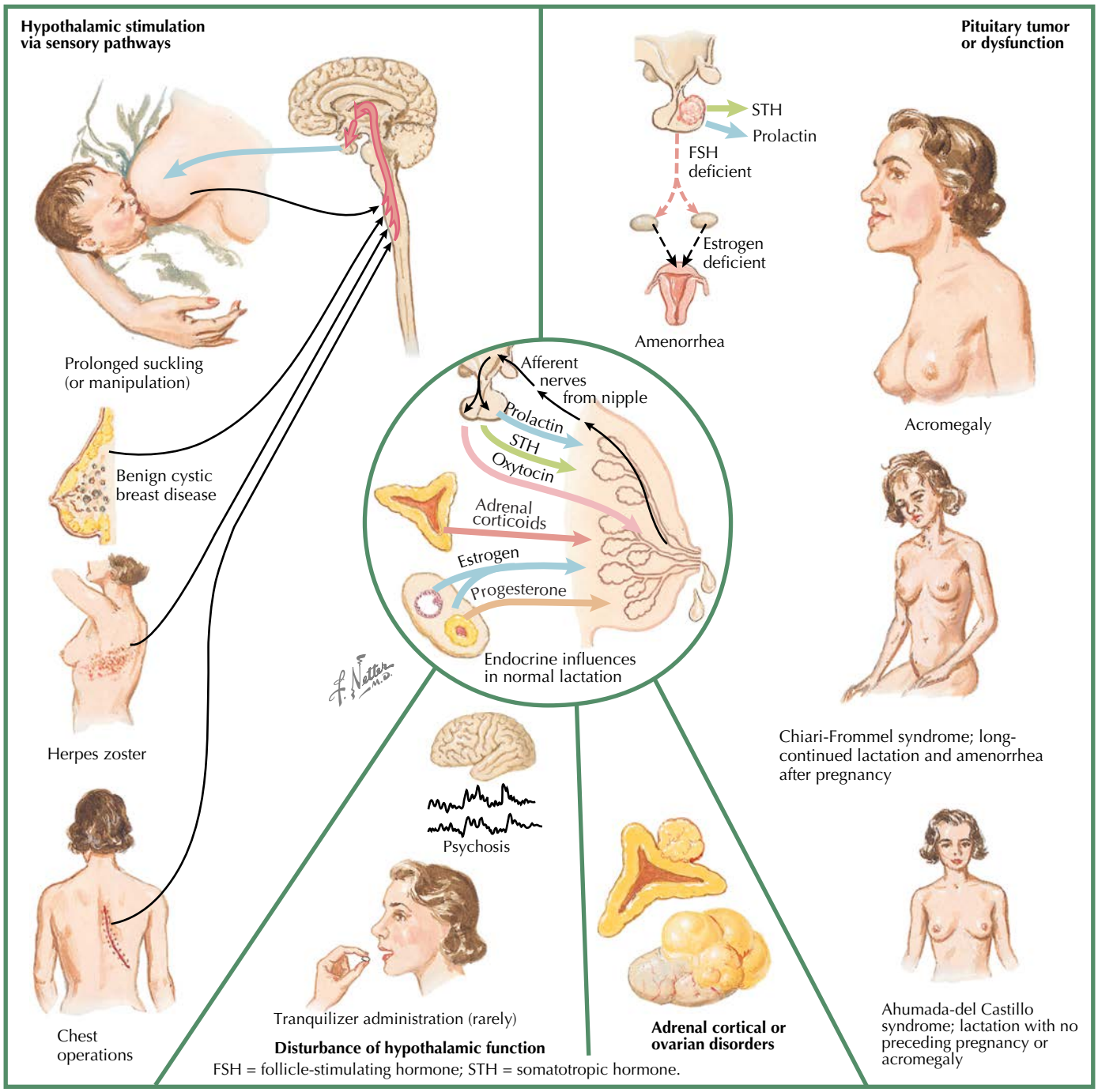

Figure 178.1 Pathogenesis of galactorrhea

vaginal and genital atrophic changes, dyspareunia, and libidinal dysfunction.

Workup and Evaluation

Laboratory: Pregnancy should always be considered if menses are absent. There is a poor correlation between serum prolactin levels and the size or detectability of a pituitary lesion. Prolactin is normal in almost 50% of patients with galactorrhea. Thyroxine, thyroid-stimulating hormone levels, and renal function tests based on the differential diagnosis being considered.

Imaging: Computed tomography or magnetic resonance imaging (preferred) are frequently indicated.

Special Tests: Testing of visual fields may be indicated.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: When prolactin levels are low and a coned-down view of the sella turcica is normal, observation alone may be sufficient. If observation is chosen, periodic re-evaluation is required to check for the emergence of slow-growing tumors.

Specific Measures: Treatment with bromocriptine is recommended for patients who desire pregnancy or for those with distressing

degrees of galactorrhea or to suppress intermediate-sized pituitary tumors. Rapidly growing tumors, tumors that are large at the time of discovery, or those that do not respond to bromocriptine therapy may require surgical therapy.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education: Discussion of treatment options.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Breastfeeding Your Baby, 2021
- Evaluating Infertility, 2020
- Treating Infertility, 2019

Drug(s) of Choice

- If the prolactin level is elevated—dopamine agonists (cabergoline 0.25–1 mg PO once or twice per week).

Contraindications: Uncontrolled hypertension, pregnancy.

Precautions: With medical therapy—nausea, orthostatic hypotension, drowsiness, syncope, hypertension, or seizures. There have been scattered reports of cardiac valve dysfunction with cabergoline therapy.

Interactions: Medical therapy may interact with phenothiazines or butyrophenones.

Alternative Drugs

- Bromocriptine (Parlodel) 2.5 mg daily, gradually increased to three times a day.
- Estrogen supplementation may be indicated in selected patients.

FOLLOW-UP

Patient Monitoring: Normal health maintenance. If a pituitary adenoma is present, periodic assessment of visual fields should be considered.

Prevention/Avoidance: None.

Possible Complications: Visual field loss; symptoms may return after medication is discontinued.

Expected Outcome: Generally good depending on cause. Prolactin levels should be measured every 6–12 months, and visual fields should be reassessed yearly. The pituitary should be re-evaluated every 2–5 years, based on initial diagnosis.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy, although pregnancy may cause pituitary adenomas to grow rapidly.

ICD-10-CM Codes: N64.3 (Galactorrhea not associated with childbirth), N91.2 (Amenorrhea, unspecified), and O92.6 (Galactorrhea) should be used only in conjunction with pregnancy and breastfeeding.

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179 MAMMOGRAPHY

THE CHALLENGE

The challenge in mammography is to effectively use mammography to detect occult disease.

Scope of the Problem: First developed in 1965 the widespread use of mammography has been credited with reducing the mortality rate of breast cancer by up to 30% since 1990. (The relative roles of imaging and improved treatment protocols in this improvement is unknown.) Unfortunately, not all women undergo appropriate screening on a regular basis. One study indicated that only 39% of women aged 50–59 years and 36% of women aged 60–69 years had undergone a mammogram in the preceding year. In another study, only 24% of women older than 65 years followed the current recommendations for annual examinations. It has been estimated that breast cancer mortality could be reduced by as much as 50% if all women older than 40 years underwent annual screening.

Objectives: To appropriately use mammography for evaluating breast complaints and to improve compliance with screening guidelines.

TACTICS

Relevant Pathophysiology: Mammography has been the primary screening test for early breast cancer for more than five decades, but conventional mammography imaging continues to have limitations in sensitivity (77%–95%) and specificity (94%–97%). Mammography localizes, documents, objectifies, and identifies other occult pathologic changes. Approximately 85% of breast cancers found by mammography are early-stage lesions versus 54%–70% found by physicians and 38%–64% of tumors found by the patient herself. Approximately 35% of breast cancers are found with an abnormal mammogram, without a palpable mass present. Mammography can identify small lesions (1–2 mm), calcifications, or other changes suspicious for malignancy approximately 1.5–4 years before a lesion is clinically palpable. The 10-year disease-free survival rate for patients with these lesions is 90%–95%. The average lesion found on breast self-examination is 2.5 cm, and half of these patients have nodal involvement. For these patients, 10-year survival falls to between 50% and 70%. More than one-third of occult breast cancers have calcifications, making the otherwise-undetected tumors visible through mammography. Digital mammography detects some cases of cancer that are not identified by film mammography, but overall detection is similar for many women.

Strategies: The American Cancer Society guidelines for mammographic screening for low-risk women are as follows.

- Mammography should be performed every year from the age of 45–54 years, but women should have the opportunity to begin annual screening between the ages of 40 and 44 years. If the patient has a first-degree relative with premenopausal breast cancer, screening should begin approximately 5 years before the age at which the relative's cancer was diagnosed.
- Annual or bi-annual mammogram from the age of 55 years and onward.
- Women should continue screening mammography as long as their overall health is good, and they have a life expectancy of 10 years or longer.
- For patients at an increased risk for breast cancer (>20%–25% lifetime risk, strong family history or genetic abnormality, eg, mutations of *BRCA1* or *BRCA2*) mammography should be augmented by magnetic resonance imaging studies beginning at age 30.

Patient Education: Instruction on the need for and timing of mammography.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Benign Breast Conditions, 2021
- Mammography and Other Screening Tests for Breast Problems, 2017

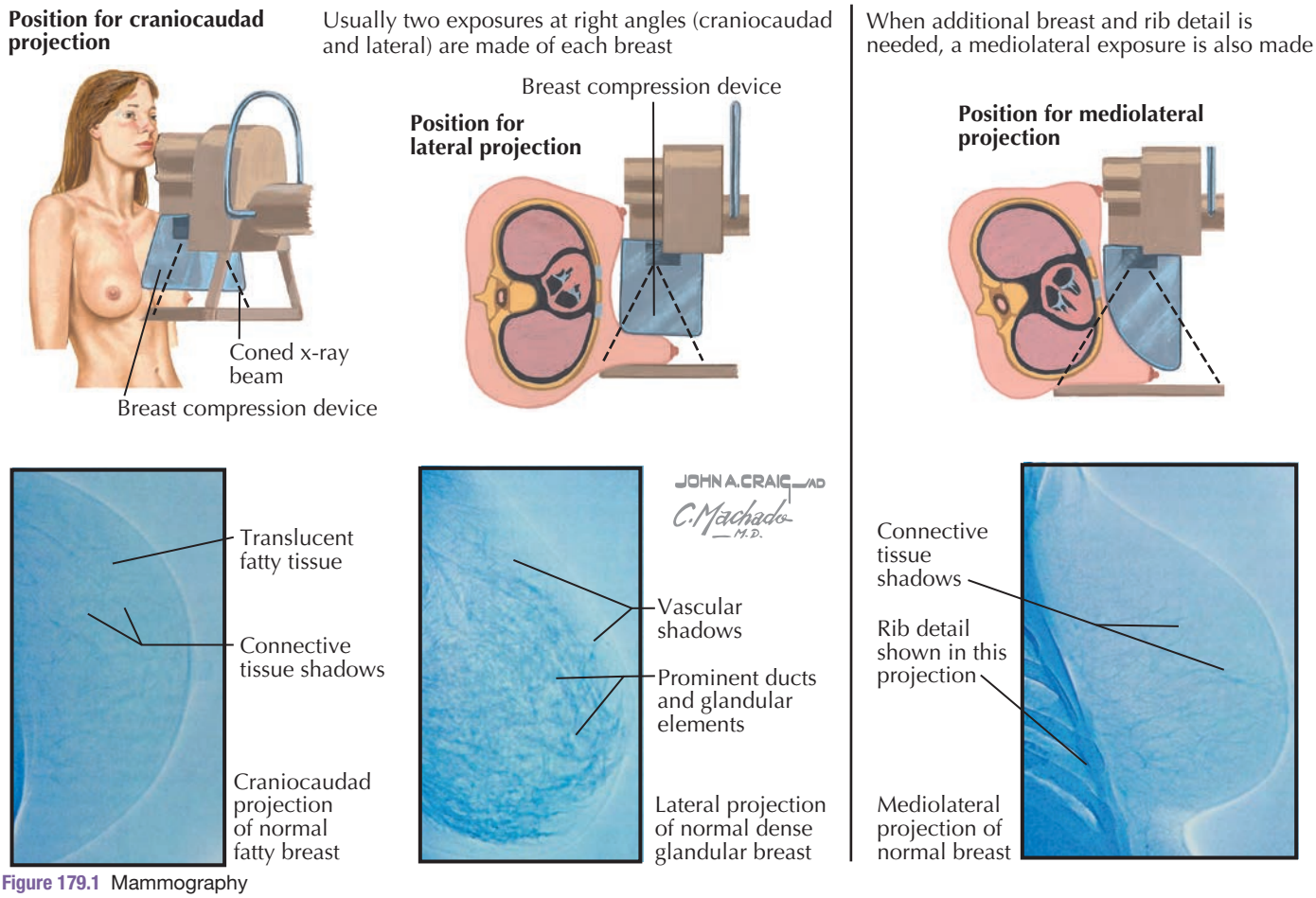

Figure 179.1 Mammography

IMPLEMENTATION

Special Considerations: Mammography in younger women is more difficult to interpret than that in older women because of the greater tissue density present during the reproductive years. Although the increasing ability to diagnose cancer in older women parallels their increasing risk, breast cancers in younger women are more easily missed. This diagnostic difficulty and the relatively higher rate of false-positive study results that necessitate further evaluation have raised questions about routine screening of women younger than 50 years. The finding of clusters of calcification that often are associated with cancer is nonspecific. Of calcification clusters found on mammography, 75% result from benign disease. Overall, mammography is approximately 85% accurate in diagnosing malignancy, with a 10%–15% false-negative rate. For this reason, mammography provides an adjunct to clinical impressions and the definitive procedure of biopsy, but it does not replace them. Approximately 10% of mammographic studies require additional views. Between 1% and 2% of screening studies necessitate histologic evaluation to establish a diagnosis. Mammographic radiation exposure is minimal (<1 rad). Based on this level of exposure, mammography might induce up 5/1 million new lifetime cancers in women ages 40–44 years screened and less than 1/1 million for women aged 60–64 years (background risk is 115 and 292 for these age groups, respectively). Therefore, the risk for death caused by radiation exposure is approximately equivalent to that encountered by driving a car 220 miles, riding a bicycle for 10 miles, or smoking 1.5 cigarettes.

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MASTITIS (LACTATIONAL)

180

INTRODUCTION

Description: Mastitis is an infection of one or more ductal complexes of the breast, generally associated with breastfeeding and potentially causing significant morbidity if not recognized and aggressively treated.
Prevalence: 2%–10% of women who are breastfeeding after delivery. Hospitalization for mastitis occurs in 9/10,000 deliveries.
Predominant Age: Reproductive age; 2–12 weeks after delivery.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Infection comes from organisms carried in the nose and mouth of a nursing infant, most commonly *Staphylococcus aureus* (especially methicillin-resistant *S. aureus* [MRSA]) and *Streptococcus* species. Common agents include β-hemolytic streptococci, *Haemophilus influenzae, Haemophilus parainfluenzae, Escherichia coli,* and *Klebsiella pneumoniae.*
Risk Factors: Diabetes, steroid use, heavy cigarette smoking, milk stagnation (infrequent feedings, weaning), history of mastitis, nipple excoriation or cracking, and retracted (inverted) nipples.

SIGNS AND SYMPTOMS

- Firm, sore, red, and tender portion of the breast, most commonly in the upper outer quadrant
- High fever >38.3°C (>100.9°F), tachycardia, headaches, anorexia, and malaise
- Axillary nodes tender or enlarged
- In patients who are not breastfeeding a palpable, recurrent mass, accompanied by a multicolored discharge from the nipple or adjacent to a Montgomery follicle

DIAGNOSTIC APPROACH

Differential Diagnosis

- Breast abscess
- Blocked (plugged) duct
- Breast engorgement
- Galactocele
- Inflammatory breast cancer

Associated Conditions: Breast engorgement.

Workup and Evaluation

Laboratory: A complete blood count documents an elevated white blood cell count but is not required for diagnosis. Cultures of the mother's milk and the infant's nose and mouth may be helpful but are not required.
Imaging: No imaging indicated.
Special Tests: None indicated.
Diagnostic Procedures: History and physical examinations combined with the knowledge of the condition of the breast at or before delivery.

Pathologic Findings

Swelling and obstruction of the involved ducts with inflammation. When present in nonpregnant and postmenopausal women, it may be accompanied by squamous metaplasia. When well established, ductal thickening may lead to nipple retraction.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Mild fluid restriction, analgesics (nonsteroidal antiinflammatory drugs), ice packs, and support (well-fitting brassiere). In mild cases, it is not necessary to cease breastfeeding. Breastfeeding, pumping, or milk expression may help provide relief.
Specific Measures: Prompt and aggressive antibiotic therapy is indicated. Breastfeeding from the opposite side or pumping or expression of the involved breast may be helpful. If tenderness or fever does not promptly decrease, abscess must be suspected and prompt surgical drainage, usually under general anesthesia, is required.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance, support, specific suggestions.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- Breastfeeding Your Baby, 2021

Drug(s) of Choice

- Dicloxacillin 500 mg PO four times a day or cephalexin 500 mg PO four times a day.
- If MSRA is suspected, trimethoprim/sulfamethoxazole one double-strength tablet PO twice a day or clindamycin 450 mg PO three times a day.
- Amoxicillin/clavulanate (Augmentin) 250 mg PO three times a day also may be used.

Contraindications: Known or suspected allergy.
Precautions: If response to therapy is not prompt, surgical drainage is required. Trimethoprim/sulfamethoxazole should not be used if breastfeeding infants who are jaundiced were not full term or who are younger than 1 month old.

Alternative Drugs

- Penicillin G or erythromycin 250–500 mg PO four times a day.
- Erythromycin ethylsuccinate 400 mg PO four times a day for 10 days. The level of erythromycin achieved in milk is very high.
- In severe infections, empiric inpatient therapy with vancomycin 15–20 mg/kg/dose every 8–12 hours (not to exceed 2 g/dose) may be indicated.

FOLLOW-UP

Patient Monitoring: Normal health maintenance. Watch for the development of an abscess.
Prevention/Avoidance: Attention to normal hygiene practices during breastfeeding (hand washing, avoid drying agents). Avoid

cracking or fissuring of nipples. Use breast or nipple shields when cracked nipples are present.

Possible Complications: Progression of infection, abscess formation, scarring, squamous metaplasia, ductal ectasia. Abscesses may form even while a patient is receiving antibiotic therapy.

Expected Outcome: Generally good with aggressive therapy.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.

ICD-10-CM Codes: O91.219 (Nonpurulent mastitis associated with pregnancy, unspecified trimester).

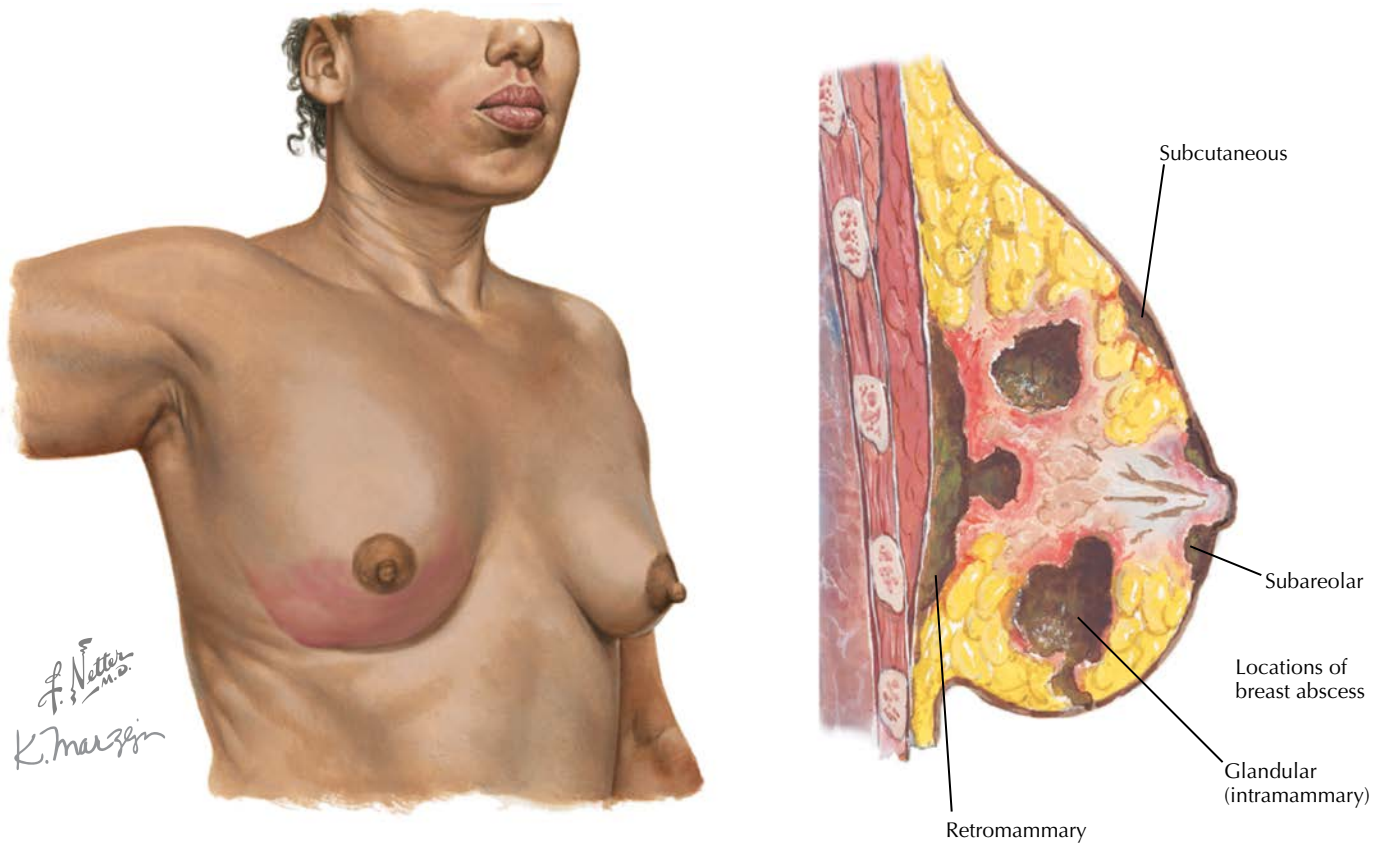

Figure 180.1 Acute mastitis

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MASTODYNIA AND MASTALGIA (BREAST PAIN) 181

INTRODUCTION

Description: Mastalgia is the nonspecific term that is used for breast pain of any etiology. Although breast pain frequently occurs to nursing mothers, the terms are generally reserved for non–pregnancy related symptoms.
Prevalence: Most women (70%) experience breast pain at some point in their lives (most are transient). Roughly 15% of women who experience it will require treatment.
Predominant Age: Reproductive age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Fibrocystic change. Rapid hormonal change (especially a change that involves an increase in estrogen levels, eg, starting birth control pills or hormone therapy or during early pregnancy). In the absence of obvious pathologic changes, mastalgia has been attributed to caffeine consumption and high-fat diets, but hard data are lacking. Nongynecologic causes include dorsal radiculitis or inflammatory changes in the costochondral junction (Tietze syndrome), sclerosing adenosis, chest wall muscle spasms, costochondritis, neuritis, fibromyalgia, and referred pain.
Risk Factors: Pregnancy, hormone therapy. Caffeine consumption and high-fat diets have been suggested but remain unconfirmed causes.

SIGNS AND SYMPTOMS

- Diffuse breast pain, worse in the upper outer quadrants of the breast, often with radiation to the shoulders or upper arms, which may (two-thirds) or may not (one-third) be related to the menstrual cycle.
- When cyclic, the pain is generally worse during the week before menses. Unilateral or localized pain suggests a pathologic process.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Fibrocystic change (most commonly manifests as cyclic, diffuse, bilateral pain and engorgement, with the worst symptoms occurring just before menses)
- Mastitis or breast abscess
- Trauma
- Inadequate or inappropriate breast support
- Chest wall abnormalities (herpes zoster, costochondritis, radicular pain)
- Breast cancer (breast pain is a manifesting complaint in less than 10% of patients with breast cancer)
- Mondor disease
- Extramammary pain (chest wall, herpes zoster, spinal and paraspinal disorders, post-thoracotomy syndrome)

Associated Conditions: Fibrocystic change, fibroadenoma, and mastitis.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: Mammography may be indicated for other reasons but seldom directly assists in the evaluation of mastalgia.
Special Tests: None indicated.
Diagnostic Procedures: History and careful physical examinations. The presence of scattered bilateral nodularity suggests fibrocystic change.

Pathologic Findings

Based on pathophysiologic changes present.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Analgesics (including topical), mechanical support (a well-fitting brassiere worn day and night), local heat, smoking cessation, reassurance.
Specific Measures: Caffeine restriction (proposed), medical treatment of underlying pathophysiologic changes (eg, fibrocystic change).
Diet: A reduction in methylxanthine intake may be beneficial for some, but its overall effectiveness is unproven. Premenstrual restriction of salt or fluids is recommended for selected patients. The role of vitamins A and E is unknown.
Activity: No restriction. To reduce discomfort, good mechanical breast support is recommended during vigorous activity.
Patient Education: Reassurance (effective treatment by itself for up to 85% of women).
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Benign Breast Conditions, 2021
- Mammography and Other Screening Tests for Breast Problems, 2017

Drug(s) of Choice

- Combination oral contraceptives (70%–90% chance of success)
- Spironolactone 50 mg PO twice a day administered 7–10 days before periods
- Tamoxifen 10–20 mg PO daily for 3 months

Contraindications: Spironolactone is contraindicated in the presence of anuria, renal insufficiency, or hyperkalemia.
Precautions: Diuretics must be used with care to avoid fluid and electrolyte disturbances. Tamoxifen is associated with menopause-like symptoms (hot flashes, vaginal dryness, joint pain, and leg cramps).
Interactions: Spironolactone enhances the action of other diuretics and increases digoxin levels.

Alternative Drugs

- Hydrochlorothiazide 25 mg PO at bedtime for 7–10 days before menses.
- Gonadotropin-releasing hormone agonists—leuprolide acetate (Lupron) 3.75 mg IM monthly for no more than 6 months.
- Evening primrose oil and chasteberry have shown efficacy in limited trials, but standardization of both therapy and active ingredients in varying preparations limits the ability to completely evaluate these as therapeutic options.

FOLLOW-UP

Patient Monitoring: Patients with mastalgia but no dominant mass may be safely rechecked at a different portion of the next menstrual cycle.
Prevention/Avoidance: None.
Expected Outcome: Symptomatic relief can generally be achieved with a combination of diet changes, analgesics, and specific medications.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy, although pregnancy may induce mastalgia.
ICD-10-CM Codes: N64.4 (Mastodynia).

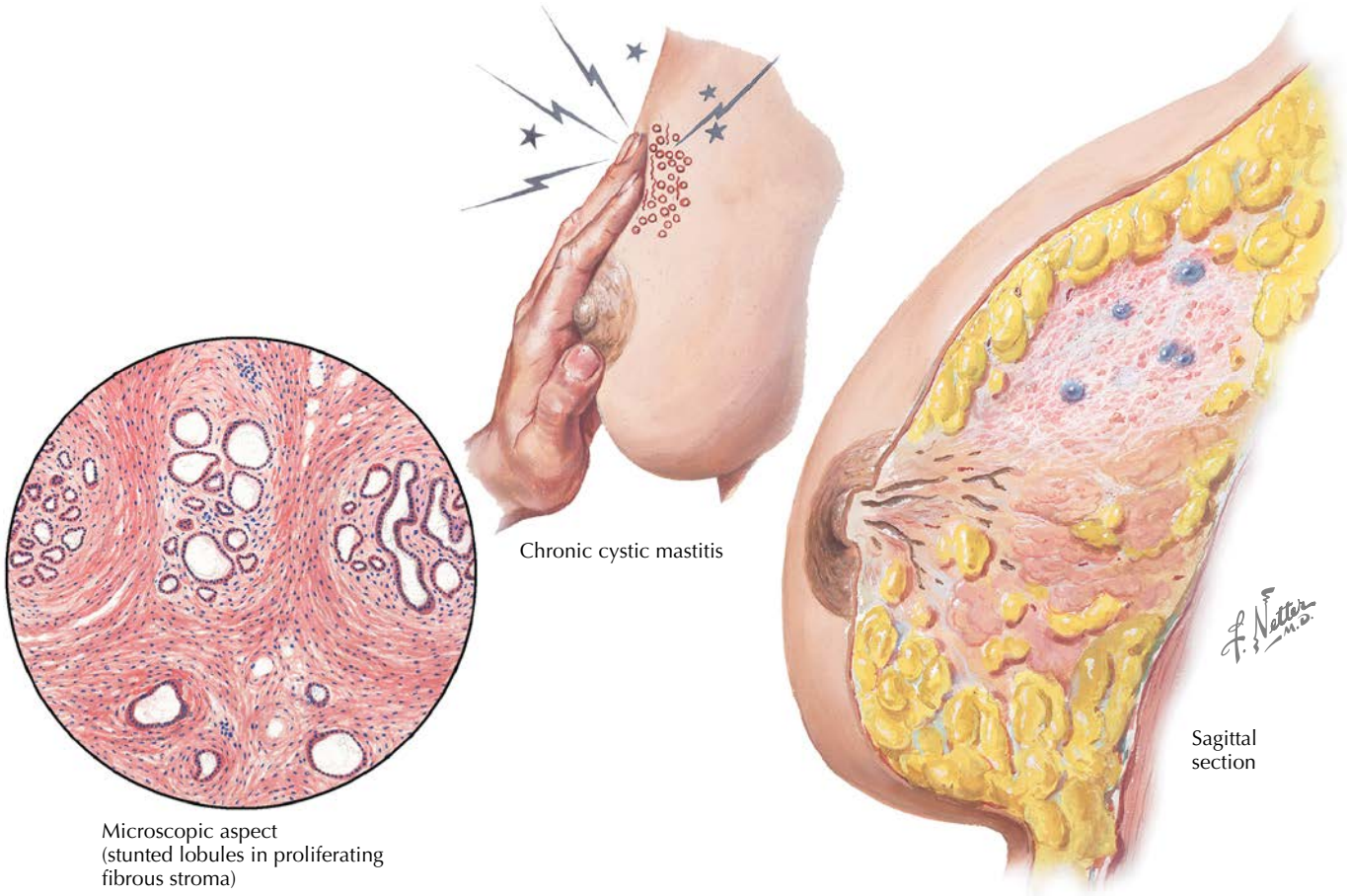

Figure 181.1 Chronic cystic mastitis

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MONDOR DISEASE

182

INTRODUCTION

Description: Mondor disease, or superficial angiitis, is a superficial thrombophlebitis of the breast.
Prevalence: Uncommon, considered to occur in up to 0.8% of women.
Predominant Age: 30–60 years.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Phlebitis is most often linked to recent pregnancy, trauma, or operative procedures but may spontaneously occur. It most often involves the thoracoepigastric veins of the breast.
Risk Factors: Pregnancy, trauma or operative procedures, thrombophilias.

SIGNS AND SYMPTOMS

- Pain (acute, generally upper outer quadrant)
- Dimpling of the skin or a distinct cord with erythematous margins
- Shallow groove seen extending upward toward the axilla when the arm is raised

DIAGNOSTIC APPROACH

Differential Diagnosis

- Breast abscess
- Duct ectasia
- Carcinoma (may be distinguished from inflammatory cancer of the breast by the presence of sudden pain, early skin adherence, and progressive improvement)
- Mastitis
- Fat necrosis
- Scarring from previous surgery (biopsy, augmentation, or reduction)

Associated Conditions: Mastitis.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: Mammography may be required to rule out other processes, but the diagnosis is generally established by examination and history.
Special Tests: On rare occasions, biopsy may be required to establish the diagnosis.
Diagnostic Procedures: History and physical examinations. Accentuation of dimpling or the formation of a groove over the affected vein often occurs when the ipsilateral arm is raised during physical examination.

Pathologic Findings

Thrombophlebitis of the superficial veins.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and reassurance, symptomatic therapy.
Specific Measures: Analgesics and heat reduce symptoms. The condition generally resolves in 2–3 weeks, but it may take 6 weeks or longer.
Diet: No specific dietary changes indicated.
Activity: No restriction. Good mechanical support improves comfort during vigorous activity.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Benign Breast Conditions, 2021
- Breastfeeding Your Baby, 2021
- Mammography and Other Screening Tests for Breast Problems, 2017

Drug(s) of Choice

- Nonsteroidal antiinflammatory agents (NSAIDs).
- Antibiotics and anticoagulants have little effect on the course of the disease and are not indicated.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: Avoidance of breast trauma.
Possible Complications: Unlikely.
Expected Outcome: Mondor disease is self-limiting, although full resolution may take 8–10 weeks.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.
ICD-10-CM Codes: I80.8 (Phlebitis and thrombophlebitis of other sites).

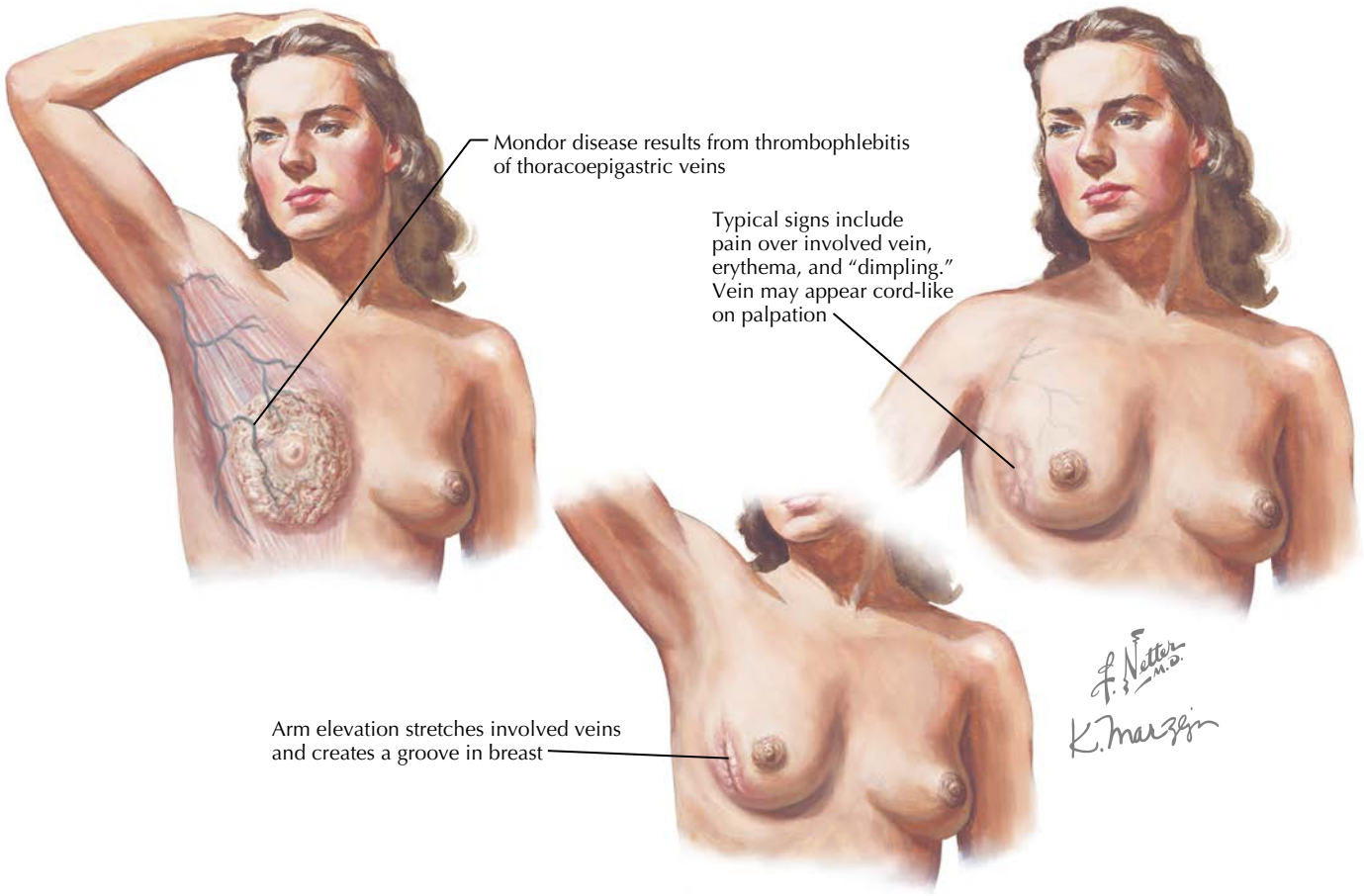

Figure 182.1 Mondor disease

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183 NIPPLE DISCHARGE

INTRODUCTION

Description: Nipple discharge is a distressing symptom that accounts for approximately 5% of breast complaints.

Prevalence: 3%–5% of breast problems; 5% of women who are not lactating; more than 80% of women can express secretions, third most common breast complaint.

Predominant Age: Reproductive age (based on pathophysiologic changes).

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Based on underlying pathophysiologic changes.
Risk Factors: See individual pathologic conditions.

SIGNS AND SYMPTOMS

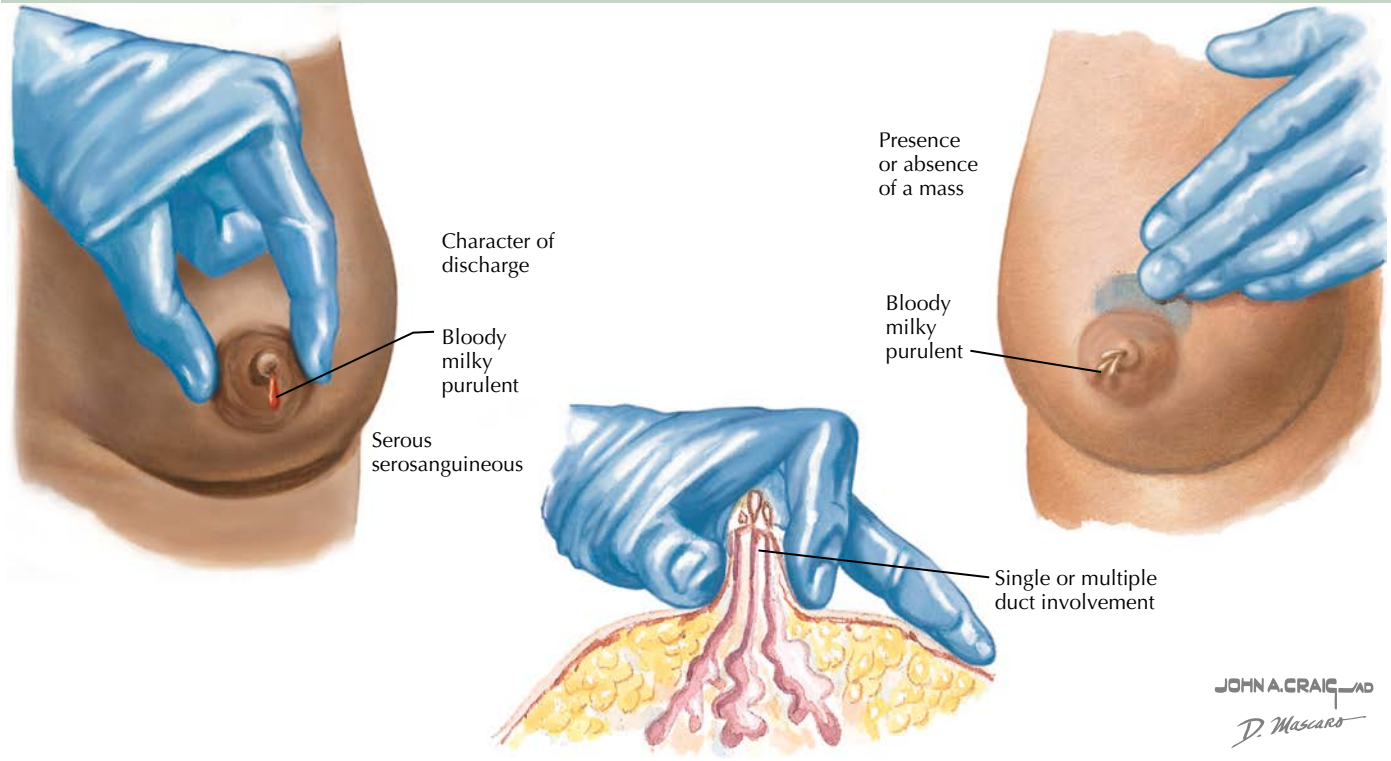
- Spontaneous, continuous, or intermittent release of fluid from one or both breasts that may be milky, bloody, serous, serosanguineous, or cloudy. Most physiologic discharge is white or green, clear, or yellow. Serosanguineous or bloody nipple discharge is associated with malignancy in up to 50% of cases, but the color or clarity of the fluid cannot diagnose or rule out carcinoma.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Breast cancer
- Intraductal papilloma

Clinical Considerations



Management Algorithm For Nipple Discharge

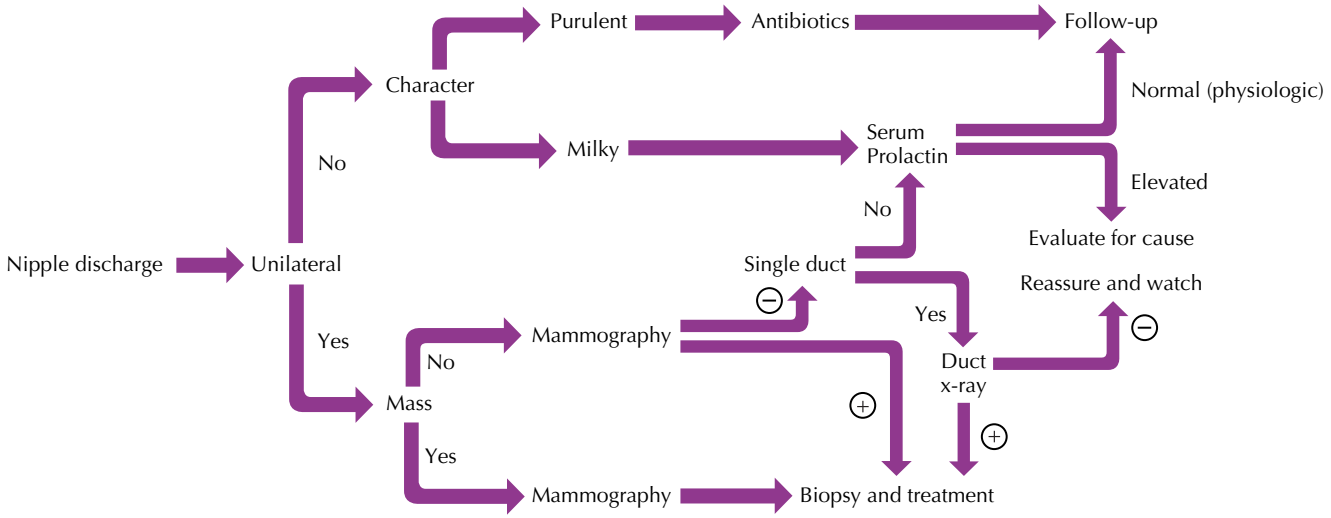


Figure 183.1 Clinical consideration and management of nipple discharge

- Galactocele or galactorrhea
- Ductal ectasia (associated with discharge from a single duct with burning, itching, or local discomfort in older patients)
- Fibrocystic change
- Mastitis

Associated Conditions: Fibrocystic change, fibroadenoma.

Workup and Evaluation

Laboratory: Cytologic evaluation of the nipple discharge is associated with a false-negative result rate of almost 20% and is therefore of little value. A simple fat stain of the discharge confirms the physiologic character of the discharge (milk).

Imaging: Ductogram or galactogram may be diagnostic; mammography may be of assistance in evaluation; for women younger than 30 years ultrasonography is a more appropriate initial study. Ductoscopy has been advocated but does not have widespread availability or acceptance.

Special Tests: Surgical excision of the involved duct may be required for diagnosis and treatment. Approximately 25% of patients who undergo operations are found to have a malignancy.

Diagnostic Procedures: History and physical examinations often differentiate between physiologic discharge and breast disease.

Pathologic Findings

Based on the pathophysiologic condition involved. Multiple papillomas or atypia suggest an increased risk for cancer.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and reassurance.

Specific Measures: Surgical excision of the affected duct or other pathologic process.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Benign Breast Conditions, 2021
- Mammography and Other Screening Tests for Breast Problems, 2017

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Normal health maintenance.

Prevention/Avoidance: None.

Possible Complications: Failure to consider the possibility of significant disease results in the delay of diagnosis and treatment.

Expected Outcome: Surgical excision of the involved duct may be required for diagnosis and treatment.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy.

ICD-10-CM Codes: N64.52 (Nipple discharge).

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PAGET DISEASE OF THE BREAST

184

INTRODUCTION

Description: Paget disease of the breast is a malignant process that involves the nipple and areola. It may also rarely involve the skin of the vulva. Paget disease is named for the 19th-century British doctor Sir James Paget, who, in 1874, noted a relationship between changes in the nipple and breast cancer.
Prevalence: 1%–4% of breast cancers.
Predominant Age: Menopausal and perimenopausal age. Average is 57 years.
Genetics: No genetic pattern. There is a report of *FOXA1* dysregulation in mammary and extramammary Paget disease.

ETIOLOGY AND PATHOGENESIS

Causes: Considered to arise in the dermoepidermal junction from multipotent cells that can differentiate into either glandular or squamous cells, although ductal migration of cells from an associated malignancy cannot be ruled out.
Risk Factors: None known.

SIGNS AND SYMPTOMS

- Pruritic, red, eczematoid, flaky skin lesion, often associated with bleeding and crusting, that begins on the nipple and spreads to the areola. Flattening of the nipple is common. Pain, burning, and/or pruritus may precede the development of the clinically evident lesion by 6–8 months.
- Almost always associated with infiltrating or intraductal carcinoma in deeper parts of the breast

DIAGNOSTIC APPROACH

Differential Diagnosis

- Eczema or psoriasis of the nipple
- Inflammatory breast cancer
- Chronic nipple irritation (jogger's nipples)
- Bowen disease

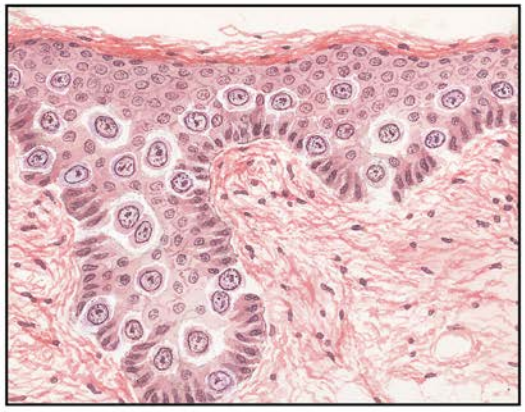
Associated Conditions: Infiltrating or intraductal carcinoma, palpable mass in more than 50% of cases.

Workup and Evaluation

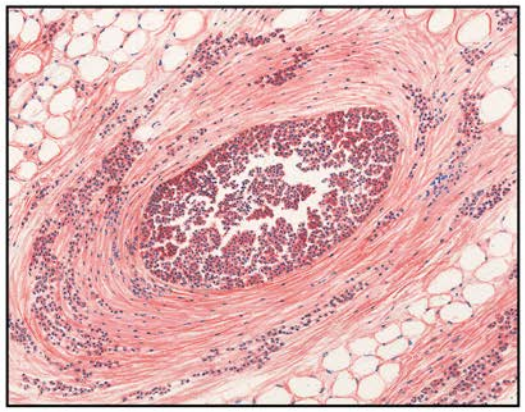
Laboratory: No evaluation indicated.
Imaging: Mammography to detect deeper lesions and lesions in the contralateral breast.
Special Tests: A touch smear obtained by softening the crust with saline and gently scraping the surface often demonstrates the characteristic Paget cells.
Diagnostic Procedures: History, physical examination, and biopsy.

Pathologic Findings

Dermal infiltrates of large neoplastic cells (Paget cells). These cells have abundant clear cytoplasm with mucin and irregular prominent



Paget cells in epidermis



Duct invasion

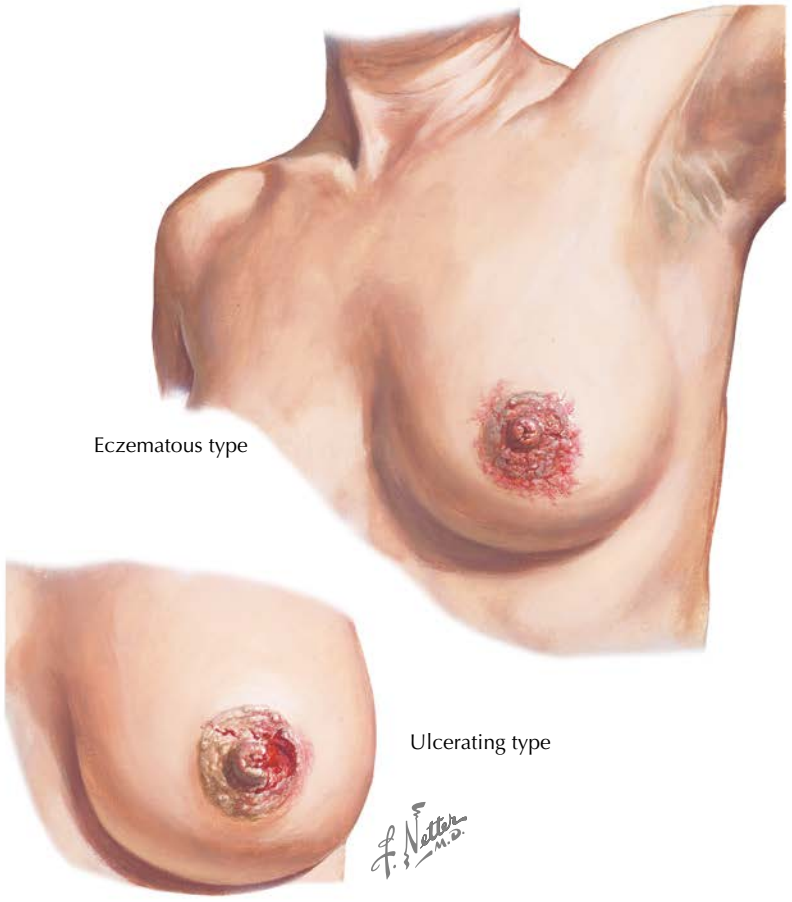


Figure 184.1 Types of Paget disease of the breast

nucleoli. Most often, these cells arise from infiltrating ductal carcinoma. Paget cells are positive for low molecular weight cytokeratins, which can distinguish Paget disease from squamous carcinoma of the epidermis (Bowen disease).

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, mammography.
Specific Measures: Therapy is focused on treating the underlying malignancy. When limited to the nipple, breast conservation is possible. Breast-conserving surgery (removal of the nipple and areola, followed by whole-breast radiation therapy) is a safe option for people with Paget disease of the breast who do not have a palpable mass on clinical examination.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Benign Breast Conditions, 2021
- Mammography and Other Screening Tests for Breast Problems, 2017

Drug(s) of Choice

None. Adjunctive chemotherapy is often recommended based on the cell type and stage.

FOLLOW-UP

Patient Monitoring: Increased surveillance for recurrence or the development of tumors in the contralateral breast.
Prevention/Avoidance: None.
Possible Complications: Progression and spread of the underlying malignancy. Local skin erosion with bleeding and discharge.
Expected Outcome: Local recurrence is common.

MISCELLANEOUS

Pregnancy Considerations: Generally not a consideration. No direct effect on pregnancy.
ICD-10-CM Codes: Based on the location and severity of disease.

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SECTION XI

Reproductive, Genetic, and Endocrine Conditions

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AMENORRHEA: PRIMARY

INTRODUCTION

Description: Primary amenorrhea is the absence of normal menstruation in a patient without previously established cycles.
Prevalence: Uncommon.
Predominant Age: Mid to late teens.
Genetics: One-third caused by chromosomal abnormalities such as 45,XO, 46,XY gonadal dysgenesis, or 46,XX q5 X long-arm deletion.

ETIOLOGY AND PATHOGENESIS

Causes: Gonadal abnormalities (failure, 60% of patients)—autoimmune ovarian failure (Blizzard syndrome), gonadal dysgenesis, pure gonadal dysgenesis, 45,XO (Turner syndrome, 43% of patients), 46,XY gonadal dysgenesis (Swyer syndrome), 46,XX q5 X chromosome long-arm deletion, mixed or mosaic, follicular depletion, autoimmune disease, infection (eg, mumps), infiltrative disease processes (eg, tuberculosis, galactosemia), iatrogenic ovarian failure (eg, alkylating chemotherapy, irradiation), ovarian insensitivity syndrome (resistant ovary [Savage] syndrome), 17α-hydroxylase deficiency, polycystic ovary syndrome (PCOS, 7%), chronic anovulation of pubertal onset. Extragonadal anomalies (40%)—congenital absence of uterus and vagina (15%; Müllerian agenesis), constitutional delay, imperforate hymen, male pseudohermaphroditism (testicular feminization/androgen insensitivity syndrome), pituitary–hypothalamic dysfunction, transverse vaginal septum.
Risk Factors: None known.

SIGNS AND SYMPTOMS

- No period by the age of 13 years with no secondary sex changes
- No period by the age of 15 years regardless of secondary sex changes
- No period by 2 years after the start of secondary sex changes

Evaluation should not be delayed any time there is the suggestion of a chromosomal abnormality or an obstructed genital tract.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Pregnancy before first cycle
- Obstructed outflow tract (making menstruation cryptic)
- Gonadal dysgenesis
- Uterine agenesis
- Androgen insensitivity syndrome
- Mayer–Rokitansky–Küster–Hauser syndrome

Associated Conditions: Infertility, abnormal stature (short or tall), and cardiac changes in some congenital syndromes; hypertension and hypokalemic alkalosis in 17α-hydroxylase deficiency, virilization, or hirsutism; and cyclic pelvic pain with outflow obstruction. Renal and skeletal abnormalities may also occur. Prolonged amenorrhea is associated with an increased risk for osteoporosis.

Workup and Evaluation

Laboratory: The development of sexual hair or breasts provides an outward sign of androgen and estrogen production, respectively. Serum follicle-stimulating hormone concentration (high) can indicate the need for a karyotype.
Imaging: Based on conditions being considered. If a normal vagina or uterus is not apparent, pelvic ultrasonography should be performed to evaluate the upper genital tract.
Special Tests: Based on conditions being considered.
Diagnostic Procedures: Laparoscopy to evaluate internal organs and gonads may be required.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Determination of underlying cause(s).
Specific Measures: Based on the diagnosis and specific needs of the patient.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Your Changing Body—Especially for Teens, 2018
- Your First Period—Especially for Teens, 2018

Drug(s) of Choice

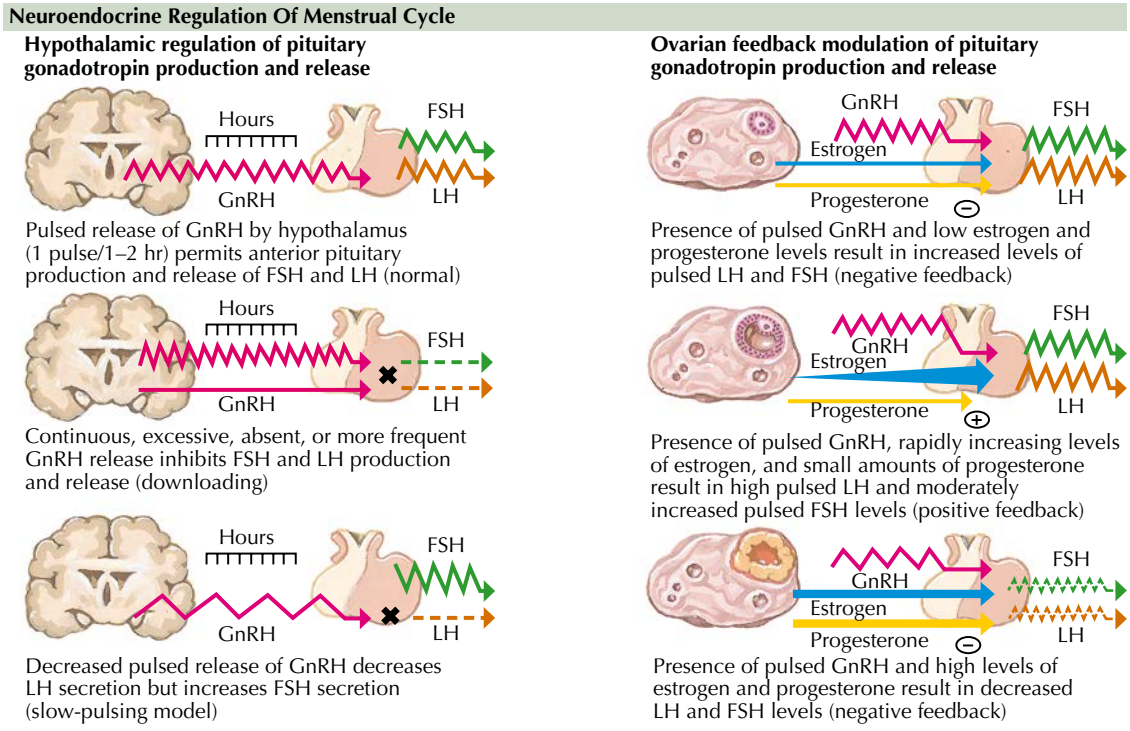
Based on the underlying cause. Hormone therapy may be required or desirable for many patients.

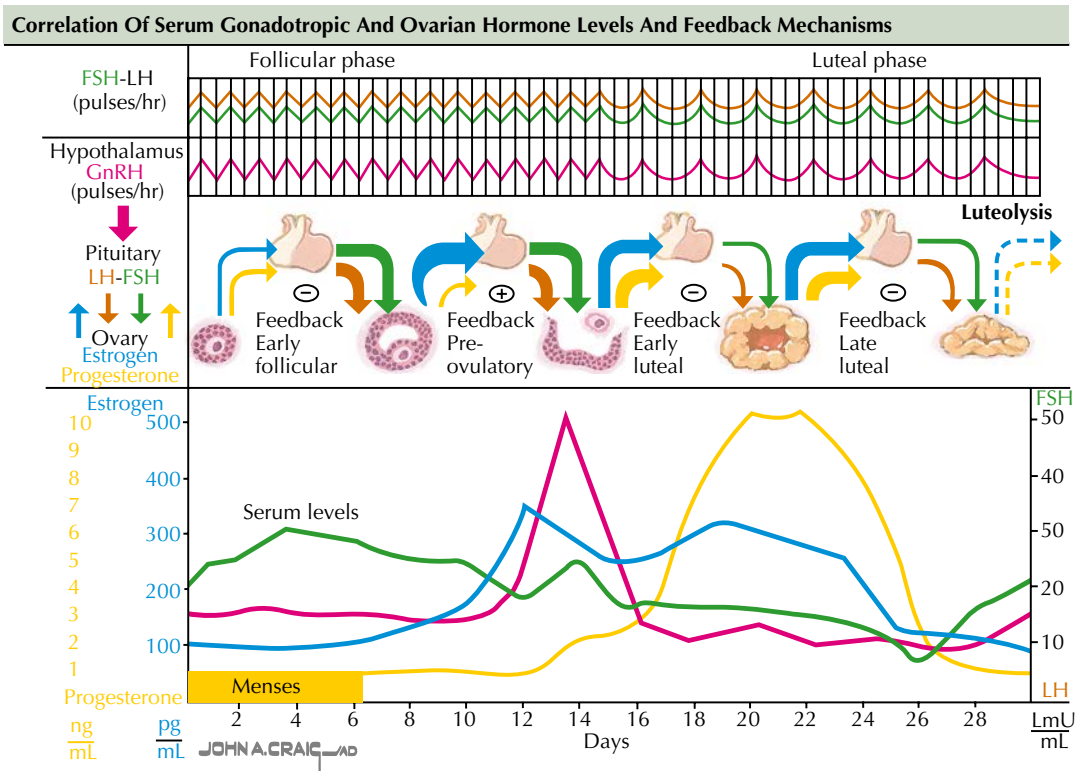
FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: Risk for gonadal malignancy is increased if a Y chromosome is present. Risk for osteoporosis is present if the patient is hypoestrogenic and does not undergo estrogen therapy. Extensive damage to the upper tract may occur if obstruction is not corrected.
Expected Outcome: Menstruation and fertility may be restored for many of these patients if there are no structural or chromosomal conditions that preclude the possibility (uterine agenesis, androgen insensitivity syndrome, gonadal dysgenesis).

MISCELLANEOUS

Pregnancy Considerations: Infertility common. If pregnancy is achieved, there are no effects except those imposed by underlying cause.
ICD-10-CM Codes: N91.2 (Amenorrhea, unspecified).





FSH, follicle-stimulating hormone; GnRH, gonadotropin-releasing hormone; LH, luteinizing hormone.

Figure 185.1 Amenorrhea: Primary

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AMENORRHEA: SECONDARY

186

INTRODUCTION

Description: Secondary amenorrhea is the absence of normal menstruation in a patient with previously established cycles.
Prevalence: Common.
Predominant Age: Reproductive age (menarche to menopause).
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Most common—pregnancy. Other causes—end organ: Asherman syndrome, outflow obstruction; ovarian (40%): polycystic ovary syndrome (PCOS, 30%), menopause, resistant ovary (Savage) syndrome, toxin exposure, surgery, autoimmune disease; central (hypothalamic, 35%), behavioral, and others: anorexia, obesity, athletics (overtraining), drugs/medications, nutritional deprivation, psychogenic (stress); medical: adenoma, craniopharyngioma, Sheehan syndrome, tuberculosis, sarcoid, empty sella syndrome; virilizing syndromes: PCOS, adrenal hyperplasia, virilizing tumors.
Risk Factors: Unprotected intercourse, exposure to toxins, chemotherapy, or radiation; surgery; overtraining; eating disorders; psychosocial stress.

SIGNS AND SYMPTOMS

- Absent menstruation—may be associated with symptoms that suggest the cause.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Pregnancy
- Menopause (natural or premature)
- Exogenous hormone use
- Virilization
- Metabolically active ovarian tumor
- Lactational amenorrhea

Associated Conditions: Endometrial hyperplasia, osteoporosis in hypoestrogenic states.

Workup and Evaluation

Laboratory: A pregnancy test is always indicated and is the first step in evaluation.
Imaging: Based on conditions being considered.
Special Tests: Women who are younger than 30 years who have ovarian failure should have a karyotype performed.
Diagnostic Procedures: Based on conditions being considered.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Determination of underlying cause(s). If a pathologic condition has been ruled out and pregnancy is not desired, reassurance only. Evaluation should not be delayed any time there is the suggestion of an abnormality or pregnancy.
Specific Measures: Periodic (every 3–6 months) progestin withdrawal to prevent endometrial hyperplasia and to re-evaluate status. Specific therapy is based on the underlying cause (such as estrogen/progestin therapy for symptoms associated with menopause). Treatment is focused on restoring or inducing ovulation if pregnancy is desired.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Polycystic Ovary Syndrome, 2021
- The Menopause Years, 2020
- Your Changing Body—Especially for Teens, 2018
- Your First Period—Especially for Teens, 2018

Drug(s) of Choice

- Based on the diagnosis (eg, thyroid replacement for hypothyroidism, estrogen and progestin therapy for ovarian failure, periodic oral or transvaginal progestin therapy, or ovulation induction for anovulation).

Contraindications: All medical interventions are contraindicated until pregnancy has been ruled out.

FOLLOW-UP

Patient Monitoring: Normal health maintenance. Watch for changing status or intercurrent pregnancy.
Prevention/Avoidance: None (contraception).
Possible Complications: Endometrial hyperplasia with continued estrogen (unopposed) exposure.
Expected Outcome: Most causes of secondary amenorrhea may be successfully treated with the return of menstruation.

MISCELLANEOUS

Pregnancy Considerations: Pregnancy must be ruled out.
ICD-10-CM Codes: N91.2 (Amenorrhea, unspecified).

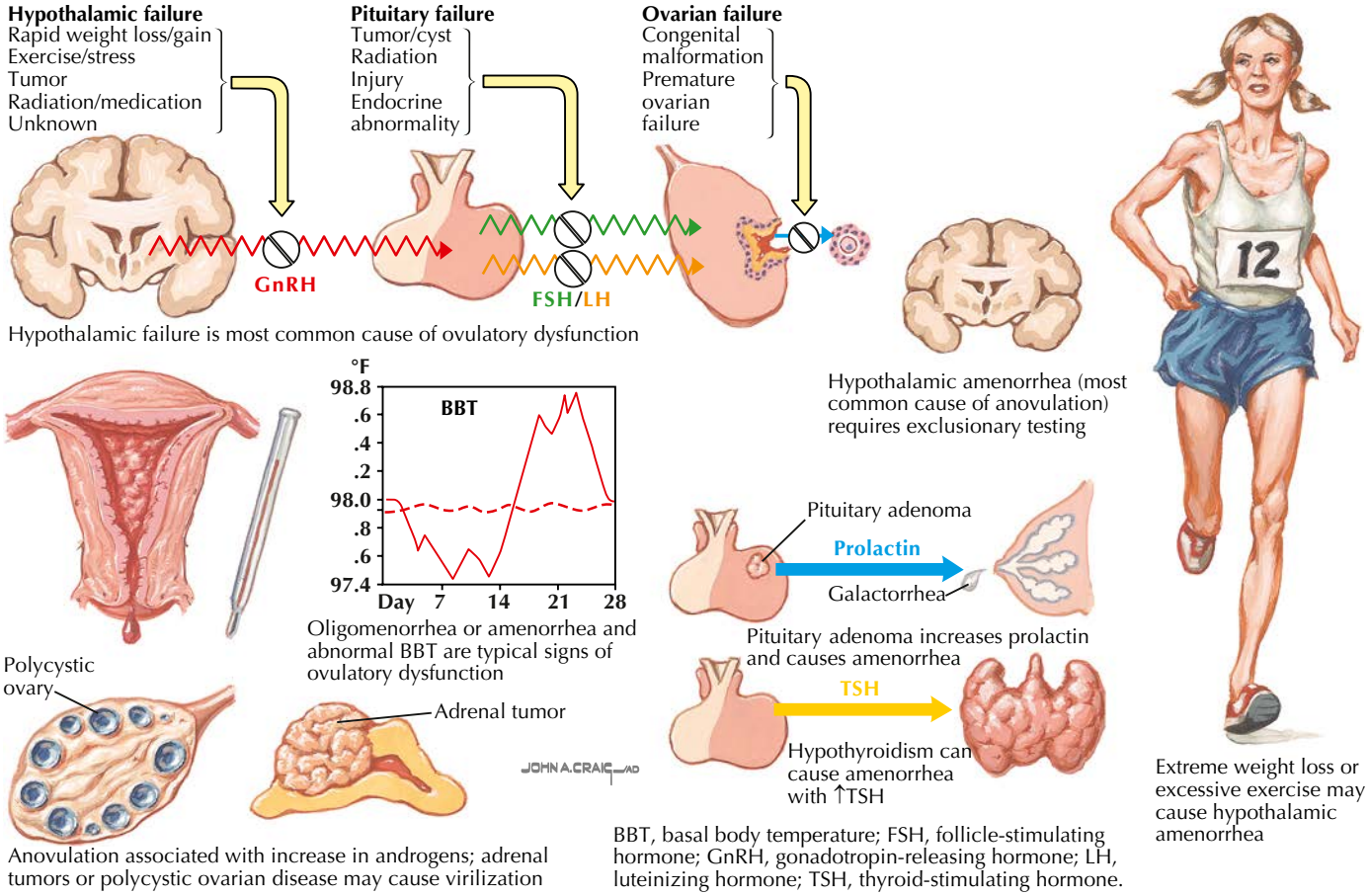

Figure 186.1 Causes of ovulatory dysfunction in amenorrhea (secondary)

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ANDROGEN INSENSITIVITY SYNDROME

187

INTRODUCTION

Description: Patients with androgen insensitivity have a normal male karyotype but a genetic alteration that results in somatic cells that cannot recognize or respond to testosterone. This results in a normal female phenotype, absent uterus, and scant (or absent) body hair. The syndrome was known at one time as "testicular feminization."

Prevalence: Uncommon; 10% of patients with primary amenorrhea (third most common cause). May be as high as 1/20,000 phenotypic females.

Predominant Age: Generally discovered in middle to late teens.

Genetics: Absence of an X-chromosome gene (eight exon androgen receptor gene located on chromosome Xq11-12) that encodes for cytoplasmic or nuclear testosterone receptor protein, X-linked recessive. Over 1000 mutations have been identified in individuals with androgen insensitivity syndrome. Most mutations have been localized in the hormone-binding domain of the gene.

ETIOLOGY AND PATHOGENESIS

Causes: Testosterone and gonadotropin levels are essentially normal (there may be a slight increase in luteinizing hormone, but the testosterone is biologically ineffective because of the body's inability to use it. Consequently, masculinization does not occur, and the normal production of Müllerian-inhibiting factor results in the regression of the upper genital tract and a blind vaginal pouch.

Risk Factors: None known.

SIGNS AND SYMPTOMS

There is a spectrum of androgen receptor dysfunction (partial androgen insensitivity) that results in a spectrum of traits and impacts ranging from hypomasculinized males (hypospadias, sparce body hair, undescended testes, and subfertility) to the complete syndrome described here.

- Amenorrhea
- Tall stature
- Normal breast development with immature nipples and hypopigmented areolae
- Short or absent blind vaginal pouch
- Scant or no pubic or axillary hair
- Gonads (testes) may be palpable in the inguinal canal or labioscrotal folds
- Inguinal hernia (50%, as many as 1%–2% of girls with inguinal hernias may have complete androgen insensitivity syndrome)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Pregnancy before first cycle
- Obstructed outflow tract (making menstruation cryptic)
- Gonadal dysgenesis
- Uterine agenesis
- Complete lack of Müllerian development (Mayer–Rokitansky–Küster–Hauser syndrome);

these individuals have normal pubic and axillary hair.

Associated Conditions: Infertility, amenorrhea, mildly impaired visual-spatial ability, horseshoe kidney.

Workup and Evaluation

- **Laboratory:** Measurement of gonadotropins, estrogen, and testosterone (not required for diagnosis).
- **Imaging:** Ultrasonography may be used to confirm the absence of the uterus, although it is not required for diagnosis.
- **Special Tests:** Chromosomal analysis confirms the diagnosis.
- **Diagnostic Procedures:** History and physical examination should provide the suggestion, confirmed by chromosomal analysis.

Pathologic Findings

The presence of testicular tissue in the labioscrotal folds.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and reassurance.

Specific Measures: Surgical extirpation of the gonads must be performed because of a 25%–30% risk of malignant gonadal tumor formation. This should not be performed until complete breast development has occurred and there has been epiphyseal closure (age, 18 years). Genetic counseling should be offered to siblings.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education: Frank discussion about the syndrome and its effects (infertility and amenorrhea). Patients should be informed that they carry an abnormal sex chromosome without mentioning the Y chromosome specifically because of the "male" connotations this carries. In addition, the term gonads should be used rather than testes when discussing the need for removal.

Drug(s) of Choice

None. Estrogen replacement therapy is generally not necessary after the removal of the gonads; the insensitivity of the peripheral tissues to the effects of circulating androgens results in unopposed estrogen effects from the low levels of estrogen that come from adrenal and peripheral conversion sources.

FOLLOW-UP

Patient Monitoring: Normal health maintenance once the diagnosis is established and the gonads are removed (at the appropriate time).

Prevention/Avoidance: None.

Possible Complications: There is a 25%–30% risk for malignant gonadal tumor formation if the testes are not removed (rare before the age of 25 years).

Expected Outcome: These patients are phenotypically, behaviorally, and psychologically female and continue to lead normal lives with the exception of infertility and amenorrhea.

MISCELLANEOUS

Pregnancy Considerations: These patients are infertile.

ICD-10-CM Codes: E34.50 (Androgen insensitivity syndrome, unspecified).

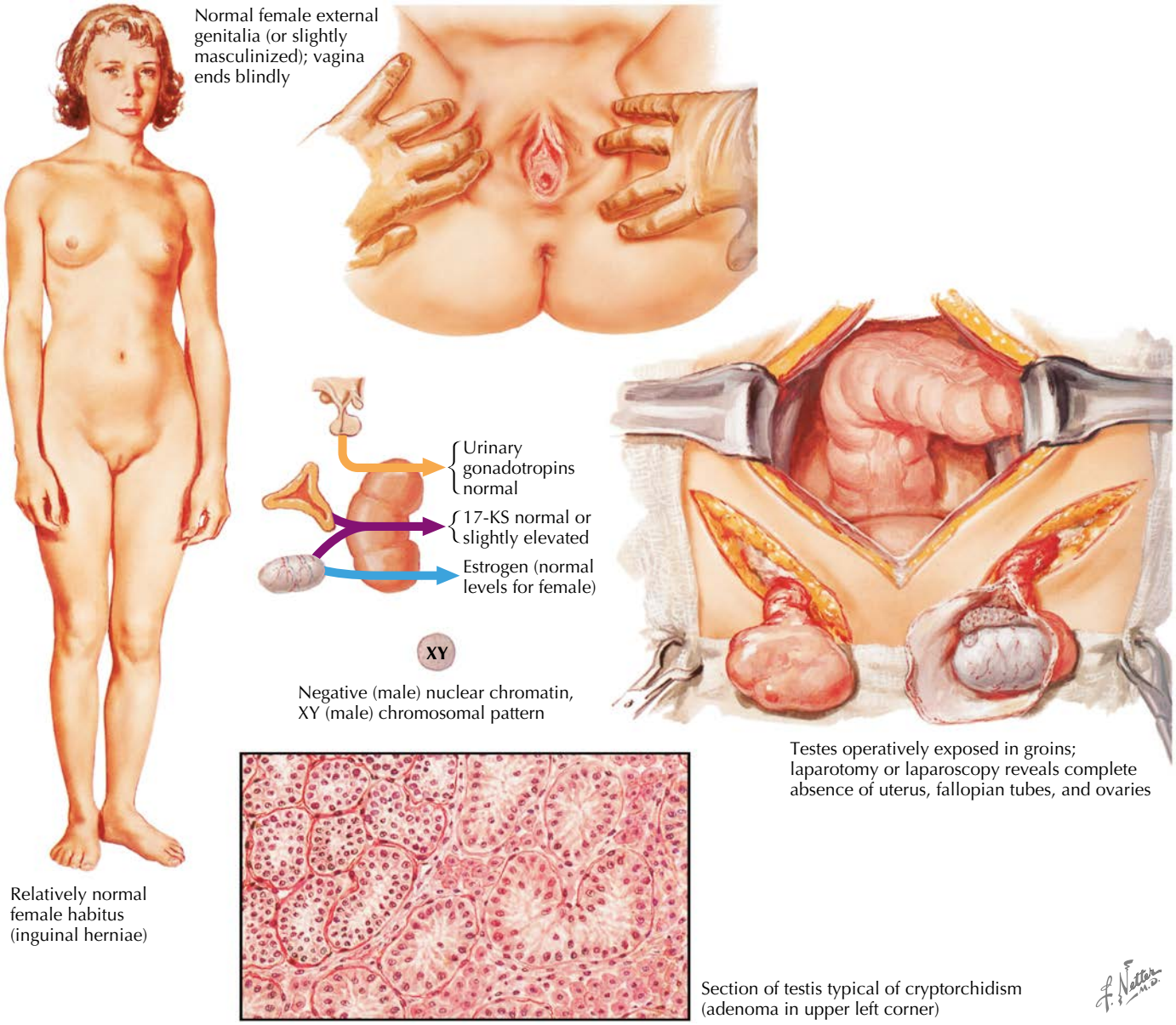

Figure 187.1 Androgen insensitivity syndrome

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ANOVULATION

188

INTRODUCTION

Description: Anovulation is characterized by the absence of ovulation in women of reproductive age.
Prevalence: Up to 25% of couples who are infertile.
Predominant Age: Reproductive age.
Genetics: No genetic pattern. Some chromosomal abnormalities are associated with premature ovarian failure (deletions on the X chromosome).

ETIOLOGY AND PATHOGENESIS

Causes: Physiologic—menopause (normal or premature), pregnancy; hormonal—elevated prolactin, hypothyroidism; functional—exercise (excessive), malnutrition, obesity, weight loss; drug-induced—alkylating chemotherapy, hormonal contraception, marijuana, tranquilizers; neoplasia—craniopharyngioma, hypothalamic hamartoma, pituitary adenoma (prolactin-secreting), small cell carcinoma of lung; psychogenic—anorexia nervosa, anxiety, pseudocyesis, stress; other—adrenal androgenization, central nervous system trauma, chronic medical illness, hemochromatosis, histiocytosis X, internal carotid artery aneurysms, irradiation, juvenile diabetes mellitus, polycystic ovary syndrome (PCOS), Sheehan syndrome (postpartum ischemic necrosis), syphilitic gummas, tuberculosis, uremia. The World Health Organization (WHO) defines three classes: WHO class 1—hypogonadotropic hypogonadal anovulation (hypothalamic amenorrhea), 5%–10%; WHO class 2—normogonadotropic normoestrogenic anovulation (most have polycystic ovary syndrome), 70%–85%; and WHO class 3—hypergonadotropic hypoestrogenic anovulation (primary ovarian insufficiency, premature ovarian failure), 5%–10%. The four most common ovulatory disorders are hypogonadotropic hypogonadism, PCOS, premature ovarian insufficiency (menopause <40 years), and hyperprolactinemia.
Risk Factors: Factors noted in previous section.

SIGNS AND SYMPTOMS

- Amenorrhea (primary or secondary)
- Absence of premenstrual molimina (prodromal symptoms)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Pregnancy must always be considered
- Menopause
- Congenital abnormality of the outflow tract causing amenorrhea
- Cervical stenosis resulting in amenorrhea

Associated Conditions: Infertility, dysfunctional uterine bleeding, endometrial hyperplasia, and endometrial cancer.

Workup and Evaluation

Laboratory: Follicle-stimulating hormone, prolactin, thyroid function studies (eg, sensitive thyroid-stimulating hormone), others as clinically indicated.
Imaging: No imaging indicated.
Special Tests: Basal body temperature charting may be used to detect ovulation, but other laboratory tests are more specific for establishing the cause.
Diagnostic Procedures: Endometrial biopsy performed during the presumed luteal phase. May also be helpful when endometrial hyperplasia resulting from chronic estrogen exposure is being considered.

Pathologic Findings

Endometrial—proliferative changes only, hyperplasia possible with prolonged anovulation.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation
Specific Measures: If pregnancy is desired, induction of ovulation. If pregnancy is not desired, periodic progestin therapy.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Abnormal Uterine Bleeding, 2021

- Evaluating Infertility, 2020
- Polycystic Ovary Syndrome, 2021
- The Menopause Years, 2020
- Treating Infertility, 2019

Drug(s) of Choice

- **Ovulation Induction:** Aromatase inhibitors are efficacious as primary agents for ovulation induction (eg, letrozole; 2.5 mg or 5 mg administered for 5 days, beginning on cycle days 3–5). Clomiphene citrate 50 mg PO daily on days 5–10 of the menstrual cycle, may be increased to 100 mg PO daily on days 5–10 of the menstrual cycle if ovulation does not occur. Metformin (1500 mg/day) as an adjunctive treatment for ovulation induction (considered first-line therapy for polycystic ovary syndrome).

Progestin Withdrawal: Medroxyprogesterone acetate 5–10 mg for 1–14 days each month.
Contraindications: Undiagnosed amenorrhea or bleeding.
Precautions: Progestins should not be used until pregnancy has been ruled out.

Alternative Drugs

- Norethindrone acetate 5–10 mg for 10–14 days each month for progestin withdrawal.
- Dopamine agonists should be considered in women with hyperprolactinemia.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: Infertility, dysfunctional uterine bleeding, endometrial hyperplasia.
Expected Outcome: For many patients, normal ovulation and fertility may be restored.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy once pregnancy is achieved. The risk for multiple gestations is increased with clomiphene citrate therapy.
ICD-10-CM Codes: N97.0 (Anovulation).

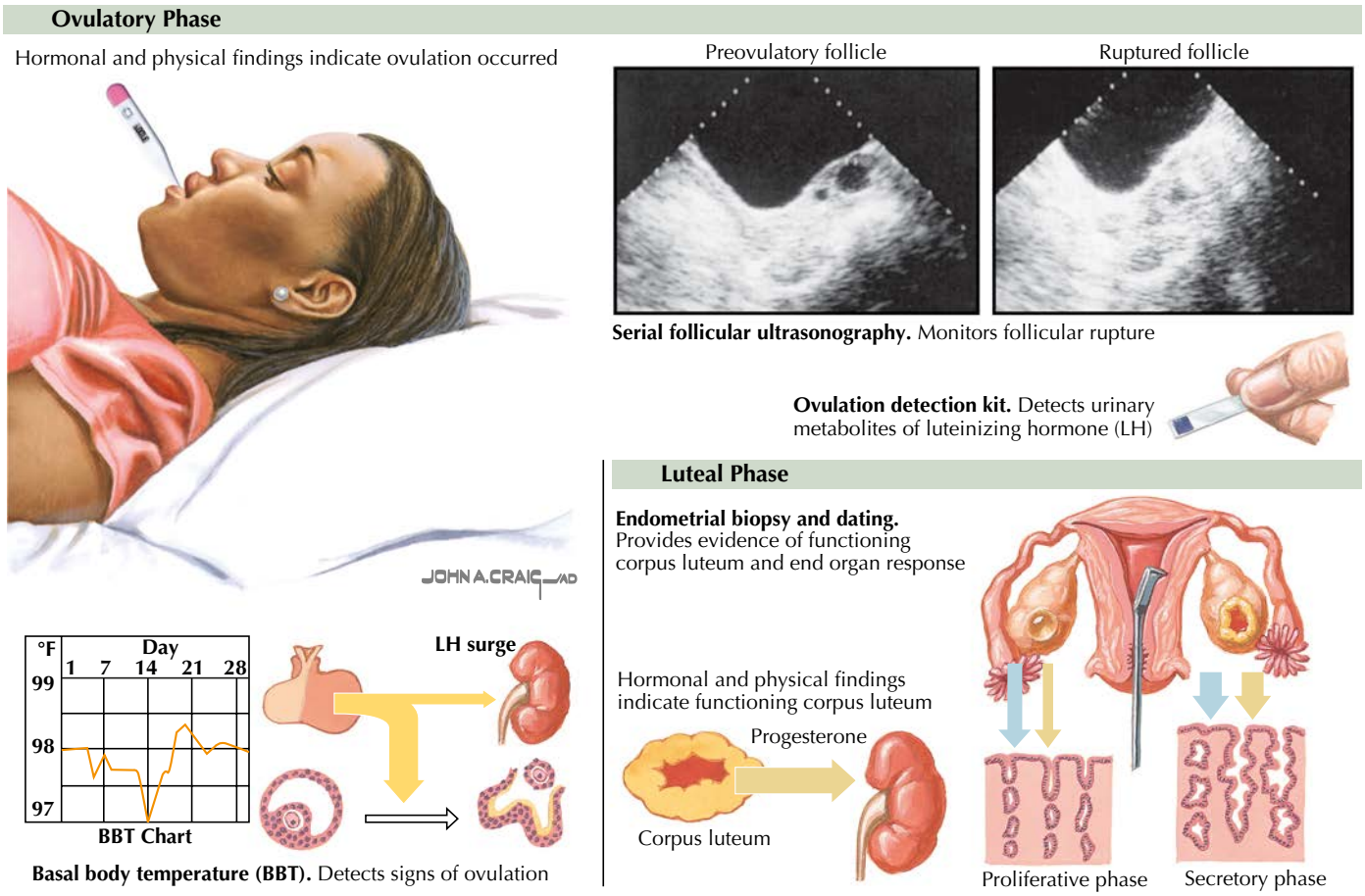

Figure 188.1 Assessment of ovulation

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ASSISTED REPRODUCTION

189

THE CHALLENGE

The challenge is to use advanced reproductive technology to assist couples who have trouble conceiving through normal means.

Scope of the Problem: 10%–15% of couples who are infertile require or benefit from assisted reproductive technologies.

Objectives of Management: To achieve a successful pregnancy (carried to term) with minimal intervention. The treatment of an infertile couple is based on identifying the impediment to fertility and overcoming or bypassing it to achieve pregnancy. A number of techniques are available to accomplish this end. Most are less exotic than their acronyms suggest (Table 189.1). Among infertile couples seeking treatment, 85%–90% can be treated with conventional medical and surgical procedures and do not require assisted reproductive technologies such as in vitro fertilization (IVF).

TACTICS

Relevant Pathophysiology: The success of the treatment depends to a great extent on the identified cause of infertility because some problems are more easily overcome than others. It must be recognized that success is also a function of the age of the woman. It is also true that the rate of spontaneous pregnancy loss rapidly increases after the age of 35 years, adversely affecting success.

Strategies: Often a good starting point in the treatment of infertility is a frank and open discussion about sexuality and the physiology of conception. When couples have intercourse four or more times per week, more than 80% achieve pregnancy in the first

Table 189.1 Abbreviations for Techniques

Abbreviation	Technique
AID	Artificial insemination, donor (using donor sperm, occasionally referred to as therapeutic donor insemination [TDI])
AIH	Artificial insemination, homologous (using the partner's sperm)
BT	Basal body temperature
GIFT	Gamete intrafallopian transfer (gametes placed in the fallopian tube for fertilization)
HSG	Hysterosalpingogram or uterine cavity radiograph
ICSI	Intracytoplasmic sperm injection
IUI	Intrauterine insemination (placement of either donor or partner sperm directly into the uterine cavity)
IVF/ET	In vitro fertilization with embryo transfer
PCT	Postcoital test or Huhner–Sims test
SPA	Sperm penetration assay (also known as a hamster egg test or zona-free egg penetration test)
ZIFT	Zygote intrafallopian transfer (fertilization takes place in vitro and the zygote is transferred to the fallopian tube to be transported into the uterine cavity)

6 months of trying. In contrast, only approximately 15% of couples conceive when intercourse happens less than once a week. Intercourse should be maintained on an every-other-day cycle for the period from 3–4 days before the presumed ovulation until 2–3 days after that time. When ovulation disorders are encountered, ovulation induction or control may be used to enhance the likelihood of pregnancy. Tubal factor infertility may be addressed by either surgical repair of the damage or bypassing the tubes completely through IVF and embryo transfer (IVF/ET). Success rates for surgical repair, including the reversal of previous sterilization procedure, are highly variable. Technologies such as intracellular sperm injection may allow fertility with as few as one sperm per oocyte.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Evaluating Infertility, 2020
- Treating Infertility, 2019

IMPLEMENTATION

Special Considerations: Patients experiencing infertility are usually extremely motivated, following to the letter any suggestion made by the healthcare team. Hence, care must be taken so that during the evaluation and treatment of infertility the couple's relationship is not destroyed in the process. In the end, there is no guarantee that efforts will result in a conception, so the healthcare team must not damage what is present in the quest for something that may not be. Couples should be reminded that if they miss having intercourse at the "right time" in a given month, remember that ovulations are like commuter trains—there is probably another one on its way. If the couple is in the mood for "making love," in any of its myriad forms, they should not worry about what the temperature chart is doing. To do otherwise is the fodder of cinematic comedy and divorce lawyers. Because infertility does not threaten life or health, many insurance providers do not cover the cost of its evaluation or treatment. A frank and open discussion about the time and expense involved in infertility evaluation allows the couple to make informed choices and avoids unnecessary financial or emotional hardship in the future.

All types of assisted reproductive technologies involving ovarian stimulation are associated with an increased incidence of multiple gestations (40%). The majority of these pregnancies are twins (25%), and 5% are higher-order gestations.

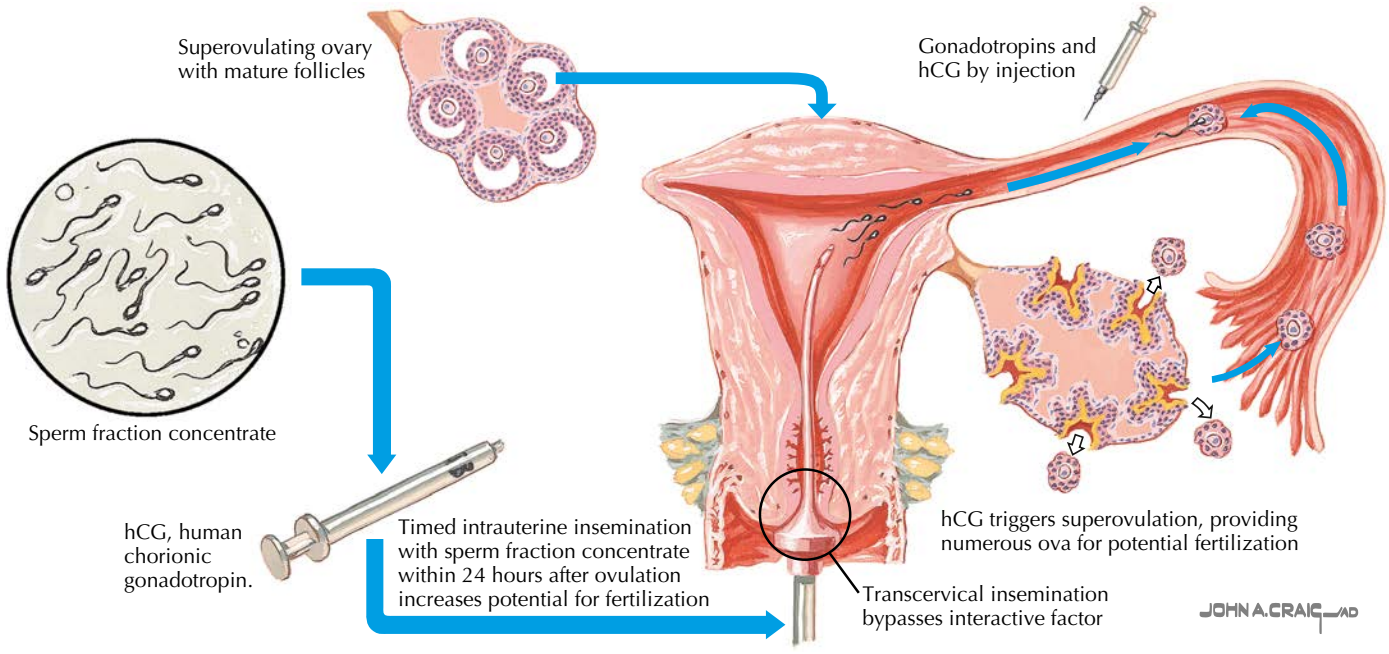
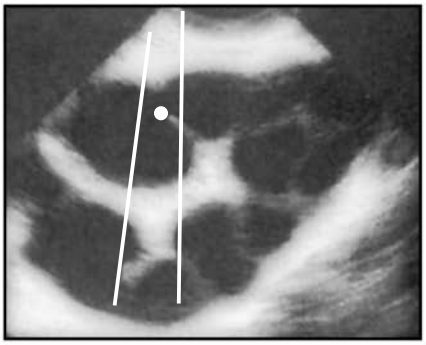
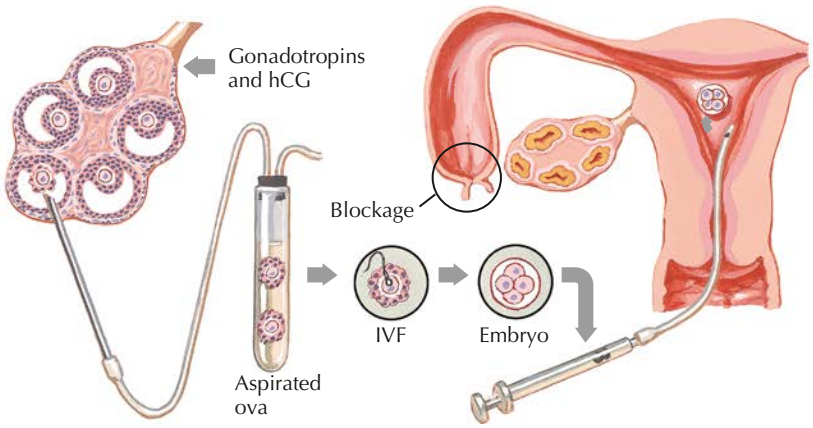


Figure 189.1 Basic options in assisted reproduction



Ultrasonogram of follicular aspiration



Hormonal stimulation induces superovulation; ova aspirated from mature follicles

hCG, human chorionic gonadotropin.

Ova fertilized in vitro (IVF) with sperm fraction concentrate. Embryo transferred directly into uterus, bypassing tubal occlusion

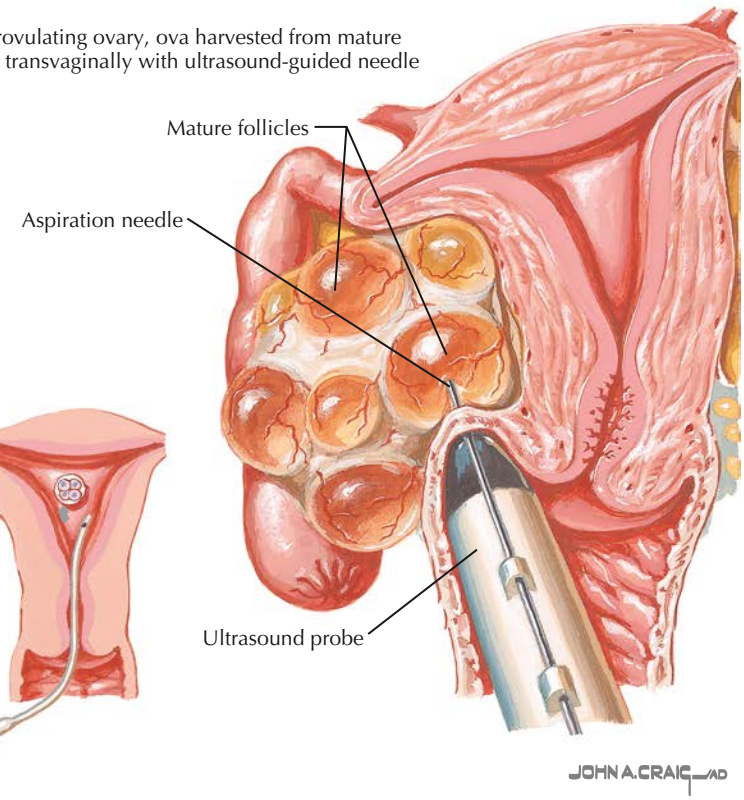
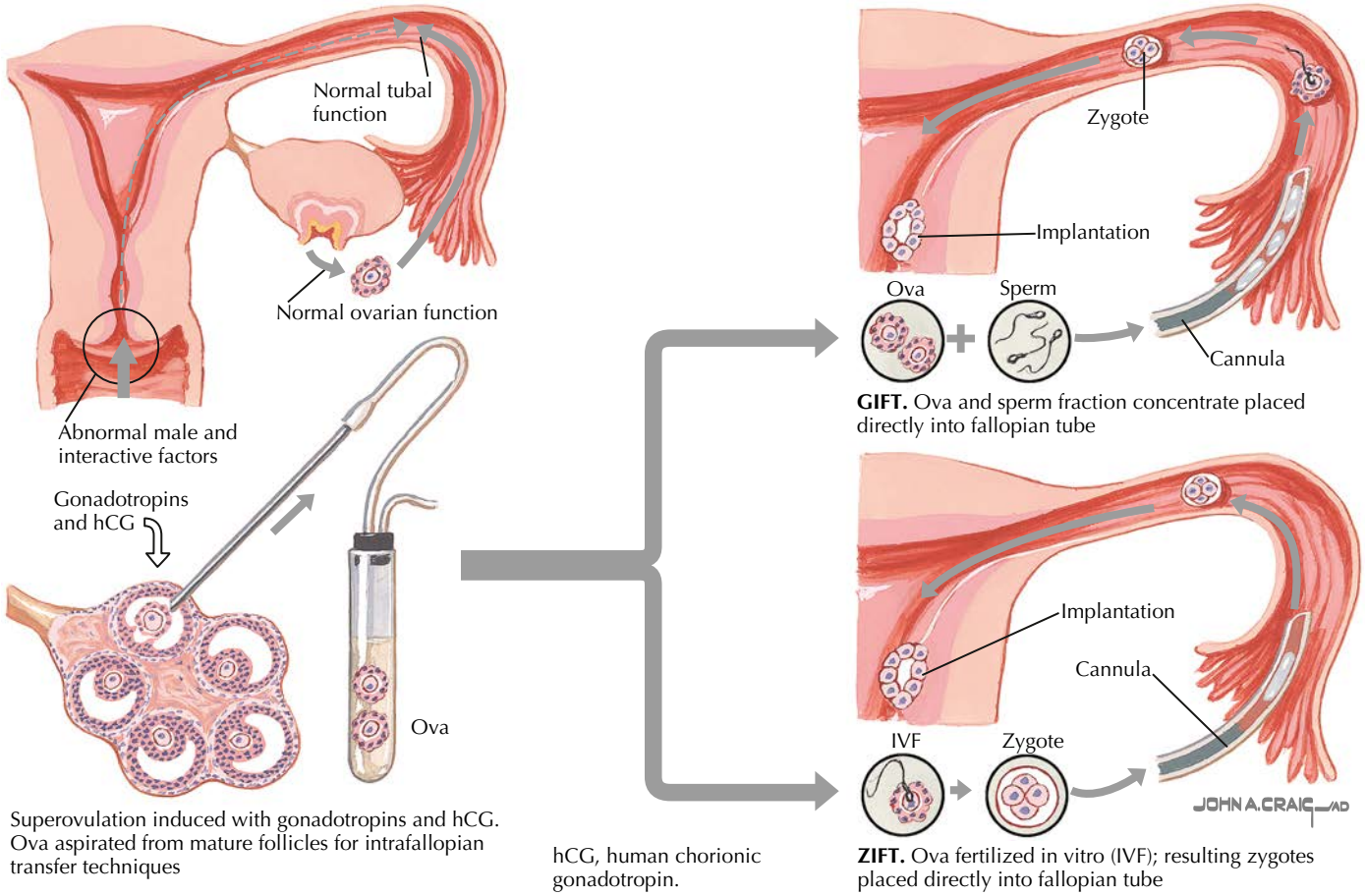


Figure 189.2 Advanced option: In vitro fertilization



Superovulation induced with gonadotropins and hCG. Ova aspirated from mature follicles for intrafallopian transfer techniques

hCG, human chorionic gonadotropin.

GIFT. Ova and sperm fraction concentrate placed directly into fallopian tube

ZIFT. Ova fertilized in vitro (IVF); resulting zygotes placed directly into fallopian tube

Figure 189.3 Advanced options: Gamete intrafallopian transfer (GIFT) and zygote intrafallopian transfer (ZIFT)

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190 DOWN SYNDROME

INTRODUCTION

Description: Down syndrome is characterized by physical and mental symptoms that have their origin in the presence of extra genetic material from chromosome 21. This may be because of duplication or translocation errors of genetic material that result in effective duplication. Patients with Down syndrome exhibit a spectrum of changes that range from mild to profound.

Prevalence: Based on maternal age, from approximately 1/1250 at the age of 25 years to approximately 1/100 at the age of 40 years. The most common chromosome abnormality among liveborn infants.

Predominant Age: Most patients with Down syndrome are identified at birth. Their life span is generally shorter than average (usually 50–60 years).

Genetics: 90% are caused by nondisjunction, resulting in an extra chromosome 21, 5% are caused by translocation, and 5% are caused by mosaicism.

ETIOLOGY AND PATHOGENESIS

Causes: Nondisjunction of chromosome 21, resulting in two copies from one parent and one from the other, with a net total of three. Balanced translocation of chromosome 21q material onto another chromosome (most often 12, 13, or 15) in 90% of patients. During cell division, this is independently inherited from the normal chromosome 21s, resulting in extra genetic material. Approximately half of these duplications are new occurrences, and half have a parental carrier. Mosaicism of two cell lines: one normal and one with trisomy 21. This is generally associated with milder clinical manifestations.

Risk Factors: Maternal age, known carrier state (translocation), prior chromosomal abnormality. Screening based on age identifies only 25% of all cases (the remainder are born to mothers considered to be at low risk).

SIGNS AND SYMPTOMS

- Brachycephaly (100%)
- Hypotonia at birth (80%)
- Posterior third fontanel
- Anomalous, small or low-set ears
- Prominent epicanthal folds (90%)
- Enlarged tongue (75%)
- Depressed nasal bridge
- Cardiac murmur (50%)
- Cognitive impairment (IQ 40–345)
- Abnormal dermatoglyphics (single palmar crease, absent plantar whorl)

DIAGNOSTIC APPROACH

Differential Diagnosis

Familial structural mimics.

Associated Conditions: Renal and cardiac anomalies, cognitive impairment, bowel obstruction, Hirschsprung disease, refractory errors (myopia, hyperopia, astigmatism), hearing loss, and thyroid disease.

Workup and Evaluation

Laboratory: Maternal serum α-fetoprotein screening between 15 and 22 weeks gestation (16–18 optimal) may be abnormally low, suggesting the presence of an infant with Down syndrome.

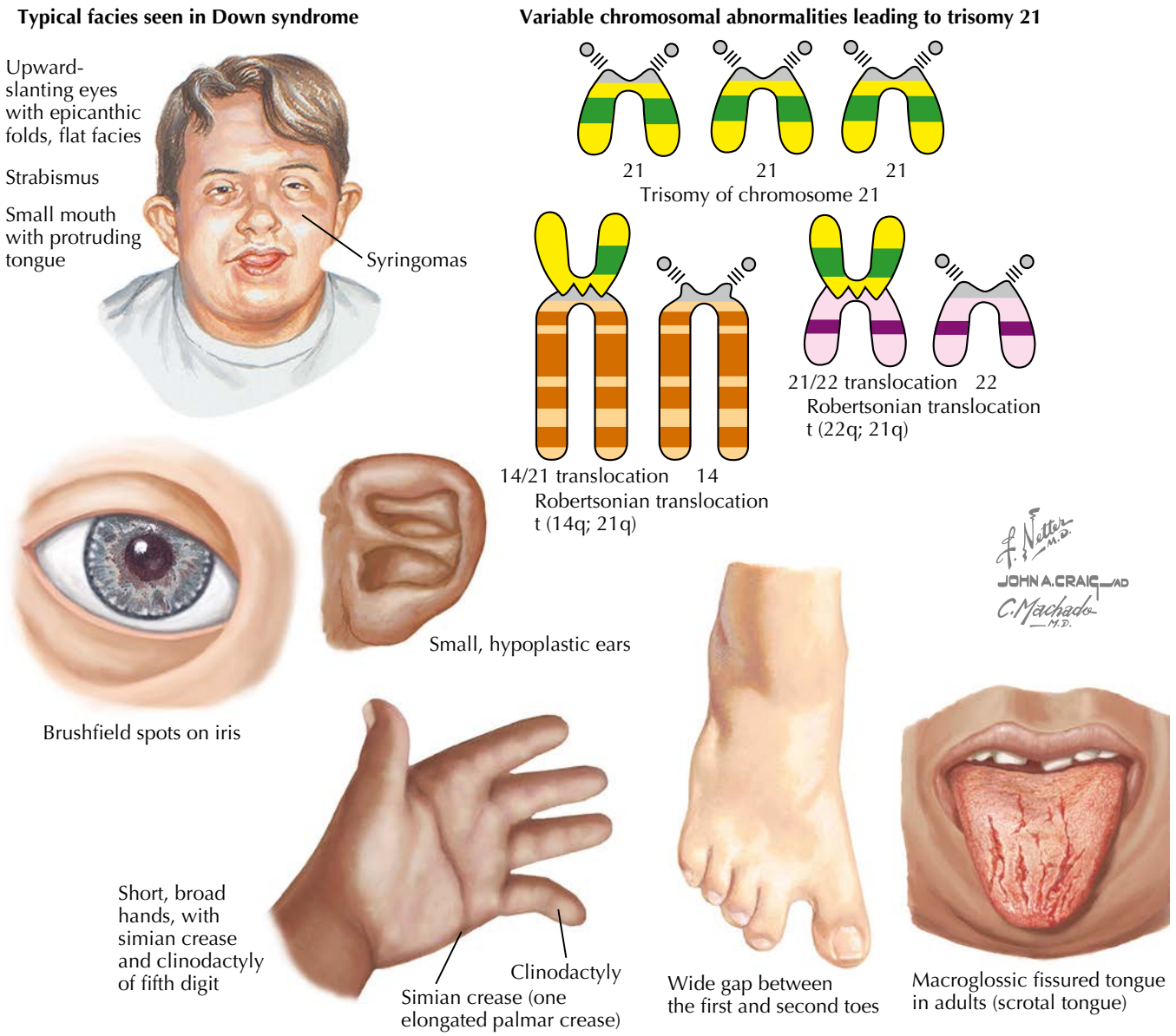

Figure 190.1 Characteristics and variable chromosomal abnormalities in trisomy 21 Down syndrome

Imaging: Ultrasonographic studies that measure fetal nasal bones or nuchal translucency are effective screening tools, but they require very specific training or experience. Imaging of the urinary tract should be considered to look for anomalies.

Special Tests: Karyotyping should be performed to look for translocation and is useful for genetic counseling of parents. Chorionic villus sampling or amniocentesis may be performed for antenatal diagnosis. Testing for cell-free DNA in maternal blood can detect more than 99% of affected pregnancies.

Diagnostic Procedures: History, physical examination, chromosomal analysis (antenatal or after birth). The presence of a whorl on the ball of the foot generally indicates a normal child, not a trisomy.

Pathologic Findings

Physical changes as noted. Alzheimer plaques common after the age of 20 years.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Genetic and cardiac evaluation and counseling. Assessment of abilities and assistance with activities of daily living as appropriate.

Specific Measures: Based on the needs of the individual. Parental support and counseling are vital.

Diet: No specific dietary changes indicated.

Activity: No restriction, except if cardiac abnormalities are present.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Carrier Screening, 2020
- Genetic Disorders, 2021
- Having a Baby After Age 35—How Aging Affects Fertility and Pregnancy, 2020
- Prenatal Genetic Screening Tests, 2019

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Normal health maintenance, monitor for renal or cardiac complications.

Prevention/Avoidance: Recurrence rate is 1% for true trisomy, 16%–20% for translocation, and 100% for trisomy involving chromosome 12.

Possible Complications: Congenital heart disease (50%), bowel obstruction (10%), Hirschsprung disease (3%), thyroid disease (5%–8%), and early Alzheimer disease (50% by age 35).

Expected Outcome: One-third of patients have normal development during the first year of life; growth, language, and mental development slow thereafter. Life expectancy is reduced by cardiac and other associated anomalies. Life potential varies from ability to live and work within sheltered environment to profound restriction. Premature aging is common, with life expectancy of 50–60 years.

MISCELLANEOUS

Pregnancy Considerations: Chorionic villus sampling (9–10 weeks) or amniocentesis (13–15 weeks) should be offered for patients at risk by age or other factors. Maternal serum α-fetoprotein (low) or triple or quadruple screening (combinations of maternal serum α-fetoprotein, β-human chorionic gonadotropin, estriol, pregnancy-associated plasma protein A, placental growth factor, and inhibin A in maternal serum) should be performed at 14–16 weeks. Pregnancy is possible for patients with Down syndrome; recurrence rate is 50%.

ICD-10-CM Codes: Q90.9 (Down syndrome, unspecified).

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191 GONADAL DYSGENESIS

INTRODUCTION

Description: Gonadal dysgenesis is a developmental abnormality of patients who do not carry the stigmata of Turner syndrome but still have absent menarche because of chromosomal abnormalities. These patients generally are tall (>150 cm), are more normal in appearance, and are a chromosomally heterogeneous group (46,XX, 46,XY, or mosaic X/XY karyotypes).

Prevalence: Appears in 1/2500 female births. Most common sex chromosome abnormality in females.

Predominant Age: Present at birth but may not be detected until puberty is delayed.

Genetics: Sporadic, loss of part or all of one X chromosome (amenorrhea more common with long arm loss; short stature with short arm loss).

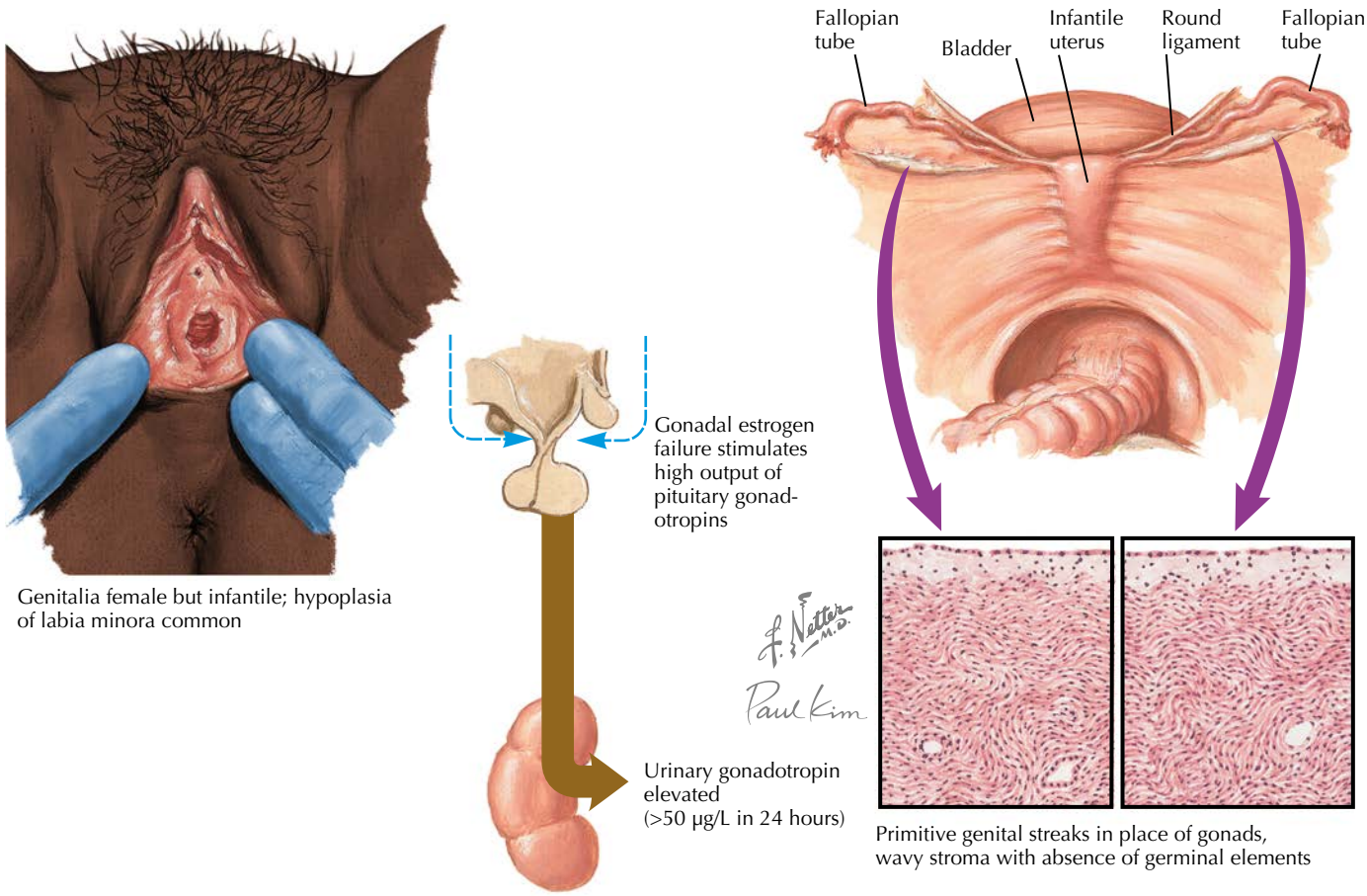

Figure 191.1 Gonadal dysgenesis

ETIOLOGY AND PATHOGENESIS

Causes: Pure gonadal dysgenesis—45,XO (Turner syndrome); 46,XY gonadal dysgenesis (Swyer syndrome); 46,XX q5 X chromosome long-arm deletion, mixed or mosaic (50%).
Risk Factors: Translocations involving the X chromosome (rare).

SIGNS AND SYMPTOMS

Based on the amount of chromatin lost
- Primary amenorrhea and infertility (the most common cause of failure to begin menstruation is gonadal dysgenesis; in approximately 60% of women with primary amenorrhea, an abnormality of gonadal differentiation or function has occurred during the fetal or neonatal period)
- Absent or grossly abnormal gonad development

DIAGNOSTIC APPROACH

Differential Diagnosis

- Polycystic ovary syndrome
- Hypothyroidism
- Growth hormone deficiency or glucocorticoid excess
- Androgen insensitivity syndrome (male pseudohermaphroditism, testicular feminization)
- Intersex abnormality
- Enzymatic defects (such as 17α-hydroxylase deficiency)
- Structural genital tract abnormalities (uterine and/or vaginal agenesis or an imperforate hymen)
- Ovarian insensitivity syndrome (resistant ovary [Savage] syndrome)
- Follicular depletion (autoimmune disease, infection [mumps], infiltrative disease processes [tuberculosis, galactosemia])

Associated Conditions: Amenorrhea, infertility, incomplete or abnormal external genitalia, and premature menopause.

Workup and Evaluation

Laboratory: Follicle-stimulating hormone (FSH) and luteinizing hormone (LH) levels are high (nonspecific). FSH is usually elevated in gonadal dysgenesis. Assessment of thyroid function, prolactin, or growth hormone if indicated by the differential diagnosis being considered.
Imaging: Pelvic ultrasonography to evaluate the presence and condition of upper genital tract organs.
Special Tests: Karyotype.
Diagnostic Procedures: History, physical examination, karyotyping.

Pathologic Findings

Abnormal karyotype. Germ cell involution occurs soon after they migrate into the undifferentiated gonad. This results in fibrous streak gonads that are hormonally inactive.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, screening for associated defects, counseling about menstrual and fertility issues.
Specific Measures: Hormone replacement therapy. When there is a mosaicism involving a Y chromosome, surgical extirpation of the gonads must be performed because of a 25%–30% risk

of malignant gonadal tumors. Timing of gonadal removal in patients with a Y chromosome is generally delayed until pubertal changes are complete.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education: Extensive counseling about sexual maturation and fertility.

Drug(s) of Choice

Adolescents are much more sensitive to the effects of estrogen than are reproductive age and postmenopausal women, allowing doses in the range of 0.3 mg of conjugated estrogen, 0.5 mg of estradiol, or their equivalent, daily. After 6–12 months of therapy at this level, the dose should be doubled and a progestin (eg, medroxyprogesterone acetate 10 mg for the first 12 days of the calendar month) should be added or the patient's treatment should be switched to combination oral contraceptives. This generally results in regular vaginal bleeding (menstruation), and normal pubertal development proceeds on its own when the patient reaches a bone age of 13 years.

Contraindications: Undiagnosed amenorrhea.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.

Prevention/Avoidance: Prenatal chromosomal analysis for those known to carry translocations (detection only, not prevention, although the couple may choose not to continue the pregnancy based on the findings).

Possible Complications: Gonadal malignancy or virilization in those with Y chromatin present. Others based on cause.

Expected Outcome: Reasonably normal lives with the exception of fertility.

MISCELLANEOUS

Pregnancy Considerations: These patients may be infertile. In pure gonadal dysgenesis and XX/XY mosaicism, a uterus is present. Consequently, some patients may achieve pregnancy. Pregnancy is associated with a 50% chance of aneuploidy.

ICD-10-CM Codes: Q50.01 (Congenital absence of ovary, unilateral), Q50.02 (Congenital absence of ovary, bilateral), and Q50.32 (Ovarian streak).

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192 HEREDITARY CANCER SYNDROMES

THE CHALLENGE

Description: Genetic mutations, especially those that impair the cell's DNA repair functions, can result in errors of cell growth and differentiation going unchecked. This propensity to malignant transformation may result in an increased risk of developing frank cancer. Not all mutations in these genes are associated with an increased cancer risk, but a number have been firmly connected with syndromes of malignancy that are clinically significant.

Scope of the Problem: Although the majority of breast, ovarian, and other gynecologic cancers are sporadic, about 5%–10% of breast and 10%–15% of ovarian cancers are hereditary. About 1/500 women in the United States has a cancer-related mutation in either the *BRCA1* or *BRCA2* gene. (If either parent has a *BRCA1* or *BRCA2* gene mutation, their children have a 50% chance of inheriting the same gene mutation.) Women with *BRCA1* mutations have a 60% lifetime risk for breast cancer, and *BRCA2* mutations carry an 85% risk for breast cancer and up to 30% risk for ovarian cancer. This has been termed hereditary breast-ovarian cancer (HBOC) syndrome. In a similar way, *MSH2, MLH1, PMS2, MSH3,* and *MSH6* germline mutations have been associated with hereditary nonpolyposis colorectal cancer (HNPCC) or Lynch syndrome (the most common cause of hereditary colorectal cancer). Lynch syndrome has an autosomal dominant inheritance and conveys a susceptibility to predominantly right-sided colon cancer, endometrial cancer, ovarian cancer, and other extracolonic cancers. The lifetime risk of ovarian carcinoma in females with Lynch syndrome is estimated to be as high as 17%, and the reported relative risk of ovarian cancer has ranged from 3.6 to 13, depending on the specific gene affected. Other syndromes (Cowden, DICER1, and Peutz–Jeghers syndromes, Li-Fraumeni syndrome, Bannayan–Riley–Ruvalcaba syndrome, rhabdoid tumor predisposition syndrome 2, and others) are less common but also convey their own increased cancer risks.

Objectives of Management: To realistically appraise the future risks of hereditary cancer and implement appropriate screening and prophylaxis strategies tailored to the needs of the patient and her family.

TACTICS

Relevant Pathophysiology: *BRCA1/2* genes are tumor suppressor genes that produce proteins used in an enzymatic pathway that makes very precise, perfectly matched repairs to DNA that has double-stranded breaks. The pathway requires proteins produced by several other genes, including *CHK2, FANCD2,* and *ATM.* Harmful mutations in any of these genes disable the gene or the protein that it produces, allowing harmful DNA breaks to accumulate. Other genes associated with an increased risk of breast cancer include *CDH1, PALB2, PTEN, STK11,* and *TP53.* Genes associated with endometrial cancer are *EPCAM, MLH1, MSH2, MSH6, PMS2,* and *PTEN.* In Lynch syndrome, mismatch repair genes, which are involved in repair of DNA mismatch variants, are affected. The *MLH1* and *MSH2* genes are the most common susceptibility genes for Lynch syndrome, accounting for 80%–90% of observed pathogenic variants, followed by *MSH6* and *PMS2.*

Strategies: Genetic counseling is commonly recommended to people whose personal or family health history suggests a greater-than-average likelihood of a mutation (Box 192.1). Based on the likelihood of a positive result, risks, and benefits of being tested, limitations of the tests, practical meaning of the results, and risk-reducing actions that could be taken if the results are positive can all be determined.

Risk-reducing mastectomy, hysterectomy, and bilateral salpingo-oophorectomy should be considered by any patient at significantly increased risk, subject to their childbearing and other considerations. The patient and provider must understand that these procedures do not convey complete protection and malignancies are still possible. Select antiestrogen and aromatase therapies also may be considered.

BOX 192.1 Indications for Genetic Screening

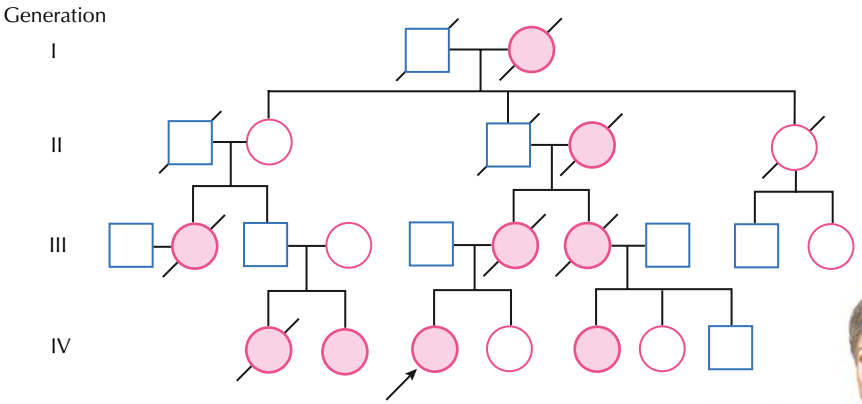
- Breast or endometrial cancer age younger than 50 years
- Any relative with cancer in both breasts or any male relative with breast cancer
- Multiple primary cancer diagnoses or a triple negative breast cancer* for the individual
- Several family members (>2) with cancers related to *BRCA* mutations or Lynch syndrome
- A family member with a known *BRCA* mutation or Lynch syndrome
- Invasive ovarian, fallopian tube, or primary peritoneal cancer in one or more relatives
- Pancreatic and/or prostate cancer (particularly aggressive types) at any age in ≥2 relatives
- Ashkenazi Jewish ancestry

*Little or no expression of the estrogen receptor (ER–) and progesterone receptor (PR–) and no increased epidermal growth factor receptor 2 (HER2).

Patient Education: Counseling by a trained genetic counselor and/or gynecologic oncologist familiar with hereditary cancer syndromes. Counseling should be given before DNA testing and when the results are shared.

IMPLEMENTATION

Special Considerations: Direct to consumer DNA testing is marketed as able to detect *BRCA* gene mutations. The lack of appropriate counseling before or after testing, along with the nonspecific nature of most of the results retuned, makes this something to be discouraged. Although genetic testing is covered by many health insurance policies, the long-term impact on insurance coverage in the face of a positive test is unclear.



Squares represent males and circles represent females, diagonal lines indicate decreased, shaded individuals are affected, arrow indicates the proband.

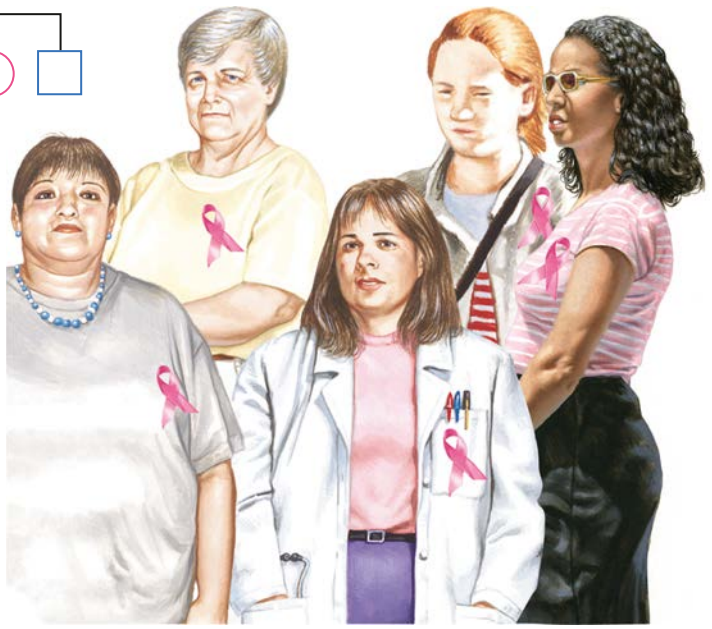


Figure 192.1 Hereditary patterns of gynecologic cancers

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193 HIRSUTISM

INTRODUCTION

Description: Hirsutism refers to increased or excessive hair growth only. It may be idiopathic (hypertrichosis) or caused by androgen-stimulated excessive growth. Hypertrichosis involves increased hair on the extremities and tends to be ethnic, racial, or familial in origin. This is not considered hirsutism.

Prevalence: 5%–10% of women; variable within ethnic groups; 60% of women with Cushing's disease.

Predominant Age: After puberty.

Genetics: Influenced by the number of hair follicles present, a function of race and ethnicity.

ETIOLOGY AND PATHOGENESIS

Causes: Familial, idiopathic, increased hair follicle androgens (5α-reductase). Increased androgen production—ovarian (polycystic ovary syndrome, hilus cell hyperplasia/tumor, arrhenoblastoma, adrenal rest), adrenal (congenital adrenal hyperplasia [10%–15% of women with hirsutism], Cushing's disease, virilizing carcinoma or adenoma). Drugs—minoxidil, androgens (including danazol [Danocrine]), phenytoin, diazoxide. Other (hypothyroidism, hyperprolactinemia). Follicle size and type (vellus or terminal) of hair can change in response to numerous factors, particularly androgens.

Risk Factors: Androgen use, danazol sodium, minoxidil, phenytoin, and diazoxide.

SIGNS AND SYMPTOMS

- Increased or excessive hair growth, primarily along the angle of the jaw, upper lip, and chin.
- For most patients, hirsutism dates from puberty
- Menstrual irregularity or amenorrhea (60%)
- Acne (40%)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Virilization (especially when hirsutism is in a male pattern)
- Familial hypertrichosis
- Cushing's disease (truncal obesity, facial rounding, cervicodorsal fat deposition [buffalo hump], and red or purple striae are often not fully developed)
- Polycystic ovary syndrome
- Iatrogenic hirsutism (patients may use steroids for a number of reasons, legal and otherwise, and may not recognize the possibility of virilizing side effects; the use of danazol sodium [eg, for endometriosis therapy] also may be associated with increased hair growth)
- Acromegaly
- Hypothyroidism
- Hyperprolactinemia
- Anorexia nervosa

Associated Conditions: Obesity, menstrual irregularity, amenorrhea, infertility, acne, oily skin, increased libido, alopecia, acanthosis nigricans.

Workup and Evaluation

Laboratory: Evaluation for possible virilizing process (prolactin, dehydroepiandrosterone sulfate [DHEA-s], follicle-stimulating hormone [FSH], thyroid screening). Patients suspected of having adrenal sources of hyperandrogenicity may be screened by measuring 24-hour urinary-free cortisol, by performing adrenocorticotropic hormone stimulation tests, or by performing an overnight dexamethasone suppression test. Circulating testosterone is generally normal or only mildly elevated (>1.5 ng/mL). Of patients with idiopathic hirsutism, 80% have elevated levels of 3α-diol-G (metabolite of 5α-reductase).

Imaging: No imaging indicated, except as indicated by physical or laboratory findings.

Special Tests: Clitoral index may be useful if virilization is suspected. The clitoral index is defined as the vertical dimension times the horizontal dimension, in millimeters. The normal range is from 9–35 mm, with borderline values in the range of 36–99 mm. Values of more than 100 mm indicate severe hyperandrogenicity and should prompt aggressive evaluation and referral. Hirsutism may be quantified using the Ferriman-Gallwey scoring system, though cutoff scores should be adjusted based on ethnicity (>8 for Whites and Blacks, >9–10 for Mediterranean, Hispanic, and Middle Eastern women).

Diagnostic Procedures: History and physical examination, Ferriman–Gallwey score greater than 8.

Pathologic Findings

Based on underlying pathophysiologic conditions.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, shaving, depilatories, or electrolysis. Topical treatment of acne (if present). Weight reduction if obesity is present.

Specific Measures: Suppressive therapies reduce the growth of new hair, but once a hair follicle is induced, or turned on, it continues to grow. For this reason, shaving, depilatories, or electrolysis may be required. These are satisfactory only if combined with other therapies to reduce new growth.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education: Instruction on management of unwanted hair.

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Polycystic Ovary Syndrome, 2021

Drug(s) of Choice

- 5α-reductase inhibitors (finasteride 5 mg PO daily).
- Polycystic ovary syndrome—combination oral contraceptives: spironolactone 100–200 mg PO daily, medroxyprogesterone acetate (Depo-Provera 150–300 mg IM every 3 months, metformin 1500 mg/day, or other insulin sensitizers). Aromatase inhibitors may be used if ovulation induction is desired (eg, letrozole 2.5 mg or 5 mg administered for 5 days, beginning on cycle days 3–5).
- Hyperandrogenicity of adrenal origin—cortisol administration. If DHEA-s is elevated, dexamethasone 0.25–0.5 mg PO every bedtime may be added.

Contraindications: Pregnancy—spironolactone and finasteride are category X drugs and patients of child-bearing potential must use reliable contraception.

FOLLOW-UP

Patient Monitoring: Normal health maintenance once a diagnosis is established. Contraception and weight maintenance also should be addressed. There is an increased risk of diabetes for patients with polycystic ovaries.

Prevention/Avoidance: None.

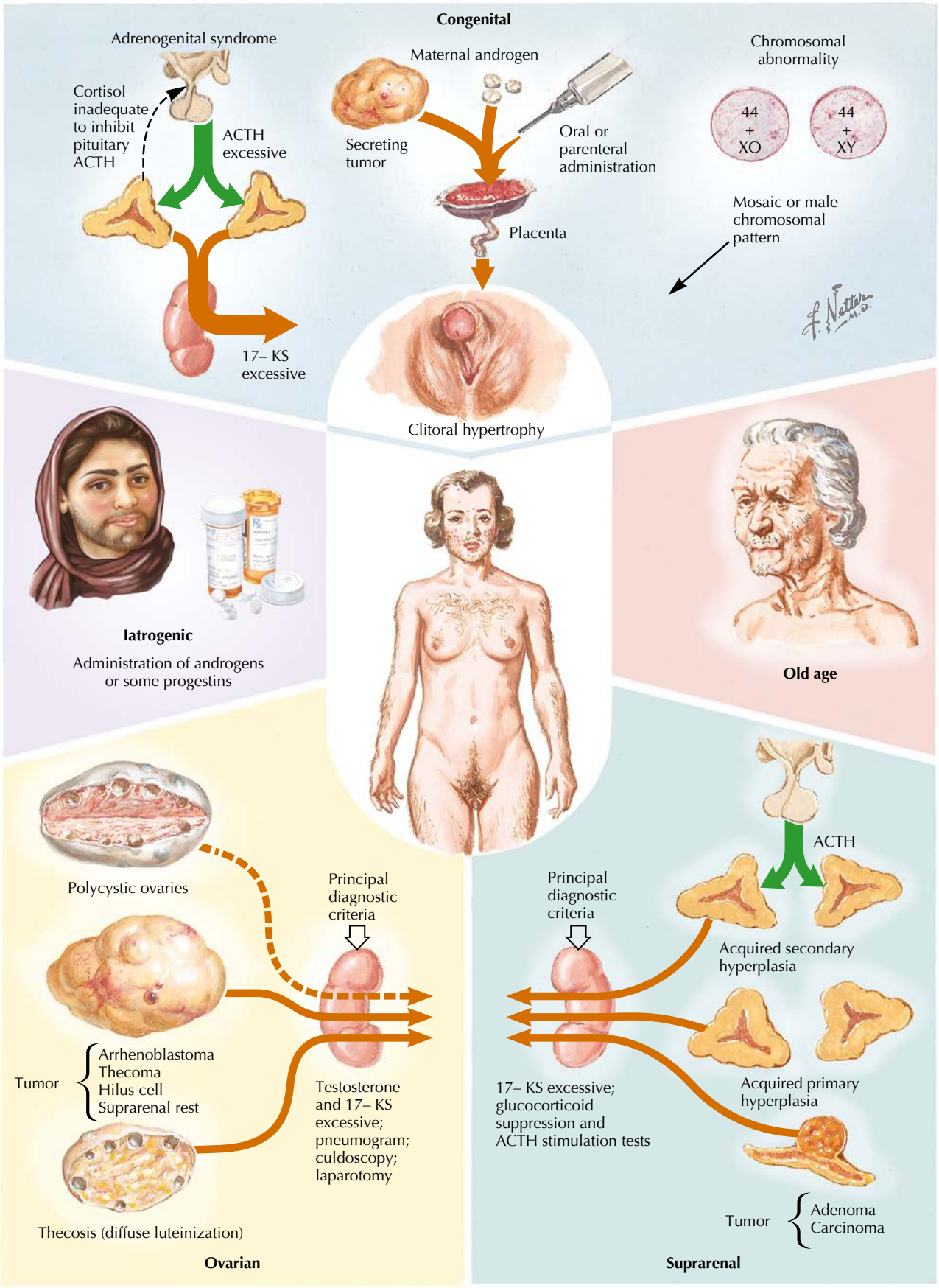
Possible Complications: Permanent induction of hair changes. Chronic anovulation is associated with increased risk of endometrial hyperplasia and cancer.

Expected Outcome: Approximately 70% response after 1 year of therapy may be expected.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy, although some metabolic causes of hirsutism may result in reduced fertility or virilization of a fetus.

ICD-10-CM Codes: L68.0 (Hirsutism) and L68.9 (Hypertrichosis, unspecified).



ACTH, adrenocorticotropic hormone.

Figure 193.1 Causes of hirsutism

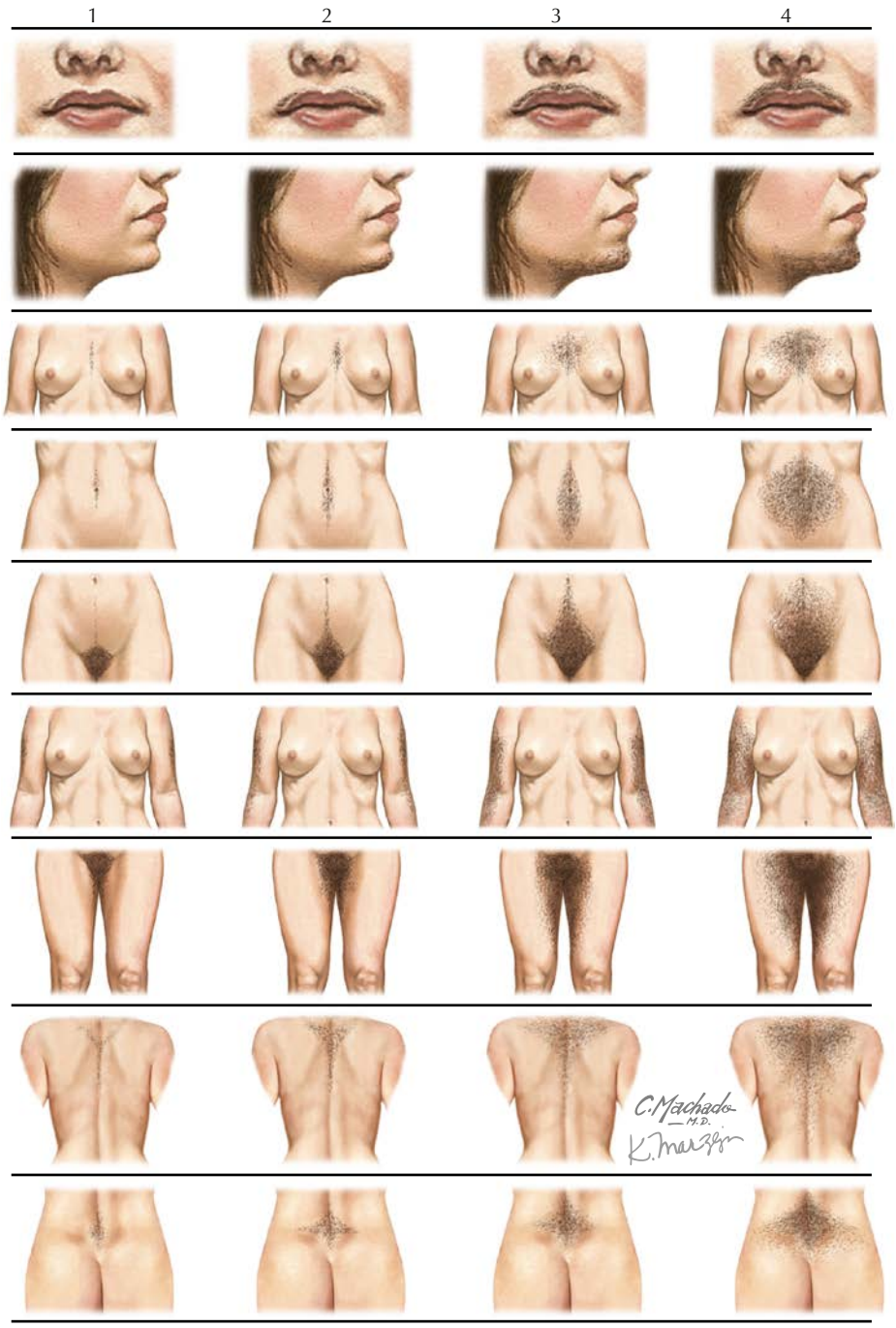


Figure 193.2 Hirsutism and virilization

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194 HYPERPROLACTINEMIA

INTRODUCTION

Description: Hyperprolactinemia is the pathologic elevation of serum prolactin levels. The finding of elevated levels of prolactin is nonspecific with respect to the cause, thereby requiring careful clinical evaluation.

Prevalence: Uncommon; reports vary from 1% to 30%, depending on the population studied.

Predominant Age: Reproductive age.

Genetics: No genetic pattern. A germline loss-of-function mutation in the prolactin receptor gene (*PRLR*) has been reported.

ETIOLOGY AND PATHOGENESIS

Causes: Prolactin is secreted solely by the lactotroph cells of the pituitary gland. Pituitary adenoma (most common). Pharmacologic—most often those that affect dopamine or serotonin: major tranquilizers (phenothiazines), trifluoperazine (Stelazine), and haloperidol (Haldol); some antipsychotic medications; metoclopramide (Reglan); less often, α-methyldopa and reserpine. Other—herpes zoster, chest wall/breast stimulation or irritation, physiologic during pregnancy, or after childbirth and/or breastfeeding.

Risk Factors: Exposure to known pharmacologic agents, specific disease processes (Table 194.1).

SIGNS AND SYMPTOMS

- Asymptomatic
- Bilateral, spontaneous milky discharge from both breasts (75%)
- Amenorrhea (30%)
- Large adenoma, clinical symptoms of impingement on the optic nerve or adjacent structures
- Fertility may be impaired even without menstrual cycle disruption

DIAGNOSTIC APPROACH

Differential Diagnosis

- Pregnancy
- Breast cancer
- Chronic nipple stimulation
- Hypothyroidism
- Sarcoidosis
- Lupus
- Cirrhosis or hepatic disease
- Radiculopathy (herpetic)

Associated Conditions: One-third of patients with elevated prolactin levels experience amenorrhea or infertility. Prolonged amenorrhea is associated with an increased risk of osteoporosis.

Workup and Evaluation

Laboratory: Serum prolactin level. Pregnancy should always be considered if menses are absent.

Imaging: Computed tomography or magnetic resonance imaging (MRI) to evaluate the pituitary and surrounding bony structures; MRI is preferred.

Special Tests: Assessment of visual fields may be indicated.

Diagnostic Procedures: History, physical examination, and laboratory determination of prolactin levels.

Table 194.1 Sources of Elevated Prolactin Levels

Pharmacologic (Examples)	Pathophysiologic Causes
Anesthetics	Central nervous system
Central nervous system: dopamine-depleting agents	Cavernous sinus thrombosis
α-Methyldopa	Infection
Monoamine oxidase inhibitors	Neurofibromas
Reserpine	Temporal arteritis
Dopamine receptor blocking agents	Tumors and cysts (all types)
Domperidone	Hypothalamic
Haloperidol	Craniopharyngioma
Metoclopramide	Glioma
Phenothiazines	Granulomas
Pimozide	Histiocytosis disease
Sulpiride	Sarcoid
Dopamine reuptake blockers	Tuberculosis
Nomifensine	Irradiation damage
Histamine H_2-receptor antagonists	Pituitary stalk transaction
Cimetidine	Surgical
Hormones	Traumatic
Estrogens	Pseudocyesis (functional)
Oral contraceptives	Pituitary lesions
Thyrotropin-releasing hormone	Acromegaly
Opiates	Mixed growth hormone or adrenocorticotropic hormone–prolactin-secreting adenoma
Stimulators of serotoninergic inhibitors	Prolactinoma
Amphetamines	Somatic sources
Hallucinogens	Breast augmentation or reduction
	Bronchogenic carcinoma
	Chest wall trauma
	Chronic nipple stimulation
	Cushing's syndrome
	Herpes zoster
	Hypernephroma
	Hypothyroidism
	Pregnancy
	Renal failure
	Upper abdominal surgery

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: When prolactin levels are low and a coned-down view of the sella turcica is normal, observation alone may be sufficient. If observation is chosen, periodic re-evaluation is required to check for the emergence of slow-growing tumors.

Specific Measures: Treatment with a dopamine receptor agonist (bromocriptine, pergolide, or cabergoline) is recommended for patients who desire pregnancy or for those with distressing degrees of galactorrhea or to suppress intermediate-sized pituitary tumors. Rapidly growing tumors, tumors that are large at the time of discovery, or those that do not respond to bromocriptine therapy may have to be treated surgically.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Evaluating Infertility, 2020
- Treating Infertility, 2019

Drug(s) of Choice

- Bromocriptine (Parlodel) 2.5 mg/day increased gradually to three times a day.

Contraindications: Uncontrolled hypertension, pregnancy.

Precautions: With medical therapy—may experience nausea, orthostasis, drowsiness, or syncope; rarely may produce hypertension or seizures.

Interactions: Medical therapy may interact with phenothiazines or butyrophenones.

Alternative Drugs

- Intravaginal bromocriptine (associated with lower rates of side effects).
- Cabergoline (0.25–1.0 mg PO once or twice per week) may also be used.

FOLLOW-UP

Patient Monitoring: Normal health maintenance. If a pituitary adenoma is present, periodic assessment of visual fields should be considered.

Prevention/Avoidance: None.

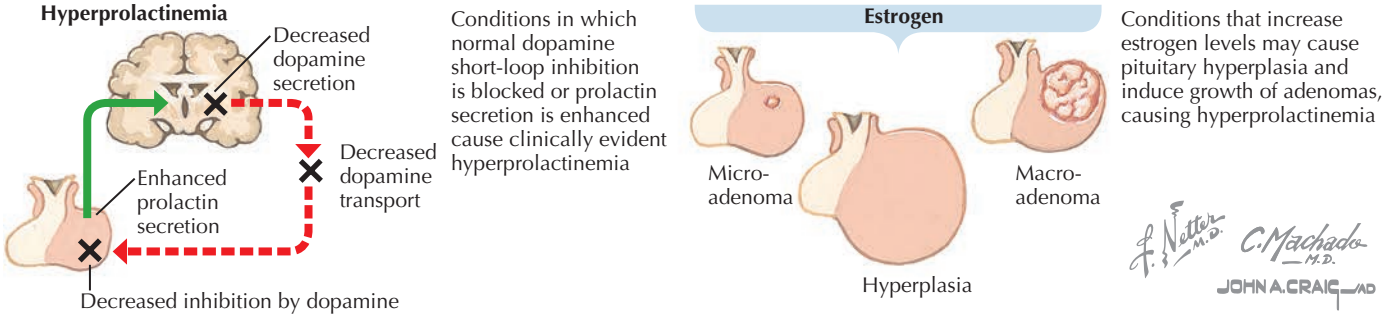
Possible Complications: Visual field loss, symptoms may return after medication is discontinued. Chronic anovulation is associated with an increased risk of endometrial hyperplasia and cancer. Cabergoline and pergolide have been associated with valvular heart disease in patients with Parkinson disease.

Expected Outcome: Generally good depending on cause. Prolactin levels should be measured every 6–12 months, and visual fields should be reassessed yearly. The pituitary should be re-evaluated every 2–5 years, based on the initial diagnosis. Approximately 10% of patients undergoing oral therapy will not experience return of prolactin to normal level.

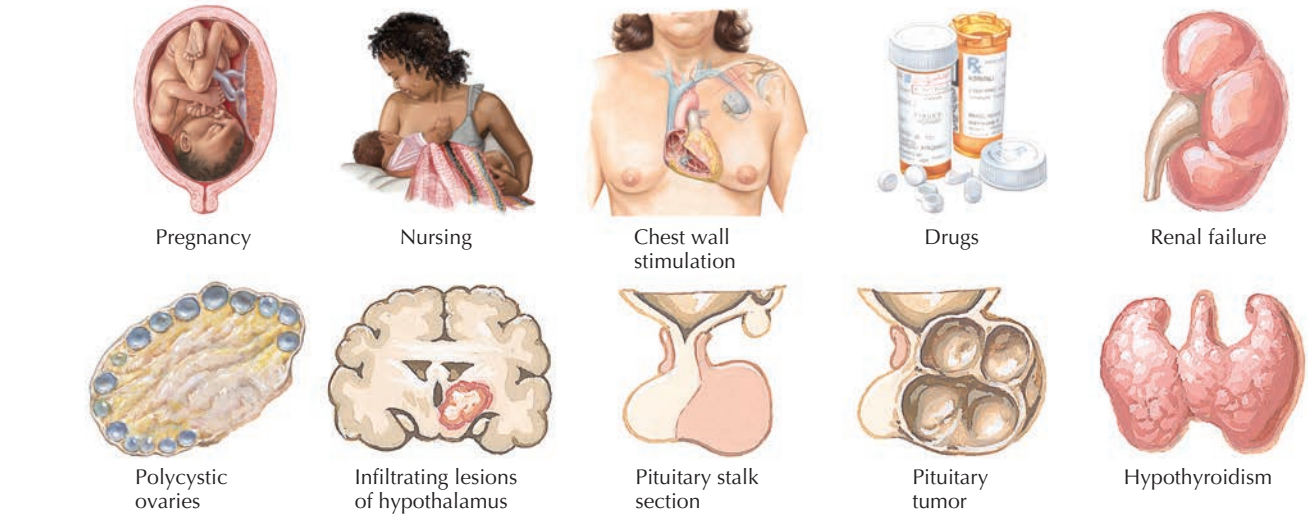
MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy. Pregnancy may cause adenomas to grow rapidly.

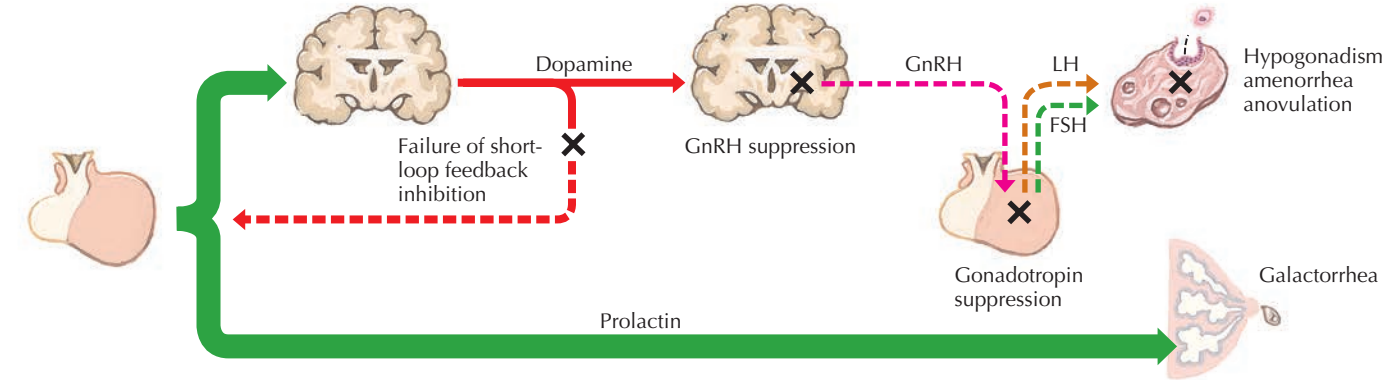
ICD-10-cm Codes: E22.1 (Hyperprolactinemia).



Conditions Associated With Hyperprolactinemia



Mechanisms in Galactorrhea-Amenorrhea Syndromes



Galactorrhea results from direct effect of prolactin on breast; amenorrhea and hypogonadism result from secondary prolactin effects (via dopamine) on GnRH and gonadotropin production and release

FSH, follicle-stimulating hormone; GnRH, gonadotropin-releasing hormone; LH, luteinizing hormone.

Figure 194.1 Hyperprolactinemia

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INFERTILITY

195

INTRODUCTION

Description: Infertility is the inability to conceive or bear a child despite more than 1 year of trying (or after 6 months for women older than 30 years old). Under ordinary circumstances, 80%–90% of normal couples conceive during 1 year of attempting pregnancy. Infertility may be further subdivided into primary and secondary types based on the patient's reproductive history: patients who are infertile and nulligravid are in the primary infertility group, and those who have become pregnant more than 1 year previously, regardless of the outcome of that pregnancy, are in the secondary infertility group. Considerably more than half of the patients experiencing infertility fall into the primary group.

Prevalence: 6%–18% of the American population; slightly higher in couples who have never conceived and slightly lower in couples who have conceived before. Approximately 6.1 million women in the United States.

Predominant Age: Reproductive age. The prevalence of infertility increases with the age of the woman. Age-related infertility is becoming more common because approximately 20% of American women delay their attempts at pregnancy to after the age of 35 years.

Genetics: No specific genetic pattern. Some chromosomal abnormalities are associated with reduced or absent fertility.

ETIOLOGY AND PATHOGENESIS

Causes: Approximately 40%–50% of infertility is due to a male factor such as azoospermia. Female factors, such as tubal disease (15%–30%), ovulation disorders (10%–20%), and cervical factors (5%), contribute to the approximately 50%–60% of female causes. The remaining 10%–20% of couples have no identifiable cause for their infertility (idiopathic). Couples experiencing primary infertility are more likely to have idiopathic or chromosomal causes than are couples who have conceived previously.

Risk Factors: Factors that increase the risk of anovulation (obesity, athletic overtraining, exposure to drugs or toxins), pelvic adhesive disease (infection, surgery, endometriosis), impaired sperm production (mumps, varicocele), or sperm delivery (ejaculatory dysfunction).

SIGNS AND SYMPTOMS

- Inability to conceive after 1 year of attempts. Evaluation is generally started after 6 months for women over the age of 35 years.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Recurrent pregnancy loss
- Primary infertility—chromosomal abnormality (eg, 45,XO [Turner syndrome], 46,XY gonadal dysgenesis [Swyer syndrome], 46,XX q5 X chromosome long-arm deletion)
- Congenital abnormality of the genital tract (either partner)

Associated Conditions: Based on the pathologic condition that causes the infertility.

Workup and Evaluation

Laboratory: Based on diagnoses being considered.

Imaging: Based on diagnoses being considered.

Special Tests: Tests will focus on ovarian reserve, ovulatory function, and structural abnormalities. Half of all women found to have tubal factor infertility have no history of antecedent infections or surgery, supporting the need to evaluate tubal patency in patients regardless of their history. Postcoital testing has been abandoned except in rare circumstances.

Diagnostic Procedures: Based on diagnoses being considered.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Support—because infertility involves both members of the couple and intrudes on the most intimate aspects of their relationship, all with no promise of success, a great deal of support is vital. Timed intercourse augmented by urinary ovulation predictor kits.

Specific Measures: The treatment of a couple experiencing infertility is based on identifying the impediment to fertility and

overcoming or bypassing it to achieve pregnancy. Most couples can be successfully treated with conventional therapies (eg, medications or surgery) rather than advanced assisted reproductive technologies.

Diet: No specific dietary changes indicated. Weight loss and limitation of caffeine and alcohol are often recommended.

Activity: No restriction unless athletic activities are thought to be adversely affecting fertility (exercise-induced amenorrhea). While the evaluation of infertility proceeds, couples should be instructed to continue attempting pregnancy through intercourse timed to the most fertile days of the cycle.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Evaluating Infertility, 2020
- Treating Infertility, 2019

Drug(s) of Choice

- Based on diagnosis of cause.
- Secondary infertility (ovulation induction)—clomiphene citrate 50 mg/day PO on days 5–10 of the menstrual cycle; may be increased to 100 mg/day PO on days 5–10 of the menstrual cycle if ovulation does not occur. Metformin 1500 mg/day as an adjunctive treatment for ovulation induction (considered now as first-line therapy for polycystic ovary syndrome).

Contraindications: Undiagnosed infertility.

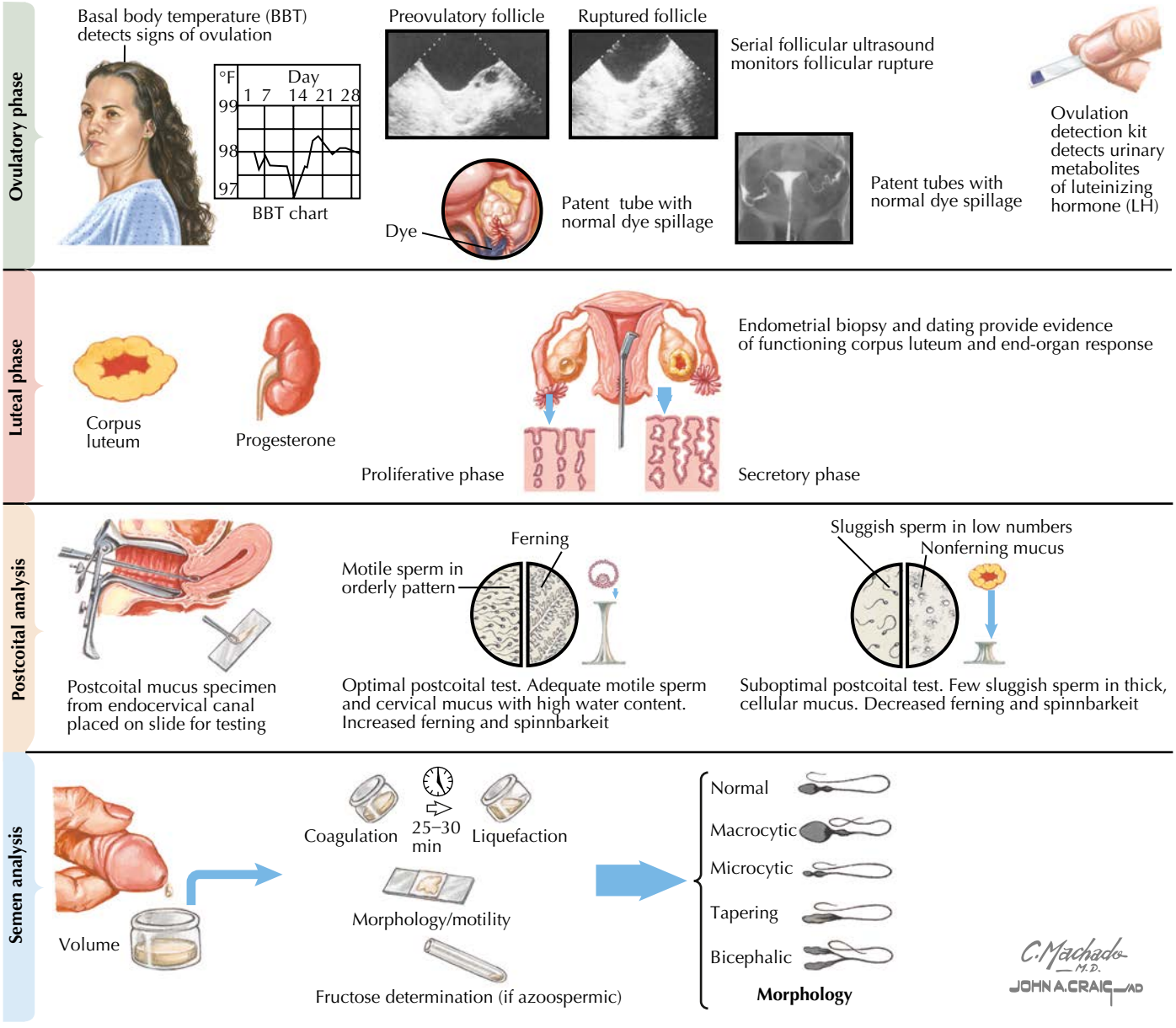

Figure 195.1 Infertility evaluation

Precautions: The possibility of ovarian hyperstimulation must be considered and close observation should be maintained if ovulation induction is attempted.

Alternative Drugs

- Gonadotropin-releasing hormone (GnRH) agonists may be used to control the hormonal environment during ovulation induction. Human gonadotropins may be used to induce ovulation but are associated with an increased risk of multiple ovulations and multiple gestations if pregnancy ensues.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.

Expected Outcome: Less than 40% of couples with primary infertility conceive after 6 years of therapy compared with more than 50% of secondary infertility couples who conceive within 3 years.

MISCELLANEOUS

Pregnancy Considerations: Generally no effect on pregnancy once pregnancy is achieved. One meta-analysis found occurrence of imprinting disorders, including Beckwith-Wiedemann, Angelman, Prader-Willi, and Silver-Russell syndromes following use of assisted reproductive technologies. Some causes of impaired fertility are associated with a greater risk of early pregnancy loss.
ICD-10-CM Codes: N97.9 (Female infertility, unspecified) (other more specific classifications based on the cause).

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196 MENOPAUSE

INTRODUCTION

Description: Menopause is an endocrinopathy that is caused by the loss of normal ovarian steroidogenesis because of age, chemotherapy, radiation, or surgical therapy. An endocrinopathy is the loss of an endocrine function with adverse health consequences. For most women, menopause is defined as the permanent cessation of menstrual periods determined after 12 months of otherwise unexplained amenorrhea.

Prevalence: Virtually all women older than 60 years, most by their early to mid-50s. Most women will spend one-third of their lifetime after menopause.

Predominant Age: Median age is 51.5 years; 95% between 44 and 55 years (or after surgical menopause). When menopause occurs before 40 years of age, it is termed primary ovarian insufficiency (premature ovarian failure).

Genetics: Loss of genetic material from the long arm of the X chromosome is associated with premature menopause.

ETIOLOGY AND PATHOGENESIS

Causes: Loss of estrogen production because of surgery, chemotherapy (alkylating agents), radiation, or natural cessation of ovarian function.

Risk Factors: Menopause may occur at a younger age in smokers, those with poor nutrition or chronic illness, or those who have a loss of genetic material from the long arm of the X chromosome.

SIGNS AND SYMPTOMS

- Absence of menstruation (with a normal uterus and outflow tract) for more than 12 months.
- Hot flashes, flushes, and night sweats (80%)
- Vaginal atrophy (genitourinary syndrome of menopause, symptomatic in up to 50%)
- Dysuria, urgency, and urgency incontinence; urinary frequency; nocturia; and an increased incidence of stress urinary incontinence
- Decrease in libido
- Irregular bleeding common during the climacteric (perimenopausal) period
- Depression (2.5-fold increase in the perimenopausal period)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Pregnancy
- Hypothyroidism
- Polycystic ovary syndrome
- Prolactin-secreting tumor
- Hypothalamic dysfunction

Associated Conditions: Genitourinary syndrome of menopause (dyspareunia, vulvodynia, atrophic vulvitis), osteoporosis, increased risk of cardiovascular disease (most apparent with premature menopause), hot flashes and flushes, sleep disturbances, stress urinary incontinence, and others.

WORKUP AND EVALUATION

Laboratory: Usually not necessary. When the diagnosis of ovarian failure must be confirmed, measurement of serum follicle-stimulating hormone is sufficient. Levels greater than 100 mIU/mL are diagnostic, although lower levels (40–50 mIU/mL) may be sufficient to establish a diagnosis when symptoms are also present. Serum estradiol levels may be determined (generally <15 pg/mL) but are less reliable as a marker of ovarian failure. A pregnancy test is always indicated in women who are perimenopausal, sexually active, and not using contraception.

Imaging: No imaging indicated. Standard imaging does not document bone loss of less than 30%.

Special Tests: The vaginal maturation index has fallen out of use and is not required for diagnosis. Bone densitometry may be indicated for those at special risk and as health screening as the patient ages. (A T-score of ≤2.5 or a Z-score of ≤2 is diagnostic of osteoporosis.) When noncyclic bleeding occurs in these patients, endometrial biopsy should be strongly considered. Women younger than 30 years who have ovarian failure should have a karyotype performed.

Pathologic Findings

Vaginal, vulvar, and endometrial atrophy. Thinned ovarian stroma with few, inactive oocytes. Accelerated calcium loss from bone for approximately 7–10 years following menopause.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Health maintenance, annual mammogram, annual pelvic and rectal examinations, thyroid and cholesterol screening every 5 years or as indicated, tetanus booster shot every 10 years, pneumococcus vaccine as indicated. The value of the routine pelvic examinations for women of advanced age has been questioned but has yet to achieve consensus.

Specific Measures: For symptom relief—systemic estrogen (estrogen/progestin) therapy (<1% of women do not benefit from therapy). Topical estrogen supplements for genitourinary symptoms. Data support empiric systemic estrogen therapy for those with premature ovarian failure or surgery, but postmenopausal estrogen is reserved for symptom relief and not for universal prophylaxis. Patients should consider a trial of treatment withdrawal after 4–5 years.

Diet: Adequate dietary calcium (1000–1500 mg/day) and vitamin D (400–800 IU/day). If dietary calcium intake is adequate (≥1200 mg/day) supplementation is not necessary.

Activity: No restriction. Weightbearing activity (30 minutes three times weekly) to promote bone health and cardiovascular fitness training/maintenance.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Osteoporosis, 2018
- Staying Active—Physical Activity and Exercise, 2021
- The Menopause Years, 2020
- Vulvovaginal Health, 2020

Drug(s) of Choice

Most common drug doses shown.

- Oral estrogens—conjugated equine estrogens 0.625–1.25 mg/day, diethylstilbestrol, esterified estrogens 0.625–1.25 mg/day, ethinyl estradiol 0.05 mg/day, micronized estradiol 0.5–1 mg/day, piperazine estrone sulfate, estropipate, quinestrol.
- Injectable estrogens—conjugated equine estrogens, estradiol benzoate, estradiol cypionate, estradiol valerate (oil), estrone (aqueous), ethinyl estradiol, polyestradiol phosphate.
- Topical estrogens—17β-estradiol (transdermal) 0.05–0.10 mg/day, conjugated equine estrogens 0.625 mg/g, estradiol 0.1 mg/g, estropipate 1.5 mg/g.

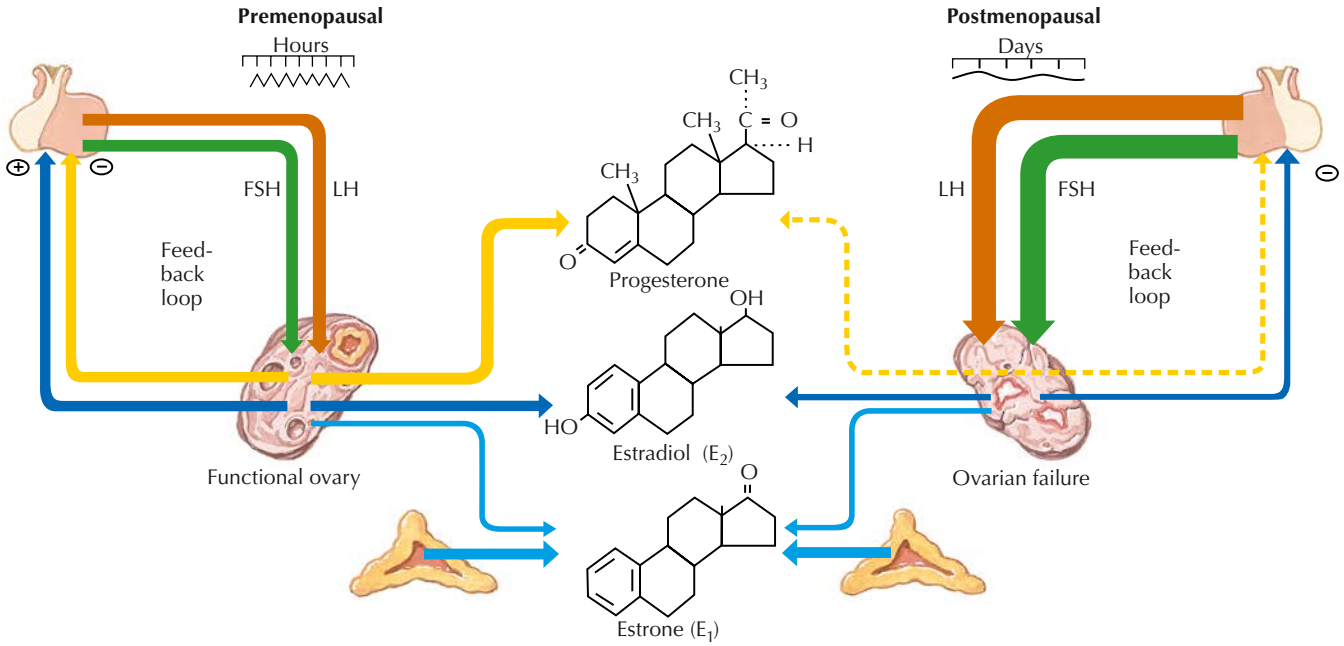
Contraindications: Systemic therapy—active liver disease, carcinoma of the breast (current), chronic liver damage (impaired function), endometrial carcinoma (current), recent thrombosis or thrombophilia (with or without emboli), unexplained vaginal bleeding. Relative contraindications/special considerations—endometriosis, familial hyperlipidemia, gallbladder disease, hypertension (uncontrolled), migraine headaches, seizure disorders, thrombophlebitis (unknown risk), uterine leiomyomas. Topical use—known sensitivity to vehicle.

Precautions: Continuous estrogen exposure without periodic or concomitant progestins increases the risk for endometrial carcinoma by 6- to 8-fold. Continuous estrogen/progestin therapy frequently results in random vaginal bleeding, but biopsy or other investigation is still warranted. Patients undergoing cyclic estrogen/progestin therapy should experience vaginal bleeding only after the withdrawal of progestin; biopsy or other investigation is warranted for other bleeding or heavy menses.

Interactions: Raloxifene should not be used with cholestyramine. Most therapies alter the effects of warfarin therapy.

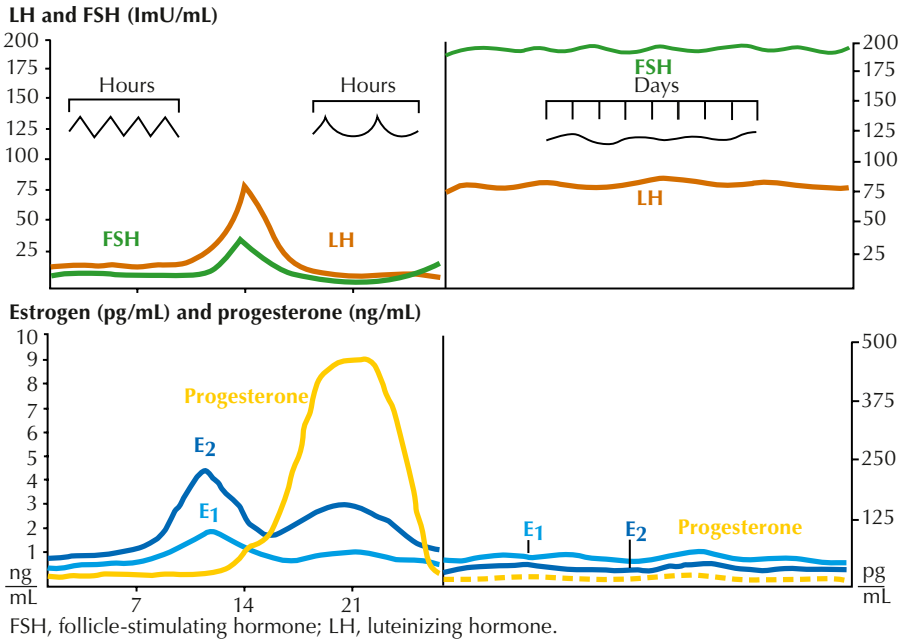
Alternative Drugs

- Raloxifene (Evista) 60 mg/day PO—reduces breast cancer risk but does not provide relief for hot flashes or vaginal dryness



Hormone levels increase and decrease cyclically during menstrual cycle. Modulation occurs by pulsatile releases of gonadotropins and positive and negative feedback loops

In postmenopausal period, gonadotropin levels increase and ovarian hormone levels decrease secondary to ovarian failure. Endogenous estrogen is primarily of adrenal origin, and E_1 to E_2 ratio is reversed



FSH, follicle-stimulating hormone; LH, luteinizing hormone.

JOHN A. CRAIG, MD

Figure 196.1 Pituitary and ovarian hormone changes in menopause

- Progestin therapy (oral, vaginal, or injectable; effective for hot flashes, may reduce bone loss, but has no effect on coronary artery disease or urogenital atrophy)
- Clonidine (oral or transdermal)
- Bellergal-S (phenobarbital, ergotamine tartrate, belladonna)
- Bisphosphonates (alendronate [Fosamax] and others; for osteoporosis)
- Topical moisturizers for genitourinary syndrome of menopause (atrophic vaginitis)
- Botanical agents have not been shown to be efficacious for most menopausal symptoms or for osteoporosis prevention. Some safety concerns have also been raised.

FOLLOW-UP

Patient Monitoring: Normal health maintenance. Serious consideration should be given to a trial of therapy discontinuation after 2 or more years.

Prevention/Avoidance: Estrogen therapy at menopause may reduce some risks (osteoporosis, heart disease) but may elevate others (venous thrombosis, stroke). The use of progestins is required if the patient retains her uterus to reduce the risk of iatrogenic endometrial hyperplasia or cancer. Therapy may be oral (such as medroxyprogesterone acetate [Provera] 5–10 mg/day PO for 12–14 days per month or 2.5 mg/day PO) or vaginal (progesterone bioadhesive gel [Crinone] 4%–8%, 45 mg [1.125 g] intravaginally every other day for six doses per month).

Possible Complications: Endometrial hyperplasia if the uterus is present and progestins are not used; vaginal bleeding (predictable or otherwise).

Expected Outcome: Reversal of symptoms, reestablishment of normal physiology with treatment. Selective estrogen receptor modulators (also called SERMS or tissue-specific estrogens) may provide protection against cardiac, bone, and colon cancer and Alzheimer disease with reduced rates of risk for both breast and endometrial cancer.

MISCELLANEOUS

Pregnancy Considerations: Menopause is associated with the loss of fertility.

ICD-10-CM Codes: N95.1 (Menopause or female climacteric states), E28.310 (Symptomatic premature menopause), and E89.40/E89.41 (Asymptomatic/Symptomatic postprocedural ovarian failure).

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PRECOCIOUS PUBERTY

197

THE CHALLENGE

The challenge is to evaluate patients who experience the normal events of puberty earlier than expected and to provide reassurance with appropriate or timely diagnosis and intervention when more sinister processes are at work. Precocious puberty is estimated to affect approximately 20/10,000 girls.

Scope of the Problem: For all patients with precocious puberty (pubertal changes before the age of 7 years or cyclic menstruation before the age of 10 years, 2–2.5 standard deviations below the mean) the possibility of a serious process, either central or peripheral, must be evaluated. (Because of evolving changes in maturation rates, these traditional ages should be adjusted downward by 1 year for African-American girls.) Precocious puberty is customarily divided into two classifications: true or gonadotropin-releasing hormone (GnRH) dependent (70%) and precocious pseudopuberty that is independent of GnRH control. For most girls older than 4 years, no specific cause is discovered for early development. In contrast, the most common cause of precocious change in girls younger than 4 years is a central nervous system (CNS) lesion, most often hamartomas of the

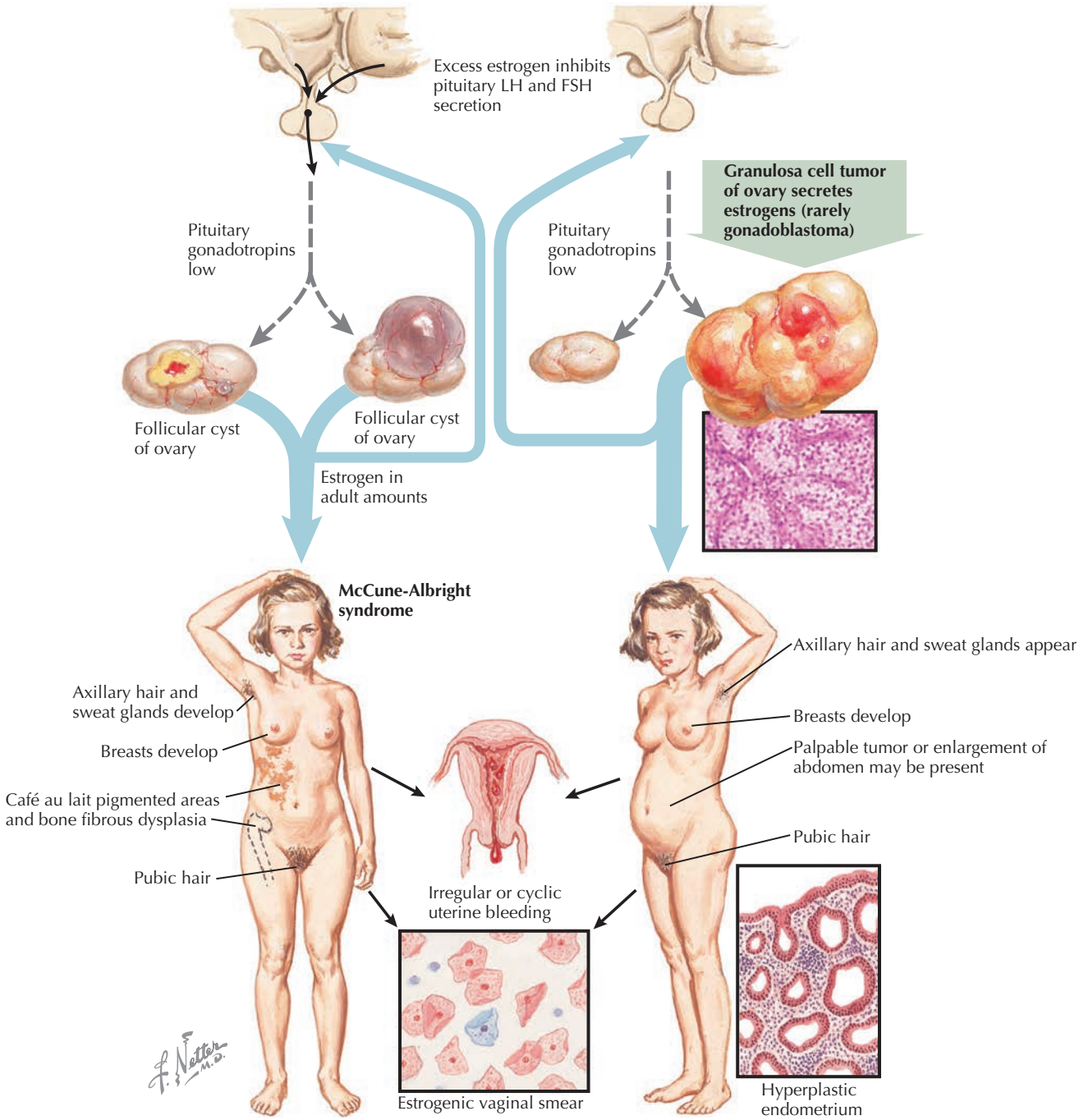

Figure 197.1 Causes of female sexual precocity

hypothalamus. Even when the sequence of events appears normal, a serious process (eg, a slowly progressing brain tumor) must be aggressively sought initially and watched for with long-term continuing observation. Patients also should be evaluated any time there is a disruption in the normal sequence of puberty or when there is patient or parental concern. Patients with significant abnormalities of either height or weight should be evaluated for chromosomal abnormalities or endocrinopathies.

Objectives of Management: To establish the cause of delayed events of puberty with appropriate speed and care, without adding to the trauma of adolescence.

TACTICS

Relevant Pathophysiology: True precocious puberty, also known as complete, isosexual, or central precocity, is related to the early activation of the hypothalamic–pituitary–gonadal axis. In 75% of patients, there is no indication of how or why the normal processes of puberty are accelerated. In the remaining one-fourth a CNS abnormality is the cause. A number of CNS pathologic conditions may result in the activation of GnRH secretion and the early onset of pubertal changes. Precocious pseudopuberty is also referred to as incomplete or peripheral and may be isosexual or heterosexual. In these patients, there may be secretion of sex steroids or human chorionic gonadotropin from sources other than the pituitary. More than 10% of girls with precocious puberty have an ovarian tumor. These tumors are palpable in 80% of patients or may be readily detected by ultrasonography or tomographic studies. Bleeding is heavy and irregular, befitting escape from the normal control mechanisms.

Strategies: The evaluation of patients with precocious puberty is focused on detecting possible life-threatening disease and defining the velocity of the process. When the diagnosis of true precocious puberty is established, generally by exclusion, treatment with GnRH agonists usually halts the progression of change. This therapy is expensive and effective only if the observed changes are under central control. GnRH also may be suppressed using medroxyprogesterone acetate (Depo-Provera) with doses of 100–200 mg IM administered every 2–4 weeks. This therapy is less likely to control bone growth abnormalities than the GnRH agonist treatment. Without any therapy, approximately 50% of girls will not reach 5 feet in height. The evaluation of patients with delayed pubertal development must begin with a general history, including general health, weight and height records, and family history, including the pubertal experience of others in the family. Physical examination should identify the type and degree of sexual development present. The presence of breast changes generally indicates the production of estrogen, and the development of pubic or axillary hair indicates the production of androgens. Laboratory evaluation should include serum follicle-stimulating hormone, luteinizing hormone, and prolactin measurements; skull radiographs; and thyroid function studies. Bone age, chromosomal or cytologic studies, and pelvic ultrasonography or other imaging studies also may be indicated. Because of the significance of the potential causes of disordered puberty, most of these patients should be evaluated by or in consultation with a specialist.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Your Changing Body—Puberty in Girls, 2018
- Your First Period—Especially for Teens, 2018

IMPLEMENTATION SPECIAL CONSIDERATIONS

Although precocious puberty is most often heralded by the sequence of increased growth, thelarche, and adrenarche, these events may simultaneously occur, or menarche itself may be the first indication. Idiopathic or constitutional precocious puberty is associated with a normal reproductive life and normal age of menopause. The greatest risk for abnormality comes from the early closure of the bony growth plates that often leaves these patients with short stature. Therapy is worth considering for young children to achieve adult height and to avoid the social and emotional stresses that early maturation can entail.

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POLYCYSTIC OVARY SYNDROME

198

INTRODUCTION

Description: Polycystic ovary syndrome (PCOS) consists of amenorrhea, hirsutism, insulin resistance, and obesity in association with enlarged, multicystic ovaries.
Prevalence: 5%–10% of women; 30% of secondary amenorrhea. The most common hormonal disorder among women of reproductive age.
Predominant Age: Begins at menarche.
Genetics: No genetic pattern established; suggestion of increased family tendency.

ETIOLOGY AND PATHOGENESIS

Causes: The exact pathophysiology of PCOS is not well established, but increased amplitude of gonadotropin-releasing hormone (GnRH) pulsation and abnormal secretion of follicle-stimulating hormone (FSH) and luteinizing hormone (LH) during puberty are considered to result in excess androgen. Elevated levels of LH persist and may be used to help establish the diagnosis. Insulin resistance is a prominent aspect of this syndrome.
Risk Factors: Borderline adrenal hyperplasia, occult hypothyroidism, and childhood obesity.

SIGNS AND SYMPTOMS

- Anovulation and amenorrhea/oligomenorrhea (<9 menses/year, 75%–80%)
- Infertility (75%)
- Excessive hair growth, primarily along the angle of the jaw, upper lip, and chin (70%)
- Obesity (54%–85%; "apple-shaped" obesity centered around the lower half of the torso)
- Acanthosis nigricans
- Acne

DIAGNOSTIC APPROACH

Differential Diagnosis

- Virilization (especially when hirsutism is in a male pattern)
- Familial hypertrichosis
- Cushing disease (truncal obesity, facial rounding, cervicodorsal fat deposition [buffalo hump], and red or purple striae are often not fully developed)

Associated Conditions: Increased risk for cardiovascular disease (adverse lipid profiles), diabetes (insulin resistance in 50% of patients), nonalcoholic steatohepatitis, sleep apnea, hypertension, and infertility.

Workup and Evaluation

Laboratory: Elevated levels of LH may be used to help establish the diagnosis (a 2:1 ratio of LH to FSH is considered diagnostic). Evaluation for possible virilizing process (prolactin, FSH, thyroid screening). Patients suspected of having adrenal sources of hyperandrogenicity may be screened by measuring 24-hour urinary free cortisol or by performing adrenocorticotropin hormone stimulation tests or an overnight dexamethasone suppression test. Serum testosterone (total) is generally 70–120 ng/mL and androstenedione is 3–5 ng/mL. Dehydroepiandrosterone sulfate (DHEA-s) is elevated in approximately 50% of patients.
Imaging: Ultrasonography (abdominal or transvaginal) may identify ovarian enlargement or the presence of multiple small follicles (≥20 follicles per ovary). Magnetic resonance imaging or computed tomography may be used to evaluate the adrenal glands.
Special Tests: None indicated.
Diagnostic Procedures: History, physical examination, imaging, and laboratory evaluations. May be confirmed at laparoscopy, but seldom required for diagnosis (Box 198.1). Hyperandrogenism is based on clinical signs and does not require laboratory confirmation.

Pathologic Findings

The ovaries are enlarged with a thickened white capsule. They contain multiple follicles in varying stages of development. Luteinization of theca cells may be present.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation. Weight loss is often associated with resolution of symptoms and a return of menstrual function in patients with mild or early PCOS.
Specific Measures: Medical therapy has replaced surgical treatment. Treatment depends on desire for pregnancy; if pregnancy is desired, ovulation induction may be required.
Diet: No specific dietary changes indicated; weight loss or control desirable.
Activity: No restriction.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- Polycystic Ovary Syndrome, 2021

Drug(s) of Choice

- Combination oral contraceptives (<50-mg formulation and a progestin other than norgestrel).
- If DHEA-s is elevated, dexamethasone 0.25–0.5 mg PO every bedtime may be added to oral contraceptives.
- Metformin 1500 mg/day as an adjunctive treatment for ovulation induction (considered as first-line therapy for patients with PCOS who do not desire contraception).
- Spironolactone 100–200 mg/day PO.

Contraindications: Pregnancy (spironolactone is a category X drug and patients of child-bearing potential must use reliable contraception).

Box 198.1 2003 Rotterdam Criteria

Patient must have two or more of the following:
1. Oligo-ovulation and/or anovulation
2. Excess androgen activity
3. Polycystic ovaries (by gynecologic ultrasonography)

Based on Rotterdam ESHRE/ASRM-Sponsored PCOS consensus workshop group. Revised 2003 consensus on diagnostic criteria and long-term health risks related to polycystic ovary syndrome (PCOS). Hum Reprod. 2004;19(1):41-47.

Alternative Drugs

- GnRH analogs and clomiphene citrate may be used.

FOLLOW-UP

Patient Monitoring: Normal health maintenance once diagnosis and management have been implemented. There is an increased risk for diabetes in patients with polycystic ovaries. Weight control and contraception also should be addressed.

Prevention/Avoidance: Role of normalized weight debated.
Possible Complications: Chronic anovulation is associated with osteoporosis and endometrial hyperplasia or carcinoma.
Expected Outcome: Generally good response to medical therapy.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy, although fertility is often reduced.
ICD-10-CM Codes: E28.2 (Polycystic ovarian syndrome).

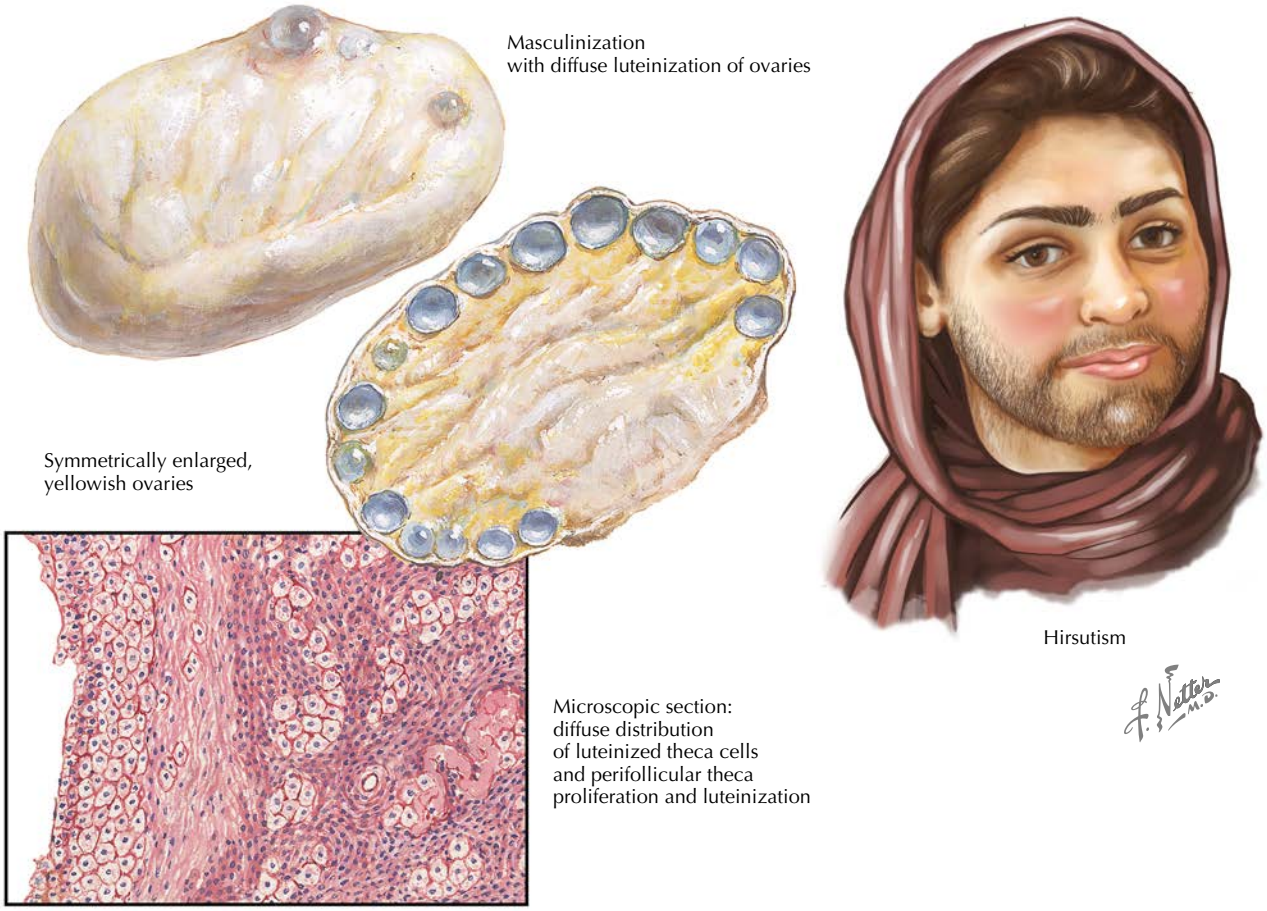

Figure 198.1 Polycystic ovarian disease

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RECURRENT PREGNANCY LOSS

199

INTRODUCTION

Description: When a woman has had two consecutive or three total first-trimester spontaneous pregnancy losses, it is considered recurrent abortion.

Prevalence: 0.4%–1% of women meet the criteria for recurrence, although 15% of clinically recognized pregnancies have sporadic loss (20%–60% before 6 weeks gestation).

Predominant Age: Reproductive age.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: When the losses occur early in gestation, there is a greater likelihood that a chromosomal abnormality is the cause, whereas for later abortions a maternal cause such as a uterine anomaly is more likely. Although most chromosomal abnormalities result from disorders of meiosis in gamete formation or in mitosis after fertilization, 5% of couples who experience recurrent abortion have a detectable parental chromosomal abnormality (60% reciprocal, 40% Robertsonian), surgically correctable uterine abnormalities, an incompetent cervix, or intrauterine synechiae. Uterine anomalies are found in 15%–25% of women with recurrent abortion. The possibility of immunologic factors as a cause of recurrent losses (5%–15% of cases) also should be evaluated (eg, lupus anticoagulant). Two-thirds of recurrent abortions occur after 12 weeks gestation, suggesting that maternal or environmental factors play a large role in this process. A cause can be determined in only 50% of patients.

Risk Factors: Those associated with spontaneous abortion, including increasing maternal and paternal age and autoimmune disorders.

SIGNS AND SYMPTOMS

- Two consecutive or three total first-trimester spontaneous pregnancy losses.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Uterine anomalies (fibroids, incompetent cervix, intrauterine synechiae, developmental abnormalities such as a septum or duplication)
- Chromosomal abnormality (maternal [more likely] or paternal)
- Immunologic causes (such as lupus anticoagulant)
- Endocrinopathy (such as hypothyroidism)
- Coagulopathy or thrombophilia

Associated Conditions: None.

Workup and Evaluation

Laboratory: Screening for immunologic (anticardiolipin antibody, ie, immunoglobulin G [IgG] and IgM, and lupus anticoagulant) or endocrine abnormality (diabetes, thyroid disease); coagulopathy or thrombophilia as indicated.

Imaging: Ultrasonography of the pelvis, sonohysterography, or hysterosalpingography may be of assistance when a uterine anomaly is suspected.

Special Tests: Karyotyping of both parents is recommended despite the low yield, cost, and limited predictive value when recurrent early abortions have occurred and other causes are not apparent. Karyotyping of the abortus may be helpful but requires fresh tissue, specialized transport media, and laboratory capabilities. Because of the stress induced by pregnancy loss, screening for depression is appropriate.

Diagnostic Procedures: Hysteroscopy may be of limited value (indicated only when a uterine factor is strongly considered).

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Support and evaluation.

Specific Measures: Those with parental chromosomal anomalies may be offered donor oocytes or artificial insemination with donor sperm. Uterine anomalies or submucous fibroids may be treated, although care must be taken to recognize the possibility of continued failure for other reasons and the possible impact of future delivery options.

Diet: No specific dietary changes indicated.

Activity: No restriction.

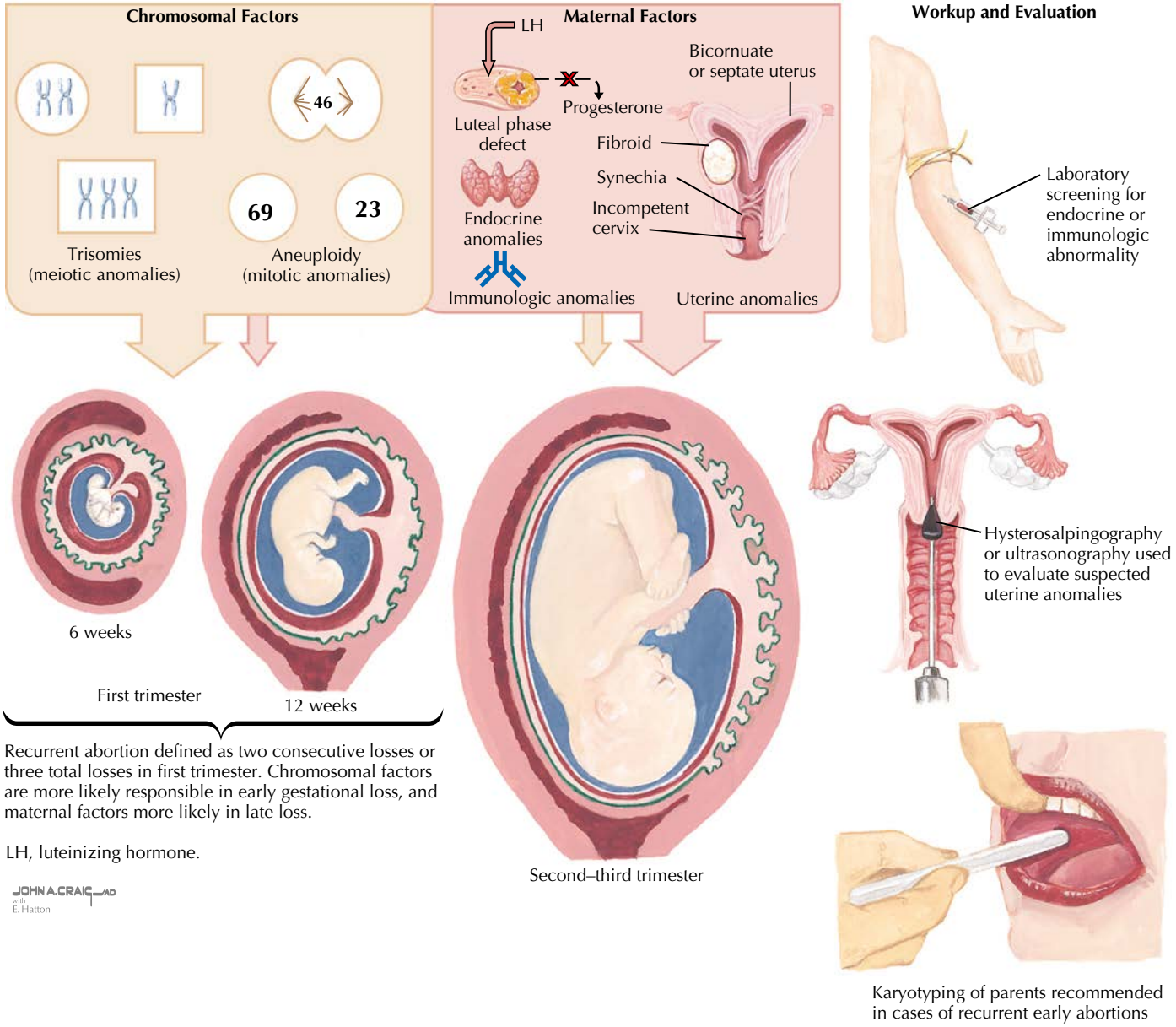
Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Early Pregnancy Loss, 2021
- Repeated Miscarriage, 2016

Drug(s) of Choice

- None.



Recurrent abortion defined as two consecutive losses or three total losses in first trimester. Chromosomal factors are more likely responsible in early gestational loss, and maternal factors more likely in late loss.

LH, luteinizing hormone.

JOHN A. CRAIG, MD with E. Hatton

Figure 199.1 Chromosomal factors, workup, and evaluation

- Progesterone and thyroid supplements have not been shown to reduce the risk for pregnancy loss.
- When immunologic factors are present (antiphospholipid syndrome), the use of low-dose aspirin and subcutaneous heparin (5000 U twice daily) has reduced the rate of subsequent loss but has no effect in the absence of documented immunologic factors.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: Based on the underlying pathologic condition.

Expected Outcome: Based on the underlying pathologic condition. With or without an identified cause, the success rate for a subsequent pregnancy is greater than 70%.

MISCELLANEOUS

Pregnancy Considerations: When because of correctable factors, future pregnancies will not be affected.
ICD-10-CM Codes: O26.20 (Pregnancy care for patient with recurrent pregnancy loss, unspecified trimester).

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SEXUAL AMBIGUITY

200

INTRODUCTION

Description: Structural abnormalities present at birth may make the assigning of an appropriate sex of rearing (gender) difficult or impossible (sexual ambiguity). The evaluation of these infants represents both a social and medical emergency because causative life-threatening conditions may be present.
Prevalence: Less than 1/2000 births.
Predominant Age: Present at birth.

Genetics: Some enzymatic defects may be inheritable. A history of a previously affected relative may be present for patients with androgen insensitivity or its variants.

ETIOLOGY AND PATHOGENESIS

Causes: Enzyme defects (5α-reductase, 11β- 17α-, or 21-hydroxylase deficiencies [95%]), androgen insensitivity

syndrome, intrauterine androgen exposure. Most patients with ambiguous genitalia prove to be androgenized females with adrenal hyperplasia. The enzyme defects present in these individuals cause the adrenal glands to produce abnormally high levels of virilizing hormones. Cases are often placed into one of four categories: female pseudohermaphroditism, male pseudohermaphroditism, dysgenetic gonads (including true hermaphroditism), and true hermaphroditism (rare). Some have advocated replacing these designations with the less pejorative overarching term disorders (or difference) of sexual development (DSD). The second most common cause of atypical genital appearance is 45,X/46,XY mosaicism.

Risk Factors: In utero androgen exposure. (Along with clitoral enlargement, some degree of fusion of the urogenital folds can occur with significant androgen exposure from the 8th–12th week of gestation. This can manifest as ambiguous genitalia at birth. If exposure occurs after the 12th gestational week, only clitoral enlargement occurs. Females with only clitoral enlargement mature normally and have normal fertility, and there is almost total regression of the clitoromegaly.)

SIGNS AND SYMPTOMS

- Incompletely formed or malformed external genitalia (varies from labial adhesion to clitoral hypertrophy and vaginal agenesis based on cause and genetic makeup of the individual)
- Infants—rapid development of vomiting, diarrhea, dehydration, and shock (congenital adrenal hyperplasia)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Congenital adrenal hyperplasia (may be life-threatening—must be first consideration in any newborn with ambiguous genitalia or male babies with cryptorchidism; if gonads are not palpable, adrenal hyperplasia must be presumed and treated until disproved)
- Androgen exposure in utero (exogenous, luteoma of pregnancy)
- Vaginal agenesis
- Imperforate hymen
- Other enzymatic defects

Associated Conditions: Premature puberty, infertility, sexual dysfunction, and gender dysphoria.

Workup and Evaluation

Laboratory: Electrolytes, hormonal and enzymatic function.

Imaging: Ultrasonography may be used to assess the internal genitalia, but it is seldom necessary for an initial diagnosis.

Special Tests: Karyotyping may be desirable, but a buccal smear to detect Barr bodies is often sufficient.

Diagnostic Procedures: Systematic examination of the genitalia (mons and groin, clitoris/phallus, urethral opening, labioscrotal folds, vaginal opening, posterior fourchette and perineum, anus and anal patency—the penis has a midline frenulum; the clitoris has two lateral folds that extend to the labia minora), karyotype, laboratory testing. A multidisciplinary team may be required to complete the evaluation.

Pathologic Findings

Based on the cause.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Rapid assessment and treatment as if congenital adrenal hyperplasia is present should be instituted until the possibility has been ruled out. The assigning of gender must be made as soon as possible after delivery but should be delayed until a gender can be established considering all available evidence. Many experts argue against the use of names that are gender ambiguous such as Leslie, Terry, or Jamie.

Specific Measures: Therapy is medical and surgical—medical therapy to reverse the effects of enzyme defects and surgical therapy for cosmetics and sexual function. Surgery is often delayed until late infancy or adolescence (based on the type of reconstruction planned). If a Y-chromosome cell line is present, removal of the gonads is indicated. For many, this may be delayed until puberty is complete.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Drug(s) of Choice

- For congenital adrenal hyperplasia—cortisol 12–18 mg/m^2 or prednisone 3.5–5 mg/m^2 or higher to maintain adrenal suppression.

FOLLOW-UP

Patient Monitoring: Normal health maintenance, continuing support for enzymatic defects.

Prevention/Avoidance: Avoidance of agents with androgenic activity during pregnancy (drugs and food supplements).

Possible Complications: Failure to establish a clear, unambiguous gender (sex of rearing) can result in lifelong social and psychologic problems and may limit future surgical reconstruction and sexual options.

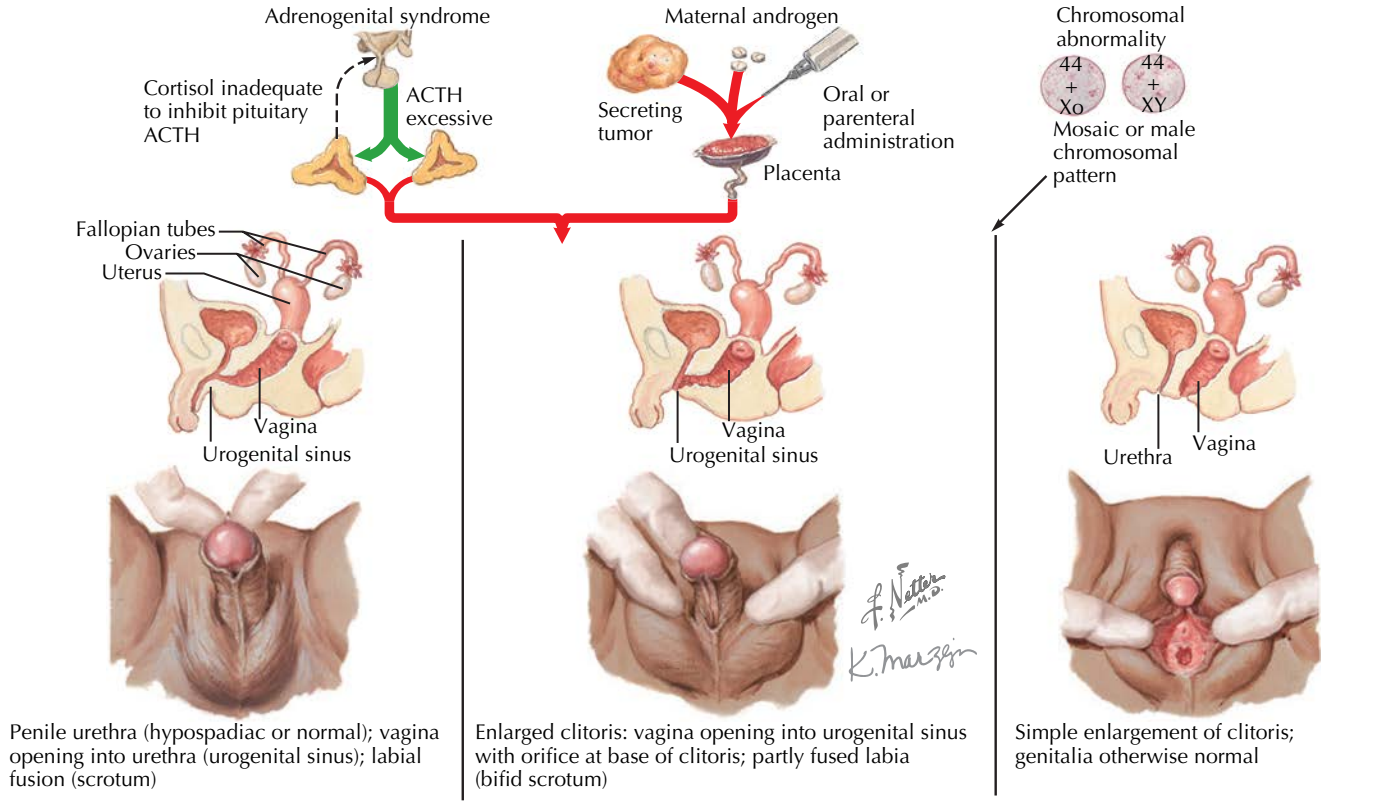
Expected Outcome: With early detection, successful growth and development appropriate to gender may be anticipated. With reconstruction, even severe anatomic deformities can be corrected to provide cosmetic and sexually acceptable results.

MISCELLANEOUS

Pregnancy Considerations: Based on cause—androgenized females are fully fertile and have normal pregnancies; males with isolated hypospadias or cryptorchidism may be fertile; all others are sterile.

ICD-10-CM Codes: Q56.4 (Indeterminate sex, unspecified) and Q56.3 (Pseudohermaphroditism, unspecified).

Clinical Considerations

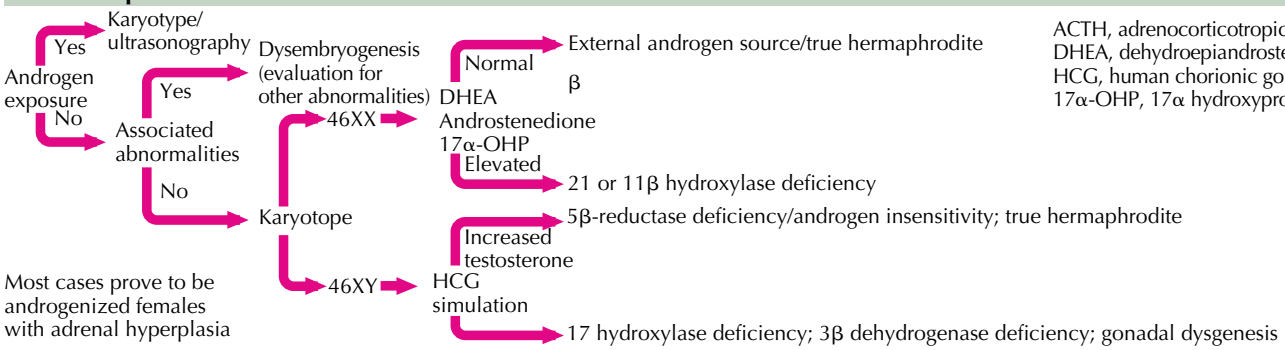


Penile urethra (hypospadiac or normal); vagina opening into urethra (urogenital sinus); labial fusion (scrotum)

Enlarged clitoris: vagina opening into urogenital sinus with orifice at base of clitoris; partly fused labia (bifid scrotum)

Simple enlargement of clitoris; genitalia otherwise normal

Workup



ACTH, adrenocorticotropic hormone; DHEA, dehydroepiandrosterone; HCG, human chorionic gonadotropin; 17α-OHP, 17α hydroxyprogesterone.

Figure 200.1 Clinical considerations and workup of ambiguous genitalia

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201 SHEEHAN SYNDROME

INTRODUCTION

Description: Sheehan syndrome (named for Harold Leeming Sheehan, who characterized the syndrome) is characterized by the loss of pituitary function, resulting from damage or necrosis that occurs through anoxia, thrombosis, or hemorrhage. When associated with pregnancy, it is called Sheehan syndrome; when unrelated to pregnancy, it is called Simmonds disease.
Prevalence: Rare; less than 1/10,000 deliveries.
Predominant Age: Reproductive age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Anoxia, thrombosis, or hemorrhage that results in damage or necrosis of the pituitary gland. The pituitary gland enlarges as pregnancy progresses and is prone to infarction from hypovolemic shock. The exact mechanism of pituitary damage is unknown, and pituitary damage can rarely occur even in the absence of hemorrhage. Even more rarely it can follow snake bite (Russell viper). Symptoms may manifest immediately or up to several years later.
Risk Factors: Postpartum hemorrhage with hypotension.

SIGNS AND SYMPTOMS

- Secondary amenorrhea
- Secondary hypothyroidism
- Adrenal insufficiency (the degree of pituitary damage and resultant loss is highly variable; as a result, the reduction of adrenal and thyroid hormone production seen is also variable, from slight to virtually complete loss)
- Postpartum failure of lactation and loss of pubic and axillary hair (lactation following delivery virtually precludes pituitary necrosis)
- Uterine superinvolution

DIAGNOSTIC APPROACH

Differential Diagnosis

- Lactational amenorrhea
- Pregnancy
- Exogenous hormone use
- Metabolically active ovarian tumor
- Other causes of secondary amenorrhea

Associated Conditions: Hypothyroidism, adrenal insufficiency, and postpartum hemorrhage.

Workup and Evaluation

Laboratory: Follicle-stimulating hormone, luteinizing hormone, thyroid-stimulating hormone, and adrenocorticotropin hormone levels are diagnostic.
Imaging: Computed tomography or magnetic resonance imaging of the pituitary is suggestive but not diagnostic.
Special Tests: None indicated.
Diagnostic Procedures: History and laboratory evaluations.

Pathologic Findings

Necrosis of part or all of the pituitary gland.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation (rapid; potentially life-threatening through loss of adrenal and thyroid hormones).
Specific Measures: Hormone replacement (thyroid, adrenal, and ovarian steroids).
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Patients must be carefully instructed when continuation of adrenal and thyroid hormone replacement therapy is required.

Drug(s) of Choice

- Hormone replacement (thyroid, adrenal, and ovarian steroids).

Follow-Up

Patient Monitoring: Careful follow-up of thyroid and adrenal functions is required.
Prevention/Avoidance: Maintenance of adequate perfusion and oxygenation when postpartum hemorrhage occurs.
Possible Complications: Failure to diagnose the loss of pituitary function can result in life-threatening adrenal insufficiency and hypothyroidism.
Expected Outcome: With timely diagnosis and hormone replacement, normal life and function may be expected.

MISCELLANEOUS

Pregnancy Considerations: Without ovulation induction and assisted reproduction, pregnancy is unlikely.
ICD-10-CM Codes: E23.0 (Hypopituitarism).

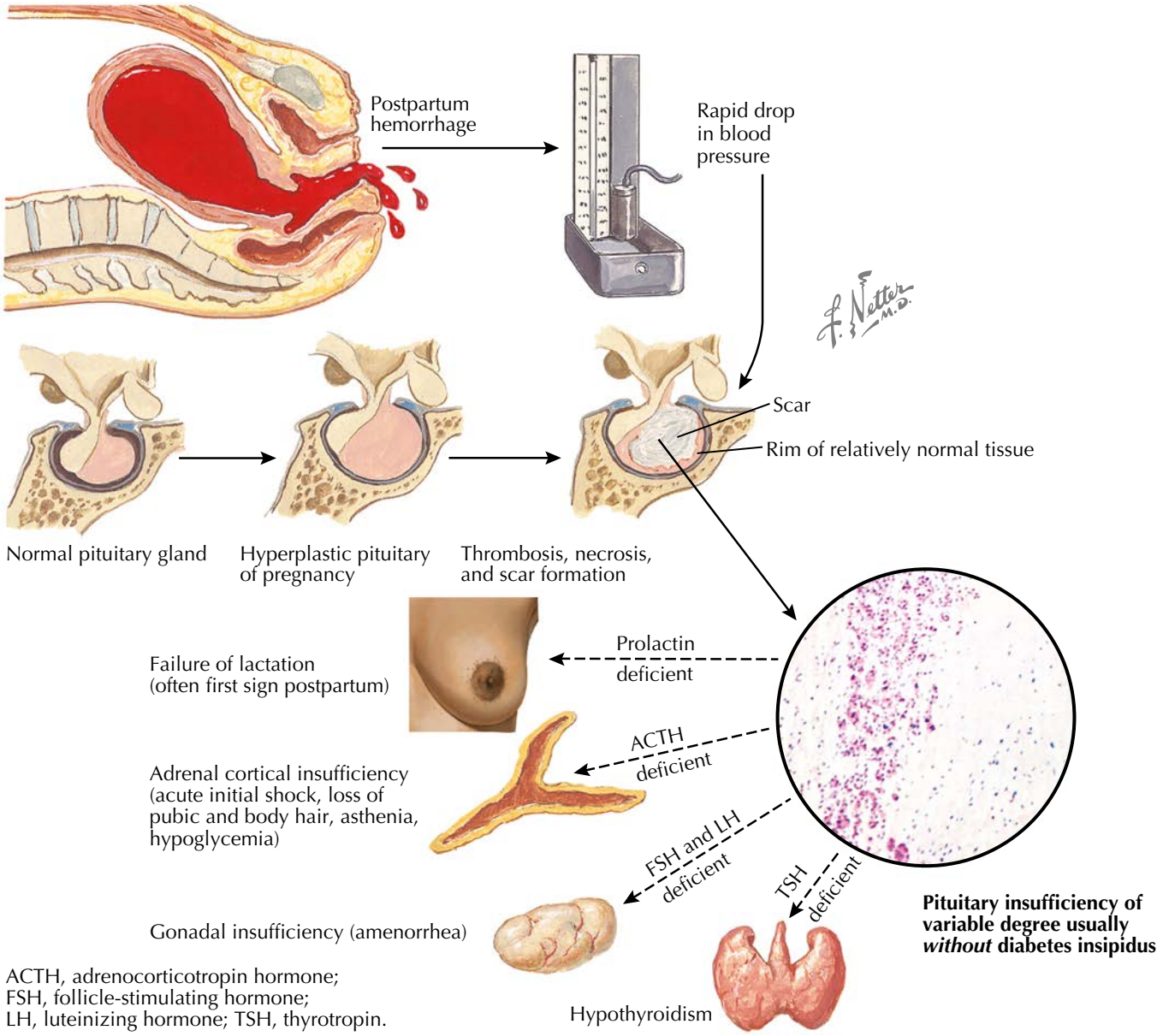

Figure 201.1 Sheehan syndrome

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202 TURNER SYNDROME

INTRODUCTION

Description: Caused as a result of the absence of one X chromosome, Turner syndrome (described in 1938 by Oklahoma physician Henry H. Turner) is a collection of stigmata that includes edema of the hands and feet, webbing of the neck, short stature, left-sided heart or aortic anomalies, and gonadal dysgenesis, resulting in primary amenorrhea and infertility. These patients have normal mental abilities but may have difficulty with mathematics, visual-motor coordination, and spatial-temporal processing.
Prevalence: 1/2700 female births.
Predominant Age: Present at birth but may not be detected until puberty is delayed.
Genetics: Sporadic; loss of one X chromosome (45,XO, 60% of cases; other partial losses: amenorrhea with a long-arm loss; short stature with short-arm loss). Roughly 50% of patients have chromosomal mosaicism (45,X/46,XX or 45,X/47,XXX, 45,X mosaics, ring chromosomes or other deletions); 10%–12% have a mosaic line containing a Y chromosome. Of conceptuses with only one X chromosome, 98% spontaneously abort in early pregnancy.

ETIOLOGY AND PATHOGENESIS

Causes: Monosomy for the X chromosome
Risk Factors: Translocations involving the X chromosome (rare)

SIGNS AND SYMPTOMS

- Short stature (<150 cm; 98%)
- Gonadal dysgenesis, amenorrhea (95%)
- Short neck, high palate, low hairline, and wide-spaced, hypoplastic nipples (80%)
- Broad (shield) chest, nail hypoplasia (75%)
- Lymphedema, cubitus valgus, prominent anomalous ears, multiple nevi, hearing impairment (70%)
- Webbing of the neck, short fourth metacarpal (65%)
- Renal and cardiac anomalies

DIAGNOSTIC APPROACH

Differential Diagnosis

- Pure gonadal dysgenesis
- Polycystic ovary disease
- Noonan syndrome
- Hypothyroidism
- Familial short stature
- Growth hormone deficiency or glucocorticoid excess
- Hereditary congenital lymphedema
- Pseudohypoparathyroid

Associated Conditions: Renal and cardiac anomalies, amenorrhea, infertility, short stature, hearing difficulties, Hashimoto thyroiditis, hypothyroidism (10%), alopecia, vitiligo, and autoimmune disorders. Gonadoblastomas or virilization may occur if the individual is mosaic for 45 X/46 XY.

Workup and Evaluation

Laboratory: Follicle-stimulating hormone and luteinizing hormone levels are high but do not need to be tested to establish the diagnosis (nonspecific).
Imaging: Renal and cardiac ultrasound studies to evaluate the possibility of anomalies. In some studies, up to 87% of Turner syndrome cases have been detected by measuring nuchal translucency.
Special Tests: Karyotype (50% of those considered to have Turner syndrome have a mosaic karyotype or have an abnormal X or Y chromosome), electrocardiogram, blood pressure in each arm or arm and leg (to screen for coarctation of the aorta).
Diagnostic Procedures: Karyotyping, physical examination.

Pathologic Findings

A 45,X karyotype, gonadal dysgenesis (with rudimentary streak gonads), horseshoe kidney or double collecting system (60%), bicuspid aortic valve, coarctation of the aorta, aortic valvular stenosis, and bone dysplasia.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, screening for associated defects, counseling about stature and fertility issues.
Specific Measures: Hormone replacement therapy, growth hormone therapy if diagnosis is established before age 10. Removal of the gonadal tissue in individuals with X/XY mosaic (generally after puberty).
Diet: No specific dietary changes indicated. There is a tendency for obesity.
Activity: No restriction (based on the cardiac and renal status).
Patient Education: Extensive counseling about stature, sexual maturation, and fertility.

Drug(s) of Choice

- Adolescents are much more sensitive to the effects of estrogen than are postmenopausal women, allowing doses in the range of 0.3 mg of conjugated estrogen, 0.5 mg of estradiol, or their equivalent daily. After 6–12 months of therapy at this level, the dose should be doubled and a progestin (eg, medroxyprogesterone acetate 10 mg for the first 12 days of the month) should be added, or the patient's therapy should be switched to combination oral contraceptives. This generally results in regular menstruation, and normal pubertal development proceeds on its own when the patient reaches a bone age of 13 years.
- Growth hormone (0.05 mg/kg SC daily) may be effective if given before the age of 10 years.

Contraindications: Undiagnosed amenorrhea.

FOLLOW-UP

Patient Monitoring: Screening for cardiac and renal anomalies, periodic hearing and thyroid testing (annual), monitoring of growth. Screening of serum lipids and glucose and pelvic examinations to detect gonadal neoplasia should be annually performed.
Prevention/Avoidance: Prenatal chromosomal analysis for those known to carry translocations (detection only, not prevention, although the couple may choose not to continue the pregnancy based on the findings).
Possible Complications: Renal or cardiac complications. New-onset breast growth or sexual hair growth should suggest the development of a gonadal tumor.
Expected Outcome: Reasonably normal life with the exception of infertility.

MISCELLANEOUS

Pregnancy Considerations: These patients are infertile. Individuals with a mosaic karyotype may be fertile, but pregnancy is associated with a 50% chance of aneuploidy. Aortic dissection or rupture has been reported in women with Turner syndrome becoming pregnant through in vitro fertilization (IVF) with donor oocytes.
ICD-10-CM Codes: Q96.9 (Turner's syndrome, unspecified).

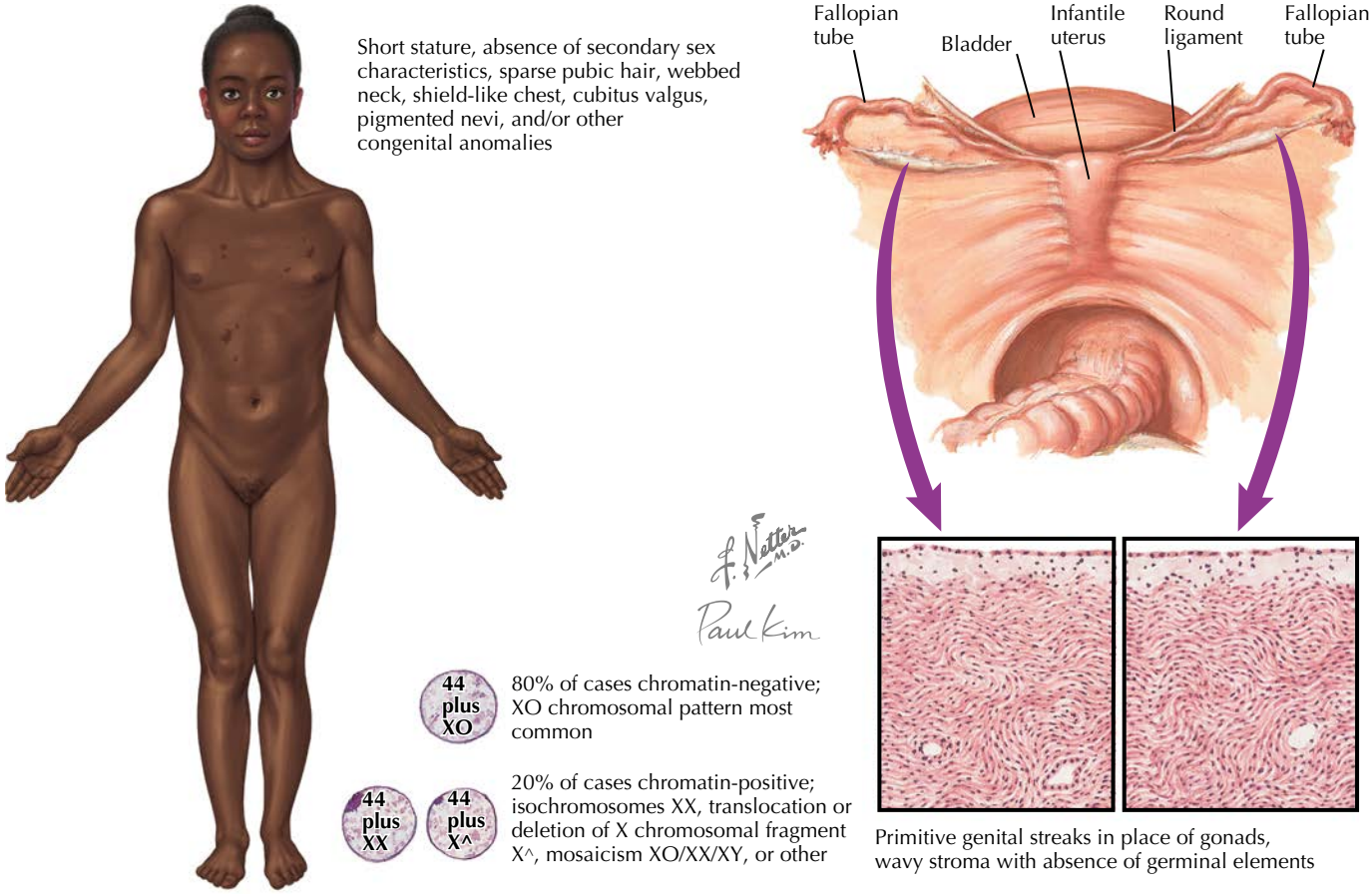

Figure 202.1 Turner syndrome

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203 UTERINE AGENESIS

INTRODUCTION

Description: Uterine agenesis is the failure of the Müllerian system to fuse in the midline to form the uterus. Incomplete variations of this failure result in a didelphic, bicornuate, septate, or arcuate uterus. It is also known as Mayer–Rokitansky–Küster–Hauser syndrome (MRKH).

Prevalence: 1/4000–5000 female births. Second most common (15%) cause of primary amenorrhea but only 3% of uterine anomalies.

Predominant Age: Congenital. Diagnosed when the patient fails to menstruate at puberty.

Genetics: Isolated developmental defect except for androgen insensitivity syndrome.

ETIOLOGY AND PATHOGENESIS

Causes: Isolated developmental defect in most patients, production of antimüllerian hormone by Sertoli cells in fetal testes (in androgen resistance syndrome). 17α-Hydroxylase deficiency, 17, 20-desmolase deficiency, and agonadism may account for those rare individuals with no breast or uterine development and a male karyotype (vanishing testes syndrome). Müllerian agenesis (MRKH syndrome) is a congenital malformation characterized by a failure of the Müllerian ducts to develop, resulting in a missing uterus and variable malformations of the vagina. Development of the upper tract occurs independent of the ovaries, so these women have normal ovarian function. Unlike other intersex conditions, MRKH is not associated with virilization but only absence of upper genital tract structures.

Risk Factors: None known.

SIGNS AND SYMPTOMS

- Primary amenorrhea (accounts for 15% of primary amenorrhea, second most common cause)
- Shortened or absent vagina (difficult or painful intercourse)
- Breast development may be absent in some syndromes but most often present and normal
- Pelvic examination demonstrates complete or partial absence of the cervix, uterus, and vagina
- Those with rudimentary uterine elements may experience cyclic abdominal pain with a growing pelvic mass (hematometra).

DIAGNOSTIC APPROACH

Differential Diagnosis

- Androgen resistance (testicular feminization)—may be ruled out by the presence of normal pubic hair
- Vaginal agenesis
- Imperforate hymen
- Transverse vaginal septum
- Primary amenorrhea

Associated Conditions: Primary amenorrhea, infertility, urinary tract abnormalities (25%–40%), skeletal abnormalities (12%), congenital rectovaginal fistula, imperforate anus, and hypospadias.

Workup and Evaluation

Laboratory: Serum follicle-stimulating hormone (to differentiate hypogonadal hypogonadism and gonadal dysgenesis).

Imaging: No imaging indicated. Ultrasonography may be used to assist the diagnosis but is generally not indicated. Intravenous pyelography should be considered.

Special Tests: Measurement of height, weight, and arm span. A karyotype or buccal smear may be performed but is generally not necessary.

Diagnostic Procedures: History, physical examination, imaging procedures.

Pathologic Findings

One or both fallopian tubes and some fibrous tissue may be present in the normal location of the uterus. Normal ovaries, with normal cyclic ovarian function, are usually present.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and education.
Specific Measures: Patients may require surgical removal of abnormal gonads (after puberty: age 18 years) because of an increased risk for malignancy if Y-chromatin material is present. Fertility may be achieved through in vitro fertilization with implantation into a host uterus. Vaginal dilators may be used to create a functional vagina.
Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Frank discussion about the syndrome and its effects (infertility and amenorrhea).

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: Renal, skeletal, and cardiac abnormalities are more common in these patients.
Expected Outcome: Normal life expectancy without reproductive capability. Fertility may be achieved through in vitro fertilization with implantation into a host uterus.

MISCELLANEOUS

Pregnancy Considerations: Normal pregnancy is not possible.
ICD-10-CM Codes: Q51.0 (Agenesis and aplasia of uterus).

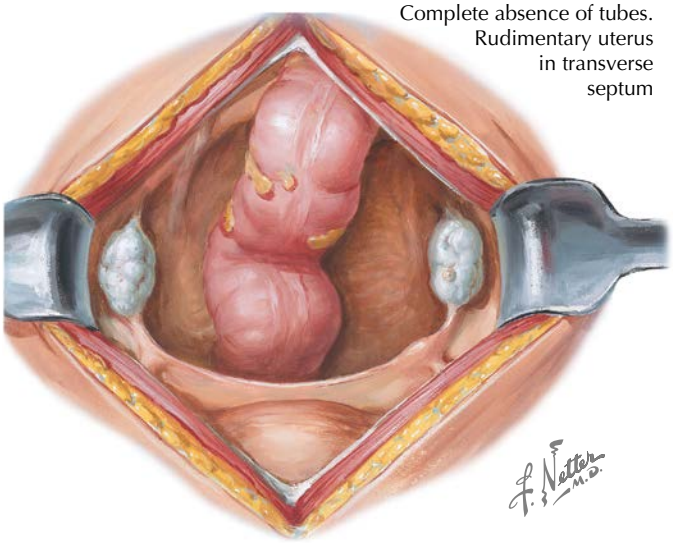

Figure 203.1 Uterine agenesis

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204 VAGINAL AGENESIS

INTRODUCTION

Description: Vaginal agenesis is the congenital absence of the vagina, most often associated with an absence of the uterus (Mayer–Rokitansky–Küster–Hauser [MRKH] syndrome). Of these women, 7%–10% have functional endometrium within a uterus that is obstructed, a rudimentary uterine horn, or cavitated Müllerian remnants.
Prevalence: Reported to vary from 1/4000 to 1/10,500 female births.
Predominant Age: Generally not diagnosed until puberty, often following a delay of 2–3 years or more.
Genetics: No genetic pattern (accident of development), although in some inbred communities there is a suggestion that an autosomal recessive gene is present.

ETIOLOGY AND PATHOGENESIS

Causes: Failure of the endoderm of the urogenital sinus and the epithelium of the vaginal vestibule to fuse and perforate during embryonic development. This process is normally completed by the 21st week of gestation. Patients with a congenital absence of the vagina but with a uterus present represent an extreme form of transverse vaginal septum.
Risk Factors: None known.

SIGNS AND SYMPTOMS

- Vaginal obstruction (absence)
- Primary amenorrhea
- Cyclic abdominal pain
- Hematometra (if a uterus or uterine remnant is present)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Imperforate hymen
- Hermaphroditism
- Androgen insensitivity syndrome (testicular feminization)
- MRKH syndrome (75% have vaginal agenesis, and 25% have shortened vaginal pouch)
- Transverse vaginal septum

Associated Conditions: Endometriosis, infertility, chronic pelvic pain, sexual dysfunction, hematometra (when uterus is present), urologic abnormalities (25%–40%), and skeletal abnormalities (10%–15%).

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: Ultrasonography, magnetic resonance imaging, or computed tomography to determine the presence and status of the upper genital tract structures. Intravenous pyelography should be considered.
Special Tests: Karyotyping or buccal smear should be considered. Laparoscopy may be desirable in some patients to confirm the diagnosis, although this is generally not necessary.
Diagnostic Procedures: History and physical examination (including rectal examination).

Pathologic Findings

The ovaries are usually normal, and the fallopian tubes are present.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and reassurance.
Specific Measures: Surgical creation of a vagina if intercourse is desired. May be created by a flap procedure (McIndoe procedure) or progressive perineal pressure techniques (Ingram dilators or bicycle seat). Primary vaginal dilation and elongation is successful for more than 90%–96% of patients. Patients with androgen insensitivity should have their gonads (testes) removed to prevent seminoma (generally after puberty is complete); patients with MRKH syndrome have normal ovaries and should not have them removed.
Diet: No specific dietary changes indicated.
Activity: No restriction.

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Normal health maintenance. Patients in whom a neovagina is created must be monitored for narrowing. Sexually active women with vaginal agenesis are at risk of sexually transmitted infections, and thus, condoms should be used for intercourse and appropriate screening performed.
Prevention/Avoidance: None.
Possible Complications: Hematocolpos, endometriosis, sexual dysfunction. If a neovagina is created, it will scar and stenose if it is not used frequently or maintained with the use of a dilator.
Expected Outcome: Sexual function can generally be restored through the creation of a neovagina. The presence of a uterus is associated with cyclic pain and often must be removed. Except as an egg donor, fertility is unlikely to be restored.

MISCELLANEOUS

Pregnancy Considerations: Generally not a consideration. Patients may be able to achieve conception as egg donors.
ICD-10-CM Codes: Q52.4 (Other congenital malformations of vagina).

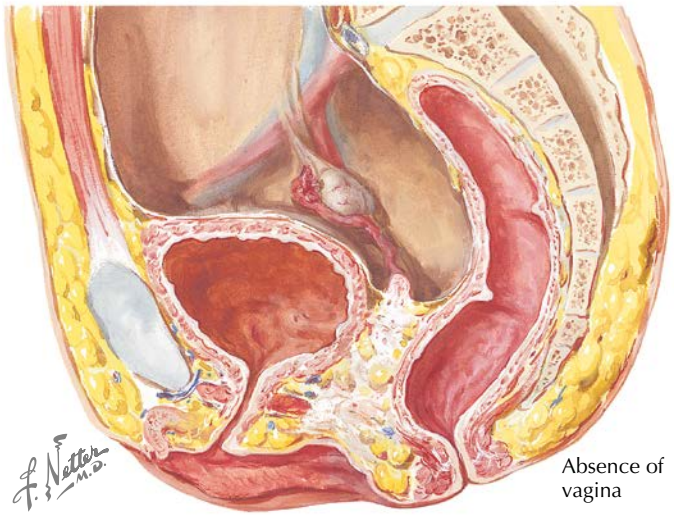

Figure 204.1 Vaginal agenesis

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VIRILIZATION

205

INTRODUCTION

Description: Virilization refers to the loss of female sexual characteristics such as body contour and the acquisition of masculine qualities such as increased muscle mass, temporal balding, deepening of the voice, and clitoromegaly.
Prevalence: Uncommon.
Predominant Age: Reproductive age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Idiopathic ovarian (polycystic ovary syndrome, hilus cell hyperplasia/tumor, arrhenoblastoma, adrenal rest), adrenal (congenital adrenal hyperplasia [10%–15% of women with hirsutism], Cushing's disease, virilizing carcinoma or adenoma), drugs (minoxidil; androgens, including danazol, phenytoin, diazoxide, valproate), pregnancy (androgen excess of pregnancy, luteoma, or hyperreactio luteinalis). In premenopausal women, polycystic ovarian syndrome is the most common cause; in postmenopausal women, it is usually associated with ovarian hyperthecosis or an androgen-secreting tumor.
Risk Factors: None known.

SIGNS AND SYMPTOMS

- Amenorrhea (common but not universal)
- Temporal or frontal balding
- Deepening of the voice
- Clitoral enlargement
- Vaginal dryness
- Increased muscle mass
- Male-pattern hair growth

DIAGNOSTIC APPROACH

Differential Diagnosis

- Iatrogenic or exogenous steroid use
- Polycystic ovary syndrome
- Ovarian stromal hyperthecosis
- Ovarian tumors (Sertoli-Leydig tumors)
- Cushing disease (truncal obesity, facial rounding, cervicodorsal fat deposition [buffalo hump], and red or purple striae are often not fully developed)
- Adrenal tumors
- Congenital adrenal hyperplasia (especially in infants and children)

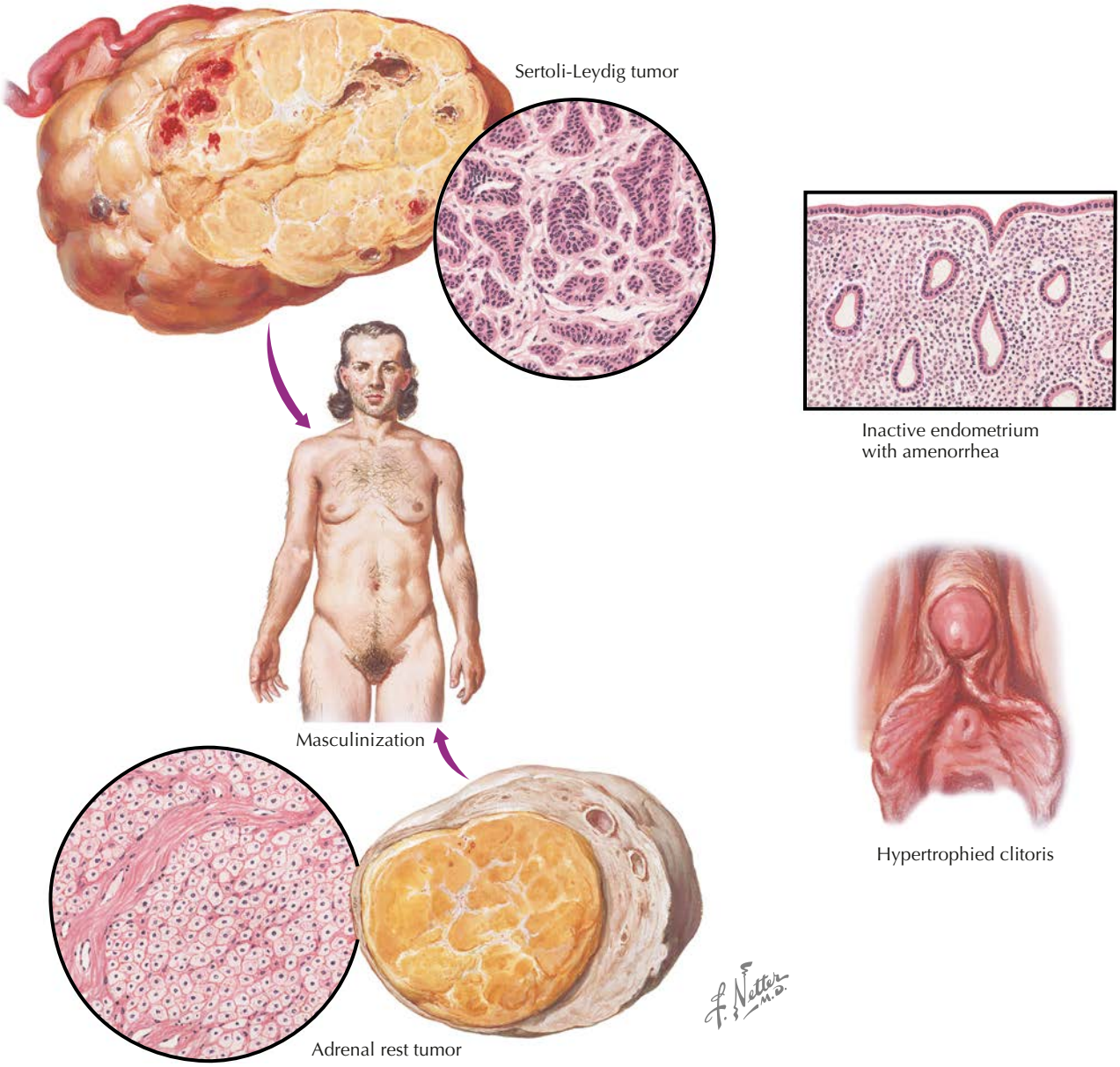

Figure 205.1 Masculinizing neoplasms

Associated Conditions: Defeminization, amenorrhea, obesity, menstrual irregularity, amenorrhea, infertility, acne, oily skin, increased libido, and alopecia.

Workup and Evaluation

Laboratory: Prolactin, follicle-stimulating hormone, thyroid screening. Patients suspected of having adrenal sources of hyperandrogenicity may be screened by measuring 24-hour urinary free cortisol, by performing adrenocorticotropic hormone stimulation tests, or by performing an overnight dexamethasone suppression test. Dehydroepiandrosterone sulfate (DHEA-s) and testosterone should be measured. The circulating testosterone level is generally 2 ng/mL or greater.

Imaging: Despite the ability of transvaginal ultrasonography and computed tomography to detect 90% of virilizing tumors, 5%–10% of tumors may not be detected, necessitating surgical exploration when these are suspected.

Special Tests: Clitoral index. The clitoral index is defined as the vertical dimension times the horizontal dimension, in millimeters. The normal range is from 9–35 mm, with borderline values in the range of 36–99 mm. Values greater than 100 mm indicate severe hyperandrogenicity and should prompt aggressive evaluation and referral.

Diagnostic Procedures: History, physical examination, and laboratory evaluation.

Pathologic Findings

Based on underlying pathophysiologic conditions.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and support, shaving, depilatories, or electrolysis. Topical treatment of acne (if present).

Specific Measures: Patients with polycystic ovary syndrome often do well with oral contraceptive suppression of ovarian function, metformin, or with the use of spironolactone. Patients with hyperandrogenicity of adrenal origin respond well to cortisol administration, which results in a reduction of the production of androgenic precursors. Tumors require surgical removal.
Diet: No specific dietary changes indicated.
Activity: No restriction.

Drug(s) of Choice

- Polycystic ovary syndrome—combination oral contraceptives, medroxyprogesterone acetate (Depo-Provera 150–300 mg IM every 3 months). Metformin 1500 mg/day (considered first-line therapy for PCOS when contraception is not desired), spironolactone 100–200 mg/day PO.
- Hyperandrogenicity of adrenal origin—cortisol administration.

Contraindications: Pregnancy (spironolactone is teratogenic; patients of childbearing potential must use reliable contraception.)

FOLLOW-UP

Patient Monitoring: Normal health maintenance once diagnosis and management have been implemented. There is an increased risk for diabetes in patients with polycystic ovaries.
Prevention/Avoidance: None.
Possible Complications: Permanent loss of feminine attributes and induction of hirsutism, lowering of voice, and others. Chronic anovulation is associated with an increased risk for endometrial hyperplasia and cancer.
Expected Outcome: Good, with appropriate diagnosis and treatment.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy, although some metabolic causes of virilization of the mother may result in reduced fertility or virilization of a fetus.
ICD-10-CM Codes: E25.9 (Adrenogenital disorder, unspecified) (others based on the diagnosis).

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SECTION
XII

Obstetrics: General Considerations

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PRECONCEPTIONAL CARE AND COUNSELING

206

THE CHALLENGE

In many ways, prenatal care is the prototypical example of preventive medicine. Preconceptional care is directed toward ensuring the optimal health of the prospective mother and doing those things that will remove preventable impediments to a healthy outcome for the pregnancy. The care these women receive during this and the prenatal phase of their lives is critical to both their health and the success of the pregnancy.

Scope of the Problem: In the United States, approximately 4 million women give birth each year, and more than 90% of American women will bear children during their lifetime. Twenty percent or more of women have one or more risk factors that could adversely affect a pregnancy if not addressed. Therefore, women who receive delayed (after 12 weeks of pregnancy) or no prenatal care are at a risk for having undetected or preventable complications of pregnancy that can result in significant maternal or fetal morbidity or mortality.

Objectives of Management: To protect the health and well-being of mother, fetus, and neonate through screening and optimizing a woman's health and knowledge before conceiving a pregnancy.

TACTICS

Relevant Pathophysiology: The initiation of folic acid supplementation at least 1 month before pregnancy has been shown to reduce the incidence of neural tube defects such as spina bifida and anencephaly. Because organogenesis begins early in pregnancy, starting folic acid supplementation after neural tube closure (28 days after conception) has no demonstrated benefit in reducing neural tube defects. Similarly, adequate glucose control in a woman with diabetes before conception and throughout pregnancy decreases maternal morbidity, spontaneous abortion, fetal malformation, fetal macrosomia, intrauterine fetal death, and neonatal morbidity. Reducing the risk of infectious diseases that can have adverse effects on the mother or fetus if contracted during pregnancy, through vaccination (eg, rubella) or avoidance (eg, toxoplasmosis), is a proven preventive strategy.

Strategies: Ideally, obstetric care should commence before pregnancy with a preconception visit, during which a thorough family and medical history for both parents is taken and a physical examination of the prospective mother is performed. Both before and between pregnancies, preexisting conditions that may affect conception, pregnancy, or both should be identified, and appropriate management plans should be formulated with the goal of a "healthy" subsequent pregnancy. Nearly half of all pregnancies in the United States are unintended, making the challenge of preconception care more difficult. As a result, effective preconceptional care must address pregnancy planning for women who seek care in anticipation of a planned pregnancy and, just as importantly, for all women with childbearing potential.

- General evaluations are directed toward establishing optimal maternal health, providing nutritional counseling, and instituting appropriate prophylaxis. This generally takes the form of genetic screening or the detection of maternal diseases that will alter or be altered by the future pregnancy. Based on the age, ethnic origin, race, or family history, couples may be identified who are at increased risk for chromosomal or enzymatic abnormalities, such as sickle cell trait, thalassemia, or Tay-Sachs disease carrier state. A family history that is positive for certain diseases, such as cystic fibrosis and congenital hearing loss, indicates the need for additional screening.
- The evaluation should focus on many aspects of the woman's life that can adversely influence the outcome of the pregnancy: undiagnosed, untreated, or poorly controlled medical conditions; immunization history; medication use; occupational and environmental exposures; nutritional issues; tobacco and substance use; and any other high-risk behaviors. Social and mental health issues that may affect the woman's ability to access and participate in prenatal care should also be addressed.
- Before pregnancy is the optimal time for immunizing against hepatitis B, rubella, and varicella, as well as screening for human immunodeficiency virus and syphilis infections; if found, treatment should be initiated to prevent the transmission of the disease to the fetus. The patient should be counseled on ways to prevent toxoplasmosis, cytomegalovirus, and parvovirus infections. Anemia, hypothyroidism, urinary tract infections, and other conditions may be identified, and nutritional counseling and weight reduction may be affected before pregnancy. Admonitions about the risks of using medications, drugs, alcohol, and tobacco and avoidance of chemicals such as solvents and pesticides during early pregnancy may be given.
- Patients considering pregnancy in the immediate future should be prescribed prenatal vitamins, folic acid supplements, or both. Prenatal vitamins should include at least 400 μg of folic acid and 30 mg of elemental iron for patients at an average risk. The dosage of folic acid should be increased to 1 mg/day for women with diabetes mellitus, epilepsy, or hemoglobinopathies. Patients who have given birth to a child with neural tube defects should take 4 mg of folic acid per day for subsequent pregnancies. Higher levels of supplementation should not be achieved by taking excess multivitamins because of the risk of vitamin A toxicity.

Patient Education:

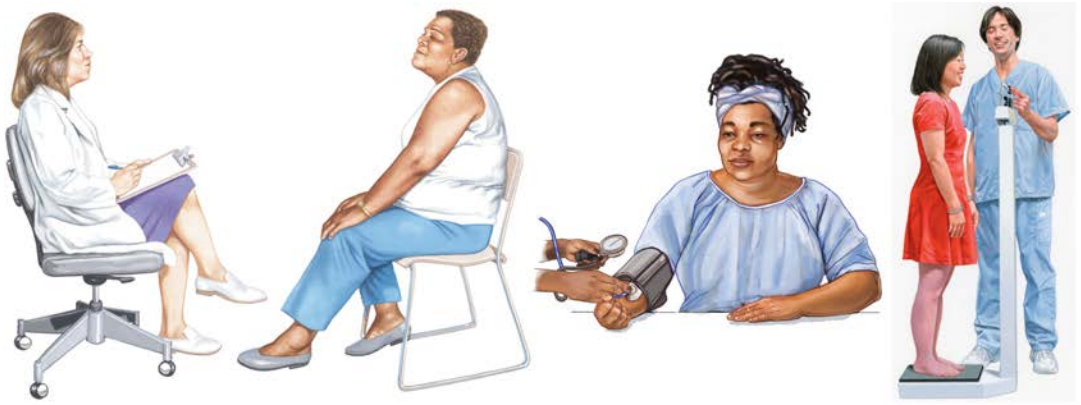
American College of Obstetricians and Gynecologists Patient Education Booklets:

- A Healthy Pregnancy for Women with Diabetes, 2019
- A Partner's Guide to Pregnancy, 2020
- Carrier Screening for Spinal Muscular Atrophy, 2018
- Carrier Screening, 2020
- Cystic Fibrosis—Prenatal Screening and Diagnosis, 2020
- Good Health Before Pregnancy—Preconceptional Care, 2020
- Having a Baby After Age 35, 2020
- Having a Baby—Especially for Teens, 2018
- Nutrition During Pregnancy, 2020
- Prenatal Genetic Screening Tests, 2020

IMPLEMENTATION

Special Considerations: If the patient has significant medical problems, the impact of pregnancy on these problems and the implications for the pregnancy may be determined, and where possible, the risks may be reduced before conception. Medications for hypertension, epilepsy, thromboembolism, depression, and anxiety should be reviewed and changed, if necessary, before the patient becomes pregnant.

Preconception Visit



Obstetric care should commence before pregnancy with preconception visit, during which a thorough family and medical history for both parents and a physical examination, including blood pressure and weight of the prospective mother, is done.

Preconception Nutrition and Health

Prenatal vitamins should include at least 400 mcg of folic acid and 30 mg of elemental iron for patients at average risk

Nutritional information, including recommendations on weight reduction, should be discussed.

Risks of using medications, drugs, alcohol, tobacco, and chemicals should be provided to patient.

Preconception Tests

- Hepatitis B
- Rubella, varicella
- Human immunodeficiency virus (HIV)
- Syphilis
- Family history may indicate need for additional tests

Figure 206.1 Preconception visit, nutrition and health, and tests

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ROUTINE PRENATAL CARE: FIRST TRIMESTER

207

THE CHALLENGE

Despite the dramatic and vulnerable changes that the conceptus undergoes in the first 14 weeks of gestation, many patients are unaware of their pregnancy or delay seeking prenatal care. Evidence suggests that it is during this period the foundations of a successful pregnancy and even the future health of the adult individual are set. Although most pregnant women would deliver healthy infants without any prenatal care, obstetric care is designed to promote optimal health throughout the course of normal pregnancy while screening for and managing any complications that may develop.

Scope of the Problem: Approximately one-fourth of pregnant women do not receive care during the first trimester.

Objectives of Management: To protect the health and well-being of mother and fetus.

TACTICS

Relevant Pathophysiology: During the first trimester of gestation, the developing embryo implants in the endometrium (except in the case of ectopic pregnancies), the placental attachment to the mother is created, and the major structures and organs of the body are formed. The developing embryo is sensitive to exposures to toxins, medications, radiation, and the effects of maternal conditions that can disrupt this process. Errors in this process may result in major disruptions in structure or function of the fetus or even the complete loss of the pregnancy. At approximately the 12th week of gestation, the placenta takes over hormonal support for the pregnancy from the corpus luteum. If this transition does not occur smoothly, the pregnancy can be lost.

Strategies: At the first prenatal visit, a comprehensive history should be taken, including previous pregnancy outcome(s), if any, and any medical or surgical conditions that may affect pregnancy. This should include medical history, information pertinent to genetic screening, and any notable events in the course of the current pregnancy. Special attention also should be given to diet, tobacco or alcohol use, and any medications or substances used. Routine laboratory studies should be conducted, and the patient should be given instructions concerning routine prenatal care, warning signs of complications, and whom to contact with questions or problems (Box 207.1). A complete physical examination should be performed, including a Pap test or human papilloma virus testing (based on screening guidelines) and tests for sexually transmitted infections.

- It is important early in the course of pregnancy to establish an accurate gestational age and estimated date of confinement (or due date). This information is needed to manage later complications of pregnancy and to determine the timing of evaluations (eg, neural tube screening, 1-hour glucose challenge testing, Rh prophylaxis). If needed, transvaginal and transabdominal ultrasonographic techniques allow gestational age determination with an approximate 7- to 10-day accuracy when performed during the first trimester.
- At each visit, the patient should be asked about any problems such as vaginal bleeding, nausea/vomiting, dysuria, or vaginal discharge. Each prenatal visit should include measurements of blood pressure and weight and an assessment for edema. (Blood pressure generally declines at the end of the first trimester,

BOX 207.1 Commonly Ordered Initial Laboratory and Other Tests

- Complete blood count
- Urinalysis and urine culture and sensitivity
- Blood group, Rh, antibody screen
- Serologic test for syphilis (rapid plasma reagin [RPR], Venereal Disease Research Laboratory [VDRL])
- Human immunodeficiency virus (HIV) titer by enzyme-linked immunosorbent assay (ELISA); Western blot if HIV+ by ELISA
- Hepatitis B surface antigen
- Rubella titer
- Cervical cytology (Pap test) or human papilloma virus (HPV) testing based on screening guidelines
- Testing for *Neisseria gonorrhoeae*
- Hemoglobin electrophoresis (selected patients)
- Maternal serum screening for open neural tube defects (triple or quad screen) at 15–20 weeks (maternal serum α-fetoprotein plus other markers)
- Cell-free DNA (Down syndrome, trisomy 13, trisomy 18)
- Nuchal translucency testing between 10 and 13 weeks (selected patients)

increasing again in the third trimester.) A clean-catch urine sample should be tested (most often by dipstick) for protein and signs of infection. Obstetric assessments should include uterine size by pelvic examination or fundal height measurement and documentation of the presence and rate of fetal heart tones by the use of a fetal Doppler ultrasound device. (The fetal heart may not be routinely detected by a Doppler device until 12 weeks or later.)

- Patients at a low risk may be followed at 4-week intervals until 28 weeks of gestation.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Booklets:

- A Partner's Guide to Pregnancy, 2020
- Carrier Screening for Spinal Muscular Atrophy, 2018
- Cystic Fibrosis—Prenatal Screening and Diagnosis, 2020
- Early Pregnancy Loss, 2021
- Exercise During Pregnancy, 2020
- Having a Baby After Age 35, 2020
- Having a Baby—Especially for Teens, 2018
- How Your Fetus Grows During Pregnancy, 2020
- Morning Sickness—Nausea and Vomiting of Pregnancy, 2020
- Nutrition During Pregnancy, 2020
- Prenatal Genetic Diagnostic Tests, 2020
- Prenatal Genetic Screening Tests, 2019
- Routine Tests in Pregnancy, 2021

IMPLEMENTATION

Special Considerations: Between 4% and 8% of pregnant women are victims of "battering" and will benefit from counseling or help finding shelters and other social supports. In the United States, suicide, homicide, and trauma associated with auto accidents in which seat belts were not used account for three-fourths of maternal mortality. These are all areas in which proactive counseling and assistance can have a positive impact on reducing morbidity or mortality.

If a genetic evaluation of the fetus is indicated, cell-free DNA testing or chorionic villus sampling may be performed between the 10th and 12th week of gestation. Ultrasonographic assessment of nuchal translucency (suggestive of Down syndrome) is generally done during this same period. Screening for cystic fibrosis should be offered to all patients during either the first or second trimester.

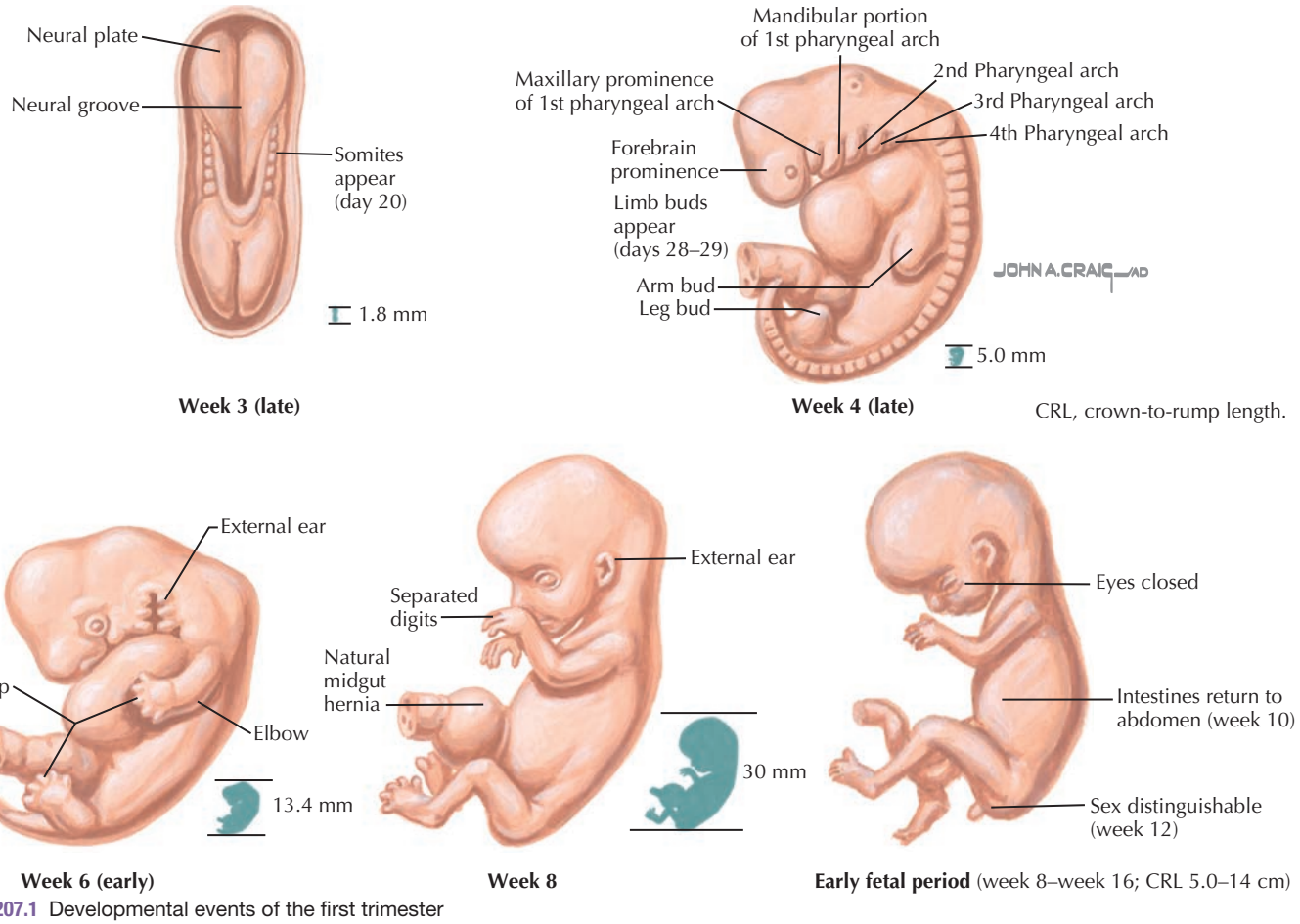

Figure 207.1 Developmental events of the first trimester

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ROUTINE PRENATAL CARE: SECOND TRIMESTER

208

THE CHALLENGE

During the second trimester (14–28 weeks) the fetus continues to grow and develop, organ function becomes more normal, and the growing uterus is more apparent. Prenatal care during this period is directed toward monitoring the progress of pregnancy and detecting treatable complications.

Scope of the Problem: Despite the relative lack of complications that occur during the second trimester, the early signs of later problems may first appear during this phase of pregnancy. These may be missed without continued vigilance.

Objectives of Management: To protect the health and well-being of the mother and fetus.

TACTICS

Relevant Pathophysiology: During the second trimester of gestation, levels of human chorionic gonadotropin plateau and often decline, easing many of the early maladies of pregnancy such as breast tenderness and morning sickness, although the growing uterus may now bring on heartburn and constipation. The risk for early pregnancy loss has passed (except for infrequent cases of cervical incompetence and preterm labor) and the fetus grows from being just 3 inches in length at 14 weeks to weighing approximately 2 lb by the end of the second trimester. There is an increase in maternal blood volume and cardiac output (20% greater) to feed the needs of the growing pregnancy. The first detectable movements of the baby (quickening) occur during this trimester (generally at approximately 16–20 weeks of gestation) and the female fetus has the most egg cells of any point in her life (oocytes peak at 6–7 million at approximately 16–20 weeks of gestation, declining to approximately 1 million at birth). Fetal viability (ability to survive apart from the mother) begins at approximately 24 weeks, although intact survival at this stage is unlikely. Toward the end of this trimester maternal hemorrhoids and low back pain may occur. Colostrum (the first form of breast milk) is present by 26 weeks of gestation.

Strategies: At each visit, patients should be asked about any problems such as vaginal bleeding, nausea/vomiting, dysuria, or vaginal discharge. Each prenatal visit should include measurements of blood pressure and weight and an assessment for edema. (Blood pressure generally declines at the end of the first trimester, increasing again in the third trimester.) A clean-catch urine sample should be tested (most often by dipstick) for protein and signs of infection. Obstetric assessments should include uterine size by fundal height measurement and documentation of the presence and rate of fetal heart tones by the use of a fetal Doppler ultrasound device.

- Screening for open neural tube and other defects (by measurement of maternal serum alpha-fetoprotein and other markers) is generally performed between 15 and 20 weeks.

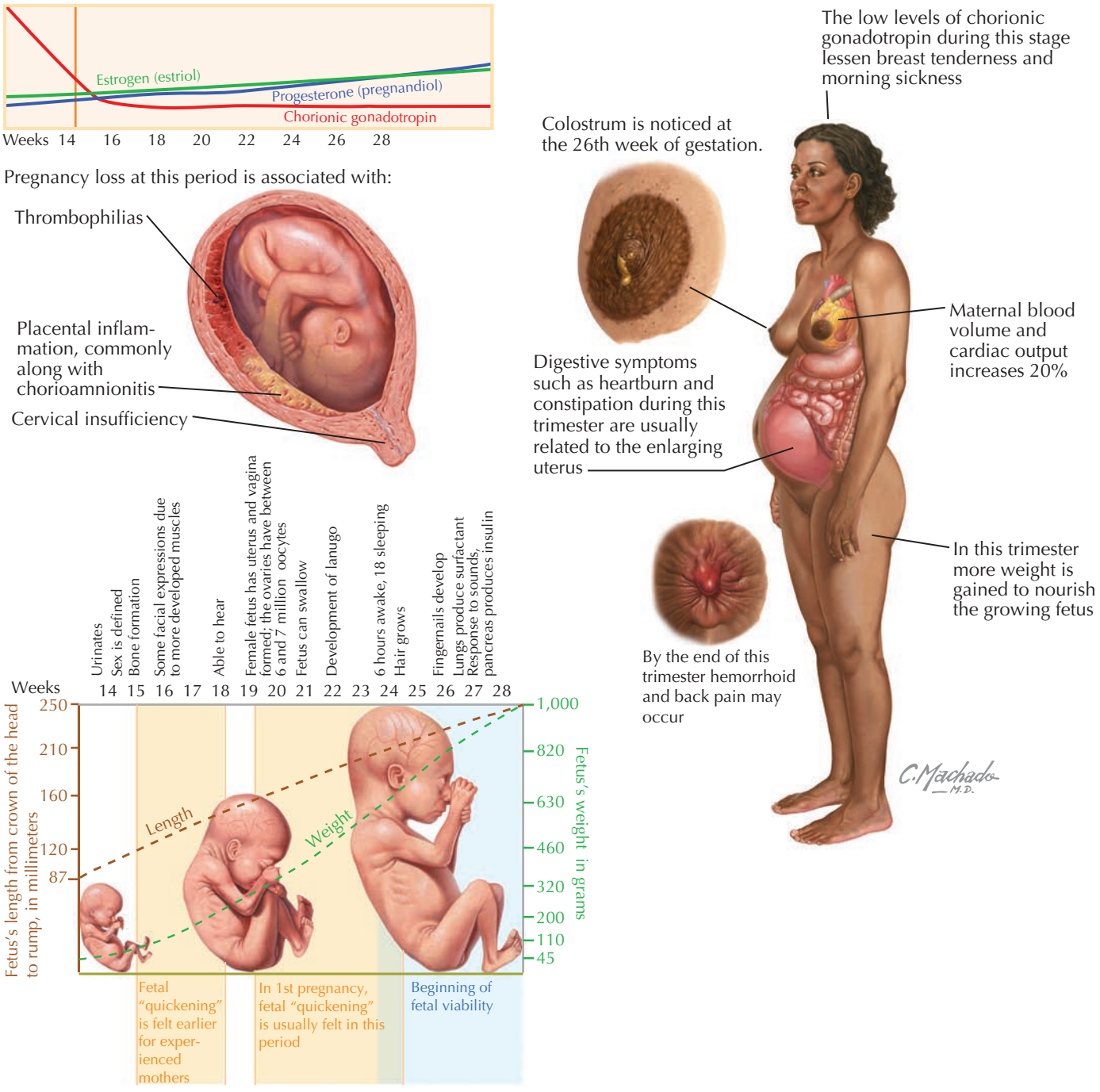

Figure 208.1 Developmental events of the second trimester

- Toward the end of this trimester, a repeat measurement of hemoglobin is taken, glucose screening (usually 1-hour glucose challenge at 28 weeks for patients at low risk) is performed, and prophylactic treatment with Rh D immune globulin is given for patients who are Rh negative.
- Patients at low risk may be followed at 4-week intervals until the end of this trimester. Ultrasonography is optimally performed between 18 and 22 weeks.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- A Partner's Guide to Pregnancy, 2020
- Carrier Screening for Spinal Muscular Atrophy, 2018
- Cystic Fibrosis—Prenatal Screening and Diagnosis, 2020
- Early Pregnancy Loss, 2021
- Exercise During Pregnancy, 2020
- Having a Baby After Age 35, 2020
- Having a Baby—Especially for Teens, 2018
- How Your Fetus Grows During Pregnancy, 2020
- Morning Sickness—Nausea and Vomiting of Pregnancy, 2020
- Nutrition During Pregnancy, 2020
- Prenatal Genetic Diagnostic Tests, 2020
- Prenatal Genetic Screening Tests, 2019
- Routine Tests in Pregnancy, 2021

IMPLEMENTATION

Special Considerations: If a genetic evaluation of the fetus is indicated, an amniocentesis may be performed between the 12th and 21st weeks of gestation. Screening for cystic fibrosis should be offered to all patients during either the first or second trimester.

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209 ROUTINE PRENATAL CARE: THIRD TRIMESTER

THE CHALLENGE

During the third trimester (29–40 weeks or more) the fetus continues to grow and develop, with full maturation in organ function being established, maternal physiology continuing to change, and the cervix and uterus preparing for the processes of childbirth. Prenatal care during this period continues to be directed toward monitoring the progress of the pregnancy and detecting treatable complications.

Scope of the Problem: It is during the third trimester that the uterus and fetus prepare for labor and delivery. It is also during this phase of pregnancy that complications such as pre-eclampsia, bleeding, complications of diabetes or hypertension, abnormalities of growth or amniotic fluid, and preterm labor may arise.

Objectives of Management: To protect the health and well-being of the mother and fetus.

TACTICS

Relevant Pathophysiology: During the third trimester of gestation, the dramatic growth of the fetus continues as it gains its final birthweight and its organs prepare for full function as an autonomous individual. Maternal blood volume almost doubles, and cardiac output reaches its maximum. By the 29th week, the fetus has 300 bones, although many of them will fuse after birth, leaving the adult with a total of 206. The fetal presenting part begins to descend into the maternal pelvis in the last month of pregnancy, resulting in a decline in fundal height, improved respiratory and gastric function, and greater pelvic pressure and discomfort. Late in this trimester, changes in the cervix begin the preparations for dilation and effacement during labor and delivery.

Strategies: At each visit, patients continue to be asked about any problems such as vaginal bleeding, nausea/vomiting, dysuria, or vaginal discharge. Each prenatal visit should include measurements of blood pressure and weight and an assessment for edema. A clean-catch urine sample should be tested (most often by dipstick) for protein and signs of infection. Obstetric assessments should include uterine size by fundal height measurement and documentation of the presence and rate of fetal heart tones using a fetal Doppler ultrasound device. Fundal height in centimeters will generally match the gestational age of the pregnancy up to 31—34 weeks. All measurements should be made with the patient's bladder empty; a full bladder can add up to 3 cm to the measurement. Vaginal examinations to assess the dilation and effacement of cervix may be indicated for those with a history of premature labor or those experiencing symptoms of labor. (Routine cervical checks near term are not normally necessary or useful.)

- For selected patients, "kick counts" may be used to assess the overall health of the fetus. In general, the detection of more than four fetal movements over the course of an hour indicates a healthy fetus. All patients should be encouraged to monitor their baby's activity levels and be evaluated for any prolonged reduction or absence in activity.
- At approximately 35–37 weeks gestation a culture for group B streptococcus should be obtained to identify patients who are carriers and will require antibiotic treatment during labor. Some practitioners choose to just treat all patients during labor based on a review of risk factors. Both strategies are equally acceptable.
- Planning and preparation for breastfeeding should be undertaken during this trimester. No special physical preparation is needed for successful breastfeeding, but discussion, questions, and the acquisition of needed supplies (eg, nursing bra) are best taken care of before delivery.
- For high-risk pregnancies, antenatal testing (nonstress test, contraction stress test, biophysical profile) should be considered and implemented as indicated.
- Patients at low risk may be followed at 2-week intervals until approximately the 36th week, when visits occur at weekly intervals (or more often as dictated by the course of the pregnancy).
- Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- A Partner's Guide to Pregnancy, 2020
- Cystic Fibrosis—Prenatal Screening and Diagnosis, 2020
- Exercise During Pregnancy, 2020
- Fetal Heart Rate Monitoring During Labor, 2018
- Having a Baby After Age 35, 2020
- Having a Baby—Especially for Teens, 2018
- How Your Fetus Grows During Pregnancy, 2020
- If Your Baby Is Breech, 2019
- Labor Induction, 2021
- Nutrition During Pregnancy, 2020
- Preeclampsia and High Blood Pressure During Pregnancy, 2021
- Preterm Labor and Birth, 2021
- Routine Tests in Pregnancy, 2021
- Special Tests for Monitoring Fetal Well-Being, 2019

IMPLEMENTATION

Special Considerations: Patients at high risk should be rechecked for sexually transmitted infections (human immunodeficiency virus, syphilis, gonorrhea, and chlamydia) toward the end of pregnancy.

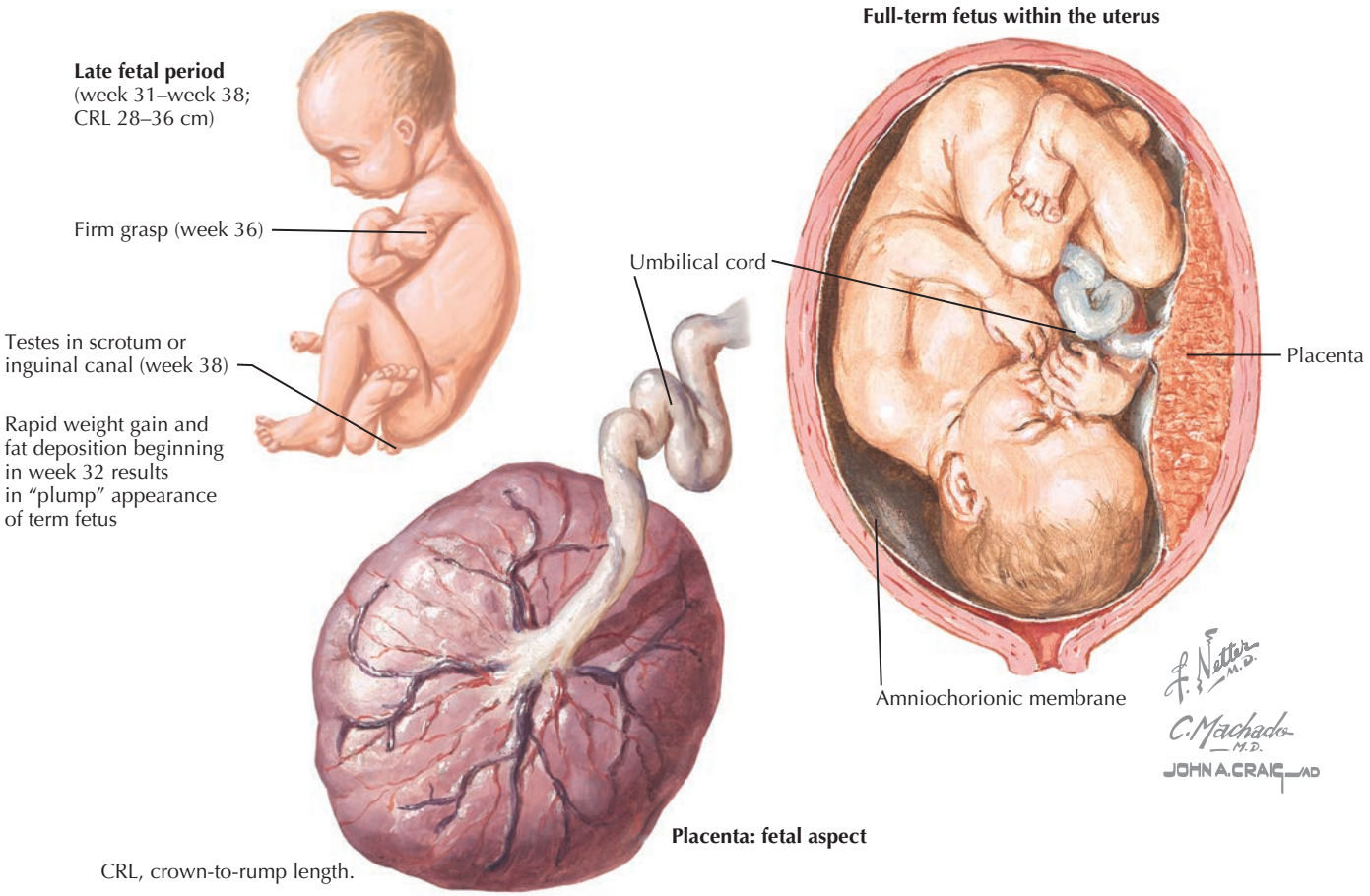

Figure 209.1 Developmental events of the third trimester

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210 ANTEPARTUM FETAL TESTING

THE CHALLENGE

The challenge is to reduce the risk for fetal demise in women at a high risk through the use of noninvasive tests that have acceptably low false-positive and false-negative results.

Scope of the Problem: There are approximately 5.7 fetal deaths at more than 20 weeks of gestation per 1000 live births in the United States (2019; 25/1000 births in 1942).

Objectives of Management: To identify those fetuses who are at a high risk and those whose status is deteriorating or nonreassuring so that intervention can be initiated to prevent mortality. Ultimately, the reduction of fetal morbidity and the improvement of neurologic outcome would also be ideal, but objective studies to support the effectiveness of antepartum fetal testing are lacking.

TACTICS

Relevant Pathophysiology: The nonstress test (NST) and contraction stress test (CST) are based on the premise that when fetal oxygenation is only marginally adequate, the fetus will not possess the normal ability to modulate heart rate in response to fetal movement or to tolerate the stress of placental ischemia induced by uterine contractions. A normal (reactive) NST has two or more accelerations (15 beats/min for 15 seconds) in a 20-minute period. Acoustic stimulation also may be used to startle the fetus and induce a heart rate increase. In the CST the occurrence of late decelerations occurring with 50% or more contractions (regardless of frequency) is "positive" and suggests fetal risk. The biophysical profile (BPP) is based on the NST, augmented by measures of fetal breathing movements, fetal activity and tone, and quantitation of amniotic fluid volume, rated on a 10-point scale (normal: 8–10/10, equivocal: 6/10, abnormal: ≤5/10). The pulsatile character of fetal blood flow in the umbilical cord or the middle cerebral artery may be used to assess the health of high-risk pregnancies, but these tests require special expertise to both perform and interpret.

Strategies: The most commonly used antepartum fetal tests are the NST, CST, BPP, and movement assessment (kick count and others). These may be used individually, in sequence, or in any combination as the individual case demands. Each has advantages and disadvantages; no single test can be said to be definitive. Some possible indications for the use of antenatal fetal testing are shown in Figure 210.1.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Fetal Heart Rate Monitoring During Labor, 2018
- Special Tests for Monitoring Fetal Health, 2019

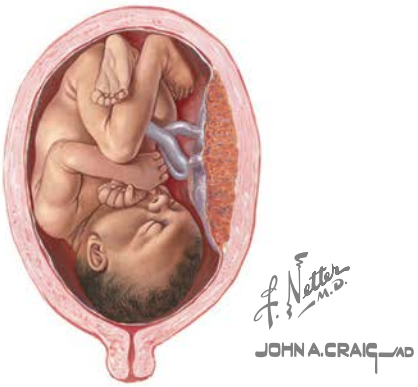
IMPLEMENTATION

Special Considerations: The NST is more easily performed than the CST, but it has the highest false-positive rate (up to 90% of positive tests) and the highest risk of a false-negative test result (1.4/1000). The CST requires the induction of contractions by IV oxytocin or nipple stimulation. There must be 3 or more contractions in a 10-minute test period and no late decelerations. The CST has a lower false-positive rate (50%) and a lower risk of a false-negative result (0.4 of 1000). The BPP has the lowest false-positive and false-negative rates (0–0.6 of 1000) but is the most expensive and requires the most expertise and equipment. All testing must be viewed in the context of the clinical picture. The choice of timing and test must be made on clinical grounds, degree of risk, and the availability and expertise of those who will perform and interpret the test. Normal test results generally warrant further testing in a few days to a week. Positive or nonreassuring test results suggest the need for a more invasive test (eg, NST to CST, CST to BPP) or more direct intervention in the course of the pregnancy (delivery). Despite the extent of the study that has accompanied these technologies, all studies must always be interpreted in light of all available clinical factors.

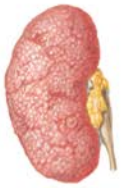
Noninvasive testing used to identify ''high-risk'' fetus and to elicit signs of deteriorating status to allow intervention and prevent mortality

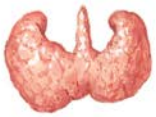
Testing based on premise that marginal fetal oxygenation limits fetal ability to modulate fetal heart rate in response to fetal movement or to placental ischemia as a result of uterine contraction. Fetal heart rate should show acceleration to movement or contraction

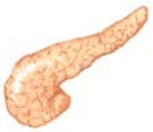
Nonstress Test (NST)
Contraction Stress Test (CST)
Biophysical Profile (BPP)



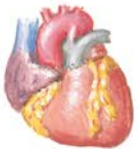
Some Conditions That Suggest Need for Antepartum Testing


Chronic renal disease

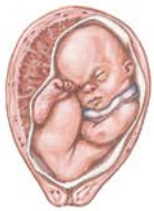

Hyperthyroidism


Diabetes mellitus

Maternal hypertension


Maternal cyanotic heart disease

Intrauterine growth restriction


Reduced fetal movement

Management Flowchart for Antepartum Fetal Testing

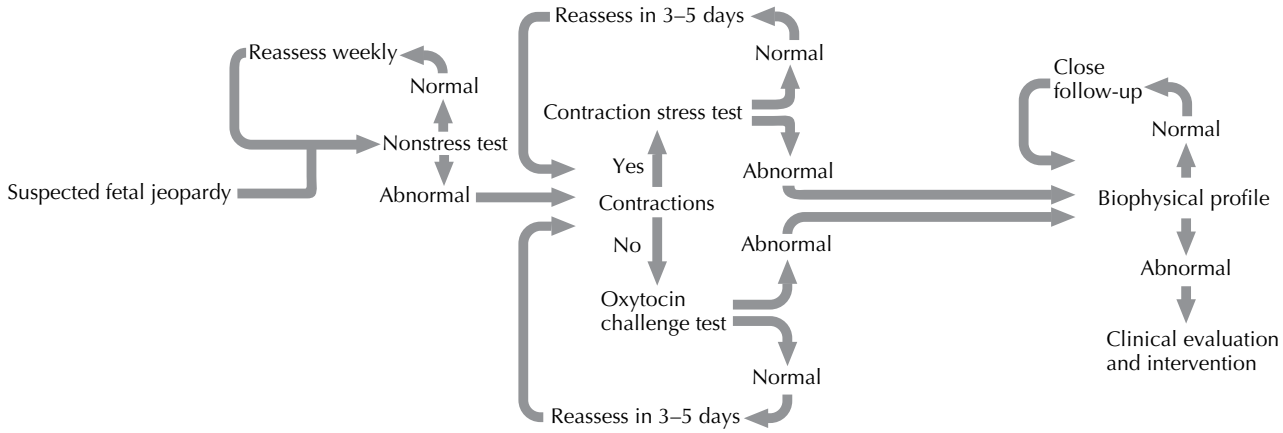


Figure 210.1 Antepartum fetal testing

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211 BIOPHYSICAL PROFILE

THE CHALLENGE

The biophysical profile (BPP) is one of several tests used to evaluate fetal health and reserve. Of the tests used for fetal assessment, the BPP is the most technologically intensive and most expensive, but it carries the lowest false-positive and false-negative rates (0.6–1/1000).

Scope of the Problem: Of pregnancies, 3%–12% are at risk because of gestations that extend beyond term and more may be compromised by maternal disease states that affect fetal health or placental function (eg, hypertension, diabetes), resulting in abnormalities of fetal growth and amniotic fluid volume and other problems.

Objectives of Test: To assess fetal health and reserve.

TACTICS

Relevant Pathophysiology: The BPP is based on the fetal heart rate response to activity (as in the nonstress test) but also adds the assessment of fetal tone, activity, and breathing as evaluated by ultrasonography. These parameters of activity often reflect the impact of acute and subacute stress. The volume of amniotic fluid (also measured by ultrasonography) can be indicative of fetal risk as reductions are often associated with either maternal or fetal compromise (most often reduced fetal urine output in the face of chronic stress).

Strategies: The BPP is made up of five assessments of fetal well-being: the volume of amniotic fluid present, the frequency of fetal breathing movements, fetal tone, gross body movements, and the results of a nonstress test. Each parameter is scored as present or absent (0 or 2 scale), and then scores are totaled (Table 211.1). A score of 8 or 10 is considered normal, and the risk for fetal death within 1 week is low (0.4–0.6/1000 births); 6 is equivocal and suggests further evaluation; and a score of 4 or less is abnormal and augurs for immediate intervention. A score of 0 is invariably associated with significant fetal acidemia.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Special Tests for Monitoring Fetal Health, 2019

IMPLEMENTATION

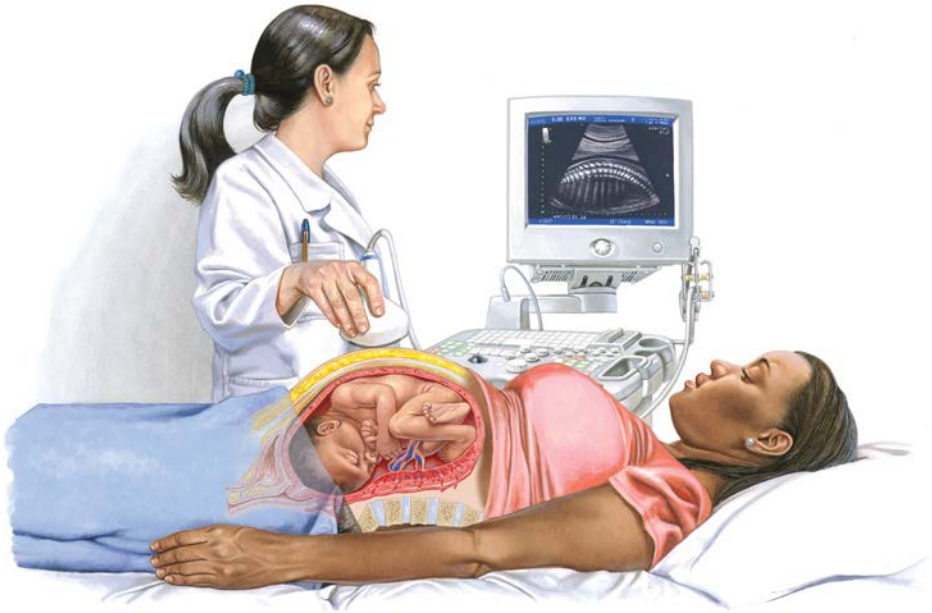
Special Considerations: Approximately 97% of BPPs will be normal. The false-normal rate of BPPs is approximately 1/1000 tests. False-positive test results occur in 1.5% of patients. The use of antenatal steroids can alter fetal heart and physical activity for up to 4 days following administration, resulting in lower scores.

Despite the extent of study that has accompanied the BPP, these studies must always be interpreted in light of all available clinical factors.

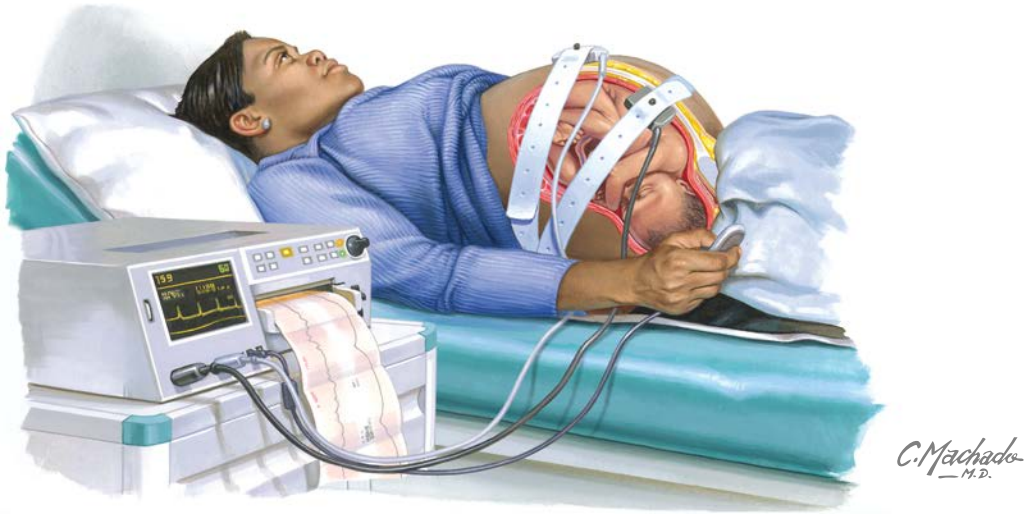
Table 211.1 Biophysical Profile Score

PROFILE PARAMETER	NORMAL (=2 POINTS)	ABNORMAL (=0 POINTS)
Amniotic fluid volume	At least 1 pocket of 1 cm in 2 perpendicular planes	No fluid or no pockets >1 cm
Fetal breathing movements (FBM)	≥1 FBM of 30-sec duration in 30 min	No FBM of 30-sec duration in 30 min
Fetal tone	≥1 episode of active extension and return or hand opening and closing	No or slow extension, poor return or no activity
Gross body movements	≥3 body or limb movements in 30 min	≤2 body or limb movements in 30 min
Reactive fetal heart rate	Reactive nonstress test	Nonreactive nonstress test

The biophysical profile score is established by summing the values obtained on each of the five-component tests.



An ultrasound is used for four of the five factors in the biophysical profile (fetal breathing, movement, tone, and fluid volume).



The fifth factor in a biophysical profile is the heart rate response to activity, which is measured by a nonstress test.

Figure 211.1 Biophysical profile

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212 CONTRACTION STRESS TESTING

THE CHALLENGE

Fetal health may be assessed using the contraction stress test (also called "oxytocin challenge test"). This test is somewhat analogous to an exercise stress test for the evaluation of adult cardiac function as problems or weaknesses that are normally compensated for at rest may become apparent with stress. In the contraction stress test the fetal–placental–maternal unit is stressed through uterine contractions. The resulting periodic deprivation of uterine blood flow can be used to evaluate the robustness of the fetal–placental condition.

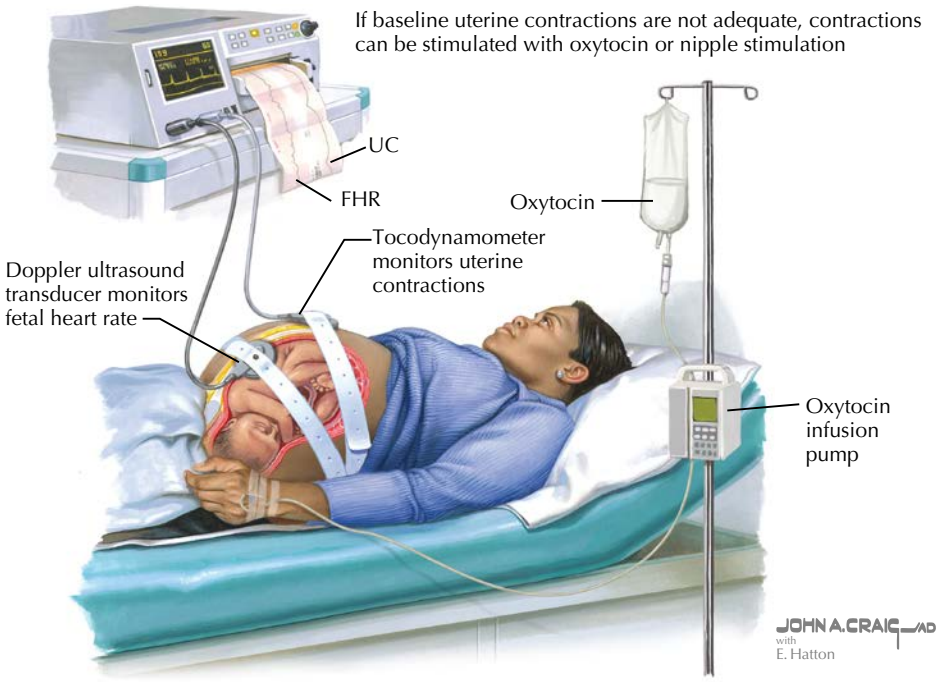
Scope of the Problem: Of pregnancies, 3%–12% are at risk because of gestations that extend beyond term. More pregnancies may be compromised by maternal disease states that affect fetal health or placental function (eg, hypertension, diabetes), resulting in abnormalities of fetal growth and amniotic fluid volume and other problems.

Objectives of the Test: To assess fetal health and reserve.

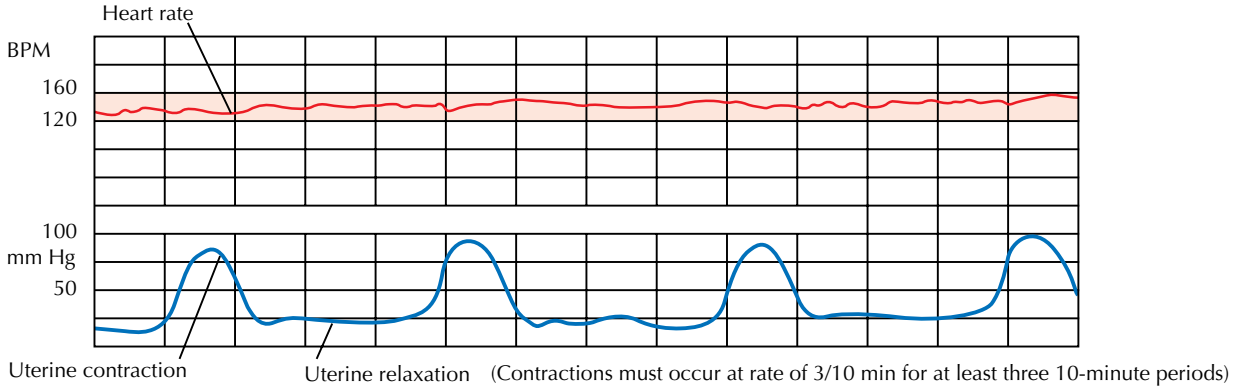
TACTICS

Relevant Pathophysiology: During uterine contractions, uterine intramural pressure exceeds perfusion pressure, resulting in transient ischemia and loss of blood delivery to the intervillous spaces. When the fetus and placenta are healthy, this loss of blood flow causes no change in fetal tissue oxygenation, and there is no compensatory or reactive change in fetal heart rate. When the fetal–placental or placental–maternal relationships have been degraded, this brief loss of perfusion may be sufficient to cause a reduction in heart rate in the same way as that seen in labor when late decelerations are found.

Strategies: If uterine contractions spontaneously occur, the contraction stress test may directly proceed. To perform the oxytocin challenge test, there must be no contraindications to the use of oxytocin. Fetal heart rate and uterine activity monitoring are established, and contractions are induced using oxytocin



Patient placed in Fowler position (30°–45°) with uterus displaced to left to avoid vena caval compression



Portion of a "normal" (negative) contraction stress test exhibiting absence of heart rate decelerations following uterine contractions

BPM, beats per minute; FHR, fetal heart rate; UC, uterine contractions.

Figure 212.1 Contraction stress testing

or through intermittent nipple stimulation. Contractions must occur at a rate of three per 10 minutes for at least three 10-minute periods. A normal stress test should show normal fetal heart rate variability and the absence of periodic decelerations. Accelerations with fetal activity are reassuring.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Fetal Heart Rate Monitoring During Labor, 2018
- Special Tests for Monitoring Fetal Health, 2019

IMPLEMENTATION

Special Considerations: If contractions spontaneously occur at a rate of at least three every 10 minutes, the term "contraction stress test" is generally used, whereas the term "oxytocin challenge test" is used when contractions must be induced through oxytocin administration. Like most tests of fetal status, the contraction stress test has a moderate false-positive rate. Consequently, the interpretation of a positive test result must be made from the perspective of other information about the mother and fetus, including the results of other tests such as the nonstress test or biophysical profile.

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DOPPLER FLOW STUDIES

213

THE CHALLENGE

Doppler flow studies (also known as Doppler velocimetry) constitute a group of tests used to evaluate fetal health and reserve by assessing blood flow characteristics in the umbilical cord, middle cerebral artery, or other vascular structures. Of the tests used for fetal assessment, Doppler flow studies are technologically intensive, expensive, and require special expertise to perform and interpret.

Scope of the Problem: Of pregnancies, 3%–12% are at a risk because of gestations that extend beyond term and more may be compromised by maternal disease states that affect fetal health or placental function (eg, hypertension, diabetes), resulting in abnormalities of fetal growth or amniotic fluid volume and other problems.

Objectives of Test: To assess fetal health and reserve.

TACTICS

Relevant Pathophysiology: The Doppler principle states that when energy is reflected from a moving boundary, the frequency of the reflected energy varies with respect to the velocity of the moving boundary. In clinical practice, this principle is used to determine the velocity of blood flow in vessels because the frequency of sound reflected from moving blood cells is slightly altered in proportion to the velocity of the blood flow (and the cosine of the angle of incidence).

- During the cardiac cycle, blood flow within the fetal circulation is pulsatile, with the difference in flow during systole and diastole gradually declining with gestational age and other factors. In the umbilical artery, this systolic-to-diastolic (S/D) ratio decreases from approximately 4 at 20 weeks to less than 3 at 30 weeks and finally to around 2 near term. Much of this change is mediated by the health and function of the placenta, and when this is compromised, diastolic flow diminishes. In extreme cases of fetal–placental compromise, diastolic flow may be absent or even show reversal of flow direction. Absent end-diastolic flow is associated with significant fetal compromise. Babies with abnormal umbilical artery Doppler blood flow results have a significantly higher rate of cesarean delivery for fetal distress, longer stays in the neonatal intensive care unit, and increased neonatal morbidity regardless of whether they were of normal size or growth restricted.
- When there is fetal anemia, the associated increased cardiac output and relatively lower blood viscosity result in increased blood flow in the middle cerebral artery. This flow can be measured and used to evaluate fetuses with alloimmunization. Fetuses with blood flow greater than 1.5 times the median (multiples of median [MoM]) are correctly identified with anemia with only a 12% false-positive rate. Increased middle cerebral artery blood flow has also been proposed as a marker for altered blood flow before other indicators of hypoxemia may be present.

- Uterine artery blood flow increases from approximately 50 mL/min in early gestation to 500–750 mL/min by term. Doppler flow studies of the uterine artery have been used in an effort to predict the development of preeclampsia and other complications. Unfortunately, uterine artery Doppler flow velocity appears to have limited diagnostic accuracy in predicting preeclampsia, intrauterine growth restriction (IUGR), and perinatal death.

Strategies: Doppler flow studies may be used to assess blood flow in the umbilical blood vein and arteries, fetal brain, and fetal heart. A Doppler flow study is often used when a fetus has IUGR or abnormalities of amniotic fluid volume.

- Blood flow in the fetal ductus arteriosus can be assessed when the fetus has been exposed to nonsteroidal antiinflammatory drugs.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Special Tests for Monitoring Fetal Health, 2019

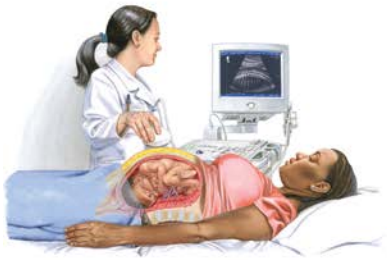
IMPLEMENTATION

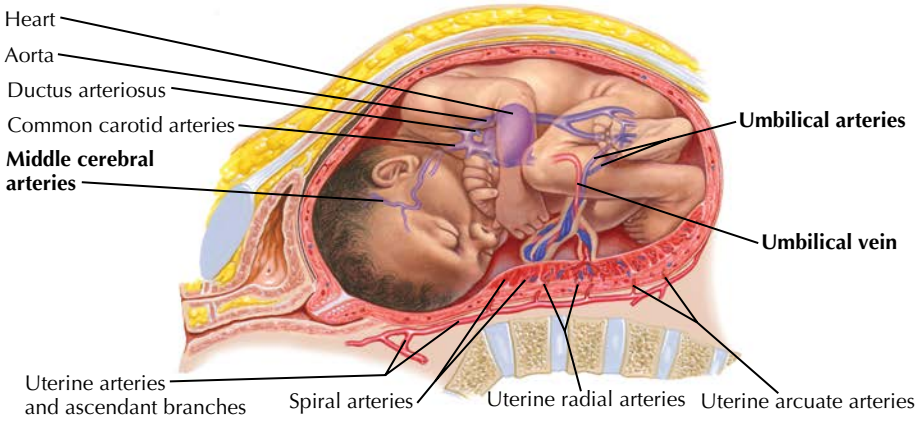
Special Considerations: Despite its usefulness in evaluating the fetus at risk, intrapartum umbilical artery Doppler velocimetry is a poor predictor of adverse perinatal outcomes.

Studies suggest that even such factors as a cholesterol-lowering diet can influence umbilical artery blood-flow patterns.

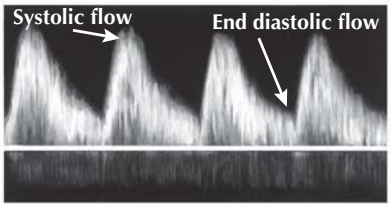
Notwithstanding the extent of study that has accompanied these technologies, Doppler flow studies must always be interpreted in light of all available clinical factors.

Doppler flow studies constitute a group of tests used to evaluate fetal health and reserve through the assessment of blood flow characteristics in fetal and uterine vessels and fetal heart. Routinely, though, only the study of umbilical and cerebral blood vessels is of major relevance.



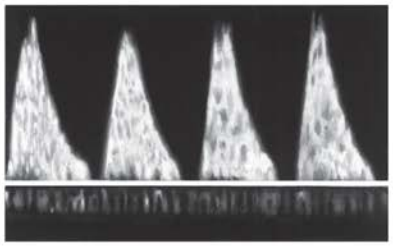


Current applications of Doppler flow studies are generally limited to cases of fetal intrauterine growth restriction (IUGR). Babies with abnormal umbilical artery Doppler blood flow results have a significantly higher rate of cesarean section delivery for fetal distress, longer stays in the neonatal intensive care unit, and increased neonatal morbidity regardless of whether they were of normal size or growth restricted.

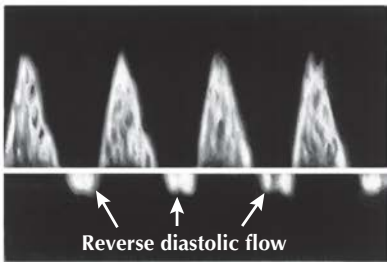


Normal blood flow in umbilical arteries.

C. Machado M.D.



Absent end diastolic flow in umbilical arteries is associated with significant fetal compromise.



Presence of reverse diastolic flow in umbilical arteries indicates extreme case of fetal-placental compromise.

Figure 213.1 Doppler flow studies (Doppler velocimetry)

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NONSTRESS TESTING

214

THE CHALLENGE

Fetal health may be assessed using the nonstress test (NST). This test is the simplest of the antenatal tests to perform and often represents the first line in managing an at-risk pregnancy.

Scope of the Problem: Of pregnancies, 3%–12% are at a risk because of gestations that extend beyond term. More pregnancies may be compromised by maternal disease states that affect fetal health or placental function (eg, hypertension, diabetes), resulting in abnormalities of fetal growth or amniotic fluid volume and other problems.

Objectives of the Test: To assess fetal health and reserve.

TACTICS

Relevant Pathophysiology: The NST is based on the premise that when fetal oxygenation is only marginally adequate, the fetus will not possess the normal ability to alter heart rate in response to fetal movement. A normal (reactive) NST has two or more accelerations in fetal heart rate that peak at 15 beats/min (although not necessarily remaining at that level), lasting for 15 seconds in a 20-minute period. Loss of reactivity is most often associated with fetal sleep but may result from any cause of central nervous system depression, including fetal acidosis. It may be necessary to continue the tracing for 40 minutes or longer to consider the fetal sleep–wake cycle. Acoustic stimulation also may be used to startle the fetus and induce a heart rate increase.

Strategies: The NST is considered reactive (normal) if there are two or more fetal heart rate accelerations (as defined previously) within a 20-minute period, with or without fetal movement felt by the mother. Accelerations with fetal activity are reassuring. A nonreactive NST is one that does not meet these criteria (lacks sufficient fetal heart rate accelerations) over a 40-minute period. A reactive NST is a good predictor of adequate fetal oxygenation, and most reactive fetuses do well for at least another week.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Fetal Heart Rate Monitoring During Labor, 2018
- Special Tests for Monitoring Fetal Health, 2019

IMPLEMENTATION

Special Considerations: To increase the reliability of the NST, the patient should not have recently smoked. The NST is more easily performed than the contraction stress test, but it has the highest false-positive rate (up to 90% of positive tests) and the highest risk for a false-negative test result (1.4/1000). The NST of the healthy preterm fetus is frequently nonreactive: from 24–28 weeks of gestation (up to 50% of NSTs may not be reactive) and from 28–32 weeks gestation, 15% of NSTs are not reactive. Variable decelerations may be observed in up to 50% of NSTs. If sporadic and brief (<30 seconds), they are inconsequential and do not indicate fetal compromise or the need for intervention. Repetitive variable decelerations (at least three in 20 minutes), even if mild, have been associated with an increased risk of cesarean delivery for fetal indications. Because of these factors, the interpretation of a nonreactive test must be made in the perspective of other information about the mother and fetus, including the results of other tests such as the contraction stress test or biophysical profile.

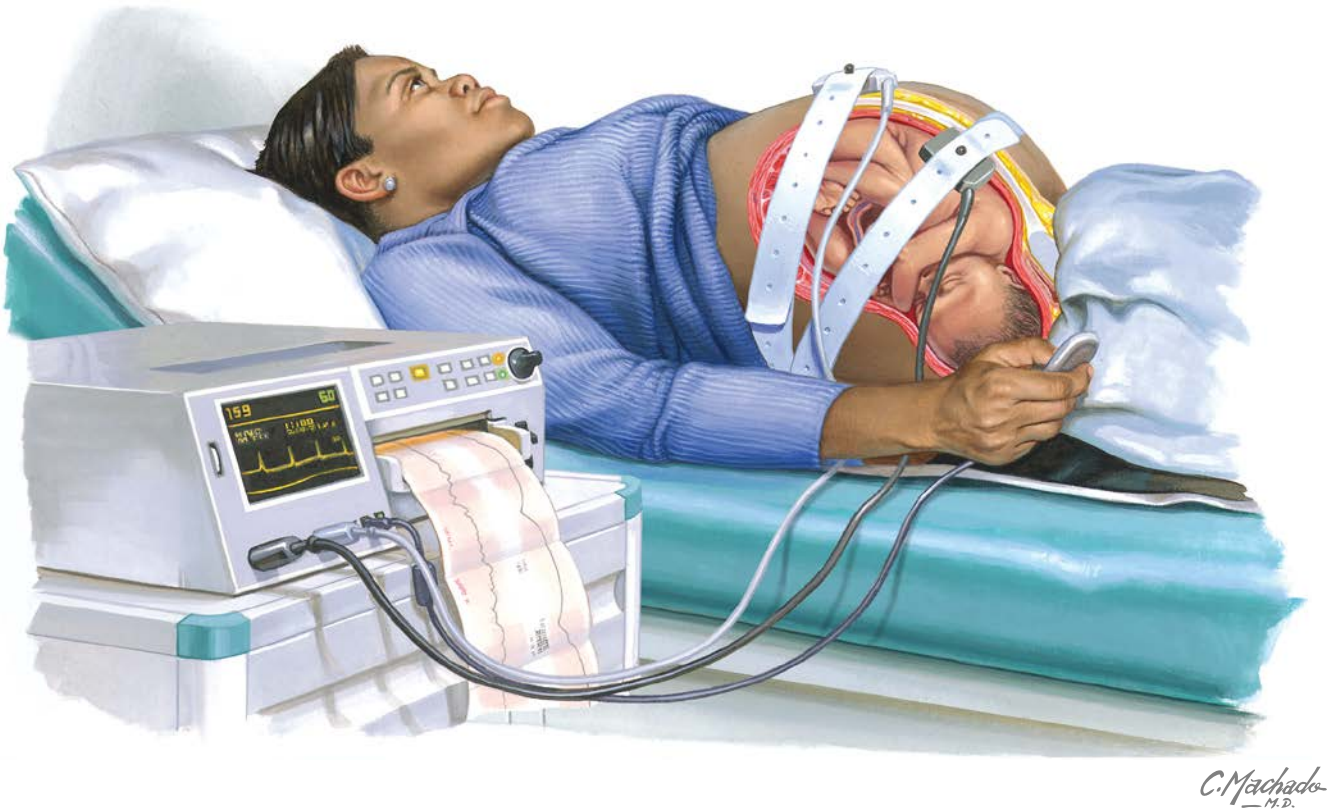

Figure 214.1 Nonstress testing

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NORMAL LABOR

215

THE CHALLENGE

Description: Labor is the rhythmic contraction of the uterus that leads to progressive cervical effacement and dilatation. When effective, this leads to descent and eventual expulsion of the fetus. Labor may or may not culminate in the delivery of the fetus. It is generally divided into three stages: first stage—from the onset of labor to complete cervical dilation, although the exact time of onset is almost impossible to establish; second stage—from complete cervical dilation to the delivery of the fetus; and third stage—from fetal delivery to expulsion of the placenta. Some add a fourth stage, recovery, which spans the time from delivery to 1 hour after. The first stage of labor is often subdivided into a latent phase (to cervical dilation of 3–4 cm) and an active phase (from 4 cm to complete), although these remain inconsistently defined and difficult to pinpoint. Labor is anticipated to follow a predictable sequence and time course. However, factors such as active labor management and pain control have raised concern about using traditional standards.

Scope of the Problem: Unless cesarean delivery is performed in advance, all pregnant women eventually go into labor.

Objectives of Management: To safely monitor and manage the processes of labor to ensure the health and safety of the mother and baby.

TACTICS

Relevant Pathophysiology: The physiologic changes that lead to the initiation of labor are many, complex, deeply interconnected, and incompletely delineated. The mean duration of human singleton pregnancy is 280 days (40 weeks) from the first day of the last menstrual period, although "term" is defined as between 259 and 293 days. It is clear that the complex interaction of maternal signaling molecules (progestins and estrogens, prostaglandins, oxytocin, relaxin, nitrous oxide, and others), fetal molecules (cortisol, estrogen, and others), and uterine distention reduce contractile inhibition and induce an increase in uterine oxytocin and prostaglandin receptors, ion channels, and cellular gap junctions. The latter appear necessary to effect coordinated contractions that create a pressure gradient from the top of the uterus toward the cervix. Intrinsic slow and fast waves of myometrial cell depolarization become more and more effective in producing local, and then regional, muscle depolarization and contraction (mediated through ATP-dependent binding of myosin to actin). Increasing pressure on the cervix causes stretch, neural signaling, and the local release of prostaglandins (predominantly PGF_{2a}), reinforcing uterine contraction and oxytocin sensitivity in an ever-increasing positive feedback loop, eventually leading to the rhythmic contractions of labor. Despite the importance of this positive feedback loop, most researchers view the onset of labor as the loss of inhibition rather than an active process.

For most viviparous animals, the fetus and placenta appear to control the timing of labor onset. In humans, this is considered to occur because of the changes in the hypothalamic–pituitary–adrenal axis, increasing fetal cortisol and inducing placental enzymatic functions that downregulate inhibitory factors, such as progesterone. (Progesterone inhibits uterine contractions early in pregnancy, but progesterone withdrawal is not a prerequisite for labor in humans and progesterone levels are not markedly different before or during labor.) Placental estrogens upregulate myometrial gap junctions and uterotonic receptors (L-type calcium channels and oxytocin receptors), while the placental and cervical production of prostaglandins increase, furthering inducing their receptors and facilitating cervical ripening (PGE_2) and contractions (PGF_{2a}). The pivotal role these molecules play can be seen by the delay caused by the use of prostaglandin synthesis inhibitors such as nonsteroidal antiinflammatory drugs (NSAIDs).

Oxytocin is the most potent endogenous uterotonic peptide and is clinically important in the management of labor. However, oxytocin levels do not significantly differ in labor from those found in the weeks before labor begins (although fetal production does seem to increase). This reinforces the importance of the increase in number of oxytocin receptors in the myometrium (up to 200-fold) at term. In addition to oxytocin's myometrial effects, it also indirectly acts by enhancing amniotic and decidual prostaglandin synthesis.

Successful delivery of the infant depends on the interaction of three variables: power (uterine contractions), passenger (fetus), and passage (both bony pelvis and pelvic soft tissues). The fetus typically undergoes a series of movements (the cardinal movements of labor), which allow it to traverse the convoluted birth passage. Abnormalities in any of the three variables may result in a failure of the fetus to progress, necessitating either operative vaginal delivery (forceps or vacuum assist) or cesarean delivery.

The strength or power of labor may be quantified through the calculation of "Montevideo units" (MVUs), which are a surrogate for uterine work (area under the pressure curve minus the baseline or resting pressure). Montevideo units are calculated by summing the peak pressure achieved above (minus) the baseline for all contractions in a 10-minute period. This requires that the rupture of the fetal membranes and placement of a pressure measurement catheter has occurred to obtain true pressure data. Labors with sustained MVUs of 200–250 are considered "adequate" and are generally associated with successful delivery. Uterine activity does vary based on the labor stage; approximately 100 MVUs in latent labor, 175 MVUs in active labor, and 250 MVUs during the second stage.

Strategies: For most women the onset and progress of labor are natural, automatic, and productive. Generally, the process of labor will result in a change of cervical dilation of about 1 cm/hr from 5–9 cm of dilation. This rate of change can be affected by parity, the use of analgesics, active management of contractions, fetal size, maternal height or weight, and other factors. The median time to dilate from 4–10 cm in nulliparas and multiparas is 5.3 hours and 3.8 hours, respectively. Traditionally, the rupture of the fetal membranes was considered to hasten the progress of labor, but studies have failed to support this. The median duration of the second stage of labor is 1.1 hours for nulliparas and 0.4 hours for multiparas, with 95% of women delivering by 3.5 and 2 hours, respectively. Meta-analysis suggests that strict dependence on these times is not supported and that clinical decisions must be made using all available information, not simply progress over time.

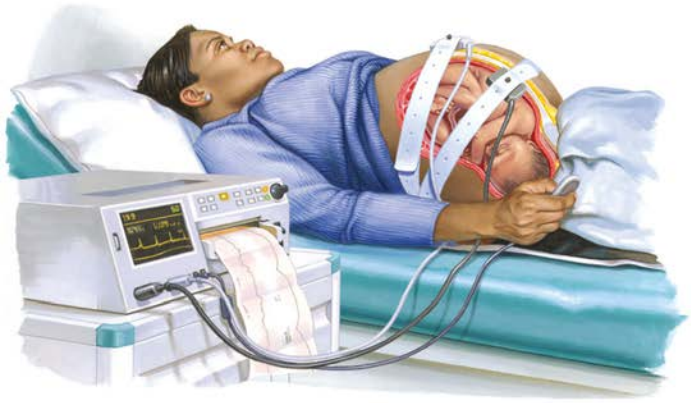
Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Assisted Vaginal Delivery, 2021
- Cesarean Birth, 2020
- Fetal Heart Rate Monitoring During Labor, 2018
- Having a Baby—Especially for Teens, 2018
- How to Tell When Labor Begins, 2020
- If Your Baby Is Breech, 2019
- Labor Induction, 2021
- Medications for Pain Relief During Labor and Delivery, 2017
- Preterm Labor and Birth, 2021
- Vaginal Birth After Cesarean Delivery, 2017
- When Pregnancy Goes Past Your Due Date, 2017

IMPLEMENTATION

Special Considerations: Protraction of labor and arrest of progress disorders are common. Depending on the population studied and the definitions used, these may occur in as many as 20% of successful labors (up to 35% in some samples). Active use of oxytocin is associated with shortening the time to delivery but is not associated with a meaningful change in the cesarean delivery rate. The use of epidural anesthesia is associated with a slight increase in labor duration and the likelihood of operative delivery but not an increased rate of cesarean delivery.

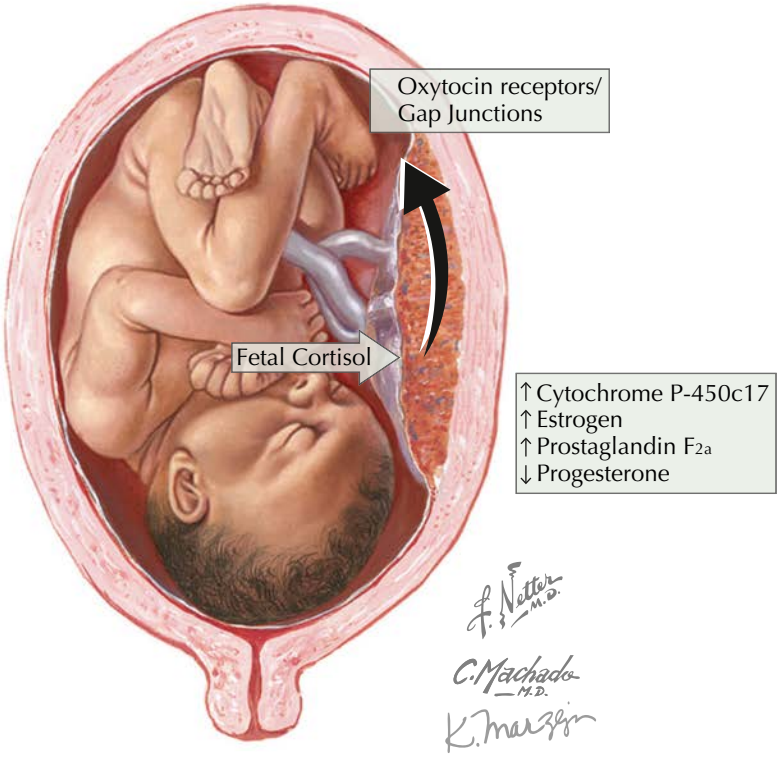


Stages of Labor

First Stage—onset to complete cervical dilation

Second Stage—complete cervical dilation to delivery

Third Stage—from delivery to expulsion of the placenta



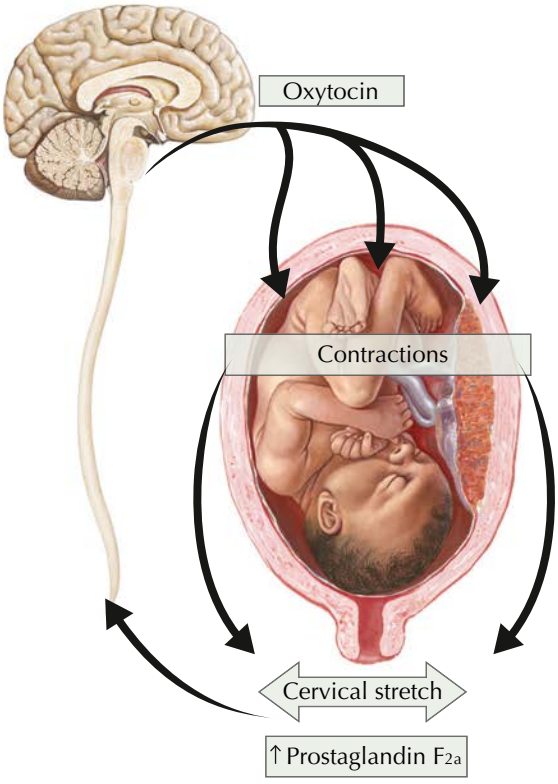


Figure 215.1 The onset and stages of labor

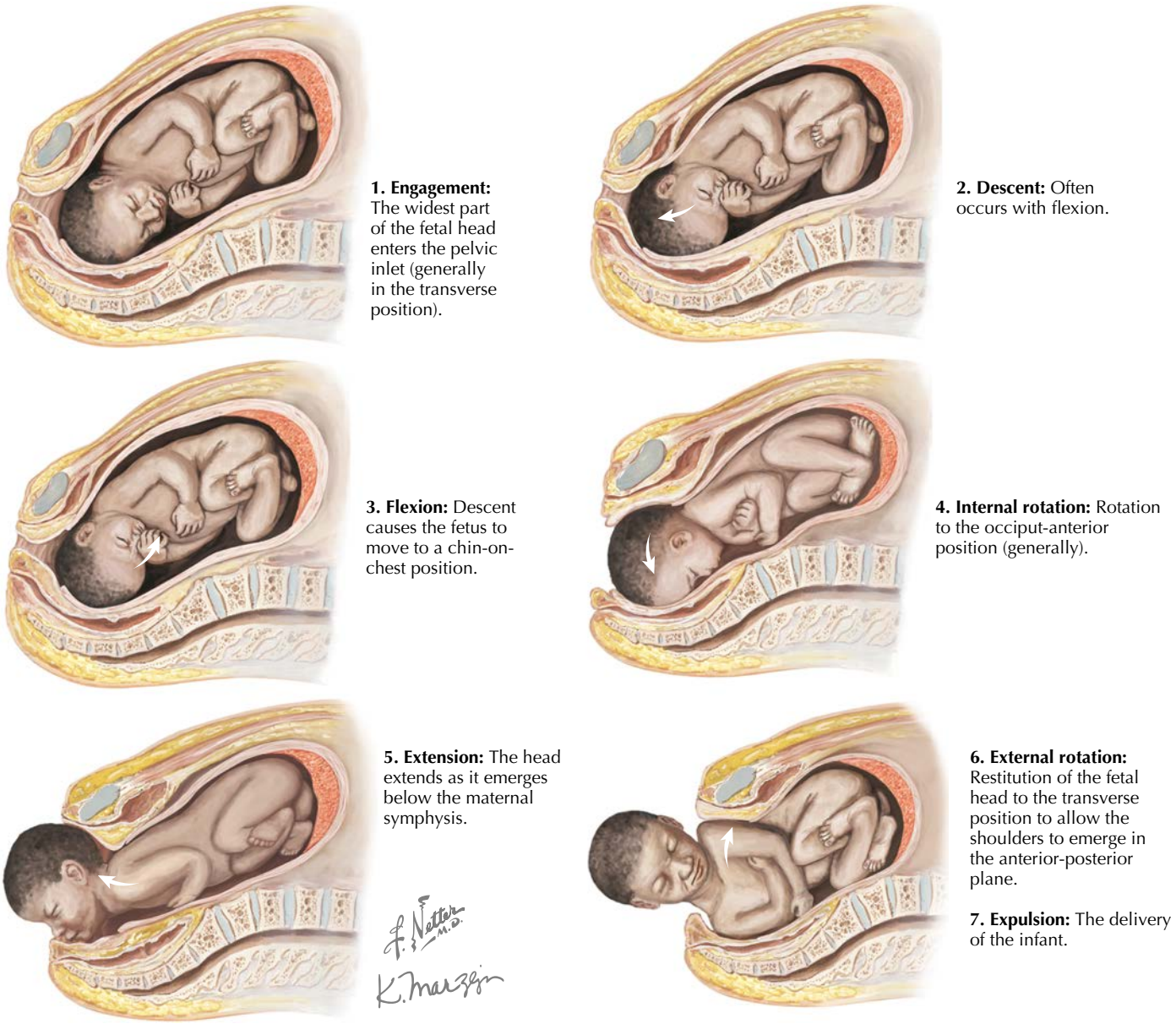


Figure 215.2 Seven* cardinal fetal movements of delivery. *Some authors combine descent and flexion into a single step, yielding six cardinal movements.

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216 FETAL HEART RATE TESTING: BRADYCARDIA

INTRODUCTION

Description: Bradycardia is a decrease in the baseline heart rate, generally below 120 beats/min. Moderate bradycardia is generally defined as 80–100 beats/min, and severe bradycardia as less than 80 beats/min, for more than 3 minutes.
Prevalence: Mild fetal bradycardia is observed during approximately 2% of labors.
Predominant Age: Reproductive age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Depressed fetal oxygenation (placental dysfunction, abruption), fetal acidosis. Effects of maternal condition (hypotension, medication, position, significant hypothermia), congenital fetal heart block, paracervical block, head compression (during final descent of the fetus, especially in the occiput posterior position).
Risk Factors: Fetal hypoxia, reduced placental perfusion (maternal or fetal side), maternal sedation, fetal occiput posterior position.

SIGNS AND SYMPTOMS

- Baseline heart rate below 120 beats/min (110 beats/min in some countries or studies)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Capture of maternal heartbeat rather than that of the fetus
- Medication effects
- Prolonged deceleration
- Fetal anomaly (cardiac or other)
- Uterine hypertonus or tachysystole (resulting in fetal stress)
- Conduction anesthesia

Associated Conditions: Possible fetal hypoxia, depression, acidosis.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: Ultrasonography may identify abnormalities of the placenta (abruption) and plays a minor role in the evaluation of the fetus with bradycardia.
Special Tests: Fetal scalp pH or pulse oximetry (when available) may be of assistance in determining the fetal status.
Diagnostic Procedures: Clinical evaluation of mother and fetus.

Pathologic Findings

Based on underlying pathophysiologic conditions.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Maternal hydration, change in maternal position (lateral recumbent), maternal oxygen therapy (debated).
Specific Measures: Aggressive fetal and maternal evaluation, amnioinfusion, tocolytics (when hypertonus is involved), expedited delivery in the face of nonreassuring changes.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Fetal Heart Rate Monitoring During Labor, 2018
- Special Tests for Monitoring Fetal Health, 2019

Drug(s) of Choice

- Tocolytics may be used if uterine tetany is thought to play a causative role in fetal stress.

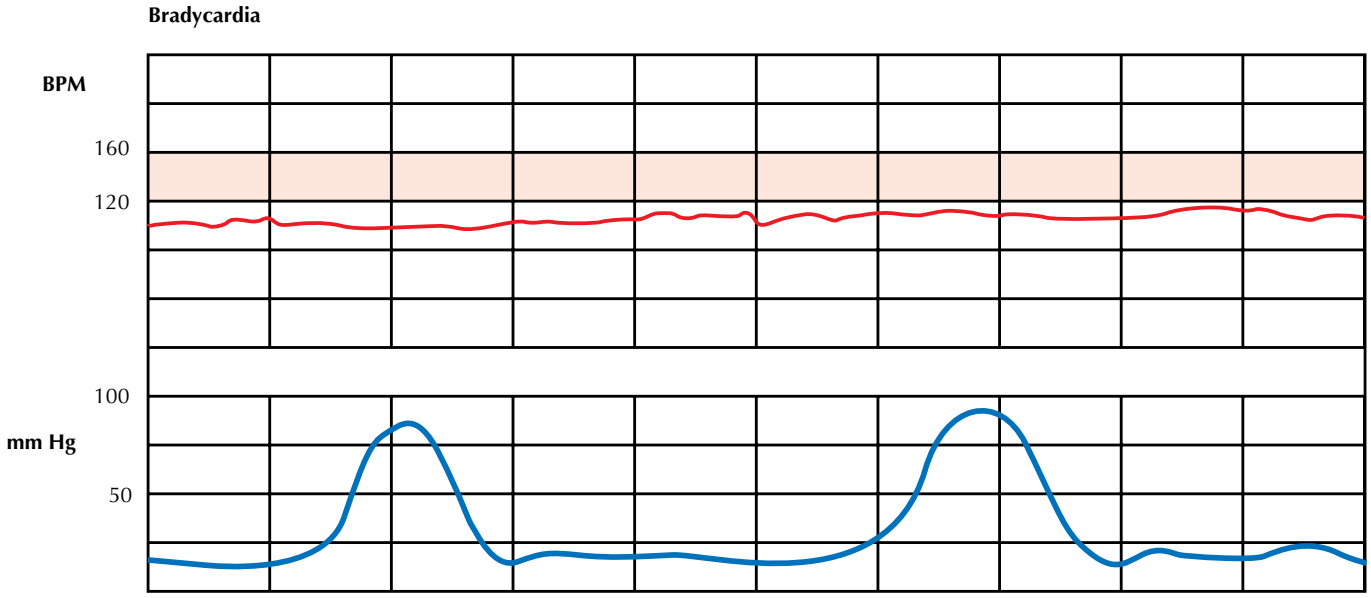
Contraindications: Tocolytics are relatively contraindicated in the absence of a diagnosis.

FOLLOW-UP

Patient Monitoring: Continued maternal and fetal assessment.
Prevention/Avoidance: Adequate maternal hydration, left lateral recumbent position for labor.
Possible Complications: Progressive deterioration of fetal status unless underlying processes are identified and corrected.
Expected Outcome: With aggressive diagnosis and management, outcome will generally be good.

MISCELLANEOUS

Other Notes: Intrapartum fetal heart rate monitoring is only one part of the overall evaluation of mother and fetus. This modality must be used to augment clinical judgment and not replace it.



BPM, beats per minute.
Figure 216.1 Bradycardia

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217 FETAL HEART RATE TESTING: PERIODIC CHANGES

INTRODUCTION

Description: Periodic changes in the fetal heart rate in conjunction with uterine contractions may occur. These may indicate fetal stress when they are persistent or become progressively deeper or longer lasting. Recurrent decelerations are defined as occurring with 50% or more of contractions during a 20-minute period. In the United States, decelerations in the fetal heart rate are classified by their relationship to uterine activity: early, late, and variable. The shape of the deceleration is also significant in the classification. Accelerations higher than the baseline often accompany fetal movement and are reassuring.

Prevalence: Mild and transient periodic decelerations are not uncommon during the course of normal labor. Accelerations are documented in virtually all normal labors.

Predominant Age: Reproductive age.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes

- Accelerations
  - Physiologic response to fetal activity or external stimuli (acoustic stimulation, scalp stimulation). Compensatory accelerations also occur following variable decelerations. These changes reflect an intact neurohormonal cardiovascular control system
- Early decelerations (mirror the timing, and sometime the amplitude, of the contraction wave)
  - Physiologic response to head compression; dural stimulation mediated via the vagus nerve ("diving reflex"). These changes are not associated with hypoxia, acidemia, or low Apgar scores
- Variable decelerations (variable relationship to the contraction wave)
  - Compensatory response to intermittent obstruction of umbilical blood flow
- Late decelerations (begin well after the uterine contraction wave and persist after it begin resolution)
  - Decreased fetal oxygenation with reflex bradycardia or myocardial depression. This type of deceleration suggests the greatest fetal stress despite the relatively modest change in heart rate

Risk Factors: Early—occiput posterior position, cephalopelvic disproportion. Variable—low amniotic fluid volume, cord prolapse, abnormal lie. Late—placental aging, reduced placental perfusion (maternal disease, vascular spasm, medications, partial placental separation).

SIGNS AND SYMPTOMS

- Accelerations
  - Abrupt increase in fetal heart rate that reaches a maximum within 30 seconds.
- Early decelerations
  - Shallow U-shaped, with gradual onset and resolution, generally (10–30 beats/min), that reaches a nadir at the peak of uterine activity; rarely associated with heart rates below 100–110 beats/min.
- Variable decelerations
  - Slowing with abrupt onset and return, frequently associated with accelerations before, after, or both; variable in depth and duration but coincide with the compression of the umbilical cord during contraction.
- Late decelerations
  - U-shaped, with gradual onset and resolution, generally shallow (10–30 beats/min), and reaches a nadir after the peak of uterine activity; often associated with decreased variability. Generally, not diagnosed unless present with more than 50% of contractions.

DIAGNOSTIC APPROACH

Differential Diagnosis

Early Decelerations

- Head compression (less common; generally results in a more gradual deceleration that is proportional to the strength and duration of the contraction but may reflect maternal expulsive efforts)

Variable Decelerations

- Cord compression
- Cord prolapse

Late Decelerations

- Uterine hypertonus or tachysystole
- Conduction anesthesia
- Maternal hypotension
- Placental abruption
- Medication effects

Associated Conditions: Oligohydramnios, preeclampsia, eclampsia, maternal hypertension, transient maternal hypotension, intrauterine growth restriction, placental abruption.

Workup and Evaluation

Laboratory: No evaluation indicated.

Imaging: Ultrasonography may be used to assess possible causes but has no role in establishing the fetal heart rate pattern.

Special Tests: Fetal scalp pH or pulse oximetry (when available) may be of assistance in determining the fetal status.

Diagnostic Procedures: Clinical evaluation of mother and fetus. Fetal monitoring patterns are often classified into three categories (Box 217.1), which suggest the level of clinical concern.

BOX 217.1 Classification of Fetal Heart Rate Patterns

Category I: Predictive of normal fetal acid-base balance. Seen in 15% of tracings.
Baseline rate: 110–160 beats/min
Moderate baseline FHR variability
No late or variable decelerations
Early decelerations may be present or absent
Accelerations may be present or absent

Category II: Intermediate risk. Continued close observation warranted. Seen in 85% of tracings.
Dose not meet the criteria for either category I or III

Category III: predictive of abnormal fetal acid-base status. Intervention may be required. Seen in <1% of tracings.
Either
Absent baseline FHR variability and any of the following:
Recurrent late decelerations
Recurrent variable decelerations
Bradycardia
Or
Sinusoidal pattern

Pathologic Findings

An elongated umbilical cord or an umbilical cord wrapped around the neck is frequently observed in the presence of variable decelerations. Placental findings often reflect underlying maternal or fetal disease associated with late decelerations.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Maternal hydration, change in maternal position (lateral recumbent), maternal oxygen therapy (debated).
Specific Measures: Aggressive fetal and maternal evaluation, amnioinfusion, tocolytics (when hypertonus is involved), expedited delivery in the face of nonreassuring changes.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Fetal Heart Rate Monitoring During Labor, 2018
- Special Tests for Monitoring Fetal Health, 2019

Drug(s) of Choice

- Tocolytics may be used if uterine tetany or tachysystole are considered to play a role in fetal stress.

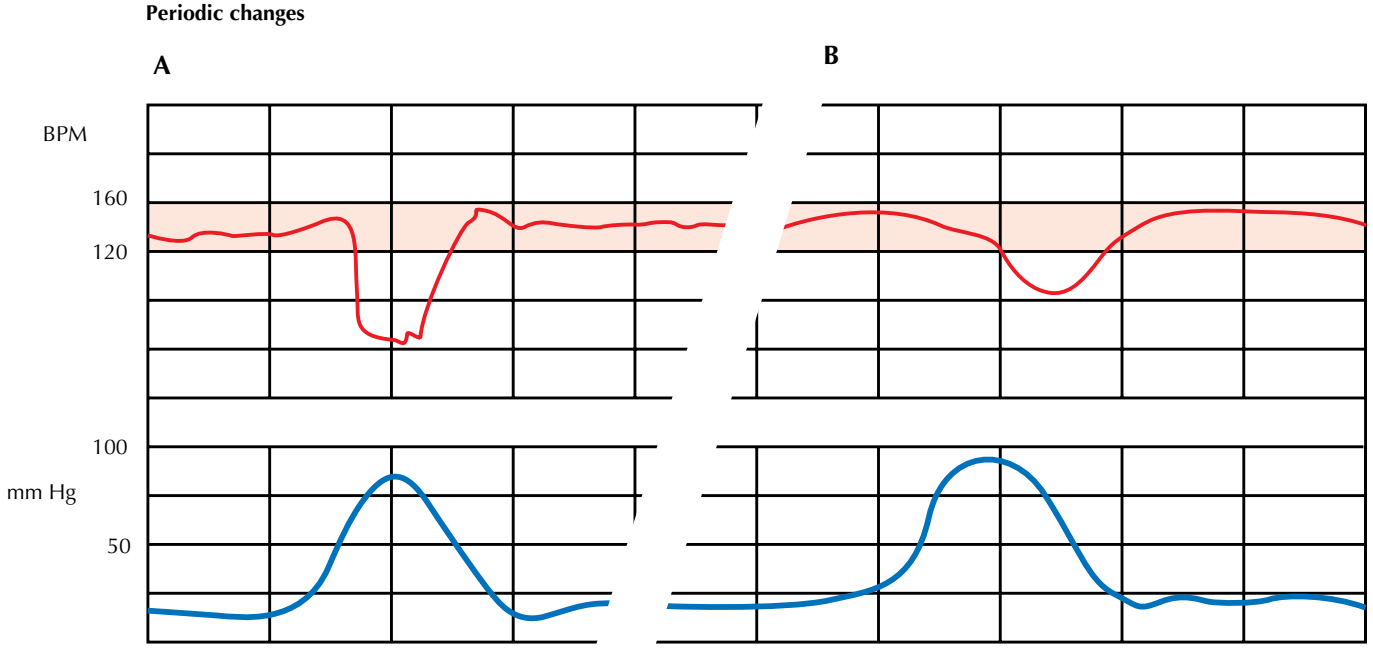
Contraindications: Tocolytics are relatively contraindicated in the absence of a diagnosis.

FOLLOW-UP

Patient Monitoring: Continued maternal and fetal assessment.
Prevention/Avoidance: Adequate maternal hydration, left lateral recumbent position for labor. Continued assessment of fetal status in postdate pregnancies.
Possible Complications: Progressive deterioration of fetal status unless underlying processes are identified and corrected.
Expected Outcome: With aggressive diagnosis and management, outcome will generally be good.

MISCELLANEOUS

Other Notes: Intrapartum fetal heart rate monitoring is only one part of the overall evaluation of mother and fetus. This modality must be used to augment clinical judgment and not replace it.



Variable decelerations (A) are generally sharp in contour, coincide with the contraction in a variable manner, and may have associated accelerations before or after. Late decelerations (B) are subtle with their nadir occurring after the peak of the contraction.

BPM, beats per minute.

Figure 217.1 Periodic changes

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218 FETAL HEART RATE TESTING: REDUCED VARIABILITY

INTRODUCTION

Description: Reduced variability is characterized by a reduction in the normal variation in heart rate from beat to beat that may signal fetal stress.
Prevalence: Reduced variability is a common finding when the fetal status is compromised. It also occurs when the fetus is sleeping.
Predominant Age: Reproductive age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Fetal hypoxia with neurologic depression (when decelerations are absent, reduced variability is unlikely to result from hypoxia); extreme prematurity; maternal sedation; fetal sleep.
Risk Factors: Prematurity, maternal sedation.

SIGNS AND SYMPTOMS

- Reduction in the variation of heart rate to below 3–5 beats/min (most commonly associated with periodic decelerations). This must be differentiated from the sinusoidal patterns of variations that have a smooth sine wave–like pattern of regular frequency and amplitude.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Uterine hypertonus or tachysystole
- Conduction anesthesia
- Maternal hypotension
- Placental abruption
- Medication effects (magnesium sulfate, sedatives)

Associated Conditions: Prematurity, fetal stress.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: Ultrasonography may be used to assess possible causes but has no role in establishing the fetal heart rate pattern.
Special Tests: Fetal scalp pH (when available) may be of assistance in determining the fetal status.
Diagnostic Procedures: Clinical evaluation of mother and fetus.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Maternal hydration, change in maternal position (lateral recumbent), maternal oxygen therapy (debated).
Specific Measures: Aggressive fetal and maternal evaluation, amnioinfusion, tocolytics (when hypertonus is involved), expedited delivery in the face of nonreassuring changes.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Fetal Heart Rate Monitoring During Labor, 2018
- Special Tests for Monitoring Fetal Health, 2019

Drug(s) of Choice

- Tocolytics may be used if uterine tetany or tachysystole are considered to play a role in fetal stress.

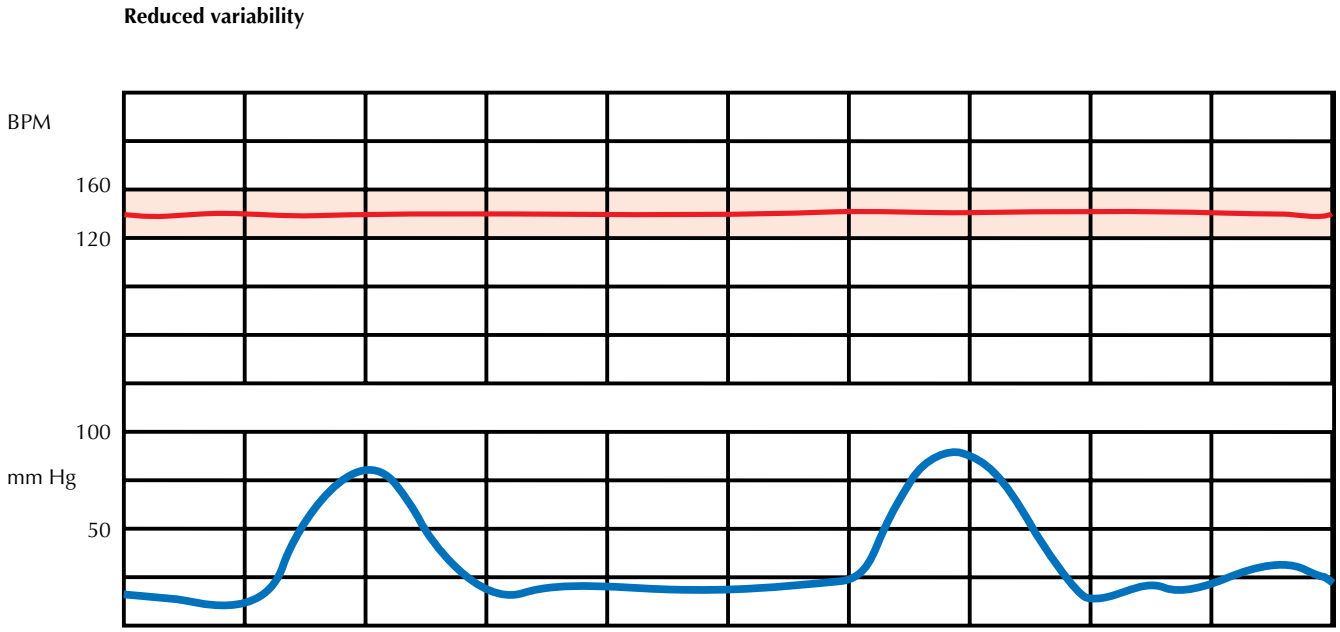
Contraindications: Tocolytics are relatively contraindicated in the absence of a diagnosis.

FOLLOW-UP

Patient Monitoring: Continued maternal and fetal assessment.
Prevention/Avoidance: Adequate maternal hydration, left lateral recumbent position for labor.
Possible Complications: Progressive deterioration of fetal status unless underlying processes are identified and corrected.
Expected Outcome: With aggressive diagnosis and management, outcome will generally be good.

MISCELLANEOUS

Other Notes: When the fetal heart rate is increased, there is an apparent reduction in beat-to-beat variability based solely on physiologic constraints and does not reflect fetal stress.
Intrapartum fetal heart rate monitoring is only one part of the overall evaluation of mother and fetus. This modality must be used to augment clinical judgment and not replace it.



BPM, beats per minute.
Figure 218.1 Reduced variability

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FETAL HEART RATE TESTING: TACHYCARDIA 219

INTRODUCTION

Description: Tachycardia is an increase in the baseline heart rate, generally above 160 beats/min. Mild tachycardia is generally defined as 161–180 beats/min, and severe tachycardia as greater than 180 beats/min for more than 3 minutes.
Prevalence: Mild fetal tachycardia is observed during approximately 2% of labors.
Predominant Age: Reproductive age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Maternal fever (most common), intra-amniotic infection (fetal tachycardia may occur even before maternal fever is present), fetal congenital heart disease, depressed fetal oxygenation, fetal acidosis, fetal anemia or blood loss, medication effects (atropine, terbutaline), maternal hypotension.
Risk Factors: Maternal, fetal, or uterine infection.

SIGNS AND SYMPTOMS

- Increased fetal heart rate (baseline) above 160 beats/min (frequently associated with an apparent loss of beat-to-beat variability)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Maternal fever (chorioamnionitis)
- Intra-amniotic infection
- Congenital heart disease
- Fetal anemia or blood loss
- Medication effects
- Uterine rupture

Associated Conditions: Chorioamnionitis, maternal fever, maternal dehydration.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: Ultrasonography may be used to assess possible causes but has no role in establishing the fetal heart rate pattern.
Special Tests: Fetal scalp pH or pulse oximetry (when available) may be of assistance in determining the fetal status.
Diagnostic Procedures: Clinical evaluation of mother and fetus.

Pathologic Findings

Based on underlying pathophysiologic conditions.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Maternal hydration, change in maternal position (lateral recumbent), maternal oxygen therapy (debated).
Specific Measures: Aggressive fetal and maternal evaluation, amnioinfusion, tocolytics (when hypertonus is involved), expedited delivery in the face of nonreassuring changes.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Fetal Heart Rate Monitoring During Labor, 2018
- Special Tests for Monitoring Fetal Health, 2019

Drug(s) of Choice

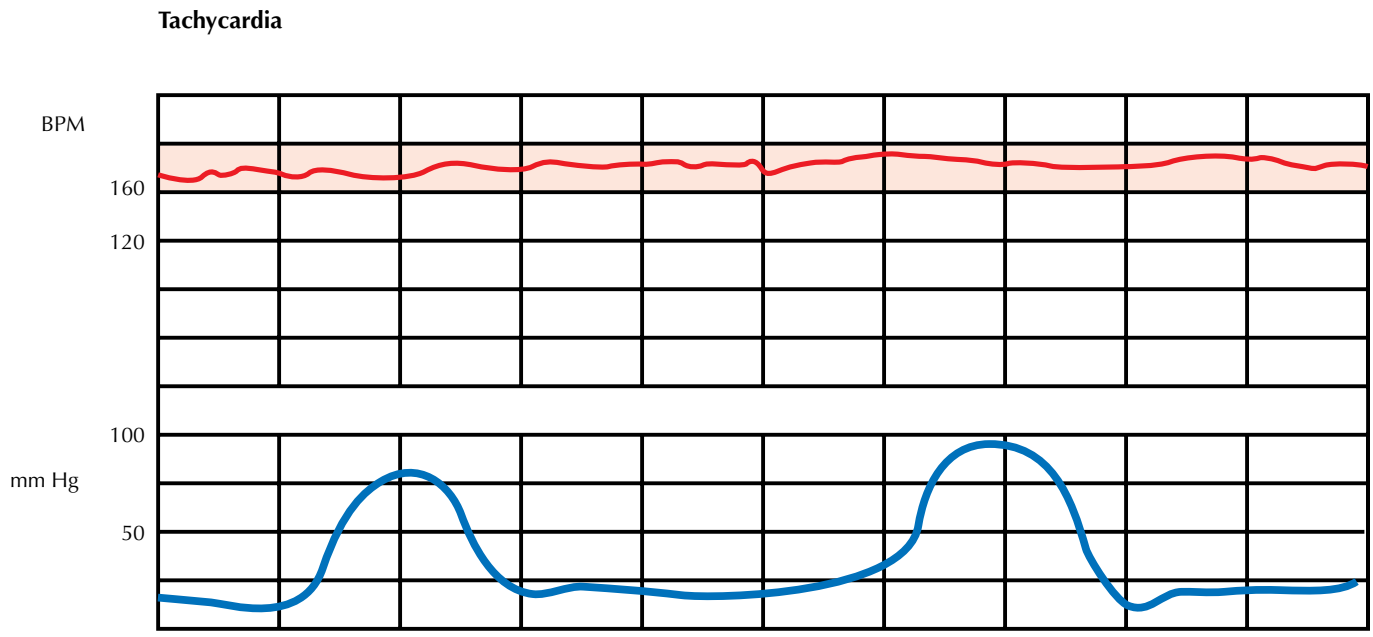
- None.
- Digoxin therapy for selected persistent fetal tachyarrhythmias, such as fetal supraventricular tachycardia, may be indicated.

FOLLOW-UP

Patient Monitoring: Continued maternal and fetal assessment.
Prevention/Avoidance: Adequate maternal hydration, reduced number of cervical examinations in patients at risk for infection (premature rupture of the membranes).
Possible Complications: Progressive deterioration of fetal status unless underlying processes are identified and corrected.
Expected Outcome: With aggressive diagnosis and management, outcome will generally be good.

MISCELLANEOUS

Other Notes: When the fetal heart rate is increased, there is an apparent reduction in beat-to-beat variability based solely on physiologic constraints and does not reflect fetal stress.
Intrapartum fetal heart rate monitoring is only one part of the overall evaluation of mother and fetus. This modality must be used to augment clinical judgment and not replace it.



BPM, beats per minute.
Figure 219.1 Tachycardia

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OBSTETRIC ANESTHESIA/ANALGESIA

220

THE CHALLENGE

Description: The processes of labor and delivery are associated with physiologic and tissue changes that result in neural signals that are universally interpreted as pressure and pain.

Scope of the Problem: On average, more than 60% of women in the United States receive epidural or spinal anesthesia during labor or delivery. Even more women receive other forms of analgesia or anesthesia during the course of labor.

Objectives of Management: To provide relief from discomfort for both physiologic and psychologic well-being during the course of labor and delivery, while still protecting the health and safety of the mother and fetus.

TACTICS

Relevant Pathophysiology: During the first stage of labor, cervical stretch, myometrial contraction, transient uterine ischemia and pressure on adjacent structures can all generate nociceptive signals. These enter the spinal cord via the T_{10}, T_{11}, T_{12}, and L_1 white rami communicantes. During the second stage of labor, distention of the vagina, perineum, and pelvic floor and stretching of the pelvic ligaments cause pain via the three sacral nerves (S_2, S_3, and S_4), which comprise the pudendal nerve. The addition of parietal pain to the visceral pain of uterine and somatic origin results in an intensification of discomfort during the second stage of labor.

Strategies: Analgesia during labor and delivery may be provided by systemic or regional means. The choice of the timing, type, and route employed is dependent on clinical factors (maternal and fetal), stage of the labor, availability, and preference (patient and provider).

Systemic analgesia may be provided by a range of options from targeted relaxation and meditation to inhalation agents, as well as intravenous opioids and other agents. The bulk of pharmaceuticals used in this manner are opioids, mixed opioid agonists-antagonists, barbiturates, and benzodiazepines. They may be administered as single (bolus) doses or through patient-controlled analgesia systems (self-administered by a programmed dose of medication with specified minimum intervals between doses). Sedation and respiratory depression, along with lower efficacy, limit the role of systemic analgesia. Because fetal elimination of these drugs is slower than for the mother, to avoid fetal depression, use of most of these agents is limited to the early phases of labor.

Regional or local anesthesia is the most effective in providing pain relief. Options consist of local or neuraxial techniques such as epidural or spinal. Local anesthesia, such as pudendal anesthesia or local infiltration, are good options for the perineal discomfort of the final processes of delivery (and repair if necessary) but provide little or no relief for the other aspects of labor and delivery pain. More versatile, effective, and longer lasting are the neuraxial techniques such as epidural, spinal, or combined epidural-spinal techniques. These are particularly well suited to the needs of cesarean or operative deliveries. Caudal anesthesia is effective for the discomfort of the late stages of labor but has fallen out of use in favor of the more versatile epidural options.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Medications for Pain Relief During Labor and Delivery, 2017.

IMPLEMENTATION

Special Considerations: Epidural and spinal techniques may not be used in the face of uncorrected coagulopathy, infection near the site of administration, uncorrected hypovolemia, or increased intracranial pressure. The use of epidural anesthesia is associated with a slight increase in labor duration and the likelihood of operative delivery but not an increased rate of cesarean delivery. Under emergent conditions, rapid sequence intubation and induction of general anesthesia may be required, but risks anesthetizing the fetus as well.

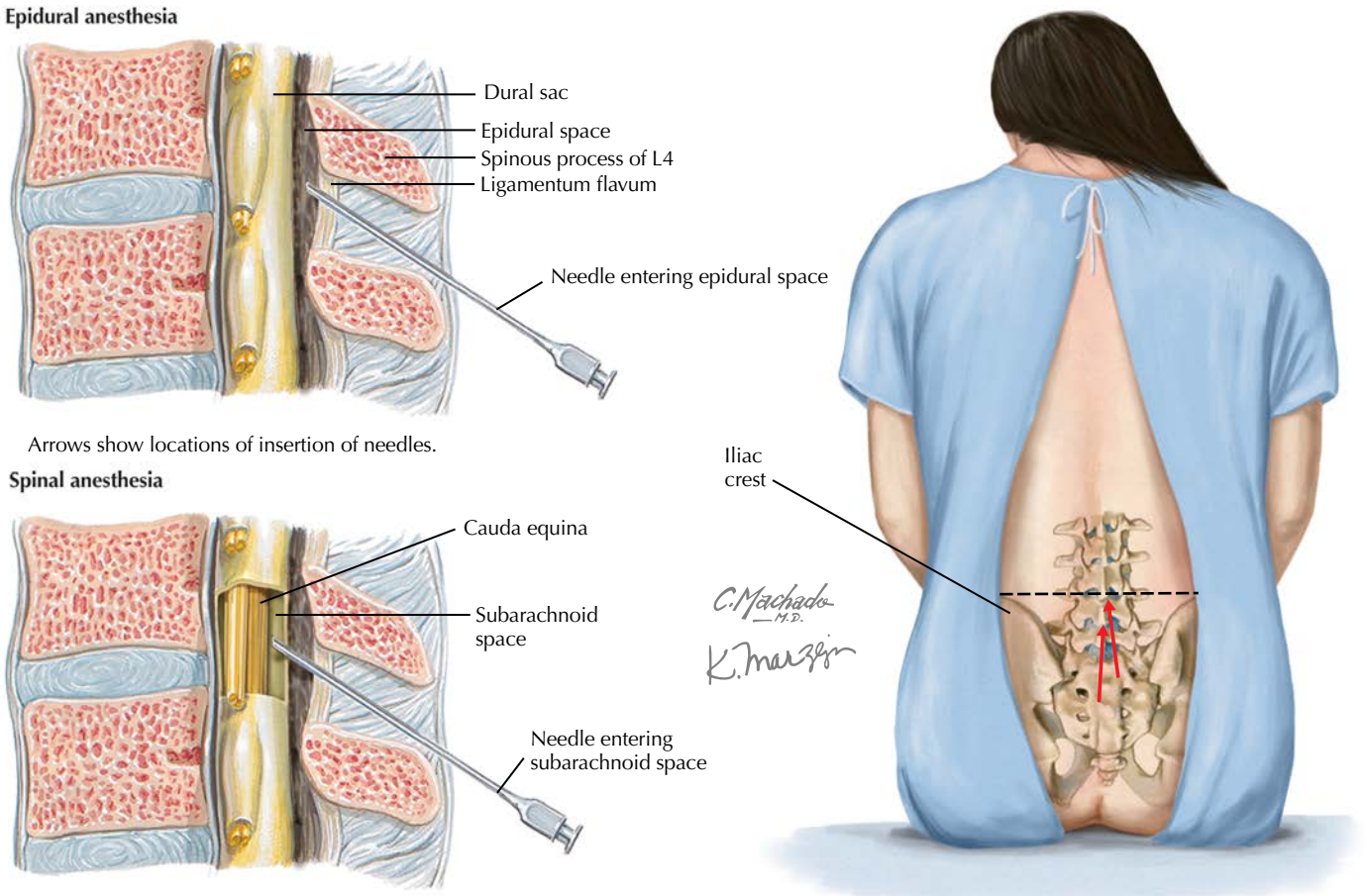

Figure 220.1 Lumbar puncture and epidural anesthesia

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NORMAL POSTPARTUM CHANGES

221

THE CHALLENGE

Description: Abrupt changes in maternal physiology are necessary to ensure the survival of the mother immediately after delivery. Slower changes return the woman to the normal, pre-pregnant state. Depending on the system and definition, complete return to the baseline state can take up to 12 months.

Scope of the Problem: Changes in virtually every organ system are necessary to revert from the adaptations of pregnancy to the starting point before or between gestations.

Objectives of Management: To ensure that the transitions of the postpartum period (the puerperium) proceed as anticipated, thus protecting the mother and returning her body to normal function.

TACTICS

Relevant Pathophysiology: Virtually all of a woman's organ systems undergo adaptive changes during pregnancy. For the most part, all of these changes must be reversed over a very short period of time.

Uterus: Acutely the uterus must contract strongly and continuously in the moments following the separation of the placenta to mechanically block the perforating arterioles that fed the placental bed. With up to 15% of total cardiac output going to the uterus at term, the woman cannot rely on clotting, which takes approximately 5 minutes to be fully established, to prevent catastrophic blood loss. Uterine atony is the leading cause of postpartum hemorrhage. Strong uterine contractions frequently lead to "after pains," which may be sufficient to require analgesics.

The volume and weight of the uterus must change from that large enough to hold the term fetus, placenta, and amniotic fluid, to approximately three-fourths of the size of a fist. The uterine fundus should be palpable near the umbilicus within the first 24 hours after delivery, halfway between the symphysis and umbilicus within 1 week, and not palpable by 2 weeks postpartum. Complete return to its pre-pregnant size will take 6–8 weeks. The weight of the uterus decreases from approximately 1 kg at term to approximately 60–80 g by the time involution is complete.

The placental bed must be resurfaced by endometrial cells. The surface of the decidualized bed, along with fibrin and other debris is shed as the lochia. The lochia contains serous exudate, erythrocytes, leukocytes, shed decidua, epithelial cells, and bacteria and evolves from red to brown to yellow-white over the course of 4–6 weeks. Regenerated endometrial tissue derived from the remaining basalis layers recovers the entire endometrial cavity by the 16th postpartum day.

The cervix returns to approximately 1 cm dilation by approximately 1 week, but histologic changes may not be complete for up to 4 months.

Breast: During the last part of pregnancy and labor, the glandular component of the breast increases, leaving the breast primarily composed of epithelial elements and very little stroma. These changes persist if the patient breastfeeds. Following lactation, involution occurs, characterized by apoptotic cell death and tissue remodeling. Stretch of the Cooper ligaments and other elastic tissues may result in varying amounts of ptosis.

Vagina and perineum: The vagina slowly constricts, and rugae are restored in the 3rd week as edema subsides and vascularity returns to normal. Healing of any lacerations or surgical trauma should be substantially complete by 3–4 weeks. Fascial stretching and muscular trauma to the pelvic floor may not completely return to the pre-pregnant state.

Cardiovascular system: Within the first 10 minutes after delivery, cardiac output and stroke volume increase by 60% and 70%, respectively. These changes persist for hours or days, while heart rate decreases by up to 15% in the first hour. By as early as 2 weeks after delivery, there are substantial reductions in left ventricular size and contractibility. Cardiac output and systemic vascular resistance return to nonpregnant levels over a period of approximately 3 months.

After delivery, autotransfusion of as much as 500 mL of blood, sequestered in the uteroplacental unit, helps to counteract the volume loss associated with delivery. Intravascular volume, red cell production, and clotting systems all return to normal within 6–12 weeks.

Pulmonary system: The return of the diaphragm to its normal position results in a return to normal of the functional residual capacity. Minute ventilation, tidal volume, and chest diameter all return to their normal values within the first hours to days.

Renal and urinary system: Following birth, mechanical pressure and the use of regional anesthetics increase the risk of urinary retention. An enlarging midline mass and lower abdominal pain combined with a history of not voiding after delivery or of continuous dribbling should suggest the diagnosis. The diagnosis is confirmed and the issue resolved by catheterization. If a large volume of urine is encountered, it should be slowly drained and the catheter left in place for 24 or more hours.

The hydroureter and hydronephrosis often found in pregnancy is generally lost by 4–6 weeks after delivery. The increase in the glomerular filtration rate and other functional changes in the kidney that are induced by pregnancy resolve over a similar time course.

Musculoskeletal system: With the loss of the forward displaced mass of the fetus, uterus, and amniotic fluid, the patient's center of gravity abruptly moves backward to its normal location. This forces a rapid return to the normal upright stance of pregnancy. When this is combined with the bending and lifting associated with newborn care, low back discomfort is common.

The abdominal wall musculature regains most, if not all, of its normal tone and strength, but the diastasis of the rectus muscles may persist.

Skin and hair: Striae, when present, fade from red to silvery but are permanent, as is some loss of skin elasticity over the lower abdominal wall. After delivery, there is a reversal in the ratio of growing (anagen) and resting (telogen) hair follicles. This causes the appearance of accelerated hair loss (telogen effluvium), which is self-limited and lasts between 6 and 12 months.

Strategies: Awareness of the changes that are induced by pregnancy and the associated reversals required to regain the pre-pregnant state are important to understand so that they may be monitored for normality or intervention instituted when the sequence is incomplete.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Breastfeeding Your Baby, 2021
- Exercise After Pregnancy, 2019
- Newborn Male Circumcision, 2017
- Postpartum Birth Control, 2021
- Postpartum Depression, 2020
- Postpartum Sterilization, 2021

IMPLEMENTATION

Special Considerations: It is common (25%–50%) for women to experience shivering during the first 30 minutes after delivery. The exact etiology of this phenomenon is not known, but it is normal and self-limited.

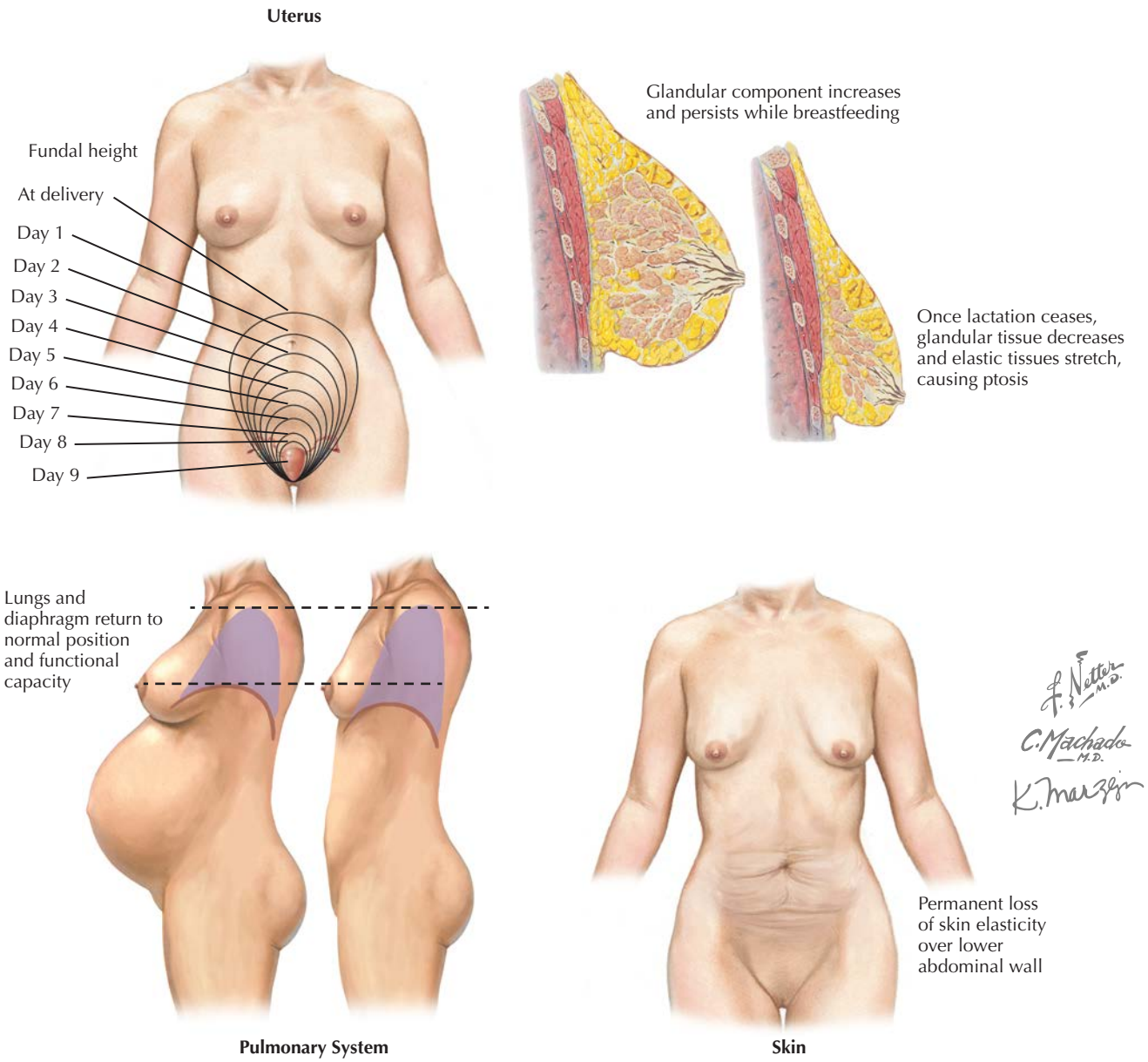

Figure 221.1 Normal postpartum changes

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BREASTFEEDING (LACTATION)

222

THE CHALLENGE

The challenge is to assist patients in successfully nursing their infant(s).

Scope of the Problem: Although most infants born in 2019 started breastfeeding (83.2%), only 24.9% of infants were exclusively breastfeeding at 6 month.

Objectives of Management: Encourage nursing as a feeding strategy, assist patients to prepare for nursing, and deal with problems if they occur.

TACTICS

Relevant Pathophysiology: Breastfeeding is the preferred method of feeding newborns and infants. Evidence continues to mount regarding the importance of breastfeeding for both women and their infants. Breastfed infants have fewer respiratory, gastrointestinal, and ear (otitis media) infections and fewer allergies. Breast milk is more easily digested, better absorbed, and less constipating than formula. Breastfeeding hastens uterine involution. Stimulation of the areola causes the secretion of oxytocin, which is responsible for the letdown reflex and ductal contraction that expels the milk. It also helps to strengthen the social bond between mother and infant. Suckling stimulates further milk production. Milk production is often not well established until day 3 of nursing. Patients should maintain adequate fluid intake and an increase of approximately 200 kcal/day in dietary intake. Prenatal vitamin supplementation should be continued. Blocked ducts and mastitis are the most common complications. Mastitis mimics blocked ducts (sore, firm lump or lumps) with the addition of erythema and fever. Warm, moist packs, analgesics, and antibiotics that are effective against *Staphylococcus aureus* are appropriate therapies. Infection comes from the infant's nose and mouth. Other sources of fever also must be considered (endometritis).

Strategies: Preparation for nursing—encourage breastfeeding, discuss plans early, address issues such as work and weaning, discuss the role of supplementation, and introduce techniques. Involvement of the father and others increases the chance of success. Preparation of the nipples in advance is not required.

Nursing—initially the infant should nurse at least nine times in 24 hours to encourage milk production. Once milk production is established, the infant should dictate the frequency and duration of nursing—six or more wet diapers per day and a weight gain of approximately 1 oz/day indicate adequate feeding. The breasts should be hard before and soft after nursing.

Weaning—introduce the bottle by 3–4 weeks as an occasional supplement (may use pumped breast milk). Complete weaning may be done either gradually (substituting bottles for some feedings) or abruptly. If engorgement occurs, analgesia, ice, and compressive binding provide the greatest relief. Medication to suppress lactation is generally not effective.

Patient Education: Reassurance, support, specific suggestions.

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Breastfeeding Your Baby, 2021

IMPLEMENTATION

Special Considerations: Breastfeeding is contraindicated in patients with human immunodeficiency virus (HIV), cytomegalovirus, hepatitis B virus infections, and human T-cell lymphotropic virus type I or type II and in those who have active untreated tuberculosis or varicella or active herpes simplex virus with breast lesions. Substances of abuse (including alcohol) pass to breast milk, as do some medications. Breastfed infants often lose weight in the first few days and do not regain birth weight until as late as day 10. Growth spurts often occur at approximately 10 days, 6 weeks, 3 months, and 4–6 months. If the infant fails to thrive, support and evaluation are in order. Care must be taken to wash the hands (and any equipment used) well before breastfeeding or breast manipulation. The nipples and the infant's face should also be clean before each feeding. Fresh breast milk may be safely kept for 6–10 hours at room temperature or 72 hours under refrigeration. Breast milk also may be frozen and kept for 6 months in a home freezer or 12 months at −20°C. Thawed breast milk should be used within 24 hours and may not be refrozen. Breast milk should never be warmed in a microwave oven. The volume of milk required for each feeding varies widely but is normally 2–5 oz for newborns, 4–6 oz for infants 2–4 months of age, and 5–7 oz for babies 4–6 months old. One study found that 65% of women with augmentation mammoplasty have lactation insufficiency.

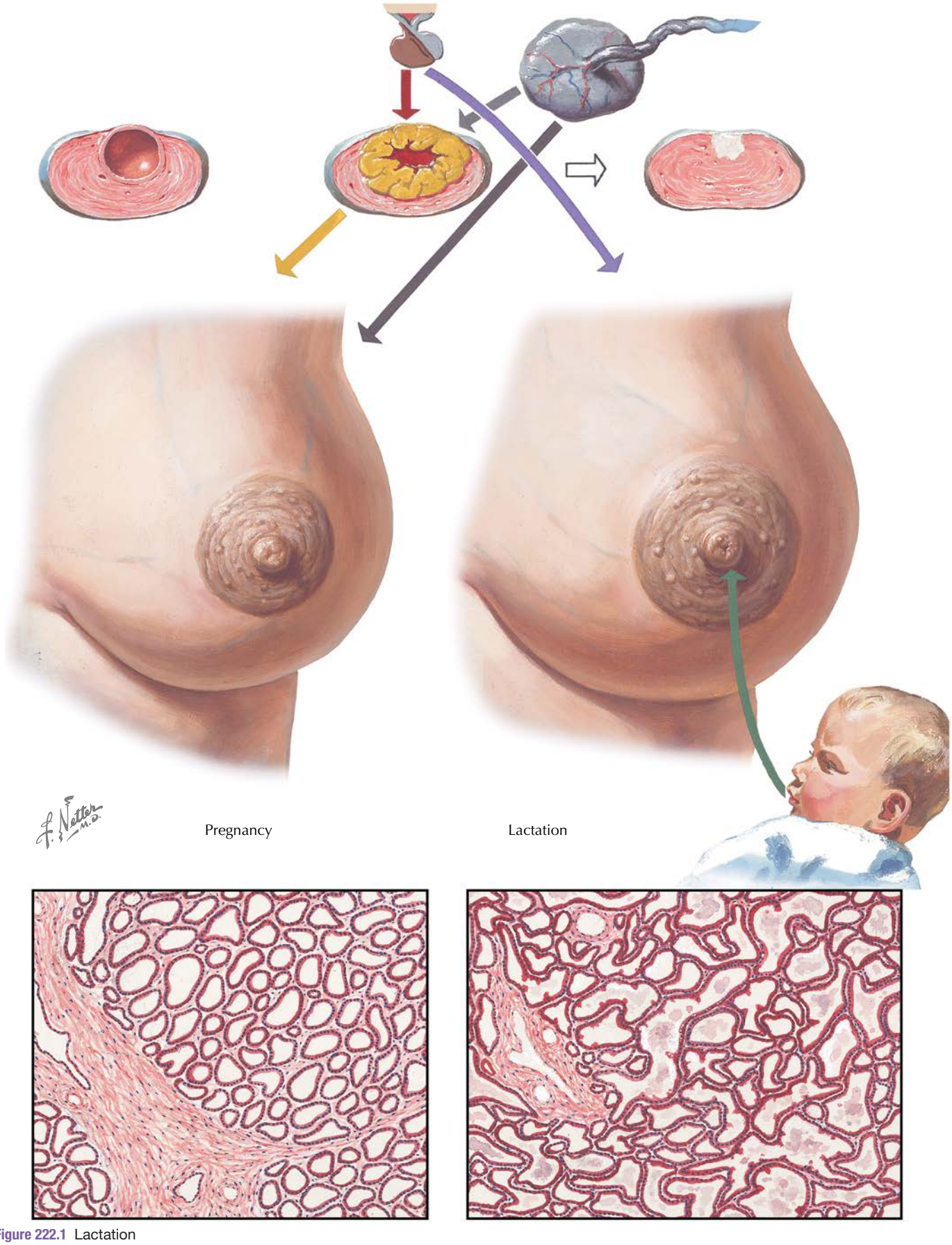

Figure 222.1 Lactation

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SECTION XIII

Obstetric Conditions and Concerns

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ABNORMALITIES OF PLACENTAL IMPLANTATION (PLACENTA ACCRETA SPECTRUM)

223

INTRODUCTION

Description: Failure of the normal process of decidua formation results in a placental implantation in which the villi directly adhere to (accreta; 79%), invade into (increta; 14%), or go through (percreta; 7%) the myometrium. One portion (partial) or all (total) of the placenta may be involved. These conditions are known as placenta accreta spectrum, formerly known as morbidly adherent placenta.

Prevalence: Difficult to assess; estimated to be 1/272 pregnancies. The incidence has been increasing in parallel with the rate of cesarean delivery.

Predominant Age: Reproductive age; average age is 29 years.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Abnormal decidua formation at the time of placental implantation. Imperfect development of the fibrinoid (Nitabuch) layer. Abnormal site of placental implantation (previa, 64% of placenta accreta, cornual or lower uterine segment, or uterine scars such as site of previous cesarean delivery or myomectomy).

Risk Factors: Placenta previa (5% without previous uterine surgery; 15%–70% with previous surgery), previous cesarean delivery (risk increases with number; 0.3% in women with one previous cesarean delivery to 6.7% for women with ≥5 cesarean deliveries), multigravidity (1/500,000 for parity <3; 1/2500 for parity >6), older maternal age (>35 years), previous uterine curettage, Asherman syndrome, previous uterine sepsis, previous manual removal of the placenta, leiomyomata, uterine malformation, prior abortion, endometrial ablation. Eighty percent of patients have a history of a uterine surgical procedure.

SIGNS AND SYMPTOMS

- Failure of normal placental separation
- Abnormally heavy bleeding after delivery of the placenta (may be life threatening)
- History of antepartum hemorrhage

DIAGNOSTIC APPROACH

Differential Diagnosis

- Placenta previa
- Uterine rupture with expulsion of the placenta
- Uterine rupture at the time of manual removal of the placenta

Associated Conditions: Placenta previa (15%), postpartum hemorrhage.

Workup and Evaluation

Laboratory: Complete blood count after delivery to assess blood loss (which may be excessive).

Imaging: Ultrasonography, Doppler ultrasonography, or magnetic resonance imaging (MRI) have been used to make the diagnosis before labor in many cases. The absence of findings with these modalities does not preclude abnormal placental attachment. Low-lying placentas noted in studies performed at less than 30 weeks may "migrate," leaving the cervix free at term (up to 90% of cases).

Special Tests: None indicated.

Diagnostic Procedures: Generally diagnosed only at delivery by failure of the normal separation mechanism. Final diagnosis is established histologically.

Pathologic Findings

Absence of the decidua basalis (replaced by loose connective tissue). The decidua parietalis may be normal or absent. The villi may be separated from the myometrial cells by a layer of fibrin.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Aggressive fluid and blood support as necessary. Oxytocin or other uterotonic agents to promote uterine contractions after placental delivery (if accomplished).

Specific Measures: Many patients require hysterectomy. If the invasion of the myometrium is incomplete and the bladder is spared, conservative management by uterine packing or intrauterine balloon tamponade may be possible. Any time the diagnosis is considered, preparations for hysterectomy, including anesthesia, instruments, and adequate blood, should be ready before any attempt is made to free the placenta.

Diet: Nothing by mouth until the patient's condition has been stabilized.

Activity: Bed rest until the patient's condition has been stabilized.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Bleeding During Pregnancy, 2021
- Cesarean Birth, 2020
- Ultrasound Exams, 2017

Drug(s) of Choice

- Uterotonics should be available, and broad-spectrum antibiotics should be prophylactically administered.

FOLLOW-UP

Patient Monitoring: Hemodynamic monitoring during the acute diagnosis and treatment.

Prevention/Avoidance: Patients at high risk may be examined by ultrasonography or MRI in an attempt to identify the absence of the subplacental hypoechoic zone or the presence of lacunar blood-flow patterns. If present, plans for autologous blood donation and elective cesarean hysterectomy may be made. The absence of these findings does not rule out this possibility.

Possible Complications: Life-threatening hemorrhage may occur; maternal mortality of 2%–6% has been reported for treatment by hysterectomy and up to 30% for conservative management. Coagulopathy secondary to blood loss and replacement is common. Acute respiratory distress syndrome and renal failure when significant hemorrhage occurs. Spontaneous rupture of the uterus may occur before labor. Rupture of the uterus or inversion may occur during attempts to remove the placenta.

Expected Outcome: Most patients go to term with normal fetal development. If the possibility is recognized and appropriate treatment is rendered, maternal survival is probable, although loss of the uterus is common. It is hypothesized that small areas of accreta may result in placental cotyledon(s) being torn from the placenta and that these cotyledons may become placental polyps.

MISCELLANEOUS

ICD-10-CM Codes: O43.21 (All types, without hemorrhage), O43.239 (Placenta percreta, unspecified trimester), related; O73.0 (Retained placenta without hemorrhage).

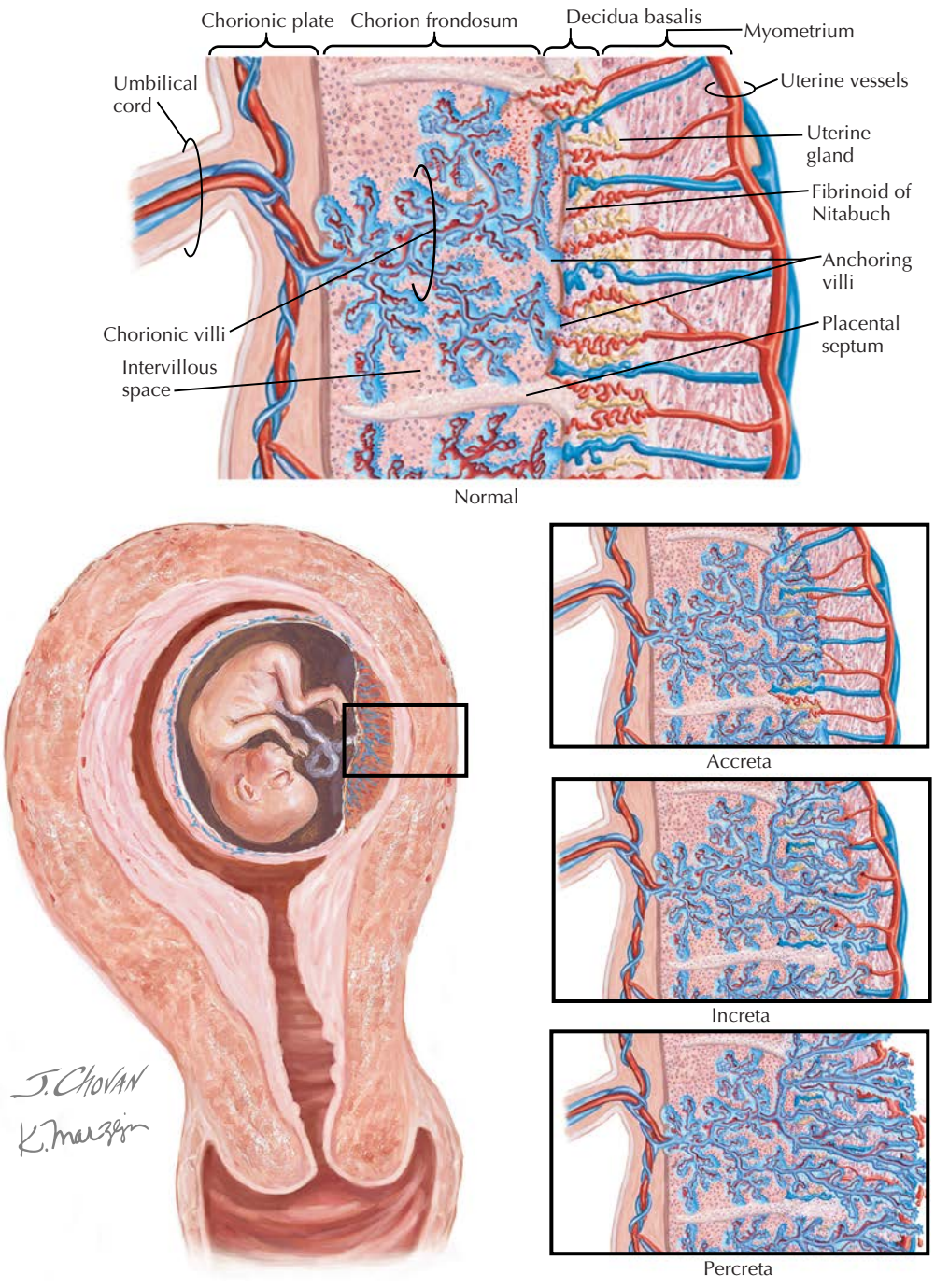

Figure 223.1 Abnormalities of placental implantation

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ACTIVE MANAGEMENT OF LABOR

224

THE CHALLENGE

Active management of labor is a system of labor management that is designed to promote effective labor and reduce the need for cesarean delivery.

Scope of the Problem: Cesarean birth rate for nulliparous patients approximates or exceeds 30% in most areas. Active management has been associated with cesarean delivery rates of less than 5% for its developers (Ireland).

Objectives of Management: To reduce cesarean delivery rates through a system of management that includes education, strict criteria for labor and abnormal progress, one-on-one care, and the use of high-dose oxytocin (when needed).

TACTICS

Relevant Pathophysiology: As developed in Ireland, the active management of labor is based on the following:

- Patient education
- Strict criteria for the diagnosis of labor, the determination of abnormal progress, and the diagnosis of fetal compromise
- One-on-one nursing care during labor
- Use of high-dose oxytocin infusion (when needed)
- Peer review of all operative deliveries

Strategies: In Ireland, where this technique was developed, the active management of labor is restricted to nulliparous patients with singleton pregnancies in vertex presentation with no evidence of fetal compromise. Women are carefully instructed to come to the hospital early in labor. Labor is confirmed by the presence of complete effacement, passage of the mucous plug, or rupture of the membranes. If these criteria are met, the patient is admitted to the hospital, and the membranes are ruptured within 1 hour (if not already ruptured). Vaginal examination is performed hourly, and the administration of high-dose oxytocin is initiated if dilation falls below 1 cm/hr. Oxytocin is initiated at 6 mU/min, and the dose is increased every 15 minutes until a maximum of 40 mU/min is reached, active labor is established, or hyperstimulation occurs. As a part of this process, one-on-one nursing care is provided and the fetal status is assessed by auscultation every 5 minutes. Fetal compromise is diagnosed by fetal scalp pH where available. Cesarean delivery is performed if delivery is not imminent 12 hours after admission or if fetal compromise is diagnosed.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- How to Tell When Labor Begins, 2020

IMPLEMENTATION

Special Considerations: The Irish experience with the active management of labor has resulted in a reduced rate of births by cesarean delivery without untoward events. Which elements of the management (education, early amniotomy, intensive nursing, aggressive use of oxytocin, or methods of establishing distress) are directly responsible for this success is unknown. Attempts to apply only some elements of the program have generally not yielded the same reductions in cesarean section rates. It should be noted that conduction (epidural) anesthesia is also less common in Ireland.

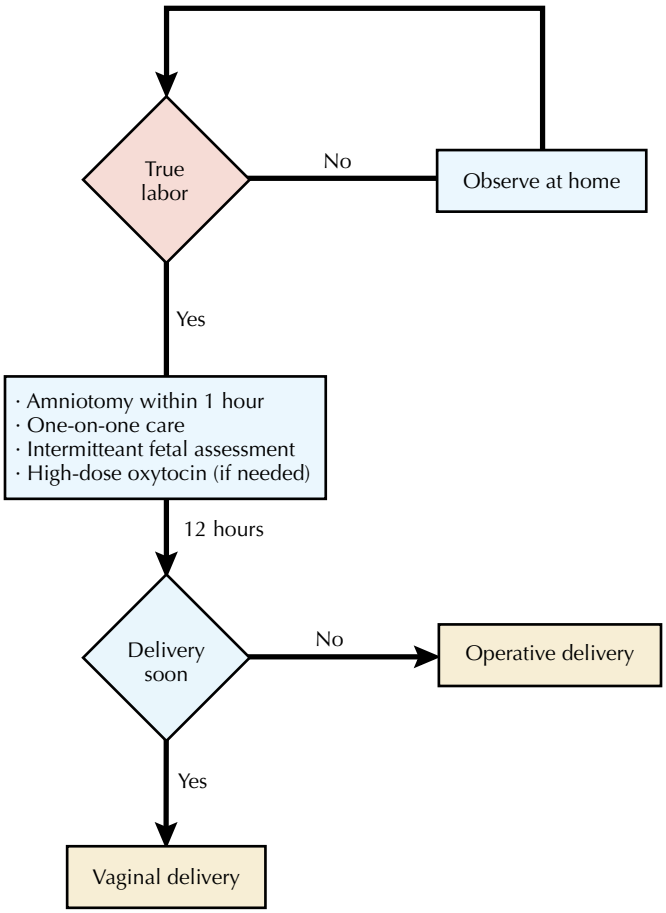

Figure 224.1 Active management of labor

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225 ACUTE FATTY LIVER OF PREGNANCY

INTRODUCTION

Description: Acute fatty liver is a rare complication of pregnancy that results in acute liver failure, often with catastrophic consequences. It is also known as acute fatty metamorphosis or acute yellow atrophy.

Prevalence: 1/7000–20,000 pregnancies.

Predominant Age: Reproductive age; typically during the third trimester of pregnancy.

Genetics: There appears to be a link to a recessively inherited mitochondrial abnormality of fatty acid oxidation, first studied in children with Reye syndrome. The most common defect is a mutation coding for long-chain 3-hydroxyacyl-CoA-dehydrogenase (LCHAD).

ETIOLOGY AND PATHOGENESIS

Causes: Unknown (mimics other forms of fatty liver failure such as that induced by tetracycline in patients with impaired renal function, Reye syndrome, hepatotoxicity with sodium valproate, or salicylate intoxication). It is currently considered that the placenta of a fetus who is LCHAD deficient may produce a toxic metabolite that affects the maternal liver.

Risk Factors: Unknown. More common in nulliparous women, when a male fetus is present, or when the mother is underweight (body mass index <20), or in multifetal gestation. The risk for recurrence in subsequent pregnancies is low, although it may be higher if the woman has a fetus that is homozygous enzyme deficient.

SIGNS AND SYMPTOMS

- Average gestational age: 37.5 weeks
- Gradual onset of malaise, anorexia, nausea and persistent vomiting (75% of patients), epigastric pain (50%), and progressive jaundice
- Polydipsia/polyuria

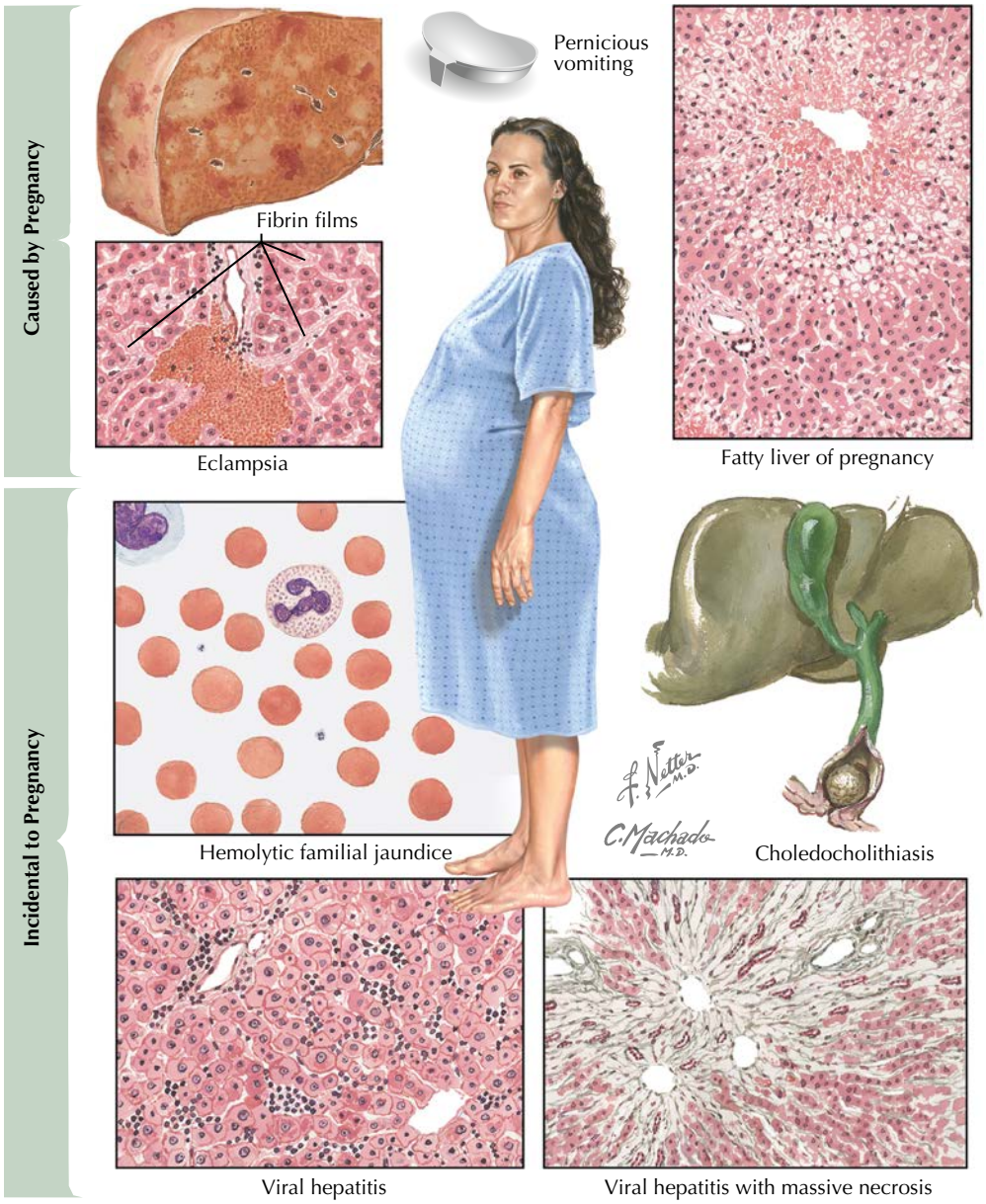

Figure 225.1 Liver diseases caused by pregnancy and incidental to pregnancy

- Hypertension, proteinuria, and edema (50%)
- Hypofibrinogenemia, prolonged clotting time, (severe coagulopathy in 55%), hyperbilirubinemia (<10 mg/dL), mild thrombocytopenia, hemolysis, markedly reduced antithrombin III levels, hypoglycemia
- Elevated serum transaminase levels (300–500 U/L), hepatic encephalopathy (60%)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Hepatitis
- Hemolysis, elevated liver enzymes, low platelet count (HELLP) syndrome
- Pre-eclampsia
- Cholestatic jaundice
- Cholelithiasis

Associated Conditions: Hypoglycemia and hepatic coma, coagulopathy, renal failure, sepsis, aspiration, circulatory collapse, pancreatitis, and gastrointestinal bleeding are all common.

Workup and Evaluation

Laboratory: Complete blood count, evaluation of liver function, serum bilirubin, clotting studies, serum ammonia.

Imaging: Ultrasonography, computed tomography, or magnetic resonance imaging may demonstrate the fatty metamorphosis, but false-negative results may be as high as 80%.

Special Tests: None indicated.

Diagnostic Procedures: History, physical, and laboratory examinations.

Pathologic Findings

Grossly the liver is small, soft, yellow, and greasy. Histologically, there are swollen, foamy hepatocytes with microvesicular fat and central nuclei and periportal sparing. There also may be lipid accumulation within renal tubular cells.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Rapid evaluation, supportive measures (fluids, glucose, and clotting factors), and prompt delivery of the fetus, regardless of gestational age.

Specific Measures: The only specific measure is delivery, which generally arrests the process. The decision between cesarean or vaginal birth remains uncertain and controversial. Transfusion with fresh-frozen plasma, cryoprecipitate, whole blood, packed red blood cells, and platelets may be necessary if surgery is planned or bleeding ensues. Liver transplantation may have to be considered in selected patients.

Diet: Nothing by mouth.

Activity: Strict bed rest. Often requires admission to intensive care facilities.

Drug(s) of Choice

- No specific medications. Other medications based on the symptoms and condition.

FOLLOW-UP

Patient Monitoring: Intensive monitoring for circulatory, renal, and hepatic collapse. Often the fetus is severely compromised (often dead at the time of diagnosis) and also requires intensive monitoring.

Prevention/Avoidance: None.

Possible Complications: At one time, this was frequently fatal for both the mother (75%) and fetus (90%). Lower mortality rates have been reported in recent studies (as low as 10% maternal and 20% fetal mortality). Hypoglycemia and hepatic coma (60% of patients), coagulopathy (55%), and renal failure (50%) may occur. Sepsis, aspiration, circulatory collapse, pancreatitis, and gastrointestinal bleeding are all common.

Expected Outcome: May be fatal for both the mother and fetus. If the diagnosis is established and delivery is accomplished in time, recovery is marked by acute pancreatitis and ascites (almost universal). Transient diabetes insipidus is common during recovery, occurring approximately 7–10 days after delivery. For patients who receive rapid and supportive care, eventual recovery is complete, and recurrence is rare. Most laboratory values normalize within 7–10 days after delivery.

MISCELLANEOUS

ICD-10-CM Codes: O26.611 (Liver and biliary tract disorders in pregnancy, first trimester), O26.612 (Liver and biliary tract disorders in pregnancy, second trimester), and O26.613 (Liver and biliary tract disorders in pregnancy, third trimester).

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226 AMNIOTIC FLUID EMBOLISM

INTRODUCTION

Description: Amniotic fluid embolism is a rare but frequently fatal complication of labor in which the amniotic fluid that contains fetal squamous cells and hair enters the maternal vascular system and is lodged in the pulmonary and other vascular beds. Mechanical obstruction and anaphylaxis combine to produce an often-fatal clinical course. The term "anaphylactoid syndrome of pregnancy" has been suggested but has not received wide acceptance.

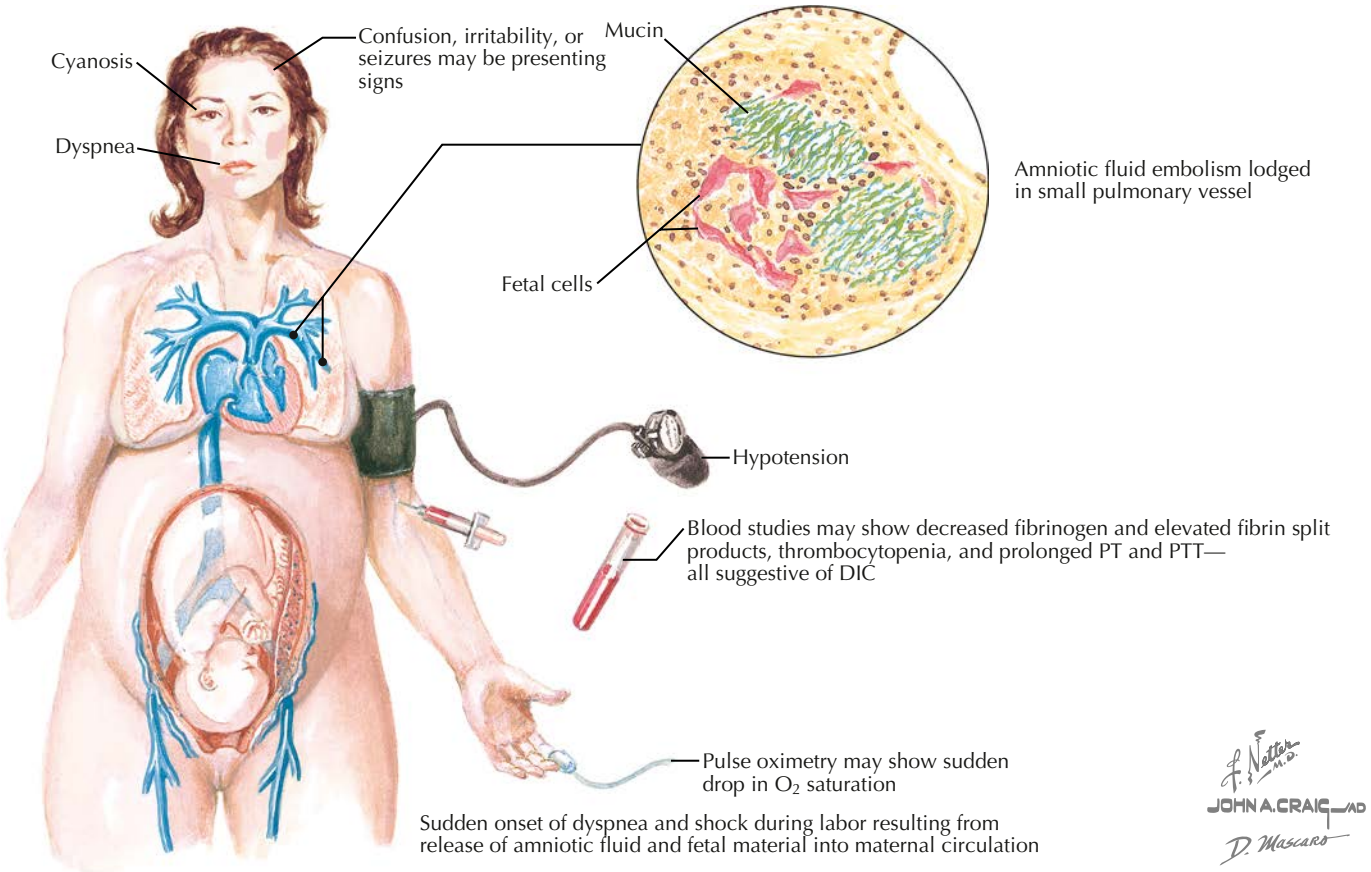
Prevalence: 1/30,000 deliveries (despite its rarity, it is one of the most common causes of maternal mortality).

Predominant Age: Reproductive age; occurs during late labor or immediately postpartum.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Anaphylaxis induced by fetal squamous cells and hair. Mechanical obstruction of pulmonary vessels by fetal squamous cells and hair. Left ventricular heart failure. Diffuse intravascular coagulation that results in coagulopathy.



Clinical Features of Amniotic Fluid Embolism

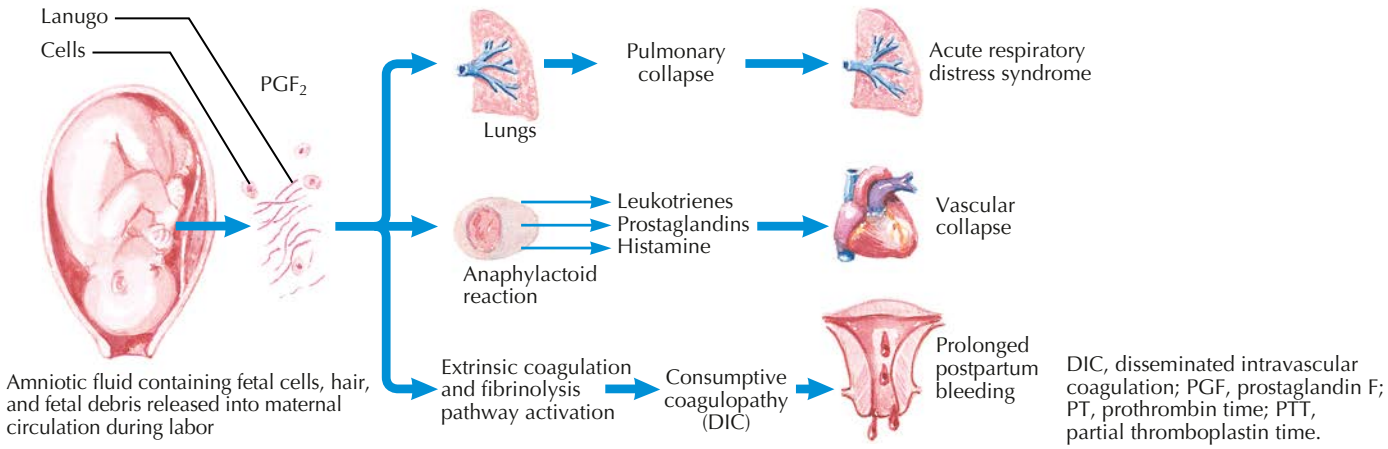


Figure 226.1 Amniotic fluid embolism

Risk Factors: Tumultuous labor, reduced uterine tone, premature separation of the placenta, advanced maternal age, cesarean and assisted delivery, placenta previa and abruption, grand multiparity, history of allergy or atopy, eclampsia, and medical induction of labor.

SIGNS AND SYMPTOMS (VARIABLE)

- Respiratory distress and hypoxemia, followed by cyanosis, followed by cardiovascular collapse, followed by hemorrhage with depletion of fibrinogen; platelets; and factors V, VIII, and XIII, followed by coma, seizures, or both.
- Disseminated intravascular coagulopathy is common.
- Acute pulmonary hypertension results in severe ventilation/perfusion mismatching, cardiogenic pulmonary edema, and hypoxemic respiratory failure. Symptoms appear abruptly during labor, delivery, or within 30 minutes after delivery. Up to one-third of patients experience a change in mental status, including a sense of sudden doom, chills, nausea and vomiting, agitation, or anxiety, preceding the collapse.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Pulmonary embolism (thrombus or air)
- Myocardial infarction or peripartum cardiomyopathy
- Cardiac arrhythmia
- Uterine rupture

Associated Conditions: Allergy and atopy.

Workup and Evaluation

Laboratory: Coagulation studies, blood gas measurements, renal function studies, all on an ongoing basis.
Imaging: May help in managing pulmonary complications but generally not helpful in establishing the diagnosis.
Special Tests: Continuous monitoring of oxygen saturation and invasive hemodynamic monitoring (pulmonary artery catheter) essential.
Diagnostic Procedures: History and physical examination. Exclusion of other causes.

Pathologic Findings

Fetal squamous cells and lanugo present in the pulmonary vascular space (typical but not sensitive or specific). Initial acute pulmonary hypertension and right ventricular failure (lasting 15–30 minutes), followed by left ventricular dysfunction.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Aggressive airway control and cardiovascular resuscitation (including myocardial support, inotropic agents and fluids, high-concentration oxygen therapy). The use of vasopressors has been reported to be successful. Correction and support for clotting defects (blood and platelets, fresh-frozen plasma, and cryoprecipitate as indicated).
Specific Measures: None. In women who suffer cardiac arrest before delivery, perimortem cesarean delivery should be considered to improve newborn outcome. In those who have not suffered arrest, maternal considerations generally take precedence.
Diet: Nothing by mouth until condition resolved.
Activity: Bed rest until condition resolved.

Drug(s) of Choice

- No specific medications. Other medications as needed for cardiovascular, pulmonary, renal, and coagulation support.

FOLLOW-UP

Patient Monitoring: Intensive hemodynamic monitoring (arterial and central venous) required. Laboratory testing in anticipation of coagulopathy.
Prevention/Avoidance: None.
Possible Complications: Acute mortality rates with amniotic fluid embolism approximate 50%. Of women who survive, 50% have a life-threatening bleeding diathesis. Renal failure is common, as are pulmonary edema and acute respiratory distress syndrome. Of women who suffer cardiac arrest during the initial phase, only 8% survive neurologically intact. Overall maternal mortality approaches 80%. More than half of the neonates that survive have neurologic impairment.
Expected Outcome: Prolonged and complicated course for those who survive.

MISCELLANEOUS

Other Notes: The most devastating effects of amniotic fluid embolism appear to be mediated through the anaphylactic reaction induced. Experimental studies indicate that pretreatment with inhibitors of leukotriene synthesis can prevent the development of symptoms in experimental settings.
ICD-10-CM Codes: O88.113 (Amniotic fluid embolism in pregnancy, third trimester) and O88.12 (Amniotic fluid embolism in childbirth).

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BREECH BIRTH

INTRODUCTION

Description: Breech birth is the presentation of the fetal buttocks (frank breech; 50%–70%), one foot, or both feet at the cervix (complete breech with hips flexed, 5%–10%; incomplete breech with the hips extended, 10%–40%) at the time of labor.
Prevalence: The rate of breech deliveries decreases with advancing gestational age from 22%–25% of births less than 28 weeks, to 7%–15% of births at 32 weeks, to 3%–4% of births at term.
Predominant Age: Reproductive age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Prematurity, fetal or maternal anomalies (eg, fetal hydrocephalus, maternal uterine anomalies), multiple gestation.
Risk Factors: Prematurity, fetal or uterine anomalies, multiple pregnancies, prior breech pregnancy.

SIGNS AND SYMPTOMS

- Fetal head located outside the pelvis on abdominal palpation (Leopold maneuvers)
- Fetal heart heard high in the uterus
- Buttock, one foot, or both feet palpable on cervical examination

DIAGNOSTIC APPROACH

Differential Diagnosis

- Fetal anomaly (hydrocephalus, anencephaly)
- Uterine anomaly (septum, duplication, leiomyomata)
- Multiple gestation
- Fetal macrosomia

Associated Conditions: Prematurity, placenta previa, placental abruption, premature rupture of the membranes, congenital anomalies (6% vs. 2.5% in total population), intracranial hemorrhage, growth restriction, neurologic disorders and mortality, multiple pregnancy, and polyhydramnios.

Workup and Evaluation

Laboratory: No evaluation indicated beyond that usually considered for patients in labor.
Imaging: Ultrasonography may be used to confirm presentation.
Special Tests: Fetal heart rate and uterine activity monitoring.
Diagnostic Procedures: Physical examination (Leopold maneuvers), ultrasonography.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Fetal and maternal monitoring and support.
Specific Measures: External version at 37–38 weeks, evaluation for route of delivery. External version is successful in more than 50% of patients. The success of external version can be increased by about 50% using epidural or spinal anesthesia for the procedure. Because of waning operator experience, concerns over potential fetal trauma, and liability fears, most planned breech deliveries are now by cesarian delivery.
Diet: No specific dietary changes indicated; nothing by mouth if the patient is in labor because of the increased risk for operative delivery.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- If Your Baby Is Breech, 2019

Drug(s) of Choice

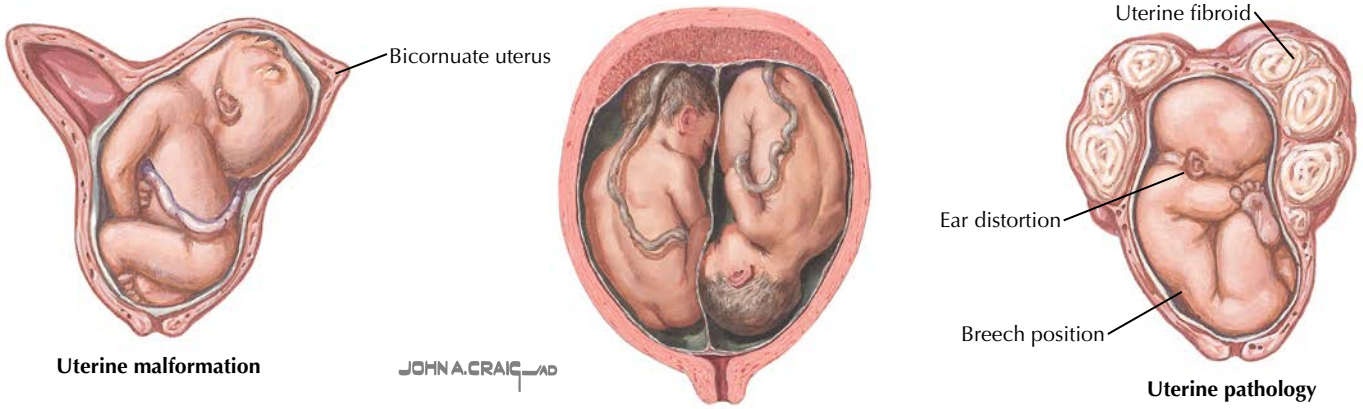
- None (tocolytics may be used to assist with external version procedures).

FOLLOW-UP

Patient Monitoring: Fetal and maternal monitoring as with normal labor.
Prevention/Avoidance: None.
Possible Complications: Prolapse of umbilical cord, entrapment of the fetal head, birth trauma.
Expected Outcome: Breech deliveries are associated with an increased risk for congenital anomalies, intracranial hemorrhage, growth restriction, neurologic disorders, and mortality, but the role of breech presentation and the delivery route are unclear. Much of the morbidity traditionally associated with breech presentation and delivery is because of factors that predispose to breech (congenital anomalies, prematurity).

MISCELLANEOUS

Pregnancy Considerations: The route of delivery must be determined on an individual basis based on fetal and maternal factors, the availability of needed resources, and the skill of the obstetrician. Vaginal delivery may be considered if labor is normal, fetal weight is 2000–3800 g, fetal status is normal, the pelvis is adequate, fetal head position is normal, and normal progression of cervical dilation and fetal descent are maintained. Cesarean delivery does not eliminate the possibility of head entrapment during extraction of the fetus (approximately 1% of cases).
ICD-10-CM Codes: O32.1XX0 (Maternal care for breech presentation, not applicable or unspecified).



Conditions that cause intrauterine crowding can lead to abnormal fetal positions

Figure 227.1 Breech birth

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CAPUT SUCCEDANEUM

228

INTRODUCTION

Description: Caput succedaneum is a characteristic change in the apparent shape of the fetal head and scalp that results from the forces of labor acting on the fetal head and the surrounding tissues. This swelling is generally located on the portion of the fetal scalp that is directly under the cervical os.
Prevalence: Typical of most vaginal vertex births. Similar swellings on the presenting part are formed with other birth presentations.
Predominant Age: Birth.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Pressure by the birth canal and surrounding tissues on the fetal head as it enters and traverses the lower vaginal canal.
Risk Factors: Fetal macrosomia, prolonged labor, contracted maternal pelvis, prolonged maternal expulsive effort (pushing).

SIGNS AND SYMPTOMS

- Symmetric swelling of the fetal scalp in a location compatible with that which is directly under the cervical os (upper posterior portion over the right parietal bone in left occiput transverse labors, over the corresponding portion of the left parietal bone in right occiput transverse labors)
- Generally with diffuse edges and only a few millimeters in thickness. Greater in obstructed or prolonged labors. The periosteal edges provide a sharp demarcation to a cephalohematoma that is not present in caput succedaneum. In addition, cephalohematomas do not cross suture lines

DIAGNOSTIC APPROACH

Differential Diagnosis

- Cephalohematoma (2%–3% of births)
- Molding of the head
- Subgaleal hemorrhage

Associated Conditions: Macrosomia, obstructed labor, maternal diabetes.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated.
Special Tests: None indicated.
Diagnostic Procedures: History and physical examination.

Pathologic Findings

Diffuse tissue edema without bruising.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and reassurance.
Specific Measures: None. Spontaneously regresses in 24–48 hours.

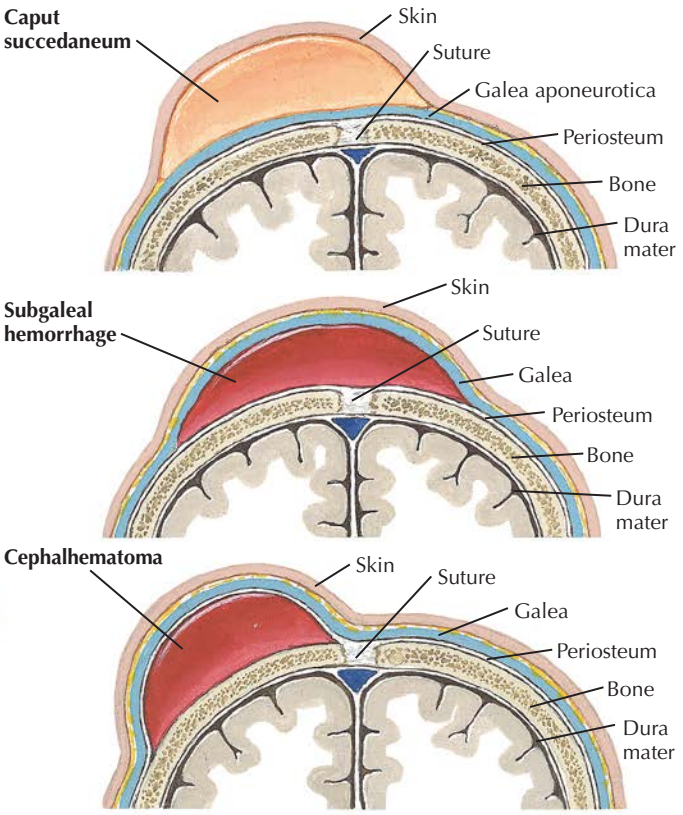

Figure 228.1 Caput succedaneum

Diet: No specific dietary changes indicated.
Activity: No restriction.

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: Expeditious labor and delivery.

Possible Complications: Cephalohematoma or intracranial bleeding may be missed. Rare cases of necrosis resulting in long-term scarring and alopecia have been reported. Infection is possible but rare.
Expected Outcome: Rapid, spontaneous, and complete resolution.

MISCELLANEOUS

ICD-10-CM Codes: P12.81 (Caput succedaneum) and P12.1 (Chignon [from vacuum extraction] due to birth injury).

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229 CARDIOVASCULAR DISEASE IN PREGNANCY

THE CHALLENGE

Cardiac disease is one of the major causes of nonobstetric maternal mortality. Whereas in the past patients with congenital or significant heart disease did not survive to the reproductive age, it is now common for these patients to become pregnant, be it planned or unplanned. Cardiovascular disease in pregnancy is often underdiagnosed, resulting in unnecessary morbidity or mortality (possibly as much as 2-fold higher).

Scope of the Problem: Cardiac disease complicates approximately 1%–4% of all pregnancies and accounts for more than 25% of pregnancy-related deaths (4.23 deaths per 100,000 live births). Mitral valve prolapse may be observed in 5%–7% of pregnant women. The type and severity of risk vary with the type of lesion and the functional abilities of the patient (Table 229.1). Patients with valvular disease have an increased risk for thromboembolic disease, subacute bacterial endocarditis, cardiac failure, and pulmonary edema during and after pregnancy. The most common maternal-acquired heart diseases during pregnancy and the postpartum periods are heart failure, myocardial infarction, arrhythmia, and aortic dissection. Non-Hispanic black women have a 3.4-fold higher risk of dying from cardiovascular disease–related pregnancy complications. Maternal age (older than 40 years), obesity, and existing hypertension also increase the risk.

Objectives of Management: Identify patients at risk because of cardiovascular conditions, provide realistic counseling regarding the risk to mother and fetus, and work to reduce this risk. The basis of antepartum management consists of frequent evaluations of maternal cardiac status and fetal well-being, combined with the avoidance of conditions or actions that increase cardiac workload. The latter includes the treatment or avoidance of anemia,

Table 229.1 Cardiac (Maternal) Mortality Associated With Pregnancy

Group I (mortality <1%)	• Atrial septal defect • Bioprosthetic valve • Mitral stenosis (functional class I and II) • Patent ductus arteriosus • Pulmonic/tricuspid disease • Tetralogy of Fallot, corrected • Ventricular septal defect
Group II (mortality 5%–15%)	• Aortic stenosis • Coarctation of aorta, without valvular involvement **IIA** • Marfan syndrome with normal aorta • Mitral stenosis (functional class III and IV) • Previous myocardial infarction • Uncorrected tetralogy of Fallot **IIB** • Artificial valve • Mitral stenosis with atrial fibrillation
Group III (mortality 25%–50%)	• Coarctation of aorta, with valvular involvement • Marfan syndrome with aortic involvement • Pulmonary hypertension

prompt treatment of any infection or fever, limitation of strenuous activity, and adherence to appropriate weight gain.

TACTICS

Relevant Pathophysiology: Although changes vary by patient, there are multiple simultaneous changes in cardiac function during the course of pregnancy (Fig. 229.1). By mid-pregnancy, there is a 45% increase in cardiac output, a 30%–50% increase in intravascular volume, and an average drop of 10 mm Hg in blood pressure because of reduced peripheral resistance; this results in an increase in cardiac demand that may be fatal. Cardiac output shows an additional increase in the immediate postpartum period, as up to 500 mL of additional blood enters the maternal circulation because of uterine contractions and rapid loss of uterine volume. Cardiac complications, such as peripartum cardiomyopathy, may occur up to 6 months after delivery. Valvular heart disease is the most commonly encountered cardiac complication of pregnancy, with rheumatic valvular disease being the most frequent type. The severity of the associated valvular lesion determines the degree of risk associated with pregnancy. Approximately 90% of these patients have mitral stenosis, which may result in worsening obstruction as cardiac output increases during the pregnancy. When severe or associated with atrial fibrillation, the risk for cardiac failure during pregnancy is increased.

Strategies: The New York Heart Association classification of heart disease is a useful guide to the risk for pregnancy (Table 229.2). Patients with class I or II disease, such as those with septal defects, patent ductus arteriosus, or mild mitral or aortic valvular disease, generally do well during pregnancy, although their fetuses are at greater risk for prematurity and low birth weight. Patients with class III or IV disease caused by primary pulmonary hypertension, uncorrected tetralogy of Fallot, Eisenmenger syndrome, or other conditions rarely do well, with pregnancy inducing a significant risk for death, often in excess of 50%. Patients with this degree of cardiac decompensation should be advised to avoid pregnancy or consider termination based on careful consultation with specialists in both cardiology and high-risk obstetrics. The ZAHARA score, validated in a single retrospective observational cohort study, allows one to predict adverse maternal cardiac events. Other scoring systems (eg, CARPREG risk score) exist but have not been universally adopted.

IMPLEMENTATION

Special Considerations: Patients with known cardiovascular disease will do best with management by an experienced multidisciplinary team. Most patients with mitral valve prolapse do well. The rare patient with left atrial and ventricular enlargement may develop dysfunction during the course of pregnancy. The severity of the disease and impact on the atrium and ventricle may be assessed by echocardiography.

Table 229.2 New York Heart Association Classification of Heart Disease

Classification	Symptoms
Class I	No cardiac decompensation
Class II	No symptoms of decompensation at rest Minor limitations of physical activity
Class III	No symptoms of decompensation at rest Marked limitations of physical activity
Class IV	Symptoms of decompensation at rest Discomfort with any physical activity

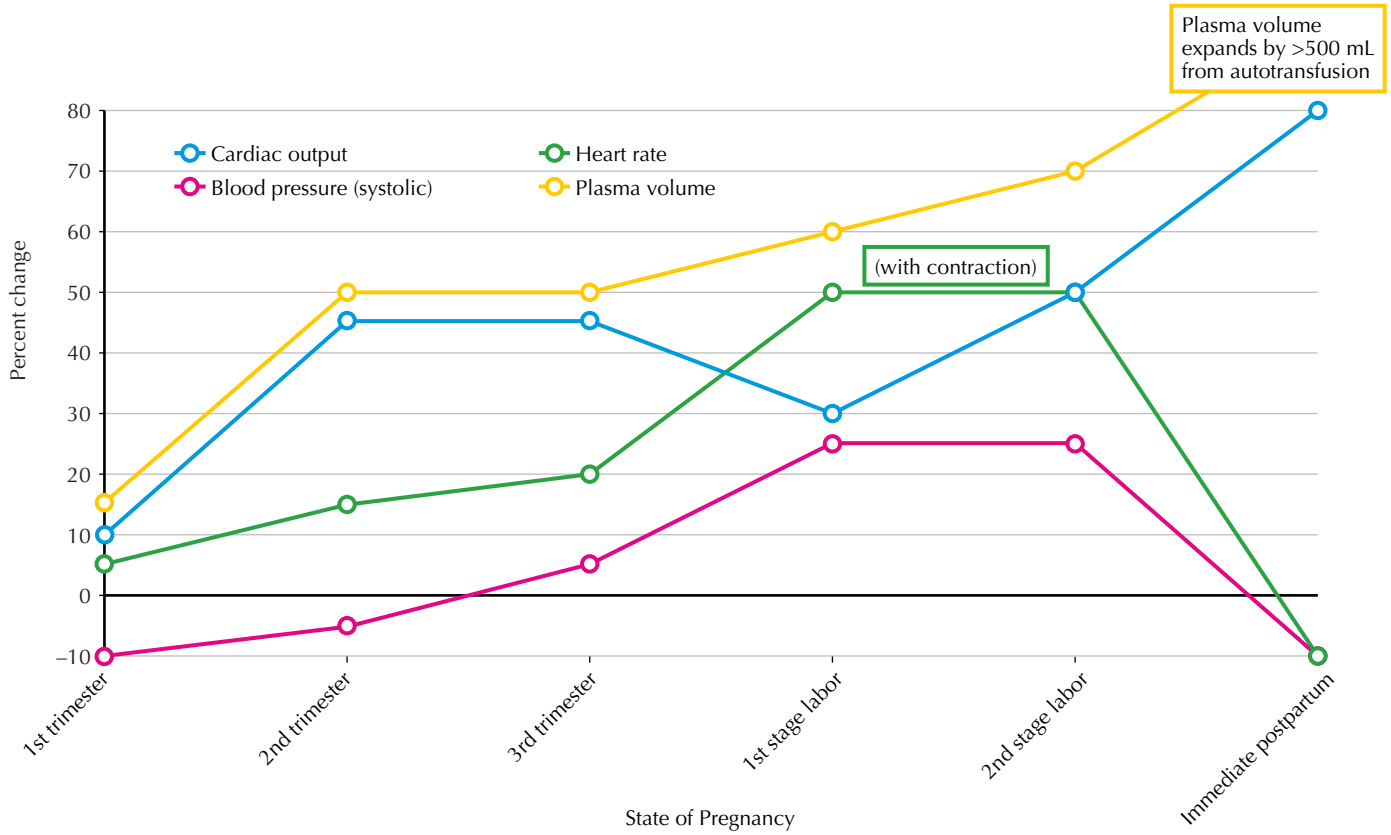

Figure 229.1 Cardiovascular changes during pregnancy

Peripartum cardiomyopathy is rare but uniformly severe. Occurring in the last month of pregnancy or during the first 6 months after delivery, it is similar to other cardiomyopathies in symptoms and findings. Most often a specific cause is not identified, and the cause remains unknown. This process presents a particularly grave risk, necessitating early suspicion and aggressive consultative management. Patients at highest risk are those in their 30s, who are multiparous, are Black, have delivered twins, or have had pre-eclampsia.

Unusual cardiac conditions, such as idiopathic hypertrophic subaortic stenosis and the structural anomalies associated with Marfan syndrome, are associated with maternal moralities of 25%–50% or higher. The presence of such conditions demands realistic preconception counseling, and early transfer for specialized care, should a pregnancy occur.

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230 CERVICAL INSUFFICIENCY

INTRODUCTION

Description: Cervical insufficiency is characterized by the asymptomatic dilation of the internal os during pregnancy. This generally leads to the dilation of the entire cervical canal during the second trimester with the subsequent risk for rupture of the membranes, expulsion of the fetus, or both. Most often, this occurs before 24 weeks gestation.

Prevalence: 1/54 to 1/1842 pregnancies (as a result of uncertain diagnostic criteria); it accounts for 10%–25% of all mid-trimester pregnancy losses; appears to be declining.

Predominant Age: Reproductive age.

Genetics: No genetic pattern. Single nucleotide polymorphisms were found in a small sample of patients with cervical insufficiency. These included rs2586490 in collagen type I alpha 1 chain (*COL1A1*), rs1882435 in collagen type IV alpha 3 chain (*COL4A3*), rs2277698 in metallopeptidase inhibitor 2 (*TIMP2*), and rs1800468 in transforming growth factor beta 1 (*TGFB1*).

ETIOLOGY AND PATHOGENESIS

Causes: Iatrogenic (most common); damage from cervical dilation at the time of dilation and curettage (D&C) or other manipulation

or damage caused by surgery (conization). Congenital tissue defect, uterine anomalies (uterus didelphys), obstetric lacerations, in utero exposure to diethylstilbestrol (DES).

Risk Factors: In utero exposure to DES (rare now), uterine anomalies, connective tissue disorders (eg, Ehlers–Danlos syndrome).

SIGNS AND SYMPTOMS

- History of second-trimester pregnancy loss accompanied by the spontaneous rupture of the membranes without labor or rapid, painless, preterm labor. Some authors argue that there must be multiple losses to establish the diagnosis.
- Prolapse and ballooning of the fetal membranes into the vagina without labor.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Uterine anomalies
- Chorioamnionitis, cervicitis
- Chromosomal anomaly (balanced translocation)

Associated Conditions: Premature rupture of the membranes, premature (preterm) delivery, and recurrent second-trimester pregnancy loss.

Workup and Evaluation

Laboratory: No evaluation indicated beyond that for routine prenatal care.

Imaging: Ultrasonography before cervical cerclage to ensure normal fetal development. Although cervical length can be measured by ultrasonography, routine use of this has not proved to be an effective screening tool except in the face of a high-risk history (then beginning approximately at 14 weeks gestation). Normal cervical length is approximately 4.1 cm (±1.02 cm) between 14 and 28 weeks and gradually decreases in length to 40 weeks, when it averages between 2.5 and 3.2 cm. Signs of cervical funneling and cervical shortening are associated with an increased risk for preterm delivery, but management in the absence of other risk factors is unclear and the finding is not sufficient to establish the diagnosis of cervical insufficiency.

Special Tests: None indicated. Frequent vaginal or ultrasonographic examinations beginning around the time of previous cervical change or the second trimester, whichever is earlier. Attempts to define or identify cervical incompetence by hysterosonography, pull-through techniques with inflated catheter balloons, measurement of cervical resistance to cervical dilators, magnetic resonance imaging, and others have not been validated or gained clinical acceptance.

Diagnostic Procedures: History.

Pathologic Findings

Painless dilation of the cervix.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, frequent prenatal visits with monitoring for cervical change.

Specific Measures: Cervical cerclage (placement of a concentric nonabsorbable suture at the level of the inner cervical os) is generally performed between 10 and 14 weeks of gestation, once viability has been established. When the suture is vaginally placed,

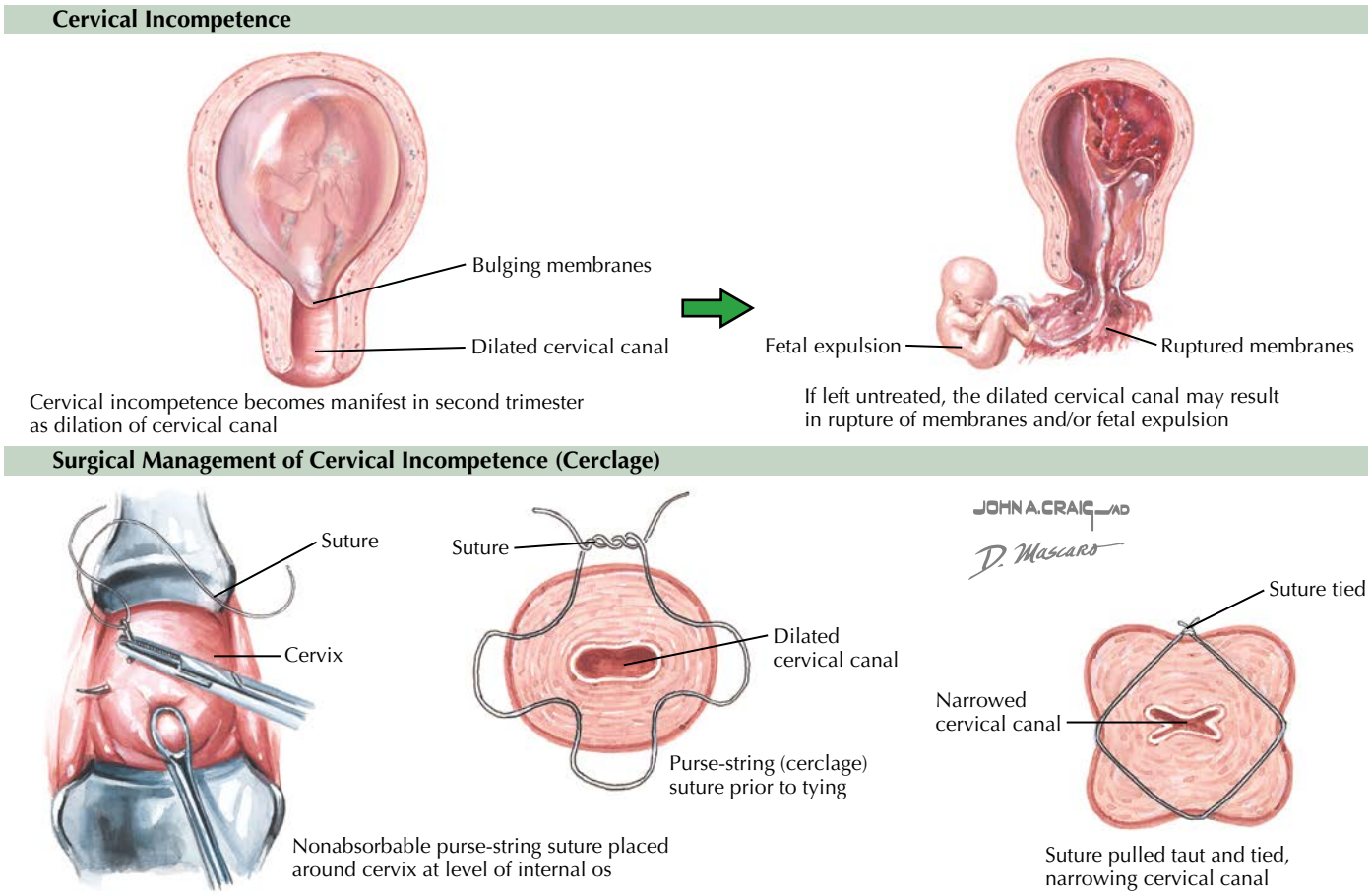

Figure 230.1 Cervical insufficiency and surgical management

it is generally removed at 38 weeks gestation. If labor occurs before this point, the suture must be immediately removed. Cervical cerclage is occasionally transabdominally performed. These sutures are intended to remain permanently and preclude vaginal delivery. The use of lever pessaries (such as the Smith–Hodge) has been reported to give outcomes similar to that obtained by cerclage, but this modality is infrequently used and more recent studies call into question the earlier work. Bleeding, uterine contractions, obvious infection, or rupture of the membranes is a contraindication to cerclage. Because of scarring after cerclage, approximately 15% of patients require cesarean delivery.

Diet: No specific dietary changes indicated.

Activity: Restriction of activity is often suggested, but evidence that this alters the outcome of pregnancy is lacking. Restrictions are generally discouraged. After 24 weeks of pregnancy, bed rest may be the only therapy available because cerclage may bring on labor.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- LEEP Procedure, 2021
- Repeated Miscarriage, 2016

Drug(s) of Choice

- In women with prior second-trimester pregnancy loss suggestive of cervical insufficiency, randomized trials of hydroxyprogesterone caproate prophylaxis (from 16–20 weeks to 36 weeks) have reduced the risk for recurrent preterm birth.
- Prophylactic antibiotics and beta mimetics have not been shown to be effective.

FOLLOW-UP

Patient Monitoring: Frequent prenatal visits with monitoring for cervical change in patients thought to be at high risk. If a cerclage is placed, planned removal of cerclage at 38 weeks gestation is advisable.

Prevention/Avoidance: Care to avoid overdilation of the cervix when surgical manipulation is required.

Possible Complications: Continued fetal loss, chorioamnionitis, cervical avulsion, or uterine rupture if labor occurs and the cerclage is not removed.

Expected Outcome: With correct diagnosis and cervical cerclage, fetal survival increases from 20% to more than 80%.

MISCELLANEOUS

ICD-10-CM Code: N88.3 (Incompetence of cervix uteri).

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231 CHOLECYSTITIS IN PREGNANCY

INTRODUCTION

Description: Cholelithiasis and cholecystitis complicate more than 3% of pregnancies. Acute cholecystitis is the second most common nonobstetric indication for surgery during pregnancy (after acute appendicitis).

Prevalence: Cholelithiasis—3%–4% of pregnancies; cholecystitis—0.25% of pregnancies.

Predominant Age: Reproductive age.

Genetics: Some groups are at greater risk (eg, Pima Indians).

ETIOLOGY AND PATHOGENESIS

Causes: The metabolic alteration leading to cholesterol stones (gallstones) is considered to be a disruption in the balance between hydroxymethylglutaryl coenzyme A (HMG-CoA) reductase and cholesterol 7α-hydroxylase. HMG-CoA controls cholesterol synthesis, whereas cholesterol 7α-hydroxylase controls the rate of bile acid formation. Patients who form cholesterol stones have elevated HMG-CoA levels and depressed cholesterol 7α-hydroxylase levels. This change in ratio increases the risk for

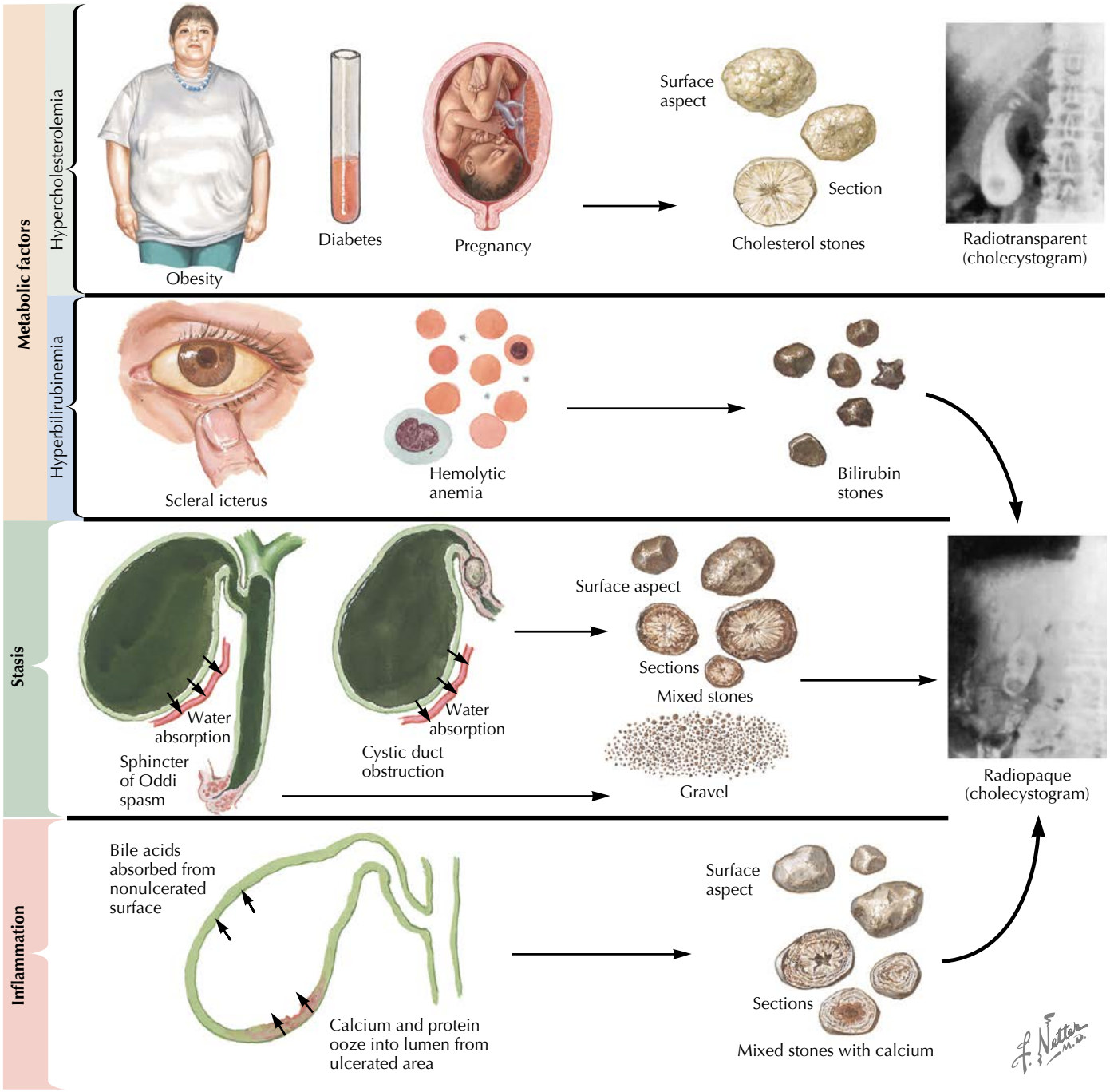

Figure 231.1 Cholecystitis

cholesterol precipitation. During pregnancy, there is an increased rate of bile synthesis, increased cholesterol saturation of bile, and a reduced rate of gallbladder emptying, increasing the risk for stone formation and obstruction. These physiologic changes reverse by approximately 2 months after delivery. As a result, approximately 30% of stones smaller than 10 mm disappear due to unsaturation of bile in the postpartum period.

Risk Factors: Cholecystitis is associated with an increased maternal age, multiparity, multiple gestation, and a history of previous attacks.

SIGNS AND SYMPTOMS

- Unchanged by pregnancy
- May be confused with symptoms of pregnancy
- Fatty food intolerance
- Variable right upper quadrant pain with radiation to the back or scapula
- Nausea or vomiting (often mistaken for "indigestion" or "morning sickness")
- Fever is usually associated with cholangitis

DIAGNOSTIC APPROACH

Differential Diagnosis

- Labor
- Pre-eclampsia
- Placental accident (abruption)
- Cholestasis of pregnancy

- Gastroenteritis
- Esophageal reflux
- Malabsorption
- Irritable bowel syndrome
- Peptic ulcer disease
- Coronary artery disease
- Pneumonia
- Appendicitis

Associated Conditions: Jaundice, cirrhosis, pancreatitis, ileus, and premature labor.

Workup and Evaluation

Laboratory: Supportive, but often not diagnostic—complete blood count, serum bilirubin, amylase, alkaline phosphatase, and aminotransferase concentrations.

Imaging: Ultrasonography of the gallbladder (96% accurate in making the diagnosis of sludge or stone in the gallbladder); can visualize stones as small as 2 mm.

Special Tests: None indicated.

Diagnostic Procedures: History, physical examination, ultrasonography, and laboratory investigation.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Watchful waiting, dietary modifications aimed at reducing cholesterol and fatty food exposure.

Specific Measures: Cholelithiasis may be treated with supportive and oral therapy (analgesics, antiemetics); surgical extirpation may be required. Cholecystectomy during pregnancy is associated with a 5% fetal loss rate, which increases to approximately 60% if pancreatitis is present at the time of surgery.

Diet: Nothing by mouth during acute attacks or until the diagnosis is established (some patients require nasogastric suction during acute attacks). Reduced fatty food and cholesterol at other times.

Activity: No restriction.

Drug(s) of Choice

- Ursodeoxycholic acid (Actigall) 8–10 mg/day divided in to two to three doses. When cholecystitis is present, intravenous fluids, nasogastric suction, analgesics, and antibiotics (cephalosporin) are appropriate.
- If cholecystitis or pancreatitis are present, coverage with ampicillin-sulbactam 3 g IV every 6 hours or piperacillin-tazobactam 3.375 g IV every 6 hours is appropriate.

Contraindications: Known allergy, acute cholecystitis, abnormal liver function, calcified stones (not cholesterol based).

Interactions: See warning for individual agents.

FOLLOW-UP

Patient Monitoring: Normal prenatal care once acute episode is resolved.

Prevention/Avoidance: None.

Possible Complications: Acute cholecystitis, pancreatitis, ascending cholangitis, peritonitis, internal fistulation (to the gastrointestinal tract), premature labor or delivery.

Expected Outcome: Cholecystitis—generally good with either oral or surgical therapy.

MISCELLANEOUS

ICD-10-CM Code: K80.20 (Calculus of gallbladder without cholecystitis without obstruction, others based on obstruction or inflammation).

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CHORIOAMNIONITIS

232

INTRODUCTION

Description: Chorioamnionitis is the inflammation of the fetal membranes. This may be associated with prolonged or premature rupture of the membranes or a primary cause of premature labor. A Eunice Kennedy Shriver National Institute of Child Health and Human Development expert panel proposed a descriptive term: "intrauterine inflammation or infection or both" abbreviated as "Triple I" to replace the term chorioamnionitis. The same panel recommended separating intraamniotic infection into three different categories: (1) isolated maternal fever, (2) suspected intraamniotic infection, and (3) confirmed intraamniotic infection. These distinctions are more important in the research setting and not for the acute care of the patient.

Prevalence: More than 40% of premature deliveries. Most cases will be found in term pregnancies (2%–5% of term pregnancies).

Predominant Age: Reproductive age.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Infection by organisms that ascend from the vaginal canal, most often when the membranes have been ruptured. Studies indicate that bacteria (specifically *Escherichia coli*) can permeate intact chorioamnionic membranes. Infection may also occur by hematogenous (eg, *Listeria monocytogenes*), transabdominal, or transfallopian routes or after invasive procedures (eg, amniocentesis or chorionic villus sampling).

Risk Factors: Prolonged rupture of the membranes, prolonged labor, internal uterine and fetal monitoring, multiple pelvic examinations (may not be independent of length of labor), low parity, bacterial or trichomonas vaginitis, vaginal or cervical infection with *Chlamydia trachomatis,* smoking, anemia, vaginal bleeding.

SIGNS AND SYMPTOMS

- May be asymptomatic
- Fever (>100.5°F, 38°C, 100% of cases); fever alone is insufficient to establish the diagnosis or to initiate antibiotic treatments
- Leukocytosis (70%–90%)
- Tachycardia (maternal and fetal, 40%–80%)
- Uterine irritability and tenderness (25%)
- May result in premature rupture of the membranes or preterm labor
- Maternal signs of infection (elevated white blood count and sedimentation rate)
- Purulent/malodorous cervical discharge (late)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Placental abruption
- Intraabdominal infection (eg, appendicitis)
- Pyelonephritis
- Pneumonia
- Pulmonary embolism
- Wound infection (episiotomy, abdominal incision following cesarean delivery or tubal ligation)
- Breast engorgement
- Drug fever

Associated Conditions: Endometritis, fetal infections (pneumonia, skin infections, septicemia), and oligohydramnios have been linked to clinical chorioamnionitis. Dysfunctional labor and postpartum hemorrhage are more common. Cerebral palsy has been linked to intrauterine infection and the associated inflammatory processes.

Workup and Evaluation

Laboratory: White blood count and red cell sedimentation rate. Gram stain of amniotic fluid (a negative test carries a 99% specificity) or measurement of amniotic fluid glucose (<15 mg/dL). Cultures may be obtained and may be of assistance in management, but the diagnosis is made on clinical grounds. Amniocentesis for culture has not been shown to improve pregnancy outcome. There is no clear evidence to support the use of C-reactive protein for the early diagnosis of chorioamnionitis.

Imaging: No imaging indicated.

Special Tests: A biophysical profile of the fetus may be of assistance in planning management (if time and maternal condition permit).

Diagnostic Procedures: Physical examination, cultures.

Pathologic Findings

Invasion of the chorion by mononuclear and polymorphonuclear leukocytes (nonspecific). Chorioamnionitis most often is polymicrobial in origin, involving aerobic and anaerobic bacteria, originating from vaginal flora.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and antibiosis; antipyretics and labor management as needed.

Specific Measures: Expedited delivery (induction of labor, augmentation of labor) and antibiotic therapy. Intrauterine infection is not an indication for cesarean delivery. For infections diagnosed during or prior to labor, the need for antibiotics should be reevaluated after vaginal delivery. They should be continued after cesarean delivery.

Diet: No specific dietary changes indicated except as dictated by obstetric management.

Activity: No restriction except as dictated by obstetric management.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Preterm Labor and Birth, 2021

Drug(s) of Choice

Broad-spectrum antibiotic coverage based on organism suspected or detected by culture.

- Ampicillin 2 g IV every 6 hours **plus** gentamicin 5 mg/kg IV every 24 hours
- Cefoxitin (2 g IV every 6–8 hours) **plus** gentamicin 5 mg/kg IV every 24 hours
- Clindamycin 900 mg IV every 8 hours **or** vancomycin 1 g IV every 12 hours **plus** gentamicin 5 mg/kg IV every 24 hours
- Antipyretics to reduce the risk of fetal morbidity

Contraindications: Known or suspected allergy. See individual agents for additional considerations.

Precautions: See individual agents.

Interactions: See individual agents.

Alternative Drugs

- Ampicillin/sulbactam 3 g IV every 6 hours
- Piperacillin/tazobactam 3.375 g IV every 6 hours **or** 4.5 g every 8 hours
- Cefotetan 2 g IV every 12 hours
- Cefoxitin 2 g IV every 8 hours

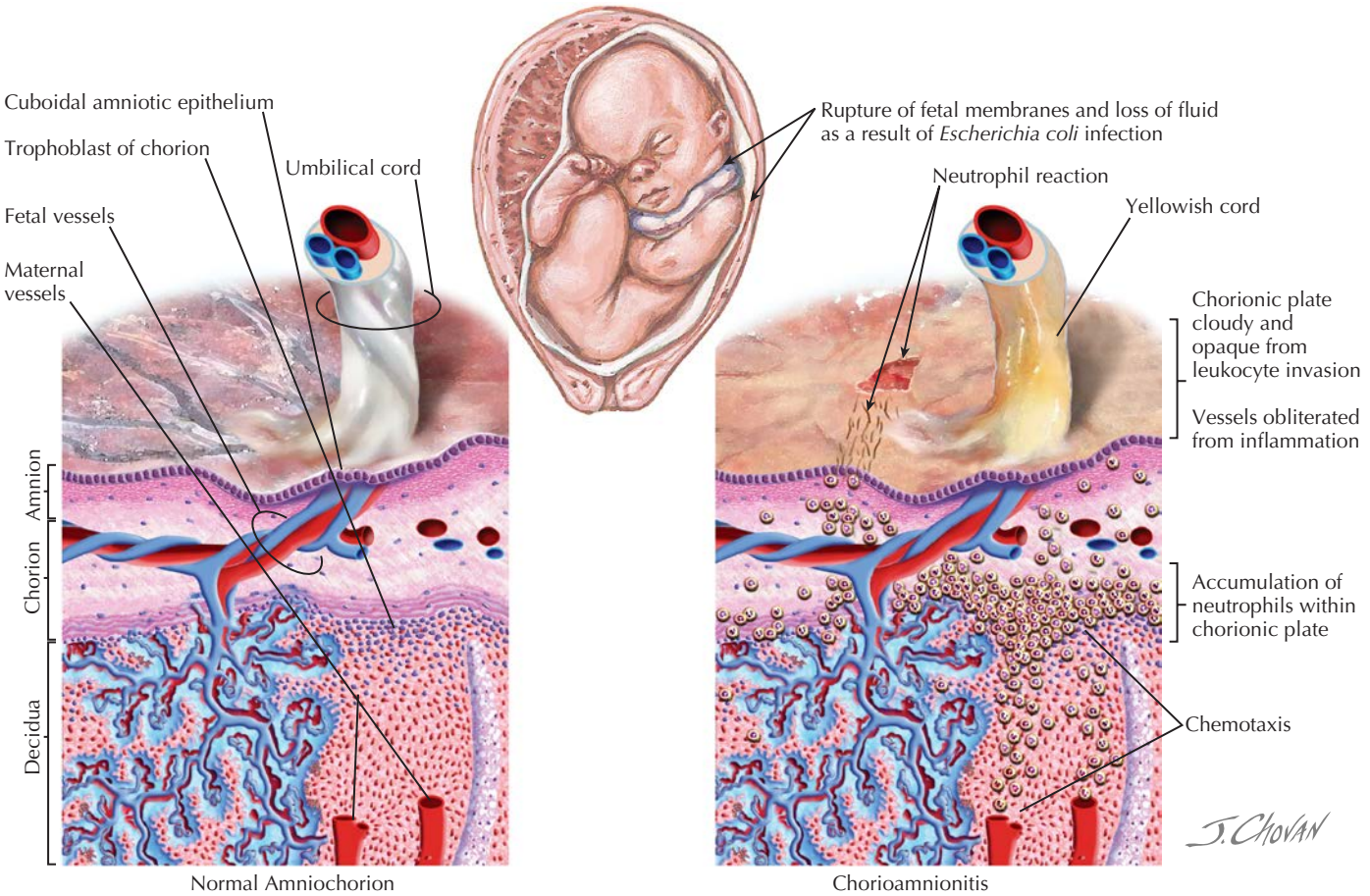

Figure 232.1 Chorioamnionitis

- Ertapenem 1 g IV every 24 hours
- Gentamycin may be given as 1.5 mg/kg IV every 8 hours following a 2 mg/kg loading dose rather than the 5 mg/kg/day dose noted above. The higher dose is more convenient and results in lower fetal blood levels.

FOLLOW-UP

Patient Monitoring: Increased need for fetal and maternal monitoring for the effects of infection and for the associated labor.

Prevention/Avoidance: Restricted vaginal examinations in labor after rupture of the membranes.

Possible Complications: Intraamniotic infection can be associated with acute neonatal morbidity, including pneumonia, meningitis, sepsis, and death. Long-term fetal morbidity (eg, bronchopulmonary dysplasia and cerebral palsy) are also possible. Maternal morbidity can be significant, including dysfunctional labor, postpartum uterine atony (with hemorrhage), endometritis, peritonitis, sepsis, acute respiratory distress syndrome, and, rarely, death. Significant maternal sepsis may occur, in rare cases to the extent that hysterectomy may be required. If antibiotic therapy does not provide improvement in 24–48 hours, consider the possibility of abscess or septic pelvic thrombophlebitis.

Expected Outcome: With early recognition, aggressive antibiosis, and expedited delivery, maternal response should be expected to be good. Fetal outcome is based on the gestational age at delivery.

MISCELLANEOUS

Pregnancy Considerations: When chorioamnionitis is present, delivery generally must be expedited.

Other Notes: Up to 20% of women with preterm labor can have bacteria recovered by amniocentesis without evidence of overt clinical infection. Chorioamnionitis is not an indication for cesarean delivery.

ICD-10-CM Code: O41.1230 (Chorioamnionitis, third trimester, not applicable or unspecified).

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DIABETES MELLITUS IN PREGNANCY

233

THE CHALLENGE

The challenge is to diagnose and manage disturbances of glucose metabolism to minimize the risk associated with diabetes in mothers and fetuses. Diabetes and pregnancy have profound effects on each other, making a familiarity with the interactions between mother, fetus, and the diabetic process a requirement to provide optimal care.

Scope of the Problem: Diabetes mellitus is the most common medical complication of pregnancy, affecting 2%–7% of patients (varying in direct proportion to the prevalence of type 2 diabetes in a given population or ethnic group). Between 80% and 90% of these patients have gestational diabetes. Patients who had gestational diabetes in a previous pregnancy have a 33%–50% likelihood of recurrence in a subsequent pregnancy. Patients with type 1 diabetes are at greater risk for maternal complications (diabetic ketoacidosis, glucosuria, hyperglycemia, polyhydramnios, pre-eclampsia, pregnancy-induced hypertension, preterm labor, retinopathy, urinary tract infections, postpartum uterine atony). The offspring of women with diabetes have a 3-fold greater risk for congenital anomalies (3%–6%) than children of mothers without diabetes (1%–2%). Most common among these anomalies are cardiac and limb deformities. Other fetal complications include fetal demise, polyhydramnios, hyperbilirubinemia, hypocalcemia, hypoglycemia, macrosomia, polycythemia, prematurity, respiratory distress syndrome, and spontaneous abortion.

Objectives of Management: To return serum glucose levels to as close to normal as possible through a combination of diet, exercise, oral hypoglycemic agents, and insulin (for selected patients). Optimal management of diabetes begins before pregnancy. Optimal management also requires patient and family education and involvement. For the established patient with diabetes, this teaching is directed to the need for tighter control and more frequent monitoring. The woman with newly diagnosed diabetes requires general instruction about her disease and the unique aspects of diabetes during pregnancy. With respect to the fetus, the goal of treatment is to reduce the likelihood of macrosomia and its consequences. Neonatal hypoglycemia may also be reduced.

TACTICS

Relevant Pathophysiology: Human placental lactogen, made in abundance by the growing placenta, promotes lipolysis and decreases glucose uptake and gluconeogenesis. This anti-insulin effect is sufficient to tip borderline patients into a diabetic state or prompt readjustments in the insulin dosage used by patients with insulin-dependent diabetes. Estrogen, progesterone, and

placental insulinase further complicate the management of diabetes, making diabetic ketoacidosis more common. High renal plasma flow and diffusion rates that exceed tubular reabsorption result in a physiologic glucosuria of approximately 300 mg/day. This physiologic glucosuria, combined with the poor correlation between urinary glucose and blood glucose levels, makes the urinary glucose screening useless to detect or monitor diabetes during pregnancy (once the standard).

Strategies: The severity of diabetes may be classified by either the American Diabetes Association (ADA) classification or by the White classification schemes, although the latter has been rendered less useful by improvements in fetal assessment, neonatal care, and the metabolic management of the pregnant patient. The use of these classifications makes comparisons of published data meaningful and may help to predict the relative risk to the pregnant mother and fetus. Patients with ADA–defined type 2 disease are often overweight, and their diabetes may be controlled with strict diet or with minimal oral hypoglycemic agents or insulin therapy. Gestational diabetes is reversible, although these patients have a greater incidence of glucose intolerance in subsequent pregnancies or with aging. Because of the increased risk for fetal anomalies, a determination of maternal serum α-fetoprotein and early ultrasonographic studies are of great importance for these patients. Antenatal testing and active management of late pregnancy and labor induction are all indicated for selected patients with diabetes. When there is an estimated fetal weight of 4500 g or more, planned cesarean delivery may be considered because it may reduce the likelihood of permanent brachial plexus injury in the infant.

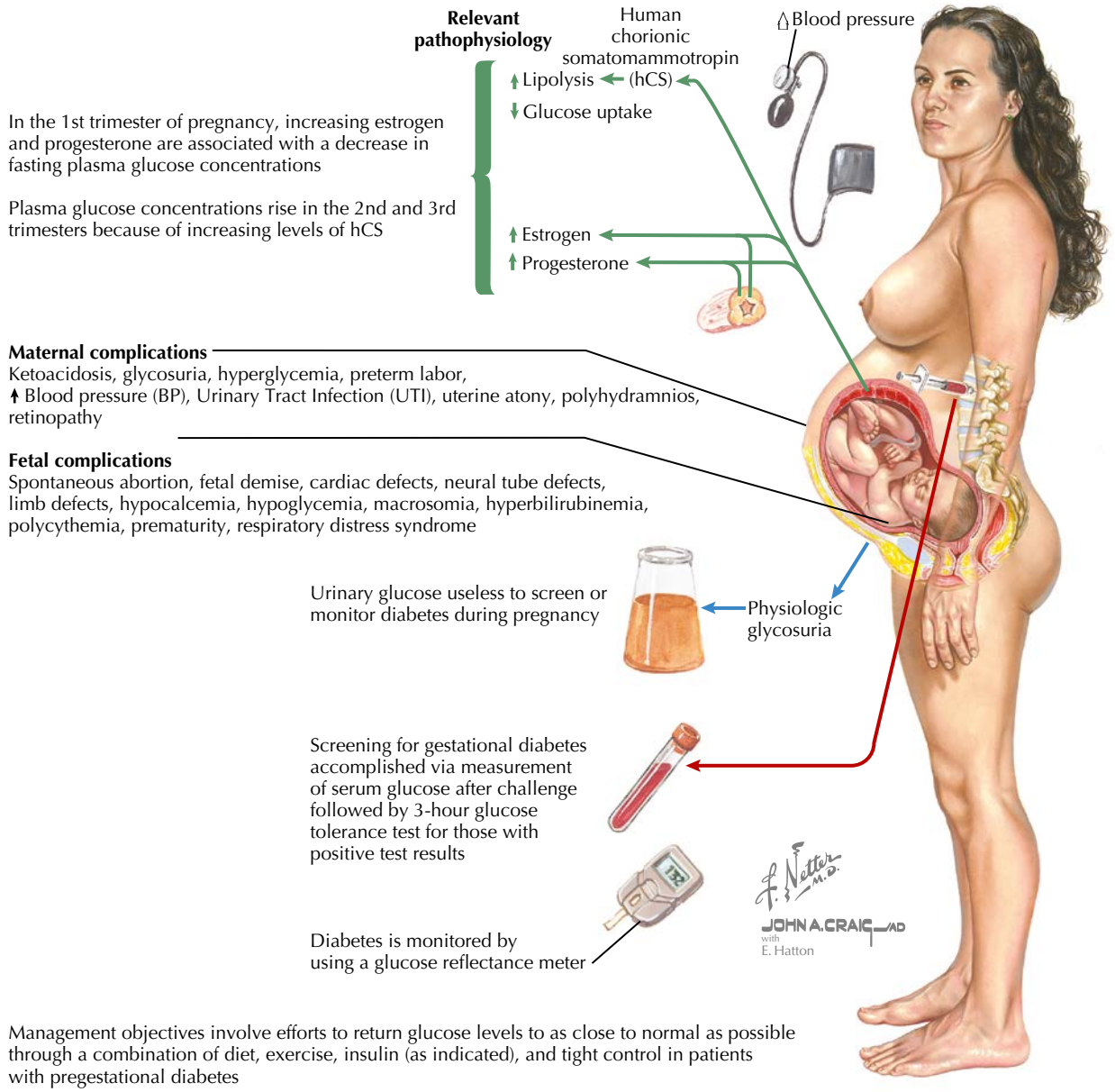

Figure 233.1 Relevant pathophysiology in gestational diabetes

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- A Healthy Pregnancy for Women with Diabetes, 2019
- Gestational Diabetes, 2020
- Diabetes and Women, 2020
- Routine Tests During Pregnancy, 2021
- Special Tests for Monitoring Fetal Well-Being, 2019

IMPLEMENTATION

Special Considerations: Screening for gestational diabetes is conducted by measuring the plasma glucose level at 1 hour after ingestion of a 50-g glucose load and is performed between 24 and 28 weeks of gestation. Jellybeans can be substituted for the usual glucose beverage (28 standard-sized jellybeans = 50 g simple carbohydrate) but this method has poor sensitivity (40%) when compared with glucose polymer solutions (80%–90%). The upper limit of normal for such a test is 130 mg/dL (A screening test threshold of 140 mg/dL has 10% less sensitivity than a threshold of 130 mg/dL but fewer false-positive results; either threshold is acceptable). If a patient's value exceeds this threshold, a formal 3-hour glucose tolerance test is performed. Approximately15% of patients have an abnormal screening test, and approximately the same proportion have an abnormal 3-hour test. For a 3-hour glucose tolerance test, the patient must ingest a minimum of 150 g/day of glucose for the 3 days preceding the test. A fasting glucose level is determined, and a 100-g glucose load is consumed. Plasma glucose levels are then measured at 1, 2, and 3 hours. If two or more values are abnormal, the diagnosis of gestational diabetes may be made. If only one value is abnormal, the test is considered equivocal and should be repeated in 4–6 weeks. Studies indicate that screening may be omitted for selected individuals who are at very low risk by selection criteria (Box 233.1).

BOX 233.1 Individuals at Low Risk for Gestational Diabetes (Must Meet All Criteria)

- Age younger than 25 years
- No known diabetes in first-degree relative
- Not a member of an ethnic group with an increased risk for the development of type 2 diabetes (examples of high-risk ethnic groups include women of Hispanic, African, Native American, South or East Asian, or Pacific Islands ancestry)
- Body mass index of 25 or less
- No previous history of abnormal glucose tolerance
- No previous history of adverse obstetric outcomes usually associated with gestational diabetes mellitus

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234 FETAL ALCOHOL SYNDROME

INTRODUCTION

Description: Fetal alcohol spectrum syndrome is characterized by malformations found in infants born to mothers who have consumed alcohol during pregnancy. Abnormalities include structural malformations (predominantly facial), growth restriction, and neurologic abnormalities, including mental retardation.
Prevalence: Estimates vary from 6/10,000 births to 2/1000 births and globally as high as 23/1000 births. US rates are estimated to be 1%–5% of births. Intrauterine exposure to alcohol is a leading cause of preventable birth defects and developmental disabilities.
Predominant Age: Reproductive age for mothers, infants diagnosed at birth.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Alcohol consumption during pregnancy (generally >3 oz/day). There does not appear to be a lower limit of safety, nor are the effects confined to one part of pregnancy. The severity of the effects appears to be proportional to the amount and duration of exposure. Clinically identifiable effects are generally not seen with sporadic exposures of less than 1 oz of alcohol per day, although absolute safety cannot be assured even at this dose, because alcohol is eliminated from the fetal compartment at a rate of less than 5% of the maternal rate.
Risk Factors: Alcohol use during pregnancy; other factors associated with alcohol use or abuse.

SIGNS AND SYMPTOMS

- Facial deformities (60%)—microcephaly, short palpebral fissures, flat midface, underdeveloped philtrum and thinned upper lip, low nasal bridge, epicanthal folds, minor ear anomalies, small teeth with faulty enamel, foreshortened nose and micrognathia may also be seen; two or more abnormal facial features must be present to make the diagnosis
- Cardiac malformations
- Deformities of joints, limbs, and fingers (eg, 5th finger clinodactyly, camptodactyly)
- Vision difficulties, including nearsightedness (myopia)
- Intrauterine and extrauterine growth restriction
- Mental retardation and developmental abnormalities, brain and spinal defects
- Abnormal behavior such as short attention span, hyperactivity, poor impulse control, extreme nervousness, and anxiety

DIAGNOSTIC APPROACH

Differential Diagnosis

- Other chromosomal or congenital syndromes

Associated Conditions: Maternal—other substance abuse (tobacco, drugs), sexually transmitted infections, early pregnancy loss. Fetal—dental caries, cardiac defects, and ophthalmic problems (vision correction often necessary).

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: Ultrasonography may be used to assess fetal growth and development. Some cardiac anomalies may be detected while in utero; absence does not exclude effects.
Special Tests: None indicated.
Diagnostic Procedures: History (maternal) and physical examination of newborn.

Pathologic Findings

Reduced brain volume affecting the frontal lobe, striatum and caudate nucleus, thalamus, and cerebellum; thinning of the corpus callosum; and abnormal functioning of the amygdala.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: For the mother—counseling, alcohol and substance abuse programs. For the fetus—evaluation, special education and support, surveillance for dental caries (more common in these children), and cardiac and ophthalmic problems.
Specific Measures: None.
Diet: Reduction or elimination of alcohol for the duration of pregnancy.
Activity: No restriction.
Patient Education: Diet and alcohol counseling.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Alcohol and Women, 2015
- Tobacco, Alcohol, Drugs, and Pregnancy, 2020

Drug(s) of Choice

None

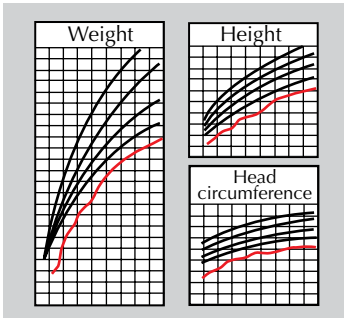
FOLLOW-UP

Patient Monitoring: Normal health maintenance, surveillance for dental caries (more common in these children), and cardiac and ophthalmic problems.
Prevention/Avoidance: Reduction or elimination of alcohol use during pregnancy. No safe level of exposure has been demonstrated, although sporadic use of less than 1 oz of alcohol per day has not been associated with the syndrome.
Possible Complications: Higher rate of spontaneous miscarriage in heavy users of alcohol.
Expected Outcome: Infants affected by fetal alcohol syndrome vary from mildly to profoundly mentally retarded. Similarly, structural anomalies are variable but lifelong.

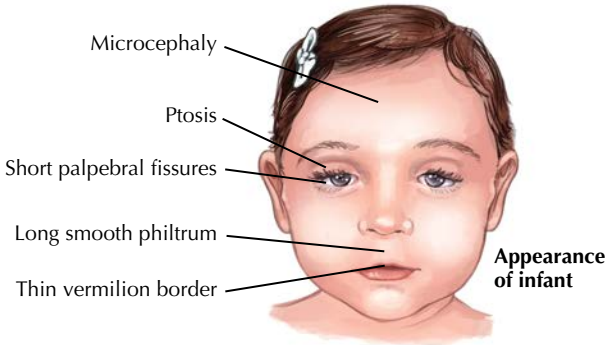
MISCELLANEOUS

ICD-10-CM Code: P04.3 (Newborn [suspected to be] affected by maternal use of alcohol) and Q86.0 (Fetal alcohol syndrome [dysmorphic]).

Alcohol consumption in excess of 3 oz/day during pregnancy is considered "high risk." Although identifiable effects are seldom seen with consumption less than 1 oz/day, there is no assurance of safety at that level



Developmental deficiency is common. Prognosis is most influenced by degree of maternal alcohol consumption, extent and severity of malformation pattern, including growth restriction



Cardiac and skeletal anomalies are common

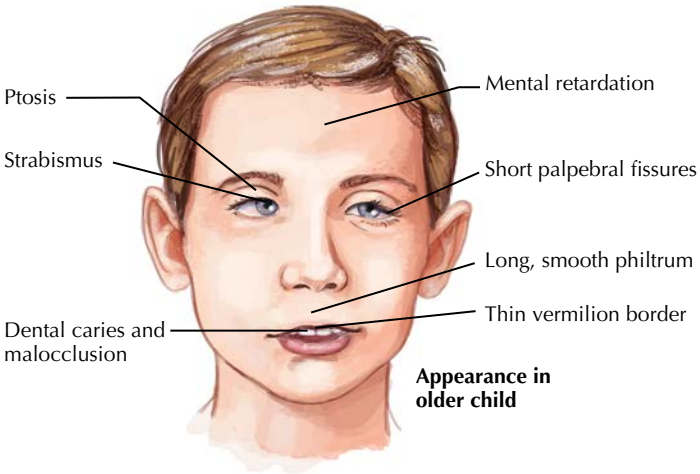


Figure 234.1 Clinical features in fetal alcohol syndrome

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235 GESTATIONAL TROPHOBLASTIC DISEASE

INTRODUCTION

Description: Gestational trophoblastic diseases include choriocarcinoma, molar pregnancy (hydatidiform mole and invasive mole), placental-site trophoblastic tumor, and epithelioid trophoblastic tumor (rare variant of placental-site tumors). They are abnormalities of pregnancy that arise entirely from abnormal placental proliferation. They are classified as being either complete, in which no fetus is present, or incomplete (partial), in which both fetus (generally abnormal) and molar tissues are present.

Prevalence: Molar pregnancy—1/1000–1500 pregnancies in the United States; as high as 10/1000 pregnancies in Asia; choriocarcinoma—1/40,000 pregnancies.

Predominant Age: Greatest during the early and late reproductive years.

Genetics: Complete—mostly 46,XX (paternal in origin, although mitochondrial DNA remains maternal in origin). Incomplete—triploid (69,XXY or 69,XXX; all of paternal origin).

ETIOLOGY AND PATHOGENESIS

Causes: Unknown.

Risk Factors: Maternal age (older than 40: 5.2 times risk), Asians living in Southeast Asia, folate deficiency, prior molar pregnancy (2% recurrence rate).

SIGNS AND SYMPTOMS

- Present as a pregnancy but associated with more profound hormonal changes, leading to exaggerated symptoms of pregnancy in many patients
- Uterine size that is inappropriate for dates (larger or smaller, 30%)
- Painless vaginal bleeding (95%, generally 6–16 weeks of gestation)
- Hypertension, pre-eclampsia, proteinuria, nausea and vomiting (hyperemesis, 8%), visual changes, tachycardia, and shortness of breath all possible (pregnancy-induced hypertension in the first trimester of pregnancy is virtually diagnostic)
- Incomplete molar pregnancies—symptoms of an incomplete or missed abortion (90%), including vaginal bleeding (75%)
- Bilateral ovarian enlargement (theca lutein cysts; because of excess human chorionic gonadotropin [hCG] stimulation)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Choriocarcinoma
- Missed abortion
- Threatened abortion

Associated Conditions: Hyperemesis, hypertension, hyperthyroidism, pre-eclampsia, proteinuria, nausea and vomiting, visual changes, tachycardia, and shortness of breath. Bilateral adnexal masses (theca lutein cysts) occur in 15%–20% of patients.

Workup and Evaluation

Laboratory: Complete blood count, quantitative measurement of β-hCG; to establish risk and serial to follow success of therapy), the patient's blood type and Rh status should be established to allow for Rh immunoglobulin therapy (if needed) or blood replacement. Clotting function studies and blood cross-matching are advisable before the evacuation of a large uterus. hCG levels often exceed 100,000 ImU/mL for invasive mole or choriocarcinoma.

Imaging: Ultrasonography can establish the diagnosis. A baseline chest radiograph to check for metastatic disease should be obtained.

Special Tests: Absence of fetal heart sounds (in complete mole).

Diagnostic Procedures: History and physical examination. Edematous trophoblastic fragments may be vaginally passed through a partially dilated cervical os, alerting the clinician to the diagnosis.

Pathologic Findings

Edematous trophoblastic fronds. Karyotype: incomplete; triploid (80%); complete; 46,XX (95%).

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation and diagnosis, general supportive measures.

Specific Measures: The treatment of molar pregnancies is surgical: evacuation of the uterine contents. This is most often accomplished by suction curettage. Because of the large size of some molar pregnancies and a tendency toward uterine atony, concomitant oxytocin administration is advisable, and blood for transfusion must be immediately available should it be needed.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Drug(s) of Choice

- Oxytocin or methylergonovine maleate (Methergine) is used to help contract the uterus during surgical evacuation.
- Primary or recurrent malignant trophoblastic disease is generally treated with chemotherapy (methotrexate, actinomycin D, chlorambucil, or cyclophosphamide [Cytoxan], singly or in combination).

FOLLOW-UP

Patient Monitoring: After the uterus has been emptied, the patient must be closely observed for at least 1 year for the possibility of recurrent benign or malignant disease. Any change in the patient's examination findings, an increase in β-hCG titers, or a failure of the β-hCG level to fall below 10 mIU/mL by 12 weeks after evacuation must be evaluated for the possibility of a recurrent benign or malignant disease. Serum hCG levels are generally monitored every 2 weeks until three consecutive tests are negative, then monthly for 6–12 months. (Proteolytic enzymes and heterophilic antibodies found in 3%–4% of individuals can cause a falsely positive hCG test [up to 800 ImU/mL has been reported] and can lead to inappropriate therapy).

Prevention/Avoidance: None.

Possible Complications: Gestational trophoblastic neoplasia is notable for the possibility of malignant transformation, although less than 10% of patients develop malignant changes. In general, the larger or more advanced the molar pregnancy, the greater the risk of pulmonary complications, bleeding, trophoblastic emboli, or fluid overload during evacuation.

Expected Outcome: Approximately 80% of molar pregnancies follow a benign course after an initial therapy. Between 15% and 25% of patients develop invasive disease, and 3%–5% eventually have metastatic lesions. The prognosis for patients with primary or recurrent malignant trophoblastic disease is generally good (>90% cure rate). The theca lutein cysts often found in molar

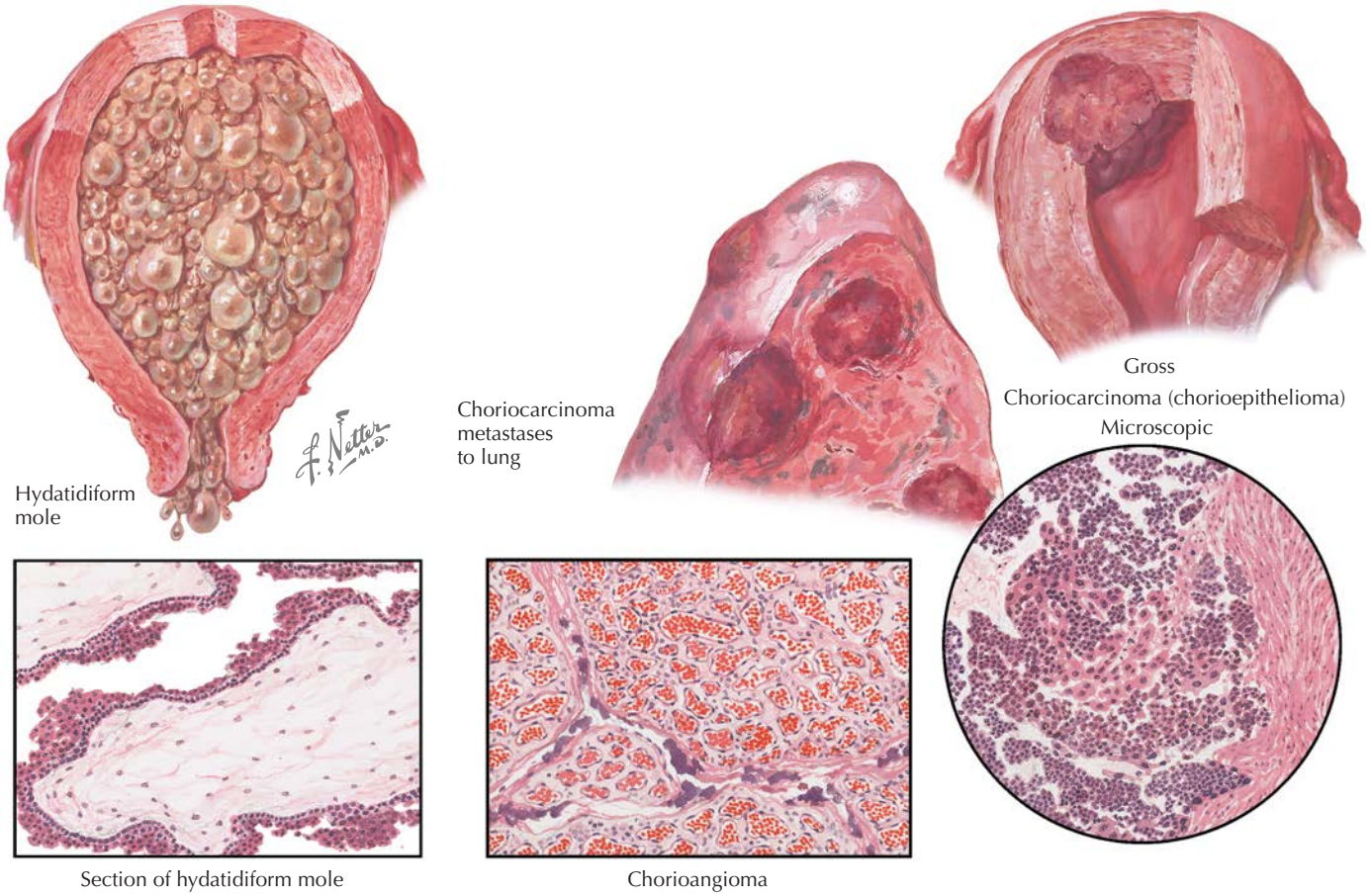

Figure 235.1 Gestational trophoblastic disease

pregnancies may take several months to regress after evacuation of the uterine contents. Less than 5% of patients will require hysterectomy to achieve a cure for choriocarcinoma.

MISCELLANEOUS

Pregnancy Considerations: Pregnancy should be delayed for at least 1 year after a molar pregnancy to avoid confusion between normal pregnancy and recurrent disease. These patients have no higher rate of abortions, stillbirths, congenital anomalies, prematurity, or other complications of pregnancy with future gestations. The placenta from any subsequent pregnancies should be sent for histologic evaluation.

ICD-10-CM Codes: O01.9 (Hydatidiform mole, unspecified) and D39.2 (Neoplasm of uncertain behavior of placenta).

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236 GINGIVITIS IN PREGNANCY

INTRODUCTION

Description: Elevated hormone levels during pregnancy may induce gingival hyperplasia, pedunculated gingival growths, and pyogenic granuloma. Despite concerns directed elsewhere during pregnancy, the practitioner must watch for this common problem and address it when present. Periodontal disease has been identified as a risk factor for preterm delivery.
Prevalence: Common (some estimate up to 90% of population affected). Pregnancy-associated pyogenic granuloma occurs in approximately 0.5%–5% of pregnant women.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Hormonally induced hypertrophy (may occur with higher-dose combination oral contraceptives as well), inadequate plaque removal, fusiform bacillus or spirochete infection, allergic reactions.
Risk Factors: Increased hormones (pregnancy, oral contraceptives), poor dental hygiene, mouth breathing, diabetes mellitus, human immunodeficiency virus (HIV) infection, and malocclusion.

SIGNS AND SYMPTOMS

- Mouth odor
- Gum swelling and redness (especially at the base of the tooth)
- Change in gum contours
- Bleeding when brushing or flossing
- Edema of interdental papillae

DIAGNOSTIC APPROACH

Differential Diagnosis

- Diabetes mellitus
- Desquamative gingivitis
- Leukemia
- Drug reaction (phenytoin)
- HIV infection

Associated Conditions: Periodontitis, glossitis, preterm delivery.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated.
Special Tests: Smear to identify causative agent. Culture also may be performed.
Diagnostic Procedures: History and physical examination.

Pathologic Findings

Acute or chronic inflammation, broken crepuscular epithelium, hyperemia, polymorphonuclear infiltrates.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, encourage good oral hygiene, smoking cessation, warm saline rinses (twice a day), periodic dental care. Infection, abscess, or sources of sepsis require prompt treatment, regardless of the stage of pregnancy.
Specific Measures: Removal of irritating factors (plaque).
Diet: Ensure adequate nutrition.
Activity: No restriction.
Patient Education: Reinforce the need for periodic dental care.

Drug(s) of Choice

- Chlorhexidine oral rinses—After brushing, swish for 30 seconds with 15 mL of undiluted oral rinse.
- Penicillin V 250–500 mg PO every 6 hours, topical corticosteroids (triamcinolone in Orabase).

Contraindications: Known or suspected allergy.
Precautions: Watch for possible overgrowth of vaginal fungal flora if penicillin is used.
Interactions: See individual agents.

Alternative Drugs

- Other antibiotics based on smear or culture results.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: Good dental hygiene (daily brushing and flossing), periodic evaluation, and cleaning.
Possible Complications: Severe periodontal disease, tooth loss.
Expected Outcome: Generally improves after delivery if hormonal change is the cause; can recur if dental hygiene is not maintained.

MISCELLANEOUS

ICD-10-CM Code: K05.10 (Chronic gingivitis, plaque induced).

Figure 236.1 Gingivitis

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HELLP SYNDROME

237

INTRODUCTION

Description: Hemolysis, elevated liver enzymes, low platelet count (HELLP) syndrome is considered to be a variant of pregnancy-induced hypertension (PIH) and pre-eclampsia, which are dominated by hepatic and hematologic changes. The course of HELLP syndrome is notable for its progressive and sometimes sudden deterioration in maternal and fetal condition.

Prevalence: 0.1%–1% of pregnancies; up to 20% of patients with severe pre-eclampsia. Most cases occur during the third trimester, but up to 30% may manifest in the postpartum period.

Predominant Age: Reproductive age; 80% of cases are diagnosed before 37 weeks gestation.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown. Genetic, endocrine/metabolic (including altered prostaglandin production), uteroplacental ischemia, immunologic. A connection to fetal long-chain 3-hydroxyacyl CoA dehydrogenase (LCHAD) deficiency has been proposed. Complement dysregulation also has been proposed.

Risk Factors: Older than 40 years, family history of pregnancy-induced hypertension, renal disease, antiphospholipid syndrome, diabetes mellitus, multiple gestation, past history of pre-eclampsia or HELLP syndrome. Chronic hypertension increases the risk for pregnancy-induced hypertension.

SIGNS AND SYMPTOMS

- Pre-eclampsia or eclampsia with hemolysis, thrombocytopenia (the degree of thrombocytopenia is predictive of the severity of the disease and the likelihood of poor outcome), elevated hepatic transaminase levels (any or all; blood pressure may be normal in up to 20% of patients)
- Right upper quadrant or epigastric pain (90%)
- Nausea, vomiting, and malaise (50%)
- Headache or visual changes (20%–60%)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Pre-eclampsia or eclampsia (>80%)
- Secondary hypertension
- Improper blood pressure measurement (wrong cuff size, position, technique), resulting in false elevation of readings
- Multiple pregnancy
- Molar pregnancy
- Primary hepatic disease and acute fatty liver of pregnancy

Associated Conditions: Intrauterine growth restriction, prematurity.

Workup and Evaluation

Laboratory: Liver and renal function studies (eg, enzymes, renal clearance, 24-hour urinary protein), platelet counts, clotting studies (platelet counts of >50,000/mm^3 are generally not associated with spontaneous bleeding). To make the diagnosis: lactate dehydrogenase (LDH) elevated to 600 IU/L or greater, aspartate aminotransferase (AST) and alanine aminotransferase (ALT) elevated more than twice the upper limit of normal, and the platelet count is less than 100,000/μL. (Aspartate aminotransferase is the dominant enzyme released into the peripheral circulation, related to periportal necrosis.) Hypertension and proteinuria may be absent in up to 15%–20% of cases.

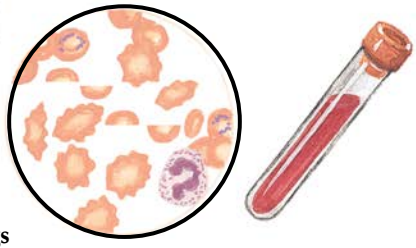
Imaging: Ultrasonography to monitor fetal growth (frequently restricted).

Special Tests: Assessment of fetal lung maturation may be performed, but if maternal disease is severe, management is based on maternal factors and not fetal maturation.

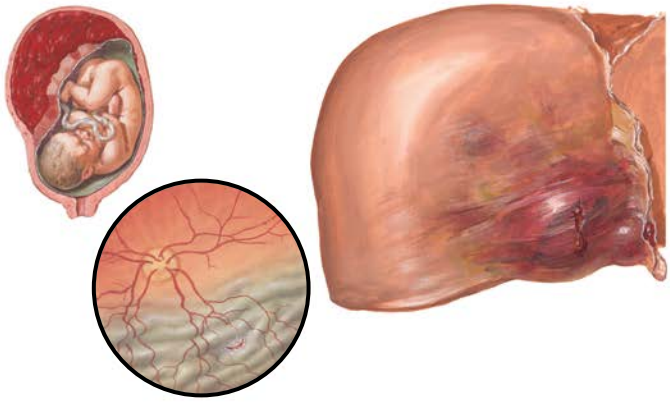
Diagnostic Procedures: Measurement of blood pressure, laboratory confirmation.

HELLP Syndrome (Hemolysis, Abnormal Liver Function Tests, Low Platelets)

Clinical symptoms
Nausea, vomiting
Right upper quadrant pain
Jaundice



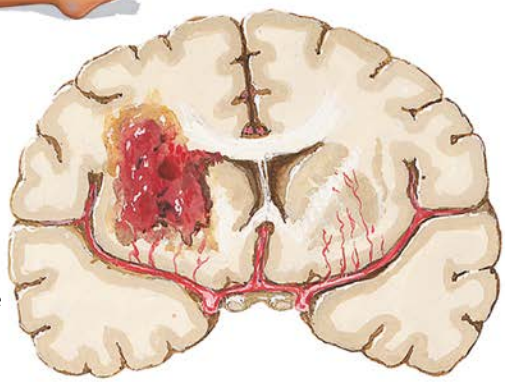
Laboratory findings
- Hemolysis (with schistocytes seen on peripheral smear)
- Elevated liver function tests
- Low platelet count



Complications
- Placental abruption
- Hepatic subcapsular hematoma
- Retinal detachment
- Acute kidney injury
- Pulmonary edema
- Disseminated intravascular coagulation (DIC)

Eclampsia

Clinical symptoms
- Generalized, tonic-clonic seizure
- Early symptoms may include:
  Blurred vision
  Severe frontal or occipital headache
  Altered mental status



Complications
- Cerebral hemorrhage

Figure 237.1 HELLP syndrome

Pathologic Findings

HELLP syndrome is a multiorgan process, including the renal, hepatic, hematologic, and nervous systems.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, support, and preparation for delivery.

Specific Measures: Patients with HELLP syndrome often represent the sickest patients with pre-eclampsia or eclampsia. The only true treatment is delivery. The presence of HELLP syndrome generally militates against conservative treatment for any but the briefest stabilization period. Platelet transfusions to treat bleeding may be necessary.

Diet: No specific dietary changes indicated. No dietary manipulations have been shown to alter the risk or course of the disease.

Activity: Bed rest during the management of severe cases or for women in the process of delivery. Bed rest is ineffective in altering the course of pre-eclampsia and is not recommended.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- Preeclampsia and High Blood Pressure During Pregnancy, 2021

Drug(s) of Choice

- For mild to moderate chronic hypertension, α-methyldopa is considered to be the first-line therapy.
- During labor or labor induction, magnesium sulfate is often used to reduce the chance of seizures or to provide fetal neuroprotection for fetuses less than 32 weeks (4 g IV for 20 minutes, then 2–3 g/hr IV continuous infusion; therapeutic range 4–8 mg/dL).
- If blood pressure is greater than 180 torr systolic or 110 torr diastolic—hydralazine HCl 5- to 10-mg IV bolus every 20 minutes

as needed or labetalol 20-mg IV bolus every 10 minutes as needed to a maximum of 300 mg in 24 hours. Sodium nitroprusside may be used for extreme disease.
- Steroids have been advocated, but their use has not been supported by large, well-designed randomized, double-blind, placebo-controlled trials.

Contraindications: Angiotensin-converting enzyme inhibitors are teratogenic and are contraindicated in pregnancy. Diuretics should be avoided in pregnancy because of the possibility of adverse fetal effects caused by reduced plasma volume. Despite the common occurrence of edema, these patients have constricted circulatory volume.

Precautions: Central hemodynamic monitoring should be considered if blood pressure is high or potent agents are used.

Alternative Drugs

Verapamil or nifedipine also may be used to acutely reduce blood pressure.

FOLLOW-UP

Patient Monitoring: Increased maternal and fetal surveillance, antenatal testing.

Prevention/Avoidance: The value of low-dose aspirin therapy or calcium supplementation remains unproved except for those at highest risk.

Possible Complications: Maternal—cardiac decompensation, stroke, pulmonary edema (10%) and respiratory failure, renal failure (5%), disseminated intravascular coagulation, bleeding, subcapsular or intraparenchymal liver hematoma, seizures and seizure-related injuries (6%), retinal detachment, intracranial hemorrhage, coma, and death (0.5%–5% mortality). Fetal risk (growth restriction and death) is directly proportional to both the degree of proteinuria and the level of maternal diastolic blood pressure. Placental abruption may occur in up to 10% of cases.

Expected Outcome: HELLP syndrome generally resolves after delivery, with reversal of the laboratory abnormalities to be expected by a week after delivery. The risk for recurrence with future pregnancies or elevated blood pressure in later life is increased.

MISCELLANEOUS

ICD-10-CM Codes: O14.20 (HELLP syndrome, unspecified trimester) and O14.10 (Severe preeclampsia, unspecified trimester).

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HEPATITIS IN PREGNANCY

238

INTRODUCTION

Description: Hepatitis is one of the most serious infections that occur during pregnancy.

Prevalence: Hepatitis—0.1%–1.5% of pregnancies (one-third of Americans have antibodies to hepatitis A). Hepatitis B is the most common cause of jaundice during pregnancy. The prevalence of hepatitis in pregnancy has declined in the past 15 years.

Predominant Age: Reproductive age.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Six or more different forms of hepatitis may be involved. Hepatitis A is caused by a ribonucleic acid (RNA) virus that is transmitted by fecal–oral contamination and accounts for 30%–50% of acute disease. Hepatitis B is caused by a small DNA virus that accounts for 40%–45% of occurrences. It is estimated that acute hepatitis B occurs in 1–2/1000 pregnancies and that chronic infections are present in 5–15/1000 pregnancies. Hepatitis B is transmitted by parenteral and sexual contact. Hepatitis B is easily sexually transmitted: 25% of people who have sexual contact with an infected person become infected. Hepatitis C (non-A, non-B) accounts for 10%–20% of cases and is caused by a single-stranded RNA virus, with at least six different genotypes, spread by parenteral exposure. Hepatitis D is caused by an RNA virus that requires coinfection with the hepatitis B virus. Significant mortality and long-term consequences may occur from this less common infection. Hepatitis E, G, and other forms of non-A, non-B hepatitis are uncommon but may occur during pregnancy as well. They generally mimic hepatitis A in acquisition, symptoms, and behavior.

Risk Factors: Groups at greatest risk for hepatitis B are intravenous drug users, hemophiliacs, men who have sex with men, and healthcare workers. Poor hand washing habits, multiple sexual partners, a history of sexually transmitted infection, tattoos, and multiple blood transfusions (hepatitis C) increase the risk for an infection as well. Up to 40% of patients with hepatitis A are thought to have become infected by asymptomatic children under the age of 6 in their household.

SIGNS AND SYMPTOMS

- Unchanged by pregnancy
- Fever (60%), malaise (70%), fatigue, anorexia (50%), nausea (80%)
- Variable right upper quadrant pain (50%)
- Upper abdominal tenderness with hepatomegaly
- Dark urine (85%) and acholic stools
- Jaundice, a possibility in up to 60%
- Coagulopathy or encephalopathy (fulminant infections only)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Acute fatty liver of pregnancy
- Toxic hepatic injury
- Cholestasis of pregnancy
- Severe pre-eclampsia
- Mononucleosis
- Cytomegalovirus hepatitis
- Lupoid hepatitis
- Viral enteritis

Associated Conditions: Jaundice, cirrhosis, pancreatitis, nephritis, and ileus. If cirrhosis is present; premature delivery, intrauterine growth restriction, intrauterine infection, and intrauterine fetal demise.

Workup and Evaluation

Laboratory: Hepatitis during pregnancy is diagnosed in the manner similar for nonpregnant patients; serum chemistry abnormalities indicate active hepatic disease (marked elevation of alanine aminotransferase, aspartate aminotransferase, and bilirubin), and immunochemical analysis indicates the presence of infection and the phase of the clinical course. In severe cases, coagulation studies should be performed. Routine screening of all pregnant patients is recommended.

Imaging: None indicated.

Special Tests: Percutaneous liver biopsy may be helpful but is generally not required.

Diagnostic Procedures: History, physical examination, ultrasonography (limited value), and laboratory investigation.

Pathologic Findings

Viral hepatitis is distinguished from other hepatic injuries by the characteristic pattern of injury and infiltrate.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Patients with encephalopathy or coagulopathy or who are severely debilitated should be hospitalized. Nutritional support is generally required. Fluid intake and electrolyte levels must be maintained. The upper abdomen should be protected from trauma. Sexual contact should be avoided until the partner(s) receive prophylaxis.

Specific Measures: Prophylaxis should be considered for anyone at risk (eg, travel to endemic area, infected sexual partners). Acute exposure should be treated with immune globulin. Tenofovir disoproxil fumarate 300 mg/day or lamivudine 100 mg/day are both suitable options during pregnancy because both have been safely used, and the risk for developing resistance is low. Antiviral therapy is usually unnecessary, except in cases of acute liver failure or protracted severe hepatitis.

Diet: Maintain good nutrition.

Activity: The upper abdomen should be protected from trauma.

Patient Education: Patients should be instructed regarding risk factors and modes of spread to limit risk for family contacts and future recurrences.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Hepatitis B and Hepatitis C in Pregnancy, 2021
- Protecting Yourself Against Hepatitis B and Hepatitis C, 2021

Drug(s) of Choice

- Those necessary for support only; others of limited or unproved value.
- Antiviral therapy to reduce high maternal viral loads is appropriate but may not prevent transmission to the infant.
- Infants born to mothers infected by hepatitis B should receive hepatitis B immune globulin in addition to the first dose of hepatitis B vaccine. Infants so treated may be breastfed.

FOLLOW-UP

Patient Monitoring: Normal prenatal care once the acute episode is resolved. Continued monitoring for chronic liver dysfunction or carrier state (where applicable).

Prevention/Avoidance: Active immunization of those at risk before a pregnancy is planned. Patients exposed to hepatitis A may be administered γ-globulin in the manner similar for nonpregnant patients. Patients exposed to hepatitis B or those found to be carriers may receive either active immunization with hepatitis vaccine or passive immunization with hepatitis B immunoglobulin (HBIG). To be effective as prophylaxis, HBIG should be administered within 48 hours of exposure. The infants of these mothers should receive both forms of immunization. Infants born to mothers with hepatitis B infection should be given HBIG 0.5 mL and hepatitis B vaccine (separate site) within 12 hours of birth, with follow-up vaccinations at 1–6 months of age.

Possible Complications: Mortality from acute hepatitis varies with the type of hepatitis and severity of infection but is generally in the range of 2–10/1000 cases. Serious complications of hepatitis A are uncommon. Vertical transmission of hepatitis B to the developing fetus can pose a significant risk. Of women seropositive for hepatitis B surface antigen (HBsAg), 10%–20% transmit the virus to their neonates in the absence of immunoprophylaxis. In women who are seropositive for both HBsAg and hepatitis B envelope antigen (HBeAg), vertical transmission is approximately 90%. In patients with acute hepatitis B, vertical transmission occurs in up to 10% of neonates when infection occurs in the first trimester and in 80%–90% of neonates when acute infection occurs in the third trimester. The majority (90%) of untreated infants become chronic carriers, capable of infecting others. These infants are also at increased risk for cirrhosis and hepatic cancer. Neonatal infection rates vary with gestation and are highest in the third trimester (exposure to blood and fluids at delivery). Patients with the envelope antigen have an 80% chance of vertical transmission of the infection. Hepatitis D leads to chronic hepatitis in 80% of patients with rapid appearance of cirrhosis in 15%; mortality approaches 25%. Chronic liver disease and liver failure may follow infection with hepatitis B, C, or D.

Expected Outcome: Of patients, 85%–90% experience complete resolution of symptoms; 10%–15% of patients with hepatitis B become chronic carriers (10%–15% of these develop serious long-term liver problems, including cirrhosis and hepatocellular carcinoma). Patients with hepatitis C or D have a more than 80% risk of chronic hepatitis with cirrhosis and liver failure in 20%–25%.

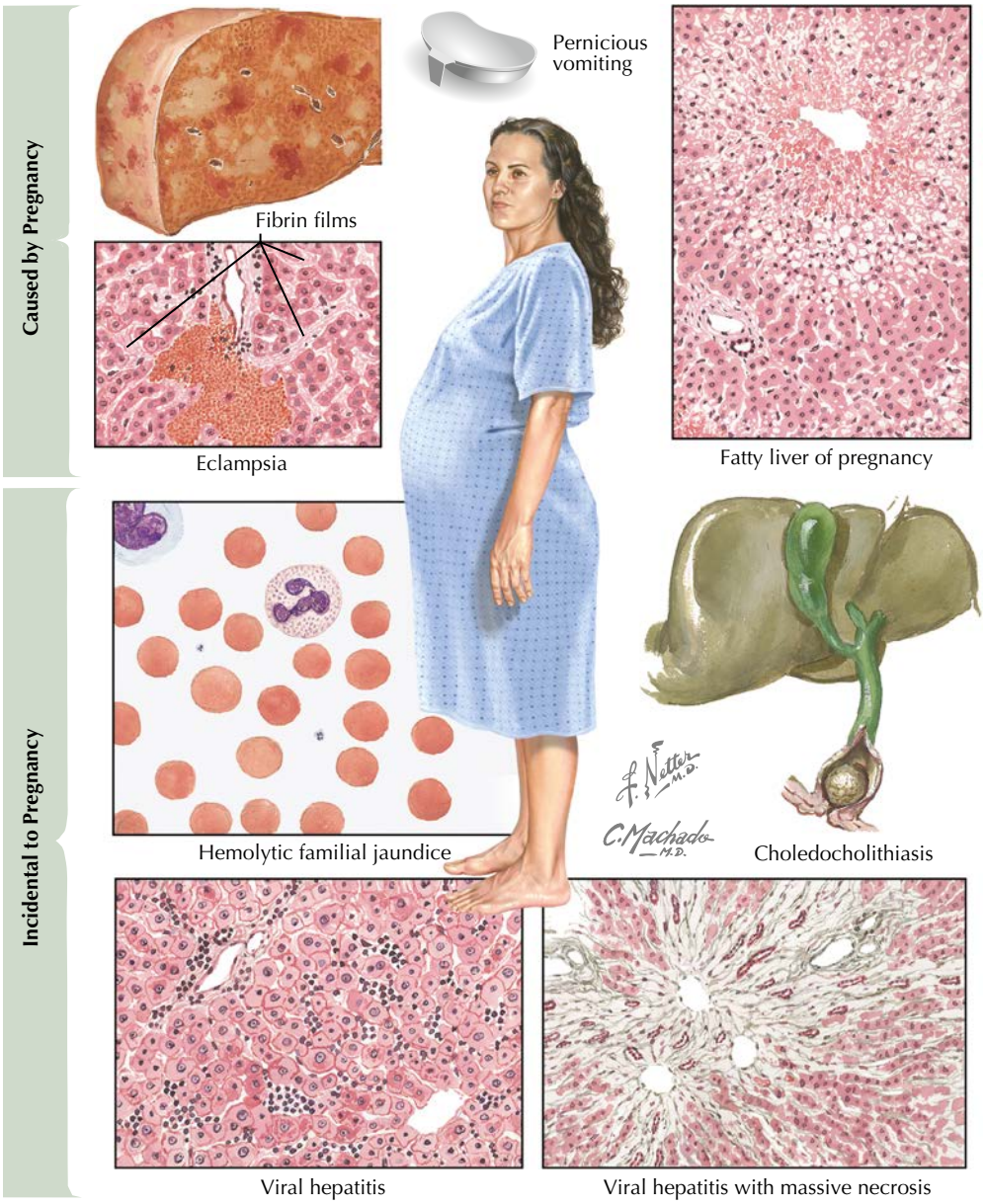

Figure 238.1 Liver diseases caused by pregnancy and incidental to pregnancy

MISCELLANEOUS

ICD-10-CM Code: O98.519 (Other viral diseases complicating pregnancy, unspecified trimester).

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239 HYPEREMESIS GRAVIDARUM

INTRODUCTION

Description: Hyperemesis gravidarum is exaggerated nausea and vomiting during early pregnancy, which is sufficient to produce dehydration, metabolic disturbances, and weight loss. Alkalosis (from HCl loss) and hypokalemia are common.
Prevalence: 70%–85% of women experience nausea; 50% have emesis in the first trimester; hyperemesis occurs in 0.5%–2% of pregnancies.
Predominant Age: Reproductive age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown. Most closely associated with hCG levels.
Risk Factors: Multiple gestation, hydatidiform mole, ambivalence about pregnancy (debated), migraine headaches, female fetus (odds of female fetus 1.27), motion sickness, family history of hyperemesis. Alcohol and cigarette smoking appear to be protective to a small degree.

SIGNS AND SYMPTOMS

- Nausea and vomiting leading to weight loss, dehydration, ketone formation, and electrolyte disturbances (some define it as weight loss exceeding 5% of pre-pregnancy body weight)
- Aversions to tastes and smells
- Symptoms generally begin between the 4th and 8th week, lasting until 16 weeks or longer

DIAGNOSTIC APPROACH

Differential Diagnosis

- Abnormality of pregnancy (trophoblastic disease, multiple gestation)
- Psychologic overlay
- Gastroenteritis
- Cholecystitis
- Pancreatitis
- Hepatitis
- Peptic ulcer disease
- Fatty liver of pregnancy
- Pyelonephritis

Associated Conditions: Intrauterine growth restriction when prolonged.

Workup and Evaluation

Laboratory: Evaluation of liver and metabolic function (serum enzymes and urinary ketones). Measurement of thyroid function is often included.
Imaging: Ultrasonography for pregnancy assessment and dating as indicated.
Special Tests: None indicated.
Diagnostic Procedures: History and physical examination. Hyperemesis is a clinical diagnosis of exclusion based on typical symptoms in the absence of other diseases with similar findings. Symptoms that begin after the 9th week of gestation are generally due to other conditions.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Small, frequent feedings (every 1–2 hours) with bland foods (crackers, toast, etc.). Early intervention is more likely to be effective and will reduce the likelihood of further complications, including hospitalization.
Specific Measures: Vitamin B_6, antiemetics, or intravenous hydration. Enteral feedings are sometimes required. Gradual reintroduction of diet as symptoms are controlled. Techniques, such as acupuncture, acupressure, steroid use, or ginger therapy, have not been proven to be effective.
Diet: Spicy or greasy foods should be avoided, and some advocate eating a protein snack at bedtime.
Activity: No restriction.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Morning Sickness: Nausea and Vomiting of Pregnancy, 2020
- Nutrition During Pregnancy, 2020

Drug(s) of Choice

- Vitamin B_6 (pyridoxine) 50–100 mg/day PO (may be divided and taken twice a day) with doxylamine succinate (Unisom) 12.5–25 mg/day PO. Available as a combined dosage (delayed release 10 mg/10 mg combination per tablet; Diclegis)
- Promethazine (Phenergan) 25 mg PO or rectally every 4–6 hours
- Metoclopramide (Reglan) 10 mg PO four times a day
- Meclizine (Antivert) 12.5–25 mg PO four times a day
- Serotonin 5-hydroxytryptamine type 3 (5-HT3) receptor antagonists are available as an oral dissolvable tablet (ondansetron) or as a transdermal patch (granisetron) formulation

Contraindications: See individual agents.
Precautions: Promethazine (Phenergan) is a class C agent (risk for teratogenesis in animals but unknown risk in humans). Metoclopramide (Reglan) and meclizine (Antivert) are class B agents (no known human risk). (Ondansetron is notable for a large number of drug interactions.)

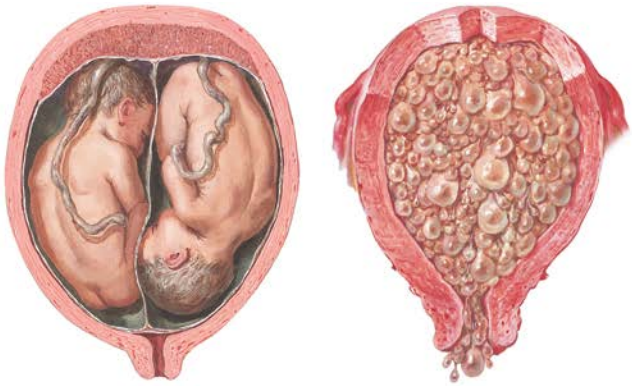
FOLLOW-UP

Patient Monitoring: Normal health maintenance, monitoring of fetal growth.
Prevention/Avoidance: None. Some studies suggest that beginning prenatal vitamins (particularly vitamin B_6) 1 month or more before conception results in lower rates and severity of significant nausea and vomiting.
Possible Complications: Maternal dehydration and metabolic compromise. Rupture or tears of the esophagus and pneumothorax have been reported as a result of vomiting.
Expected Outcome: Generally good, although relapses in severe cases are common (25%–30%).

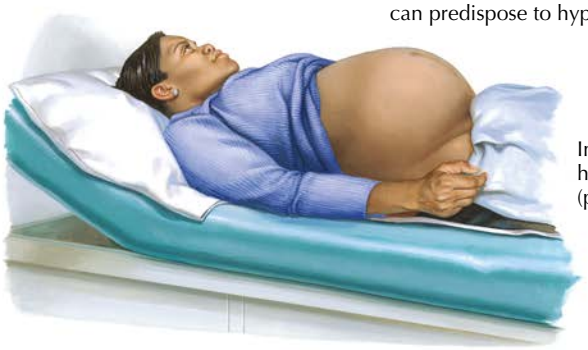
MISCELLANEOUS

Pregnancy Considerations: If nutrition is maintained, no effect on pregnancy. May recur with subsequent pregnancies.
ICD-10-CM Codes: O21.0 (hyperemesis gravidarum [mild]) and O21.1 (with metabolic disturbance).

While most woman will have morning sickness, only about 1%-2% have hyperemesis



Conditions such as multiple gestation or hydatiform mole can predispose to hyperemesis.



Inpatient treatment with intravenous hydration, antimetics and vitamin B_6 (pyridoxine) is frequently effective

When symptoms are severe, there is dehydration or weight loss, inpatient treatment may be warranted

Small, frequent feedings, such as toast or crackers, may provide some relief.

Figure 239.1 Hyperemesis in early pregnancy

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240 INTRAUTERINE GROWTH RESTRICTION

INTRODUCTION

Description: Intrauterine growth restriction is the symmetric or asymmetric reduction in the size and weight of the growing fetus in utero compared with that expected for a fetus of comparable gestational age and population. (Low birthweight is used to describe newborns who weigh less than the 10th percentile.) Growth restriction may occur for many reasons, but most occurrences represent signs of significant risk for fetal death or jeopardy to the fetus. Some authors advocate identifying fetuses with growth between the 10th and 20th percentiles as suffering "diminished" growth and at intermediate risk for complications.

Prevalence: Problems of consistent definition make estimates difficult, but by most definitions, prevalence is 5%–10% of pregnancies.

Predominant Age: Reproductive age; higher at the extremes of childbearing. For women younger than 15 years, the rate of low birthweight is 13.6% compared with 7.3% for women 25–29 years of age. When multiple gestations are excluded, the rate for women older than 45 years is greater than 20%.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Idiopathic (50%). Maternal disease—hypertension; drug or alcohol use; smoking; Dilantin (phenytoin), coumarin, propranolol, or steroid use; poor nutrition, renal or autoimmune disease, inflammatory bowel disease, low maternal weight (<50 kg), high altitude, hemoglobinopathy, cyanotic heart disease, multiple pregnancy (as high as 25% for twin pregnancies, 60% for triplet and quadruplet pregnancies), irradiation. Placental disease or abnormalities—placenta previa, fibrosis, chronic infection, partial abruption or infarction. Fetal factors—congenital anomalies, chromosomal factors, chronic fetal infections.

Risk Factors: Chronic maternal disease (hypertension, renal disease, cardiovascular disease), impaired placental function, congenital anomalies, history of previous growth-restricted fetus, recurrent abortion, fetal death, or preterm labor.

SIGNS AND SYMPTOMS

- Uterine size less than dates
- Oligohydramnios
- Fetal growth (weight or abdominal circumference) that falls below the 5th–10th percentile for gestational age or demonstrates reduced growth velocity on serial examinations

DIAGNOSTIC APPROACH

Differential Diagnosis

- Inaccurate gestational age
- Congenital anomalies
- Multiple gestation
- Constitutionally small infants
- Extrauterine gestation

Associated Conditions: Prematurity, intrauterine fetal death, congenital anomalies, and oligohydramnios.

Workup and Evaluation

Laboratory: No evaluation indicated unless suggested by maternal disease.

Imaging: Ultrasonography with fetal biometry compared with curves specific to the location and population served. The diagnosis also must be based on serial examinations that provide information about the growth of the individual fetus.

Special Tests: When found in advanced gestations: fetal nonstress and contraction stress testing or biophysical profiling. The role of Doppler flow studies continues to be evaluated and is reliable only when placental dysfunction is the cause of the growth restriction. They should still be considered once fetal growth restriction is diagnosed, to assess for deterioration. Fetal growth restriction that happens before 32 weeks or is in combination with polyhydramnios or fetal malformation, is an indication to offer genetic counseling.

Diagnostic Procedures: Physical examination, ultrasonography. (Physical examination may miss up to two-thirds of cases; ultrasonography can exclude or verify growth restriction in 90% and 80% of cases, respectively.) Intrauterine growth restriction must be distinguished from infants who are constitutionally small for gestational age who are not at increased risk. Asymmetric restrictions in growth argue against a constitutional cause. Early intrauterine insults are more likely to result in symmetric growth restriction; later insults result in asymmetry. Similarly, intrinsic factors generally cause symmetric restriction; extrinsic factors generally cause asymmetric restriction.

Pathologic Findings

Reduced fetal fat stores and reduced overall size compared with that expected for gestational age.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, ultrasonography with biometry. Cessation of tobacco and alcohol use (if present).

Specific Measures: Based on cause and stage of gestation. Early delivery (38–39 weeks) is often necessary (the majority of fetal deaths occur after 36 weeks gestation). Constitutionally small infants require no intervention.

Diet: No specific dietary changes indicated unless deficiencies are identified. Dietary modifications to prevent fetal growth restriction have not been proven effective and are not recommended.

Activity: No restriction except as dictated by maternal disease or fetal condition.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- How Your Fetus Grows During Pregnancy, 2020
- Special Tests for Monitoring Fetal Health, 2019
- Ultrasound Exams, 2017

Drug(s) of Choice

- None.
- Low-dose aspirin therapy has been advocated but has been abandoned.

FOLLOW-UP

Patient Monitoring: Enhanced fetal assessment, antenatal fetal testing (including nonstress testing, biophysical profiles, and contraction stress tests). Patients at risk because of maternal disease should have early assessment of fetal growth (biparietal diameter, head circumference, abdominal circumference, and femur length) with frequent reassessment as the pregnancy progresses.

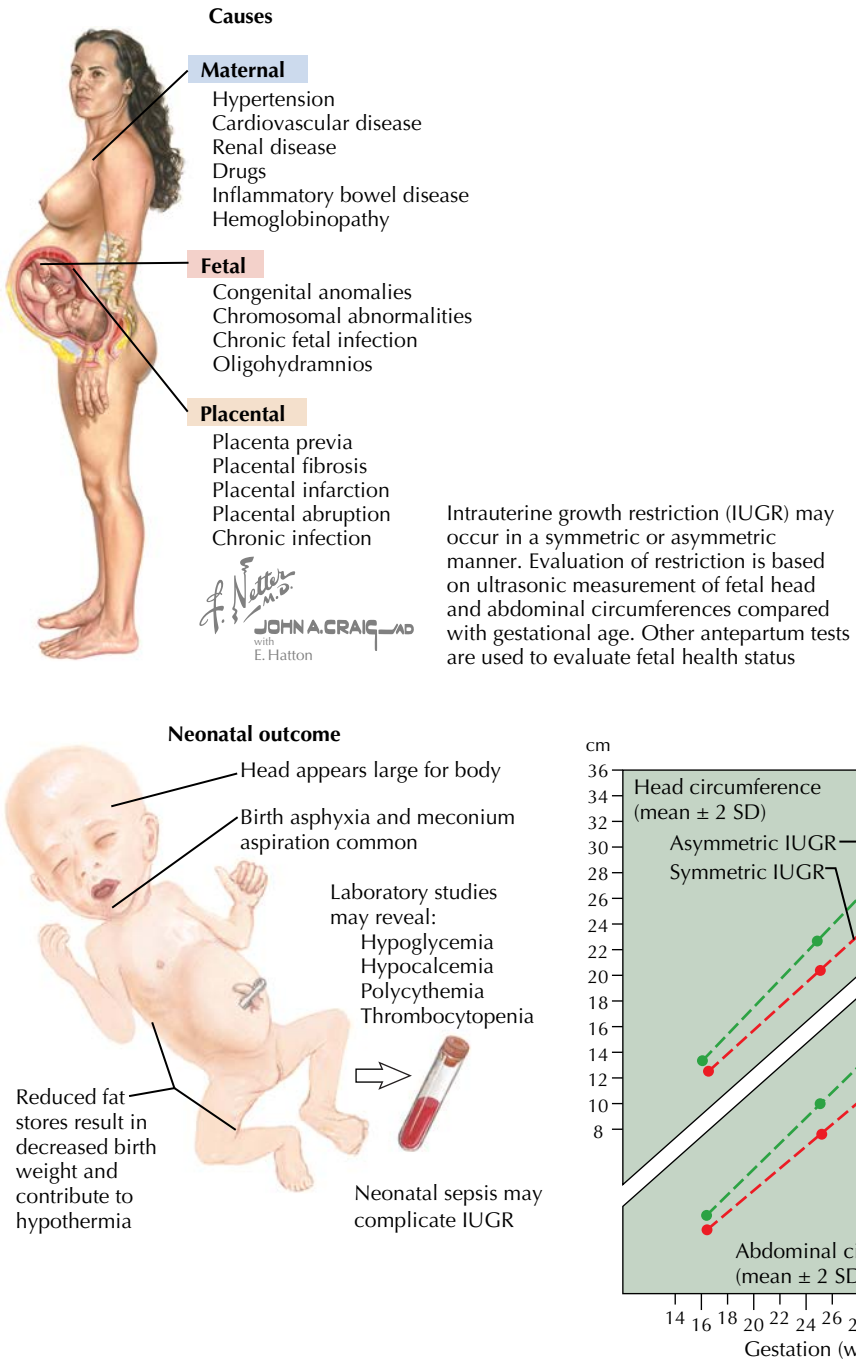

Figure 240.1 Intrauterine growth restriction

This may need to be done as often as every 2–3 weeks in severe cases. Careful fetal monitoring during labor.

Prevention/Avoidance: Management of maternal disease.

Possible Complications: Progressive deterioration of fetal status and intrauterine fetal demise. (There is an 8- to 10-fold increase in the risk for perinatal mortality; growth restriction is the second most important cause of perinatal morbidity after preterm delivery.) Long-term physical and neurologic sequelae are common. The risk for adverse outcome is proportional to the severity of growth restriction present. The presence of risk factors for intrauterine growth restriction increases the risk for fetal death by 2-fold in growth-restricted fetuses. The most immediate fetal morbidities are birth asphyxia, meconium aspiration, sepsis, hypoglycemia, hypocalcemia, hypothermia, polycythemia, thrombocytopenia, and pulmonary hemorrhage.

Expected Outcome: With early detection, progressive fetal growth often can be achieved, although many pregnancies may require early delivery or other interventions to ensure fetal well-being.

MISCELLANEOUS

ICD-10-CM Code: O36.5990 (Maternal care for other known or suspected poor fetal growth, unspecified trimester, not applicable or unspecified).

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241 MULTIPLE GESTATION

INTRODUCTION

Description: Multiple gestation is two or more fetuses that coexist during the same gestation.

Prevalence: Occurs in 32.1/1000 live births resulting in 112,437 births in the United States (2020); 79.6/100,000 live births for triplets, for a total of 2738 births in the United States and 137 quadruplet or higher births. The rate of multiple births is influenced by the use of fertility drugs and the rate of childbearing in women older than 30 years, who are more likely to conceive multiples. Multiple gestations are responsible for a disproportionate share of perinatal morbidity and mortality. They account for 17% of all preterm births (before 37 weeks of gestation), 23% of early preterm births (before 32 weeks of gestation), 24% of low-birthweight infants (<2500 g), and 26% of very-low-birthweight infants (<1500 g). Hospital costs for women with multiple gestations are on an average 40% higher than those for women with gestational age–matched singleton pregnancies because of their longer length of stay and increased rate of obstetric complications. Twin pregnancies account for approximately 97.5% of multiple gestations.

Predominant Age: Reproductive age (becomes more common with increasing maternal age; 4-fold increase from the age of 15–35 years).

Genetics: Dizygotic twins are more common in mothers who are themselves a dizygotic twin.

ETIOLOGY AND PATHOGENESIS

Causes: Monozygotic twins result from the cleavage of a single fertilized ova (4/1000 births). Dizygotic multiple gestations occur when there are multiple ova released and fertilized (naturally or through assisted ovulation; Table 241.1).

Table 241.1 Mechanisms of Twin Gestation Formation

Mechanism	Resulting Twin Pregnancy
Two ova, two sperm	Dizygotic (fraternal; 70% of cases)
Single ova, single sperm	Monozygotic ("identical")
• Division within 72 hr	• Diamniotic, dichorionic
• Division between 4 and 8 days*	• Diamniotic, monochorionic
• Division between 8 and 13 days	• Monoamniotic, monochorionic
• Division after 10–13 days	• Conjoined twins

*Days after fertilization.

Risk Factors: Ovulation induction (clomiphene therapy: 5%–10% multiple gestation rate), other assisted reproduction techniques (roughly 25% twin rate, 1% higher order), increased maternal age, parity, weight and height, Black race.

SIGNS AND SYMPTOMS

- Uterus larger than dates
- Multiple fetal heart tones by auscultation or Doppler study

DIAGNOSTIC APPROACH

Differential Diagnosis

- Polyhydramnios
- Molar pregnancy

Associated Conditions: Prematurity, cord accidents, intrauterine growth restriction (50%–60% of triplet or greater pregnancies), polyhydramnios, increased fetal morbidity and mortality, increased risk of congenital anomalies, placental abruption, placenta previa, hypertension (risk proportional to fetal number: 1 = 6.5%, 2 = 12.7%, 3 = 20%), pre-eclampsia, HELLP syndrome, anemia, acute fatty liver, gestational diabetes, hyperemesis gravidarum, pyelonephritis, cholestasis, pulmonary edema, thrombosis and embolism, postpartum hemorrhage, increased operative delivery rate. Twin-twin transfusion and cord entanglement for monochorionic twins.

Workup and Evaluation

Laboratory: No special evaluation indicated, although because of the higher incidence of gestational diabetes, screening is of greater importance. Abnormality of gestation-sensitive laboratory tests, such as maternal serum alpha-fetoprotein (MSAFP), is to be expected.

Imaging: Ultrasonography (considered definitive; reduces the rate of undiagnosed multiple gestation from 40% to <5%). It can be used to determine fetal number, estimated gestational age, chorionicity, and amnionicity. Serial ultrasonography at 2-week intervals is suggested starting at 16 weeks gestation. Radiographic studies are generally inadequate to establish the presence or health of a multiple pregnancy, making routine use of x-rays undesirable.

Special Tests: Genetic amniocentesis may be considered (twin pregnancies have twice the rate of abnormalities: monozygotic = 2%–10% rate). Weekly antenatal fetal surveillance in twin gestations should start at 36 0/7 weeks.

Diagnostic Procedures: History, physical examination, ultrasonography.

Pathologic Findings

Examination of the placenta can identify the type of pregnancy.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Adequate nutrition, diminished activity, frequent perinatal visits, monitoring of fetal growth (serial ultrasonography).

Specific Measures: Antenatal testing and monitoring of fetal growth, prompt intervention for threatened preterm labor. Routine preterm hospitalization is not recommended.

Diet: Increase maternal intake by 300 kcal more than normal for pregnancy. Iron and folic acid supplementation.

Activity: Reduced activity as pregnancy progresses. Bed rest is unproven and carries an increased risk of vascular thromboembolic events.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Multiple Pregnancy, 2021
- Counseling Regarding Signs of Pre-Term Labor—Preterm Labor and Birth, 2021
- How to Tell When Labor Begins, 2020

Drug(s) of Choice

- None.
- Tocolytic agents are often used when premature labor is threatened but are not useful as prophylaxis and are associated with an increased risk for side effects when used in these patients.
- The use of progestational agents to reduce the risk for preterm birth has been tested only in singleton pregnancies.

FOLLOW-UP

Patient Monitoring: Increased frequency of prenatal evaluations, antenatal fetal testing in late pregnancy. Counseling regarding signs of preterm labor.

Prevention/Avoidance: None. Some complications of multiple gestation may be reduced by increased surveillance and monitoring. Interventions to reduce the risk of preterm labor have not been successful and are not recommended. Because of the elevated risk of pre-eclampsia in multifetal pregnancies, low-dose aspirin prophylaxis (81 mg/day) is recommended and should start between 12 and 28 weeks gestation (optimally before 16 weeks) and continued daily until delivery. Fetal reduction for triplet and higher-order pregnancies results in greatly reduced risk to the mother and surviving fetuses.

Possible Complications: Perinatal morbidity and mortality is two to seven times higher than for singleton gestations (5-fold increased risk of stillbirth, a 7-fold increased risk of neonatal death). Preterm delivery (50%) is the most common cause of morbidity or mortality. Other complications: intrauterine growth restriction (12%–47% vs. 5%–7% in singletons) or discordant growth, cord accidents, polyhydramnios, congenital anomalies (two times increase), malpresentation. Monozygotic twins have a 1% incidence of monoamniotic sacs that carries a 50% fetal mortality because of cord entanglement or conjoined twins. One-fifth of triplet pregnancies and half of quadruplet pregnancies result in at least one child with a major long-term handicap, such as cerebral palsy. Cerebral palsy occurs 17 times more often in triplet pregnancies and more than four times more often in twin pregnancies than in singleton pregnancies. When matched for gestational age at delivery, infants from multifetal pregnancies have a nearly 2-fold greater risk of cerebral palsy.

Maternal Complications: Placental abruption, placenta previa, pre-eclampsia, HELLP syndrome, anemia, hyperemesis gravidarum, pyelonephritis, cholestasis, postpartum hemorrhage, increased operative delivery rate.

Expected Outcome: Generally good, although delivery before term is common and there is an increased risk of operative delivery.

MISCELLANEOUS

Other Notes: Up to 50% of twin pregnancies identified in the early weeks will silently abort one fetus (with or without bleeding).

Most Common Presentation: Vertex/vertex (43%), vertex/other (38%), twin A other (19%).

ICD-10-CM Codes: O30.009 (Twin pregnancy, unspecified number of placentas and unspecified number of amniotic sacs, unspecified trimester), O30.109 (Triplet pregnancy, unspecified number of placentas and unspecified number of amniotic sacs, unspecified trimester), and O30.309 (Quadruplet pregnancy, unspecified number of placentas and unspecified number of amniotic sacs, unspecified trimester).

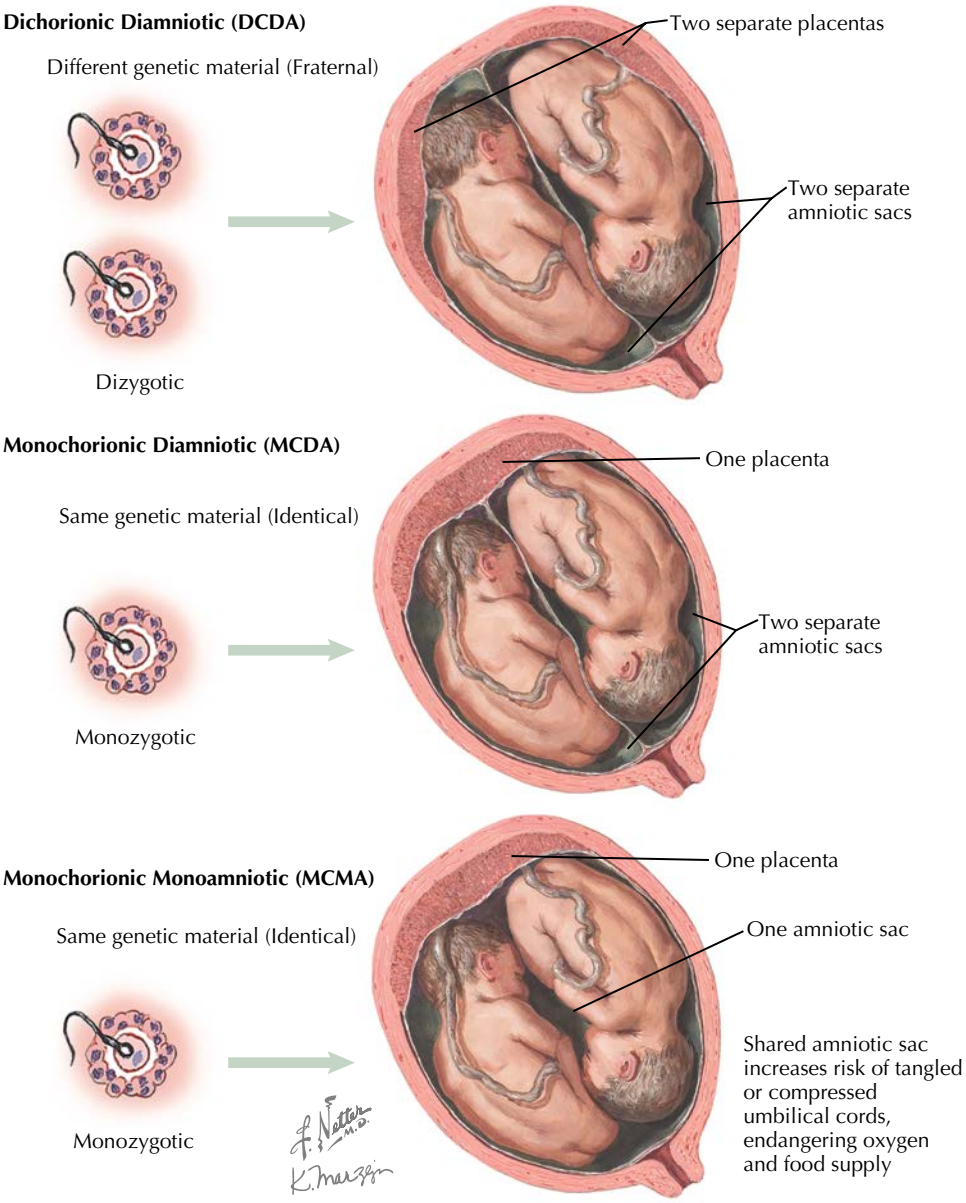

Figure 241.1 Multiple gestation: types of wins

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OBSTETRIC LACERATIONS

242

INTRODUCTION

Description: Obstetric lacerations of the vaginal wall or introitus are common in vaginal deliveries. Laceration of the cervix, labia, and periurethral and periclitoral (prepuce) tissues is also possible.
Prevalence: Common; 50%–80% of vaginal deliveries; third- and fourth-degree lacerations occur in less than 5% of deliveries.
Predominant Age: Reproductive age (most common in females younger than 25 years).
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Tissue laxity induced by the hormonal changes of pregnancy, combined with the large diameter of the fetal head and shoulders, often result in vaginal wall or introital lacerations, in even the most controlled spontaneous delivery. The use of instrumentation (forceps or vacuum) to augment or expedite vaginal delivery increases these chances. Fetal malpresentation, such as occiput posterior, can also increase the risk to maternal tissues due to the altered geometry of these deliveries.
Risk Factors: Nulliparity, fetal macrosomia, precipitous birth, operative delivery, episiotomy, epidural anesthesia, occiput posterior delivery.

SIGNS AND SYMPTOMS

- Vaginal bleeding (may be profuse and prolonged)
- Visible tissue damage on inspection
- Lacerations are classified as follows:
  - **First-degree lacerations**—Injury to the skin and subcutaneous tissue only.
  - **Second-degree lacerations**—Extends into the fascia and musculature of the perineal body, the deep and superficial transverse perineal muscles, and the pubococcygeus and/or bulbocavernosus muscles.
  - **Third-degree lacerations**—Involve some or all of the fibers of the external anal sphincter (EAS) and/or the internal anal sphincter (IAS). Subclassified as follows:
    - 3a—<50% of EAS thickness is torn
    - 3b—>50% of EAS thickness is torn
    - 3c—Both EAS and IAS are torn
  - **Fourth-degree lacerations**—Involves both the anal sphincter complex (EAS and IAS) and anal mucosa.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Cervical laceration
- Uterine atony
- Retained placental or membranous material

Associated Conditions: Vulvar hematoma, fecal and urinary incontinence, pelvic organ prolapse, introital laxity, sexual dysfunction.

Workup and Evaluation

Laboratory: Complete blood count.
Imaging: No imaging indicated.
Special Tests: None indicated.
Diagnostic Procedures: Physical examination, including visual inspection and palpation.

Pathologic Findings

The most common site of obstetric laceration is the posterior fourchette and perineum. Laceration along the vaginal canal and lateral fornixes do also occur.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Rapid assessment and hemodynamic stabilization (when appropriate).
Specific Measures: Evaluation of the integrity of the urinary and gastrointestinal tracts, especially the anal sphincter, should be performed before any attempt at repair. Small superficial lacerations that are not bleeding or that distort the local anatomy do not require repair. Surgical repair is generally delayed until after delivery of the placenta to avoid compromise of the repair if intrauterine manipulation is required. Surgical closure of the laceration is generally performed using synthetic, braided, delayed absorbable material. Multilayer closures are desirable for deeper lacerations and those involving the anal sphincter(s). Use of perineal wash bottles and sitz baths to provide perineal hygiene and analgesia are reasonable. Adequate additional analgesia should be offered.
Diet: No specific dietary changes indicated.
Activity: Pelvic rest until healing has occurred.

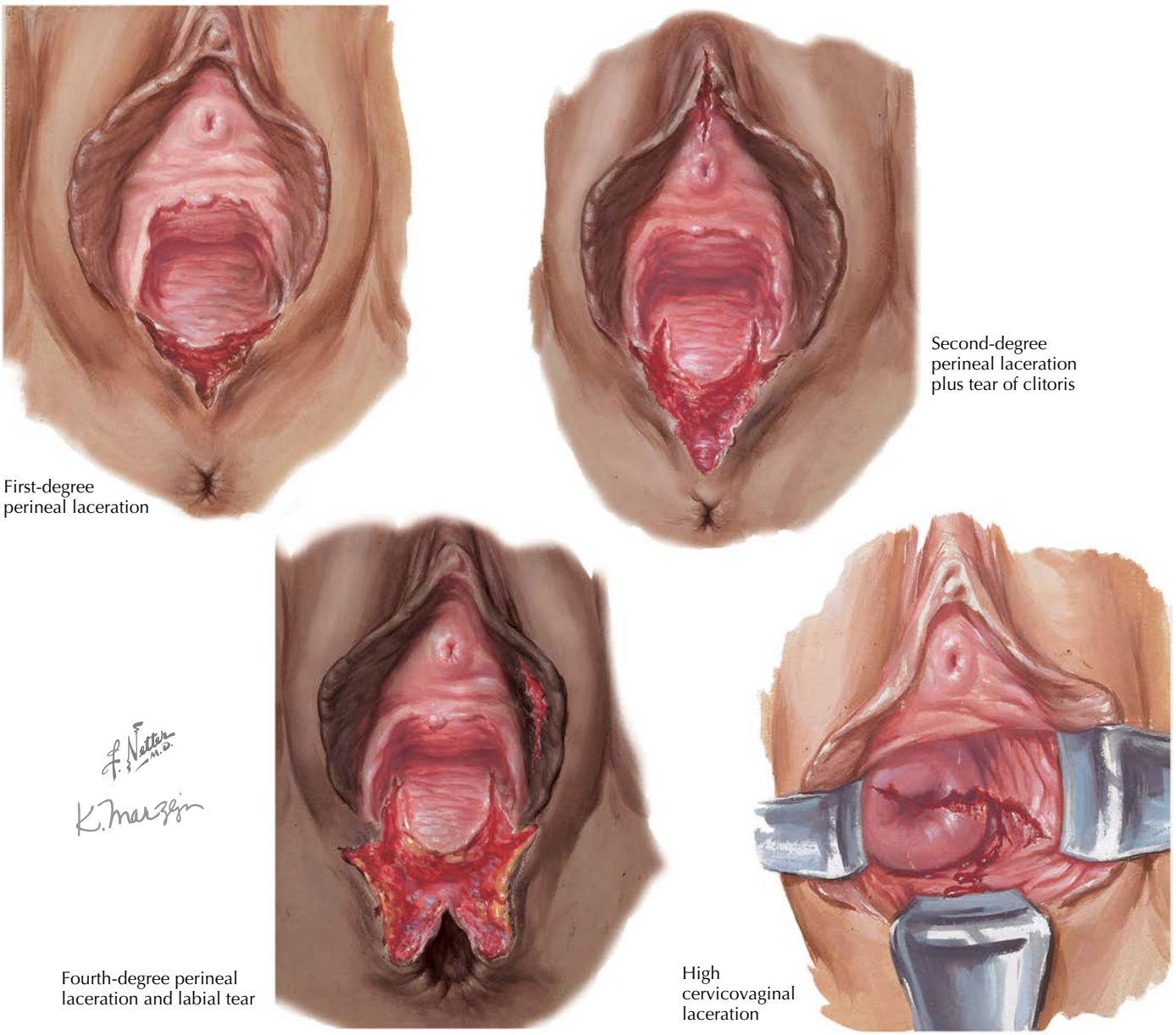

Figure 242.1 Obstetric lacerations (first, second, and third degrees)

Patient Education: Discussion of the injury, repair, and expected course of healing.

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Assisted Vaginal Delivery, 2021

Drug(s) of Choice

- Local or general anesthesia for surgical repair if the anesthesia/analgesia provided for the delivery is inadequate or no longer effective.
- Treatment with an antibiotic is not required for first- or second-degree lacerations. Prophylactic antibiosis has been proposed prior to repair of third- or fourth-degree lacerations.
- Stool softeners may improve patient comfort when the anal musculature has been involved, but this has been inadequately studied.

FOLLOW-UP

Patient Monitoring: Normal health maintenance after healing has been completed.

Prevention/Avoidance: Topical heat and perineal massage during the second stage of labor has been advocated, but data are lacking. The use of an episiotomy does not appear to be protective.

Possible Complications: Excessive blood loss, fecal incontinence, fistula formation, pelvic organ prolapse, introital laxity.

Expected Outcome: Generally good healing.

MISCELLANEOUS

Pregnancy Considerations: No effect on future pregnancy unless scarring is excessive, or it is deemed prudent to deliver by cesarean delivery to avoid recurrence (generally not necessary).

ICD-10-CM Codes: Based on the location and severity.

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OLIGOHYDRAMNIOS

243

INTRODUCTION

Description: Oligohydramnios is an abnormal reduction in the amount of amniotic fluid surrounding the fetus. At term, there should be approximately 800 mL of amniotic fluid present. Often defined as a single deepest pocket of amniotic fluid of 2 cm or less or an amniotic fluid index (sum of maximum vertical fluid pocket in each quadrant not containing umbilical cord or fetal extremities) of 5 cm or less on ultrasonography. Adequate fluid is important for fetal movement, lung development, and protection of the umbilical cord from compression.

Prevalence: Rare in early pregnancy, common in postterm pregnancies (12%–25% at 41 weeks) and during labor after rupture of the fetal membranes.

Predominant Age: Reproductive age.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Generally associated with a reduction in fetal urine production (renal agenesis, urinary tract obstruction, fetal growth restriction, postterm pregnancy, and fetal death), chronic amniotic leak or preterm rupture of the membranes (35%), maternal disease (hypertension, diabetes, uteroplacental insufficiency, pre-eclampsia, medications).

Risk Factors: Fetal chromosomal or congenital abnormalities (approximately 50%; see Box 243.1), fetal growth restriction or demise, postterm pregnancy, multiple gestation (twin–twin transfusion), maternal hypertension, diabetes, pre-eclampsia, and prostaglandin synthetase inhibitors.

SIGNS AND SYMPTOMS

- Uterine size smaller than normal for stage of pregnancy
- Reduced amniotic fluid measured by ultrasonography

DIAGNOSTIC APPROACH

Differential Diagnosis

- Inaccurate gestational age
- Intrauterine growth restriction

- Fetal anomalies
- Premature rupture of the membranes

Associated Conditions: Fetal—renal and urinary tract anomalies, intrauterine fetal growth restriction, pulmonary hypoplasia, musculoskeletal defects (clubfoot, amniotic bands, amputations), meconium-stained amniotic fluid. Fetal anomalies are present in 15%–25% of cases. Maternal—chronic disease (diabetes, hypertension).

BOX 243.1 Anomalies Associated With Oligohydramnios

- Amniotic band syndrome
- Cardiac anomalies: tetralogy of Fallot, septal defects
- Central nervous system: holoprosencephaly, meningocele, encephalocele, microcephaly
- Chromosomal: triploidy, trisomy 18, Turner syndrome
- Cloacal dysgenesis
- Cystic hygroma
- Diaphragmatic hernia
- Genitourinary tract: renal agenesis, renal dysplasia, urethral obstruction (posterior urethral valve), bladder exstrophy, Meckel-Gruber syndrome, ureteropelvic junction obstruction, prune-belly syndrome
- Hypothyroidism
- Multiple gestation: twin–twin transfusion syndrome, twin reverse arterial perfusion sequence (TRAP)
- Musculoskeletal: sirenomelia, sacral agenesis, absent radius, facial clefting
- VACTERL (vertebral, anal, cardiac, tracheoesophageal, renal, limb) association

Workup and Evaluation

Laboratory: No evaluation indicated.

Imaging: Amniotic fluid index calculated by adding the vertical depths of the largest pockets of amniotic fluid in each quadrant of the uterus (average at term = 12.5 cm, 95th percentile = 21.4). Borderline values should always be rechecked before any intervention is undertaken. Fetal anomalies may also be documented.

Special Tests: Nonstress or contraction stress testing to evaluate fetal health.

Diagnostic Procedures: Physical examination, ultrasonography.

Pathologic Findings

Reduced amniotic fluid (other findings based on the cause).

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation. Mild degrees may be managed expectantly. Maternal oral hydration may transiently improve amniotic fluid volume.

Specific Measures: Amnioinfusion (the introduction of normal saline via an intrauterine catheter placed through the partially dilated cervix during labor) has been used to reduce the incidence of umbilical cord compression during labor. This does not reduce the risk for meconium aspiration.

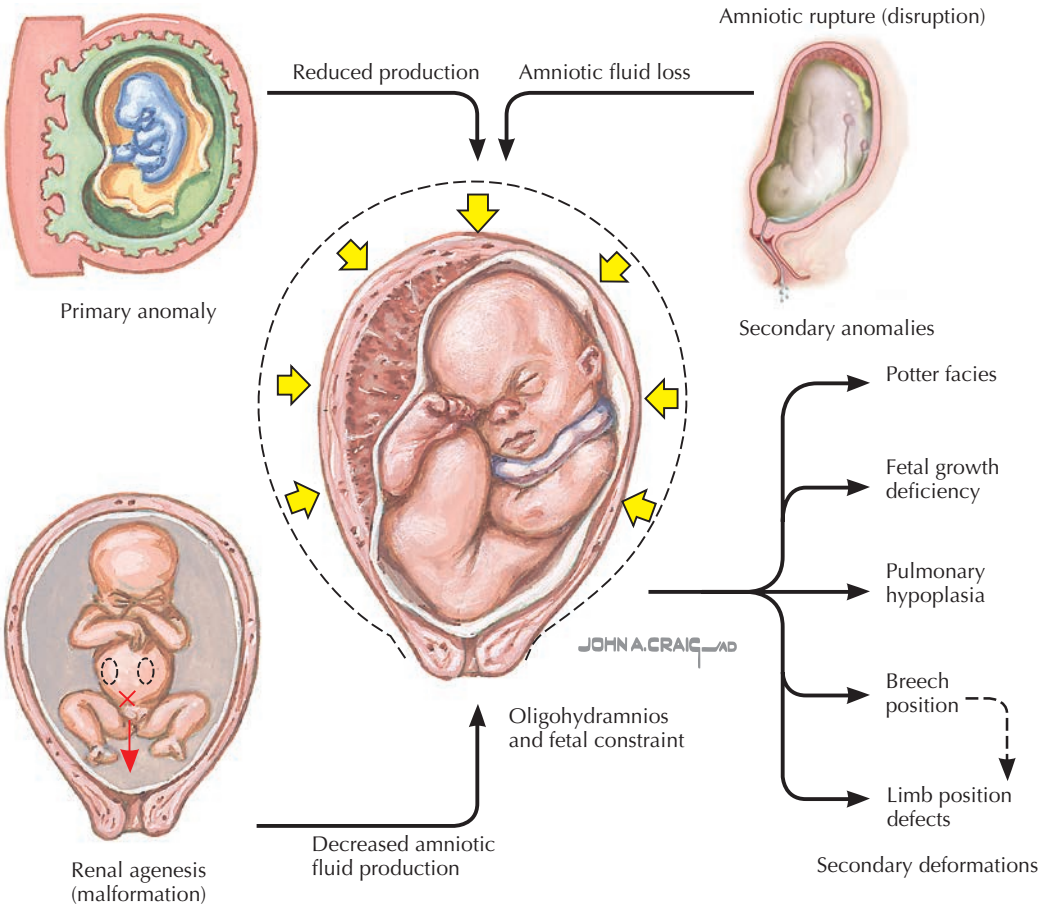

Figure 243.1 Events in oligohydramnios

Diet: No specific dietary changes indicated.
Activity: No restriction.
Patient Education: Reassurance.
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Special Tests for Monitoring Fetal Well-Being, 2019
- Ultrasound Exams, 2017
- When Pregnancy Goes Past Your Due Date, 2017

Drug(s) of Choice

None

FOLLOW-UP

Patient Monitoring: Intensive fetal surveillance is required.
Prevention/Avoidance: None.
Possible Complications: Amniotic band syndrome (including partial limb amputation), pulmonary hypoplasia, premature labor, clubfoot, meconium-stained amniotic fluid, umbilical cord compression, and fetal death. The prognosis is inversely related to gestational age: the earlier the oligohydramnios occurs, the worse the outcome.
Expected Outcome: When oligohydramnios occurs in term or postterm pregnancies, it is associated with fetuses that do not tolerate labor well (5-fold to 7-fold increase in rate of cesarean delivery).

MISCELLANEOUS

ICD-10-CM Codes: 41.00X0 (Oligohydramnios, unspecified trimester, not applicable or unspecified), P01.2 (Newborn [suspected to be] affected by oligohydramnios), and O42.00 (Premature rupture of membranes, onset of labor within 24 hours of rupture, unspecified weeks of gestation).

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PLACENTA PREVIA

244

INTRODUCTION

Description: Placenta previa is the implantation of the placenta in a location that leaves a part or all of the cervical os covered. This is associated with potentially catastrophic maternal bleeding and obstruction of the uterine outlet. Several degrees are recognized: total, partial, marginal, and low-lying placenta. These degrees may vary with cervical dilation or gestational age.
Prevalence: Observed in 0.3%–0.5% of deliveries; up to 6% of patients at 10–20 weeks gestation.
Predominant Age: Reproductive age; average age is 29 years.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Implantation by the zygote low in the uterine cavity (in close proximity to the cervical os). Defective decidual vascularization, resulting from inflammation or atrophy, has been implicated.
Risk Factors: Multiparity, advanced maternal age (>35 years: 1% of deliveries, >40 years: 2%), prior cesarean delivery (two to five times increase based on the number of procedures), induced abortion, smoking (2-fold increase), cocaine use, multiple gestation (40% increased risk), male fetus, high altitude, prior placenta previa, and prior abortion.

SIGNS AND SYMPTOMS

- Asymptomatic; found on routine ultrasonography (90% of cases found on routine ultrasonography before 20 weeks of gestation will resolve before delivery), 10% reach term without symptoms
- Painless vaginal bleeding (70%–90%; generally not present until late second or early third trimester), which may be catastrophic in amount, although initial episodes are rarely fatal; blood is maternal in origin. Vaginal bleeding at more than 20 weeks gestation precludes vaginal examination and should prompt immediate ultrasonography to evaluate placental location and health.
- Uterine hyperactivity possibly present with bleeding (20%)
- Fetal malpresentation
- Heavy or prolonged bleeding after delivery (20%–25%)

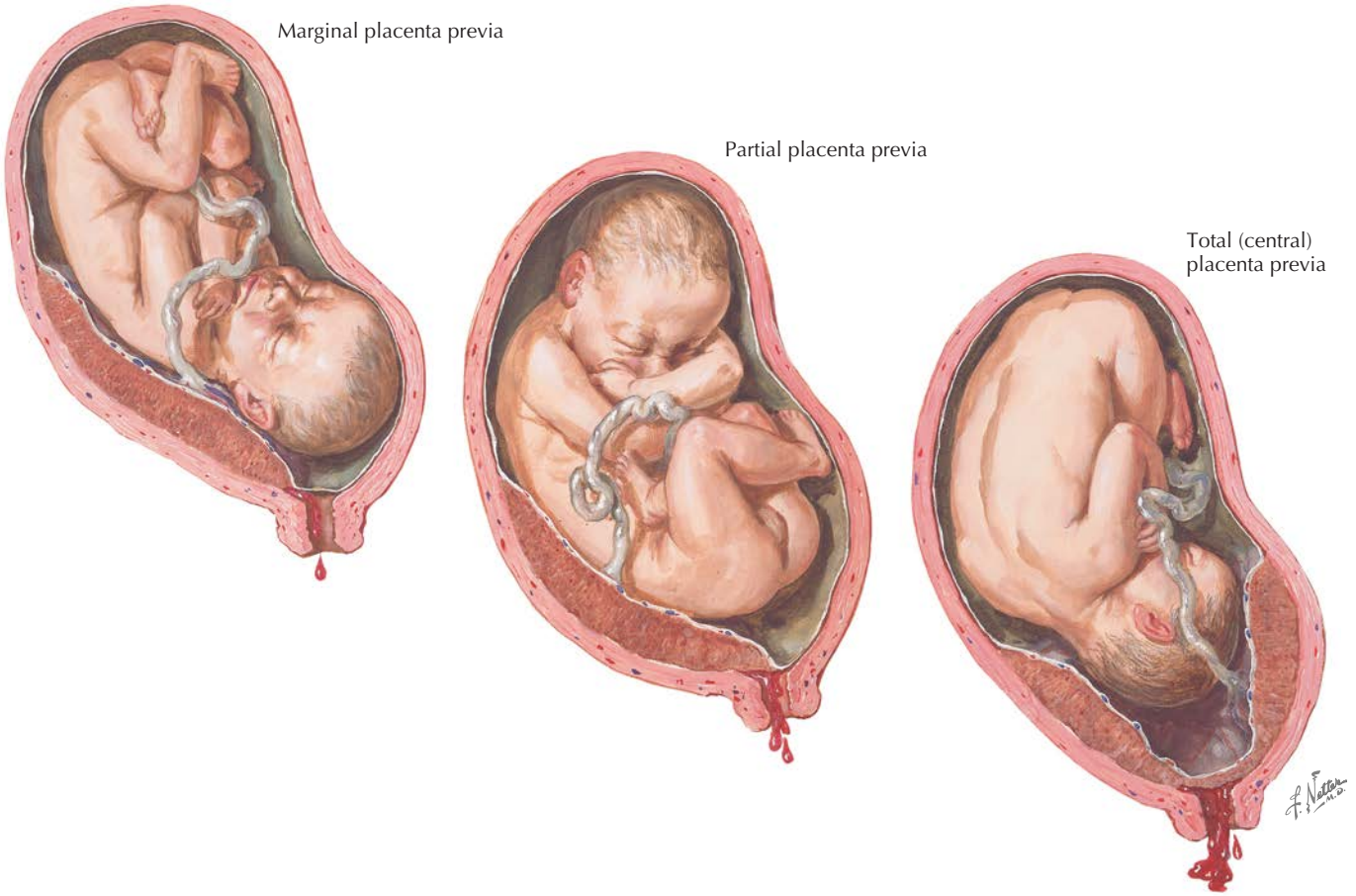

Figure 244.1 Placenta previa

DIAGNOSTIC APPROACH

Differential Diagnosis

- Bloody show of early labor
- Placental abruption
- Vasa previa
- Low-lying placenta

Associated Conditions: Placenta accreta (15%–25% of patients, highest when implantation occurs near or over a prior surgical site such as cesarean scar), increta, or percreta, prematurity, and vasa previa.

Workup and Evaluation

Laboratory: Complete blood count, type and crossmatched blood products for possible replacement.

Imaging: Ultrasonography (transabdominal) to determine placental location and condition, fetal status. (Transabdominal ultrasonography is the standard, but transvaginal studies may be carefully performed and provide better resolution.) False-positive ultrasonographic results may occur with a full bladder; suspicious studies should be repeated with the bladder empty. Low-lying placentas noted in studies performed at less than 30 weeks may "migrate," leaving the cervix free at term (up to 90% of cases, most typically anterior placentas). The degree of cervical coverage predicts the probability of persistence at term: less than 14 mm over the internal os, the probability of placenta previa at delivery is near zero; 14 mm or greater but less than 25 mm over the os: 20%, 25 mm or greater over the os: 40%–100%.

Special Tests: Kleihauer–Betke test for fetal–maternal transfusion, clot tube to assess possibility of coagulopathy, Apt test to identify fetal blood loss (eg, from a vasa previa).

Diagnostic Procedures: History, ultrasonography. Pelvic examination is contraindicated until the location of the placenta can be ascertained.

Pathologic Findings

Placental implantation in the lower uterine segment.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, hemodynamic stabilization, fetal assessment. If placenta previa is suspected, no vaginal examinations until the location and degree of placental obstruction can be determined.

Specific Measures: If bleeding is heavy or the placenta obstructs delivery, cesarean delivery is indicated. Marginal (low lying) placental implantation may be managed conservatively if it occurs long before term. Bleeding from the placental site may be heavy, requiring extensive measures (including hysterectomy, hypogastric artery ligation, or embolization) to control bleeding.

Diet: No specific dietary changes indicated unless active bleeding is present or the patient's condition is unstable.

Activity: Bed rest is generally indicated.

Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Bleeding During Pregnancy, 2021
- Cesarean Birth, 2020
- Ultrasound Exams, 2017

Drug(s) of Choice

- Fluid and blood product replacement as needed.
- Steroid therapy to accelerate fetal lung maturation has been advocated for patients remote from term.
- Oxytocin, methylergonovine maleate (Methergine), and prostaglandin (E_2) therapy to assist with uterine contraction after delivery.
- Rh (D) immunoglobulin should be administered as indicated in mothers who are Rh negative. If tocolysis is required, $MgSO_4$ is preferred.

Contraindications: β-Mimetic agents should not be used if there is significant maternal blood loss or hypotension.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: Catastrophic maternal hemorrhage, fetal anoxia. Coagulation defects may occur as a result of heavy or prolonged blood loss. Significant bleeding from the placental site may result in maternal compromise, and extensive measures (including hysterectomy) to achieve control must be taken. In resource-rich countries, maternal mortality is around 1%. Preterm delivery represents the greatest source of morbidity for the fetus. Approximately 35% of infants whose mothers require transfusion require transfusion themselves.
Expected Outcome: Generally good—25%–30% of patients complete 36 weeks of gestation despite labor or repetitive bleeding.

MISCELLANEOUS

ICD-10-CM Codes: O44.00 (Placenta previa specified as without hemorrhage, unspecified trimester) and O44.10 (Placenta previa with hemorrhage, unspecified trimester).

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PLACENTAL ABRUPTION

245

INTRODUCTION

Description: Placental abruption is the premature separation of an otherwise normally implanted placenta before the delivery of the fetus. The term is generally applied only to 20-week or later gestations.
Prevalence: 1/185–290 deliveries; sufficient to result in fetal death, 2–10/1000 deliveries (approximately 10% of third-trimester fetal demise).
Predominant Age: Reproductive age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Pregnancy-induced hypertension (most common), trauma to the abdomen, decompression of an overdistended uterus (loss of amniotic fluid, delivery of a twin), cocaine use. It is thought that abnormalities in the early development of the spiral arteries lead to decidual necrosis, placental inflammation, and infarction, resulting in vascular disruption and bleeding.
Risk Factors: Pregnancy-induced hypertension (most common, 5-fold increased risk over those with normal blood pressure). Prior abruption: 15% chance if one prior episode, 20%–25% for two or more prior events. Others: smoking more than 1 pack/day (2.5-fold increased risk; risk increases by 40% for each pack/day smoked), multiparity, alcohol abuse, cocaine use, polyhydramnios, maternal hypertension (5-fold increased risk), premature rupture of the membranes, external trauma, uterine leiomyomata or anomalies, increased age or parity, and multiple gestation.

SIGNS AND SYMPTOMS

- Highly variable
- Vaginal bleeding (not universal; approximately 80%)

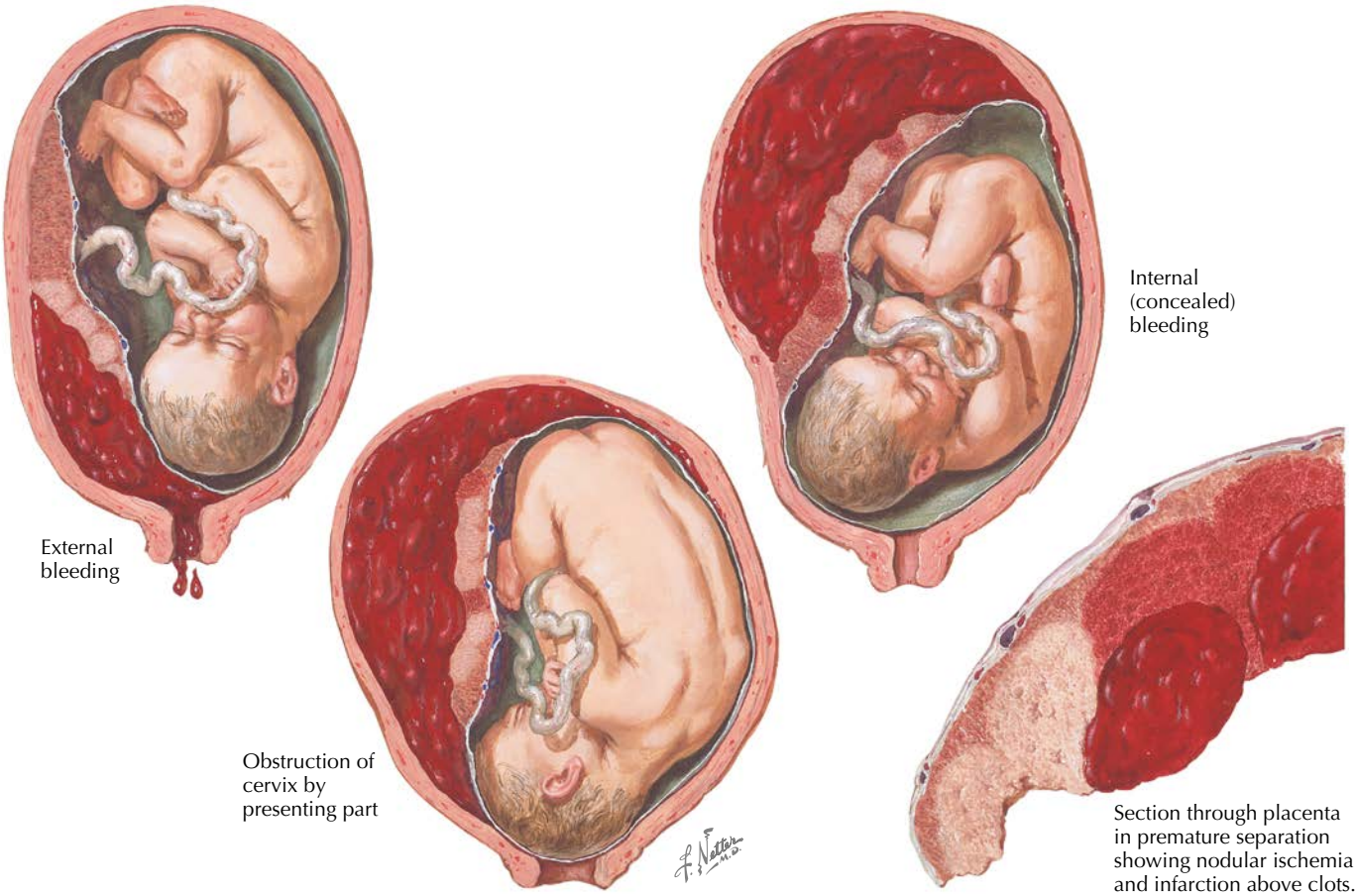

Figure 245.1 Placental abruption

- Abdominal, back, or uterine pain (65%)
- Fetal bradycardia or late decelerations (60%)
- Uterine irritability, tachysystole, tetany, elevated baseline intrauterine pressure (20%–40%, thrombin is a strong uterotonic)
- Maternal hypotension or signs of volume loss (postural hypotension, shock)
- Fetal demise

DIAGNOSTIC APPROACH

Differential Diagnosis

- Uterine rupture
- Placenta or vasa previa
- Bloody show
- Chorioamnionitis
- Other sources of abdominal pain
- Preterm labor

Associated Conditions: Hypertension, pre-eclampsia, eclampsia, intrauterine fetal demise, postpartum hemorrhage, consumptive coagulopathy, tumultuous labor, premature delivery, and fetal bradycardia. There is a slight increase in the rate of congenital anomalies in these infants.

Workup and Evaluation

Laboratory: Complete blood count, assessment of clotting function (bleeding time, prothrombin time, partial thromboplastin time, fibrinogen, D-dimer assay).

Imaging: Ultrasonography may show signs of a retroplacental clot or collection of blood, but absence does not rule out abruption.

Special Tests: Kleihauer–Betke test for fetal–maternal transfusion, clot tube to assess possibility of coagulopathy, Apt test to identify fetal blood loss (vasa previa).

Diagnostic Procedures: History, physical examination, and laboratory evaluation. Fetal heart rate and uterine activity monitoring.

Pathologic Findings

Placental abruption is a clinical diagnosis. Bleeding into the decidua basalia with hematoma formation, leading to progressive separation of the placenta and pressure necrosis. When the bleeding is venous in origin, the separation may be smaller and self-limited; when arterial, dissection tends to be progressive and extensive. Acute anemia, evidence of clotting activation and consumption, histologically normal placenta.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Prompt evaluation, intravenous access and fluid support, crossmatch blood or blood products, Rh typing (if not known).

Specific Measures: Fetal and uterine activity monitoring, monitoring of maternal condition (pulse, blood pressure, pulse oxygenation), expedited delivery when significant separation has occurred.

Diet: Nothing by mouth until the diagnosis is established and the patient's condition is stabilized.

Activity: Bed rest until the diagnosis is established and the patient's condition is stabilized.

Patient Education: Reassurance. Often there is insufficient time for any more than the most basic information and counseling.

American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- Bleeding During Pregnancy, 2021

Drug(s) of Choice

- None.
- Oxygen and intravenous fluid, Rh immune globulin if indicated.

Contraindications: Tocolytics should not be used until a diagnosis is established.

FOLLOW-UP

Patient Monitoring: Close attention to vaginal bleeding, fetal well-being, and maternal circulatory status.

Prevention/Avoidance: Eliminate modifiable risk factors. The risk of recurrence is estimated to be 9%–15%.

Possible Complications: Consumptive coagulopathy, maternal mortality 0.5%–1% and fetal mortality 20%–70% based on the size of the separation, the cause, and gestational age; 10%–15% neurologic sequelae in fetal survivors. Acute renal failure can occur with severe forms of abruption and hypovolemia. Women who experience a placental abruption have a roughly 2-fold increase in their risk for cardiovascular disease later in life.

Expected Outcome: Small abruption may be managed conservatively; larger separations may jeopardize mother and fetus and frequently require immediate delivery.

MISCELLANEOUS

ICD-10-CM Code: O45.8X9 (Other premature separation of placenta, unspecified trimester).

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POLYHYDRAMNIOS

246

INTRODUCTION

Description: Polyhydramnios (also known as hydramnios) is an abnormal increase in the amount of amniotic fluid surrounding the fetus. This diagnosis is generally reserved for volumes greater than 2 L and amniotic fluid index greater than 24–25 cm. (At term, there should be approximately 800 mL of amniotic fluid present). This fluid may gradually accumulate over time (chronic hydramnios) or acutely over the course of several days (more common in early pregnancy).

Prevalence: In 0.7%–2% of pregnancies, some increase in amniotic fluid is observed during pregnancy (80% mild; 5% severe).

Predominant Age: Reproductive age.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Idiopathic (40%), maternal diabetes (25%), multiple gestation, fetal anemia, fetal anomalies (50% of patients with severe hydramnios: central nervous system, gastrointestinal tract, chromosomal [trisomies 18 and 21]).

Risk Factors: Fetal anomalies that impair swallowing or alter urine production, multiple gestation (twin–twin transfusion), maternal diabetes, erythroblastosis.

SIGNS AND SYMPTOMS

- Uterine size larger than normal for stage of pregnancy
- Increased amniotic fluid measured by ultrasonography (amniotic fluid index >24–25 cm)
- Dyspnea (especially when supine)
- Lower-extremity and vulvar edema
- Premature labor
- Difficulty palpating fetal parts or hearing fetal heart tones

DIAGNOSTIC APPROACH

Differential Diagnosis

- Inaccurate gestational age
- Normal multiple gestation
- Fetal anomalies
- Fetal macrosomia
- Ascites
- Ovarian cyst

Associated Conditions: Anencephaly, esophageal atresia, prematurity, trisomy 21, fetal anemia, umbilical cord prolapse, fetal malposition, postpartum uterine atony, and placental abruption. When associated with fetal growth restriction, trisomy 18 should be considered. Perinatal mortality is increased by 2- to 5-fold.

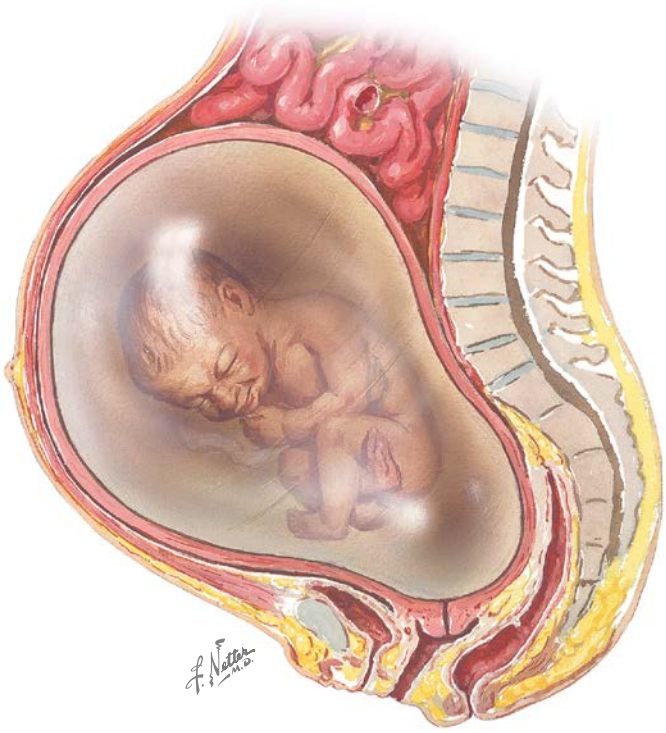

Figure 246.1 Polyhydramnios

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: Amniotic fluid index calculated by adding the vertical depths of the largest pockets of amniotic fluid in each quadrant of the uterus (average at term = 12.5 cm, 95th percentile = 21.4). Fetal anomalies also may be documented.
Special Tests: None indicated.
Diagnostic Procedures: Physical examination, ultrasonography.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation. Mild conditions may be expectantly managed. If dyspnea or abdominal pain is present, hospitalization may be required.
Specific Measures: Indomethacin therapy has been shown to be of help in some patients. Therapeutic amniocentesis may be used to transiently relieve maternal symptoms and in some cases allow prolongation of the gestation. If performed, the rate of withdrawal should be approximately 500 mL/hr and limited to 1500–2000 mL total volume. Bed rest, diuretics, and salt and water restrictions are ineffective. Administration of steroids to accelerate fetal lung maturation as indicated by gestational age and risk for preterm delivery.
Diet: No specific dietary changes indicated.
Activity: No restriction except for those imposed by the enlarged uterus.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:
- Special Tests for Monitoring Fetal Well-Being, 2019
- Ultrasound Exams, 2017

Drug(s) of Choice

- Indomethacin 1.5–3 mg/kg/day.

Contraindications: Aspirin-sensitive asthma, inflammatory bowel disease, or ulcers.
Precautions: Use of nonsteroidal antiinflammatory agents has been associated with premature closure of the ductus arteriosus. This is generally transient and may be monitored by ultrasonography.

Alternative Drugs

None

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None.
Possible Complications: Premature labor and delivery (40%), placental abruption, maternal pulmonary compromise, umbilical cord prolapse, uterine atony.
Expected Outcome: Mild to moderate increases in fluid are not associated with significant risk. Severe polyhydramnios is often associated with significant fetal anomalies. Perinatal mortality is as high as 25%–30% in some studies. In general, the more severe the hydramnios, the greater the fetal risk.

MISCELLANEOUS

ICD-10-CM Code: P01.3 (Newborn [suspected to be] affected by polyhydramnios).

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POSTPARTUM BREAST ENGORGEMENT

247

INTRODUCTION

Description: Postpartum breast engorgement is characterized by tender, swollen, hard breasts that are caused by the accumulation of milk in the postpartum period or during weaning or interstitial edema with the onset of lactation after birth.
Prevalence: Common.
Predominant Age: Reproductive age, 3–4 days after delivery.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Increased milk production relative to use. Generally occurs 3–4 days after delivery when milk first comes in or during weaning. Pacifier use does not influence breastfeeding success or duration.
Risk Factors: High fluid intake, infrequent nursing, poor suckling by the infant, abrupt cessation of nursing, excessive breast pumping.

SIGNS AND SYMPTOMS

- Warm, hard, sore breasts with no fever or erythema

DIAGNOSTIC APPROACH

Differential Diagnosis

- Mastitis
- Blocked (plugged) duct

Associated Conditions: Mastitis.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No imaging indicated.
Special Tests: None indicated.
Diagnostic Procedures: History and physical examination.

Pathologic Findings

Firm, tender breasts without skin change, fever, or inflammation.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Mild fluid restriction, analgesics, ice packs or heat, support (well-fitting brassiere). The use of cabbage leaves or herbal poultices (applied to the breast) has been advocated, but conclusive studies are lacking.
Specific Measures: More frequent breastfeeding (if breastfeeding is to continue), firm binding.

Figure 247.1 Painful engorgement

Diet: Mild fluid restriction. If breastfeeding is to continue, adequate calories (additional 200 kcal/day) and protein are required.
Activity: No restriction.
Patient Education: Reassurance, support, specific suggestions.
American College of Obstetricians and Gynecologists Patient Education Pamphlet:
- Breastfeeding Your Baby, 2021

Drug(s) of Choice

- Analgesics. Medication to suppress lactation has little value, and recommendations for its use have been withdrawn. There are, however, some reports of success with cabergoline to suppress lactation.

FOLLOW-UP

Patient Monitoring: Normal health maintenance; watch for possible infection.
Prevention/Avoidance: Gradual weaning reduces engorgement.
Possible Complications: Ductal obstruction and ectasia (uncommon).
Expected Outcome: Generally resolves in 24–48 hours.

MISCELLANEOUS

ICD-10-CM Code: O92.29 (Other disorders of breast associated with pregnancy and the puerperium).

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248 POSTPARTUM DEPRESSION

INTRODUCTION

Description: Postpartum depression is a cluster of symptoms that are characterized by a disturbance of mood; loss of sense of control; intense mental, emotional, and physical anguish; and loss of self-esteem associated with childbirth. There is a spectrum of symptoms and severity from postpartum "blues" that are mild and self-limited (subsyndromal depressive symptoms) to debilitating major depression. The American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders,* fifth edition (DSM-5) limits the definition to the first 4 weeks following childbirth, whereas others extend the interval up to a year after delivery.

Prevalence: 8%–15% of delivering women; true psychosis occurs in 1–2/1000 deliveries. Arguments can be made that this represents the most common complication of pregnancy.

Predominant Age: Reproductive age (by definition).

Genetics: No genetic pattern, although there is a proposed family tendency.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown.

Risk Factors: History of major depression, premenstrual syndrome, prior postpartum depression, perinatal loss, early childhood loss (parent, sibling), physical or sexual abuse, socioeconomic deprivation, family predisposition, lifestyle stress, preterm delivery, unplanned pregnancy, single marital status, young age. There is a 50% recurrence rate for subsequent pregnancies.

SIGNS AND SYMPTOMS

- Five of the following must be present—depressive mood most of the time; diminished interest in normal or pleasurable activities; significant involuntary change in weight; insomnia or hypersomnia; psychomotor agitation or retardation; fatigue or loss of energy; feelings of worthlessness or guilt; diminished ability to think or concentrate; recurrent thoughts of death
- Begins 2–12 months after delivery; lasts 3–14 months (up to 50% of cases have symptoms before delivery)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Normal grief reaction
- Transient mood change ("postpartum blues"; 40%–80% of patients, onset within 2–3 days of delivery with resolution within 2 weeks)
- Substance abuse
- Eating disorders or other nonmood psychiatric disorders

Associated Conditions: None.

Workup and Evaluation

Laboratory: No evaluation indicated.

Imaging: No imaging indicated.

Special Tests: Beck Depression Inventory or the 10-item Edinburgh Postnatal Depression Scale may be used to screen for depression. Available in over 50 languages, the Edinburgh scale is for screening, not diagnosis. An alternative screening tool is the nine-item Patient Health Questionnaire. Because of the high prevalence of postpartum depression, universal screening is recommended.

Diagnostic Procedures: History, suspicion.

Pathologic Findings

None

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Support, reassurance, and assistance with transition to motherhood. Postpartum exercise has been associated with a lower rate of depression.

Specific Measures: Psychotherapy (cognitive behavior therapy and others), antidepressants, electroshock therapy. Response rates and speed of recovery are comparable to those of major depression outside of pregnancy and the puerperium.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education: Reassurance, family support.

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Postpartum Depression, 2020

Drug(s) of Choice

- Selective serotonin reuptake inhibitors—fluoxetine (Prozac) 10–40 mg/day, paroxetine (Paxil) 20–50 mg/day, sertraline (Zoloft) 50–150 mg/day.

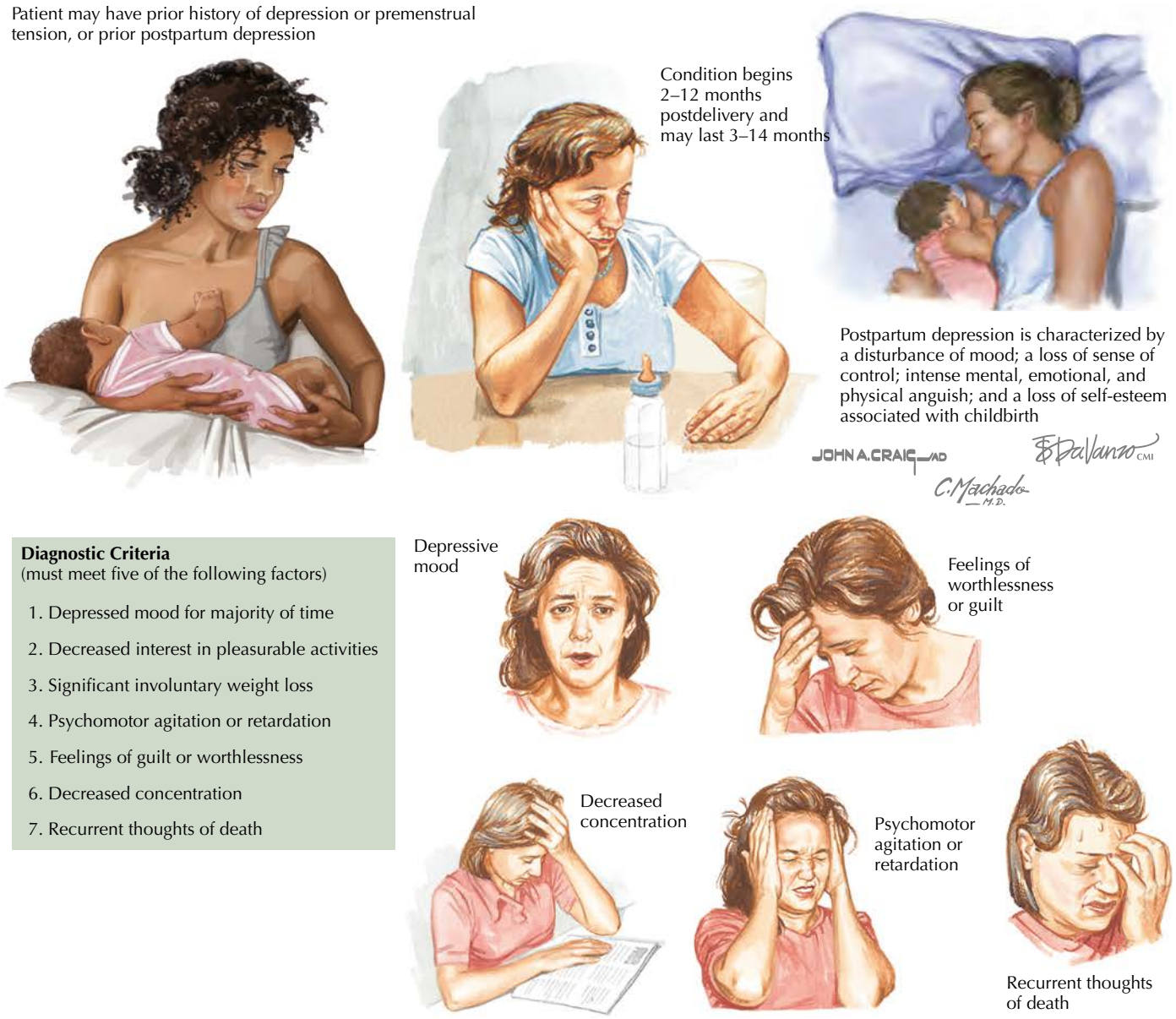

Figure 248.1 Postpartum depression

- For symptoms of appetite loss; loss of energy or interest in pleasure; psychomotor retardation; thoughts of hopelessness, guilt, or suicide—cyclic antidepressants (eg, amitriptyline, clomipramine, doxepin, imipramine, nortriptyline, bupropion, and others).
- For symptoms of increased appetite, sleepiness, high levels of anxiety, phobias, obsessive-compulsive disorders—monoamine oxidase (MAO) inhibitors (eg, isocarboxazid, phenelzine, tranylcypromine).

Contraindications: See individual agents.

Precautions: Use in pregnancy must be carefully weighed versus the potential effects (teratogenic) on the fetus. Some agents are associated with delayed cardiac conduction and disturbances in rhythm. Tricyclic agents, paroxetine, sertraline, and venlafaxine must be tapered over 2–4 weeks to discontinue.

Interactions: Virtually all agents may produce fatal interactions with monoamine oxidase inhibitors or antiarrhythmic medications. Monoamine oxidase inhibitors can also adversely interact with vasoconstrictors, decongestants, meperidine, and other opiates.

Alternative Therapy

- Electroshock therapy may still play a role in the treatment of major depression and mania in those who do not respond to other therapies or are at high risk for suicide.

FOLLOW-UP

Patient Monitoring: Follow up at 6 weeks, 3 and 6 months, and as needed.

Prevention/Avoidance: None for primary occurrence. For those with a history of prior postpartum depression, prophylactic treatment with antidepressants is associated with a reduced rate of recurrence. Postpartum exercise has been associated with a lower rate of depression.

Possible Complications: Progressive loss of function, impaired bonding, short duration or failed breastfeeding, marital discord, infanticide (2–7/100,000 infants) or suicide (suicidal ideation, 3%, suicide, 1/100,000 cases).

Expected Outcome: Generally good response for mild to moderate depression with psychotherapy and medication; severe depression in 45%–65% of patients respond to medication. Recurrence rates are approximately 50% after a single episode, 70% after two episodes, and 90% with three or more episodes.

MISCELLANEOUS

Pregnancy Considerations: Tends to recur with subsequent pregnancies. Prophylactic treatment after delivery should be considered for these patients.

ICD-10-CM Codes: O99.340 (Other mental disorders complicating pregnancy, unspecified trimester), O90.6 (Postpartum mood disturbance), and O90.345 (Other mental disorders complicating the puerperium).

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249 PRE-ECLAMPSIA AND ECLAMPSIA

INTRODUCTION

Description: Pre-eclampsia is a pregnancy-specific syndrome (occurring after 20 weeks gestation) of reduced organ perfusion, vasospasm, and endothelial activation that is characterized by hypertension, proteinuria, end-organ failure, and other symptoms. Pregnancy can induce hypertension or aggravate existing hypertension. Edema and proteinuria (one or both) are characteristic pregnancy-induced changes. If pre-eclampsia is untreated, convulsions (eclampsia) may occur. Chronic hypertension may be worsened by or superimposed on pregnancy-induced changes. Severe cases may include hemolysis, elevated liver enzymes, and low platelet counts (HELLP syndrome; occurs in up to 20% of severe pre-eclampsia cases).

Prevalence: 2%–8% of all births; 250,000 per year; results in 150 maternal deaths (10%–15% of all maternal deaths; case-fatality rate of 6.4 deaths per 10,000 cases) and 3000 fetal deaths per year. Overall, hypertensive disease of some type occurs in approximately 12%–22% of pregnancies, and it is directly responsible for 16% of maternal deaths in the United States. Eclamptic seizures occur in roughly 2% of patients with pre-eclampsia and 3%–4% of patients with severe pre-eclampsia, though in one study almost 40% of cases occurred in the absence of prior diagnosis of hypertension or proteinuria.

Predominant Age: Rare before 20 weeks gestation. May uncommonly occur between 2 days and 6 weeks after delivery.

Genetics: Multifactorial, runs in families.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown, genetic, endocrine/metabolic (including altered prostaglandin production), uteroplacental ischemia, immunologic all proposed.

Risk Factors: Prior history, body mass index greater than 26.1, nulliparity (1.5-fold to 2-fold increase, 30%–35% of cases), older than 35 years (2-fold to 3-fold increase) or younger than 18 years, multifetal pregnancy, body mass index greater than

30, gestational diabetes, fetal hydrops, hydatidiform mole, thrombophilia.

SIGNS AND SYMPTOMS

- Hypertension without proteinuria or edema (gestational hypertension)
- Hypertension with proteinuria or edema (pre-eclampsia; pre-eclampsia with severe features: headache, abdominal pain, visual disturbances, thrombocytopenia, hemoconcentration, pulmonary edema)
- Hypertension and seizures (grand mal type, often with prodrome [80%]; eclampsia)
- Posterior reversible encephalopathy syndrome (PRES, neurologic signs and symptoms such as vision loss or deficit, seizure, headache, and altered sensorium or confusion, that last from a few hours to a week)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Chronic (essential) hypertension
- Transient hypertension
- Chronic renal disease
- Acute or chronic glomerulonephritis
- Coarctation of the aorta
- Cushing disease
- Systemic lupus erythematosus
- Periarteritis nodosa
- Obesity
- Epilepsy or other neurologic condition associated with seizure
- Encephalitis
- Cerebral aneurysm or tumor
- Lupus cerebritis
- Hysteria

Associated Conditions: Hypertension, heart disease, stroke, placental infarcts, and placental abruption.

Workup and Evaluation

Laboratory: Liver and renal function studies (enzymes, renal clearance, 24-hour urinary protein measurement).

Imaging: Ultrasonography to monitor fetal growth (frequently restricted).

Special Tests: Assessment of fetal lung maturation may be performed, but if maternal disease is severe, management is based on maternal factors and not fetal maturation. Invasive hemodynamic monitoring may be required for patients with the most severe cases.

Diagnostic Procedures: History, physical examination (with blood pressure), urinalysis (or "dipstick"), laboratory assessment. (For diagnostic criteria see Table 249.1).

Pathologic Findings

Results of 24-hour urinary protein measurement is greater than 300 mg/24 hr, blood pressure greater than 140/90 mm Hg, characteristic renal glomerular lesions (capillary endotheliosis), premature aging of the placenta, increased vascular reactivity, elevated liver enzymes, thrombocytopenia.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Aggressive evaluation, frequent prenatal visits, increased fetal surveillance (fetal growth). Hospitalization is required for all but the most benign conditions (mild gestational hypertension, stable chronic hypertension with normal fetal growth). Weekly antenatal testing should be strongly considered.

Specific Measures: The only true treatment for pre-eclampsia or eclampsia is delivery. Management of symptoms may be used to get both mother and baby into optimal condition for delivery. Delivery is preferred over expectant management for pregnancies over 37 and 0/7 weeks gestions—34 and 0/7 weeks if severe features are present.

Diet: No specific dietary changes indicated except as dictated by labor or other management. No dietary manipulations have been shown to alter the risk or course of the disease.

Activity: Bed rest during the management of severe cases or for women in the process of delivery. Bed rest is ineffective in altering the course of pre-eclampsia and is not recommended.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Pre-eclampsia and High Blood Pressure During Pregnancy, 2021

Table 249.1 Criteria for Pre-Eclampsia

Pre-eclampsia (mild)	• Blood pressure ≥140 mm Hg systolic or ≥90 mm Hg diastolic after 20 weeks gestation with previously normal blood pressure* • Proteinuria (≥0.3 g/24 hr) or 1+ dipstick protein • In the absence of proteinuria hypertension signs of significant end-organ dysfunction are sufficient for diagnosis • Impaired hepatic function (transaminases 2-fold above normal) • New-onset headache
Pre-eclampsia with severe features (one or more)	• Blood pressure ≥160 mm Hg systolic or ≥110 mm Hg diastolic on two occasions at least 4 hours apart, while the patient is on bed rest • Renal insufficiency (serum creatinine >1.1 mg/dL or doubling of concentration in the absence of other causes) • Cerebral or visual disturbances • Headache unresponsive to medication • Pulmonary edema or cyanosis • Epigastric or right upper quadrant pain unresponsive to analgesia • Impaired hepatic function (transaminases >2-fold above normal) • Thrombocytopenia (<100,000/μL)

*Some have advocated for a cutoff of 130/80, but this has not been universally adopted.

Drug(s) of Choice

- Drug treatment of mild pre-eclampsia has generally been disappointing.
- Glucocorticoids are often administered to encourage fetal lung maturation.
- Drugs such as labetalol or nifedipine have been administered as part of conservative management protocols. These have generally resulted in prolongation of the gestation and improved fetal outcome but no reduction in catastrophic events such as placental abruption.
- Magnesium sulfate is often intravenously administered during labor to stabilize blood pressure and reduce the risk of seizures but is not associated with a reduction in fetal morbidity or mortality except below 32 weeks. It is most often reserved for patients with severe features or fetal prematurity.

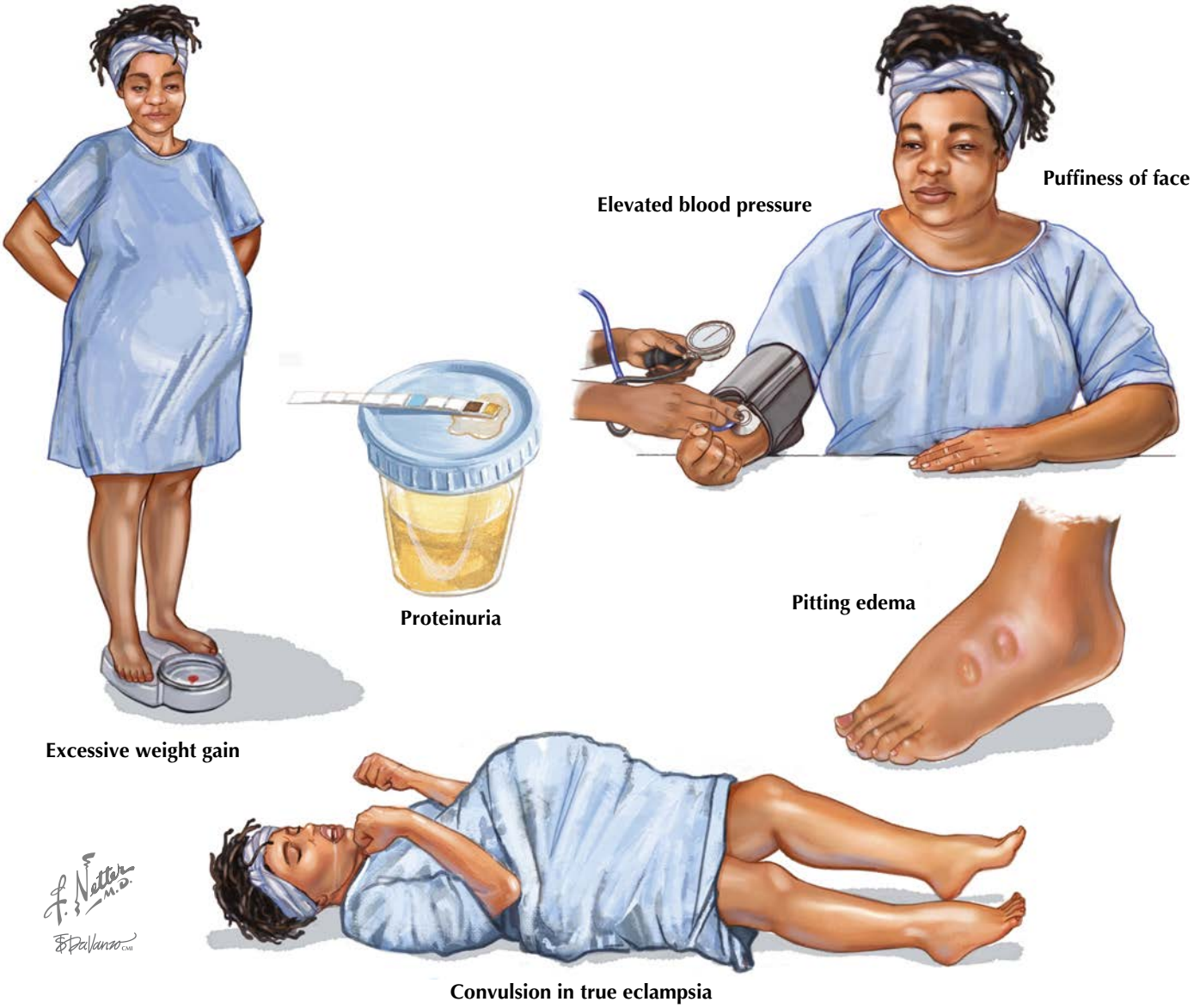

Figure 249.1 Clinical triad of pre-eclampsia and eclampsia

- Intravenous hydralazine may be used to acutely lower blood pressure during labor.
- Data suggest that antiplatelet/nonsteroidal antiinflammatory agents may reduce the risk for recurrence or complications, but definitive data are lacking.

Contraindications: Angiotensin-converting enzyme inhibitors are contraindicated in pregnancy.

Precautions: Excessive levels (>10 mEq/L) of magnesium sulfate may result in respiratory paralysis and cardiac arrest.

Interactions: See individual agents.

Alternative Drugs

- Verapamil, nimodipine, diazoxide, and nitroglycerin have all been studied or advocated at some time.
- Prophylactic treatment with aspirin has not been proved to be effective in preventing pre-eclampsia except in high-risk patients. If given, aspirin therapy (81 mg/day) should be given during weeks 12–28 of gestation.

FOLLOW-UP

Patient Monitoring: Increased maternal and fetal surveillance (more frequent prenatal visits, laboratory tests, and ultrasonography evaluations).

Prevention/Avoidance: Early detection and treatment. Efforts to establish screening criteria or protocols have not yielded clinically useful methods. The measurement of blood pressure at every prenatal visit, even before 20 weeks gestation, can establish a baseline and may detect early changes. Aggressive management of pre-eclampsia may reduce the risk for eclampsia. The use of prophylactic aspirin remains controversial and unproven except for the very highest-risk patients. The risk for recurrence of pre-eclampsia in subsequent pregnancies is inversely proportional to the gestational age at which it occurred in the index pregnancy.

Possible Complications: Maternal—cardiac decompensation, stroke, pulmonary edema and respiratory failure, renal failure, seizures and seizure-related injuries, intracranial hemorrhage, coma, death (0.5%–5% mortality). Fetal risk (growth restriction and death) is directly proportional to the level of diastolic blood

pressure. The risk to both mother and fetus dramatically increases in eclampsia.

Expected Outcome: Generally, gestational hypertension, preeclampsia, and eclampsia improve after delivery. Eclamptic seizures may occur up to 10 days after delivery but are less common beyond 48 hours.

MISCELLANEOUS

ICD-10-CM Codes: O14.00 (Mild to moderate preeclampsia, unspecified trimester), O14.10 (Severe preeclampsia, unspecified trimester), O15.9 (Eclampsia, unspecified as to time period), and O11.9 (Preexisting hypertension with preeclampsia, unspecified trimester).

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PRURITIC URTICARIAL PAPULES AND PLAQUES OF PREGNANCY (PUPPP)

250

INTRODUCTION

Description: Pruritic urticarial papules and plaques of pregnancy (PUPPP) is the most common dermatosis specific to pregnancy. It is also called polymorphic eruption of pregnancy (PEP), Bourne toxemic rash of pregnancy, linear immunoglobulin M (IgM) dermatosis of pregnancy, or toxic erythema of pregnancy. It typically manifests as itchy, erythematous papules within striae on the abdominal wall, which then may spread to the extremities, coalescing into urticarial plaques.

Prevalence: 1/160–300 pregnancies.

Predominant Age: Reproductive age; late in the third trimester (mean 35 weeks) but may occur postpartum.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Unknown. Proposed—skin stretching may cause connective tissue damage, resulting in exposure of dermal antigens

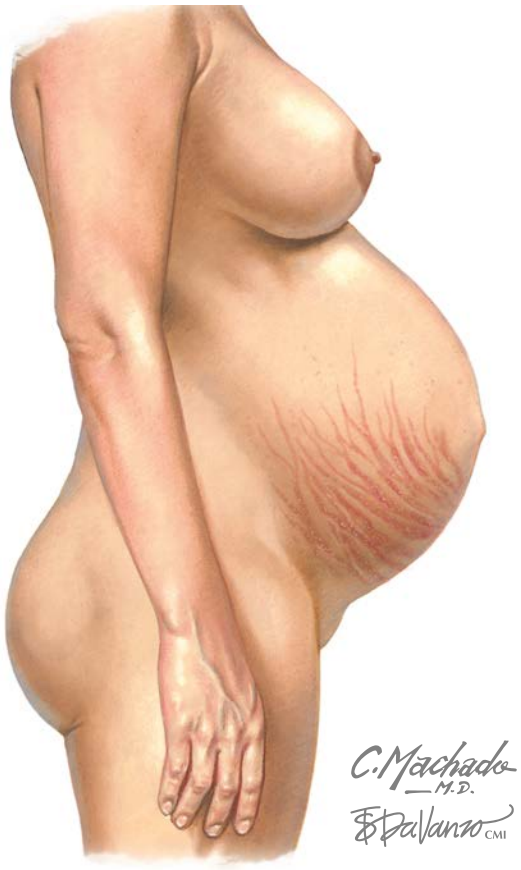

Figure 250.1 PUPPP on abdomen within striae

triggering an inflammatory response, or there may be an immunologic response to circulating fetal antigens.
Risk Factors: Nulliparity (75% of cases), multiple gestation (8- to 12-fold increased risk), excessive skin stretch (polyhydramnios).

SIGNS AND SYMPTOMS

- Erythematous papules within striae on the abdominal wall, sparing the umbilical area, the face, palms, and soles.
- White halos surround the erythematous papules; target-like, with three distinct rings/color changes
- Progression to urticarial plaques and the extremities
- Face, palms, and soles are generally spared
- Intense itching

DIAGNOSTIC APPROACH

Differential Diagnosis

- Pemphigoid gestationis (formerly called herpes gestationis)
- PEP, can be distinguished by direct immunofluorescence of a biopsy specimen)
- Erythema multiforme
- Infestations (scabies)
- Drug reactions
- Viral syndromes

Associated Conditions: Nulliparity, multiple gestation, male fetus, secondary skin infections from scratching.

Workup and Evaluation

Laboratory: No evaluation indicated.
Imaging: No evaluation indicated.
Special Tests: None indicated. Biopsy is confirmatory but not necessary.
Diagnostic Procedures: History and physical examinations.

Pathologic Findings

Nonspecific findings. Spongiosis and parakeratosis in the epidermis, perivascular lymphocytic infiltrate of T-helper cells in the dermis; eosinophils or neutrophils are sometimes found. Dermal edema may be present. C3 and IgM or IgA deposits at the dermoepidermal junction or around blood vessels are found in approximately one-third of cases.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Skin hygiene, topical moisturizing creams or aqueous or emollient ointments, cold shower or iced cloths, mild sedation at night and the wearing of cotton gloves may reduce itching and skin damage.
Specific Measures: Topical corticosteroids to control itching.
Diet: No restriction.
Activity: No restriction, activity encouraged.
Patient Education: Reassurance.

Drug(s) of Choice

- Betamethasone dipropionate 0.05% spray or lotion, triamcinolone acetonide 0.025%–0.1% spray, cream, or ointment.
- Nonsedating oral antihistamines also may be used.
- Systemic corticosteroids (prednisone 0.5 mg/kg/day) may occasionally be needed.

Contraindications: See individual agents.
Precautions: Total dosage should be limited—see individual agents for maximum recommended dosage.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.
Prevention/Avoidance: None known. Does not tend to recur in subsequent pregnancies.
Possible Complications: Skin breakdown or secondary infections from scratching.
Expected Outcome: Itching may worsen immediately after delivery, but most often resolves within 15 days. No long-term risk for either the mother or child.

MISCELLANEOUS

Pregnancy Considerations: No direct effect on pregnancy.
ICD-10-CM Code: O26.86 (Pruritic urticarial papules and plaques of pregnancy [PUPPP])

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PUERPERAL INFECTION (ENDOMETRITIS) 251

INTRODUCTION

Description: Although the term *puerperal infection* can be used to describe any infection during or after labor, it generally applies to the infection of the uterus and surrounding tissues after delivery. This can vary from mild to life-threatening severities. Some of the most severe infections may appear within hours of delivery and are often opportunistic and not associated with reliable risk factors. Vigilance and aggressive diagnosis and treatment are required.

Prevalence: Estimated to occur in 1%–3% of vaginal deliveries; approximately 15% if chorioamnionitis is present during labor. Following cesarean delivery: 1.5%–10% if antibiotic prophylaxis is administered during delivery and 50%–90% without antibiotic prophylaxis in some series.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Colonization and infection of the tissues of the uterus, peritoneum, or surrounding organs; typically, a polymicrobial infection (70%) that involves a mixture of two to three aerobes and anaerobes. The most common organisms are group B streptococci; other facultative streptococci; *Gardnerella vaginalis;* and *Escherichia coli, Bacteroides,* and *Peptostreptococcus* species. Infection by clostridia or group A streptococci may result in rapidly progressive soft-tissue (subcutaneous tissue, muscle, or myometrial) infection. Abscesses usually contain both aerobic and anaerobic bacteria such as *Bacteroides* species (*Bacteroides bivius, B. disiens,* or *B. fragilis*). Approximately 50% of ascending uterine infections involve *Chlamydia trachomatis.*

Risk Factors: Cesarean delivery (10- to 30-fold increase over vaginal delivery), invasive procedures during labor, prolonged rupture of the membranes, prolonged labor, multiple vaginal examinations, retained placental fragments, manual removal of the placenta, urinary catheter, bacterial vaginosis, intravenous line(s), low socioeconomic or nutritional status, maternal age, anemia, and chronic disease (diabetes).

SIGNS AND SYMPTOMS

- Fever (90%; >38.5°C by 24 hours) and tachycardia (often developing rapidly after delivery)
- Uterine tenderness (may be absent)
- Purulent drainage from the uterus
- Signs of septic or cardiovascular shock (hypotension, anxiety, disorientation, prostration)
- Impaired renal function (<20 mL/hr urine production)
- Altered white blood count (<1000 or ≥25,000)
- Hemolysis or hemoconcentration
- Uterine subinvolution and excessive bleeding
- The United States Joint Commission on Maternal Welfare defines postpartum febrile morbidity as an oral temperature of ≥38.0°C (≥100.4°F) on any 2 of the first 10 days postpartum, exclusive of the first 24 hours.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Urinary tract infections, including pyelonephritis (5% of patients; classic signs are routinely absent, urinalysis shows large numbers of white blood cells, and cultures are positive)
- Wound infection
- Atelectasis or pneumonitis
- Infection in intravenous line or site, contaminated fluids
- Disturbed abscess (old tubo-ovarian or appendiceal abscess)
- Septic thrombophlebitis
- Necrotizing fasciitis
- Pseudomembranous colitis
- Transfusion reaction (when applicable)
- Amniotic fluid or pulmonary embolism
- Cardiogenic shock (drugs, cardiac disease, aortic dissection)
- Toxic shock syndrome
- Mastitis (2% of patients)

Associated Conditions: Septic shock, acute respiratory distress syndrome, acute renal failure, and disseminated intravascular coagulation.

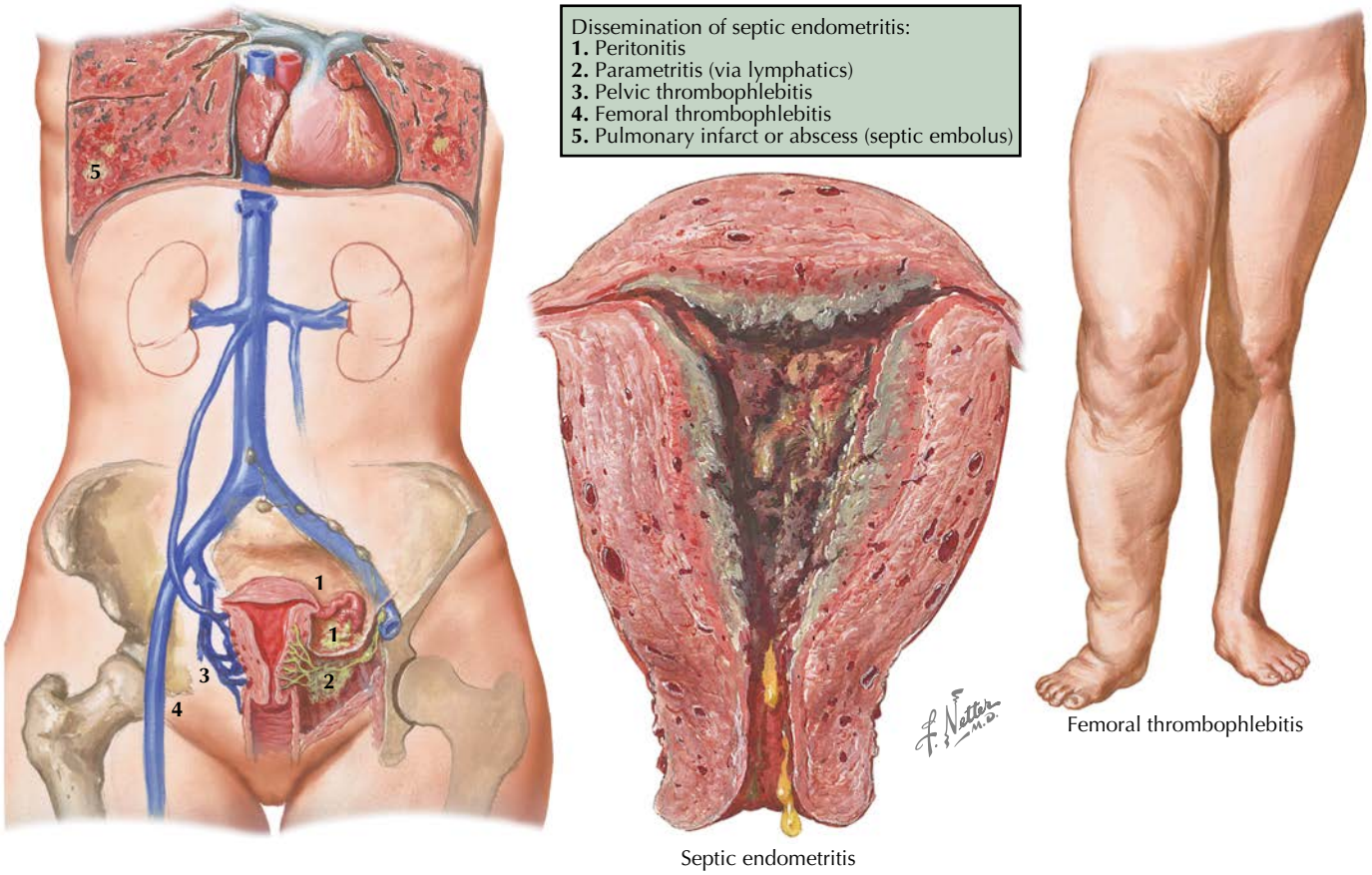

Figure 251.1 Puerperal infection

Workup and Evaluation

Laboratory: Complete blood count, endometrial culture obtained by protected swab (if amniotic fluid or endometrial culture obtained within 24 hours of delivery is not available). Blood cultures are positive in 15%–25% of patients who are febrile but do not reflect the severity of the infection. Tissue culture (direct or by needle aspiration, when wound infections are suspected) and Gram stain. Urine culture is advisable.

Imaging: Ultrasonography may be useful in evaluating the possibility of pelvic abscess or gas formation. Computed tomography and magnetic resonance imaging are useful for a more wide-ranging assessment.

Special Tests: Frozen-section histopathologic evaluation may be useful if necrotizing fasciitis is suspected.

Diagnostic Procedures: History, physical examination, cultures. The diagnosis is generally clinical.

Pathologic Findings

Evidence of inflammation and/or necrosis (based on tissue involved and severity of infections); edema and hyperemia with marked inflammatory infiltrates of the endometrial glands, primarily by neutrophils. This may invade the myometrium and parametrium with areas of necrosis and thrombosis. Endometritis is defined as five or more neutrophils per 400 high-power fields in the superficial endometrium and one or more plasma cells per 120 high-power fields in the endometrial stroma.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, fluid replacement or resuscitation, antipyretics and analgesics (after a diagnosis has been established). Close monitoring, including intensive care, may be required when infection is severe. Consultation with an infectious-disease specialist may be desirable. Low-grade (<38°C) or intermittent fevers may not require treatment when present in the first 24 hours.

Specific Measures: Aggressive antibiotic therapy. Based on response, removal of infected products (if present), surgical exploration, abscess drainage (percutaneous or open), debridement, or hysterectomy may be required. Virtually all postpartum septic shock is caused by surgically treatable processes. Because of the expanded blood and tissue volume at and after delivery, antibiotic dosages must be increased by 40% over those used outside of pregnancy.

Diet: For patients who are acutely ill, nothing by mouth until condition is stabilized. For other patients, no specific dietary changes indicated.

Activity: Bed rest until patient's condition is stable, then a progressive return to normal activity.

Patient Education: Reassurance.

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Cesarean Birth, 2020

Drug(s) of Choice

- Antibiotics should be administered to provide protection against gram-negative facultative and anaerobic bacteria.
- Moderate infections require double antibiotic treatment (clindamycin/gentamicin, 90%–97% effective); severe infections should be treated with triple therapy: an aminoglycoside or first-generation cephalosporin (for facultative bacteria); clindamycin, imipenem-cilastatin, or metronidazole (anaerobic bacteria); and penicillin or ampicillin (clostridia and synergistic action with aminoglycosides on enterococci).
- β-Lactam antibiotics (penicillin or cephalosporin) should be administered in dosages of 8–12 g/day.

Contraindications: See individual agents.

Precautions: Antibiotic dosages must be increased by up to 40% because of the altered physiologic state of pregnancy.

Interactions: See individual agents.

FOLLOW-UP

Patient Monitoring: When severe infections are present, intensive monitoring (including placement in an intensive care unit) may be required. This may include central venous access and monitoring, pulse oximetry, and careful (frequent if not continuous) blood pressure monitoring.

Prevention/Avoidance: Careful attention should be given to antisepsis, reduced numbers of vaginal examinations when the amniotic membranes have been ruptured, careful tissue handling during operative procedures, use of prophylactic antibiotics when risk factors are identified. Changing intravenous sites every 48 hours reduces the risk of infection. There is no evidence to support a role for vaginal antisepsis (chlorhexidine or similar) during labor, though benefit has been shown for its use before cesarean delivery. Parenteral prophylaxis at the time of cesarean delivery is appropriate. There are insufficient data to evaluate the role of prophylactic antibiotics after manual removal of the placenta or operative delivery.

Possible Complications: Progression of infection, abscess formation, septic thrombophlebitis, septic shock, streptococcal or staphylococcal toxic shock syndrome, acute respiratory distress syndrome, renal failure, cardiovascular collapse, death. If septic shock occurs, mortality rates of 20%–30% are common. Coagulopathy may develop. Necrotizing fasciitis is possible.

Expected Outcome: With timely diagnosis and appropriate therapy a complete recovery with no long-term sequelae should be expected. Approximately 90% of patients rapidly respond to antibiotic therapy (and/or percutaneous drainage of abscesses).

MISCELLANEOUS

ICD-10-CM Code: O86.89 (Other specified puerperal infections).

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252 RH INCOMPATIBILITY

INTRODUCTION

Description: Isoimmunization to any fetal blood group not possessed by the mother is possible. The most common example is the Rh (D) factor. What was once a common cause for intrauterine fetal death has been largely eradicated by prophylactic administration of immunoglobulins to those at risk. When mothers develop antibodies against fetal blood antigens, the fetus is at risk for developing hemolytic disease of the fetus and newborn, with serious morbidity or mortality risks. (Roughly 14% of affected fetuses are stillborn; 50% of live-born infants suffer neonatal death or brain injury.) Though isoimmunization to the Rh(D) factor is the prototype for this type of immune problem, alloimmunization to other antibodies (eg, Lewis, Kell) can result in significant morbidity. These are much less common and no prophylaxis against them is available.

Prevalence: Uncommon in developed countries because of the routine use of D immunoglobulin therapy (with routine antepartum prophylaxis 0.14%–0.2% of pregnancies). Roughly 15%–17% of non-Hispanic Whites are Rh (d) negative; 5%–8% of the Black population and 1%–2% of Asians and Native Americans. Among Whites, an Rh-negative woman has an approximate 85% chance of mating with an Rh-positive man (60% are heterozygous; 40% are homozygous at the D locus).

Predominant Age: Reproductive age.

Genetics: Mothers who are Rh (D) negative. The genes for the CDE blood groups are separately inherited from the ABO groups and are located on the short arm of chromosome 1.

ETIOLOGY AND PATHOGENESIS

Causes: Antibody formation against the D antigen.

Risk Factors: Any process that exposes the woman to blood carrying the D antigen including blood transfusion, miscarriage, ectopic or normal pregnancy, trauma, amniocentesis, and others.

SIGNS AND SYMPTOMS

- Elevated maternal serum titers of anti-D immunoglobulin (IgM)
- Fetal hydrops, erythroblastosis fetalis, hemolytic disease of the newborn
- Intrauterine fetal demise

DIAGNOSTIC APPROACH

Differential Diagnosis

- Other isoimmunizations (most frequently Lewis, Kell, or Duffy antigens)
- Iron-deficiency anemia (maternal)
- Hemoglobinopathy

Associated Conditions: Polyhydramnios.

Workup and Evaluation

Laboratory: Serum antibody titers (at first visit, 20 weeks, and approximately every 4 weeks thereafter), testing of baby's father's antibody status. Data suggest that the Rh status of the fetus can be directly determined from fetal cells circulating in maternal blood.

Imaging: Ultrasonography is useful to establish gestational age and monitor amniotic fluid volume and fetal growth. Doppler ultrasonography can assess the degree of fetal anemia, but this technique requires additional expertise and can carry a high false-positive rate.

Special Tests: Amniocentesis is used to determine fetal blood type using polymerase chain reaction on uncultured amniocytes. Amniocentesis or umbilical cord blood sampling is performed to determine bilirubin levels using spectral analysis at 450 nm (ΔOD450) if titers are elevated or there has been a prior affected pregnancy. This is being replaced by middle cerebral artery Doppler ultrasonography.

Diagnostic Procedures: Serum titers, amniocentesis, or umbilical cord blood sampling.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Evaluation, increased surveillance.

Specific Measures: When antibody titers are ≤1:8, no intervention is required. When titers are ≥1:16 in albumin or 1:32 by an indirect Coombs test, amniocentesis or umbilical cord blood sampling should be considered. In severely affected fetuses, intrauterine transfusion may be required.

Diet: No specific dietary changes indicated.

Activity: No restriction.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- The Rh Factor: How It Can Affect Your Pregnancy, 2020

Drug(s) of Choice

- None, if isoimmunization has occurred.
- Prophylaxis (with Rh-positive father): D immunoglobulin—50 mcg for miscarriage before 13 weeks gestation or after chorionic villus sampling; 300 mcg after amniocentesis or ectopic pregnancy; at 28–30 weeks gestation in unsensitized patients or after normal delivery (20 mcg/1 mL of D-positive cells [2 mL of whole blood] infused or lost into the patient's circulation).

Contraindications: Patients who are already sensitized to the D antigen should not receive D immunoglobulin.

FOLLOW-UP

Patient Monitoring: Normal prenatal care with increased surveillance of fetal growth and health.

Prevention/Avoidance: All patients should have their Rh type established and be tested for isoimmunization (indirect Coombs test) at the first prenatal visit. Those who are Rh negative should receive D immunoglobulin after delivery (if the newborn is Rh-positive), amniocentesis, fetal demise, miscarriage, ectopic pregnancy, or any other time exposure to Rh-positive cells may have occurred. Prophylactic administration between 28 and 30 weeks gestation is also standard.

Possible Complications: Isoimmunization with subsequent immune damage to fetal red cells leading to lysis, anemia, hydrops, and fetal death.

Expected Outcome: With prophylaxis, the risk for isoimmunization is estimated to be 0.2%.

MISCELLANEOUS

ICD-10-CM Code: O36.0190 (Maternal care for anti-D [Rh] antibodies, unspecified trimester, not applicable or unspecified).

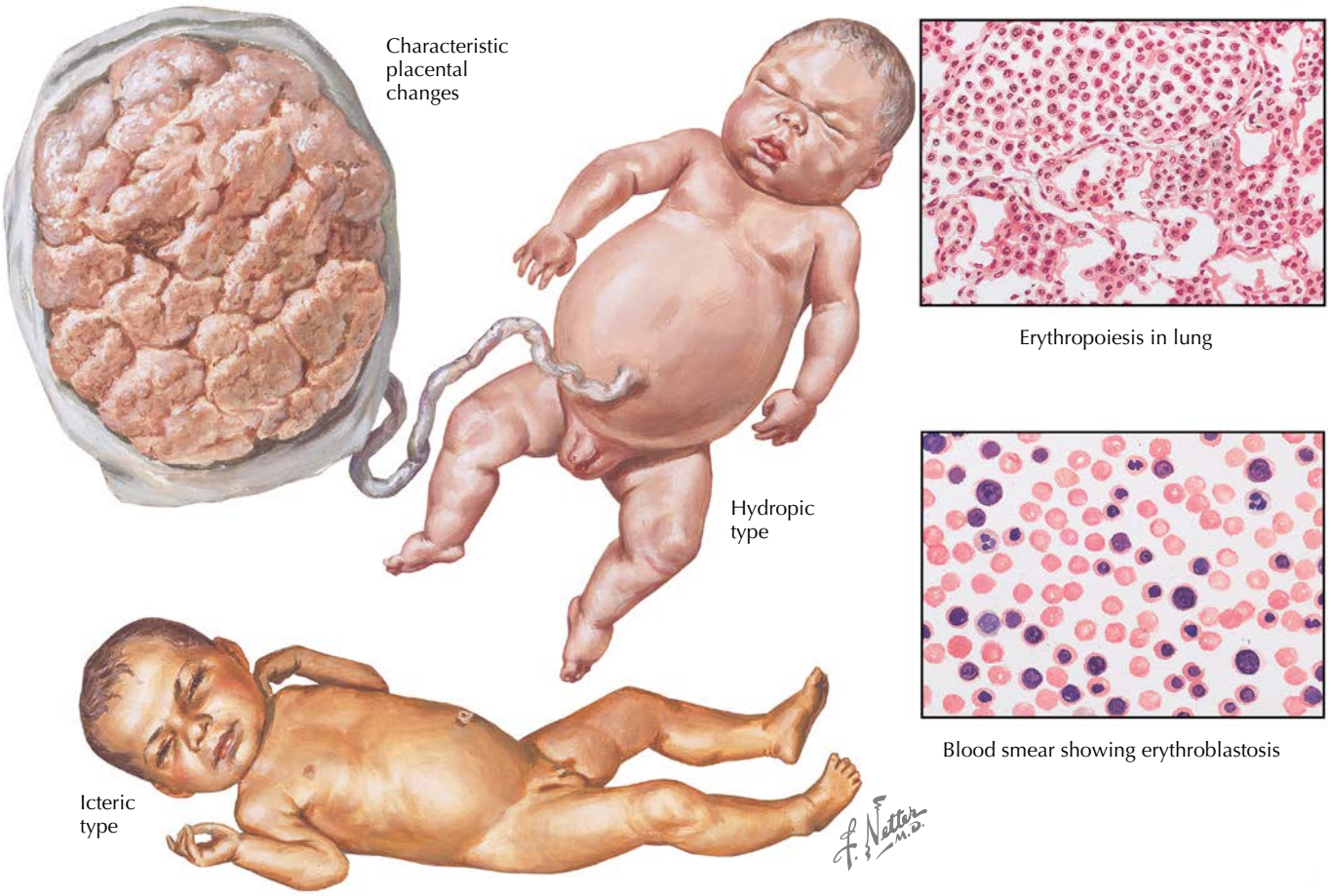

Figure 252.1 Rh incompatibility

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253 SHOULDER DYSTOCIA

INTRODUCTION

Description: Shoulder dystocia is an obstruction to delivery that is caused by the impaction of the fetal shoulder behind the maternal symphysis. Shoulder dystocia is less commonly due to an impaction of the posterior fetal shoulder on the sacral promontory. Shoulder dystocia is most often an unpredictable and unpreventable obstetric emergency, usually defined as a delivery that requires additional obstetric maneuvers (following failure of gentle downward traction on the fetal head) to effect the delivery of the shoulders.

Prevalence: 0.15% of fetuses weighing ≥2500 g (5 lb 8 oz), 1%–5% for ≥4000 g (8 lb 13 oz), 19% for ≥4500 g (9 lb 15 oz); overall, 0.2%–3% of vertex deliveries.

Genetics: Tall or large parents are at a higher risk.

ETIOLOGY AND PATHOGENESIS

Causes: A relative disproportion between fetus and the birth passage or a misalignment of normally sized structures (fetus and pelvis).

Risk Factors: Pre-pregnancy, antepartum, and intrapartum risk factors have extremely poor predictive value for shoulder dystocia: Fetal macrosomia (risk proportional to weight), pelvic deformity, maternal obesity, diabetes mellitus, postterm pregnancy, prolonged second stage of labor, oxytocin induction, mid-forceps or vacuum extraction. Most cases occur in the absence of risk factors.

SIGNS AND SYMPTOMS

- Poor descent during labor
- Retraction of the fetal head onto the perineum following delivery of the chin ("turtle sign")

DIAGNOSTIC APPROACH

Differential Diagnosis

- Fetal macrosomia
- Fetal malformation
- Soft-tissue tumor (maternal or fetal)
- Conjoined or locked twins

Associated Conditions: Diabetes, obesity, prolonged gestation, neurologic injury (brachial plexus), hypoxia, macrosomia (fetal), postpartum hemorrhage (11%), fourth-degree laceration (4%), labor induction, operative vaginal delivery.

Workup and Evaluation

Laboratory: No evaluation indicated.

Imaging: Ultrasonography to assess fetal weight (88% accuracy). Of little or no help during acute management.

Special Tests: None indicated.

Diagnostic Procedures: Pelvic examination, ultrasonography (suggestive or risk), clinical assessment at the time of dystocia.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Risk factor analysis, rapid recognition, call for assistance.

Specific Measures: Move the shoulder to the oblique, suprapubic pressure, fundal pressure only after the shoulder is disimpacted (if then), McRoberts maneuver, Rubin maneuver or Woods maneuver (shoulder rotations), delivery of posterior arm, clavicular fracture, Zavanelli maneuver, symphysiotomy. A generous episiotomy may be needed to allow access even though it, by itself, will not result in resolving the impaction.

Diet: Patients generally should have nothing by mouth during delivery.

Activity: Not applicable. McRoberts maneuver requires flexion and abduction of the maternal hips.

Drug(s) of Choice

- None. Maternal analgesia or anesthesia may be required if time permits.

FOLLOW-UP

Patient Monitoring: Normal health maintenance.

Prevention/Avoidance: Identification of patients at risk (risk factors and ultrasonography—58% accurate, most not predictable), Cesarean delivery for fetuses 4500 g or greater in diabetic pregnancies or 5000 or greater in other women (cesarean delivery for all suspected fetuses is not appropriate; operative delivery for ≥4000 g would result in 2345 procedures to prevent 1 permanent injury at a cost of $4.9 million annually). The risk of recurrence is estimated to be between 1% and 17%, although good data are lacking. Shoulder dystocia simulation and team training protocols are associated with improved outcomes.

Possible Complications: Maternal—uterine atony, hemorrhage (11%), uterine rupture, urinary tract or rectal trauma (fourth degree laceration, 4%). Fetal/neonatal—asphyxia, death (up to 0.35%), brachial plexus injury (up to 40%, 10% persist), fractures (clavicular fracture [1.7%–9.5%], humerus fracture [0.1%–4.2%]). Data suggest that a significant proportion (34%–47%) of brachial plexus injuries are not associated with shoulder dystocia (in fact, 4% occur after cesarean delivery); clavicle or humerus fracture, neurologic damage.

Expected Outcome: Delivery can generally be accomplished, but 10%–30% of fetuses will experience long-term sequelae.

MISCELLANEOUS

ICD-10-CM Code: O66.0 (Obstructed labor due to shoulder dystocia).

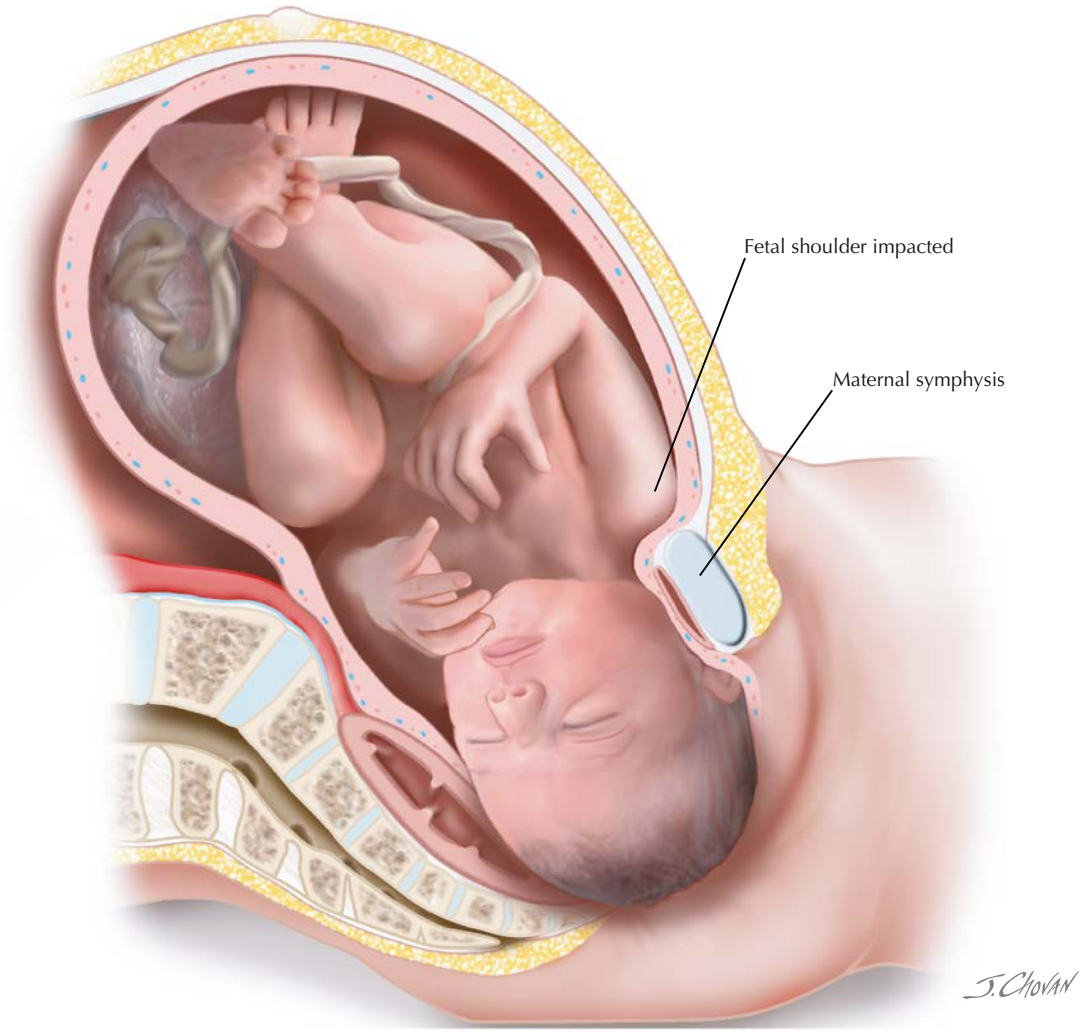

Figure 253.1 Shoulder dystocia

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254 SPONTANEOUS PREGNANCY LOSS (ABORTION, MISCARRIAGE)

INTRODUCTION

Description: In the first trimester, the terms *miscarriage, spontaneous abortion,* and *early pregnancy loss* are used interchangeably. Abortion is the loss or failure of early pregnancy (generally first trimester) in several forms: complete, incomplete, inevitable, missed, septic, and threatened. Except for threatened abortions, these losses generally involve a nonviable pregnancy. A complete abortion is the termination of a pregnancy before the age of viability, typically defined as occurring at less than 20 weeks from the first day of the last normal menstrual period or involving a fetus with a weight less than 500 g. Most complete abortions generally occur before 6 weeks or after 14 weeks of gestation. An incomplete abortion is the spontaneous passage of some, but not all, of the products of conception, associated with uniform pregnancy loss. A pregnancy in which the rupture of the membranes and/or cervical dilation occurs during the first weeks of pregnancy is labeled as an inevitable abortion. Uterine contractions typically follow, ending in the spontaneous loss of the pregnancy for most patients. A missed abortion is the retention of a failed intrauterine pregnancy for an extended period; however, with ultrasonographic studies, this can often be detected significantly sooner than it could be on clinical grounds alone. A septic abortion is a variant of an incomplete abortion in which the uterus and its contents are infected. A threatened abortion is a pregnancy that is at a risk for some reason. Most often, this applies to any pregnancy wherein vaginal bleeding or uterine cramping occurs, but no cervical changes have occurred. Not all of these cases end in the loss of the pregnancy.

Prevalence: Estimates for the frequency of complete abortions are as high as 50%–60% of all conceptions and between 10% and 15% of known pregnancies. Of pregnant women hospitalized for bleeding, 60% have an incomplete abortion. Less than 2% of fetal losses are missed abortions. Septic abortions occur in 0.4–0.6 of 100,000 spontaneous pregnancy losses. Threatened abortions occur in 30%–40% of pregnant women. About 80% of all pregnancy losses occur in the first trimester.

Predominant Age: Reproductive.

Genetics: In about 50% of conceptuses lost, chromosomal abnormalities are present. Some maternal chromosomal abnormalities are associated with reduced or absent fertility and increased risk of fetal loss (eg, translocations).

ETIOLOGY AND PATHOGENESIS

Causes: Endocrine abnormalities (25%–50%)—hyperandrogenism, in utero diethylstilbestrol (DES) exposure (rare now), luteal phase defect, and thyroid disease. Genetic factors (10%–70%)—balanced translocation/carrier state, nondisjunction, trisomy (40%–50%, trisomy 16 most common, any possible except trisomy 1), monosomy X (15%–25%), and triploidy (15%), tetraploidy (5%). Reproductive tract abnormalities (6%–12%)—abnormality of placentation, bicornuate or unicornuate uterus, incompetent cervix, intrauterine adhesions (Asherman syndrome), leiomyomata uteri (submucous), and septate uterus. Infection—*Mycoplasma hominis,* syphilis, toxoplasmosis, *Ureaplasma ureolyticus,* and possibly chlamydia and herpes. Systemic disease—chronic cardiovascular disease, chronic renal disease, diabetes mellitus, and systemic lupus erythematosus/lupus anticoagulant. Environmental factors—alcohol, anesthetic gases, drug use, radiation, smoking, and toxins. Other factors—advanced maternal age, delayed fertilization (old egg), and trauma.

Risk Factors: Increasing parity, increasing maternal age (80% loss risk for age 40–45 years), increasing paternal age, prior pregnancy loss, a short interval between pregnancies, excessive caffeine consumption (≥6 cups of coffee per day). Retention of tissue after pregnancy loss increases the risk of a septic abortion.

SIGNS AND SYMPTOMS

- General—vaginal bleeding (may be bright red to dark in color)
  - Abdominal cramping (frequently rhythmic, accompanied by pelvic or low back pressure)
  - Passage of tissue (complete and incomplete abortion)
  - Cervical dilation (typical of all types of abortion except missed and threatened)
  - Cervical dilation with tissue visible at the cervical os (diagnostic of either incomplete or inevitable abortion)
- Missed abortion—decreased or minimal uterine growth early in pregnancy
  - Vaginal bleeding that changes to a dark brown discharge that continues
  - Loss of early symptoms of pregnancy, such as breast fullness or morning sickness
  - Disseminated intravascular coagulopathy (DIC) can occur when an intrauterine fetal demise in the second trimester has been retained beyond 6 weeks after the death of the fetus (rare)
- Septic abortion—severe hemorrhage (vaginal)
  - Midline lower abdominal pain
  - Uterine and perimetric tenderness
  - Bacteremia
  - Septic shock
  - Renal failure
- Threatened abortion—implantation bleeding

DIAGNOSTIC APPROACH

Differential Diagnosis

- Ectopic pregnancy
- Cervical polyps, cervicitis
- Molar pregnancy
- Possibility of trauma, including the perforation of the uterus or vagina, when sepsis is present
- Other causes of lower abdominal discomfort (eg, urinary tract infection, constipation)

Associated Conditions: 30% of patients treated by sharp curettage for missed abortion have intrauterine adhesions. Septic abortion is associated with septic shock, ascending infection (myometritis, pelvic inflammatory disease), disseminated intravascular coagulopathy (DIC), and renal failure.

Workup and Evaluation

Laboratory: A pregnancy test (if pregnancy has not been confirmed). If serial determinations of quantitative β-human chorionic gonadotropin (β-hCG) do not reveal at least a 66% increase every 48 hours, the outlook for the pregnancy is poor. Perform complete blood count (if blood loss has been excessive). Serial determinations of serum β-hCG may be used to confirm pregnancy loss but are not required for diagnosis.

Imaging: Ultrasonography of the uterus may be used to confirm the loss of intrauterine contents, the absence of a fetal pole, or

the failure to grow. Although the presence of fetal cardiac activity is reassuring, it does not guarantee a favorable outcome. A crown–rump length of greater than 7 mm without cardiac activity or an empty gestational sac measuring 25 mm in diameter are used as diagnostic criteria to confirm early pregnancy loss. Other ultrasonographic findings (eg, fetal heart rate <100 beats/min at 5–7 weeks) are suggestive but not diagnostic of a poor pregnancy outcome.

Special Tests: None indicated.

Diagnostic Procedures: If significant cervical dilation is identified by speculum and bimanual examination or if tissue is seen at the cervix, the diagnosis of inevitable or incomplete abortion is established.

Pathologic Findings

Products of conception (including chorionic villi); in a missed abortion there is the absence of a fetal pole.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Support and evaluation are helpful. Analgesia if required. Unsensitized Rh-negative mothers should be treated with Rh immune globulin after completing the loss. Because ovulation may occur as early as 2 weeks after a pregnancy loss, a discussion of contraception is warranted.

Specific Measures: When there is a complete abortion, immediate considerations include control of bleeding, prevention of infection, pain relief (if required), and emotional support. Ensuring that all the products of the conception have been expelled from the uterus controls bleeding. Although most patients with an incomplete or inevitable abortion spontaneously pass the remaining tissue (complete abortion), bleeding, cramping, and the risk of infection associated with expectant management generally support medical or surgical evacuation. If retained tissue is present or cannot be ruled out, curettage must be promptly performed. When a missed abortion is diagnosed, evacuation of the uterus can be accomplished either through dilation and evacuation or through medical therapies such as prostaglandin therapies or mifepristone (RU-486), based on the stage of the pregnancy and other considerations. Septic abortion requires immediate and aggressive management. Broad-spectrum parenteral antibiotics, fluid therapy, and prompt evacuation of the uterus are indicated. Emergency evacuation of the uterine contents is mandatory because of the significant threat to the mother they represent. When the diagnosis of threatened abortion is made, intervention should be minimal, even when bleeding is accompanied by low abdominal pain and cramping. If there is no evidence of cervical change, the patient can be reassured and encouraged to continue normal activities. If significant pain or bleeding persists, especially bleeding leading to hemodynamic alterations, the evacuation of the uterus should be conducted.

Diet: No specific dietary changes are indicated unless immediate surgical therapy is being considered. In that case, nothing should be taken by mouth.

Activity: Generally. there is no restriction. When sepsis is present, bed rest is initially required while therapy is instituted. After evacuation is accomplished and fever is reduced, the patient may return to normal activity. Although frequently recommended, a short period of bed rest has no documented benefit for patients with a threatened abortion.

Patient Education: Reassurance about the process and its lack of impact on future pregnancy.

American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Bleeding During Pregnancy, 2021
- Dilation and Curettage, 2018
- Early Pregnancy Loss, 2021
- Repeated Miscarriage, 2016

Drug(s) of Choice

- Misoprostol 800 mcg vaginally, with one repeat dose as needed, no earlier than 3 hours after the first dose and typically within 7 days if there is no response to the first dose. (Success by day 3 is roughly 70%.) Where possible, a dose of mifepristone (200 mg PO) 24 hours before misoprostol administration should be considered. Pain medication should be provided and women who are Rh(D) negative and unsensitized should receive Rh(D)-immune globulin within 72 hours of the first misoprostol administration.
- Septic abortion—aggressive fluid therapy, antibiotic therapy (clindamycin 900 mg IV every 8 hours plus gentamicin 5 mg/kg IV once/day, with or without ampicillin 2 g IV every 4 hours. Alternatively, a combination of ampicillin, gentamicin, and metronidazole 500 mg IV every 8 hours can be used). The uterine contents should be removed either medically or surgically. If clinical improvement is evident by 48 hours, further antibiotics may not be necessary.

Contraindications: Undiagnosed vaginal bleeding.

Precautions: Methergine should be used with care in patients with hypertension.

Interactions: Vasoconstrictors and ergot alkaloids.

Alternative Drugs

- Prostaglandin E_2. For septic abortion, other broad-spectrum antibiotics, singly or in combination, are available.

FOLLOW-UP

Patient Monitoring: Anticipate the normal return of menstrual function in 4–6 weeks and offer contraceptive counseling. Patients with septic abortions must be monitored for the possibility of septic shock during the early treatment period.

Prevention/Avoidance: None. Septic abortions may be prevented by the prompt evacuation of the uterus in patients with incomplete or inevitable abortions. Data on the risk of sepsis for patients with missed abortions is lacking; therefore expectant, medical, or surgical managements are all acceptable.

Possible Complications: Infection (myometritis, pelvic inflammatory disease) may occur. Removal of the products of conception, combined with vaginal rest (no tampons, douches, or intercourse), provides adequate protection against infection for most patients.

Expected Outcome: The risk of pregnancy loss subsequent to a spontaneous abortion increases slightly, although much of this increase may be due to selection for those with factors that preclude successful pregnancy. For those with an inevitable abortion who do not spontaneously lose the pregnancy, infection or bleeding often ensues, requiring the evacuation of the uterus. Missed abortions may spontaneously abort, progressing through incomplete to complete stages, or they may be evacuated. After the pregnancy has terminated (spontaneous or medically induced abortion or surgical evacuation of products of conception), normal menses return in 4–6 weeks. With aggressive antibiotic treatment and prompt evacuation of the uterus the outcome should be good for patients with a septic abortion. Among patients with a threatened abortion, half go on to lose the pregnancy in a spontaneous abortion. (The risk of failure is greater in those who bleed for 3 or more days.) For those who carry the fetus to viability, there is a greater risk for preterm delivery and low fetal birth weight and a higher incidence of perinatal mortality. There does not, however, appear to be a higher incidence of congenital malformations in these newborns.

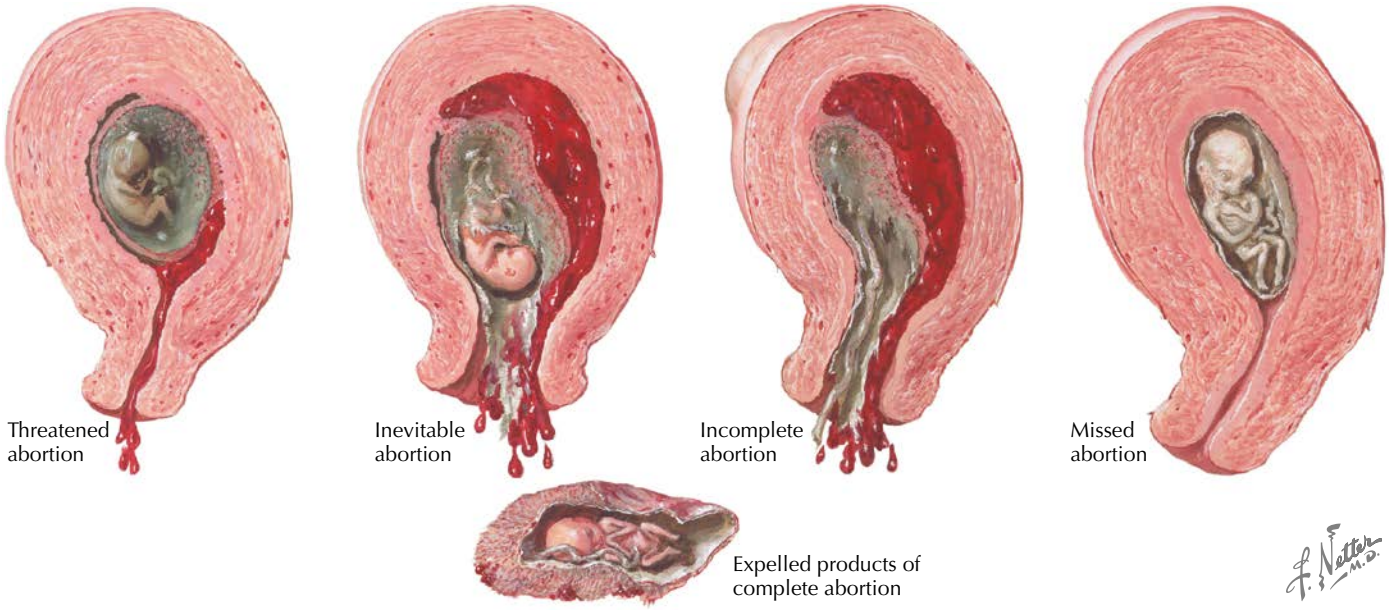

Figure 254.1 Abortion

MISCELLANEOUS

Other Notes: When losses are caused by aneuploidy or polyploidy, they tend to happen earlier in gestation (75% before 8 weeks) and are more likely to recur in subsequent pregnancies Abnormal development, including the zygote, embryo, fetus, or placenta, is common. Expulsion of the pregnancy is almost always preceded by the death of the embryo or fetus. For threatened abortion, intercourse is usually proscribed for 2–3 weeks, or longer, although this probably provides more psychologic support than medical effect. Progesterone therapy for threatened abortions is of no benefit and may result in virilization of a fetus or a missed abortion. It should not be used. Incomplete abortions are more common after the 10th week of gestation, when fetal and placental tissues tend to be separately passed.

ICD-10-CM Codes: O03.9 (Complete or unspecified spontaneous abortion without complication), O03.4 (Incomplete spontaneous abortion without complication), O03.39 (Inevitable abortion-Incomplete spontaneous abortion with other complications), O02.1 (Missed abortion), O03.37, O03.87 (Septic abortion—Spontaneous abortion, complicated by genital tract and pelvic infection, incomplete, Sepsis following incomplete spontaneous abortion), and O20.0 (Threatened abortion, antepartum condition or complication).

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THIRD TRIMESTER BLEEDING

255

INTRODUCTION

Description: Vaginal bleeding during the third trimester of pregnancy (generally >25–27 weeks gestation). Vaginal bleeding should be seen as a symptom, rather than a diagnosis. Most often, the blood is of maternal origin.
Prevalence: Bleeding complicates 4%–5% of pregnancies.
Predominant Age: Reproductive age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Cervical dilation, premature separation of a part or all of the placenta, abnormal placentation (location or character).
Risk Factors: Trauma (including physical abuse), labor, multiparity, advanced maternal age, smoking, cocaine use, multiple gestation, prior placenta previa and prior abortion.

SIGNS AND SYMPTOMS

- Painless vaginal bleeding after 25–27 weeks of gestation.
- Uterine hyperactivity possibly present when associated with a placental abnormality (20%).
- When bleeding is heavy—hypotension, tachycardia, orthostasis, syncope.

DIAGNOSTIC APPROACH

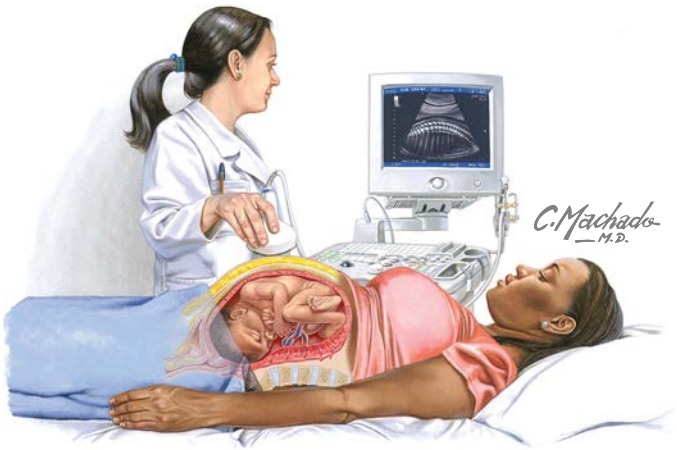
Differential Diagnosis

- Labor (bloody show)
- Placenta previa
- Placental abruption
- Uterine rupture
- Vasa previa
- Vaginal or cervical lacerations
- Bleeding from other sources (hemorrhoids, vulva, vagina)

Associated Conditions: Labor, prematurity, anemia, postpartum hemorrhage, coagulopathy.

Workup and Evaluation

Laboratory: Complete blood count. If bleeding is heavy, type and crossmatch blood products for possible replacement.



Whenever there is any significant bleeding during the third trimester of pregnancy it is vital to establish the location and condition of the placenta and fetus prior to any pelvic examination.

Figure 255.1 Ultrasound in third trimester bleeding

Imaging: Ultrasonography (transabdominal) to determine placental location and condition, fetal status.
Special Tests: Kleihauer–Betke test for fetal–maternal transfusion, clot tube to assess possibility of coagulopathy, Apt test to identify fetal blood loss (such as from a vasa previa).
Diagnostic Procedures: History, ultrasonography. Pelvic examination is contraindicated until the location of the placenta can be ascertained.

Pathologic Findings

Based on the cause.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: History, evaluation, hemodynamic stabilization if bleeding is heavy, fetal assessment.
Specific Measures: Based on the etiology and severity of bleeding.
Diet: Nothing by mouth if the bleeding is heavy or it is thought to foreshadow labor.
Activity: Bed rest pending a working diagnosis.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

- Bleeding During Pregnancy, 2021
- Cesarean Birth, 2020
- Ultrasound Exams, 2017

Drug(s) of Choice

- When bleeding is heavy, fluid and blood product replacement as needed. Rh (D) immunoglobulin should be administered as indicated in mothers who are Rh negative.
- If tocolysis is required, $MgSO_4$ is preferred.

Contraindications: β-Mimetic agents should not be used if there is significant maternal blood loss or hypotension.
Precautions: Vaginal examinations should not be performed until a placenta previa has been ruled out.

FOLLOW-UP

Patient Monitoring: Maternal—hemodynamic monitoring, direct inspection of bleeding. Fetal—fetal heart rate and biometry as indicated by obstetric considerations.
Prevention/Avoidance: None.
Possible Complications: Catastrophic maternal hemorrhage, fetal anoxia. Coagulation defects may occur as a result of heavy or prolonged blood loss. Preterm delivery represents the greatest source of morbidity for the fetus.
Expected Outcome: Good with most causes of bleeding, presuming early recognition and prompt management of the underlying cause.

MISCELLANEOUS

Pregnancy Considerations: No effect on pregnancy aside from those imposed by the underlying cause of the symptom of bleeding.
ICD-10-CM Codes: Based on the cause.

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256 TRAUMA IN PREGNANCY

INTRODUCTION

Description: Trauma and violence are the leading causes of maternal death and death for women at reproductive age. The most common cause of fetal death in automobile accidents is the death of the mother. The altered physiologic state of pregnancy and the need to treat two patients simultaneously alter the management of even simple trauma.
Prevalence: 1/12 pregnancies.
Predominant Age: Reproductive age.
Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Motor vehicle accidents (most common; two-thirds of cases in developed countries), falls, direct assault (battering most common; 60% report two or more episodes of physical assault during pregnancy; pregnancy increases the risk of battering), falls, burns, homicide, suicide, penetrating trauma, and toxic exposure.
Risk Factors: Failure to use a safety restraint while driving, abusive relationship, low socioeconomic status, drug or alcohol use, and abuse.

SIGNS AND SYMPTOMS

- Varies with type of trauma—blunt trauma, trauma associated with covert internal injuries such as retroperitoneal hemorrhage or splenic rupture with bowel injuries less common, penetrating, fetal injury (two-thirds)
- Placental abruption (1%–5% of minor trauma; 40%–50% of major trauma)—vaginal bleeding, uterine tenderness, tetany, or contractions suggest abruption
- Uterine rupture (0.6%) as the result of substantial force to the abdomen
- Direct fetal injury rare in blunt trauma
- Because of increased blood volume and cardiac output during pregnancy, signs of blood loss may be delayed

DIAGNOSTIC APPROACH

Differential Diagnosis

- Based on the type of trauma and organs potentially involved.

Associated Conditions: Rh isoimmunization.

Workup and Evaluation

Laboratory: Based on the normal management of trauma.
Imaging: As needed for the management of trauma (unchanged by the pregnancy, trauma takes precedence). Ultrasonography for gestational age assessment, placental location, intrauterine death, and others (not reliable for assessment of fetal injury).
Special Tests: Peritoneal lavage under direct vision may be used to evaluate intraperitoneal hemorrhage. Kleihauer–Betke test for fetal–maternal hemorrhage.
Diagnostic Procedures: History, physical examination, imaging studies, and exploratory surgery when indicated.

Pathologic Findings

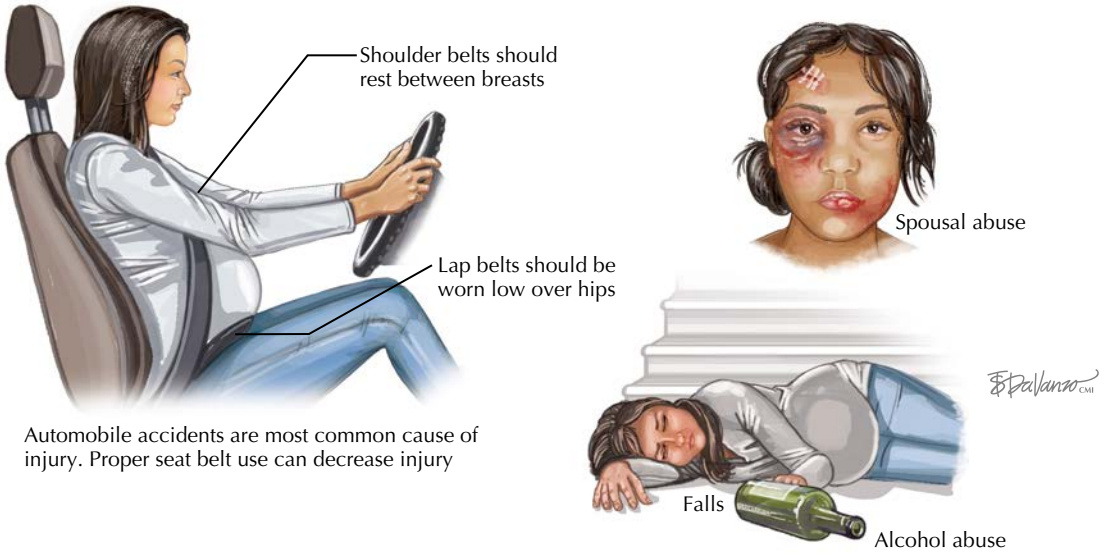
Based on the nature of the trauma.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Rapid assessment and stabilization (eg, intravenous access, administration of fluids and oxygen, cardiac and fetal heart rate monitoring based on gestational age), assessment of status (blood pressure, oxygen saturation, urinary output). Gestational age and fetal status must be established to inform other decisions. Tetanus prophylaxis should be provided as needed.
Specific Measures: The uterus should be displaced leftward, off the vena cava. All penetrating abdominal injuries must be surgically explored. The decision to surgically deliver the fetus must be based on the gestational age, fetal and maternal injuries, and the risk of death of the fetus if left in utero. Agonal cesarean delivery is only appropriate when there is imminent maternal death or cardiopulmonary resuscitation has been ineffective and delivery can be accomplished within 4 minutes. Prophylaxis for Rh isoimmunization should be given if fetal–maternal hemorrhage is likely (up to 30% of cases). Antenatal glucocorticoids should be considered for women who are at a risk for preterm birth (if time permits).
Diet: Nothing by mouth until the patient has been fully evaluated.
Activity: Bed rest until the patient has been fully evaluated.
Patient Education:
American College of Obstetricians and Gynecologists Patient Education Pamphlets:

Causes and Prevention



Clinical Considerations in Trauma

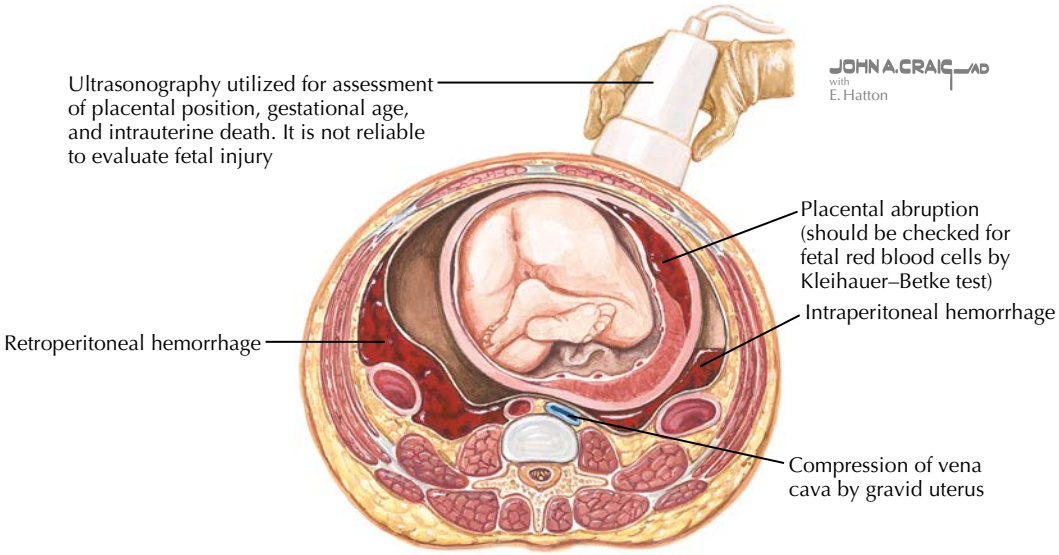


Figure 256.1 Blunt trauma in pregnancy

- Car Safety for You and Your Baby, 2018
- Domestic Violence, 2020
- Travel During Pregnancy, 2020

Drug(s) of Choice

- Based on the injuries sustained.
- D immunoglobulin 300 mcg IM for each 30 mL of fetal blood thought to have been transfused to the mother (for Rh-incompatibility prophylaxis).

Precautions: Tocolytics should only be administered after abruption has been ruled out because medication side effects, such as tachycardia, may confuse the clinical picture. Vasopressors should be withheld until appropriate fluid resuscitation has been administered.

FOLLOW-UP

Patient Monitoring: Aggressive monitoring as appropriate for the trauma sustained, fetal heart rate monitoring.

Prevention/Avoidance: The incidence and severity of injuries can be reduced by the appropriate use of automobile safety restraints. The greatest injuries are observed when a pregnant woman is not using safety restraints during an automobile accident; injury is not usually caused by the restraints; air bags pose no increase in risk. Approximately 45% of pregnant women use safety restraints while driving. Lap belts should be worn low over the hips, and shoulder restraints should rest comfortably between the breasts. The use of approved infant seats to transport the newborn home and for all subsequent travel must also be encouraged in the strongest terms.

Possible Complications: Based on the injuries sustained.

Expected Outcome: Based on the trauma sustained; maternal generally good, fetal mortality 50%–75% for penetrating injuries involving the uterus.

MISCELLANEOUS

ICD-10-CM Codes: O71.9 (Obstetrics trauma, unspecified) and P00.5 (Newborn [suspected to be] affected by maternal injury).

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257 UTERINE ATONY AND POSTPARTUM HEMORRHAGE

INTRODUCTION

Description: Uterine atony is the loss of uterine tone after delivery that often manifests as a postpartum hemorrhage. Postpartum hemorrhage is sometimes divided into primary (first 24 hours after delivery) and secondary (up to 12 weeks postpartum), although the causes and management of secondary bleeding are very different and are not covered here.

Prevalence: Hemorrhage is observed in 5% of deliveries, mostly because of atony (1/20 births; 80% of postpartum hemorrhage); milder degrees are more common. One of the top three causes of maternal mortality (11% of mortality); 1/1000 to as high as 200/1000 in some African countries.

Predominant Age: Reproductive age.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Loss of the normal uterine contractile forces.

Risk Factors: Multiparity (grand multiparity), uterine overdistention (multiple birth, polyhydramnios), prolonged labor, prolonged oxytocin stimulation, muscle-relaxant agents ($MgSO_4$, tocolytics), rapid labor, chorioamnionitis, retained placental tissue, obesity, high parity.

SIGNS AND SYMPTOMS

- Bright-red vaginal bleeding
- Loss of uterine tone palpable on abdominal examination
- Tachycardia, hypotension, and vascular collapse possible
- Postpartum hemorrhage is variously defined but is generally blood loss of 1000 mL or more or bleeding greater than expected associated with signs or symptoms of hypovolemia. Older definitions made a distinction between blood loss at vaginal delivery (≥500 mL) and that at cesarean delivery (≥1000 mL). Because morbidity is infrequent with blood loss less than 1000 mL, this lower threshold has been dropped. However, this amount of bleeding following vaginal delivery is still abnormal and should prompt investigation and possible intervention.

DIAGNOSTIC APPROACH

Differential Diagnosis

- Retained placental fragments and/or abnormal placentation
- Genital tract lacerations (cervical, vaginal)
- Uterine rupture
- Uterine inversion
- Coagulopathy

Associated Conditions: Atony—uterine inversion and postpartum hemorrhage; hemorrhage—anemia, cardiovascular collapse, Sheehan syndrome, shock, death.

Workup and Evaluation

Laboratory: Hemoglobin or hematocrit to monitor status and volume of blood loss.

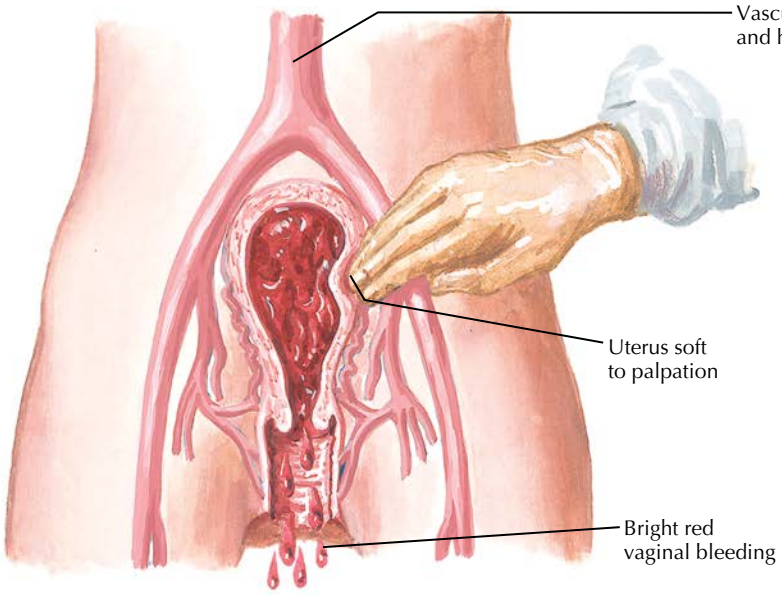
Imaging: Ultrasonography may be used to identify retained placental products but is generally not necessary.

Special Tests: None indicated.

Diagnostic Procedures: Physical examination (abdomen and vagina).

Pathologic Findings

Hemoglobin and hematocrit concentrations will not reflect the volume of blood lost until after equilibration has taken place at 6–24 hours.



Uterine atony often presents as postpartum hemorrhage

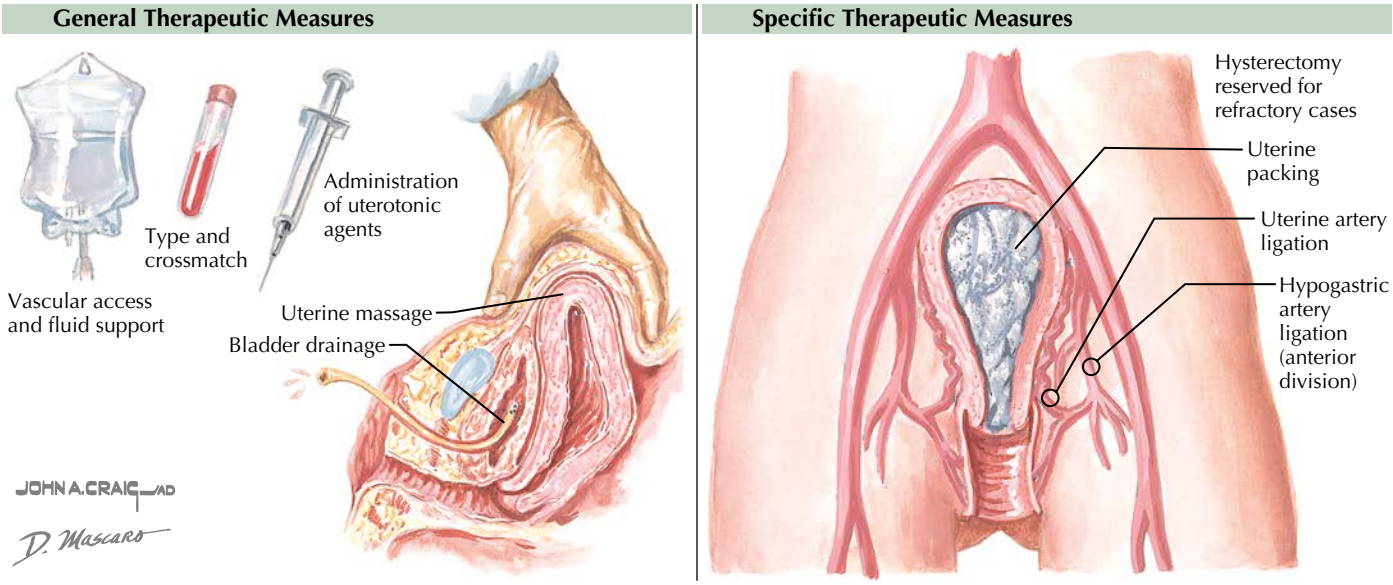


Figure 257.1 Uterine atony and postpartum hemorrhage

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Uterine atony should be suspected in any patient with excessive bleeding after delivery of placenta. If initial treatments do not appear to alter patient's bleeding (uterine massage, uterotonic agents such as oxytocin), other diagnoses should be considered while measures to treat atony continue. Rapid evaluation, fluid support or resuscitation (through large-bore access), massage of the uterine fundus. Type and crossmatch blood for possible transfusion. The bladder should be drained to allow the uterus to contract and to assess urinary output.

Specific Measures: Uterotonic agents (see later), uterine exploration (manual), uterine artery ligation (O'Leary stitch), hypogastric artery ligation, uterine packing or balloon placement, hysterectomy. Initiation of massive transfusion protocols early in the process.

Diet: Nothing by mouth until a diagnosis is established and effective treatment is rendered.

Activity: Bed rest until a diagnosis is established and effective treatment is rendered.

Drug(s) of Choice

- Oxytocin 10–20 U/L of IV fluids, 100–300 mL administered as rapid infusion until uterine tone is reestablished, then 100–150 mL/hr for the next several hours. Concentrations as high as 20–40 U/L may be used.
- Tranexamic acid 1 g (10 mL of a 100 mg/mL solution) infused over 10–20 minutes while other agent are initiated. (More rapid infusion may potentiate hypotension.)
- Methylergonovine maleate (Methergine) 0.2 mg IM, may repeat in 5 minutes (produces tetanic contractions).

- 15-Methylprostaglandin F2α (carboprost tromethamine, Hemabate) 0.25 mg IM or 0.25–1 mg in 10 mL of normal saline injected into the myometrium (may repeat once).
- Misoprostol (synthetic prostaglandin E_1 analog, Cytotec) 100–800 mg rectally or intravaginally administered.
- Iron replacement therapy.
- Broad-spectrum antibiotic treatment should be considered, especially if uterine packing is used or there has been manual exploration of the uterus.

Contraindications: Prostaglandin therapy is contraindicated in patients with asthma. Methergine should not be used in the presence of hypertension, coronary or cerebral artery disease, or Raynaud syndrome and may not be intravenously administered.

Precautions: The volume of fluids administered should be closely monitored to avoid inadvertent fluid overload. The placement of a bladder catheter to assess urinary output and to keep the bladder decompressed is desirable. When prostaglandins are used, side effects, such as diarrhea, hypertension, vomiting, fever, flushing, and tachycardia, are common.

Interactions: Magnesium sulfate and some halogenated anesthetic agents promote atony and work against uterotonic agents.

Alternative Drugs

- Prostaglandin E_2 vaginal suppositories have been used, but newer agents and the techniques shown here are more effective and are more readily available.

FOLLOW-UP

Patient Monitoring: Normal postpartum care, follow-up complete blood count as needed. Uterine atony (postpartum); anticipation of possible uterine atony, fundal massage, and oxytocin stimulation after delivery of the placenta.

Possible Complications: Hysterectomy, hemorrhagic shock, and cardiovascular collapse, Sheehan syndrome.

Expected Outcome: Most conditions respond to simple measures (uterine massage, oxytocin, methylergonovine maleate [Methergine]) if administered for the appropriate problem and in a timely way.

MISCELLANEOUS

ICD-10-CM Code: O72.1 (Other immediate postpartum hemorrhage).

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UTERINE INVERSION

INTRODUCTION

Description: Uterine inversion is the turning inside-out of the uterus immediately after delivery. Uncommon and often iatrogenic, this may be associated with catastrophic bleeding and cardiovascular collapse. The condition also has been reported in nonpregnant patients with intrauterine pathology (eg, pedunculated leiomyomata), accounting for 5% of inversions. Although schema exist to quantitate the degree of inversion, any degree of inversion represents a clinical emergency.

Prevalence: 1/25,000 deliveries (estimates range from 1/1200–57,000 deliveries based on definitions and selection criteria).

Predominant Age: Reproductive age.

Genetics: No genetic pattern.

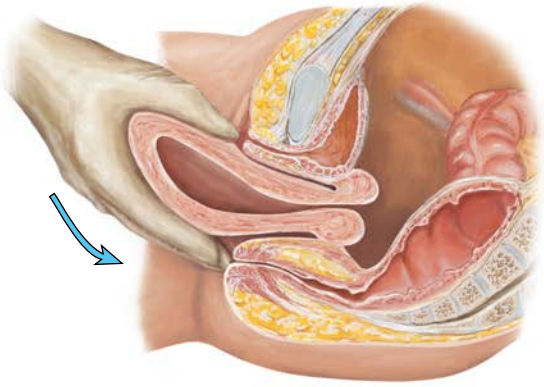
ETIOLOGY AND PATHOGENESIS

Causes: Iatrogenic (traction on the umbilical cord or downward pressure on the uterine fundus to facilitate delivery of the placenta; exact role remains controversial); abnormalities of placentation (accreta, increta, percreta).

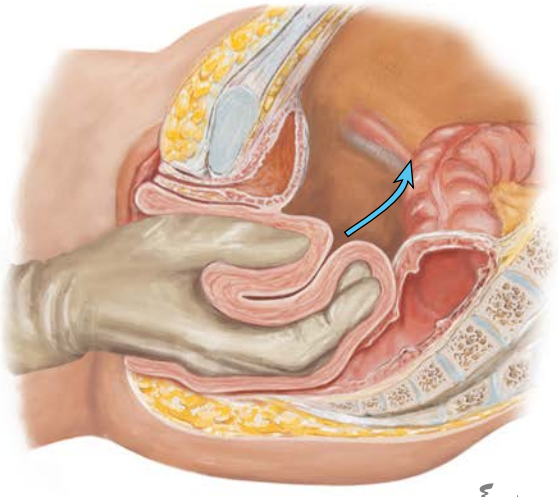
Risk Factors: Uterine atony—multiparity (grand), uterine overdistention (multiple birth, polyhydramnios), prolonged labor, prolonged oxytocin stimulation, muscle-relaxant agents ($MgSO_4$), rapid labor. Less than 50% of cases have risk factors.

SIGNS AND SYMPTOMS

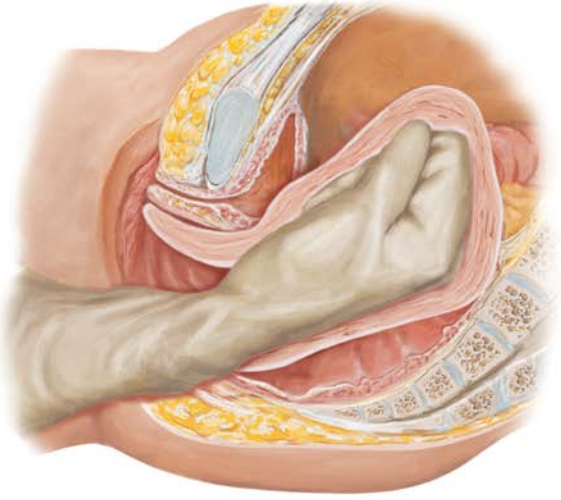
- A mass may be seen attached to or directly following the placenta as it delivers
- Bright-red vaginal bleeding



A. The fundus of the uterus is grasped by the operator's hand and gently pushed cephalward.



B. As the uterus is returned to the abdominal cavity, the body of the uterus must be allowed to revert to its normal configuration.



C. The examining hand is used to ensure that the fundus of the uterus is fully expanded into its normal position prior to the hand's being removed.

Figure 258.1 Uterine inversion

- Lower abdominal pain
- Smooth round mass protruding from the cervix or vagina
- Bradycardia from vagal stimulation
- Tachycardia, hypotension, and vascular collapse possible as a result of blood loss

DIAGNOSTIC APPROACH

Differential Diagnosis

- Uterine atony
- Retained placental fragments
- Genital tract lacerations
- Coagulopathy
- Prolapsed leiomyoma

Associated Conditions: Uterine atony, postpartum hemorrhage.

Workup and Evaluation

Laboratory: Hemoglobin or hematocrit to monitor status and volume of blood loss. Acute loss may not be reflected by these measures until equilibration has occurred in 6–24 hours.
Imaging: Ultrasonography may be used to verify the diagnosis, but this is unnecessary and delays the implementation of therapy.
Special Tests: None indicated.
Diagnostic Procedures: Pelvic examination.

Pathologic Findings

Inversion of the uterus.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Rapid evaluation, fluid support or resuscitation, call for anesthesia assistance.
Specific Measures: Discontinue uterotonic agents until replacement is accomplished. Uterine-relaxant agents (see later), manual replacement of uterine fundus (may require general anesthesia with a relaxant agent [halothane]), may require operative intervention (replacement or hysterectomy). Once the uterine wall has relaxed, gentle manual pressure should be placed on the fundus to displace it inward and upward until its normal position can be restored and the uterus returned to its normal configuration. Uterotonic agents are then used to obtain uterine contraction and hemostasis. Laparotomy may be required in rare cases.
Diet: Nothing by mouth until a diagnosis is established and effective treatment is rendered.
Activity: Bed rest until a diagnosis is established and effective treatment is rendered.

Drug(s) of Choice

- Tocolytics—terbutaline 0.25 mg IV (may repeat once) or nitroglycerin 100–250 mcg IV (may repeat to a total of 1000 mcg).
- Broad-spectrum antibiotic prophylaxis (first-generation cephalosporin or clindamycin/gentamycin) should be instituted.

Contraindications: See individual agents.
Precautions: If nitroglycerine is used, blood pressure must be closely monitored (hypotension).

Alternative Drugs

- Halothane general anesthesia may be required.

FOLLOW-UP

Patient Monitoring: Normal postpartum care, follow-up complete blood count as needed.
Prevention/Avoidance: Little or no traction on the umbilical cord or fundal pressure during the delivery of the placenta.
Possible Complications: Hysterectomy, hemorrhagic shock, and cardiovascular collapse.
Expected Outcome: Generally good if recognized and acted on promptly.

MISCELLANEOUS

Other Notes: Following replacement of the fundus, the possibility of uterine atony must be anticipated. If the placenta is still attached to the uterine wall, it should be left in place until after the uterine fundus has been reduced and returned to its normal location.
ICD-10-CM Code: O71.2 (Postpartum inversion of uterus).

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UTERINE RUPTURE

INTRODUCTION

Description: Uterine rupture is characterized by the breach of the uterine wall (new or after previous uterine surgery such as cesarean delivery) that may result in significant maternal or fetal morbidity or mortality. This should be distinguished from uterine scar dehiscence, in which there is a separation of an old scar that does not penetrate the uterine serosa or result in complications. Rupture of an intact uterus (without scars) does occur on rare occasions (1/5700–1/20,000 deliveries, approximately 10% of ruptures) and is generally associated with significant uterine distention (polyhydramnios, multiple gestation) or obstruction of labor.

Prevalence: Found in 0.3%–3.7% of patients with a previous cesarean delivery and 5% of patients for whom vaginal birth after cesarean (VBAC) delivery fails. Uterine rupture rates in women with previous classic incisions and T-shaped incisions range between 4% and 12%. Approximately 7% of emergency cesarean hysterectomies are for rupture.

Predominant Age: Reproductive age.

Genetics: No genetic pattern.

ETIOLOGY AND PATHOGENESIS

Causes: Abnormal healing of a previous uterine scar, mechanical disruption of the uterine wall weakened by previous surgery, congenital anomalies (structural malformations, Ehlers–Danlos type IV), or abnormalities of placentation. The uterine wall may also be breached by injudicious manual removal of the placenta or manual exploration of the uterus after delivery of the placenta. Traumatic rupture of the uterus may occur with blunt trauma to the abdomen such as occurs to an unrestrained passenger during an automobile accident. The proper use of automobile lap and shoulder belts significantly reduces the risk for an injury to both mother and fetus. Air bags do not increase the risk for an injury.

Risk Factors: Previous uterine surgery (cesarean delivery; greatest for vertical incisions, myomectomy, septoplasty), multiple gestation, internal or external version, grand multiparity (20-fold increase), Increased maternal age, short interval between pregnancies, fetal malpresentation, polyhydramnios, macrosomia, oxytocin stimulation (unproved), low Bishop score, congenital anomalies, and disuse or misuse of vehicle passenger restraints. There is considerable evidence that cervical ripening with prostaglandin preparations increases the likelihood of uterine rupture (15-fold increase). Induction or augmentation of labor using mechanical means does not seem to increase the risk for rupture. Prior successful vaginal delivery reduces the risk.

SIGNS AND SYMPTOMS

- Abrupt fetal distress (80% of cases)
- Abrupt loss of station (presenting part may cease to be present in the vagina)
- Vaginal bleeding (may not be present)
- Abdominal pain (may not be present; pain may be referred to the chest or diaphragm)
- Maternal circulatory collapse
- Uterine activity may persist despite expulsion of the fetus
- Hematuria (if rupture extends into the bladder)

DIAGNOSTIC APPROACH

Differential Diagnosis

- Uterine dehiscence
- Placental abruption
- Umbilical cord prolapse (causing abrupt fetal distress)
- Adnexal torsion
- Pulmonary or amniotic fluid embolism
- Abdominal pregnancy

Associated Conditions: Fetal demise, maternal blood loss.

Workup and Evaluation

Laboratory: Interoperative and postoperative blood counts. Evaluation of clotting when significant bleeding has occurred.

Imaging: Ultrasonography may demonstrate uterine dehiscence, but the need for clinical intervention often precludes the examination.

Special Tests: Intensive fetal and maternal monitoring may be indicated.

Diagnostic Procedures: History and physical examinations (vaginal and abdominal).

Pathologic Findings

Separation of previous uterine scar or a new failure of the uterine wall muscle.

MANAGEMENT AND THERAPY

Nonpharmacologic

General Measures: Rapid evaluation, supportive measures as needed (intravenous access, fluids, blood products).

Specific Measures: Immediate operative delivery (most often by laparotomy), surgical exploration with the possibility of repair or hysterectomy. Ligation of one or both hypogastric arteries may be necessary.

Diet: Nothing by mouth once the diagnosis is made (pending surgical intervention).

Activity: Strict bed rest (pending surgical intervention).

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Vaginal Birth After Cesarean Delivery, 2017.

Drug(s) of Choice

- None. Supportive measures including fluids, blood products, and anesthetics (for immediate delivery) as needed.
- Prophylactic antibiotics are often recommended.

FOLLOW-UP

Patient Monitoring: Fetal and maternal monitoring must be maintained for those at risk and intensified when the diagnosis is considered.

Prevention/Avoidance: Care in all uterine manipulations (eg, manual removal of the placenta, version, external pressure during delivery). Patients with a prior successful vaginal delivery have a greater likelihood of successful VBAC delivery and a lower risk for uterine rupture than those without a successful vaginal delivery. One study has suggested that there is a lower rate of uterine rupture when a double-layer closure of the uterus is used at the time of cesarean delivery.

Possible Complications: Maternal morbidity or mortality possible (significantly reduced by fetal and maternal monitoring). Damage to the cervix, vagina, or bladder may occur as a part of the rupture. Fetal demise may occur in up to 50%–75% of fundal incision ruptures and 10%–15% of lower uterine segment ruptures. Long-term neurologic sequelae are common in infants who survive.

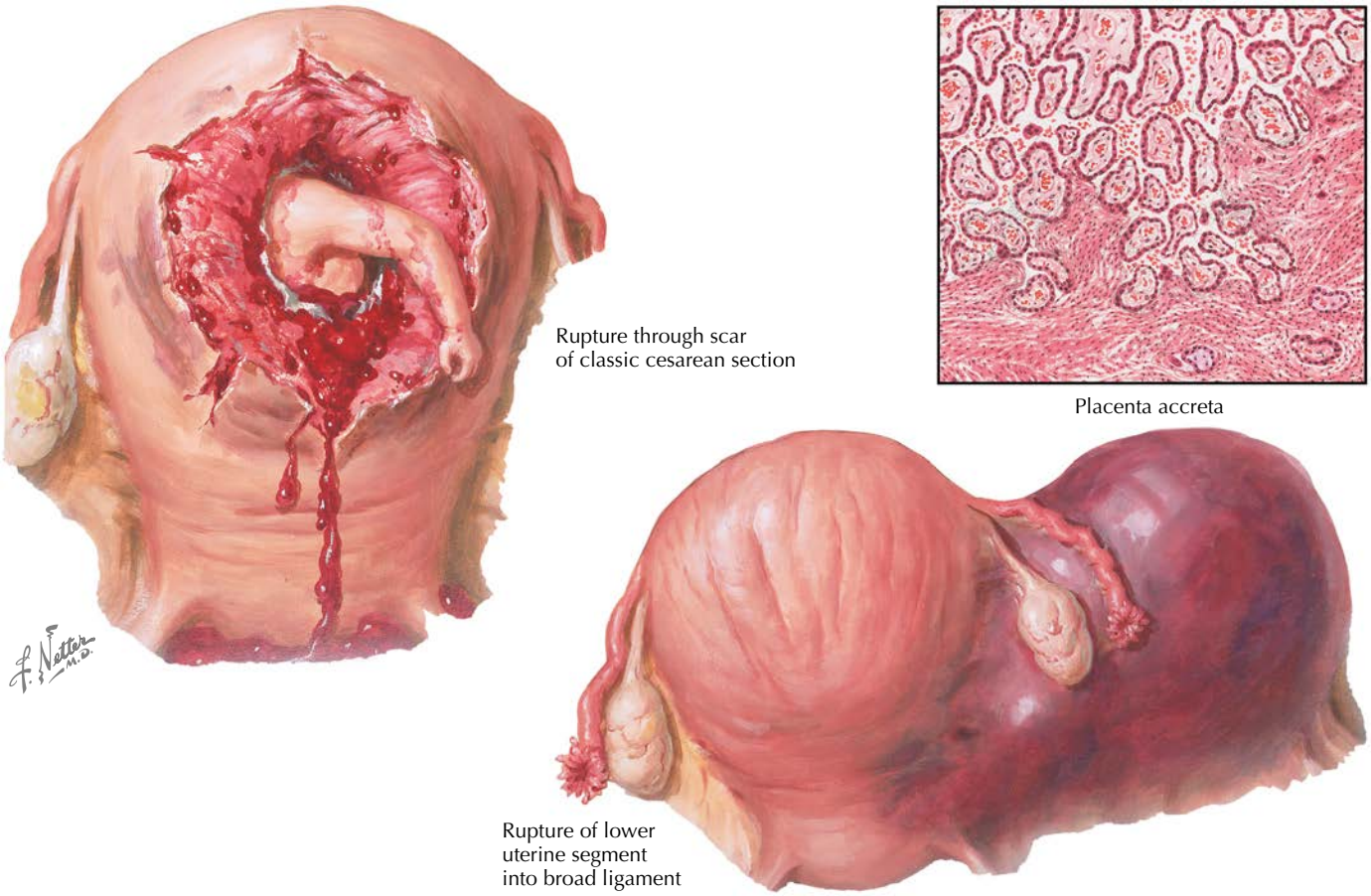

Figure 259.1 Uterine rupture

Vertical uterine scars are associated with the greatest morbidity and mortality when a rupture occurs.

Expected Outcome: When diagnosed early and acted on promptly, a good outcome can be expected. If the uterus is repaired and preserved, the risk of recurrence in a subsequent pregnancy is approximately 20%.

MISCELLANEOUS

ICD-10-CM Codes: O71.1 (Rupture of uterus during labor), O71.00 (Rupture of uterus before onset of labor, unspecified trimester), and S37.60XA (Unspecified injury of uterus, initial encounter).

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SECTION XIV

Procedures

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AMNIOCENTESIS

260

DESCRIPTION

Amniocentesis is the sampling of fluid from around the growing fetus for prenatal biochemical or genetic diagnosis. For these purposes, amniocentesis is being replaced by chorionic villus sampling and cell-free DNA analysis. Amniocentesis may rarely be used to reduce the amount of amniotic fluid present in cases of polyhydramnios.

INDICATIONS

This procedure is used for assessing fetal genetics or metabolic disorders, fetal infection, or isoimmunization status. Amniocentesis for the assessment of fetal lung maturity was once common but is rarely performed now. Cell-fee DNA studies are also supplanting much of the need for genetic amniocentesis. Therapeutic amniocentesis may be performed for reducing the fluid volume or instilling agents for fetal therapy or other purposes such as fetal imaging or diagnosing the rupture of fetal membranes. Amniocentesis is also a necessary step in other diagnostic and therapeutic procedures such as cordocentesis or fetal transfusion.

CONTRAINDICATIONS

Active skin infections near the site of needle placement. Relative; maternal fever of unknown origin, known or suspected allergies to materials used (eg, latex, skin preparation materials, local anesthetics), and uncorrected coagulopathy. Although technically possible as early as 11 weeks gestation, higher rates of fetal loss suggest that early amniocentesis should be delayed until or after 15–17 weeks. Amniocentesis may be technically difficult to accomplish in patients with multiple gestations.

REQUIRED EQUIPMENT

- Sterile gloves
- Skin preparation materials (eg, povidone-iodine and 70% isopropyl alcohol, hexachlorophene-based antibacterial solution)
- Sterile gauze pads (2- × 2-inch or 4- × 4-inch)
- Self-adhesive bandage
- Ultrasonography unit
- Fetal monitor or Doppler fetoscope
- Commercial amniocentesis tray

  or
- 20- and 22-gauge spinal needles (or smaller), 20-mL syringe, three sterile 10-cc specimen tubes with caps (plain, without additive), sterile drape (one with a small fenestration, or multiple drapes)
- If desired: 1% lidocaine without epinephrine, 5-mL syringe, 22-gauge needle (if not included in amniocentesis kit)
- Antibiotic prophylaxis is not recommended

TECHNIQUE

The indications, contraindications, risks, benefits, and complications should be reviewed and discussed with the patient, and informed consent should be obtained. The patient should be placed in the supine position with the head elevated at 20–30 degrees. If the pregnancy is advanced, the patient may empty her bladder and be placed in a slightly left decubitus position. Ultrasonography is used to assess fetal well-being, fetal lie, and placental position.

A suitable pocket of amniotic fluid should be identified using ultrasonography. Ideally, this pocket should be located away from the fetal face and placenta, but it should be accessible with a standard spinal needle. Areas around the fetal extremities are often best. The location of this pocket relative to the skin surface should be noted as a guide to needle insertion.

The skin of the abdominal wall over the selected pocket of amniotic fluid should be disinfected with a suitable skin preparation solution and technique of the examiner's choice. If a local anesthetic is to be used, it is established at this juncture using a sterile technique: a small skin wheal of local anesthetic is placed, and the proposed needle track is infiltrated with a total of less than 4–5 mL of anesthetic agent.

With the stylet in place, a 20- or 22-gauge spinal needle is perpendicularly passed through the skin, abdominal, and uterine walls into the amniotic sac. A slight pop or loss of resistance may be felt as the needle traverses the fascia. After entering the pocket of fluid, the stylet is removed from the needle. Free flow of fluid should be demonstrated. If free flow is not found, the needle should be rotated or tipped and rechecked before being advanced farther (with the stylet in place). Using ultrasonography to guide the needle's advancement may facilitate the placement of the needle into the pocket of the amniotic fluid and avoid fetal parts. This can be particularly helpful when amniocentesis is performed early in pregnancy.

Once free flow of fluid has been demonstrated, a small syringe should be attached to the needle and 2–3 mL of fluid should be withdrawn. This fluid is discarded. Appropriate samples are now taken and placed in sterile specimen tubes. Determination of the amount of material needed and any special handling required for these specimens is dictated by the studies to be performed. If there is any doubt, consultation with the laboratory before initiating the procedure may help in identifying any special handling that must be used.

After the samples have been obtained, the needle is withdrawn and a self-adhesive bandage is applied to the site of needle puncture. The fetus should be monitored for a short period after the procedure. If bloody fluid was obtained, this monitoring period should be extended by 1–2 additional hours or longer, depending on other considerations. An appropriate procedure note should be entered into the patient's record.

COMPLICATIONS

Early amniocentesis is associated with a fetal loss rate of approximately 2.5% (vs. 0.7% for later procedures). Amniotic fluid leakage, frank rupture of fetal membranes, amnionitis (infection), bleeding, and possible isoimmunization of mothers who are Rh negative are

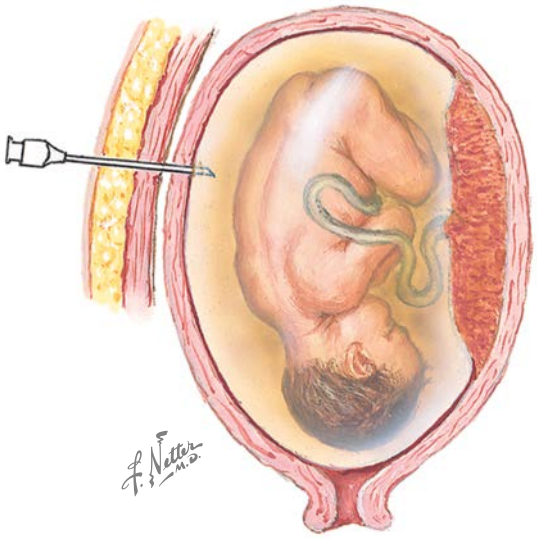

Figure 260.1 Amniocentesis

all possible. The risk for direct fetal injury is small when the procedure is carefully performed. When amniocentesis is conducted in the presence of preterm premature rupture of membranes, failure rates are higher. Bleeding and infection are always possible with any invasive procedure. Data suggest that prophylactic antibiotics reduce the risk for infection, but the impact is small and the use of these agents is generally discouraged.

FOLLOW-UP

When amniocentesis is performed after fetal viability (24 weeks), a period of electronic fetal heart rate monitoring (30 minutes) is recommended. If bloody fluid is obtained or the fetus or umbilical cord is perforated, this monitoring is generally increased (1–2 hours or longer, as clinically indicated). Patients should report persistent uterine cramping, vaginal bleeding or leakage of fluid, or fever. Rh (D) immunoglobulin should be administered as indicated in mothers who are Rh negative.

CPT CODE(S)

59000 Amniocentesis, any method
76946 Ultrasonic guidance for amniocentesis, physician supervision and interpretation

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261 ASPIRATION OF BREAST CYST

DESCRIPTION

Fluid is removed from breast cysts via aspiration. This may be performed for both diagnosis and therapy.

INDICATIONS

Palpable breast mass that is credibly considered to be cystic in nature.

CONTRAINDICATIONS

Local skin infection, known or suspected allergy to agents used (eg, latex, iodine), uncorrected coagulopathy.

REQUIRED EQUIPMENT

- Skin preparation materials (alcohol, iodine- or hexachlorophene-based antibacterial solution [eg, Betadine, Hibiclens])
- Self-adhesive bandage
- 10-mL disposable syringe
- 22- to 25-gauge needle

TECHNIQUE

In women older than 35 years, mammography before aspiration should be considered because of the increased incidence of malignancy in cystic breast masses. Once aspiration has been attempted, mammography should be delayed by several weeks because of artifactual changes induced by the manipulation, thereby rendering mammography difficult to interpret.

Following adequate skin preparation, the nondominant hand stabilizes the cystic mass. This is accomplished by using the thumb and fingers to gently pinch the breast tissue below the mass. A 22- to 25-gauge needle (attached to a 10-mL syringe) is inserted into the cyst cavity. A small "pop" or loss of resistance is often felt as the cyst wall is breached. The cyst contents are aspirated by gentle suction using the syringe. Firm pressure applied for 5–10 minutes will reduce the

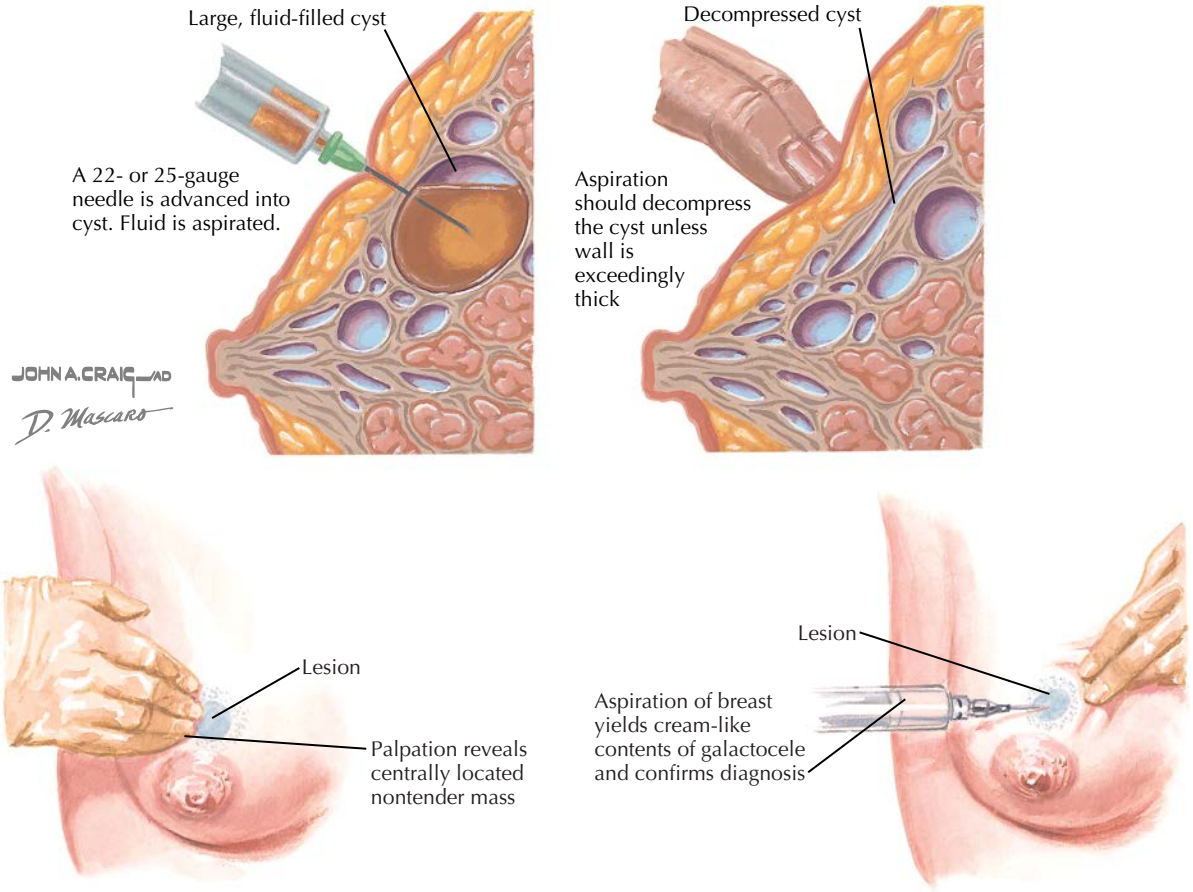

Figure 261.1 Aspiration of breast cyst

risk for hematoma formation. No dressing or special breast care is required, although a self-adhesive bandage may be used.

Fluid aspirated from patients with fibrocystic changes will customarily be straw colored. Fluid that is dark brown or green occurs in cysts that have been present for a long time but is equally innocuous. Because of high false-positive rates (up to 6%) and even higher false-negative rates (2%–22%), cytologic evaluation of the fluid obtained is of little value.

COMPLICATIONS

Hematoma, infection (rare).

FOLLOW-UP

If the cyst completely disappears and does not re-form at a 1-month follow-up examination, no further therapy is required. If no fluid is obtained, if the cyst re-forms within 2 weeks or must be repeatedly aspirated, or if a mass persists after the aspiration, biopsy should be performed.

CPT CODE(S)

19000 Puncture aspiration of cyst of breast
19001 Each additional cyst

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Level III

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262 BARTHOLIN GLAND CYST/ABSCESS DRAINAGE

DESCRIPTION

Bartholin gland cyst/abscess drainage is an acute drainage of a symptomatic cystic dilation of the Bartholin gland.

INDICATIONS

Symptomatic cystic dilation or abscess of the Bartholin gland. Asymptomatic cysts in women younger than 40 years do not require treatment; in patients older than 40 years, biopsy is indicated. Mild Bartholin gland infections also may be treated with broad-spectrum antibiotics and frequent warm sitz baths.

CONTRAINDICATIONS

Incomplete evaluation of the vulvar lesion, bleeding diathesis, known or suspected allergy to agents used (eg, latex, iodine), uncorrected coagulopathy.

REQUIRED EQUIPMENT

- Skin preparation materials (alcohol, iodine- or hexachlorophene-based antibacterial solution [eg, Betadine, Hibiclens])
- Sterile gloves
- 1% lidocaine without epinephrine, 5-mL syringe, 22-gauge needle, analgesic skin-cooling spray or other topical analgesic
- 10-mL syringe
- Normal saline (for irrigation)
- Scalpel (#11 or #15 blade)
- Sterile gauze pads (2- × 2-inch or 4- × 4-inch)
- Word catheter or iodoform gauze packing (¼- or ½-inch)

TECHNIQUE

After appropriate informed consent has been obtained from the patient, the skin of the vulva is disinfected. When an acute abscess is to be drained, the exquisite tenderness that is usually present dictates that this is gently performed; pain relief is best obtained by using an analgesic or skin-freezing spray. This technique also may be used for nonacute Bartholin cysts; local anesthesia using local or field infiltration is also appropriate. Abscesses should be incised at the point of least thickness overlying the mass (where the abscess is "pointing"). A vertical or "stab" incision is made, generally resulting in the abrupt release of purulent material. (Despite the apparent purulent character of the drained material, culture is generally of little use in the management of these cases). The size of this incision need only be of the order of 1 or 2 cm; sutures are generally not required. The abscess cavity may be gently irrigated with normal saline using a 10-mL syringe. A Word catheter should then be placed through the incision and inflated with a few milliliters of saline. As an alternative, iodoform gauze packing may be placed within the cavity with a 2- to 3-cm "tail" left outside the incision to facilitate eventual removal. Unless cellulitis is present, antibiotic therapy is not required.

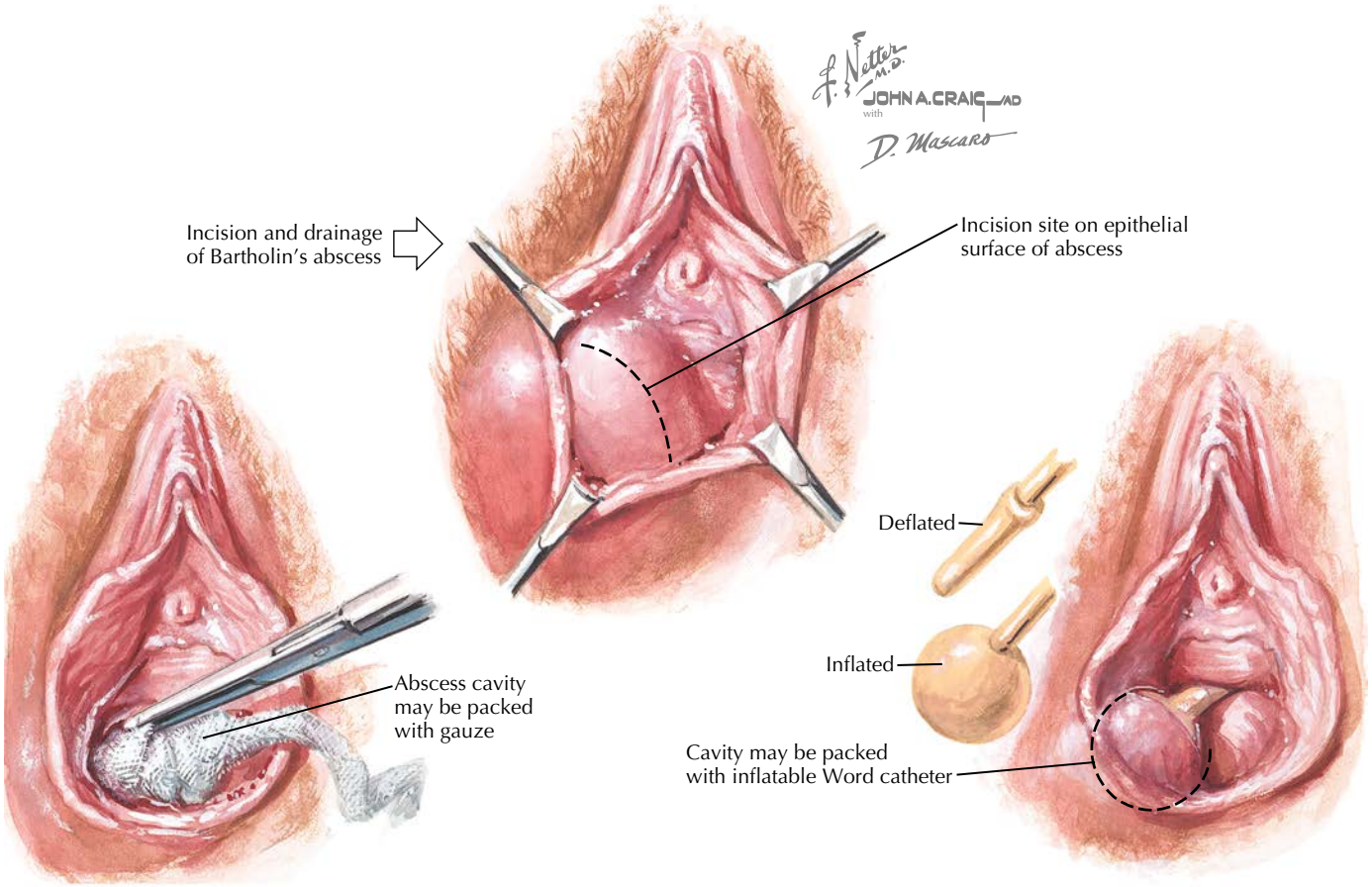

Figure 262.1 Bartholin gland cyst drainage

When the cyst is not acutely inflamed, it should be stabilized and tensed by gentle finger pressure applied on either side of the affected labium, below the cyst. Incision in this case should be made within the hymeneal ring whenever possible. Incision length should be similar to that used for acute cases, and a Word catheter or iodoform gauze packing should be inserted in a similar manner.

COMPLICATIONS

Bleeding, hematoma, recurrence.

FOLLOW-UP

Word catheters should be left in place for 4–6 weeks. Iodoform gauze packing should be gradually removed over the course of several days. Recurrence is frequent, and many prefer marsupialization to simple drainage in all but the most acute cases.

CPT CODE(S)

56420 Incision and drainage of Bartholin gland abscess

REFERENCES

Level II

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Level III

Omole F, Simmons BJ, Hacker Y. Management of Bartholin's duct cyst and gland abscess. *Am Fam Physician*. 2003;68(1):135–140.

BARTHOLIN GLAND MARSUPIALIZATION 263

DESCRIPTION

Marsupialization is the drainage and permanent fistulization of a symptomatic cystic dilation of the Bartholin gland. This provides an alternative to the obstructed anatomic drainage of the Bartholin gland.

INDICATIONS

Symptomatic cystic dilation of the Bartholin gland. Asymptomatic cysts in women younger than 40 years do not require treatment; in patients older than 40 years, biopsy is indicated. When performed for recurrent abscess formation, marsupialization should be deferred until inflammation has subsided.

CONTRAINDICATIONS

Incomplete evaluation of the vulvar lesion, bleeding diathesis, active inflammation or infection, age more than 40 years, known or suspected allergy to agents used (eg, latex, iodine), uncorrected coagulopathy.

REQUIRED EQUIPMENT

- Skin preparation materials (alcohol, iodine- or hexachlorophene-based antibacterial solution [eg, Betadine, Hibiclens])
- Sterile gloves
- 1% lidocaine without epinephrine, 5-mL syringe, 22-gauge needle
- Scalpel (#11 or #15 blade)
- 3-0 or 4-0 absorbable suture on a small cutting needle, needle holder, thumb forceps, suture scissors
- Electrosurgical generator, hand piece, and return electrode ("ground pad")
- Sterile gauze pads (2- × 2-inch or 4- × 4-inch)
- Word catheter or iodoform gauze packing (¼- or ½-inch)

TECHNIQUE

After appropriate informed consent has been obtained from the patient, the skin of the vulva is disinfected. When a regional or general anesthetic is not used, local anesthesia using local or field infiltration is appropriate. The cyst should be stabilized and tensed by gentle finger pressure applied on either side of the affected labium, below the cyst. An incision should be made over the body of the cyst and within the hymeneal ring (generally near the 4- to 5-o'clock or 7- to 8-o'clock positions of the introitus). The incision is generally made in a cruciate manner and extended for up to 2–3 cm in longest axis (based on the cyst size). Hemostasis should be obtained using electrosurgical energy. Many prefer to sew the edges of the incision open by tacking the center of the flaps outward in a petal-shaped manner. As an alternative, the incision may be made using electrosurgical energy, taking advantage of the tendency for the resultant slough of skin edges to produce a fistula tract. A Word catheter or iodoform gauze packing should be placed after final hemostasis has been achieved.

COMPLICATIONS

Bleeding, hematoma, recurrence.

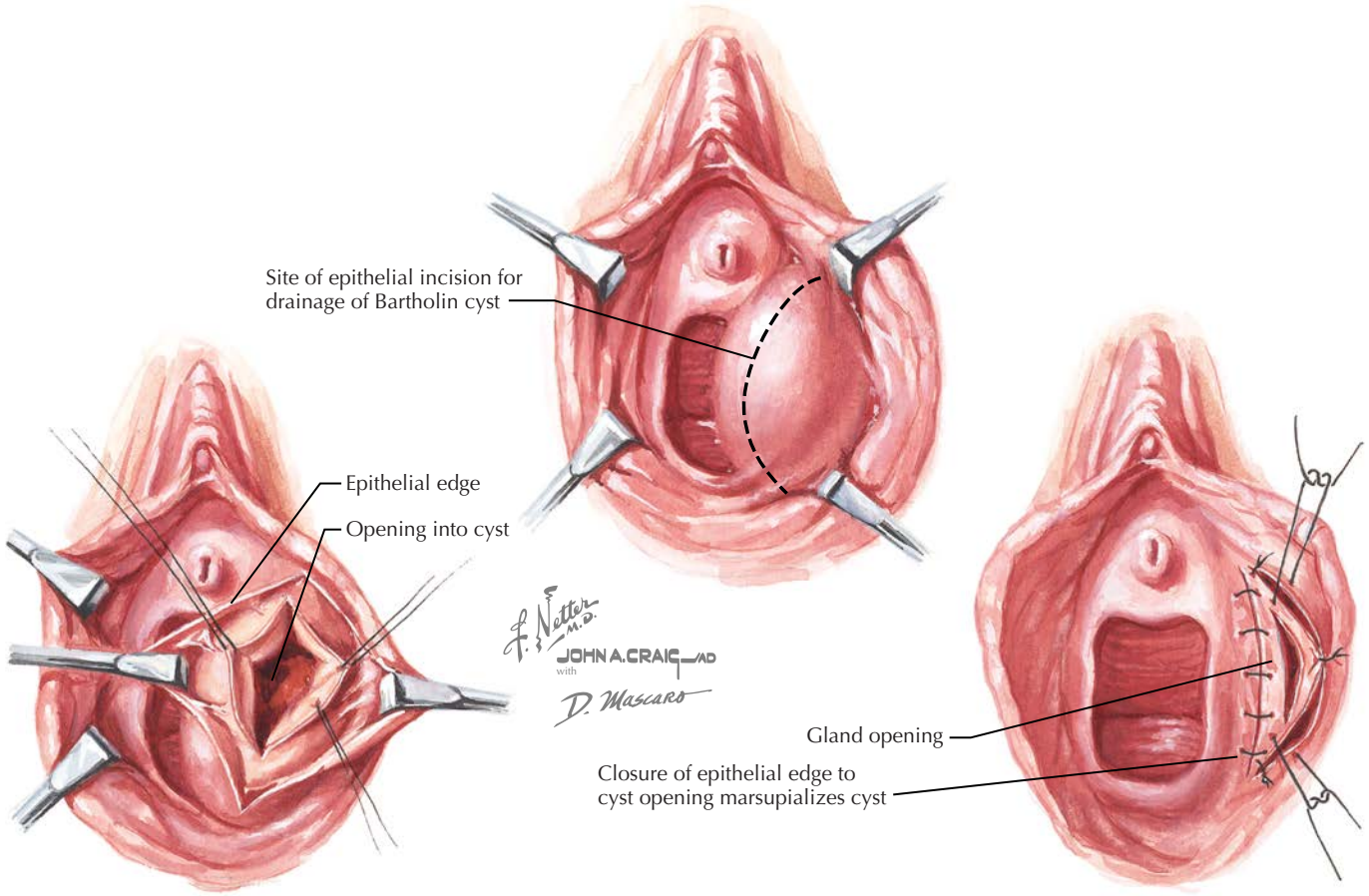

Figure 263.1 Bartholin gland marsupialization

FOLLOW-UP

Word catheters should be left in place for 4–6 weeks. Iodoform gauze packing should be gradually removed over the course of several days. Recurrence is frequent (5%–10% of cases).

CPT CODE(S)

56440 Marsupialization of Bartholin gland

REFERENCES

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Wechter ME, Wu JM, Marzano D, et al. Management of Bartholin duct cysts and abscesses: a systematic review. *Obstet Gynecol Surv*. 2009;64(6):395–404.

Level III

Omole F, Simmons BJ, Hacker Y. Management of Bartholin's duct cyst and gland abscess. *Am Fam Physician*. 2003;68(1):135–140.

BREAST BIOPSY: CORE

DESCRIPTION

Core breast biopsy is a technique used to obtain small tissue samples for the histologic diagnosis of breast masses. It has become the preferred method of histologic diagnosis for breast masses.

INDICATIONS

Breast mass or suspicious lesion (palpable; nonpalpable masses may be sampled if image guidance is available).

CONTRAINDICATIONS

Local skin infection, known or suspected allergy to agents used (eg, latex, iodine). Core needle biopsy may not be suitable for patients who have very small or very hard breast lumps; masses close to the chest wall, nipple, or surface of the breast; calcifications that require magnification; or very small breasts. Patients who take blood thinners or aspirin should discontinue them before the procedure. Women who cannot remain still or in the supine position for 20–40 minutes because of physical illness or other problems are not good candidates for stereotactic core needle biopsy.

REQUIRED EQUIPMENT

- Skin preparation materials (alcohol, iodine- or hexachlorophene-based antibacterial solution [eg, Betadine, Hibiclens])
- Sterile gloves (if desired)
- 1% lidocaine without epinephrine, 5-mL syringe, 25-gauge needle
- Disposable core biopsy needle
- Scalpel (#11 blade), if desired
- Sterile gauze pads (2- × 2-inch)
- Suitable tissue preservation/transportation medium (10% formalin solution or similar)
- Self-adhesive bandage
- Anxiolytics may be administered as needed
- Nonsteroidal antiinflammatory agents for postprocedure pain relief

TECHNIQUE

After appropriate informed consent has been obtained from the patient, the skin is disinfected and a skin wheal of local anesthetic is injected at the site chosen for needle penetration. The patient may be either in the supine or prone position based on the location of the lesion to be biopsied, optimal access, and availability or need for image guidance. Using the fingers of the opposite hand to stabilize

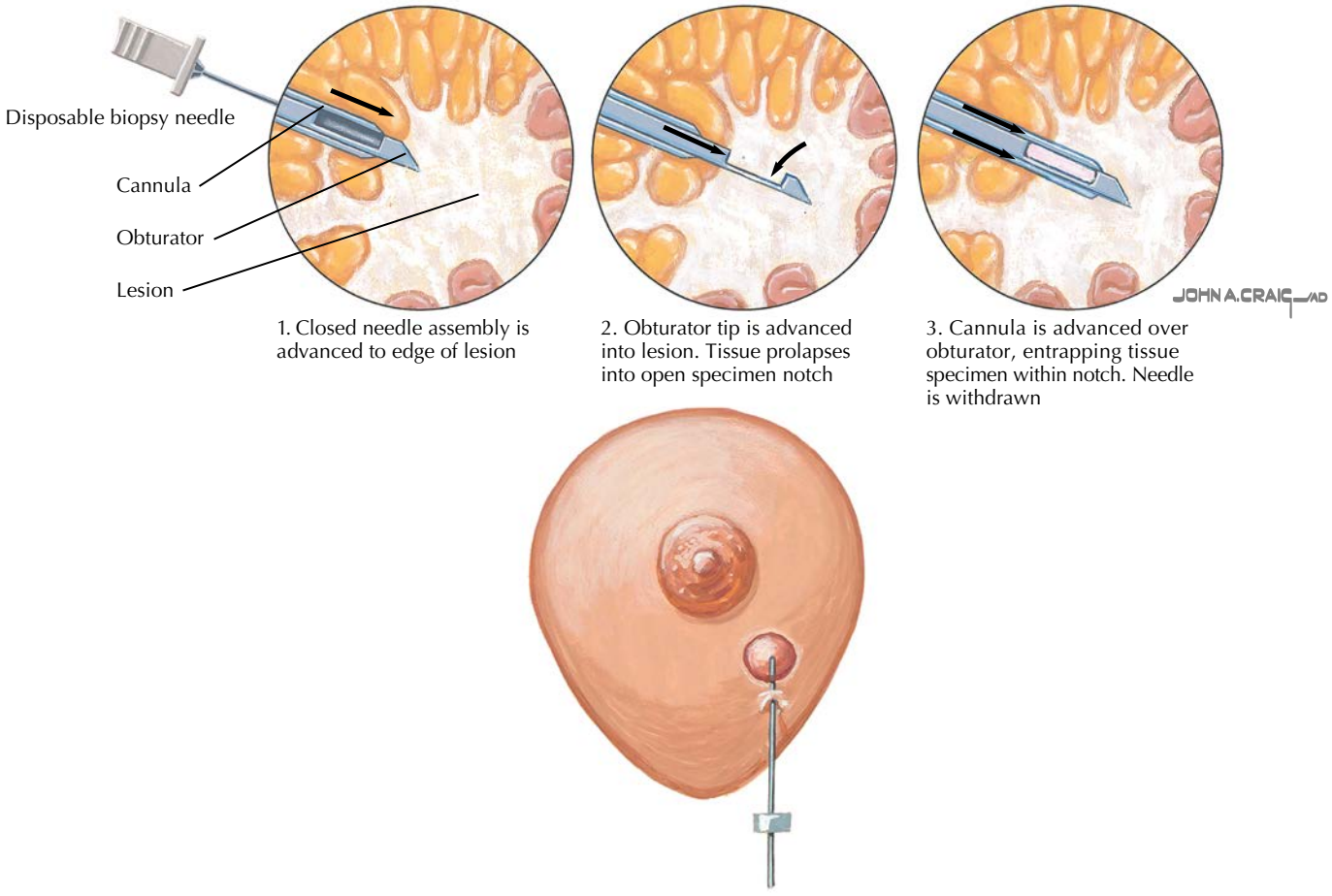

Figure 264.1 Needle biopsy

the area in question, the physician advances the needle into the area of concern by palpation or under image guidance using either stereotactic mammography or ultrasonography. Passage of the needle through the skin may be facilitated by a small incision if desired. Where possible, the needle track should be parallel to the chest wall to minimize the chance of incursion and a pneumothorax. A change in tissue resistance or a "gritty" sensation may be noticed as the needle enters some mass lesions.

Core biopsy needles generally have a specialized tip with a covering sheath and cutting edge. The needles are of large caliber (14 g) and are mounted onto a spring-loaded device that allows small cylinders of tissue to be cut and collected within the notch of the needle. Techniques vary slightly based on the specific needle but commonly involve placing the tip just short of the tissue to be biopsied; then, the inner core is advanced into the tissue and the outer (cutting) sheath is advanced to free the tissue sample trapped in the inner portion of the needle. The needle is removed, tissue sample is extracted, and additional samples (as needed) are obtained in the same manner. Typically, samples are approximately 2-cm long and 0.16 cm in diameter.

Three to six separate core needle insertions are typically needed to obtain a sufficient sample of breast tissue. Patients may experience a slight pressure during core needle biopsy but should not experience any significant pain. At the close of the procedure, samples are sent to the pathology laboratory for diagnosis, and a light dressing is applied (a self-adhesive bandage suffices). Ice and gentle pressure may be applied for 15–30 minutes to minimize bruising. An elastic wrap or sports bra will reduce discomfort and reduce hematoma formation.

Vacuum-assisted breast biopsy is able to remove approximately twice the amount of tissue compared with core needle biopsy while still offering the advantages of a minimally invasive procedure. The technique is the same as with core biopsy, differing only in the nature of the sampling device.

COMPLICATIONS

Bleeding, hematoma (<3%), infection (<1%).

FOLLOW-UP

The reported false-negative rate for malignancy with core biopsy is in the range of 2%–6.7%, with a mean rate of 4.4%. Approximately 10% of biopsy attempts will be inconclusive. Certain histologic results should be interpreted with caution: more than half of all cases of atypical ductal hyperplasia diagnosed with core biopsy prove malignant at surgery, and invasive carcinoma is found in up to one-third of core biopsy–confirmed ductal carcinoma in situ.

CPT CODE(S)

19100 Biopsy of breast; percutaneous, needle core, not using imaging guidance (separate procedure)
19102 Biopsy of breast; percutaneous, needle core, using imaging guidance
19103 Biopsy of breast; percutaneous, automated vacuum assisted or rotating biopsy device, using imaging guidance

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BREAST BIOPSY: OPEN

DESCRIPTION

Open breast biopsy is a technique used to obtain tissue samples for the histologic diagnosis of breast masses. Open biopsy techniques remove more tissue in larger specimens than do core biopsy methods.

INDICATIONS

Breast mass or suspicious lesion (palpable; nonpalpable masses may be sampled if image guidance is available).

CONTRAINDICATIONS

Local skin infection, known or suspected allergy to agents used (eg, latex, iodine). Patients who take blood thinners or aspirin should discontinue them before the procedure.

REQUIRED EQUIPMENT

- Skin preparation materials (alcohol, iodine- or hexachlorophene-based antibacterial solution [eg, Betadine, Hibiclens])
- Sterile gloves
- 1% lidocaine without epinephrine, 10-mL syringe, 22-gauge needle
- Scalpel (#15 blade) and fine tissue scissors (eg, Metzenbaum)
- 2-0 or 3-0 absorbable undyed suture on a small to medium tapered needle and 3-0 or 4-0 absorbable undyed suture on a small cutting needle, needle holder, thumb forceps, suture scissors
- Small retractors (eg, Senn Miller, Ragnell [Army/Navy] or similar) may be useful, especially if an assistant is available
- Electrosurgical generator, hand piece, and return electrode ("ground pad")

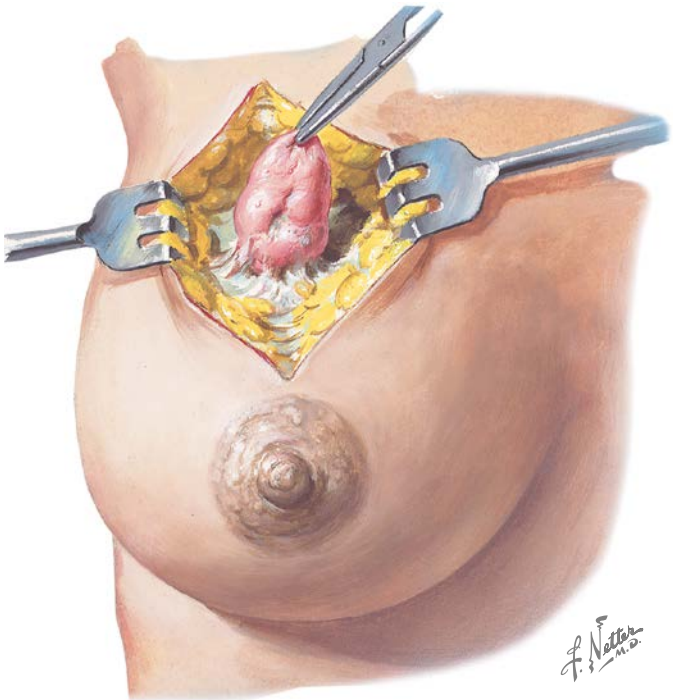

Figure 265.1 Open breast biopsy: masses are often not easily identified, requiring larger incision or needle localization using radiographic assistance.

- Sterile gauze pads (2- × 2-inch)
- Self-adhesive skin tapes (if desired)
- Self-adhesive bandage
- Suitable tissue preservation/transportation medium (10% formalin solution or similar) (If estrogen and progesterone receptors are to be assessed, a sample of unpreserved tissue must be frozen within 30 minutes.)
- Anxiolytics or anesthetics may be administered as needed
- Nonsteroidal antiinflammatory agents for postprocedure pain relief

TECHNIQUE

After appropriate informed consent has been obtained, the skin is disinfected, and the local anesthetic is injected at the selected site. The majority of biopsies can be performed with curvilinear incisions following the contours of the breast, often in the circumareolar area. An open biopsy should be performed using a scalpel rather than electrosurgical energy because thermal effects on the biopsy material may blur the margin of normal tissue around the tumor and cause abnormally low receptor levels. Thermal damage may also delay skin healing.

The dissection is carried to the area of concern through a combination of sharp and blunt techniques. A change in tissue character or a "gritty" sensation may be noticed as the tissue is dissected near some mass lesions. The mass or area of interest is excised, and hemostasis is obtained through electrosurgical energy or the placement of hemostatic sutures to close dead space. The skin may be closed using a running subcuticular suture or self-adhesive skin tapes.

At the close of the procedure, samples are sent to the pathology laboratory for diagnosis and a light dressing is applied; a self-adhesive bandage often suffices. Ice and gentle pressure may be applied for 15–30 minutes to minimize bruising. An elastic wrap or sports bra will reduce discomfort and reduce hematoma formation.

It is important to send the pathology laboratory a small sample (1 g of suspect tissue) to determine the presence or absence of estrogen and progesterone receptors. These receptors are heat labile; therefore, the tissue must be frozen within 30 minutes.

Nonpalpable masses may be localized through the placement of a small needle or sterile J-wire under fluoroscopic or ultrasonographic guidance. These are then used as guides for the open dissection. The specimen is removed with the wire or needle in place, with radiography to confirm the removal of the suspect area. These techniques have been largely supplanted by computer-guided core biopsy techniques.

COMPLICATIONS

Bleeding, hematoma, infection.

FOLLOW-UP

If nonabsorbable suture material is used to close the skin, the stitches will need to be removed during a follow-up visit. The incidence of carcinoma in biopsies corresponds directly with the patient's age. Approximately 20% of breast biopsies in women age 50 are positive, and this figure increases to 33% in women aged 70 years or older.

CPT CODE(S)

19101 Biopsy of breast; open, incisional

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266 BREAST IMAGING

THE CHALLENGE

Description: To understand the imaging modalities available to detect occult breast disease and characterize clinically identified lesions.

Scope of the Problem: Imaging is paramount for the early detection and staging of breast cancer, as well as to inform management decisions and direct therapy for this and other breast conditions.

Objectives of Management: To appropriately use imaging modalities for evaluating breast disease and to improve the efficacy of screening.

TACTICS

Relevant Pathophysiology: In both ultrasonography and mammography, energy (ultrasonic or x-ray) is passed into the breast tissue, where it is reflected, scattered, and attenuated. In ultrasonography, sound waves are reflected from tissue interfaces where the characteristic acoustic impedance (ability to transmit sound) differ; the greater the differences in the tissues, the greater the reflection (and refraction) of the sound waves. Reflected sound wave are detected and used to create an image of the tissues in the path of the sound beam. In mammography, x-rays are attenuated, based upon the characteristics of the breast tissue, and are then absorbed on the recording device (x-ray film or digital screen). The resultant shadows allow the architecture of the tissues to be discerned. Ultrasonography tends to be used in a targeted manner, whereas x-ray mammography routinely uses two views (craniocaudal and mediolateral oblique) of each whole breast.

The ability of digitally mammographic images to be captured rapidly and manipulated by computer programs has led to the development of three-dimensional breast tomosynthesis. Breast tomosynthesis involves acquiring images of a stationary compressed breast at multiple angles during a short scan. These images are reconstructed into a series of thin (1 mm) high-resolution slices that can be displayed in various ways. Digital breast tomosynthesis still requires breast compression for optimal images. (Compression increases the image contrast and decreases the radiation dose.) Initial data indicated a doubling of the mean glandular radiation dose with tomosynthesis compared with standard digital mammography (0.7 mSv, equivalent to natural background radiation over 3 months). Subsequent data suggest that it 8% higher compared with digital mammogram. Clinical data suggest that tomosynthesis produces a better image, improved accuracy, and lower recall rates compared with digital mammography alone (especially for women younger than 50 and those with dense breasts), but higher false-positive rates and uncertain cost-effectiveness and impact on breast cancer survival means the technology's role remains to be proved. Computed tomography is not a cost-effective screening tool but does have a place when evaluating the possibility of advanced disease.

Magnetic resonance imaging (MRI) uses strong magnetic fields, magnetic field gradients, and radio waves to form its images. Some atomic nuclei (most often hydrogen) can absorb radio frequency energy when in a strong external magnetic field. Pulses of radio waves excite the nuclear spin energy transition. The resultant evolving spin polarization can induce a radio frequency signal in a receiving coil and thereby be detected. Magnetic field gradients localize the polarization within the tissues, painting a three-dimensional image. Hydrogen atoms are abundant in the body's water and fat, allowing tissues to be visualized. For most studies, a contrast material (gadolinium) is given IV before the images are taken. MRI breast cancer screening has a greater sensitivity but less specificity than mammography for detecting breast cancer in high-risk women.

Efforts have been made to apply other technologies to the problem of breast imaging. Positron emission tomography (PET) scan uses a radioactive tracer to identify breast cancer and its spread. Positron emission mammography (PEM) is a newer imaging test that combines some aspects of a PET scan and a mammogram. Contrast-enhanced spectral mammography (CESM) uses a contrast dye (containing iodine) that is injected into the blood a few minutes before two sets of mammograms (using different energy levels) are taken. The contrast helps the x-rays show any

abnormalities. Other modalities such as thermal imaging (thermography), molecular breast imaging (scintimammography or breast-specific gamma imaging), shear-wave elastography (elastography), electrical impedance imaging (T-scan), and transillumination, are either experimental or have not proven to be effective.

Strategies: Breast imaging technologies may be used for either screening or diagnosis. The ideal screening technology must be cost-effective, safe, widely available and easy to administer, exquisitely sensitive (high probability of detecting disease), and extremely specific (high probability that those without the disease will screen negative). Based on current experience, mammography remains the best screening modality for breast cancer. When the patient is younger than 30 years, has particularly dense breasts, or is at a greater than 20% lifetime risk, mammography augmented by MRI is recommended. Although ultrasonography is less sensitive than MRI (detects fewer tumors), it has the advantage of costing less and being more widely available. Ultrasonography is useful in the evaluation of palpable masses that are mammographically occult, in the evaluation of clinically suspected breast lesions in women younger 30 years, and in the follow-up of abnormalities seen

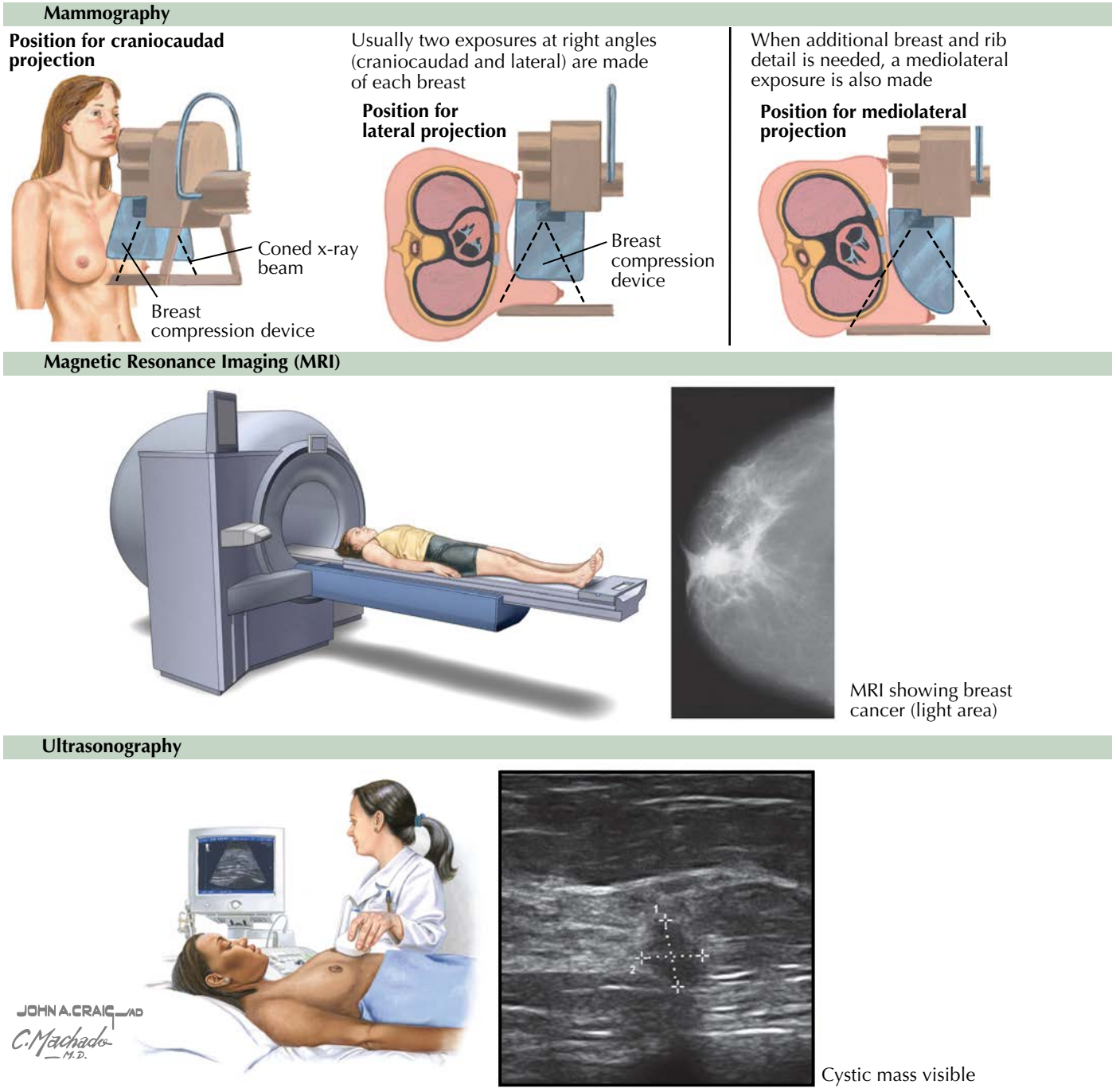

Figure 266.1 Breast imaging modalities

on mammography. When a clinically identified mass is present, ultrasonography is the most effective modality for differentiating solid from cystic elements or for guiding percutaneous biopsy techniques.

Patient Education:

American College of Obstetricians and Gynecologists Patient Education Pamphlet:

- Mammography and Other Screening Tests for Breast Problems, 2017

IMPLEMENTATION

Special Considerations: Ultrasonography and MRI are both deemed safe during pregnancy.

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CERVICAL CERCLAGE

267

DESCRIPTION

Cervical cerclage is the placement of a suture or tape to support and partially occlude the uterine cervix to reduce the risk for preterm delivery in the face of cervical insufficiency. A number of procedures have been described, but the most common and simplest is the McDonald cerclage, which is described here. Cervical cerclage also may be accomplished by placing the suture via an abdominal route, although this is a much more invasive procedure and the suture is generally left in place permanently, precluding vaginal delivery.

INDICATIONS

Cervical incompetence as documented by a history of preterm pregnancy loss associated with painless cervical dilation or prolapse and ballooning of the fetal membranes into the vagina without labor. Cerclage may be placed based on history or cervical shortening documented through ultrasonography. Prophylactic cervical cerclage is generally delayed until after 14 weeks so that early pregnancy losses from other factors may be resolved. Cerclage is not performed after 26–28 weeks gestation.

CONTRAINDICATIONS

Bleeding, uterine contractions, obvious infection, multiple gestation, fetal demise, or rupture of the membranes. Beyond 24–26 weeks, bed rest, pessary therapy, or other treatments are often preferred because of the increased risk for surgically related labor.

REQUIRED EQUIPMENT

- Skin (vaginal) preparation materials (iodine- or hexachlorophene-based antibacterial solution [eg, Betadine, Hibiclens] or other suitable cleansing agents)
- Sterile gloves
- Number 1 or 2 permanent synthetic suture (Prolene or similar) or 5-mm woven tape (Mersilene or similar) on a medium blunt needle. (Monofilament sutures are easier to pass through the tissues, but a broader tape provides more support and less chance of suture erosion into or through the cervix.)
- Needle holder, long thumb forceps, suture scissors
- Retractors (two Deaver or right-angle retractors and/or weighted speculum)
- Sponge stick (may be useful to atraumatically grasp and manipulate the cervix)
- Foley or straight catheter (optional)
- External fetal heart rate monitor or Doppler fetal heart detector
- Neuraxial or general anesthesia

TECHNIQUE

After appropriate informed consent has been obtained, ultrasonography should be performed to confirm a living fetus, exclude major fetal anomalies, and assess cervical length. Any obvious vaginal or cervical infections should be treated, and tests for gonorrhea, chlamydia, and group B streptococci should be obtained before proceeding. Sexual intercourse is generally proscribed for 1 week before and after the procedure.

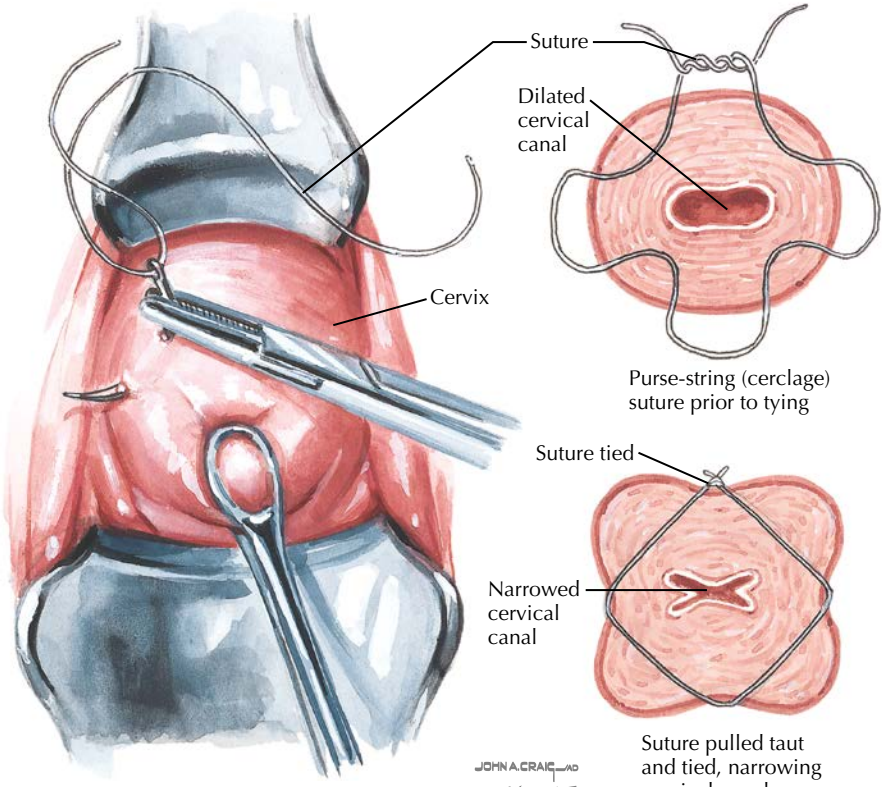

Figure 267.1 Surgical management of cervical incompetence (cerclage)

The anesthetized patient is placed in the dorsal lithotomy position, the vagina and cervix are disinfected, and the cervix is visualized using retractors. Some authors advise distending the maternal bladder to elevate the fetal presenting part, relieve pressure on the fetal membranes, and define the cervicovesical reflection. For right-handed surgeons, the needle is first placed entering the cervix at the 11- to 12-o'clock position near the inner cervical os, taking care to avoid injuring the bladder. The suture is passed below the surface of the cervix, incorporating some of the parenchyma, and exits at approximately the 10-o'clock position. The suture is then passed once again into the cervical tissue, entering at approximately the 8-o'clock position and exiting posteriorly near the 6- to 7-o'clock position. The circumferential suture is carried up the opposite side in a similar manner, terminating at approximately the 1-o'clock position, where it is firmly tied to the first portion of the suture. The suture should not cause blanching of the tissue but should narrow the cervix so that it will not admit a single gloved finger. The tied suture should be both tied and cut in such a manner as to facilitate eventual location and removal.

Based on the size of the cervix and needle chosen, it may be necessary to take additional suture passes to accomplish adequate circumferential support. Care should be taken such that the portions of the suture at the 3- and 9-o'clock positions are shallow or outside the cervical epithelium to minimize the risk to the descending cervical branches of the uterine vessels.

Following conclusion of the procedure, the fetal heart rate is monitored to ensure normal fetal status. Prophylactic antibiotics or β-mimetic drugs have not been shown to be of any benefit in reducing the rate of complications or preterm labor. Some authors advocate prescribing a nonsteroidal antiinflammatory drug, such as indomethacin, for the first 12–24 hours after cerclage placement, but data are conflicting and the effects small.

When the suture is to be removed (generally at 38 weeks and always if labor ensues before that time), it may be carried out in the office or labor and delivery area by firmly grasping the knot or visible suture ends and applying traction to identify one side of the suture below the knot. Snipping this portion of the suture allows traction on the knot to pull the suture through the tissues for removal. An anesthetic may be required based on exposure, patient comfort, and provider or patient preference.

COMPLICATIONS

Suture migration occurs in 3%–13% of cases. Preterm rupture of the membranes (1%–18%, up to 65% of emergent cases), chorioamnionitis (1%–7%, up to 35% of emergent cases), bleeding, and damage to adjacent structures (bladder or rectum). Scarring from the procedure may lead to cervical lacerations during labor (1%–13%) or failure of the cervix to dilate (2%–5%).

FOLLOW-UP

Fetal and maternal monitoring is generally performed for 12–24 hours or longer depending on clinical factors.

When the suture is placed vaginally, it is generally removed at 38 weeks of gestation. If labor occurs before this point, the suture must be removed immediately.

CPT CODE(S)

59320 Cerclage of cervix, during pregnancy; vaginal
59325 Cerclage of cervix, during pregnancy; abdominal

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CERVICAL CONIZATION (COLD KNIFE)

DESCRIPTION

Cervical conization is a diagnostic or therapeutic procedure that removes a cone-shaped specimen from the uterine cervix. Cold knife cone biopsy used to be the preferred treatment for removing abnormal cells, but now most cone biopsies are performed using the wire loop and electrosurgical energy (loop electrosurgical excision procedure [LEEP]/large loop excision of the transformation zone [LLETZ] cone). Cold knife cone biopsy is generally used for special situations such as when the size or shape of the specimen must be customized to a greater degree than allowed by loop procedures.

INDICATIONS

Histologically verified advanced epithelial atypia (for diagnosis or therapy) or inability to adequately evaluate the cervix through colposcopy.

CONTRAINDICATIONS

Coagulopathy, advanced pregnancy, known or suspected allergy to the agents used.

REQUIRED EQUIPMENT

- Skin (vaginal) preparation materials (iodine- or hexachlorophene-based antibacterial solution [eg, Betadine, Hibiclens] or other suitable cleansing agents)
- Sterile gloves
- 0 or 2-0 synthetic absorbable suture on a medium needle
- Needle holder, long thumb forceps, suture scissors
- Retractors (two Deaver or right-angle retractors and/or weighted speculum)
- Scalpel (#11 blade)
- Mayo, Metzenbaum, or angled (Jorgenson) scissors
- Uterine sound (blunt probe) or small cervical dilator
- Sponge stick (may be useful to atraumatically grasp and manipulate the cervix)
- Electrosurgical generator, hand piece, and return electrode ("ground pad")
- A smoke evacuator with odor and viral filter if electrosurgical energy is to be used.
- Monsel solution or paste (ferric subsulfate)
- Histology fixative (10% formalin) in containers
- 5% acetic acid or Lugol solution (super-saturated potassium iodide) if colposcopy is to be performed
- Vaginal pack (optional)

TECHNIQUE

Cold knife conizations are generally performed under regional or general anesthesia. After providing appropriate informed consent, the anesthetized patient is placed in the dorsal lithotomy position, the vagina and cervix are disinfected, and the cervix is visualized using retractors. If necessary, a colposcopic examination, facilitated

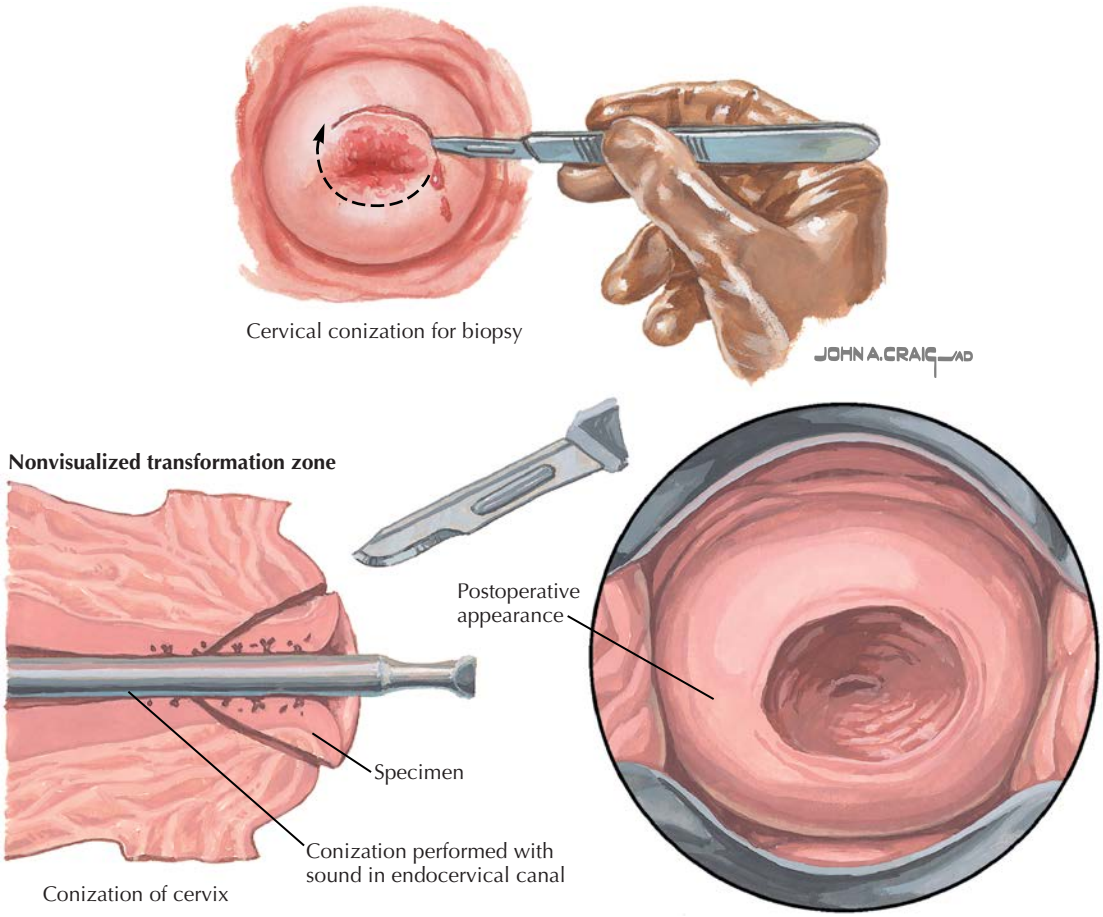

Figure 268.1 Cervical conization

by acetic acid or Lugol solution, may be performed to further characterize any abnormalities present.

For many, the procedure begins with the placement of hemostatic sutures (simple loop or figure-of-8) at the 3- and 9-o'clock positions on the cervix near the cervicovaginal reflections bilaterally. These are generally tied and held to stabilize the cervix until the end of the procedure, although the role of these sutures in reducing blood loss has been debated and they may be omitted in certain cases. Dilute vasopressin (1 pressor unit/20 mL saline) or 1:100,000 epinephrine solution may be injected into the cervical parenchyma to further reduce blood loss. If desired, a blunt uterine probe or small cervical dilator is placed into the endocervical canal to guide the dissection.

A cone-shaped plug of cervical tissue is excised by sweeping the scalpel blade around the ectocervix with the blade angled inward to intersect the endocervical canal. The width and depth of the conization are determined by the anatomy of the cervix, the location of the transformation zone, and the lesion being treated; it must include the transformation zone and any specific lesion. Scissors may be used to release the base of the specimen.

Hemostasis may be obtained through electrosurgical energy or the application of styptics such as Monsel solution. Some advocate general cautery of the cut surface of the cervix, although the resultant slough of damaged tissue may delay final healing. If electrosurgical surgical energy is used, a smoke evacuator with viral filter should be used to reduce the risk of human papillomavirus exposure for operating room personnel. If desired, the ectocervical edges may be sewn with a running suture to provide hemostasis at the edge and to roll the edges inward. As an alternative, Sturmdorf stitches may be placed to partially reconstruct the external cervical os, although some argue that this may increase the risk of cervical stenosis. At the close of the procedure, the held tails of the hemostatic sutures may be either clipped (leaving the suture in place) or tied across the cervix to apply pressure or to hold a hemostatic pledget (oxidized regenerated cellulose [Surgicel or similar]) in place. (Patients should be warned to expect passage of this material in 10–14 days.) Pelvic rest (no tampons, douching, or sexual intercourse) is generally advised for 2–3 weeks after the procedure, and the patient is instructed to return for heavy bleeding or bleeding that lasts more than 2 weeks.

COMPLICATIONS

Bleeding (acute and delayed, 5% to 15%, <1% transfusion rate), infection (<7%), uterine perforation, injury to the bladder or bowel, cervical stenosis, and cervical incompetence. Conization appears to approximately double the risk that a woman will subsequently have a preterm delivery, a low-birthweight infant, or premature rupture of the membranes.

FOLLOW-UP

The cervix is generally inspected at about 6 weeks after the procedure. Treatment success for cervical intraepithelial neoplasia is generally 95%.

CPT CODE(S)

57520 Conization of cervix, with or without fulguration, with or without dilation and curettage, with or without repair; cold knife or laser

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CERVICAL POLYPECTOMY

DESCRIPTION

Cervical polypectomy is the removal of cervical or visible endocervical polyps; it is generally a simple, painless office procedure.

INDICATIONS

Cervical or visible endocervical polyp. Some authors have questioned the need to treat asymptomatic polyps.

CONTRAINDICATIONS

Known or suspected allergy to the agents used, coagulopathy. Relative: pregnancy.

REQUIRED EQUIPMENT

- Skin (vaginal) preparation materials (iodine-based antibacterial solution [eg, Betadine] or other suitable cleansing agents [chlorhexidine])
- Sterile or examination gloves
- Vaginal speculum
- Sponge stick or uterine packing forceps (fine scissors may be used but are seldom required)
- Kevorkian or similar endocervical curette
- Monsel solution or paste (ferric subsulfate) or silver nitrate–tipped sticks
- Histology fixative (10% formalin) in container

TECHNIQUE

The polyp is first visualized using a standard vaginal speculum. Disinfection with a suitable solution may be performed, although most think it is not required. The visible portion of the polyp is then grasped, and gentle traction, twisting through several revolutions, or excision accomplishes the removal of polyp. If the polyp is considered to arise from high in the endocervical canal, the base may be gently curetted with an endocervical curette. Curettage of the endocervical canal also should be considered to rule out a coexisting hyperplasia or cancer. Although malignancy is rare, all polyps should be submitted for histologic examination. The base of the polyp may be treated with chemical cautery (Monsel solution or silver nitrate), electrocautery, or cryocautery.

COMPLICATIONS

Bleeding

FOLLOW-UP

Although the histology of the polyp should be confirmed as benign, malignant degeneration of an endocervical polyp is extremely rare. The reported incidence is less than 1/200.

CPT CODE(S)

58999 Unlisted procedure, female genital system (nonobstetric)

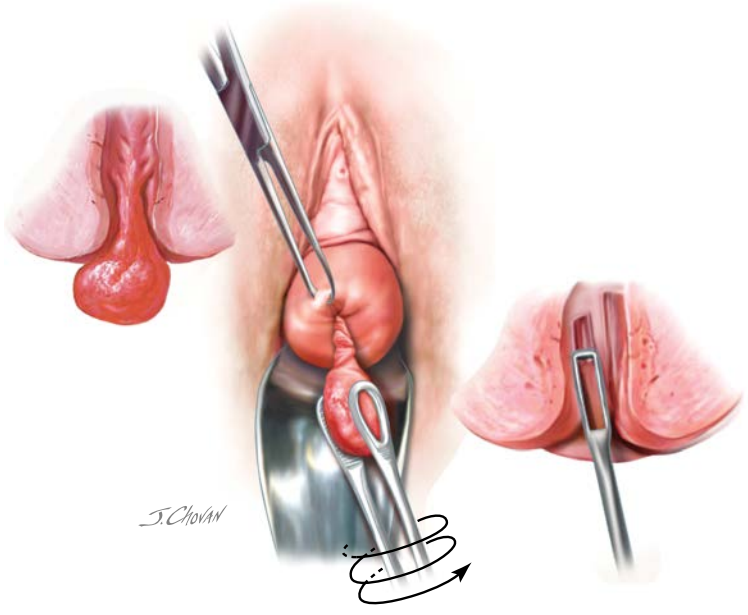

Figure 269.1 Cervical polypectomy

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270 CESAREAN BIRTH

DESCRIPTION

Cesarean birth (or cesarean section) is the delivery of the fetus through surgical incisions in the mother's abdomen and uterus. The rate of cesarean birth varies from 10% to 35% around the world, influenced by cultural factors and the availability of surgical care. In the United States, the rate of cesarean births increased by 5-fold for a 20-year period that ended in the early 1990s. The exact reasons for this are open to conjecture, but concerns about liability, almost universal use of electronic fetal monitoring, increasing birthweight, and an increased number of repeat cesarean deliveries have all been postulated. The rate of cesarean delivery in the United States is 31.8% (2020). Despite this increase, only minor improvements in newborn outcomes have occurred as a result.

INDICATIONS

Cesarean birth may be selected to accomplish fetal delivery when it is impossible, impractical, or unsafe for the baby to be vaginally delivered. Acute indications for cesarean birth include fetal distress, hemorrhage from placenta previa, placental abruption, prolapse of the umbilical cord, and uterine rupture because these conditions require prompt delivery. Fetal intolerance to labor or failure of the labor to progress may also necessitate cesarean birth. Less common are the anatomic or congenital conditions of mother or fetus that make vaginal birth undesirable. An estimated 2.5% of all births in the United States are cesarean birth on maternal request.

CONTRAINDICATIONS

Like most surgical procedures, the gross instability of the mother (eg, hypovolemia, hypotension, sepsis) and uncertainty about fetal status are relative contraindications. That said, there are rare instances in which cesarean delivery must be performed to save a fetus when the mother is dying.

REQUIRED EQUIPMENT

Minimum requirements (for emergency procedures outside of the operating room):

- Sterile gloves, antiseptic solution or skin preparation swabs
- #10 scalpel
- Emergency delivery pack (bulb syringe, umbilical cord clamps, scissors, towels, and basin)
- Emergency cesarean pack (typically: 2 Kocher clamps, 4 Kelly clamps, 1 or 2 Allis clamps, 1 Mayo scissors, 1 bandage scissors, 2 tissue forceps, 1 or 2 retractors [Richardson])
- An assistant is advantageous

Preferred requirements (operating room setting):

- Sterile gloves, antiseptic solution or skin preparation swabs
- Surgical gowns and gloves for the surgical team
- Sterile drape pack for abdominal surgery
- "Major abdominal surgery" instrument tray
- Sutures for uterine and fascial closure (eg, 0 or 00 delayed absorbable), and skin (eg, undyed 3-0 or 4-0 delayed absorbable, or 4-0 permanent to be removed a few days after the procedure)
- Umbilical cord clamps (2)
- Bulb suction (to clear the newborn's airway)
- Electrosurgical energy source, hand piece, and return electrode
- Surgical suction and saline irrigation
- Sterile wound dressing materials and adhesive tape

TECHNIQUE

Following the establishment of appropriate anesthesia (generally a regional technique) and skin and vaginal preparation, the patient is draped in the usual fashion for lower abdominal surgery. Except in the most emergent of conditions, reverification of the patient's identity and performance of safety protocols and surgical counts should be completed before the procedure begins. Cesarean birth may be accomplished through either a lower abdominal vertical midline or transverse (Pfannenstiel) incision. Cesarean births are not classified by the kind of abdominal incision made but rather as lower uterine segment (transverse or vertical) when the uterine incision is in the lower uterine segment or classic when the incision is in the mid or upper, contractile portion of the uterus—the low-transverse form is described here. Once the abdominal cavity has been entered and adequate exposure of the lower uterus has been secured, the bladder reflection is identified. If a "bladder flap" of visceral peritoneum is to be raised, an incision in the peritoneum overlying the lower segment is made and the peritoneum reflected inferiorly and superiorly to a distance of 1–2 cm. A transverse incision in the lower uterine segment is made (within the peritoneal flap, if one has been made), and this is carried down to the amniotic sac. The incision is then widened laterally and cephalad through a combination of blunt and sharp dissection at the surgeon's discretion. This incision must be able to accommodate the delivery of the fetus. The amniotic sac is entered, and the exact lie and position of the fetus are determined. Where possible, the fetal head is delivered through the uterine incision in the occiput-anterior position and extended to allow passage outside the abdomen by gentle upward traction. The birth is completed, and the newborn is briefly dried, suctioned, and stimulated as needed. The umbilical cord is doubly clamped and cut, and the newborn is transferred from the sterile field to the pediatrician or other provider, who will conduct the initial assessment and stabilization. If significant bleeding from the edge of the uterus is encountered, it is temporarily controlled using noncrushing clamps. The placenta may be spontaneously delivered by expulsion, by anterior–posterior pressure or by manual extraction. The uterine incision is closed in either 1 or 2 layers using delayed absorbable suture. Hemostasis must be established and verified before the abdominal wall closure is begun. The fascia is generally approximated using a delayed absorbable suture in a running fashion. The skin may be closed with skin staples or subcuticular sutures of either (undyed) delayed absorbable or permanent suture material—suture closure is associated with fewer wound complications and better cosmetic results. Following final sponge and needle counts a sterile dressing is applied.

COMPLICATIONS

Immediate complications of cesarean birth include bleeding, infection, injury to adjacent organs or the fetus itself, and the possibility of additional surgery (including hysterectomy) based on the conditions at hand. Complications of surgical anesthesia, such as hypoxia, ischemic events (eg, stroke, myocardial infarction), aspiration, and embolism may also occur.

Because cesarean birth is a major surgical procedure, the rate of maternal mortality is approximately 3- to 4-fold higher than that for vaginal delivery. Potential risks of cesarean birth include a longer maternal hospital stay, an increased risk for respiratory problems for the baby, and greater complications in subsequent pregnancies, including increased risks for uterine rupture and placental

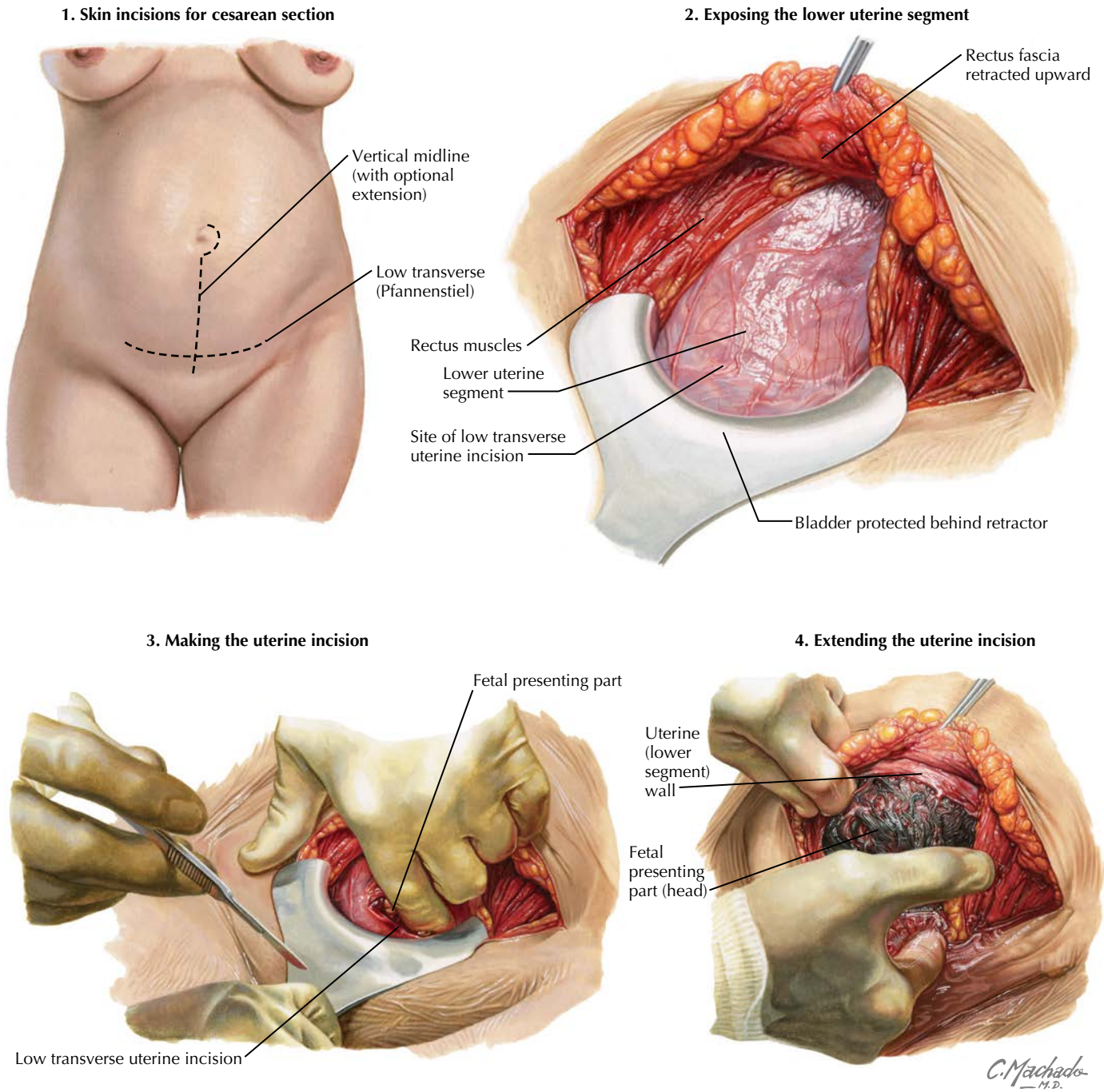

Figure 270.1 Cesarean birth: Steps 1–4

implantation abnormalities. The risks for placenta previa, placenta accreta, and the need for cesarean hysterectomy all increase with each successive cesarean birth.

FOLLOW-UP

Patients are generally seen within a week of hospital discharge to inspect the abdominal incision. If permanent sutures were used for skin closure, they are generally removed at or before this visit. Additional follow-up appointments are based on the healing of the wound or the presence of any complicating factors. A routine 6-week postpartum visit is also scheduled regardless of the route of delivery.

CPT CODE(S)

59510 Routine obstetric care, including antepartum care, cesarean delivery, and postpartum care
59514 Cesarean delivery only
59515 Cesarean delivery only, including postpartum care

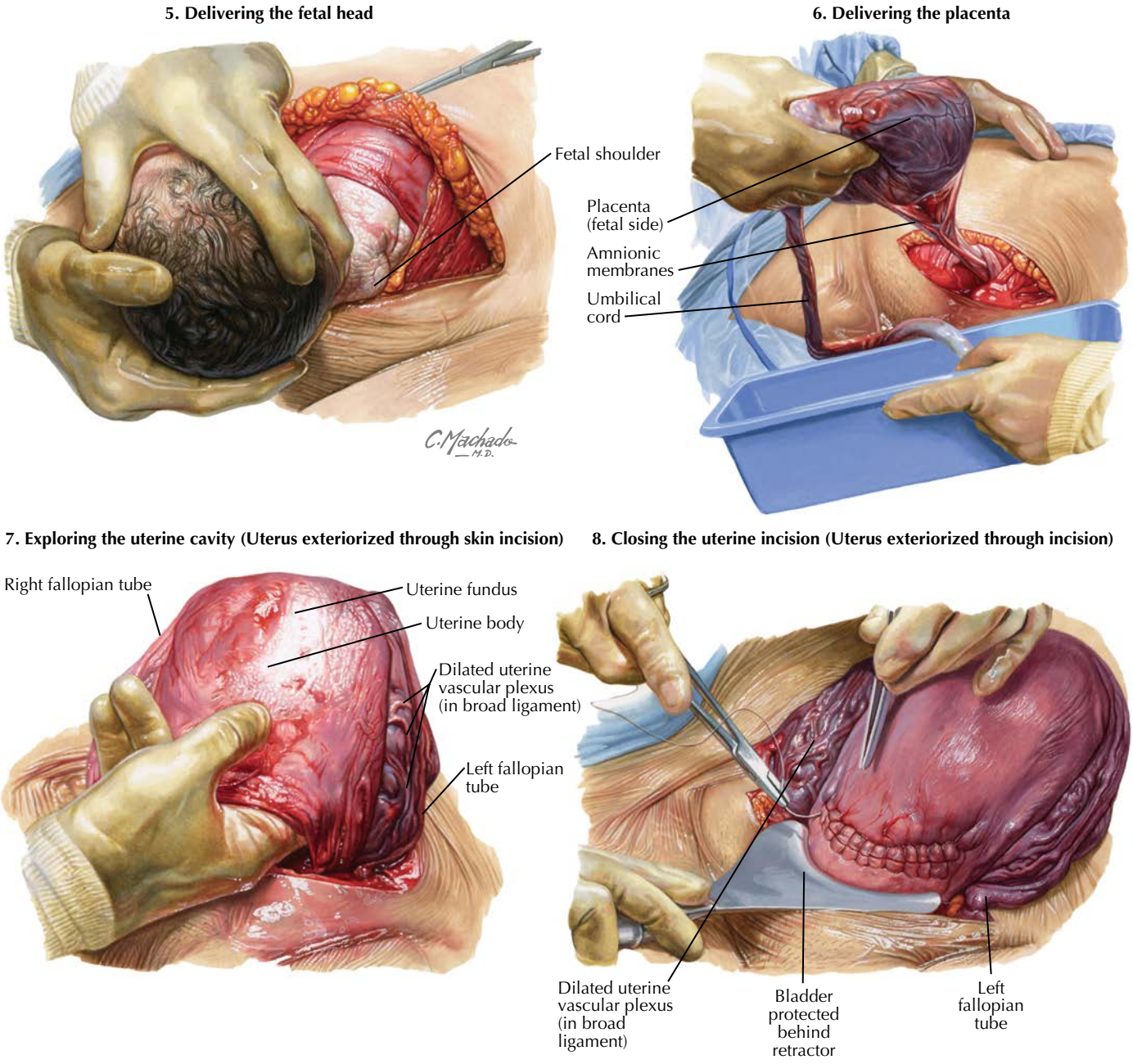

Figure 270.2 Cesarean birth: Steps 5–8

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CHORIONIC VILLUS SAMPLING

271

DESCRIPTION

A technique for obtaining fetal chorionic villus cells for cytogenetic or other testing, chorionic villus sampling (CVS) is usually performed between 10 and 13 weeks gestation and involves the aspiration of the placental tissue using either percutaneous transabdominal or transcervical approaches. Transabdominal CVS can be performed at more than 13 weeks gestation. A transvaginal approach similar to the transabdominal method also has been used for retroverted uteruses. Results from CVS have a higher diagnostic uncertainty (confined placental mosaicism) than those from amniocentesis, and the procedure is associated with slightly more complications than second-trimester amniocentesis. The ability to obtain results earlier in pregnancy is important if termination based on findings is an option being considered.

INDICATIONS

Genetic testing for fetal chromosome anomalies prompted by risk factors, parental genetic screening, or an abnormal screening test result during the first trimester. Neural tube defects in the fetus cannot be detected by CVS.

CONTRAINDICATIONS

Thrombocytopenia or antiplatelet antibodies, active vaginal bleeding, or infection are relative contraindications. For transcervical CVS: cervical stenosis, cervical or lower uterine myomas. For transabdominal CVS: Fetal position that blocks access to the placenta, known or suspected intraabdominal adhesions that could block access to the uterus. CVS may be technically difficult to accomplish in patients with multiple gestations. The risk for human immunodeficiency virus (HIV) vertical transmission associated with early invasive diagnostic techniques is lower than previously expected (3%) and similar to that in women who do not undergo the procedure.

REQUIRED EQUIPMENT

- Skin (or vaginal) preparation materials (iodine- or hexachlorophene-based antibacterial solution or other suitable cleansing agents)
- Sterile gloves
- Tissue transport medium (to be specified by the laboratory used and the test to be performed)
- Ultrasonography unit

For Transvaginal Approach

- Vaginal speculum
- Sponge stick (may be useful to atraumatically grasp and manipulate the cervix)
- Small (1.5 mm) aspiration cannula (with obturator) and 20- to 30-mL syringe; small biopsy forceps may be used as an alternative

For Transabdominal Approach

- 20- and 22-gauge spinal needles (or smaller), 20-mL syringe, three sterile 10-mL specimen tubes with caps (plain, without additive), sterile drape (one with a small fenestration or multiple drapes)
- If desired: 1% lidocaine without epinephrine, 5-mL syringe, 22-gauge needle (if not included in the procedure kit)

TECHNIQUE

The consensus is that CVS, both transabdominal and transcervical approaches, must be performed under ultrasonographic guidance. Ultrasonography is performed before CVS to confirm the gestational age of the fetus. Ultrasonography can also document multiple gestations and whether the multiples share a single placenta or each has its own. It is important to determine the number of placentas because each must be separately sampled to obtain an accurate genetic picture of each fetus. The maternal bladder is generally full to provide an acoustic window.

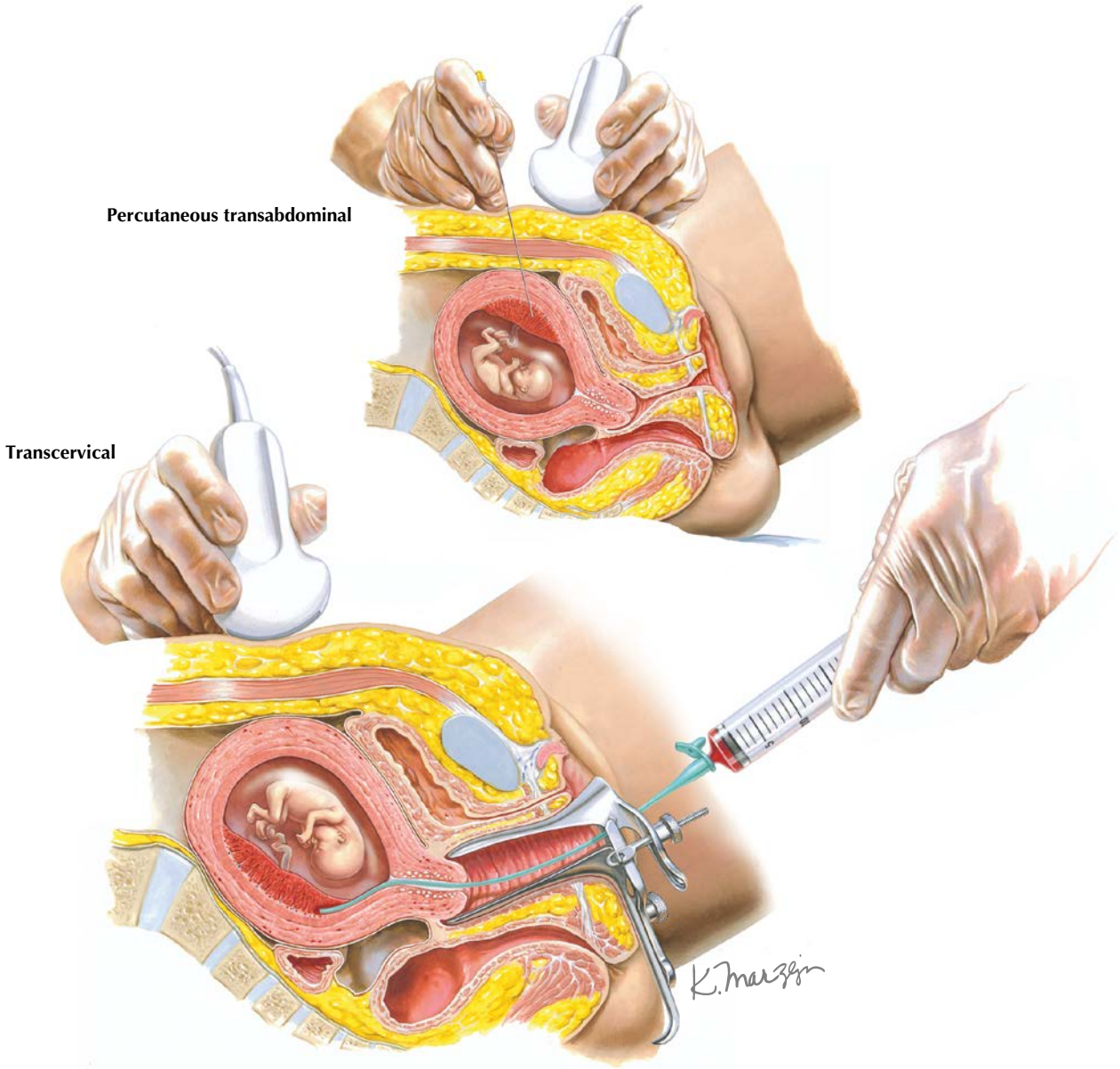

Figure 271.1 Chorionic villus sampling

The choice between the transcervical and the transabdominal approach is driven by several factors: The transabdominal approach is associated with a lower rate of procedure-related fetal losses, and a lower risk of bleeding and infectious complications. There is less need for multiple insertions, and higher sampling success rate at the first attempt. The abdominal approach also results in less maternal cell contamination. In contrast, the transcervical route is technically easier, offers less discomfort for the mother, and less fetomaternal bleeding. In only about 5% of cases will the location of the placenta dictate one method over the other.

In the transcervical technique, a speculum is used to visualize the cervix and it is cleansed with an antiseptic solution. The cervix may be stabilized with a sponge stick. Gentle traction may be applied to straighten the axis of the uterus, if needed. The cannula or biopsy tube is gently advanced through the cervix under ultrasonographic guidance until the tip is at the base of the placenta. The obturator is removed from the cannula, and the vacuum is applied to pull a sample of cells into the lumen of the cannula. The cannula is then withdrawn. The amount of tissue needed for the analysis is extremely small (10–25 mg) and represents only approximately 0.1% of the total amount of the placental tissue. The tissue sample obtained should be inspected for perceived adequacy, placed in the appropriate transport medium, labeled, and sent to the laboratory for analysis. Some clinicians prefer to place 10 mL of transport medium directly into the syringe used for suction to allow the aspirated material to enter the medium directly.

Small biopsy forceps may be substituted for the cannula and used in the same manner as with the cannula technique. Although there is some evidence to support the use of forceps as opposed to an aspiration cannula, the evidence is not strong enough to cause a change in practice, and the choice should be driven by operator experience and equipment availability.

When a transabdominal approach is selected, it is accomplished in a manner very similar to amniocentesis: the chorionic

villus sample is obtained by passing a fine needle through the abdominal wall and into the placenta using ultrasonographic guidance. Published techniques for transabdominal CVS significantly vary both in the size of the needle used (18-gauge, 20-gauge, and others) and method of aspiration (negative pressure by syringe, negative pressure by vacuum aspirator). No published studies comparing clinical outcomes using these different techniques exist.

For patients who are Rh-negative, prophylaxis with Rho(D) Rh-immunoglobulin should be administered.

COMPLICATIONS

Fetal loss rates following CVS are reported to be as high as 0.7%. Several randomized trials show almost identical miscarriage rates after transcervical CVS compared with the transabdominal approach. CVS is associated with a 14% risk for fetomaternal hemorrhage of more than 0.6 mL. Limb reductions have been associated with early (<9 weeks) CVS. There is some evidence that the focal disruption of the placenta at 13–14 weeks may increase the risk for hypertension/pre-eclampsia. The chance of getting a placental "mosaic" artifact is higher than with an amniocentesis. Vaginal spotting after CVS is reported in up to one-third of women; slightly heavier bleeding occurs in fewer than 6% of women. Bleeding is more common after transcervical compared with transabdominal CVS. Infection following CVS is very rare, although it is higher for the transcervical approach. Occult or gross rupture of the fetal membranes may occur.

FOLLOW-UP

Results are usually available in 2–3 weeks.

CPT CODE(S)

59015 Chorionic villus sampling, any method

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272 CIRCUMCISION (MALE; NEWBORN AND INFANT)

DESCRIPTION

Male circumcision is the removal of some or the entire foreskin of the phallus.

INDICATIONS

Parental or religious preference (not a medically indicated procedure). Circumcision of newborns should be performed only on healthy and stable infants.

CONTRAINDICATIONS

Age greater than 6–8 weeks (relative), age less than 12 hours, ambiguous genitalia, hypospadias, illness, less than 1 hour postprandial, possibility of blood dyscrasia, prematurity, undescended testicles (relative). A family history of intolerance or allergy to local anesthetics should prompt reconsideration.

REQUIRED EQUIPMENT

- Infant restraint board ("papoose" board)
- Sterile gloves
- Sterile drape (one with a small fenestration or multiple drapes)
- Skin preparation materials (eg, povidone–iodine and 70% isopropyl alcohol)
- Sterile gauze pads (2- × 2-inch or 4- × 4-inch)
- Three hemostats (small tips, two curved, one straight)
- Small scissors or scalpel (#10 or #11 blade)
- Flexible blunt probe
- Gomco clamp (1.1–1.45 cm) or Plastibell (1.3–1.6 cm) or Mogen clamp (for clamp methods)
- Sterile safety pin, clip, or skin staple (optional)
- Viscous lidocaine (2%–5%) or 1% lidocaine without epinephrine, 1-mL syringe, 27-gauge needle for dorsal penile nerve or ring block. EMLA cream may also be used but is associated with an 8%–14% incidence of erythema, swelling, and, rarely, blistering.
- Petrolatum (Vaseline) gauze
- Monsel solution (ferric subsulfate)
- Small suture (3-0 or 4-0 absorbable) and needle holder (available)

Electrosurgical devices should never be used in conjunction with any of the clamp-based procedures.

A bulb syringe should be kept near during circumcision as a protection against aspiration should the newborn regurgitate.

TECHNIQUE

Following informed consent by the parent(s), all circumcision techniques begin with the undiapered newborn restrained on an infant restraint (papoose) board. The penis should be inspected to identify the meatus and its location on the glans. Once the anatomy has been confirmed to be normal, anesthesia by way of topical lidocaine or dorsal block may be administered.

Swaddling, sucrose by mouth, and acetaminophen administration may reduce the stress response but are not sufficient for the operative pain and cannot be recommended as the sole method of analgesia. EMLA cream, dorsal penile nerve block, and subcutaneous ring block are all reasonable options, although the subcutaneous ring block may provide the most effective analgesia but is associated with a slight increased risk of penile edema.

Identifying the depth of the root of the penis using the index finger begins a dorsal penile block. The root is usually located 0.75–1 cm beneath the skin surface, with the size and consistency of a large blueberry. The skin of the penis and the surrounding areas should be disinfected using any suitable method, and sterile drapes should be placed to provide a surgical field. Using aseptic technique, the physician places the penis on slight downward traction and inserts the needle at the 2-o'clock position near the base. The needle is passed in a posteromedial direction to a depth of 3–5 mm beneath the skin, approximately 5–7 mm distal to the penile root near the point at which the dorsal nerves branch. If it is correctly located outside of the corpus cavernosum, the tip of the needle should freely move. The syringe should be aspirated to prevent intravenous injection, and 0.2–0.4 mL of anesthetic should be injected. The procedure is repeated at the 10-o'clock position, although a single needle insertion point in the dorsal midline may also be used, if desired. Total anesthetic dose should remain less than 0.8 mL. Full anesthesia will be achieved in 2–4 minutes.

The specific technique used varies slightly with the type of instrument chosen, the final choice of which is generally based on the personal preference and experience of the provider.

Both the Plastibell and Gomco clamp techniques begin in the same way: A hemostat is used to grasp the edge of the foreskin dorsal to the 3- and 9-o'clock positions (dorsal as 12 o'clock). A hemostat or flexible probe is inserted just under the foreskin and swept laterally to bluntly lyse any adhesions. Care must be taken to avoid disrupting either the ventral attachment or coronal reflection or to inadvertently canalize the urethra. The foreskin is tented away from the glans, and a straight hemostat is inserted along the dorsal line and clamped to a depth of one-third to half of the way to the coronal reflection. This is left in place for approximately 1 minute before it is removed, and the crushed tissue is incised using scissors. The glans must be avoided during both the clamping and incision process. The foreskin is next retracted and any further adhesions are removed; if needed, the dorsal incision is extended by repeating the crush and cut process. The procedure is then completed based on the instrument preferred.

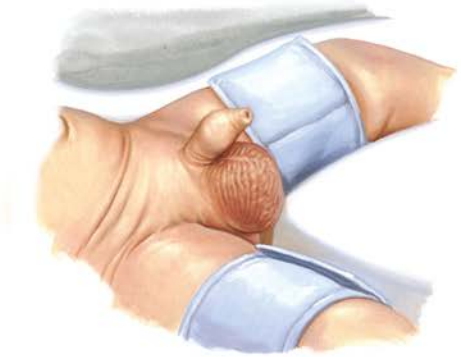
Plastibell

With the dissection of the foreskin free of the glans completed, the Plastibell string is placed as a loop near the base of the penis. The bell is placed under the foreskin and over the glans. This may be facilitated by upward traction on the edges of the foreskin grasped by hemostats and by downward pressure on the stem of the bell. When in a correct position, the bell should rest against the corona. The foreskin is pulled upward, ensuring even placement and positioning that leaves the groove in the bell well below the apex of the dorsal slit. The bell should freely move over the glans. While maintaining these relationships, the string is brought into position, resting in the groove of the bell. The string should be firmly pulled, and all aspects should be rechecked before the string is maximally tightened. Tension on the string is maintained for at least 30 seconds and then a square knot is placed.

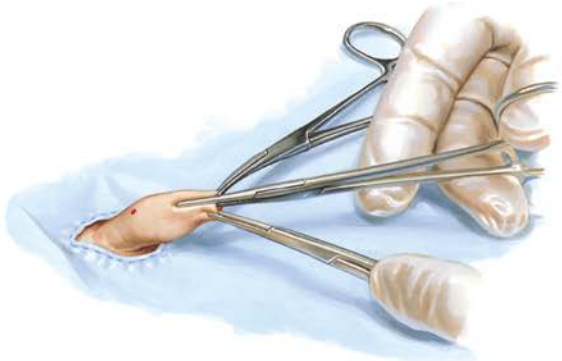
The foreskin is cut just above the level of the string, with care taken not to cut too close to the string or to damage the string itself. The string is trimmed, and the stem of the Plastibell is broken off at its junction with the bell. Hemostasis should be confirmed, and a dressing may be applied if desired. The bell may be expected to slough off in 5–8 days, or it may be removed by cutting the ligature after a minimum of 36 hours.

Gomco Clamp

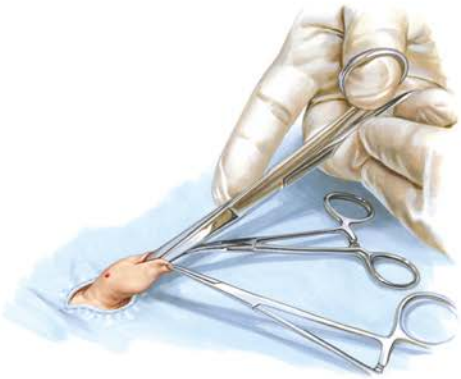
The Gomco clamp consists of a base plate, arm, bell, and thumbscrew. The bell of the Gomco clamp is placed under the foreskin and over the glans in the same manner as with the Plastibell. The bell and



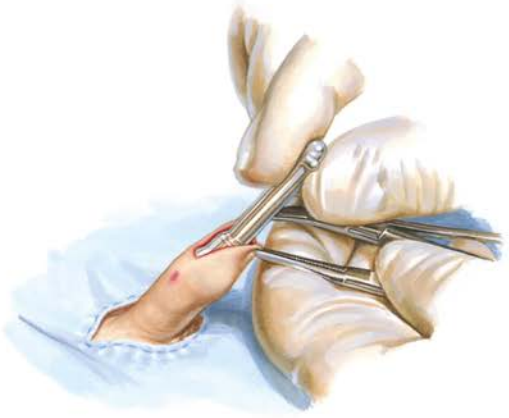
1. All circumcision techniques begin with the undiapered newborn restrained on an infant (papoose) board.



2. A hemostat is used to grasp the edge of the foreskin dorsal to the 3 and 9 o'clock positions (dorsal as 12 o'clock).

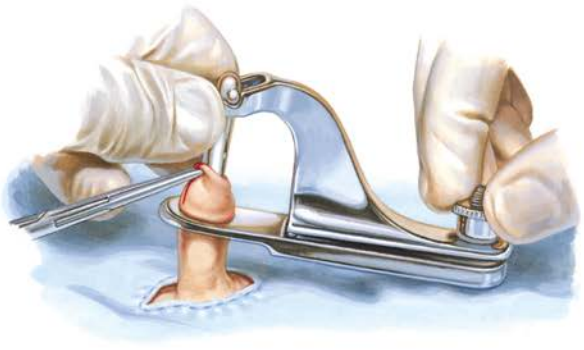


3. The crushed tissue is incised using scissors.

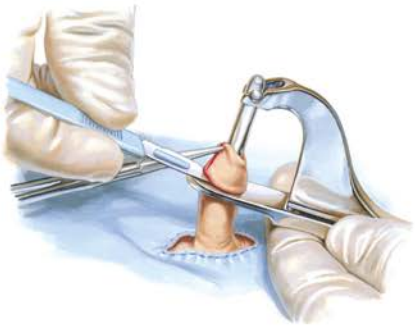


4. The bell of the Gomco clamp is placed under the foreskin, over the glans.

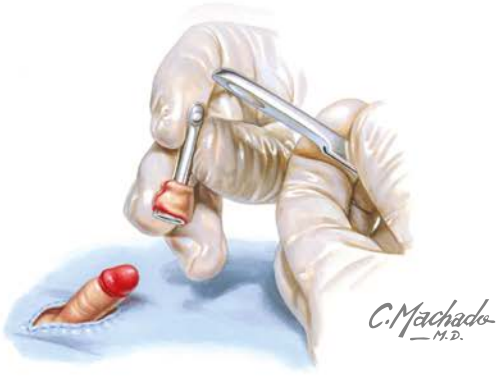
5. Placement of the bell through the baseplate may be facilitated by reaching through the opening with a hemostat.



6. The stem of the bell is placed into the top of the clamp and the thumb screw gently tightened.



7. A scalpel is used to excise all of the tissue above the baseplate of the clamp.



8. The Gomco clamp is loosened and the bell freed to conclude the procedure.

Figure 272.1

foreskin are then inserted through the opening in the baseplate of the clamp. This may be facilitated by reaching through the opening with a hemostat to help guide the foreskin. When the bell is passed through the baseplate, the foreskin must be brought completely through the opening and evenly drawn up on all sides. The entire length of the dorsal incision must be above the baseplate opening. The stem of the bell is placed into the top of the clamp, and the thumbscrew is gently tightened. The foreskin, bell, and shaft of the penis are again inspected before the final tightening is performed.

A scalpel is used to excise all of the tissue above the baseplate of the clamp. Care must be used to completely remove any tissue devitalized by the clamp. The Gomco clamp is loosened, and the bell is freed. The foreskin is freed from the bell by gentle traction using a gauze sponge. Hemostasis must be ensured and may be assisted by pressure, the application of Monsel solution, or a fine suture. A petrolatum gauze dressing should be placed, and the newborn should be diapered.

Mogen Clamp

When the Mogen clamp is used, the infant is restrained and inspected, and the skin is prepared as for the other two methods. Hemostats are used to pull the foreskin upward, and the tip of the penis is transilluminated to identify the glans. The Mogen clamp is applied with its curved side toward the glans. It is slid into place over the foreskin from dorsal to ventral in a horizontal plane, and the provider adjusts it so that the desired amount of skin is distal to the clamp. The clamp is angled so that more skin is removed from the dorsal side of the penis. The glans is again inspected and palpated to ensure it is clear of the clamp, and the clamp is then tightened. A scalpel is used to cut the foreskin flush with the surface of the clamp. The clamp is left in place for approximately 1 minute before it is removed. If the Mogen clamp is left in place for more than 1 minute, the sides of the foreskin may become fused and difficult to separate. The sides of the foreskin are separated by downward traction, inspected, and dressed. A gauze pad may be used to help separate the sides of the foreskin if necessary, although excess bleeding may be encountered if too much force is used. (A small ventral "dog ear" will often be present when the clamp is removed. This will partially necrose and heal without cosmetic defect.)

Silver nitrate should not be used for hemostasis because of the risk of permanent staining of the tissues. Electrosurgical energy should never be used for hemostasis because of the risk of significant, if not catastrophic, tissue loss.

COMPLICATIONS

The exact incidence of complications after circumcision is not known, but data indicate that the rate is low (0.2%–0.6%), and the most common complications are local infection and bleeding. Rare complications include urinary fistulae, chordee, cysts, lymphedema, ulceration of the glans, necrosis of all or part of the penis, hypospadias, epispadias, impotence, and removal of too much tissue (sometimes causing secondary phimosis).

FOLLOW-UP

Following circumcision, the infant should be observed for at least 4 hours and should void before being released. The petrolatum gauze should be removed after 24 hours or if it becomes soiled. Petrolatum jelly should be applied at each diaper change until healing has occurred (approximately 7–10 days). At each diaper change the penile skin should be retracted to prevent adhesion formation.

CPT CODE(S)

54150 Circumcision, using clamp or other device with regional dorsal penile or ring block

54160 Circumcision, surgical excision other than clamp, device, or dorsal slit; neonate (28 days of age or less)

00920 Anesthesia for procedure on male external genitalia; not otherwise specified

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COLPOSCOPY

273

DESCRIPTION

Colposcopy is a diagnostic technique that allows the clinician to identify normal landmarks, find changes suggestive of underlying abnormality, and select sites for biopsy that will yield the greatest information. It may be used to support other procedures such as conization.

Colposcopy is based on a simple stereoscopic operating microscope with magnifications of 4–40 times. Although most often used to examine the uterine cervix, colposcopy may be used to evaluate the vagina, vulva, and other structures.

INDICATIONS

Abnormal cervical cytology (atypia, cancer, dysplasia, koilocytosis), cervical lesions (palpable or visible), condyloma (current or past; relative indication), human immunodeficiency virus infection, intrauterine diethylstilbestrol exposure, surveillance or follow-up, or as a guide to ablative or extirpative procedures.

CONTRAINDICATIONS

Colposcopy is not recommended for adolescents or pregnant patients with Pap test abnormalities of low-grade squamous intraepithelial lesions. Endocervical curettage is contraindicated during pregnancy. Cervical or vaginal infections are not contraindications to the procedure but may alter histopathologic or cytologic evaluations.

REQUIRED EQUIPMENT

- Colposcope with integrated light source
- Endocervical speculum
- Biopsy forceps (eg, Tischler, Kevorkian)
- Endocervical curette
- Large cotton-tipped swabs, cotton balls, or small gauze sponges
- Examination gloves
- Vaginal speculum
- Tenaculum (optional)
- Acetic acid (3%–5%) (white vinegar)
- Monsel solution (ferric subsulfate)
- Lugol (5%) solution (supersaturated iodine) (optional)
- Sputum or urine cups (to hold solutions)
- Sterile gloves (optional; any instrument that will enter the endocervical canal (ECC) or will be used for biopsy should be sterilized before use. The use of sterile gloves is not required as long as the portions of instruments that will come in contact with the patient remain sterile)
- Video, photographic, or digital image capture equipment may be attached to the colposcope as desired (optional)

TECHNIQUE

The patient is placed in the dorsal lithotomy position. If a bimanual examination is performed, the amount of lubricant used should be limited because this lubricant and glove powder can adversely affect cytologic studies. By using the largest warmed but unlubricated speculum the patient can comfortably accommodate the cervix should be brought into full view. Following gross inspection for lesions, excessive secretions may be gently blotted away, cultures obtained, samples for human papillomavirus screening or a repeat Papanicolaou (Pap) smear taken.

The colposcope should be positioned to provide an unobstructed view of the cervix and maintained in a position and height that is comfortable for both the patient and examiner. The usual focal length (working distance between the lens and object examined) is 30 cm. The focus is adjusted grossly by moving the entire device, while fine adjustments are made by a focus knob on the instrument. Acetic acid (3%–5%) should be liberally applied to the cervix

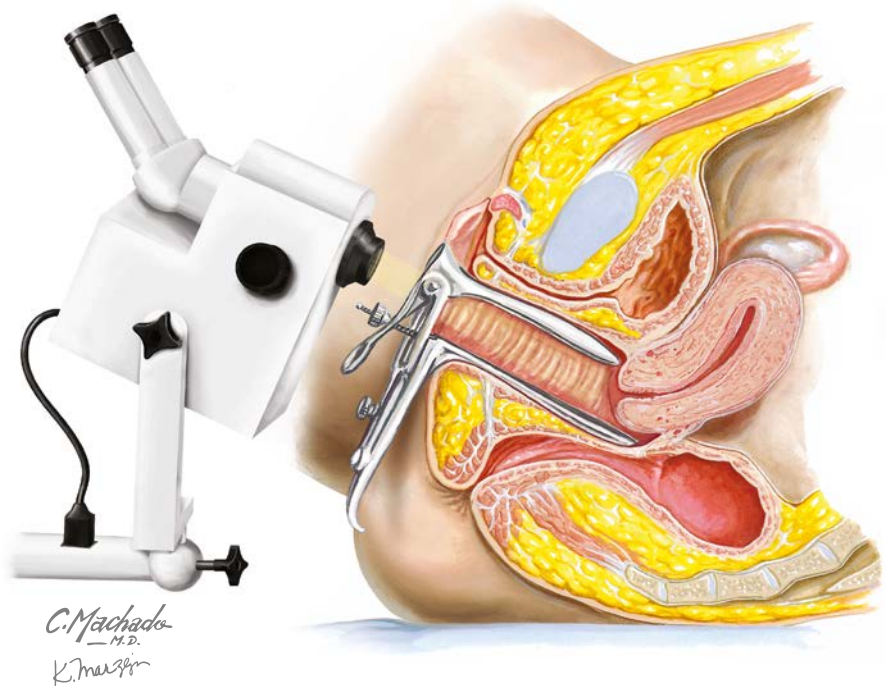

Figure 273.1 Colposcopy

with large cotton-tipped applicators, cotton balls, or small gauze sponges. Acetic acid causes the columnar epithelial cells to swell and opacifies metaplastic and dysplastic cells. The changes brought on by the application of acetic acid are only temporary, requiring periodic reapplication at approximately 5-minute intervals.

Inspection of the cervix begins using the lowest magnification, with additional magnification added later if needed. The transformation zone should be identified and inspected in its entirety. If necessary, the cervix may be manipulated using an acetic acid–soaked applicator stick, a cervical hook (similar to a skin hook retractor), or an endocervical speculum.

For a colposcopy to be considered "adequate" the entire transformation zone must be visualized. The full extent of any lesion present also must be visible for the study to be considered adequate. If the colposcopy is "inadequate," diagnostic conization will be required. Any areas of white change, vascular abnormality, or mosaicism should be inspected under greater magnification. Vascular patterns may be enhanced by the interposition of a green filter in the colposcope's light path, making the vessels appear black against the pale background of the epithelium.

Any area of abnormality identified should be biopsied. Although rarely necessary, abnormal areas may be stained with Lugol solution to aid in this identification. When multiple abnormalities are present, biopsies of the most severe areas take precedence. Whenever possible, the biopsy specimen should include the edge or border of the lesion. Biopsy specimens should be placed in a buffered formalin solution for transport to the pathology laboratory.

Curettage of ECC should be generally included to exclude the possibility of endocervical lesions above the limits of visibility. The ECC is especially helpful as a first stage in the evaluation of atypical glandular cells.

If bleeding from a biopsy site persists or is heavy, Monsel solution may be applied. Monsel solution should be applied only after all specimens have been obtained.

For colposcopy of the vulva, a weaker concentration of acetic acid will result in less burning and discomfort. Because of the relatively thicker epithelium of the vulva, the acetic acid must be left in contact with the tissues for a longer period (even if the stronger solution is chosen). Soaking a gauze sponge and allowing it to remain in contact with the skin for several minutes most easily accomplishes this.

COMPLICATIONS

Transient bleeding from biopsy sites. Infection at the biopsy site or endometrium is rare. Colposcopic examinations fail to visualize the squamocolumnar junction or the limits of any lesions present (inadequate studies) in approximately 15%–20% of premenopausal women.

FOLLOW-UP

Follow-up is dictated by the indication for the procedure and any lesions found. A review of the histology reports on any material removed may also alter the follow-up indicated. No specific procedure-related follow-up is needed, although if extensive biopsies are taken, pelvic rest (no tampons, douches, or sexual intercourse) for a period of time may be prudent. The patient should be advised to expect increased vaginal discharge if biopsies were taken and Monsel solution was used. An abnormal discharge or vaginal bleeding should prompt a re-evaluation.

CPT CODE(S)

57452 Colposcopy (Vaginoscopy); (separate procedure)
57454 Colposcopy with biopsy(s) of the cervix and/or endocervical curettage
57460 Colposcopy with loop electrode excision procedure of the cervix
57500 Biopsy of cervix only, single or multiple
57505 Endocervical curettage (not done as part of a dilatation and curettage)

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CERVICAL CRYOCAUTERY

274

DESCRIPTION

Cervical cryocautery is the use of cold to produce a "frost bite" as an ablative therapy for cervical abnormalities. Loop electrocautery excisional procedures (LEEP, also known as large loop excision of the transformation zone [LLETZ]) have largely replaced cervical cryosurgery.

INDICATIONS

Histologically verified advanced epithelial atypia. Because this is an ablative technology, a histologic diagnosis must be established before instituting this therapy.

CONTRAINDICATIONS

Undiagnosed cervical lesions, pregnancy.

REQUIRED EQUIPMENT

- Skin (or vaginal) preparation materials (iodine- or hexachlorophene-based antibacterial solution [eg, povidone-iodine [Betadine], Hibiclens] or other suitable cleansing agents)
- Cryosurgery unit (eg, nitrous oxide–powered, carbon dioxide or similar)
- Cryoprobes: Flat and conical, assorted sizes
- Water-soluble lubricant (eg, K-Y Jelly)
- Timer (optional, although recommended)
- Vaginal speculum (insulated preferred but not required)
- Colposcope (if colposcopy has not been previously performed or the boundaries of the lesion are not visible)
- 3%–5% acetic acid (white vinegar) or Lugol (5%) solution (if desired)
- Gauze pads and/or cotton balls
- Vaginal sidewall retractor (optional)
- Ibuprofen (800 mg) or other similar nonsteroidal antiinflammatory agent administered approximately 1 hour before therapy (if desired)

TECHNIQUE

After informed consent has been obtained, the patient is placed in the dorsal lithotomy position as for a speculum examination. The cervix should be brought into view, and any cultures or cytologic samples should be obtained as needed. If the extent of the lesion has not been documented or is not immediately visible, acetic acid or Lugol solution should be applied to the cervix to delineate the area of abnormality.

To be effective, the ectocervix must be cooled to –20°C to cause crystallization of intracellular water. A cryoprobe tip should be chosen to allow the freezing effect to extend approximately 5 mm beyond the extent of the lesion. Whenever possible, the probe should be flat or slightly conical to minimize the risk for extensive endocervical damage and the risk for the inward migration of the squamocolumnar junction. After the tip is secured to the device (following manufacturer's directions), turning on and checking the tank pressure to ensure an adequate supply, ready the device.

A water-soluble gel or lubricant is applied to the tip of the cryoprobe; lidocaine jelly may be substituted if desired. The tip of the probe should be placed against the cervix, covering the lesion and avoiding contact with the vaginal sidewalls or speculum. The unit is activated, and, after approximately 5 seconds, the tip will adhere to the cervix. Once the tip is adhered to the cervix, the device is maneuvered outward and farther away from the vaginal sidewalls to avoid adherence to other tissues. This outward movement will bring along the cervix, minimizing lateral freezing as well.

Freezing should continue for 3 minutes, resulting in an ice ball that extends 5 mm beyond the cervical lesion. The freezing mechanism is then deactivated to allow for a 5-minute thaw. The probe should not be actively loosened from the cervix but allowed to defrost and detach by itself. After thawing for 5 minutes, the lesion is refrozen for another 3 minutes. A single 5-minute freeze may also be used, but with either method, the ice ball must extend to a distance of more than 5 mm for the procedure to be effective.

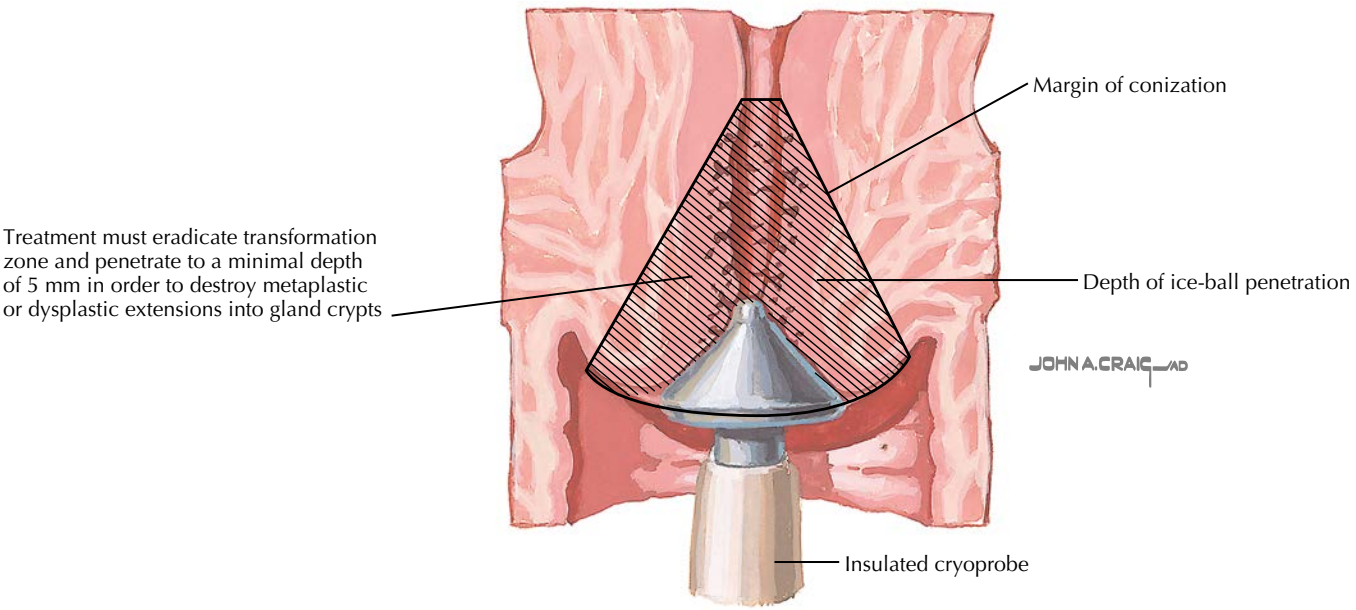

Figure 274.1 Cervical cryocautery

COMPLICATIONS

Cervical stenosis (unlikely unless the procedure is repetitively performed or a probe tip that extends high into the endocervix is used).

FOLLOW-UP

A follow-up sequence of Pap tests should be discussed with the patient. The first Pap test should be delayed at least 3 months to allow for complete healing.

CPT CODE(S)

57511 Cauterization of cervix; cryocautery, initial or repeat (surgical procedure only)
56501 Destruction of lesion(s), vulva; simple, any method
56515 Extensive, any method
57061 Destruction of lesion(s), vagina; simple, any method
57065 Extensive, any method

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275 CYSTOURETHROSCOPY

DESCRIPTION

Cystourethroscopy (commonly referred to as cystoscopy) is a technique for visualizing the interior of the urethra or bladder. This may also serve as a portal for other diagnostic or therapeutic measures.

INDICATIONS

To diagnose urinary tract disorders such as bleeding, pain, or dysfunction (eg, interstitial cystitis). Cystourethroscopy can be a part of the evaluation of abnormal symptoms, signs, or laboratory findings; intraoperatively during gynecologic or urogynecologic surgery to rule out bladder, urethral, or ureteral trauma; and as part of staging or surgery for gynecologic malignancy.

CONTRAINDICATIONS

Active urinary tract infection. Known or suspected allergy to cleansing solutions or local anesthetics to be used. Pregnancy is not a contraindication.

REQUIRED EQUIPMENT

- Skin (or vaginal) preparation materials (iodine-based antibacterial solution or other suitable cleansing agents)
- Sterile gloves, antiseptic solution and sterile cotton balls, or skin preparation swabs
- Sterile urine specimen cup (with gradations)
- One liter of sterile saline (intravenous fluid without glucose is generally used) at room temperature (low-pressure carbon dioxide may also be used with suitable equipment). If electrocautery is to be performed, a nonconducting solution, such as glycine, should be used.
- Absorbent underpads
- 2% Xylocaine jelly in a mushroom-tipped syringe (optional) or tube with conical delivery cap
- Cystoscope (rigid or flexible, direct viewing or with a 30-degree or greater down-angle view; the latter is better for visualizing the bladder trigone and ureteral openings)
- Fiber-optic light source (compatible with type of cystoscope used)
- Fiber-optic light cord
- An assistant is advantageous

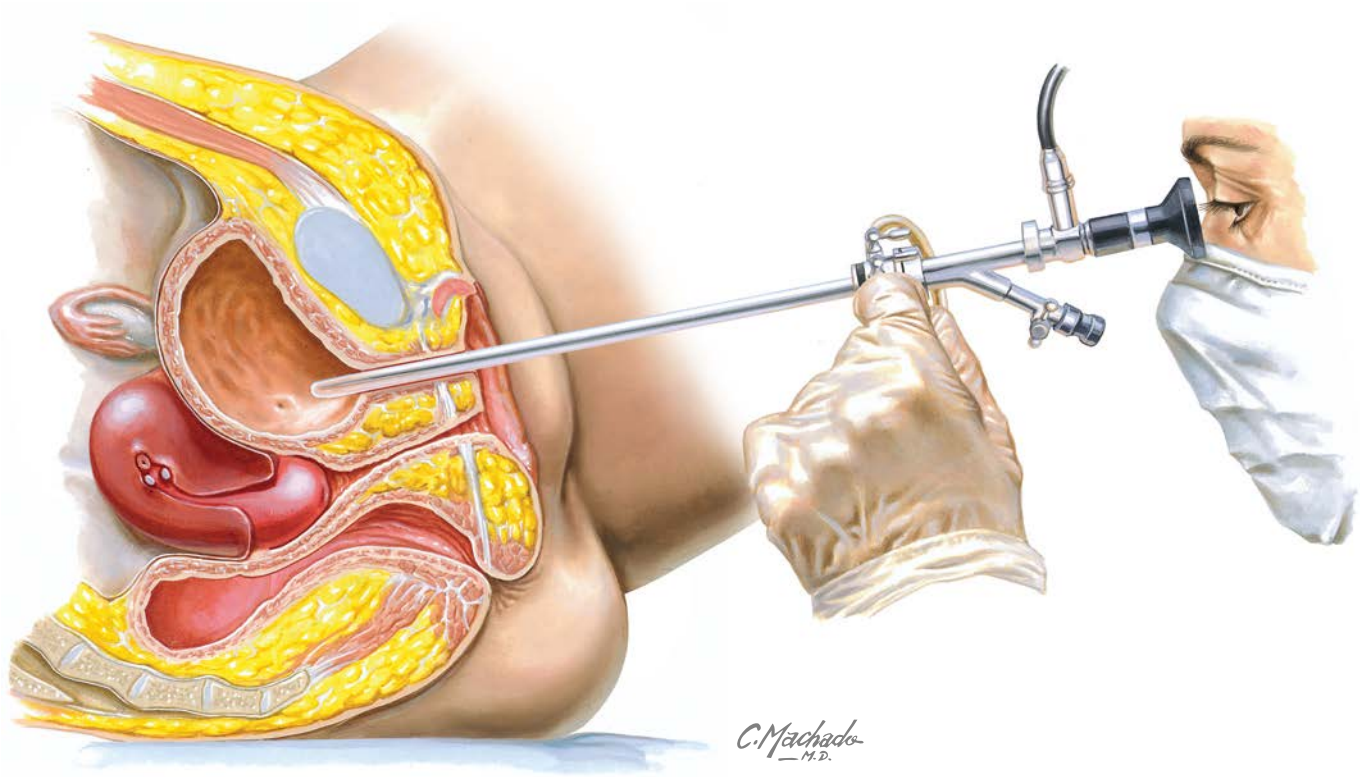

Figure 275.1 Cystourethroscopy

TECHNIQUE

Shortly before the procedure a single dose of prophylactic antibiotics is recommended to prevent urinary tract infection or septicemia for patients at high risk for endocarditis, those who are neutropenic, and those with preoperative bacteriuria or an indwelling catheter. The necessity for this prophylaxis is debated, and antibiosis in unnecessary for all others.

Immediately before starting the procedure, the patient is asked to empty her bladder (in private and in her usual manner). The patient is placed in the dorsal lithotomy position, and the external urinary meatus and surrounding vulvar vestibule are cleansed with antiseptic solution. One to three milliliters of topical anesthetic, such as 2% Xylocaine, are introduced into the urethra. The procedure should be delayed for 5–15 minutes to enable full anesthesia.

With sterile technique, the patient is catheterized using a straight catheter, and any residual urine is caught, measured for volume, and sent for culture (if appropriate). With the catheter left in place, the bladder is slowly (to avoid inducing bladder spasm) filled with 100–200 mL of sterile saline, and the catheter is then removed. This step may be omitted if the cystoscope used is capable of retrograde filling of the bladder.

After the light guide is attached to both the cystoscope and light source, the tip of the cystoscope is placed at the external meatus and gently inserted under direct (or video) guidance. The cystoscope should be initially inserted with a slight downward angle and then gently rotated under the symphysis. A direct (forward looking) cystoscope may be used to facilitate the inspection of the internal sphincter (urethral–vesical junction) and the urethra itself. The entire lumen of the urethra, bladder wall, the trigone, and ureteral openings should be systematically examined. If problems are encountered viewing the trigone, using a cystoscope with a downward-viewing angle facilitates the process.

If the goal is to examine for ureteral patency, 5 mL of indigo carmine can be intravenously administered 10–15 minutes before the cystoscopy, followed by the observation of blue-stained urine from the ureteral orifices.

At the completion of the procedure, the patient may empty her bladder or the bladder may be drained by the device or catheter, as desired.

COMPLICATIONS

Infection (2%–5%), bleeding, dysuria, and urinary retention are possible, although unlikely. Perforation or bladder rupture is possible (more likely with biopsy).

FOLLOW-UP

Based on the indications.

CPT CODE(S)

52000 Cystoscopy

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Level I

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276 DIAPHRAGM FITTING

DESCRIPTION

Diaphragms (rubber or latex domes with a springy ring) are designed to provide a physical barrier between the sperm and egg in conjunction with contraceptive jelly or creams to provide contraception by both barrier and spermicidal actions. Contraceptive diaphragm use is associated with a 12% typical use failure rate and a 6% perfect use rate.

INDICATIONS

Elective. (Approximately 2% or less of women using contraception choose this method.)

CONTRAINDICATIONS

Known or suspected allergy to latex or other materials used in the contraceptive device. Diaphragms are not a good contraceptive choice for those who have significant pelvic floor support failure or those unwilling or unable to actively participate in the placement or removal process.

REQUIRED EQUIPMENT

- Examination gloves
- Set of graduated diaphragm fitting rings
- Water-soluble lubricant

TECHNIQUE

A single-size diaphragm system is available, but most practitioners and users prefer those that are fitted to the individual. Diaphragms must be fitted to the individual patient, choosing the largest size that may be comfortably accommodated. Diaphragms come in sizes that range from 50 to 105 mm in diameter, graduated in 5-mm increments. The most common size prescribed is 75 mm. The optimal size may change with significant weight change (10 to 15+ lb), vaginal birth, or pelvic surgery. Following delivery, diaphragms may be fitted at the 6- to 8-week postpartum visit. Diaphragms are made with coiled spring or with a flat or arcing type of rim that somewhat alters the fit. The flat type is better suited to those with a less well-defined subpubic arch; the arcing spring is best for those with less muscle tone.

Diaphragm fitting begins with a gentle, bimanual examination of the patient using a lubricated, gloved examining finger to measure the approximate distance from the back of the symphysis to the posterior vaginal fornix. A fitting ring that approximates this diameter should be selected, lubricated, and inserted into the vagina. The ring should be placed to rest in the posterior vaginal fornix with the outer portion resting in the retropubic notch. The examining finger should easily fit between the ring and vaginal wall in all areas. The examining hand is removed, and the comfort of the fit is checked. The ring should be comfortable or imperceptible when properly fitted and inserted. The patient should be asked to strain to ensure that the ring is not displaced by physical activity. It is not uncommon to have to try one or two sizes to accomplish an optimal fit.

The fitting ring should be removed (by gentle traction on the retropubic edge of the ring). Whenever possible, the actual diaphragm should next be inserted and checked in the same way. The cervix should be clearly palpable through the dome of the device. The patient also should be given the opportunity to perform the insertion and removal and confirm correct positioning and comfort in the office setting before actual contraceptive use.

In use, the diaphragm (with spermicide applied) may be inserted up to 1 hour before sexual intercourse commences, and it must be left in place for 6–8 hours after. It is then removed, washed, and stored. Should additional intercourse be desired before the 6- to 8-hour time has expired, additional spermicide is applied to the vaginal side of the diaphragm, and the waiting time to removal is restarted. Postcoital douching is not recommended. When correctly positioned, the diaphragm should not be noticeable by either partner. As with tampons, the patient can determine the best positions

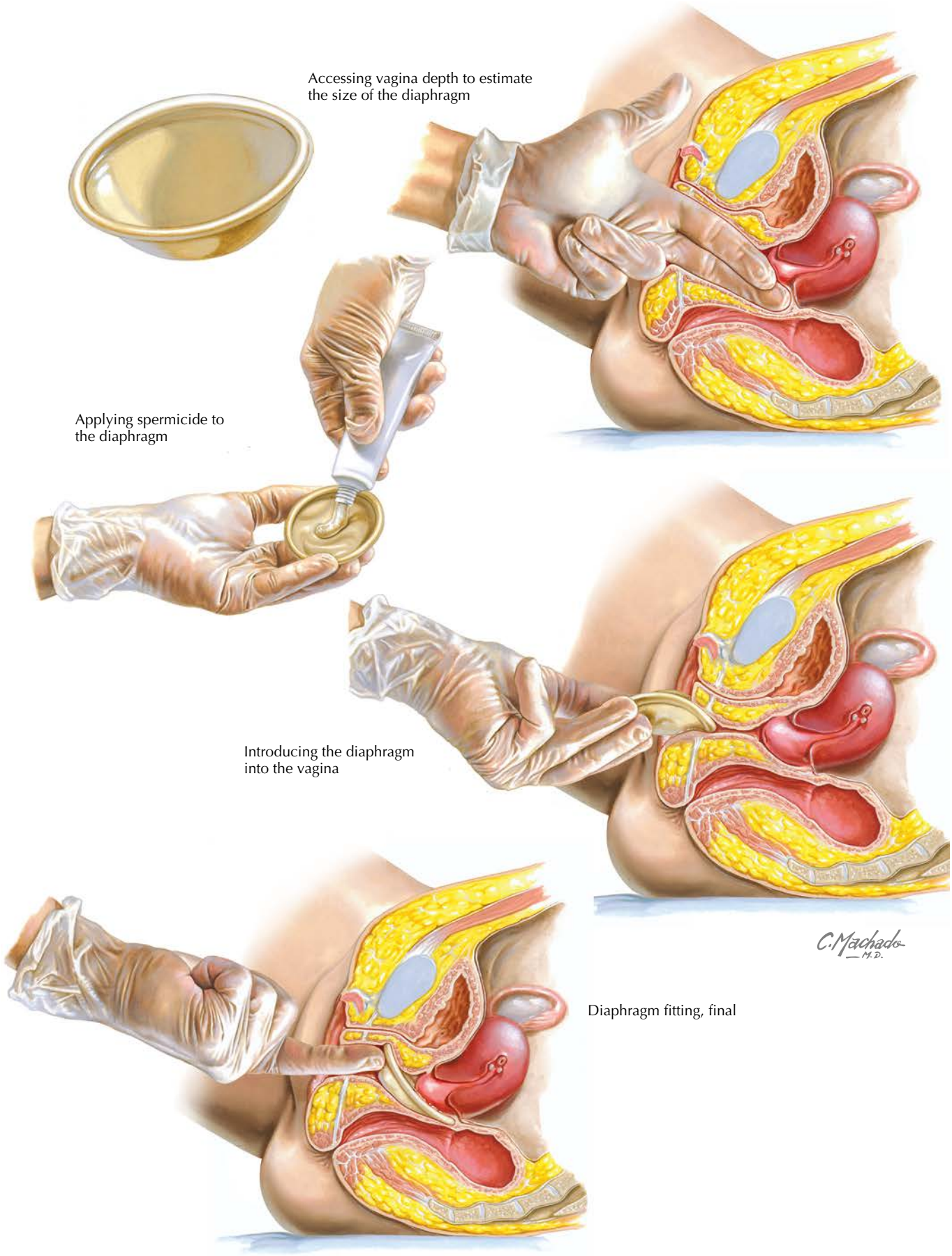

Figure 276.1 Diaphragm fitting

for inserting or removing the diaphragm (standing, squatting, supine, or standing with a foot supported on a stool, bathtub, or toilet).

Flat spring diaphragms are often inserted using an introducer because of their less stiff character. The introducer is not required for fitting and is generally not employed except by the patient during use.

COMPLICATIONS

Vaginal infection, urinary retention, toxic shock (2.4/100,000 when left in place for >24 hours), and vaginal wall trauma or erosions are all possible but unlikely with a properly fitted diaphragm that is removed at the proper intervals.

FOLLOW-UP

As needed. If the patient has not had an opportunity to practice insertion, positioning, and removal in the office, this should be offered before the diaphragm is relied on for contraception.

CPT CODE(S)

57170 Diaphragm or cervical cap fitting with instructions

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Level III

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277 DILATION AND CURETTAGE

DESCRIPTION

Dilation and curettage (D&C) is the dilation of the uterine cervix with the removal (by scraping) of a portion of the uterine lining or uterine contents. (The same term may be applied to any setting in which a cavity is curetted after gaining entrance through dilation, such as endocervical curettage of a cervical stump.) The procedure may be combined with other diagnostic procedures such as hysteroscopy.

INDICATIONS

D&C may be performed for either diagnostic or therapeutic indications. This can range from the control of acute bleeding or an incomplete abortion to the temporary treatment of dysfunctional bleeding. Office endometrial biopsy, hysteroscopy, and sonohysterography have replaced D&C as a diagnostic modality in many cases.

CONTRAINDICATIONS

Patients who are medically unstable, viable or desired pregnancy, active pelvic inflammatory disease, blood dyscrasia.

REQUIRED EQUIPMENT

- Sterile gloves
- Skin preparation materials (generally an iodine-based antibacterial solution such as povidone-iodine [Betadine])
- Vaginal speculum or weighted vaginal speculum with Deaver or similar retractors
- Single tooth tenaculum
- Graduated cervical dilators (Hegar, Pratt, Rocket, Heaney, Hank, or similar; Goodell dilators are generally not preferred because of an increased risk for cervical laceration)
- Blunt uterine sound (optional)
- Uterine curettes (sharp preferred) in a selection of sizes

- Small stone forceps (Randall or similar)
- Polyethylene terephthalate-covered dressing (Telfa or similar; optional)
- Suitable tissue preservation/transportation medium (10% formalin solution or similar)

For Pregnancy-Related Procedures

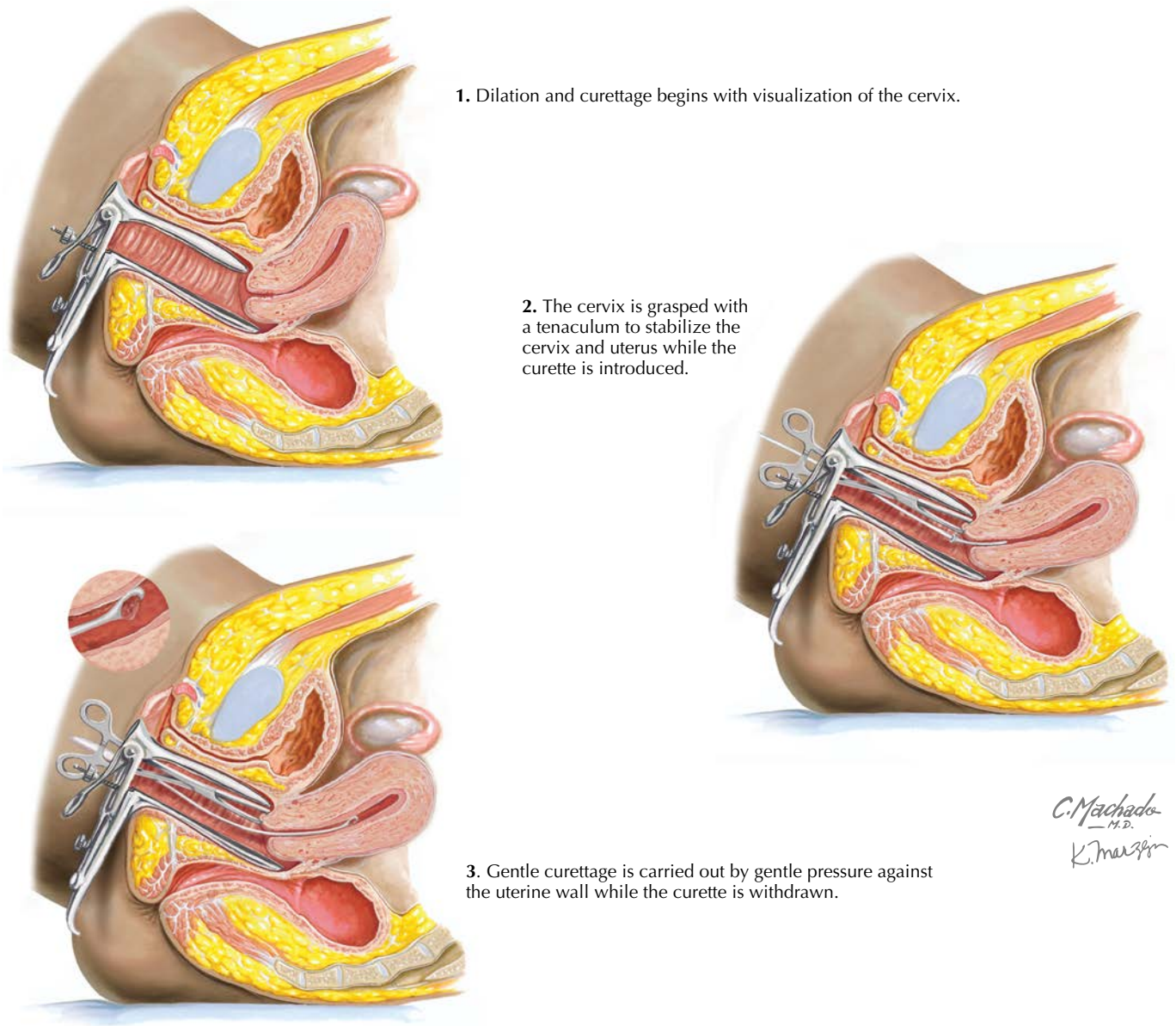
- Graduated suction curettes
- Suction curettage pump, tubing, and tissue collection device
- Sponge stick (may be useful to atraumatically grasp and manipulate the cervix)

TECHNIQUE

D&C is generally performed under pericervical, regional, or general anesthesia. After an appropriate informed consent is obtained, the anesthetized patient is placed in the dorsal lithotomy position, the vagina and cervix are disinfected, and the cervix is visualized using a speculum or retractors.

The cervix is grasped by the anterior lip and placed on gentle traction. If desired, the depth of the uterine cavity may be measured by the gentle passage of a blunt uterine sound. Next, the cervix is gently dilated by the insertion of progressively larger cervical dilators to beyond the inner cervical os. The cervix is generally dilated to the size of an 8 mm (25–27F) dilator, although this should be dictated by the needs of the specific procedure. If hysteroscopy is to be performed, it is generally accomplished at this stage or during the dilation process, depending on the size of the hysteroscope to be used and the indications for the procedure.

Curettage of the uterine cavity proceeds using the largest-diameter curette that will safely pass through the dilated cervix; this choice of size is to reduce the risk for perforation attendant to smaller devices. The uterine wall is scraped (curetted) using gentle pressure (akin to the force of a pencil on paper) in an outward motion. The curettage proceeds with the curette repeatedly advanced to the fundus and withdrawn under mild pressure, systematically covering the surface of the endometrial cavity. The curette should be periodically withdrawn from the uterine cervix so that any tissue obtained may be collected; placing a small polyethylene-covered surgical dressing



1. Dilation and curettage begins with visualization of the cervix.

2. The cervix is grasped with a tenaculum to stabilize the cervix and uterus while the curette is introduced.

3. Gentle curettage is carried out by gentle pressure against the uterine wall while the curette is withdrawn.

Figure 277.1 Dilation and curettage

below the cervix, on top of the posterior retractor, in the posterior vaginal fornix may facilitate this.

If a suction curette is used, it should be inserted to the level of the fundus with the suction off, then the suction applied and the curette withdrawn, curetting the uterine wall in the process. This withdrawal is often performed in a spiral manner to increase efficiency.

To ensure that all tissue is loosened by the curettage process (and for the possibility of intracavitary polyps), a small stone forceps is passed into the uterine cavity, opened, rotated 90 degrees, closed, and removed. This may be repeated as needed.

The procedure ends with the removal of the tenaculum or sponge stick used to grasp the cervix and the extraction of the speculum or retractors. The specimens obtained should be placed in a suitable fixative or transport media. Prophylactic antibiotic coverage is generally not indicated.

COMPLICATIONS

Uterine perforation, cervical laceration, infection (endometrial, myometrial, pelvic), hemorrhage (intraoperative or postoperative), uterine synechia (Asherman syndrome)

FOLLOW-UP

Based on indications. Patients are generally advised to refrain from sexual intercourse, douching, or tampon use for 10–14 days.

CPT CODE(S)

58120 Dilation and curettage, diagnostic and/or therapeutic (nonobstetric)
59160 Curettage, postpartum
57558 Dilation and curettage of cervical stump

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278 ENDOMETRIAL BIOPSY

DESCRIPTION

Endometrial biopsy is an office technique used for obtaining tissue samples from the lining of the uterus. In-office techniques have largely replaced traditional dilatation and curettage.

INDICATIONS

Dysfunctional uterine bleeding, postmenopausal bleeding, menorrhagia, infertility (selected cases), endometrial or pelvic infections (eg, tuberculosis), or other situations in which a tissue diagnosis is indicated. Because it is associated with some discomfort and a small but not insignificant risk for perforation or infections and carries not only the cost of the procedure but also the cost of histologic diagnosis, this procedure is best suited for diagnosis and not screening.

CONTRAINDICATIONS

Pregnancy, active pelvic inflammatory disease, significant vaginal infection, profuse bleeding, blood dyscrasia, obstructing cervical mass. Endometrial biopsy should generally be performed during the first 14–16 days of the menstrual cycle to avoid inadvertent disruption of an undiagnosed pregnancy; biopsies performed within 10–14 days beyond a temperature rise or luteinizing hormone surge will generally not interfere with implantation during that cycle.

REQUIRED EQUIPMENT

- Disposable endometrial sampling device (eg, Accurette, Explora, Gynocheck, Pipelle, and Z-Sampler) or reusable curette (Novak or other curette)
- Sterile single-tooth tenaculum (optional)

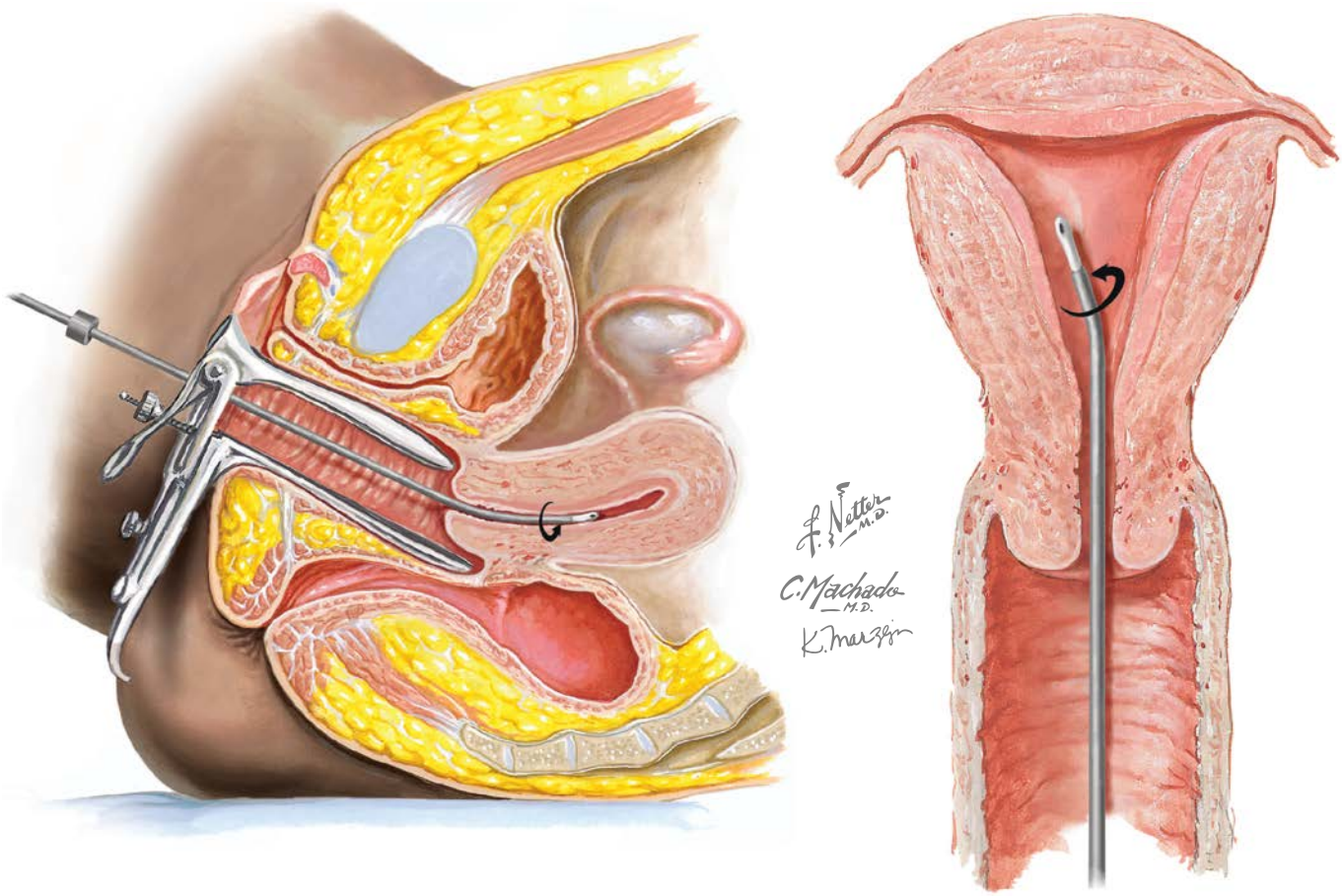

Figure 278.1 Endometrial biopsy

- Sterile uterine sound (optional)
- Sterile lacrimal duct probe (optional)
- Skin preparation materials (generally an iodine-based antibacterial solution such as povidone-iodine [Betadine])
- Suitable tissue preservation/transportation medium (10% formalin solution or similar)
- Pelvic examination equipment (examination gloves, lubricant, speculum, light source)
- Antibiotic prophylaxis is not needed.

TECHNIQUE

The discomfort of endometrial biopsy may be decreased by premedicating with a single oral dose of a nonsteroidal antiinflammatory agent administered in doses typically used to treat dysmenorrhea. If used, this should precede the procedure by approximately an hour. A paracervical block or an intrauterine instillation of local anesthesia also may be used but is seldom needed.

Although this is an office procedure, informed consent is generally considered necessary. The patient is prepared and positioned as for a routine pelvic examination. After the cervix has been visualized, it is disinfected with a topical antiseptic (eg, Betadine).

When the patient is parous, endometrial sampling often may be accomplished without stabilizing or dilating the cervix; both of these procedures produce mild to moderate discomfort and should be avoided when possible. The sampling device is gently introduced into the uterine cavity, and the depth is noted. For suction devices, such as the Pipelle or Z-Sampler, the piston is withdrawn (producing a vacuum), and the curette itself is gradually withdrawn using a spiral or twisting motion. If an adequate tissue sample is obtained, it should be placed in fixative, completing the procedure. If additional tissue is needed, the piston may be advanced to a point just short of expelling the sample, the device again advanced into the uterine cavity, and the procedure repeated. If tissue already obtained is to be expelled before a second or subsequent attempt, care must be taken to avoid contact with the fixative solution or any bacterial contamination.

Open curettes, such as the Novak, or rigid suction cannula should be gently inserted in to the apex of the uterine cavity and then withdrawn in a straight line using light pressure against the uterine wall. Tissue obtained may be removed from the opening of the curette using the point of a broken (but still sterile) wooden cotton-tipped applicator.

If significant cervical stenosis is encountered (or there is significant patient discomfort) a paracervical block using a few milliliters of 1% lidocaine (or similar) may be appropriate. The use of a lacrimal duct probe may assist in finding the path of the endocervical canal, but its fine size also increases the risk for a "false passage."

COMPLICATIONS

Uterine perforation (1–2/1000), infection (endometrial, myometrial, pelvic). Vasovagal syncope during the procedure may occur but is generally transient.

FOLLOW-UP

Based on indications. Patients are generally advised to refrain from sexual intercourse, douching, or tampon use for 10–14 days.

CPT CODE(S)

58100 Endometrial sampling (biopsy) with or without endocervical sampling (biopsy) without cervical dilation, any method (separate procedure)

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Level II

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279 EXTERNAL CEPHALIC VERSION

DESCRIPTION

External cephalic version is the process used to move a malpositioned fetus into the vertex position by external means. This is performed on the nonlaboring patient near term (≥37 0/7 weeks) to improve the chance of vaginal delivery.

INDICATIONS

Fetal malposition, oblique or most often breech.

CONTRAINDICATIONS

External cephalic version is contraindicated anytime vaginal delivery is not clinically appropriate. Additional contraindications include nonreassuring fetal heart tones, known fetal or uterine anomalies, multiple gestation, hyperextension of the fetal head, macrosomia, placenta previa, prior uterine vertical scar, ruptured membranes, oligohydramnios, engaged fetal part, and maternal obesity sufficient to impede the palpation of the fetus. Known or suspected allergy to agents used (eg, latex, coupling gel), uncorrected coagulopathy. The success of external version is less when there is an anterior placenta and is often seen as a relative contraindication.

REQUIRED EQUIPMENT

- Nonsterile gloves
- Nonsterile towels
- Ultrasonography machine and ultrasonography coupling gel
- External fetal heart rate monitor
- Uterine relaxant (eg, terbutaline 0.25 mg subcutaneously 15–30 minutes before the procedure). Use of tocolytics doubles the chance of success.
- Regional anesthesia should be established (if desired, results in a greater rate of success in some studies but most providers do not use it)
- Intravenous access (debated)

TECHNIQUE

The indications, contraindications, alternatives, risks, benefits, and complications should be reviewed and discussed with the patient, and informed consent obtained. The patient should be placed in the supine position with the head elevated at 20–30 degrees. The patient should empty her bladder and be placed in a slightly left decubitus position. Ultrasonography is used to assess fetal well-being, fetal lie, and placental position. The use of Leopold maneuvers will inform fetal location and mobility but do not provide information about fluid volume and placental location. If tocolytics or neuraxial analgesia are to be used, they should be administered in time to be effective for the needed manipulations.

Ultrasonography coupling gel or other suitable skin lubricant should be applied liberally to the maternal abdomen. The mother is asked to keep her abdominal muscles relaxed and to report any discomfort. The provider generally stands on the side nearest the fetal back, but there is no clear consensus on this. Although many prefer to start with a forward diving or summersaulting maneuver, the choice of forward or backward is generally dictated by operator preference and fetal cooperativeness.

The forward summersault begins by applying pressure above the symphysis, on each side of the fetal presenting part, gently lifting it out of the pelvic inlet. With one hand behind the fetal head and the other to the ventral side of the breech, pressure is applied to rotate the fetus forward. This movement is continued by gentle pressure

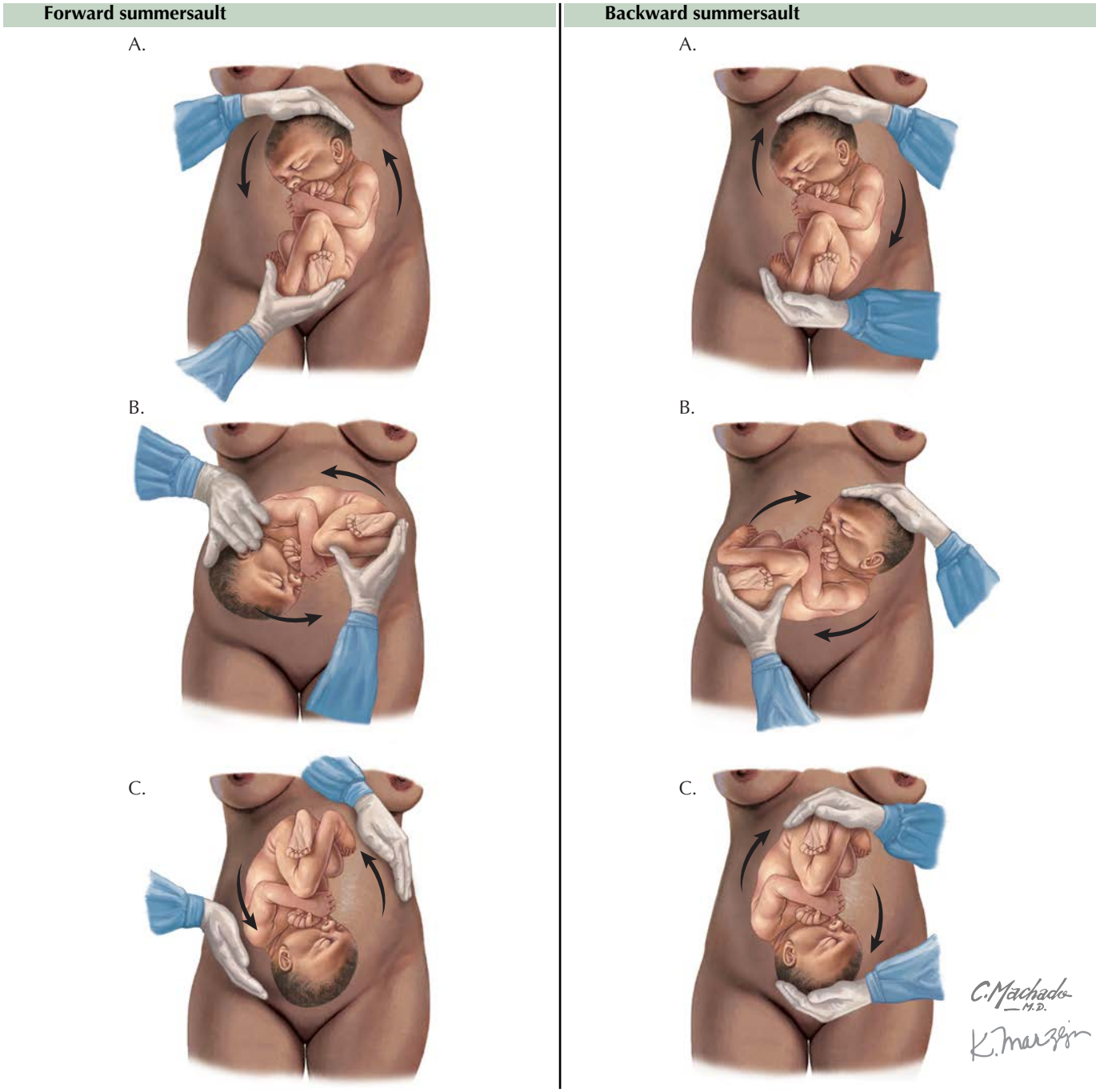

Figure 279.1 The maneuvers used in external cephalic version

sliding over the maternal abdomen until the fetal vertex approaches, or is aligned with, the maternal pelvis. This position may be then maintained briefly, and the fetal heart rate is measured. If significant resistance is encountered or the fetus reverts quickly to an oblique or breech presentation, a backward summersault may be tried by urging the fetal head and breech in the opposite direction. If either effort last more than 2–3 minutes, a brief assessment of fetal heart rate is appropriate before continuing. The procedure should be abandoned at mother's request or after 4–5 unsuccessful attempts. Fetal heart rate monitoring is carried out until fetal reactivity is documented. (A period of 20–40 minutes of nonreactivity often follows the stress of the rotation.) Rh (D) negative mothers should receive anti-D immune globulin prophylaxis.

Success rates for external cephalic version are 40%–65% depending on parity, gestational age, location of the placenta, provider experience, and other factors. The practice of proceeding to induction of labor within a few hours to days to minimize the chance of the fetus reverting to a nonvertex presentation is being abandoned. Almost all (97%) of successful versions will remain cephalic at the time of natural labor, and over 80% will successfully deliver vaginally.

COMPLICATIONS

Overall complication rate is 6%: Fetal bradycardia, cord entanglements, rupture of the membranes, precipitation of labor, vaginal bleeding, fetomaternal transfusion, placental abruption, stillbirth (0.12%).

FOLLOW-UP

Standard prenatal care may be resumed after the procedure. External cephalic version is associated with a 40% or greater reduction in the rate of cesarean delivery.

CPT CODE(S)

59412 (External cephalic version, with or without tocolysis)

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Level II

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280 FORCEPS-AIDED BIRTH

DESCRIPTION

Forceps-aided birth is a method of assisting or expediting vaginal vertex birth through the application of obstetric forceps. Operative vaginal birth can be faster and safer than cesarean birth in many cases. There is a greater chance of success in delivering the fetus vaginally with forceps-assisted techniques that with vacuum methods. Discussion here is limited to low or outlet forceps with the fetus presenting within 45 degrees of directly occiput anterior (Box 280.1).

INDICATIONS

Fetal—nonreassuring fetal status, acute fetal distress. *Maternal*—fatigue, prolonged second stage of labor (nulliparous women: lack of continuing progress for 3 hours with regional anesthesia or 2 hours without regional anesthesia; multiparous women: lack of continuing progress for 2 hours with regional anesthesia or 1 hour without regional anesthesia), certain types of pulmonary, cardiac, or neurologic diseases that preclude pushing.

CONTRAINDICATIONS

Incompletely dilated cervix, significant fetal malpresentation, unengaged fetal head, intact fetal membranes, inability to assess fetal position or obtain maternal cooperation, distorted or contracted maternal pelvic anatomy, gestational age less than 34 weeks, fetal demineralization or clotting disorder.

BOX 280.1 Classification of Forceps-Aided Birth

Outlet Forceps
- Fetal scalp is visible at the introitus without separating the labia.
- Fetal skull has reached the pelvic floor.
- Fetal head is at or on perineum.
- Sagittal suture is in an anteroposterior diameter or within 45 degrees of this axis.
- Rotation does not exceed 45 degrees.

Low Forceps
- Leading point of the fetal skull is at station +2 cm or more but not on the pelvic floor.
- Without rotation: Rotation is 45 degrees or less to achieve occiput anterior or occiput posterior birth position.
- With rotation: Rotation is greater than 45 degrees.

Mid-Forceps
- Fetal head is engaged but above +2 station.

REQUIRED EQUIPMENT

- Standard equipment for spontaneous vaginal birth, including sterile gowns and gloves
- Fetal heart rate monitor
- Traction forceps (Simpson, Tucker-McLane, or similar)

TECHNIQUE

Adequate maternal anesthesia or analgesia should be ensured in all but the most extreme circumstances. Whenever possible, the maternal bladder should be emptied (by catheter). The exact position of the fetal head must be ascertained by the palpation of the sagittal suture and fontanels. There should be an assessment of estimated fetal weight, the clinical adequacy of the maternal pelvis, the fetal station and position, and the adequacy of anesthesia. All other preparations for vaginal birth should be in place before forceps are applied.

Correct placement of forceps occurs only when the long axis of the blades corresponds to the occipitomental diameter, with the major portion of the blade lying over the face, the concave margins of the blades directed toward the sagittal suture (with the fetus in the occiput anterior position). To accomplish this, the left blade (both operator's and patient's left) is introduced into the vagina next to the fetal head using the operator's right hand or fingers within the vaginal canal. The vaginal hand is used as a guide to accomplish the placement, while the external hand provides only minimal support, often with a two- or three-finger grasp. The introduction is

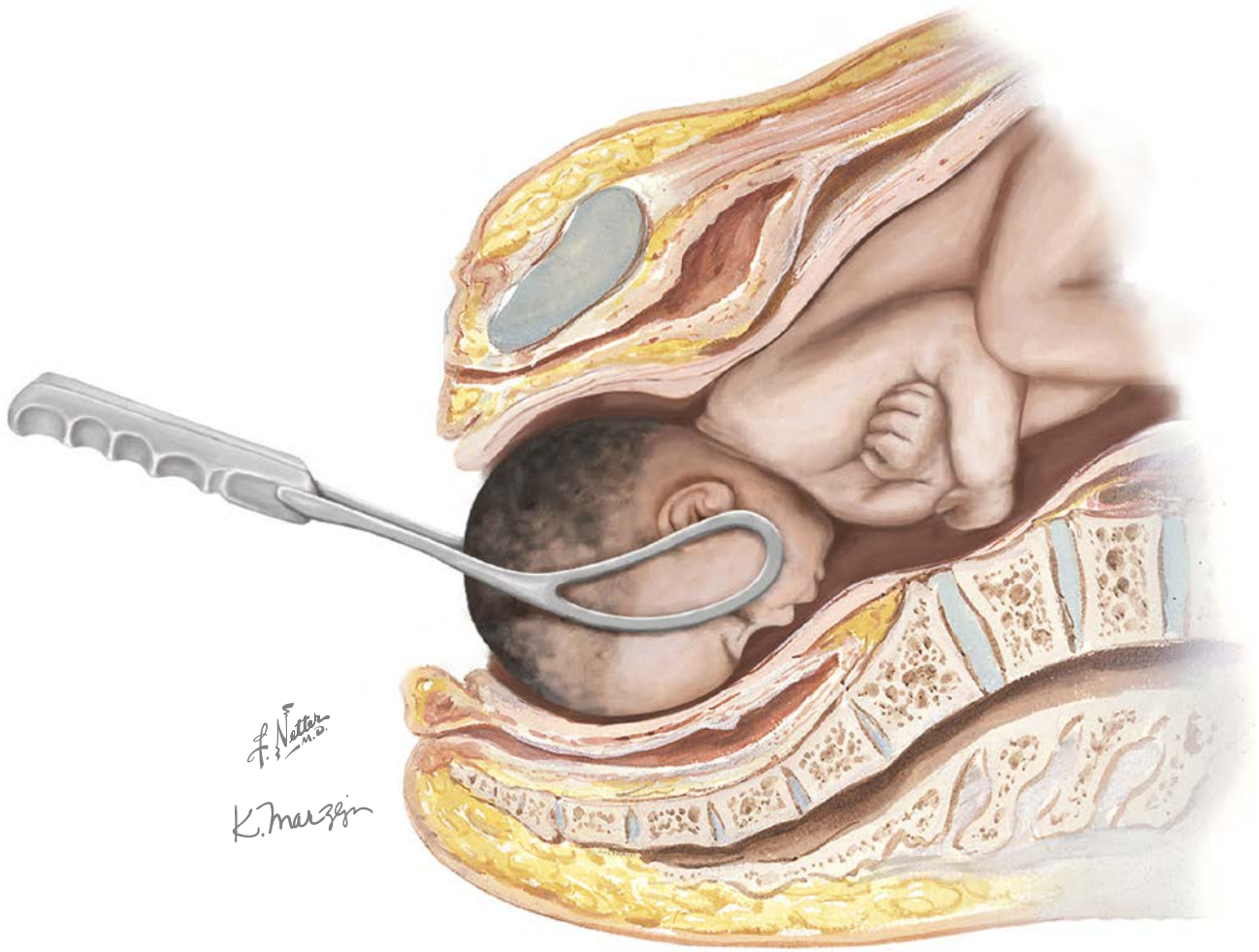

Figure 280.1 Forceps-aided birth

accomplished by starting with the handle perpendicular to the floor and the cephalic curve of the blade resting against the fetal head. The internal hand guides the blade inward, upward, and with a rotation that brings the forceps handle through a wide outward arc ending parallel to the floor. This arc is necessary to accommodate both the cephalic and pelvic curves of the device. A preliminary assessment of placement adequacy should be made before the right blade is placed. The right blade is placed in a similar arcing manner using the operator's left hand as the internal hand, with the right providing simple support.

Before the two forceps blades are articulated, the position of the fetal head should be verified. A correct position will be evident by the symmetry of the blades compared with the sagittal sutures and posterior fontanel. If necessary, one or both blades may be gently maneuvered (using fingers within the vagina) to accomplish optimal positioning. Removal and re-placement is sometimes necessary.

Traction is generally applied by the placement of the fingers on the upper surface of the handles or shanks and the thumbs below. Traction on the articulated forceps begins in a horizontal or slightly downward (axis of the maternal pelvic canal) manner. Traction should be intermittent and, when possible, coordinated with maternal expulsive efforts. To mimic the normal birth process, traction in the horizontal plane continues until the descending fetal head distends the vulva; an episiotomy may be performed at this point, though it should not be routinely used.

As the fetal head further distends the vulva, the axis of traction is gradually rotated upward, mimicking the normal extension process of the head as it rotates under the symphysis. Once the brow is palpable through the perineum the blades may be removed and the fetal head delivered by pressure on the perineum (modified Ritgen maneuver). More often the blades may be left in place until the fetal chin has cleared the perineum. The remainder of the birth proceeds as with a spontaneous birth.

COMPLICATIONS

It is difficult (if not impossible) to separate the effects of forceps-aided vaginal birth from those of spontaneous vaginal birth. Both randomized trials and meta-analysis studies have failed to demonstrate conclusive differences. Both forceps birth and vacuum extraction have been associated third- and fourth-degree perineal tears and with the development of maternal hematomas, possibly linked to pelvic floor injury. However, other factors associated with pelvic floor injury include normal spontaneous vaginal delivery, episiotomy, prolonged second stage of labor, and increased fetal size. Similarly, studies have failed to identify neonatal or fetal injuries or developmental abnormalities that can be directly linked to forceps birth. The morbidity that previously had been considered to be because of operative vaginal birth actually may have resulted from the process of abnormal labor that led to the need for an intervention.

CPT CODE(S)

59400 Routine obstetric care including antepartum care, vaginal delivery (with or without episiotomy, and/or forceps) and postpartum care

59610 Routine obstetric care including antepartum care, vaginal delivery (with or without episiotomy, and/or forceps) and postpartum care, after previous cesarean delivery

59409 Vaginal delivery only (with or without episiotomy and/or forceps)

59410 Vaginal delivery only (with or without episiotomy and/or forceps); including postpartum care

59612 Vaginal delivery only, after previous cesarean delivery (with or without episiotomy and/or forceps)

59614 Vaginal delivery only, after previous cesarean delivery (with or without episiotomy and/or forceps); including postpartum care

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HYSTEROSCOPY: DIAGNOSTIC

281

DESCRIPTION

Diagnostic hysteroscopy describes a number of techniques that allow the direct inspection of the endometrial cavity, endocervix, and fallopian tube ostia.

INDICATIONS

Dysfunctional uterine bleeding, postmenopausal bleeding, menorrhagia, abnormal endometrial thickening documented by ultrasonography, retained intrauterine contraceptives or other foreign bodies, infertility (eg, suspected Müllerian anomalies), endometrial or pelvic infections (eg, tuberculosis), surveillance of (treated) endometrial cancer or other situations in which a visual or tissue diagnosis is indicated. Because of its more invasive nature, cost, and small, but not insignificant, risk for perforation or infection, this procedure is best suited for diagnosis and not screening.

CONTRAINDICATIONS

Patients who are medically unstable, viable (desired) pregnancy, known cervical or uterine cancer, active pelvic inflammatory disease, blood dyscrasia, active herpetic infection. Office hysteroscopy is a poor choice for patients who have cervical stenosis, high levels of anxiety, comorbidities, limited mobility, in whom there is difficulty visualizing the cervix, or the presence of uterine pathology that may require operative procedures.

REQUIRED EQUIPMENT

- Sterile gloves and operative drapes
- Skin preparation materials (generally an iodine-based antibacterial solution such as povidone-iodine [Betadine] unless the patient is allergic)
- Vaginal speculum or weighted vaginal speculum with Deaver or similar retractors
- Single tooth tenaculum or sponge stick
- Blunt uterine sound (optional)
- Hysteroscope (rigid or flexible) with light source. Rigid hysteroscopes generally include an outer sheath that surrounds the channels for the telescope, distending media inflow and outflow, and operative instruments. Rigid hysteroscopes offer better optical quality and are less expensive. Contact hysteroscopes that do not require an external light source (using ambient light instead) are available, but their limited field of view and the inability to convert to an operative procedure have resulted in their infrequent use. They are not discussed further here.
- Normal saline (intravenous fluid without glucose) at room temperature. Carbon dioxide also may be used as a distending medium if compatible with the equipment being used.
- Equipment for infusing and monitoring the uterine distending media
- Hysteroscopes with more than 5-mm outside diameter require mechanical cervical dilation: Graduated cervical dilators (Hegar, Pratt, Rocket, Heaney, Hank, or similar; Goodell dilators are generally not preferred because of an increased risk of cervical

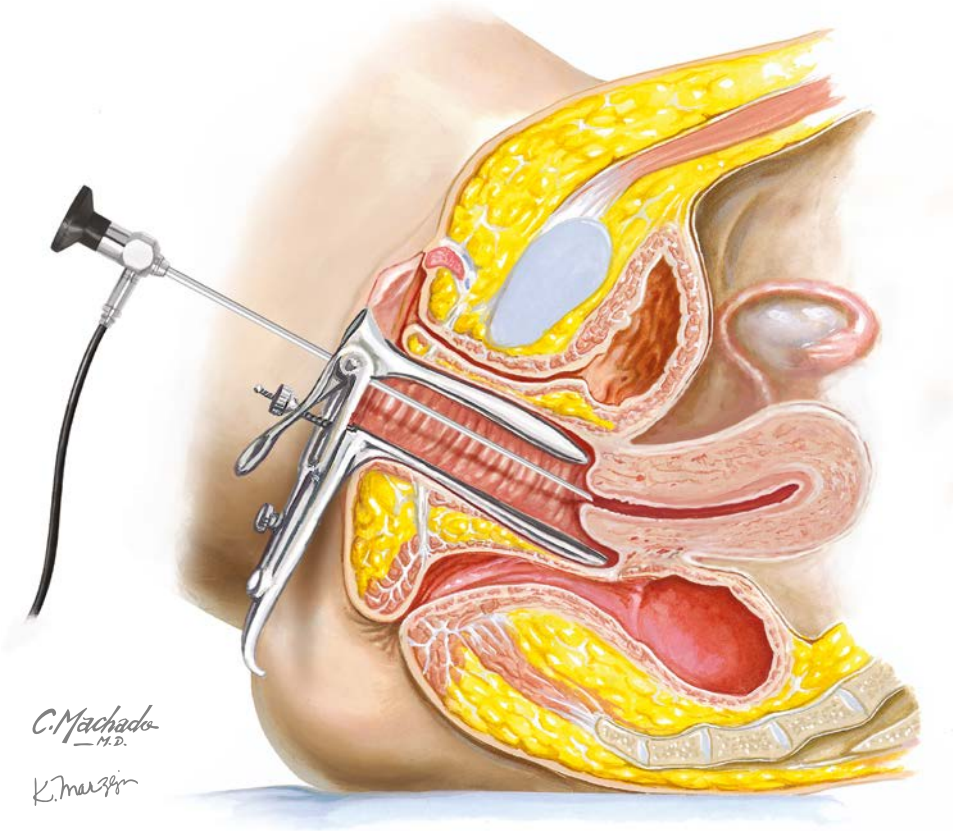

Figure 281.1 Diagnostic hysteroscopy

laceration). Preoperative dilation is generally preferred and may be accomplished with the aid of cervical ripening agents (eg, misoprostol, 200–400 mcg PO or intravaginally) or osmotic dilators (eg, laminaria).
- Video, photographic, or digital image capture equipment may be attached to the hysteroscope as desired (optional).
- An assistant is advantageous.
- If local anesthesia is to be used, a syringe with 25- or 27-gauge 1.5-inch needle (or longer) for anesthetic injection, 1% or 2% lidocaine with or without 1:100,000 epinephrine.
- Premedication with a nonsteroidal antiinflammatory agent can reduce intraoperative and postoperative pain.
- Antibiotic prophylaxis is not recommended for routine hysteroscopic procedures.

TECHNIQUE

When possible, the proliferative phase of the menstrual cycle is best for the visualization of the uterine cavity. Bleeding can easily obscure inspection, and the procedure may have to be rescheduled. Cycle optimization and endometrial thinning can be accomplished using combination oral contraceptives for a few weeks before the procedure. Most diagnostic hysteroscopy can be accomplished in the office or ambulatory setting with local anesthesia. Mild sedation may be appropriate for selected patients.

Before the procedure begins, the fit and completeness of the hysteroscope and its associated sheath, obturator, light cord, and fluid management tubing should be verified. Hysteroscopes are available with viewing angles that vary from 0 to 70 degree, with the optimal angle chosen based on the needs of the planned procedure and anticipated pathology; 0-degree scopes provide panoramic views and good delineation of the endocervix and fundus of the uterus, angled scopes are helpful when the cavity is misshapen or pathology near the inner cervical os is anticipated.

Following informed consent, the patient is placed in the dorsal lithotomy position and sterile drapes placed as for colposcopy or cystoscopy. The cervix should be visualized, cleansed, and grasped by the anterior lip using a tenaculum or sponge stick. If desired, a paracervical block using lidocaine should be placed at this point and the anesthetic allowed a few minutes to take full effect. Some practitioners choose to sound the uterus with a blunt probe, but doing so may disrupt pathology and incite bleeding, which may lead to a suboptimal examination. For these reasons, it is generally not recommended.

The degree of dilation of the cervix is determined and dilated as needed to ensure a snug fit over the hysteroscope's outer sheath. (Cervical ripening regimens have been described using misoprostol but are not currently recommended for routine use.) Distending media, most commonly normal saline, is used to distend the uterine cavity either just prior to or during the insertion of the viewing scope. The hysteroscope may be inserted into the uterine cavity under direct visualization (0-degree scope) or with the obturator in place until the tip of the sheath is within the uterine cavity. A careful and systematic inspection of the uterine cavity and tubal ostia is then carried out. Before the completion of the procedure, the pressure of the distending media should be gradually reduced under direct visualization to ensure that small lesions or excrescences have not been compressed and missed. The procedure concludes with the withdrawal of all instruments and verification of hemostasis.

COMPLICATIONS

Vasovagal syncope, uterine perforation, cervical laceration, infection (endometrial, myometrial, pelvic), hemorrhage (intraoperative or postoperative), fluid overload or gas embolus (based upon the distending media used), hyponatremia (with electrolyte-poor fluids).

FOLLOW-UP

Based on indications and findings.

CPT CODE(S)

58555 Hysteroscopy, diagnostic (separate procedure)

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HYSTEROSCOPY: POLYP AND LEIOMYOMA RESECTION

DESCRIPTION

Operative hysteroscopy enables the visual inspection and treatment of intracavitary and submucosal myometrial leiomyomata, which incorporates the use of mechanical or electrosurgical instruments.

INDICATIONS

Known or suspected endometrial polyp(s) or symptomatic intracavitary, submucosal, or intramural leiomyomata where there is a significant proportion of the lesion that protrudes into the uterine cavity.

CONTRAINDICATIONS

Patients who are medically unstable, viable (desired) pregnancy, known cervical or uterine cancer, active pelvic inflammatory disease, blood dyscrasia, active herpetic infection.

REQUIRED EQUIPMENT

- Sterile gloves and operative drapes
- Skin preparation materials (generally an iodine-based antibacterial solution such as povidone-iodine [Betadine] unless the patient is allergic)
- Vaginal speculum or weighted vaginal speculum with Deaver or similar retractors
- Single tooth tenaculum or sponge stick
- Blunt uterine sound (optional)
- Hysteroscope (rigid) with light source. Operating hysteroscopes include an outer sheath which surrounds channels for the telescope, distending media inflow and outflow, and operative instruments.
- Distending media. For operative procedures using monopolar electrosurgical instruments, a nonconductive fluid (eg, glycine) is required; bipolar electrosurgical procedures may use an isotonic fluid (eg, normal saline); mechanical procedures (eg, biopsy or morcellation) are generally done using saline.
- Equipment for infusing and monitoring the uterine distending media.
- Hysteroscopes with greater than 5-mm outside diameter (most operating sets) require mechanical cervical dilation via graduated cervical dilators (Hegar, Pratt, Rocket, Heaney, Hank, or similar; Goodell dilators are generally not preferred because of an increased risk of cervical laceration). Preoperative dilation is generally preferred and may be accomplished with the aid of cervical ripening agents (eg, misoprostol, 200–400 mcg PO or intravaginally) or osmotic dilators (eg, laminaria).

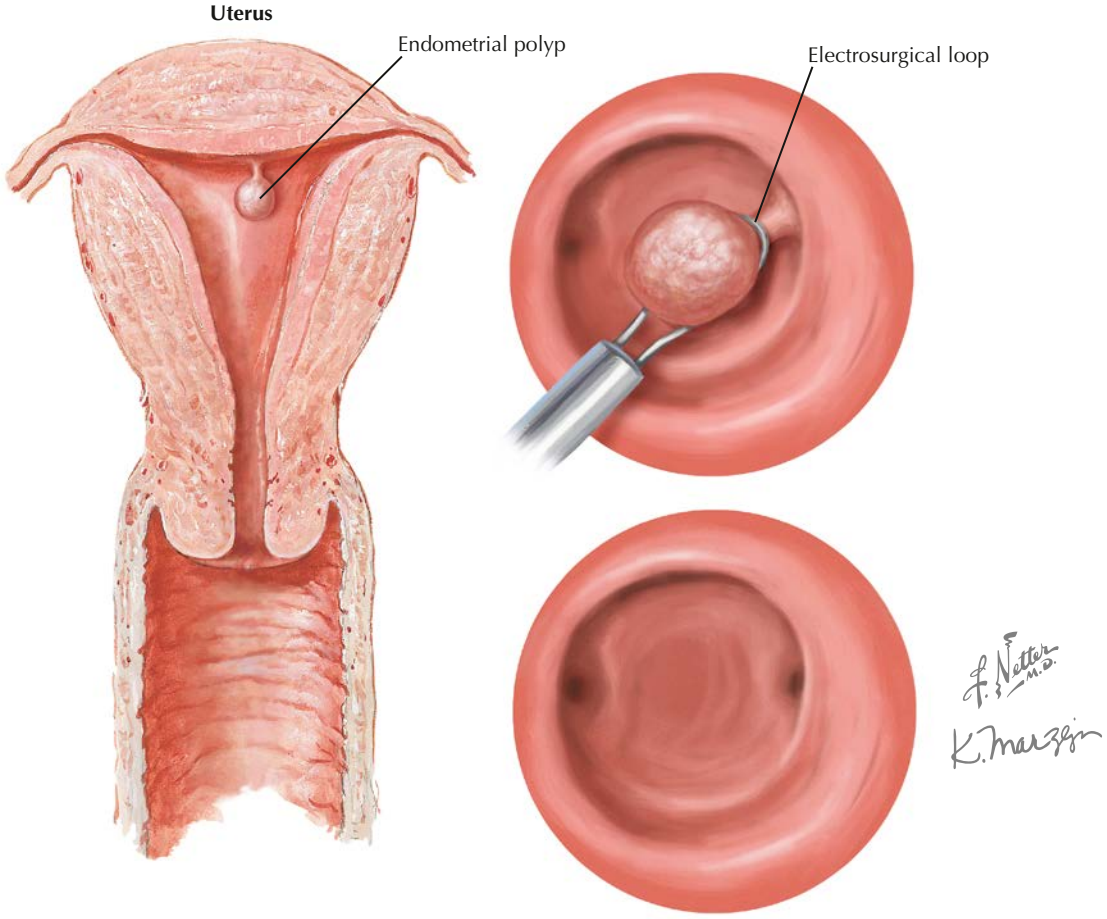

Figure 282.1 Polyp and leiomyoma resection (hysteroscopy)

- Video, photographic, or digital image capture equipment may be attached to the hysteroscope as desired (optional).
- If an electrosurgical technique is chosen, appropriate operative electrodes, electrosurgical generator, patient return electrode with monitor, and isolated circuitry should be available.
- Histology fixative (10% formalin) in containers.
- An assistant is advantageous.
- Premedication with a nonsteroidal antiinflammatory drug can reduce postoperative pain.
- Cycle optimization and endometrial thinning can be accomplished using combination oral contraceptives for a few weeks prior to the procedure.
- Antibiotic prophylaxis is not recommended for routine hysteroscopic procedures.

TECHNIQUE

There are three broad types of operative hysteroscopes: the traditional model with a retractable hand piece that can perform bipolar or monopolar electrosurgery; a second type using a morcellator that resects tissue and suctions it to a catchment device; and a third type that integrates a bipolar electrosurgical hand piece that resects and removes tissue through the operative sheath. The choice among these options will be driven by the procedure to be performed and the experience and preference of the operator.

Before the procedure begins, the fit and completeness of the hysteroscope and its associated sheath, obturator, light cord, and fluid management tubing should be verified. Hysteroscopes are available with viewing angles that vary from 0 to 70 degrees, with the optimal angle chosen based on the needs of the planned procedure and anticipated pathology; 0-degree scopes provide panoramic views and good delineation of the endocervix, angled scopes are helpful when the cavity is misshapen or pathology near the inner cervical os is anticipated.

Following informed consent and the establishment of satisfactory anesthesia, the patient is placed in the dorsal lithotomy position, and sterile drapes are placed as for colposcopy or cystoscopy. The cervix should be visualized, cleansed, and grasped by the anterior lip using a tenaculum or sponge stick. The degree of dilation of the cervix is determined and dilated as needed to ensure a snug fit over the hysteroscope's outer sheath.

Distending media is used to distend the uterine cavity either just before or during the insertion of the operating instruments. The hysteroscope may be inserted into the uterine cavity under direct vision (0-degree scope) or with the obturator in place until the tip of the sheath is within the uterine cavity. A careful and systematic inspection of the uterine cavity and tubal ostia is then conducted.

Electrosurgical Resection

Monopolar electrosurgical resection is generally conducted using a resectoscope that includes a U-shaped electrode, which carries the electrosurgical energy; bipolar resection tips are available in several shapes. The path to be resected, including the polyp or portion of leiomyoma to be removed, is inspected and a practice pass made. The electrosurgical generator is activated and the loop drawn toward the observing lens, removing a shallow strip of tissue. This is repeated as needed until the full resection has been accomplished. With larger lesions, it may be necessary to periodically irrigate the uterine cavity to improve visualization and to remove pathology specimens.

Morcellation

The morcellation device should be assembled following the manufacturer's directions. Once correct assembly has been verified, the morcellating device is inserted into the hysteroscope's operating channel. The correct alignment of the cutting head and fluid/tissue removal port must be verified. To resect tissue, the cutting port is placed against the side and base of the lesion and the device's cutting function is activated, moving the device laterally into and across the polyp or myoma. The device simultaneously resects and aspirates tissue to a collection point. The size of the bites taken by the device may provide a practical limit to the dimensions of lesions that can be addressed using this technology. At the conclusion of the resection, the device should be either retracted so that the cutting window is within the sheath of the hysteroscope or completely removed before withdrawing the scope from the uterus.

Fluid Management

Fluid overload is one of most common and potentially serious complications of operative hysteroscopy. Strict attention to the balance of fluid infused and lost to the outside, minimizing the distending pressure and amount of raw surface created by the procedure, will all diminish the risk for this complication. Selecting a distending medium that minimizes risk and being prepared to promptly recognize and treat fluid overload are required to ensure the safety of the procedure. If at any point in the procedure there is evidence of systemic absorption, such as a deficit of 750 mL of electrolyte-poor fluids, 1000–1500 mL of a nonelectrolyte solution, or 2500 mL of an electrolyte solution, further infusion should be discontinued, and the procedure terminated. In an outpatient setting or those with limited acute care and laboratory capabilities, discontinuing the procedure at a lower threshold should be considered.

Before the completion of the procedure, the pressure of the distending media should be gradually reduced under direct visualization to ensure that small lesions or excrescences have not been compressed and missed and that hemostasis of the surgical site(s) has been achieved. The procedure concludes with the withdrawal of all instruments and verification of cervical hemostasis. Any specimens removed should be placed in suitable transport media and sent for histopathologic examination.

COMPLICATIONS

Fluid overload, hyponatremia (with electrolyte-poor fluids), uterine perforation, cervical laceration, infection (endometrial, myometrial, pelvic), hemorrhage (intraoperative or postoperative).

FOLLOW-UP

Based on the indications and findings.

CPT CODE(S)

58558 Hysteroscopy, surgical; with sampling (biopsy) of endometrium and/or polypectomy, with or without D&C

58561 Hysteroscopy, surgical; with removal of leiomyomata

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INTRAUTERINE CONTRACEPTIVE DEVICE INSERTION 283

DESCRIPTION

Placement of an intrauterine contraceptive device (IUD).

INDICATIONS

Elective, desiring contraception. The IUD is associated with an efficacy rate that is comparable to sterilization and oral contraceptives and may be a particularly good choice for women with diabetes, thromboembolism, menorrhagia, or dysmenorrhea. The copper IUD may be preferable for those breastfeeding or with breast cancer or liver disease. The copper IUD may be placed up to 5 days after unprotected intercourse as an emergency contraceptive measure. The progestin-releasing IUDs may be used as a treatment for menorrhagia in select patients.

CONTRAINDICATIONS

Active cervical infection, acute sexually transmitted disease, allergy to any component of the device, dysfunctional uterine bleeding (undiagnosed), genital actinomycoses, history of ectopic pregnancy (relative), immunocompromised (relative), IUD in situ (unremoved), malignancy (uterine or cervical, known or suspected), multiple sexual partners (relative), pelvic inflammatory disease (current or past 3 months), pregnancy (known or suspected), uterine cavity malformation, vaginitis, Wilson disease (hypothetical, copper IUD only).

REQUIRED EQUIPMENT

- Intrauterine contraceptive device in sterile package

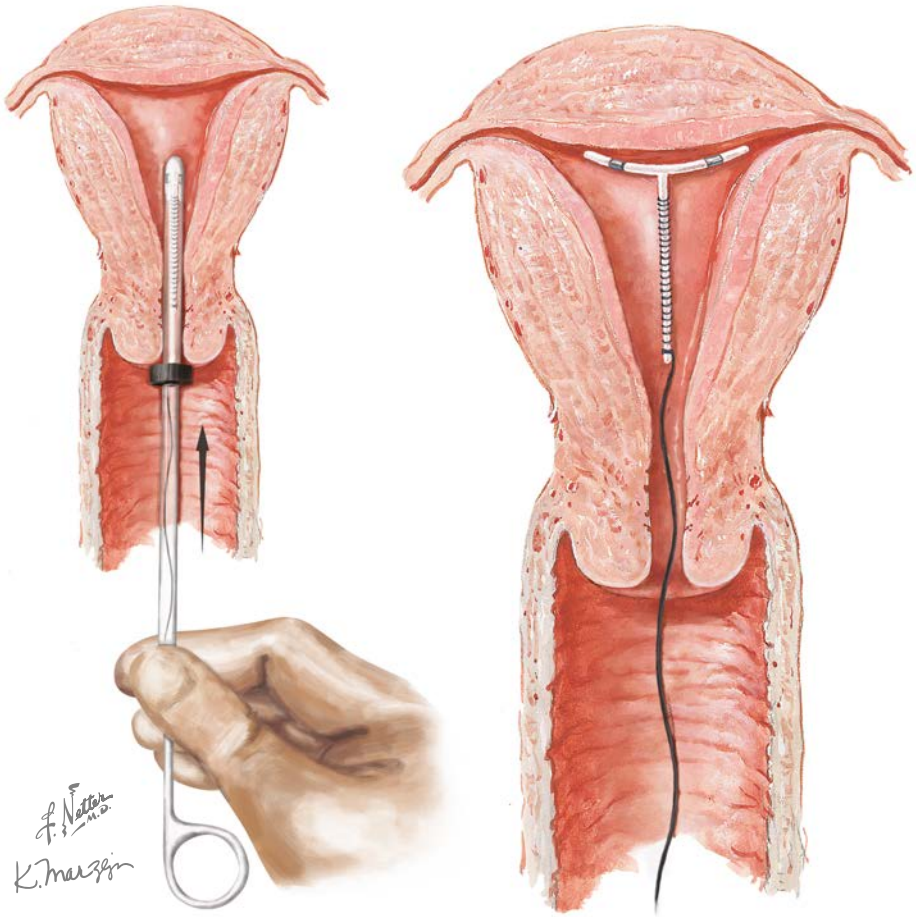

Figure 283.1 Intrauterine contraceptive device (IUD) insertion

- Skin (vaginal) preparation materials (iodine-based antibacterial solution or other suitable cleansing agents)
- Vaginal speculum
- Tenaculum
- Scissor (long)
- Uterine sound (optional)
- Nonsterile examination gloves
- Sterile gloves (optional with "no touch" technique)

TECHNIQUE

The discomfort of IUD insertion may be decreased by premedicating with a single oral dose of a nonsteroidal antiinflammatory drug administered in doses usually used to treat dysmenorrhea, through the use of 2% intracervical lidocaine gel, a paracervical block, or a combination of these. Before beginning the procedure, the size, shape, and location of the uterus should be determined. The cervix should be visualized with the aid of a speculum and then disinfected. In patients who are parous without significant uterine flexion, a tenaculum is often not needed.

The technique used to place the contraceptive device in its proper location in the uterine cavity varies slightly based on the device. Each follows the same general sequence of steps: loading the IUD into its carrier or placement device, placing the IUD in position in the uterine cavity, withdrawing the placement instrument leaving the IUD behind, verifying correct placement, and trimming the marker string(s).

ParaGuard T380A

The IUD must be loaded into its insertion device, which may be accomplished using either sterile gloves or a "no touch" technique. With sterile gloves the device is grasped, folded, and inserted into the distal end of the insertion tool. In the "no touch" method the same ends must be accomplished, but the IUD in this case is manipulated through the outer package wrapper.

Once the IUD is in the insertion device, the flexible flange is moved backward on the insertion tube until it corresponds to the expected or measured depth of the uterus. The IUD and inserter are placed at the disinfected external cervical os and gently advanced until resistance indicates that the fundus has been reached. With the obturator held in place, the insertion tube is withdrawn, leaving the device in the correct position. The obturator should not be advanced as the insertion tube is withdrawn; the insertion tube may be slightly readvanced to ensure that the IUD lies against the fundus and then is completely withdrawn. The string of the device should be trimmed at a point approximately 1–2 cm from the external os.

Mirena, Liletta, and Skyla

The levonorgestrel-containing IUDs are supplied with a self-loading inserter. To insert this device, the package is opened, taking care to maintain the sterility of the contents. The threads of the IUD must be freed from the base of the inserter, and the slider (located in the handle of the inserter) is advanced to the position closest to the IUD

itself. This will result in the arms of the IUD folding inward and their distal knobs occluding the inserter tube. Once the IUD is withdrawn into the insertion device, the flexible flange is moved backward on the insertion tube until it corresponds to the expected or measured depth of the uterus.

To place the IUD in the uterine cavity, the tip of the IUD and insertion tool is placed against the disinfected cervical os, and traction on the os is applied if needed. Gentle pressure is exerted, advancing until the flange is approximately 1.5–2 cm from the cervix. This will allow sufficient room for the arms of the IUD to expand on deployment. While this position is maintained, the slider is pulled back. This will release the arms from the inserter tube. After 30 seconds is allowed for the arms to regain their full extension, the inserter should be gently advanced until the flange meets the cervix, ensuring proper fundal placement of the device. Being careful not to entangle the threads, the device is now removed, and the threads are trimmed approximately 2–3 cm from the cervix.

Although an IUD may be placed at any point in a menstrual cycle (after pregnancy has been ruled out), it is preferable to insert it 7–10 days after the onset of menstruation. Insertion at this point of the cycle is associated with a lower expulsion rate. The patient should be counseled to use a backup method of contraception during this cycle. If the IUD is to be placed in the immediate postpartum period, the procedure is altered only by the lack of tenaculum use and the practice of leaving the string untrimmed until the 6-week follow-up visit. The IUD may also be introduced on the end of a sponge stick, if desired, omitting the inserter.

When gentle pressure does not result in the IUD insertion tool's advancement through the cervix, a tenaculum may be used to stabilize the cervix. Traction on the tenaculum may result in some straightening of the canal, further aiding insertion. In some cases, it may be necessary to use a sterile uterine sound to identify the axis of the canal, provide modest cervical dilation, or confirm the depth of the uterine cavity.

IUDs should not be left in the folded position inside the inserter for more than 1–2 minutes. Prolonged folding will result in a device that will not unfold properly in the uterine cavity, increasing the risk for expulsion or contraceptive failure.

COMPLICATIONS

Vasovagal reaction, pain, uterine perforation (approximately 1/1000 insertions), infection (uterine or pelvic, most common in the first 20 days after insertion), bleeding, expulsion of the device.

FOLLOW-UP

Generally, women should be re-evaluated 1–4 weeks after the IUD placement. The patient should be advised to periodically verify the presence and length of the IUD strings. Expulsion is most common during menstruation and during the first 6 months of use. Amenorrhea, intermenstrual spotting, and reduced menstrual flow are common with progesterone-releasing IUDs. Amenorrhea in a woman using the copper IUD should prompt a pregnancy test. Any woman who misses a period and experiences pain should have ectopic pregnancy ruled out. Women should be instructed about warning signs of pelvic infection, particularly in the first month after the insertion of the device, when the risk for pelvic infection is greater.

CPT CODE(S)

58300 Insertion of intrauterine device (IUD), not including the device
X4633 Charge for cost of copper IUD
X4634 Charge for cost of progesterone IUD

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284 INTRAUTERINE CONTRACEPTIVE DEVICE REMOVAL

DESCRIPTION

Removal of an intrauterine contraceptive device (IUD).

INDICATIONS

Elective, desiring a return to fertility or to replace a device after its approved lifespan. IUDs should also be removed in the face of active pelvic inflammatory disease, unrelenting side effects, or an intrauterine pregnancy (if possible). The IUD does not have to be removed from an asymptomatic patient in whom actinomycosis is found on cervical cytology.

CONTRAINDICATIONS

Unstable or uncooperative patient or those in whom the presence of an IUD cannot be confirmed.

REQUIRED EQUIPMENT

- Skin (vaginal) preparation materials (iodine-based antibacterial solution or other suitable cleansing agents)
- Vaginal speculum
- Tenaculum
- Nonsterile examination gloves
- Uterine packing forceps or other long forceps
- IUD or "crochet" hook (optional)
- Cervical cytology brush (Cytobrush or similar; optional)

TECHNIQUE

The discomfort of an IUD removal may be decreased by premedicating with a single oral dose of a nonsteroidal antiinflammatory drug administered in doses usually used to treat dysmenorrhea, through the use of 2% intracervical lidocaine gel a paracervical block, or a combination of these. Before beginning the procedure, the size, shape, and location of the uterus should be determined. The cervix should be visualized with the aid of a speculum. The cervix should be disinfected if reinsertion of a new device is planned.

When the IUD string(s) are visible at the cervical os, gentle traction with uterine packing forceps or other suitable grasping device will result in the delivery of the IUD. When the string is not apparent, gentle probing of the outer portion of the cervical canal with the forceps or a sterile crochet hook may locate the strings. A Cytobrush also may be placed in the endocervix and gently swept downward to locate the strings. These maneuvers will often yield the string, which may then be grasped as previously described. If these maneuvers are unsuccessful in retrieving the IUD, the cervix should be disinfected before any further attempts. Ultrasonography should be considered to ensure an intrauterine location of the IUD. The possibility of an ongoing pregnancy must also be considered (if not already assessed).

An IUD ("crochet") hook may be used under sterile conditions in the outpatient setting, or the IUD may be removed in the operating room or ambulatory surgery setting where hysteroscopic guidance is available. In most cases, if a hook is to be used, a tenaculum to stabilize the cervix will be needed, and the hook is passed through the cervix to the level of the uterine fundus. As the hook is advanced, the device should be carefully monitored for vibrations, sounds, or a sensation that the tip has encountered the IUD. Once the hook has reached the fundus (or the IUD, if felt), the hook is slowly rotated 180–360 degrees and withdrawn. Moderate resistance to withdrawal is associated with capture of the IUD, and persistent traction will often deliver the device. Even when no resistance is felt, removal of the hook will often deliver the string(s), allowing removal of the IUD by conventional traction. If neither the IUD nor its string has been retrieved after several attempts, the effort should be abandoned until the presence of the IUD in the body has been confirmed and removal via hysteroscopy or laparoscopy is considered.

COMPLICATIONS

Vasovagal reaction, pain, uterine perforation (when a hook is used), infection (uterine or pelvic), bleeding.

FOLLOW-UP

Based on the contraceptive plans and the indications for removal.

CPT CODE(S)

58301 Removal of intrauterine device (IUD)

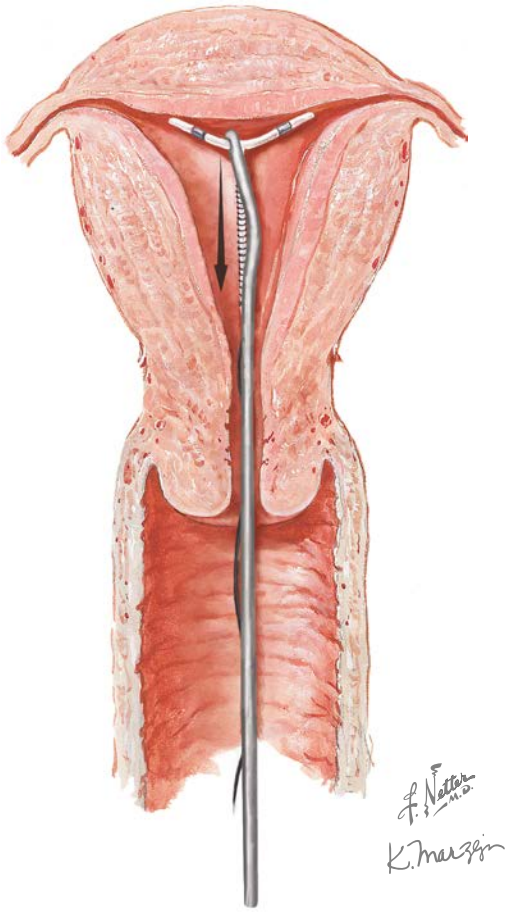

Figure 284.1 Intrauterine contraceptive device (IUD) removal

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LOOP ELECTROSURGICAL EXCISION PROCEDURE AND LARGE LOOP EXCISION OF THE TRANSFORMATION ZONE CONIZATIONS

285

DESCRIPTION

Cervical conization is a diagnostic or therapeutic procedure that removes a cone-shaped specimen from the uterine cervix. Loop electrocautery excisional procedure (LEEP, also known as large loop excision of the transformation zone [LLETZ]) uses electrosurgical energy instead of a knife to remove the diseased cervical tissue.

INDICATIONS

Histologically verified advanced epithelial atypia (for diagnosis or therapy) or inability to adequately evaluate the cervix through colposcopy.

CONTRAINDICATIONS

Coagulopathy, advanced pregnancy, known or suspected allergy to the agents used.

REQUIRED EQUIPMENT

- Skin (vaginal) preparation materials (iodine- or hexachlorophene-based antibacterial solution [eg, povidone-iodine [Betadine], Hibiclens] or other suitable cervical cleansing agents)
- Sterile gloves
- Nonconductive vaginal speculum
- Electrosurgical generator with an output capability of at least 50 W in both coagulation and cutting modes, a variety of waveform outputs (pure cut, blended current, and coagulation current), patient return electrode (grounding pad) with monitor, and isolated circuitry
- A variety of loop electrodes (size and shape to be determined at the time of the procedure based on the size and shape of the cervix and lesion to be removed)
- A smoke evacuator with odor and viral filter (to reduce the risk of human papillomavirus exposure for operating personnel)
- Monsel paste (ferric subsulfate solution allowed to evaporate to the consistency of paste)
- 5% acetic acid or Lugol solution (super-saturated potassium iodide)
- Kevorkian or similar endocervical curette
- Histology fixative (10% formalin) in containers
- Syringe with 25- or 27-gauge 1.5-inch needle for anesthetic injection, 1% or 2% lidocaine with or without 1:100,000 epinephrine
- 12-inch needle holder, 2-0 absorbable suture material (or similar)

TECHNIQUE

After informed consent has been obtained, the patient is placed in the dorsal lithotomy position and a return electrode ("grounding pad") is placed on the patient's thigh with the long edge placed closest to the hip.

The cervix should be visualized using a nonconductive speculum with a smoke evacuator attachment. Acetic acid or Lugol solution may be applied to the cervix to delineate the area of abnormality.

The local anesthetic should be injected below the epithelium into the cervix at the 3-, 6-, 9-, and 12-o'clock positions. These injections should be approximately 3–5 mm deep. Vasopressin (1 pressor unit/20 mL saline) or 1:100,000 epinephrine solution may be added to this solution or separately injected. The appropriate loop electrode should be selected based on the size of the lesion to be treated: lesions confined to the external cervix are most often treated with a round loop, 2-cm wide and 0.8-cm deep; for a nulliparous, small cervix, a loop 1.5-cm wide and 0.7-cm deep is used; and for lesions extending into the endocervix, a square loop electrode, measuring 1 × 1 cm, can be used.

The power setting for the electrosurgical generator depends on the manufacturer of the generator and the diameter of the loop: A 2-cm loop requires 35–45 W of power and a 1- × 1-cm loop requires 20–30 W of power. A blended current should be used.

The loop should be placed several millimeters lateral to the edge of the lesion, and a simulated pass of the loop over the lesion is made to ensure that there are no obstacles. The electrosurgical generator is then activated in the "cut" mode. The loop is pressed perpendicular into the tissue to a depth of 5–8 mm and then is dragged laterally across and through the endocervix, exiting at a point several millimeters past the lesions or beyond the transformation zone, whichever is farther. The resultant specimen should be dome shaped with the endocervical canal visible in the middle. Care should be taken to not press the loop more than 4- to 5-mm deep at the lateral borders of the cervix because of the arterial blood supply located at the 3- and 9-o'clock positions of the cervix.

If the lesion is too large to be removed in a single pass, the central portion of the lesion is removed first using a 2-cm wide loop as described earlier. Additional passes are then made using the same

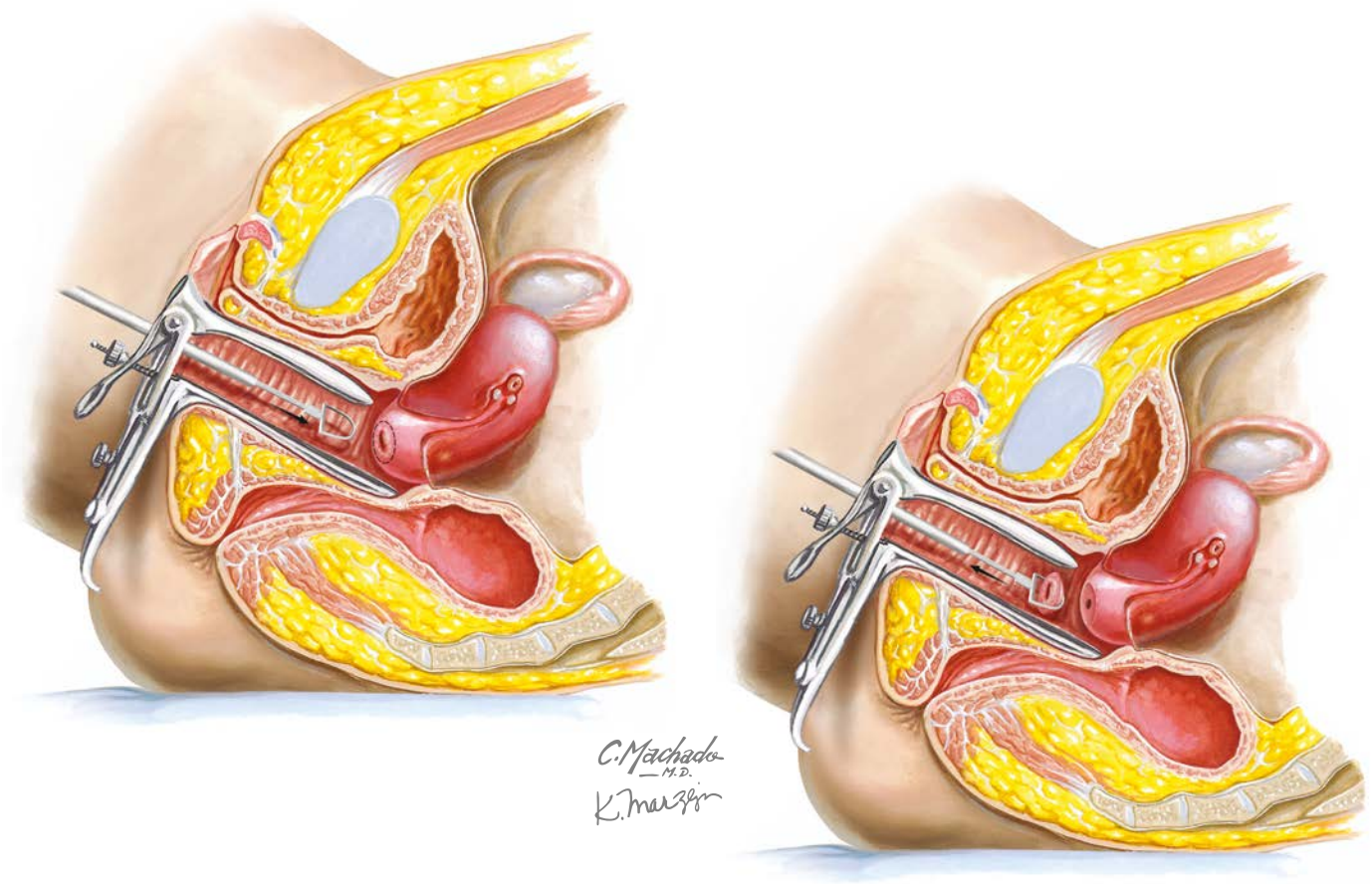

Figure 285.1 LEEP and LLETZ conizations

loop to remove remaining lesions and the transformation zone, or a smaller loop may be used to extend the excision farther up the endocervical canal.

If a blended current is used, bleeding from the base of the excision site is generally minimal. If needed, hemostasis may be obtained by fulguration using the ball electrode or the application of Monsel solution.

Pelvic rest (no tampons, douching, or sexual intercourse) is generally advised for 2–3 weeks after the procedure, and the patient is instructed to return for heavy bleeding or bleeding that lasts more than 2 weeks.

COMPLICATIONS

Bleeding (acute and delayed, ≤8%), infection (<2%). Conization appears to approximately double the risk that a woman will subsequently have a preterm delivery, a low-birthweight infant, or premature rupture of the membranes.

FOLLOW-UP

The cervix is generally inspected at approximately 6 weeks after the procedure. Treatment success for cervical intraepithelial neoplasia is generally 95%.

CPT CODE(S)

57522 Conization of cervix, with or without fulguration, with or without dilation and curettage, with or without repair; loop electrode excision

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PESSARY FITTING

286

DESCRIPTION

Pessaries are devices fitted and worn in the vagina to provide support to the pelvic organs. Pessaries are available in various sizes and shapes and are categorized as supportive (eg, ring, lever, Gellhorn, Gehrung, Shaatz) or space occupying (eg, doughnut, cube, inflatable).

INDICATIONS

Pelvic organ prolapse, urinary incontinence, cervical incompetence (lever or ring type), drug delivery. Pessaries are often used as either an alternative to surgery or as a presurgical trial (Box 286.1).

CONTRAINDICATIONS

Undiagnosed vaginal bleeding, significant vaginal atrophy, latex sensitivity. Patients who are unable or unwilling to manage the periodic insertion and removal of the device are poor candidates.

REQUIRED EQUIPMENT

- Vaginal speculum
- Water-soluble lubricant
- Nonsterile examination gloves
- Examples of appropriate pessaries in a variety of sizes (generally the "average size" and at least one size larger and smaller)

TECHNIQUE

Pessaries will not be well tolerated or provide optimal support in a patient who is poorly estrogenized. Therefore, a minimum of 30 days of topical estrogen therapy should be instituted before a trial of pessary therapy in such patients.

The type of pessary chosen for a given patient is determined by the anatomic defect and the symptoms the patient is experiencing. The most commonly used forms of pessary for pelvic relaxation are the ring (or doughnut), the ball, and the cube. The indications for various types of commonly used pessaries are shown in Box 286.1. The type of pessary that can be fitted is related to the severity of prolapse. Ring pessaries are frequently the first choice, followed by Gellhorn or other pessaries if the rings do not stay in place.

Pessaries are fitted and placed in the vagina in much the same way as a contraceptive diaphragm: the depth of the vagina and the integrity of the supporting structures of the vagina are gauged as a part of the pelvic examination. The size of pessary to be fitted is based on the findings of the pelvic examination. The pessary is lubricated with a water-soluble lubricant, folded or compressed, and inserted into the vagina. Some pessaries require specific maneuvers for their insertion; always consult the manufacturer's instructions.

The pessary is next adjusted so that it is in the proper position based on the type: Ring and lever pessaries should sit behind the cervix (when present) and rest in the retropubic notch; the Gellhorn pessary should be entirely contained in the vagina, with the plate resting above the levator plane; the Gehrung pessary must bridge the cervix, with the limbs resting on the levator muscles on each

BOX 286.1 Indications for Common Pessaries

Malposition: Lever type (Hodge)
Prolapse
  Uterine: Gellhorn, ring, doughnut, cube
  Vaginal: Doughnut, cube, ball (Gehrung)
  Cystocele/Rectocele: Gehrung, Shaatz
Incompetent cervix: Lever, ring
Incontinence: Doughnut, lever, ring
Preoperative: Based on the defect
Drug delivery: Specialized ring (17β-estradiol, medroxyprogesterone, prostaglandin E_2)

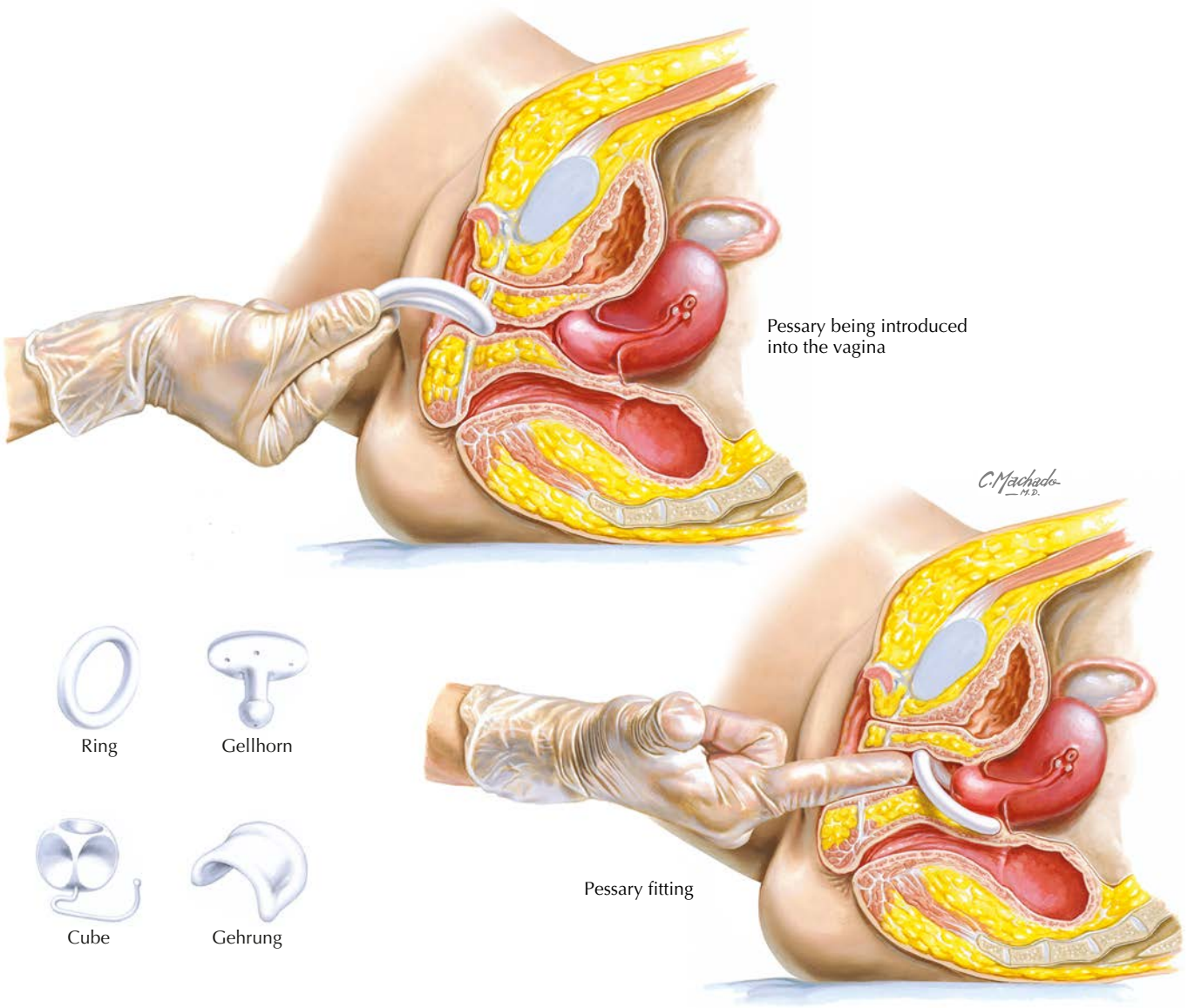

Figure 286.1 Pessary fitting

side; and the ball or cube pessaries should occupy and occlude the upper vagina. All pessaries must allow the easy passage of an examining finger between the pessary and vaginal wall in all areas. The only situation in which a pessary is allowed to exert any significant pressure beneath the urethra is in the case of those devices designed for the control of urinary incontinence.

After the pessary has been placed and the fit checked, the patient should be asked to strain. The pessary may slightly descend, but its integrity should be maintained and it should return to its normal position when the patient relaxes. The patient should be allowed to stand and walk a bit with the pessary in place to ensure comfort and retention. The pessary may then be removed (if a "fitting" pessary has been used) or may be left in place (if this is to be the patient's final device). If necessary, the process should be repeated until an appropriate, comfortable fit is obtained. The fit also should be confirmed at a follow-up visit in 5–7 days. In most patients (50%–73%) an appropriately sized pessary can be successfully fitted in one or two office visits.

The patient should be instructed on both the proper insertion and removal techniques. Ring pessaries should be removed by hooking a finger into the pessary's opening, gently compressing the device, and then withdrawing the pessary with gentle traction. Cube pessaries also must be compressed, but the suction created between the faces of the cube and vaginal wall must be broken by gently separating the device from the vaginal sidewall; the locator string often attached to these pessaries should not be used for traction. Inflatable pessaries should be deflated before removal. Gellhorn and Gehrung pessaries are removed by a reversal of their insertion procedures.

COMPLICATIONS

Vaginal erosion, bleeding, infection, vaginal discharge, pain, expulsion, urinary retention, fistula formation (rare with proper fit, care, and estrogen therapy).

FOLLOW-UP

An examination at 5–7 days after initial fitting is required to confirm proper placement, hygiene, and the absence of pressure-related problems (vaginal trauma or necrosis). Earlier evaluation (in 24–48 hours) may be advisable for patients who are debilitated

or who require additional assistance. Follow-up should then occur in approximately 1 month and then quarterly for the duration of use. Some authors recommend maintaining a monthly schedule indefinitely, especially in those with limited abilities to maintain the device themselves.

CPT CODE(S)

57160 Fitting and insertion of pessary or other intravaginal support device (procedure only)

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SONOHYSTEROGRAPHY

287

DESCRIPTION

Sonohysterography is a technique for ultrasonographic visualization of the uterine cavity using saline as a contrast and distending media. The technique is also known as saline infusion sonohysterography (SIS). It is well suited for the ultrasonographic detection of endometrial polyps, hyperplasia, cancer, leiomyomas, and intrauterine adhesions. It has replaced diagnostic dilatation and curettage for most women.

INDICATIONS

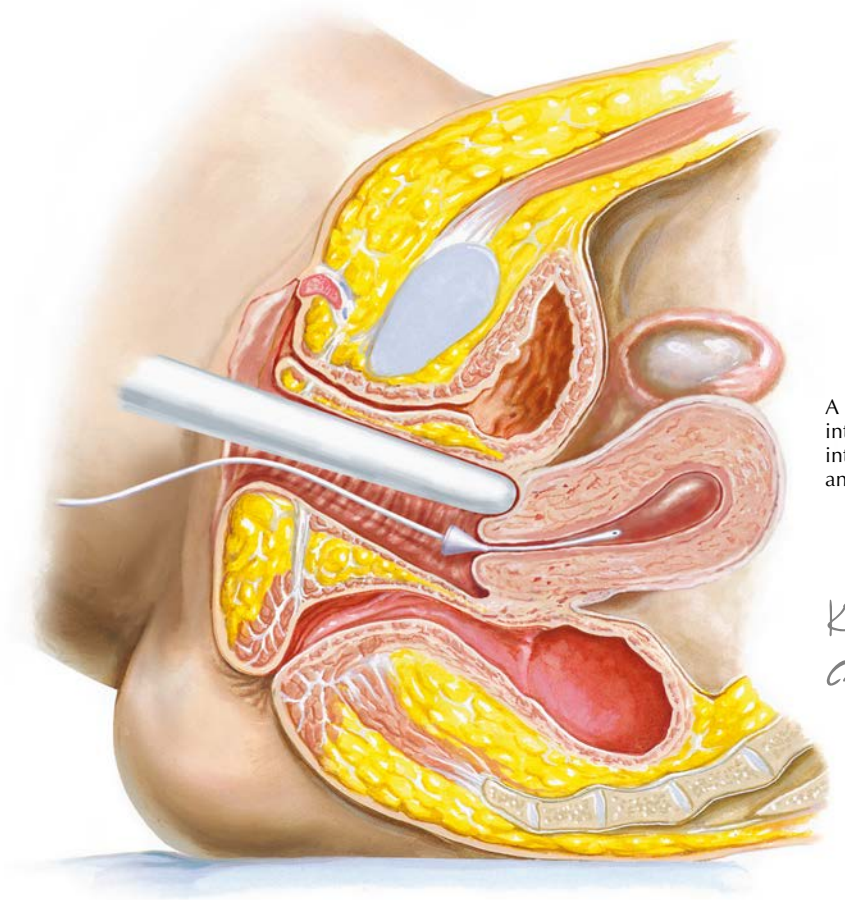
Similar to those for hysteroscopy or endometrial biopsy; dysfunctional uterine bleeding, postmenopausal bleeding, menorrhagia, infertility (selected cases), or recurrent abortion, endometrial or pelvic infections (eg, tuberculosis), missing intrauterine contraceptive device, or other situations in which viewing the endometrial cavity can establish a diagnosis. The technique is particularly adept at documenting endometrial polyps, submucosal leiomyomata, and intrauterine adhesions.

CONTRAINDICATIONS

Acute bleeding; acute cervical, uterine, or pelvic infection; known uterine or cervical cancer; pregnancy (known or suspected); recent uterine perforation; vaginitis (relative).

REQUIRED EQUIPMENT

- Sterile gloves
- Operating vaginal speculum (open sided)
- Skin preparation materials (generally an iodine-based antibacterial solution such as povidone-iodine [Betadine] unless the patient is allergic)
- 30–50 mL of warmed sterile saline
- 30 mL syringe
- Intrauterine insemination catheter (eg, Soules), sonohysterography catheter (eg, Goldstein), thin balloon-tipped catheter, or small-gauge (5F) pediatric feeding tube (or similar)
- Sterile ring forceps or uterine packing forceps (optional)



A small catheter or infant feeding tube is inserted into the uterine cavity so that sterile saline can be introduced to help visualize the uterine cavity and lining.

K. Margin
C. Machado M.D.

Figure 287.1 Sonohysterography

- Lidocaine (1%) without epinephrine, syringe and 22- to 25-gauge spinal (4-inch) needle or lidocaine spray (optional)
- Appropriate ultrasonographic equipment and probe (abdominal and/or vaginal probe)

TECHNIQUE

When possible, sonohysterography should be performed during the proliferative phase of the menstrual cycle (before day 10) when the endometrium is thinnest. If it is not possible to determine cycle timing, a 10-day course of progestin therapy, followed by withdrawal, may produce the needed endometrial thinning. The discomfort of sonohysterography may be decreased by premedicating with a single oral dose of a nonsteroidal antiinflammatory drug administered in doses usually used to treat dysmenorrhea.

The patient should be placed in the dorsal lithotomy position, and a pelvic examination should be performed to determine the current size, shape, and position of the uterus. The vaginal speculum (open sided) should be placed to allow clear access to the cervix. When the cervix is in view, it is disinfected with an appropriate antiseptic solution. Sonohysterography generally produces only mild cramping, obviating the need for an anesthetic, but if one is desired a paracervical block should be placed or the anesthetic material should be applied at this time.

The syringe and catheter to be used should be filled with warmed saline, and any residual air should be expelled. The catheter is placed against the cervical os and gently advanced until well inside the endocervical canal or uterine cavity. The use of sterile ring or uterine packing forceps may facilitate this. If a balloon-tipped catheter is used, less discomfort will be experienced if the balloon is placed below the level of the inner cervical os. Occasionally, it will be difficult to thread the flexible catheter into place because of cervical stenosis, uterine position, or abnormal uterine contour; the use of a tenaculum to straighten the cervical canal, a catheter with a stylet, or a catheter made of less flexible material may resolve this issue.

After the infusion catheter is in place, the vaginal speculum is withdrawn, taking care to avoid displacing the catheter. Ultrasonographic visualization may be obtained with either transabdominal or transvaginal means, although the transvaginal route is most commonly chosen because of the higher-resolution image possible with this approach. With the chosen ultrasonographic probe in place and functioning, 5–30 mL of the warmed saline is slowly injected into the uterine cavity. The amount of instilled fluid will vary, depending on the indication for the procedure, patient comfort, and the image produced on the ultrasonography monitor. The full uterine cavity should be surveyed by moving the ultrasonography probe both horizontally and vertically to form a three-dimensional impression of the uterine cavity.

COMPLICATIONS

Bleeding, infection (endometrial, myometrial, pelvic). Infection after sonohysterography is rare, and prophylactic antibiotics are not

recommended. Vasovagal syncope during the procedure may occur but is generally transient.

FOLLOW-UP

Based on the indications.

CPT CODE(S)

58340 Catheterization and introduction of saline or contrast material for saline infusion sonohysterography (SIS) or hysterosalpingography

76831 Saline infusion sonohysterography (SIS), with or without color flow Doppler hysterosonography

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SPECULUM EXAMINATION

288

DESCRIPTION

Speculum examination of the vaginal canal and cervix is a vital part of any gynecologic examination. The use of a speculum also facilitates a number of gynecologic processes, including obtaining cervical cytology or cultures, colposcopy, intrauterine contraceptive device placement and removal, hysteroscopy, and others. When used properly it is an invaluable tool; when used artlessly, its use can result in pain, trauma, and lost information.

INDICATIONS

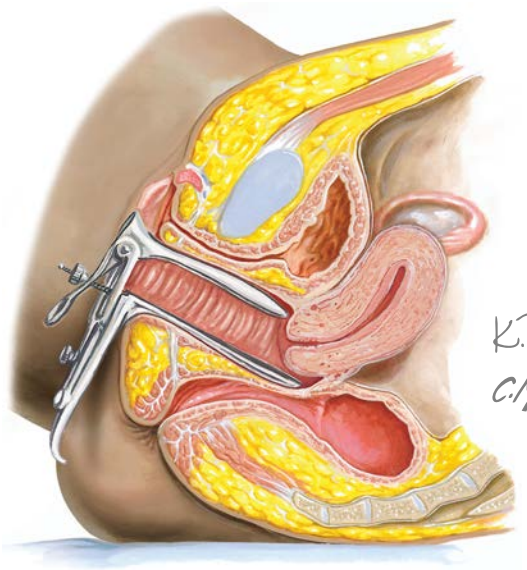
Any time the tissues of the external genitalia or vaginal canal must be retracted for inspection or access, a speculum is used.

CONTRAINDICATIONS

Pelvic examinations are intrinsically an invasive procedure. As such, they require the specific or implied permission of the patient except under emergency conditions. Risk (though small) must always be exceeded by benefit; if the speculum examination is unlikely to yield information that will alter patient management, it is contraindicated.

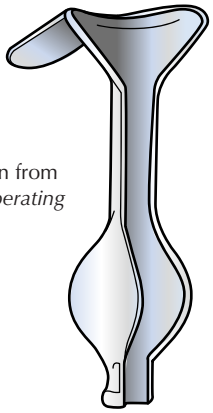
REQUIRED EQUIPMENT

- Nonsterile gloves
- A selection of vaginal specula in several sizes and types: For most needs, a medium Peterson or Graves speculum will serve. A narrow Peterson is excellent for most nonparous patients and is the

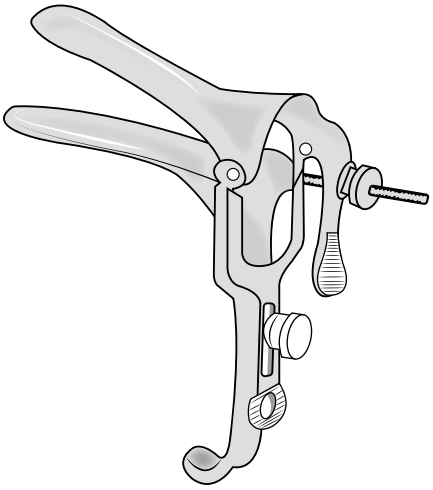


The blades of the speculum should embrace the cervix, resting in the anterior and posterior fornix.

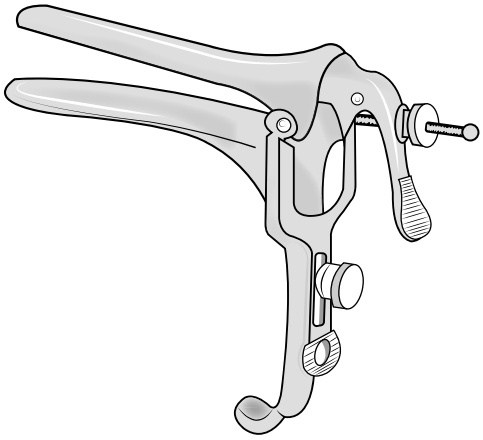
Sims retractor (Reused with permission from Kay S, Sandhu CJ, Dutta R, et al. *Crash Course Obstetrics and Gynaecology*. 4th ed. London: Elsevier; 2019.)



Weighted retractor (Reused with permission from Phillips N, Hornacky A. *Berry & Kohn's Operating Room Technique*. 14th ed. Elsevier; 2020.)



Graves speculum (Reused with permission from Johnson R, Taylor W. *Skills for Midwifery Practice*. Elsevier; 2018.)



Pederson speculum (narrower straight blades) (Reused with permission from Johnson R, Taylor W. *Skills for Midwifery Practice*. Elsevier; 2018.)

Figure 288.1 Correct speculum placement

first choice of many for routine use. An open-sided Graves speculum is useful when procedures are planned in which the speculum may be removed before completing the procedure. A pediatric Peterson or nasal speculum is useful for children or young adolescent patients. All specula should be clean but do not need to be sterilized except in the operating room setting.

- A source of warm water is desirable
- A water-soluble lubricant may be used but is seldom necessary and should not be used in many situations. (It can interfere with some cytologic studies and cultures.)

TECHNIQUE

The patient should rest comfortable in the dorsal lithotomy position for most speculum examinations. (Knee-chest position may be used for pediatric examinations.) The chosen speculum should be gently warmed under water and only the excess water shaken off. The speculum should be held by the handle in the operator's dominant hand.

Because the operator is often out of view of the patient, the examination begins by alerting the patient to the first touch of the hands. Many prefer to use the back of the nondominant hand to touch the patient's inner thigh and then rotate toward the vulva. The index and middle finger are used to gently separate the labia so that the vaginal introitus is visible. This may be accomplished with the hand above and the palm facing outward, or from below with the palm facing inward based on operator preference.

With the labia thus retracted, the tip of the speculum is placed against the vaginal opening with the blades parallel to the floor and at a slight downward angle. This is to align with the natural planes of the vagina, which form a flattened H in cross section. The speculum should not be inserted with the blades perpendicular to the floor and then rotated back to the horizontal— doing so is not only not anatomic but risks both discomfort and tissue injury when the urethra become trapped between the rotating speculum below and the symphysis above.

The patient should be informed that she will feel the speculum insertion, especially in her rectum, and that if the speculum is too hot or too cold, or if she should experience pinching, pain, or discomfort, she should indicate those so that adjustments may be made. The speculum is advanced hugging the posterior vaginal wall and at an angle of roughly 45 degrees to the horizontal to follow the axis of the vagina as it hugs the sacrum. Once the speculum has been advanced to the vaginal apex, it is gently opened to allow access to the cervix. The cervix should rest between the two blades of the speculum. If need be, the speculum may be slightly withdrawn and advanced to obtain a clear view, or to allow the cervix to drop into place in the tip of the slightly longer posterior blade. If the speculum is to remain in place briefly, the appropriate holding screws should be adjusted.

Inspection of the vaginal walls is most easily accomplished as the speculum is withdrawn. To do so, the speculum's opening should be slightly relaxed, taking care not to entrap or pinch vaginal or vulvar tissues. The anterior, posterior, and lateral walls of the vagina should be inspected as the speculum reveals them on its way away from the apex to the introitus.

COMPLICATIONS

If care is not taken, vaginal tissue may be pinched as the speculum is closed or withdrawn.

FOLLOW-UP

Based on indications and findings.

CPT CODE(S)

CPT codes do not generally apply to the speculum examination alone but are determined by the other procedures or processes associated with it, such as:

G0101 Cervical or vaginal cancer screening; pelvic and clinical breast examination

or

88150 Cytopathology, slides, cervical or vaginal

REFERENCES

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Level III

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SUBDERMAL CONTRACEPTIVE CAPSULE INSERTION 289

DESCRIPTION

The etonogestrel implant (Nexplanon) is a single-rod progestin contraceptive placed under the skin of the inner upper arm that provides up to 3 years of reversible contraception. The implant is a 40- × 2-mm semirigid ethylene vinyl acetate rod containing 68 mg of etonogestrel (the 3-keto derivative of desogestrel). Contraceptive effectiveness is equal to or greater than that of most sterilization procedures.

INDICATIONS

Reversible contraception. The US Food and Drug Administration and the device's manufacturer have agreed that the device will be distributed only to providers who have undergone 3 hours of training in patient selection, counseling, insertion, and removal.

CONTRAINDICATIONS

Uncertainty about contraceptive plans, known or suspected pregnancy, undiagnosed abnormal uterine bleeding, local skin infection, current or past history of thrombosis or thromboembolic disorders, liver tumors (benign or malignant) or active liver disease, known or suspected breast cancer, other contraindications to hormonal contraception (eg, stroke, ischemic heart disease).

REQUIRED EQUIPMENT

- Antiseptic solution and sterile cotton balls, or skin preparation swabs
- Sterile gloves (may be placed with nonsterile gloves with careful technique)
- Local anesthetic (eg, lidocaine, 1% without epinephrine, 2–5 mL), 3–5 mL syringe, 25-gauge needle
- Sterile 2- × 2-inch gauze
- Sterile drapes (helpful, but not required)
- Contraceptive capsule and insertion device (preloaded and sterile)
- Sterile skin closure strips (¼ inch, optional)
- Adhesive bandage, pressure bandage (optional)
- Skin marker (optional)
- Mild analgesics (nonsteroidal antiinflammatory drug or similar, if desired)

TECHNIQUE

Note that the following technique does not exactly match that recommended by the manufacturer (eg, making the use of pressure bandage optional). Should a question arise, the manufacturer's manual should be consulted.

Following informed consent and verification that the patient is not pregnant, the patient should lie in the supine position with the nondominant arm elevated, flexed at the elbow, externally rotated,

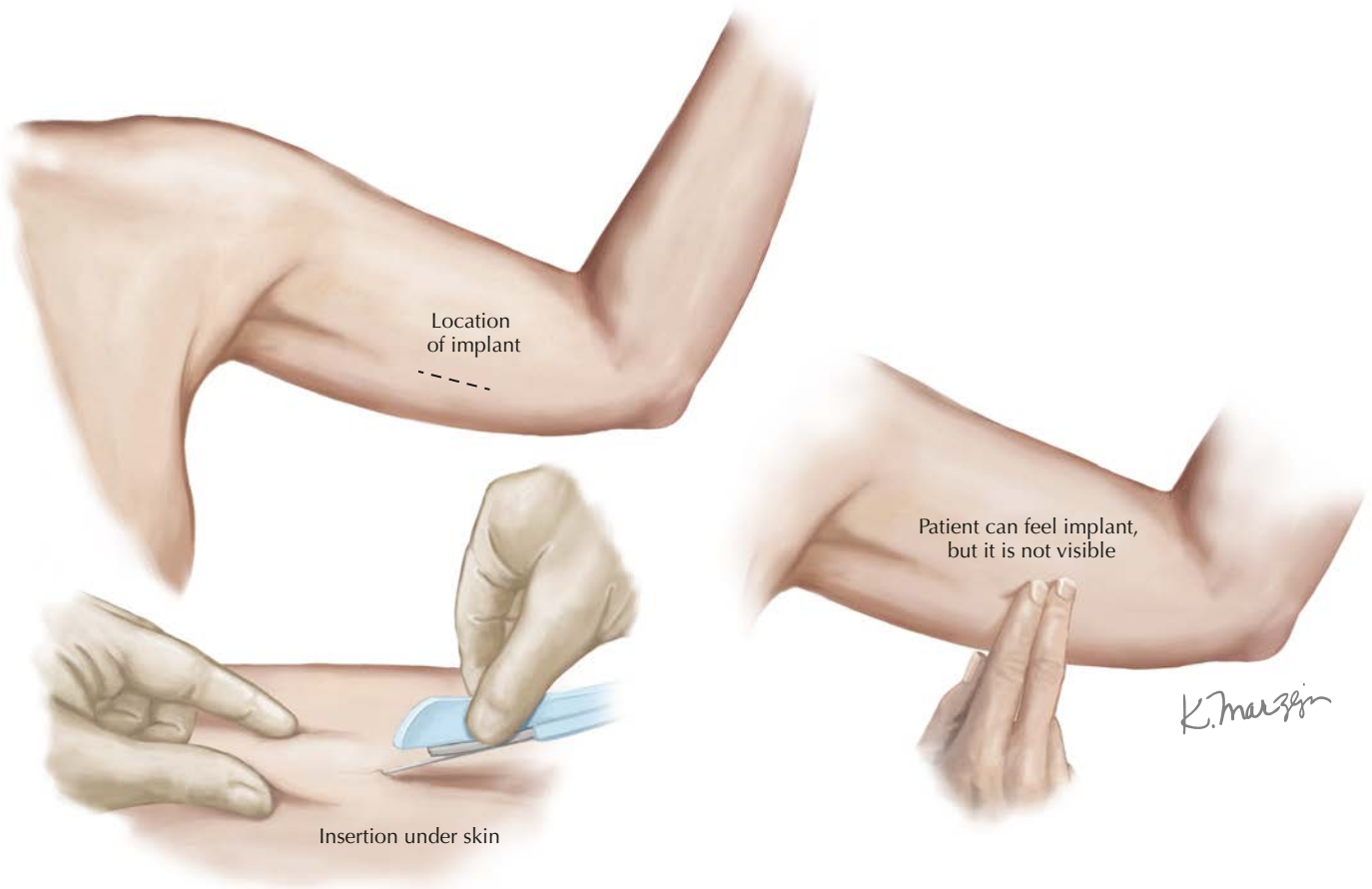

Figure 289.1 Subdermal contraceptive capsule insertion

and extended to approximately 90-degree angle from the body. The hand should rest comfortably at the level of the head. Some authors advocate having the arm extended, but mechanical support for the arm during the procedure may be difficult. The insertion point should be located and palpated to identify any potential problems and to indicate the planned placement to the patient. The site should be approximately 8–10 cm (4 fingerbreadths) above the medial epicondyle of the humerus. The sulcus between the biceps and triceps muscles should be avoided, reducing the risk for damage to the large blood vessels and nerves that lie in the neurovascular bundle deeper in the subcutaneous tissue. The distal end of the insertion may be marked by a skin marker or gentle pressure by a (retracted) pen, if desired. If a skin marker or other pigmented mark is used, insertion directly through the marked skin should be avoided as it can result in "tattooing." A second spot a few centimeters proximal (toward the axilla) to the first may be marked to guide the anesthesia and placement tracks, although many find this unnecessary.

The skin along the insertion track and surrounding area should be disinfected. Local anesthesia should be established by injecting 2–3 mL of local anesthetic just below the skin along the proposed insertion line, being sure to include approximately 3–4 mm beyond the distal (starting) point. While the anesthetic is allowed to take effect, the integrity of the insertion device should be verified, and the presence of the contraceptive insert within the insertion trocar confirmed.

The insertion device should be grasped above the needle cap and the clear plastic cover removed. The trocar (needle) tip is placed against the insertion point at an angle of approximately 30 degrees to the skin. While applying countertraction to the distal skin, the skin is punctured, and then the trocar is lowered so that it is parallel to the skin. It is then advanced in the subdermal connective tissue, simultaneously lifting the skin with the tip. The trocar must be advanced to its full length. The slider on the tip of the insertion device is unlocked with downward finger pressure and then moved fully backward (toward the elbow), deploying the insert and retracting the trocar.

Immediately after insertion, the site should be palpated to verify the correct placement of the implant; both ends should be palpable. The patient also should be given the opportunity to feel her implant. An adhesive closure of the insertion puncture may be placed if desired and a sterile dressing or adhesive bandage applied. A pressure bandage may be placed for the first 24 hours, if desired. If the implant cannot be felt, check the applicator to make sure the implant is no longer in the insertion device (the applicator obturator is purple, and the implant is white). If there is uncertainty about the location of the implant, ultrasonography or x-ray may be used to determine its presence. The procedure should be documented in the chart to help guide the eventual removal process. Although postplacement discomfort is relatively minor, mild analgesics may be offered.

COMPLICATIONS

Complications occur in 0.3%–1% of insertions. Local bruising, hematoma, infection, local irritation or rash, expulsion, neural or vascular injury (deep insertion), and allergic reaction. Menstrual cycle irregularity and even amenorrhea are common and expected.

FOLLOW-UP

Abstinence or backup contraception is recommended for 7 days after insertion if the implant is placed more than 5 days after the start of the last menstrual period. No additional follow-up is required until fertility is desired or 3 years have elapsed. Some practitioners allow up to 2 additional off-label years of use. (Contraceptive effectiveness persists to 5 years, but the device is labeled for removal or replacement at 3 years.)

CPT CODE(S)

11981 Insertion, nonbiodegradable drug delivery implant

REFERENCES

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Level III

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SUBDERMAL CONTRACEPTIVE CAPSULE REMOVAL 290

DESCRIPTION

Etonogestrel subdermal contraceptive implants provide reliable reversible contraception, but they must be removed after 3 years of use or if a return to fertility is desired.

INDICATIONS

Desired return of fertility or the completion of the useful life of the contraceptive implant.

CONTRAINDICATIONS

Local skin infection, known or suspected allergy to the agents used for the removal process.

REQUIRED EQUIPMENT

- Antiseptic solution and sterile cotton balls, or skin preparation swabs
- Sterile gloves
- Local anesthetic (eg, lidocaine, 1% without epinephrine, 2–5 mL), 3–5 mL syringe, 25-gauge needle
- Sterile 2- × 2-inch gauze
- Sterile drapes (helpful, but not required)
- Scalpel (#11 blade preferred)
- Sterile forceps (straight and curved mosquito)
- Sterile skin closure strips (¼ inch)
- Adhesive bandage, pressure bandage (optional)
- Mild analgesics (nonsteroidal antiinflammatory drug or similar, if desired)

TECHNIQUE

Note that the following technique does not exactly match that recommended by the manufacturer (eg, making use of pressure bandage optional). Should a question arise, the manufacturer's procedure should be consulted.

Following informed consent, the patient should lie in the supine position with the implant-bearing arm elevated, flexed at the elbow, externally rotated and extended to approximately 90-degree angle from the body. The hand should rest comfortably at the level of the head. Some authors advocate having the arm extended, but mechanical support for the arm during the procedure may be difficult. The contraceptive implant should be palpated to identify any potential problems. If the rod is not palpable, the procedure must be postponed until the location can be determined by imaging studies.

The skin over the implant and surrounding area should be disinfected. The proximal (axillary) end of the contraceptive rod should be depressed or pushed distally to make the distal end apparent. Local anesthesia should be established by injecting 0.5–1 mL of local anesthetic just below the distal end, elevating

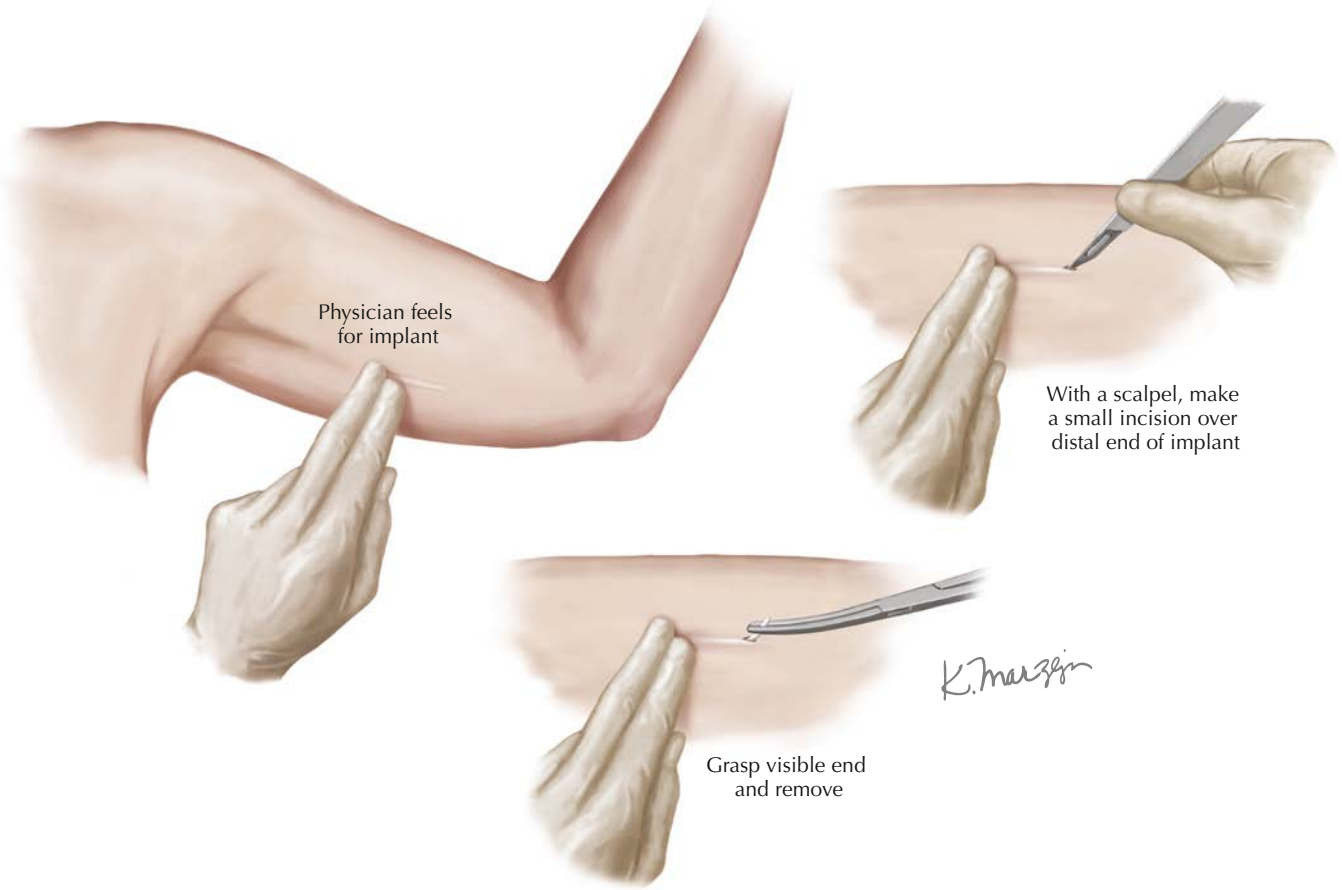

Figure 290.1 Subdermal contraceptive capsule removal

it slightly. Too much volume or injection above the rod will make removal difficult.

With the distal end of the implant again placed under outward and upward pressure, a 2- to 3-mm longitudinal skin incision is made over the end of the rod. The incision is deepened until a rubbery sensation against the point of the scalpel blade is felt (the rod encased in a fibrous sheath). While taking care not to cut the rod itself, this sheath should be scraped or incised, exposing the rod itself. The rod then may be expelled by further pressure on the proximal end, or it may be grasped at its end using a hemostat. If a hemostat is used, the rod should not be grasped significantly back from the tip because this can result in fracture of the rod, spill of contents, creation of fragments, or incomplete removal. If the distal end is not readily delivered through the incision, the curved hemostat may be burrowed below the rod tip to facilitate delivery and scar tissue removal. Additional local anesthesia or extension of the incision is occasionally required. Complete removal of the 40-mm rod should be confirmed. If the patient wants to continue to use contraceptive implants, the new rod may be inserted through the same incision that was used for removal (with the addition of appropriate anesthesia) or the new implant can be placed in the other arm.

A sterile adhesive closure of the incision should be placed, and a sterile dressing or adhesive bandage should be applied. A pressure bandage may be placed for the first 24 hours, if desired. The procedure should be documented in the chart. Although post-removal discomfort is relatively minor, mild analgesics may be offered. The hormonal effects of the implant end promptly with removal; circulating levels of etonogestrel are undetectable in 1 week, and more than 90% of women ovulate within 3–4 weeks of removal.

COMPLICATIONS

Complications occur in 0.2%–1.7% of removals. Local bruising, hematoma, infection, local irritation or rash, neural or vascular injury (removal of deep insertion), and allergic reaction.

FOLLOW-UP

Based on the alternative contraception plans, if any.

CPT CODE(S)

11976 Removal, implantable contraceptive capsules
11983 Removal with reinsertion, nonbiodegradable drug delivery implant

REFERENCES

Level II

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Level III

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TRANSVAGINAL ULTRASONOGRAPHY

291

DESCRIPTION

Transvaginal (also called endovaginal) ultrasonography is a technique for ultrasonographic visualization of the uterus and adnexa using an ultrasonographic probe placed in the vaginal canal. The superior resolution of transvaginal ultrasonography derives from the proximity of the ultrasonographic transducer, and the higher frequencies of sound waves used by these devices. In some cases, this resolution may be as small as 0.2 mm. The tradeoff of this higher resolution is a smaller field of view.

INDICATIONS

Any situation in which the imaging of the pelvic organs is appropriate and greater resolution than that possible with transabdominal approaches is desirable. Typical gynecologic indications include the determination of the uterine size, shape, and orientation; evaluation of the endometrium, myometrium, and cervix; identification and morphology of ovaries, assessment of the uterus and adnexa for masses, cysts, hydrosalpinges, and fluid collections; and evaluation of the cul-de-sac for free fluid or masses. Common obstetric indications include the assessment of cervical length, placental location, or the evaluation of fetal parts low in the pelvis. Obesity can complicate transabdominal ultrasonography but does not generally affect transvaginal studies.

CONTRAINDICATIONS

Known or suspected allergy to latex, unwillingness or inability to tolerate the vaginal probe.

REQUIRED EQUIPMENT

- Sheath for the ultrasonographic probe (condom, glove, or similar)
- Ultrasonographic coupling media (gel)
- Appropriate ultrasonographic equipment and probe

TECHNIQUE

The patient should be placed in the dorsal lithotomy position with an empty bladder (for most studies). The vaginal probe should be lubricated with an ultrasonographic coupling media (gel), and the probe should be inserted into an appropriate covering sheath such as a condom. This sheath may be further lubricated with a water-soluble lubricant to facilitate its insertion into the vagina. It may also be more comfortable for the patient if she inserts the probe herself. The sheath-covered probe is gently advanced up the vaginal canal until it rests against the cervix. Alternatively, the probe may be brought to rest in the anterior, posterior, or one of the lateral vaginal fornices, depending on the anatomic area of greatest interest.

The pelvic structures should be surveyed in a systematic manner by rocking the probe up and down, left and right so that all structures are fully seen. Rotating the probe 90 degrees to the right or left will change the plane of observation, further facilitating a full evaluation. Some ultrasonographic equipment is capable of forming three-dimensional renderings of the anatomy seen, but its superiority over other modalities remains to be demonstrated.

COMPLICATIONS

A small amount of discomfort (pelvic or vaginal fullness) may be experienced during the procedure, but this is considered normal.

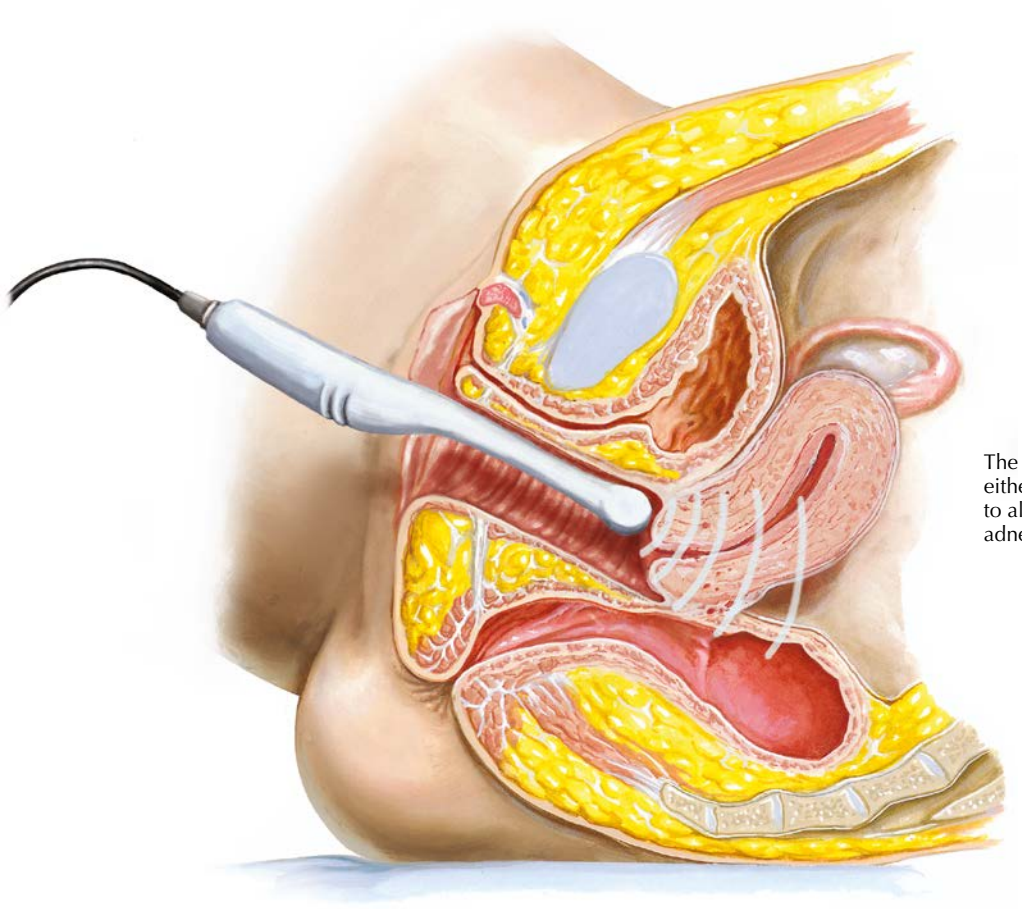
FOLLOW-UP

Based on the indications.

CPT CODE(S)

76830 Ultrasound, transvaginal

76817 Ultrasound, pregnant uterus, real time with image documentation, transvaginal



The ultrasonographic probe is placed in either the anterior or posterior cul-de-sac to allow detailed views of the uterus, adnexa, and adjacent structures.

Figure 291.1 Transvaginal ultrasonography

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TRIGGER POINT INJECTION

292

DESCRIPTION

Injection of steroids or local anesthetics into selected fascial and subcutaneous locations thought to give rise to pain and other symptoms. Response to trigger point injection routinely persists longer than the duration of action of the agent used. This frequently extends to permanent relief after only one or two anesthetic injections. Because of the rapid response to trigger point injections, they can be useful as a diagnostic tool.

INDICATIONS

A "trigger point" that induces or reproduces the patient's pain complaints. Musculoskeletal pain frequently radiates or is referred to areas distant from the source of the nociceptive signal. Trigger points are hypersensitive areas overlying muscles that induce muscular spasms and pain. They may be found throughout the body but are most common in the abdominal wall, back, and pelvic floor when pelvic pain is the complaint. Myofascial pain syndromes and fibromyalgia frequently demonstrate trigger point involvement.

CONTRAINDICATIONS

Known or suspected allergies to any of the agents used (latex, skin preparation materials, etc.), active skin infection, uncorrected blood dyscrasias.

REQUIRED EQUIPMENT

- Antiseptic solution and sterile cotton balls, or skin preparation swabs
- Local anesthetic (eg, lidocaine, 1% without epinephrine, 2–5 mL, 0.25% bupivacaine may also be used), 3–5 mL syringe, 25-gauge needle
- 22-gauge needle (1–1.5 inch), an 18-gauge needle if a multidose vial is used
- 2.5- to 10-mL syringe for anesthetic infiltration
- Alcohol wipes
- Sterile gloves (optional)
- Ice or ethyl chloride spray
- Skin marking pencil (optional)

Pelvic floor trigger points can be injected using a pudendal anesthesia kit.

TECHNIQUE

The presence of a trigger point and the point of maximal tenderness must be established before any consideration of injection therapy. Most trigger points are located at or near areas of moving or sliding muscle surfaces, though they are not limited to these locations. Gentle palpation over the various muscle groups of the body is carried out using the flat of the hand or the fingertips. Trigger points may occur in skin, ligaments, or periosteum in addition to muscles

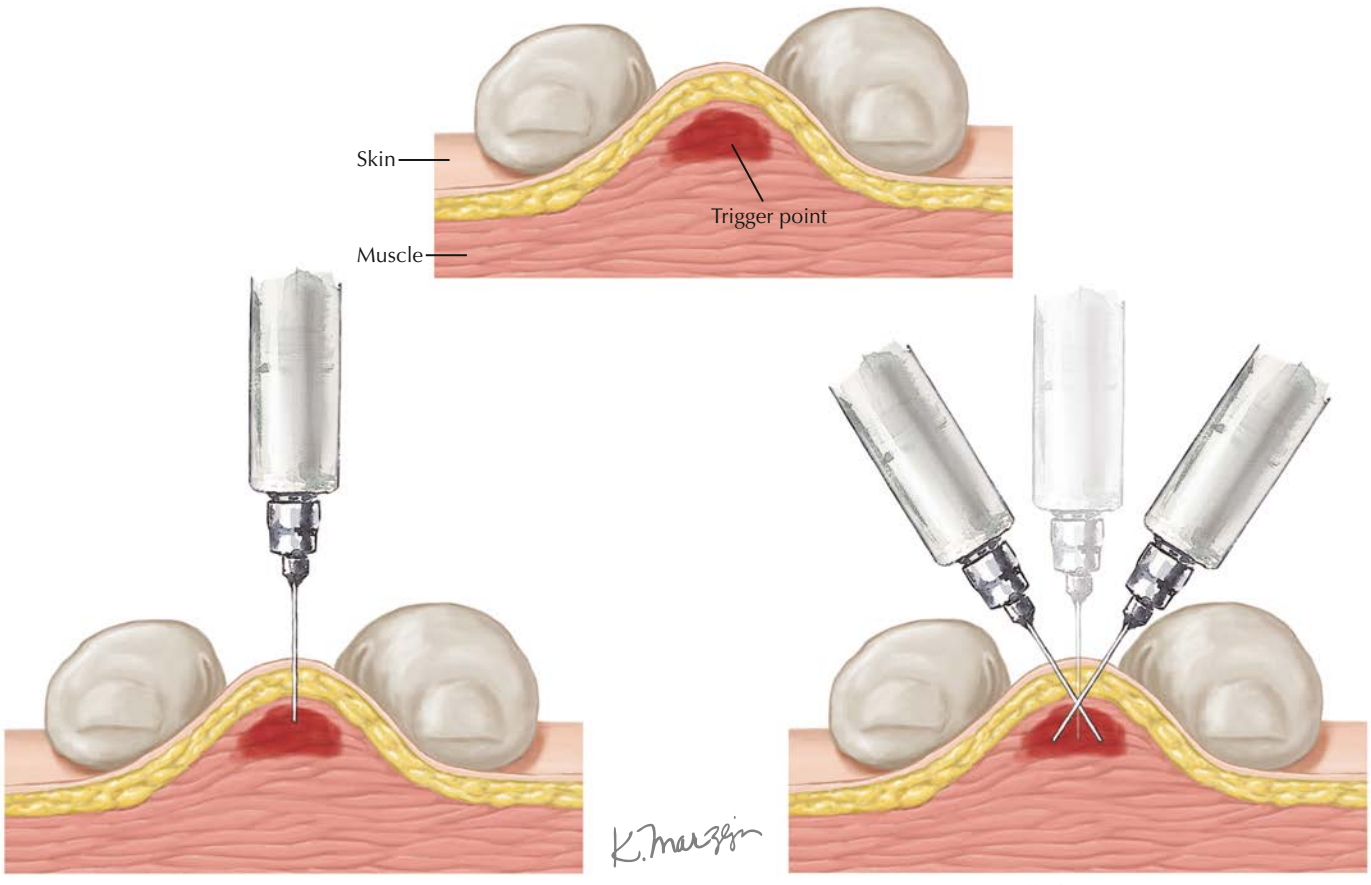

Figure 292.1 Trigger point injections

themselves; an area that is a trigger point often will be felt as an overly taut band of muscle. Compression of this site will elicit local tenderness and often reproduce the referred pain. Normal muscle should not be tender to firm compression and does not contain taut bands. The site of maximal tenderness should be noted, and this site may be marked with a skin marking pencil if desired. When evaluating possible trigger points in the lower abdominal wall, care must be taken to specify the origin of the tenderness elicited. This is especially true during bimanual pelvic examination. It should be apparent that tenderness is arising from the abdominal wall and not the uterus, adnexa, bladder, or bowel. To aid in this differentiation, ask the patient to lift her head and shoulders off the table or raise her heels with her legs straight. Pain arising from the abdominal wall will worsen with this maneuver, whereas visceral pain may improve. The diagnosis of a trigger point is established solely on clinical grounds. There are no laboratory or imaging studies that will assist in the diagnosis.

A 22-gauge needle is selected for trigger point injection because of the amount of movement within tissue often required to probe for and block a taut muscle bundle. Thinner needles may bend or break under these circumstances. The length of the needle should be sufficient to allow the entire trigger point to be reached without indenting the skin or having the hub at the skin surface. The former will unduly distort landmarks and findings, and the latter avoids the possibility of a lost needle should the needle break or become separated from the hub during the injection maneuvers.

The patient should be made comfortable and warned that the process of injection may cause a very brief worsening of the referred pain. The skin over the point of maximal tenderness should be disinfected using a skin disinfecting agent or an alcohol wipe. Ice or a spray type topical anesthetic (eg, ethyl chloride) may be used to numb the skin prior to needle insertion, if desired. The skin should be held taut, and the needle inserted quickly at an acute angle to minimize discomfort. Skin tension should be maintained to minimize bleeding.

Once the needle has been inserted beneath the skin, the tip should be used as a probe to identify the taut band of muscle responsible for the patient's symptoms. Injection will be less successful if this band is not identified and specifically injected. With the needle at or in the taut muscle band, gentle aspiration should be performed to ensure against intravascular injection, and a small amount (1–3 mL) of anesthetic agent is then injected. The needle should then be moved from side to side of this original location, repeating the injection sequence. No more than 10 mL of any anesthetic agent should be used in one spot and no more than 30–40 mL used during any one session. Trigger points will often respond promptly to therapy, providing immediate feedback to confirm the diagnosis.

COMPLICATIONS

The most common complications of trigger point injection are local ecchymoses and anesthetic agent toxicity. The latter is best avoided by strictly limiting the total dose administered. Infection is rare if the skin is first disinfected and areas of frank infection avoided.

FOLLOW-UP

Based on the indications and findings.

CPT CODE(S)

11900 Injection, intralesional; up to and including seven lesions
11901 Injection, intralesional; more than seven lesions
20550 Injection(s); single tendon sheath, or ligament, aponeurosis (eg, plantar "fascia")

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URODYNAMIC TESTING: COMPLEX

293

DESCRIPTION

Complex urodynamic testing involves the measurement of bladder function that is conducted using specialized equipment or techniques.

INDICATIONS

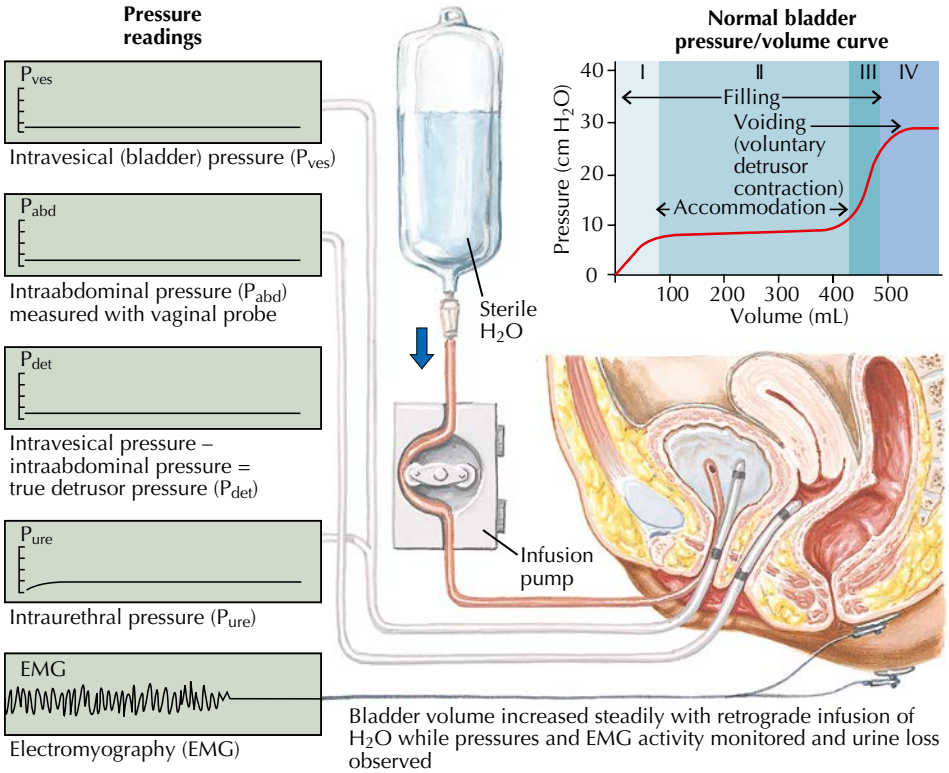
Urinary incontinence (stress, urge, mixed, overflow). May be used as an adjunct to the evaluation of interstitial cystitis or other urinary complaints.

CONTRAINDICATIONS

Active bladder infection. Known or suspected allergy to cleansing solutions or local anesthetics to be used.

REQUIRED EQUIPMENT

- Sterile gloves, antiseptic solution and sterile cotton balls, or skin preparation swabs
- Sterile urine specimen cup (with gradations)
- 12- or 14-French straight catheter



Bladder volume increased steadily with retrograde infusion of H_2O while pressures and EMG activity monitored and urine loss observed

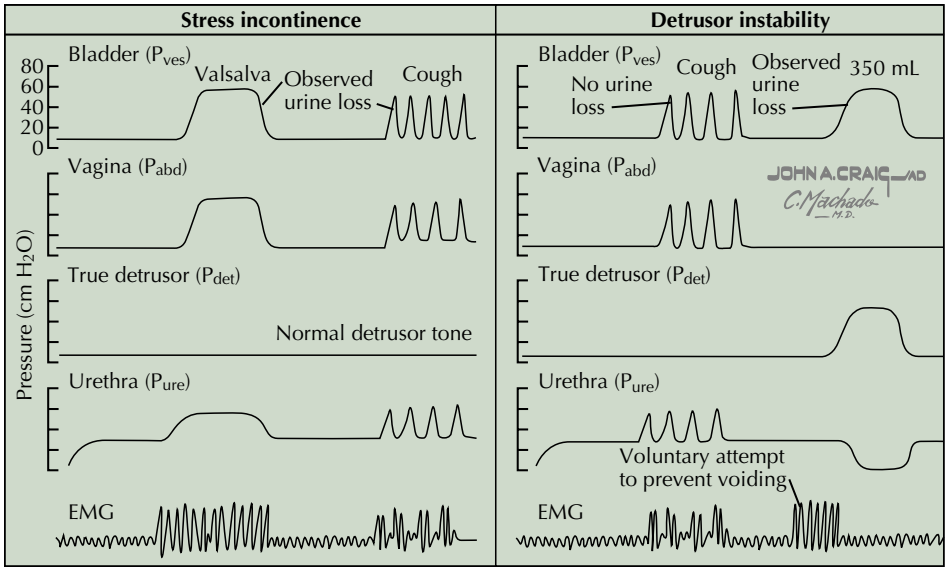


Figure 293.1 Urodynamics: complex

- 1 L of sterile saline (intravenous fluid without glucose is generally used) at room temperature
- 2% lidocaine jelly in a mushroom-tipped syringe (optional)
- Intravenous or pump tubing (based on the specifics of the equipment used)
- Absorbent underpads
- Urodynamics testing unit (includes recording device, fluid pump, catheter puller, uroflowmetry commode)
- Printer for urodynamics reports
- An assistant is advantageous.

If Cystoscopy Is to Be a Part of the Procedure

- Cystoscope (rigid or flexible, direct viewing or with a 30-degree or greater down-angle view; the latter is better for visualizing the bladder trigone and ureteral openings)
- Fiberoptic light source (compatible with type of cystoscope used)
- Fiberoptic light cord

TECHNIQUE

Immediately before the procedure is initiated, the patient is asked to empty her bladder (in private and in her usual manner). The patient is placed in the dorsal lithotomy position, and the external urinary meatus and surrounding vulvar vestibule are cleansed with an antiseptic solution. Then, 1–3 mL of topical anesthetic, such as 2% lidocaine, is introduced into the urethra. The procedure should be delayed for 5–15 minutes to enable full anesthesia.

With sterile technique, the patient is catheterized using a straight catheter, and any residual urine is collected, measured for volume, and sent for culture (if appropriate). The catheter is then removed.

A catheter-tip microtransducer or other pressure-recording catheter (specific to the equipment being used) is introduced into the bladder to record bladder and urethral pressure. A reference catheter is placed either in the vaginal or rectal canal to infer intraabdominal pressure. These catheters are secured by tape to the patient's thigh and attached to the urodynamic unit. The bladder is filled in a controlled manner (approximately 50 mL/min) using the pumping system supplied with the urodynamic equipment. The patient's first sensation of bladder fullness, the occurrence of a sense of urgency, and maximal bladder capacity are noted, and the patient is asked to cough several times. The resulting spikes in bladder and urethral pressures that occur are recorded, along with any urinary leakage. Leakage that occurs immediately after the cough is prolonged, is associated with an increase in true bladder pressure, or is of large volume suggests detrusor instability.

If leak point pressures are to be measured, the volume of the bladder must be adjusted to 200 mL and the pressure catheter must be no greater than 10 French in size. The true detrusor pressure is calculated by the subtraction of the reference pressure (from the vagina or rectum) from the pressures recorded from the urethra and bladder. The urodynamics equipment itself generally automatically performs this subtraction. The patient is asked to strain, and the pressure at which leakage occurs (if any) is noted.

Pressure measurements conclude with the reference pressure catheter being removed and urethral profilometry being performed. This is accomplished using the machine's catheter puller to remove the bladder catheter at a known rate while continuous pressures are recorded. Thus, pressure profiles are compiled by the urodynamic equipment; this may be repeated while the patient coughs to obtain a dynamic profile.

Cystoscopy is commonly performed as a part of complex urodynamic testing and is conducted at this point in the testing process.

Uroflowmetry is performed using the urodynamic equipment's commode, which is equipped to measure flow rate, volume, and time. These are automatically recorded and displayed in formats that are determined by the specific equipment.

Cystometrics is associated with a false-negative rate of approximately 50% and a false-positive rate of 15% in cases of urge incontinence.

COMPLICATIONS

Urinary tract infection, hematuria, dysuria, urinary retention.

FOLLOW-UP

Based on the indications and findings.

CPT CODE(S)

51726 Complex urodynamics
51772 Urethral profilometry
51741 Complex uroflowmetry

REFERENCES

Level II

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URODYNAMIC TESTING: SIMPLE

DESCRIPTION

Simple urodynamic testing involves the measurement of bladder function that is conducted using simple equipment readily found in an office setting.

INDICATIONS

Urinary incontinence (stress, urge, mixed, overflow). May be used as an adjunct to the evaluation of interstitial cystitis or other urinary complaints.

CONTRAINDICATIONS

Active bladder infection. Known or suspected allergy to cleansing solutions or local anesthetics to be used.

REQUIRED EQUIPMENT

- Sterile gloves, antiseptic solution and sterile cotton balls, or skin preparation swabs
- Sterile urine specimen cup (with gradations)
- 12- or 14-French straight catheter
- Large catheter-tip syringe (without piston) or "Asepto" surgical irrigation syringe (without bulb)
- 1 L of sterile water or saline (intravenous fluid without glucose is sufficient) at room temperature
- Intravenous tubing and measuring tape or ruler, or spinal manometer
- Commode or toilet
- Stopwatch or watch that allows counting of seconds
- Absorbent underpads
- 2% lidocaine jelly in a mushroom-tipped syringe (optional)
- An assistant is advantageous.

TECHNIQUE

Immediately before the procedure is started, the patient is asked to empty her bladder (in private and in her usual manner). The patient is placed in the dorsal lithotomy position, and the external urinary meatus and surrounding vulvar vestibule are cleansed with an antiseptic solution. Then, 1–3 mL of topical anesthetic, such as 2% lidocaine, are introduced into the urethra. The procedure should be delayed for 5–15 minutes to enable full anesthesia.

With a sterile technique, the patient is catheterized using a straight catheter, and any residual urine is collected, measured for volume, and sent for culture (if appropriate). The catheter tip or irrigation syringe is attached to the catheter to act as a funnel to fill the bladder with sterile water or saline. With the syringe held no more than 15 cm above the level of the symphysis and the catheter pinched off, fluid is poured into the syringe. The fluid is then allowed to flow by gravity into the bladder at a rate that does not exceed 1–3 mL/sec. This is often best accomplished in aliquots of 50 mL. The patient is asked to report her first sensation of bladder fullness, and the volume infused at that point is noted. Filling continues in 25-mL aliquots until the patient is unable to tolerate more, and this volume is recorded as the maximal bladder capacity. Any upward movement of the fluid column, intense sensation of urgency, or leakage around the catheter is abnormal, suggests detrusor instability, and should be noted.

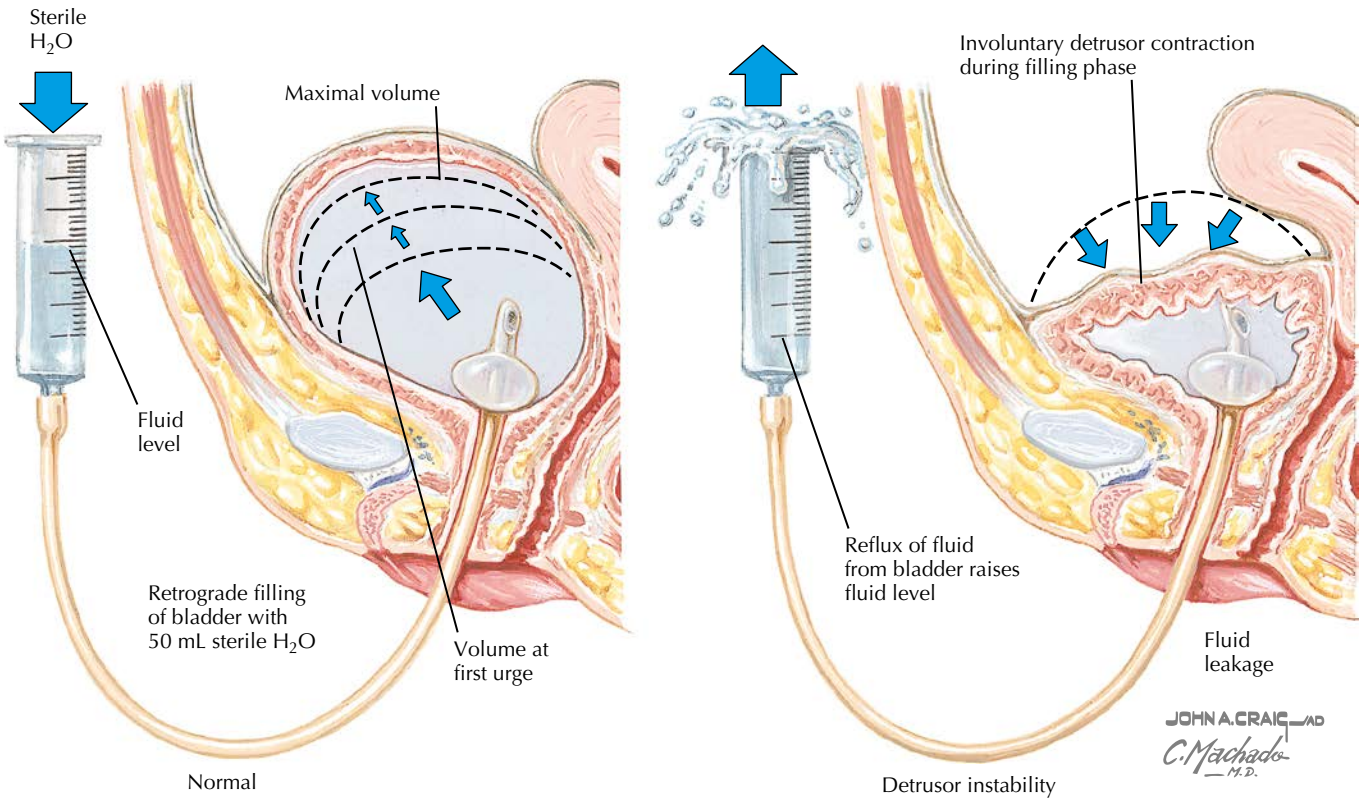

Figure 294.1 Urodynamics: simple

For more exact measurements of bladder function, intravenous tubing, a spinal manometer (or limb of extra tubing), and a three-way connector may be connected to form a water-column manometer. In this configuration, filling proceeds as described with the exception that the pressure inside the fluid column may be directly monitored, and the presence of bladder contractions may be more easily detected. When this greater degree of accuracy is required, many prefer to proceed to formal urodynamic testing rather than commit to the additional preparation and time necessary to assemble this configuration.

Once the bladder has been filled and bladder compliance has been noted, the catheter is next removed and the patient is asked to cough several times. Urinary leakage at the time of cough should be noted. Leakage that occurs immediately after, is prolonged, or is of large volume suggests detrusor instability.

Filling the bladder with 200 mL of fluid and listening to the patient's voiding from outside a bathroom door or while the patient voids behind a screen can provide a simple assessment of voiding. The duration of flow may be timed with a stopwatch.

COMPLICATIONS

Urinary tract infection, dysuria, urinary retention.

FOLLOW-UP

Based on the indications and findings.

CPT CODE(S)

51725 Simple cystometrogram
51736 Simple uroflowmetry

REFERENCES

Level II

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295 VACUUM-ASSISTED BIRTH

DESCRIPTION

Vacuum-assisted birth is a method of assisting or expediting vaginal vertex birth through the application of a vacuum-assist device. Operative vaginal birth can be faster and safer than cesarean birth in many cases. Discussion here is limited to vacuum-assisted births with the fetus presenting within 45 degrees of directly occiput anterior.

INDICATIONS

Fetal—nonreassuring fetal status, acute fetal distress. *Maternal*—fatigue, prolonged second stage of labor (nulliparous women: Lack of continuing progress for 3 hours with regional anesthesia or 2 hours without regional anesthesia; multiparous women: Lack of continuing progress for 2 hours with regional anesthesia or 1 hour without regional anesthesia), certain types of pulmonary, cardiac, or neurologic diseases that preclude pushing.

CONTRAINDICATIONS

Incompletely dilated cervix, significant fetal malpresentation, unengaged fetal head, intact fetal membranes, inability to assess fetal position or obtain maternal cooperation, distorted or contracted maternal pelvic anatomy, gestational age less than 34 weeks, fetal demineralization or clotting disorder, prior scalp sampling, or multiple attempts at fetal scalp electrode placement (relative).

REQUIRED EQUIPMENT

- Standard equipment for spontaneous vaginal birth, including sterile gowns and gloves
- Fetal heart rate monitor
- Vacuum birth device (cephalic cup and vacuum hand pump); vacuum cups may be soft (pliable) or rigid, and the shape may be

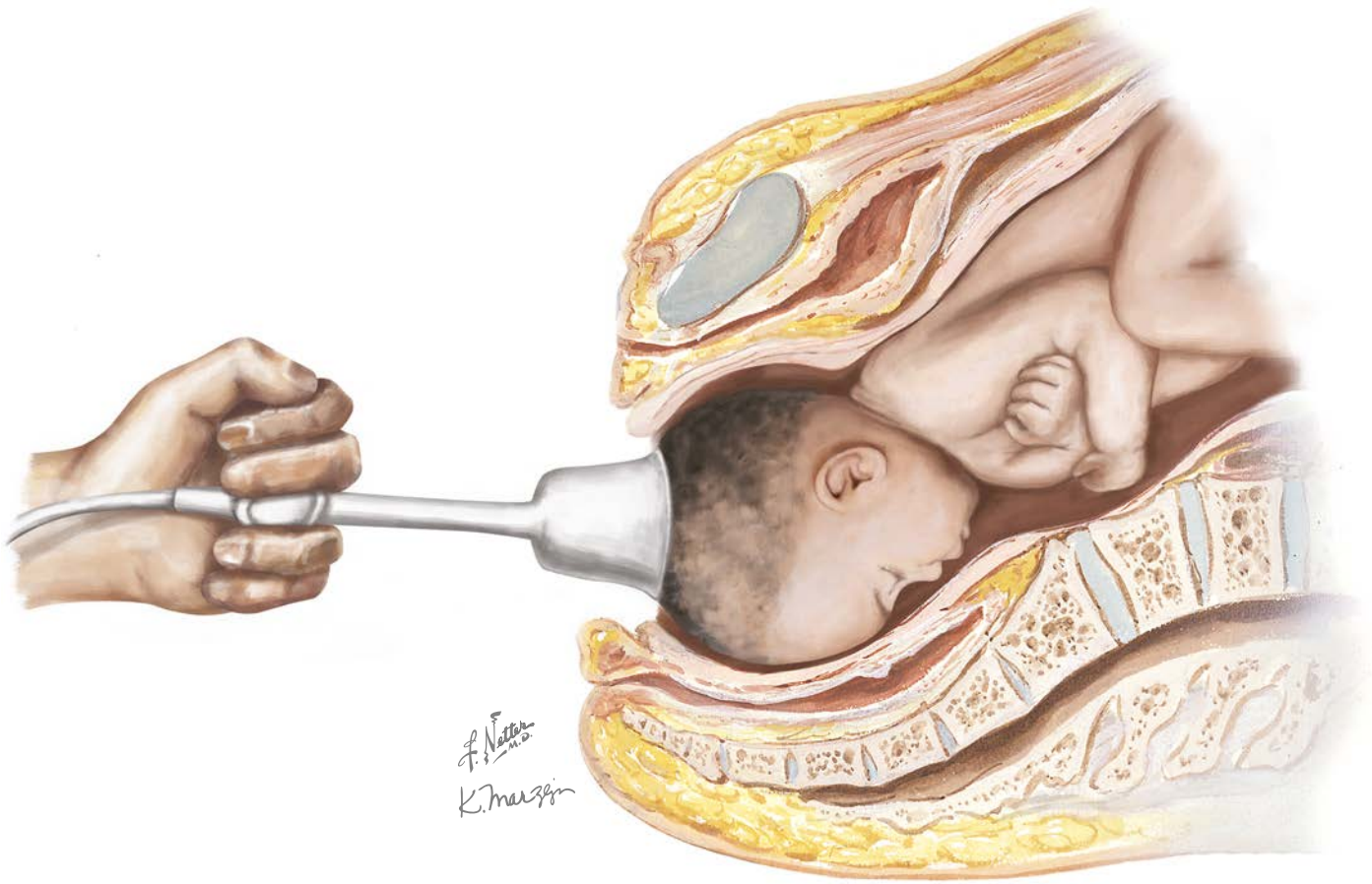

Figure 295.1 Vacuum-assisted birth

domed (bell) or M shaped (Soft cups are generally associated with less fetal trauma but a higher incidence of "pop offs.")

TECHNIQUE

Adequate maternal anesthesia or analgesia should be ensured in all but the most extreme circumstances. Whenever possible, the maternal bladder should be emptied (by catheter). The exact position of the fetal head must be ascertained by the palpation of the sagittal suture and fontanels. There should be an assessment of estimated fetal weight, the clinical adequacy of the maternal pelvis, the fetal station and position, and the adequacy of anesthesia. All other preparations for vaginal birth should be in place before the vacuum device is applied.

Optimal placement of the vacuum cup is over the flexion point of the fetal head. Normally, the flexion point is in the midline, over the sagittal suture, approximately 6 cm from the anterior fontanel and 3 cm from the posterior fontanel. When the center of the vacuum cup is placed over this point, the edges of the cup should be approximately 3 cm from the anterior fontanel and just above the edge of the posterior fontanel.

To place the vacuum cup, the labia are separated and the bell-shaped cup is compressed and inserted into the vagina while the device is angled toward the posterior vagina. If an M-shaped or rigid cup is used, the device is flexed at the base of the shaft and inserted sideways into the vagina while being angled backward.

The cup is placed in contact with the fetal head, with the center of the cup placed over the flexion point. The entire circumference of the cup must then be inspected (visually or by touch) to ensure that no maternal tissues intercede between the cup and the fetal head. The cup should be clear of both fontanels.

After correct placement of the cup is established, vacuum pressure should be increased to 100–150 mm Hg to maintain the cup's position. The edges of the cup should again be swept to ensure placement and that no maternal tissues are entrapped. Just before traction, the vacuum should be increased to between 450 and 600 mm Hg. The maximal suction should not exceed 600 mm Hg.

Traction must be coordinated with maternal expulsive efforts. Traction on the vacuum device begins in a horizontal or slightly downward (axis of the maternal pelvic canal) manner. Rocking movements or torque should not be applied to the device; only steady traction in the line of the birth canal should be used. Traction is gradually applied as the contraction builds and is maintained for the duration of the contraction, coordinated with maternal expulsive efforts. During traction, the stem of the device must be kept perpendicular to the plane of the cup to maintain the seal with the fetal head to reduce the risk for detachment from the scalp. Traction should be gradually discontinued as the contraction ends or the mother stops pushing. Between contractions, suction pressure can be fully maintained or reduced to less than 200 mm Hg; fetal morbidity is similar either way. To mimic the normal birth process, traction in the horizontal plane continues until the descending fetal head distends the vulva. An episiotomy may be performed at this point, though it should not be routinely used.

As the fetal head further distends the vulva, the axis of traction is gradually rotated upward, following the normal extension process of the head as it rotates under the symphysis. Once the brow is palpable through the perineum, the suction may be released and the vacuum cup removed, allowing the fetal head to be delivered by pressure on the perineum (modified Ritgen maneuver). More often the cup may be left in place until the fetal chin has cleared the perineum. The remainder of the birth proceeds as with a spontaneous birth.

COMPLICATIONS

It is difficult (if not impossible) to separate the effects of vacuum-aided vaginal birth from those of spontaneous vaginal birth. Randomized trials and meta-analysis studies have failed to show conclusive differences. Both forceps birth and vacuum extraction have been associated with the development of maternal hematomas and possibly linked to pelvic floor injury. However, other factors associated with pelvic floor injury include normal spontaneous vaginal birth, episiotomy, prolonged second stage of labor, and increased fetal size. Similarly, studies have failed to identify neonatal or fetal injuries or developmental abnormalities that can be directly linked to vacuum-assisted birth. Fetal scalp lacerations, cephalohematoma (14%–16%), subgaleal (subaponeurotic) hematoma (26–45/1000), intracranial hemorrhage, hyperbilirubinemia, and retinal hemorrhage are all possible. The higher rates of neonatal jaundice associated with vacuum birth may be related to the higher rate of cephalohematoma. Overall, the incidence of serious complications with vacuum birth is approximately 5%. There is a greater risk of failure to deliver the fetus vaginally with vacuum-assisted techniques that with forceps methods.

CPT CODE(S)

59400 Routine obstetric care including antepartum care, vaginal delivery (with or without episiotomy, and/or forceps), and postpartum care

59610 Routine obstetric care including antepartum care, vaginal delivery (with or without episiotomy, and/or forceps), and postpartum care, after previous cesarean delivery

59409 Vaginal delivery only (with or without episiotomy and/or forceps)

59410 Vaginal delivery only (with or without episiotomy and/or forceps), including postpartum care

59612 Vaginal delivery only, after previous cesarean delivery (with or without episiotomy and/or forceps)

59614 Vaginal delivery only, after previous cesarean delivery (with or without episiotomy and/or forceps), including postpartum care

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Level III

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