McCance: Pathophysiology, 6th Edition

Chapter 23: Alterations of the Reproductive Systems

Key Points – Print

SUMMARY REVIEW

Alterations of Sexual Maturation

1. Sexual maturation, or puberty, should begin in girls between ages 8 and 13 years and in boys between ages 9 and 14 years. Delayed puberty is the onset of sexual maturation after these ages; precocious puberty is onset before these ages. The average age of puberty has been occurring earlier than previously defined for girls.
2. Alterations of sexual maturation can be idiopathic or caused by a disease or congenital anomaly. In most cases of delayed puberty, the hypothalamic-pituitary-gonadal axis is intact but the surge of activity that stimulates puberty is delayed. This situation is common in boys. Precocious puberty, more common in girls, also can be caused by mistiming of the stimulatory surge in a child whose HPO system is otherwise normal.
3. Precocious puberty can be complete (sex appropriate), mixed (not sex appropriate), or partial (development of one secondary sex characteristic only). Causes of delayed or incomplete puberty can be divided into categories based on gonadotropic secretion: hypergonadotropism (increased levels of FSH and LH), and hypogonadotropism (decreased LH and FSH levels).

Disorders of the Female Reproductive System

1. The female reproductive system can be altered by hormonal imbalances, infectious microorganisms, inflammation, structural abnormalities, and benign or malignant proliferative conditions.
2. Menstrual disorders usually involve some disruption of the HPO axis and subsequent alteration of hormone production, reception by target organs, or feedback mechanisms.
3. Primary dysmenorrhea is painful menstruation not associated with pelvic disease. It results from excessive synthesis of prostaglandins, which cause the myometrium to contract and constrict blood vessels, resulting in ischemic pain.
4. Primary amenorrhea is the continued absence of menarche and menstrual function by 14 years of age without the development of secondary sex characteristics or by age 16 years if these changes have occurred.
5. Secondary amenorrhea is the absence of menstruation for a time equivalent to more than three cycles or 6 months in women who have previously menstruated. Secondary amenorrhea is usually associated with anovulation.
6. Categorization of amenorrhea as primary or secondary has no clinical significance. Instead, amenorrhea is divided into compartments that reflect the underlying disorder: compartment I, disorders of the outflow tract or uterine target organ; compartment II, disorders of the ovary;

compartment III, disorders of the anterior pituitary; and compartment IV, disorders of the CNS or hypothalamic factors.

7. DUB is heavy or irregular bleeding caused by a disturbance of the menstrual cycle.
8. PCOS is a difficult syndrome to diagnose because several factors are involved. It is a syndrome when at least two of the following are present: oligo-ovulation or anovulation, elevated levels of androgens, or clinical signs of hyperandrogenism and polycystic ovaries. Prolonged anovulation leads to infertility, menstrual bleeding disorders, hirsutism, acne, endometrial hyperplasia, cardiovascular disease, and diabetes mellitus in women with hyperinsulinemia.
9. PMS is the cyclic recurrence of physical, psychologic, or behavioral changes distressing enough to disrupt normal activities or interpersonal relationships. More than 200 emotional, physical, and behavioral symptoms have been attributed to PMS. Emotional symptoms, particularly depression, anger, irritability, and fatigue, are reported as the most distressing; physical symptoms tend to be less problematic. Treatment is symptomatic and includes self-help techniques, lifestyle changes, counseling, and SSRIs.
10. Infection and inflammation of the female genitalia can result from microorganisms from the environment or overproliferation of microorganisms that normally populate the genital tract.
11. PID is an acute ascending polymicrobial infection of the upper genital tract and is sexually transmitted.
12. Vaginitis, or vaginal infection, is usually caused by sexually transmitted pathogens or *C. albicans*, which causes candidiasis. Development is related to the overall health of a woman and local defense mechanisms, particularly vaginal pH. Variables such as antibiotics, douching, soaps, feminine hygiene sprays, and pregnancy alter vaginal pH or the bactericidal nature of secretions and predispose a woman to infection.
13. Cervicitis, which is inflammation of the cervix, can be acute (mucopurulent cervicitis) or chronic. Its most common cause is a sexually transmitted pathogen.
14. Vulvovestibulitis is an inflammation of the skin of the vulva. It can be caused by chemical and mechanical irritants, allergens, skin disorders, or vaginal infections, such as candidiasis.
15. Bartholinitis, also called Bartholin cyst, is an inflammation of the ducts that lead from the *Bartholin glands* to the surface of the vulva. Inflammation blocks the glands, preventing the outflow of glandular secretions, and is caused by trauma or infection.
16. Pelvic organ prolase—uterine prolapse, cystocele, rectocele, and urethrocele—are caused by loss of support provided by the pelvic muscles and fascia. Age and pelvic trauma are associated. Women with a familial or genetic predisposition have a higher risk.
17. Benign growths and proliferative conditions of the female reproductive tract tend to affect the ovaries (benign ovarian cysts) or uterine tissues (endometrial polyps, leiomyomas, and endometriosis).
18. Benign ovarian cysts develop from mature ovarian follicles that do not release their ova (follicular cysts) or from a corpus luteum that persists abnormally instead of degenerating (corpus luteum cyst). Cysts usually regress spontaneously.

19. Endometrial polyps are overgrowths of endometrial tissue and often cause abnormal bleeding in the premenopausal woman.
20. Leiomyomas, also called *uterine fibroids,* are tumors arising from the muscle layer of the uterus, the myometrium. Incidence increases in women between ages 30 and 50; most myomas remain small and asymptomatic. Adenomyosis is the presence of endometrial glands and stroma within the uterine myometrium.
21. Endometriosis is the presence of functional endometrial tissue (i.e., tissue that responds to hormonal stimulation) at sites outside the uterus. Endometriosis causes an inflammatory reaction at the site of implantation and is a cause of infertility.
22. Most cancers of the female genitalia involve the uterus (particularly the cervix) and the ovaries. Cancer of the vagina is rare.
23. Infection with high-risk HPV is a necessary precursor to developing CIN and cervical cancer. Smoking, immunosuppression, and poor nutrition are cofactors. HPV vaccination can substantially reduce the risk of cervical cancer.
24. Cervical cancer arises from the cervical epithelium and is considered a sexually transmitted disease. The progressively serious neoplastic alterations are (1) cervical intraepithelial neoplasia (cervical dysplasia), (2) cervical carcinoma in situ, and (3) invasive cervical carcinoma.
25. Risk factors for vaginal cancer are in utero DES exposure and prior or concurrent cervical cancer. Like cervical cancers, vaginal cancers arise from the epithelium and are identified as intraepithelial neoplasia (dysplasia), carcinoma in situ, or invasive carcinoma. Most are secondary in nature. Mean age is 55 years for invasive cancer, 45 years for precursor lesions.
26. The major risk for vulvar cancer is a history of HPV infection or squamous dysplasia of the vagina or cervix. Symptoms include chronic vulvar irritation, pruritus, bloody discharge, and a hard, ulcerated area of the vulva or large cauliflower lesions. Peak incidence is in postmenopausal women, but women age 40 years or younger can be affected.
27. Endometrial cancer is the most common cancer of the pelvic region. Risk factors for endometrial cancer include unopposed estrogen exposure, obesity, infertility, failure to ovulate, early menarche or late menopause, and tamoxifen. Oral contraceptive use protects against endometrial and ovarian cancers. Peak incidence occurs at 58 to 60 years of age, approximately 10 years later than peak incidence of precursor lesions.
28. Risk factors for ovarian cancer include early menarche, late menopause, nulliparity, use of fertility drugs, and associations with breast cancer–susceptibility genes. Ovarian cancer causes more deaths than any other genital cancer in women.
29. Awareness of sexual dysfunction is relatively new. Chronic illness, medications, infection, sexual trauma, and a variety of psychosocial concerns have been implicated as causes.
30. Infertility, or the inability to conceive after 1 year of unprotected intercourse, affects approximately 15% of all couples. Fertility can be impaired by factors in the male, female, or both partners.

Disorders of the Male Reproductive System

1. Disorders of the urethra include urethritis (inflammation of the urethra) and urethral strictures (narrowing or obstruction of the urethral lumen caused by scarring).
2. Although noninfectious urethritis can occur, most cases of urethritis result from sexually transmitted pathogens. Symptoms of urethritis include dysuria, frequency, urgency, urethral tingling or itching, and clear or purulent discharge. Treatment consists of appropriate antibiotic therapy and avoidance of future chemical or mechanical irritation.
3. Acquired or congenital scarring that causes urethral stricture can be caused by trauma or by severe or untreated urethral infection. The primary symptom is diminished force and caliber of the urinary stream; other symptoms include urinary frequency and hesitancy, mild dysuria, double urine stream or spraying, and postvoiding dribbling. Treatment is usually surgical.
4. Phimosis and paraphimosis are penile disorders involving the foreskin (prepuce). In phimosis the foreskin cannot be retracted over the glans. In paraphimosis the foreskin is retracted and cannot be returned to its normal anatomic position over the glans. Phimosis is caused by poor hygiene and chronic infection and can lead to paraphimosis. Paraphimosis can constrict the penile blood vessels, preventing circulation to the glans.
5. Peyronie disease consists of fibrosis, affecting the corpora cavernosa, which causes penile curvature during erection. Fibrosis prevents engorgement on the affected side, causing a lateral curvature that can prevent intercourse.
6. Priapism, a prolonged painful erection not stimulated by sexual arousal, is a urologic emergency. The corpora cavernosa (but not the corpus spongiosum) fills with blood that does not drain out, probably because of venous obstruction. Priapism is associated with spinal cord trauma, sickle cell disease, leukemia, and pelvic tumors. It can also be idiopathic.
7. Balanitis is an inflammation of the glans penis and usually occurs in conjunction with posthitis. It is associated with phimosis, inadequate cleansing under the foreskin, skin disorders, and infections.
8. Cancer of the penis is rare; major risk factors include HPV, smoking, and consequences of treatment for psoriasis. Penile carcinoma in situ tends to involve the glans; invasive carcinoma of the penis involves the shaft as well.
9. A varicocele is an abnormal dilation of the veins within the spermatic cord caused by either congenital absence of valves in the internal spermatic vein or acquired valvular incompetence.
10. A hydrocele is a collection of fluid between the testicular and scrotal layers of the tunica vaginalis. Hydroceles can be idiopathic or caused by trauma or infection of the testes.
11. A spermatocele is a cyst located between the testis and epididymis that is filled with fluid and sperm.
12. Cryptorchidism is a congenital condition in which one or both testes fail to descend into the scrotum. Treated or untreated cryptorchidism is associated with infertility and a significantly increased risk of testicular cancer.

13. Testicular torsion is the rotation of a testis, which twists blood vessels in the spermatic cord. This interrupts blood supply to the testis, resulting in edema and, if not corrected within 4 to 6 hours, necrosis and atrophy of testicular tissues.
14. Orchitis is an acute inflammation of the testes. Pathogenic organisms may reach the testes through the blood or the lymphatics; most commonly, they reach the testes by ascending through the vas deferens and epididymis. Complications of orchitis include hydrocele and atrophy. Granulomatis orchitis, an autoimmune disease, is a nonspecific, noninfectious, inflammatory process that occurs in middle-aged men.
15. Testicular cancer is the most common malignancy in males ages 15 to 35 years. Although its cause is unknown, high androgen levels, genetic predisposition, and a history of cryptorchidism, trauma, or infection may contribute to tumorigenesis. Most testicular neoplasms are germ-cell tumors.
16. Epididymitis, an inflammation of the epididymis, is usually caused by a sexually transmitted pathogen that ascends through the vasa deferentia from an already infected urethra or bladder.
17. BPH is enlargement of the prostate gland. Symptoms are obstructive or irritative in nature and include urge to urinate often, delay in starting urination, and decreased force of stream. BPH can be treated surgically, with laser therapy, microwave thermotherapy, or medications.
18. Prostatitis can be bacterial or nonbacterial and chronic or acute. Bacterial prostatitis is an infection of the prostate. Acute bacterial prostatitis causes an inflammatory response in which the prostate becomes enlarged, tender, and firm. Chronic bacterial prostatitis is recurrent prostatic infection that eventually causes fibrosis. Nonbacterial prostatitis is prostatic inflammation without evidence of bacterial infection.
19. Prostate cancer is the most common cancer in American men, and the incidence varies greatly worldwide. Possible causes involve dietary and hormonal factors, obesity, and age. Only nutrition seems to explain the differences in global incidence. Incidence is greatest among northwestern European and North American men (particularly blacks) older than 65 years.
20. Most cancers of the prostate are adenocarcinomas that develop at the periphery of the gland. Because there are no early symptoms, disease is often advanced at the time of diagnosis.
21. A multifactorial model of prostate carcinogenesis includes (1) androgens act as tumor promoters through receptor mechanisms; (2) to enhance endogenous DNA toxic carcinogens, including ROS and reactive estrogen metabolites and estrogen; and (3) unknown environmental carcinogens. In addition, there are changes in the balance between autocrine/paracrine growth promoting and inhibiting factors, such as IGFs.
22. The microenvironment fuels the metastatic growth of prostate cancer.
23. Sexual dysfunction in males can be caused by any physical or psychologic factor that impairs erection, emission, or ejaculation. Impairment can be caused by a number of physiologic, psychologic, and emotional factors.
24. Spermatogenesis (sperm production by the testes) can be impaired by disruptions of the hypothalamic-pituitary-testicular [AU1]axis that reduce testosterone secretion and by

testicular trauma or atrophy from any cause. Sperm production is also impaired by neoplastic disease, cryptorchidism, or any factor that causes testicular temperature to rise.

25. Sperm quality is impaired by chromosomal abnormalities resulting from genetic factors, irradiation, or toxins. Sperm motility can be impaired by unfavorable constituents or characteristics of semen.

Disorders of the Breast

1. Most disorders of the breast are disorders of the mammary gland, that is, the female breast.
2. Galactorrhea, or inappropriate lactation, is the persistent secretion of a milky substance by one or both breasts in nonpregnant, nonlactating women. Its most common cause is nonpuerperal hyperprolactinemia, a rise in serum prolactin levels that is not associated with pregnancy and childbirth. Hyperprolactinemia can be caused by medications, pituitary tumors, hypothyroidism, chronic stress, or persistent and repeated suckling.
3. Numerous benign conditions occur in ducts and lobules in the breast. Benign lesions are broadly classified as (1) nonproliferating breast lesions, (2) proliferative breast disease, and (3) atypical (atypia) hyperplasia.
4. The term *nonproliferative lesions* is used to discriminate such lesions from the “proliferative” changes associated with increased risk of breast cancer.
5. FCC is the most widely accepted term for physiologic nodularity and breast tenderness that waxes and wanes with the menstrual cycle. These changes are nonproliferative. Symptoms affect women ages 30 to 50 and include cyclic bilateral breast tenderness and transient breast lumps.
6. Proliferative breast lesions without atypia are characterized by proliferation of ductal epithelium and/or stroma without cellular signs suggestive of malignancy. These diverse lesions include (1) moderate or florid hyperplasia, (2) sclerosing adenosis, (3) complex sclerosing (radial scar), (4) papillomas, and (5) fibroadenoma.
7. Proliferative breast lesions with atypia include ADH and ALH. ADH is an increased number of cells mostly within the lumen of the terminal ducts. It includes a continuum of changes—cell structure and placement—ranging from an increase in cellularity to features of DCIS. The cells in ALH do not distend more than 50% of the acini within a lobule.
8. Breast cancer is the most common form of cancer in American women and second only to lung cancer as the most frequent cause of cancer death. Most breast cancer occurs in women older than 50 years. The major risk factors for breast cancer are reproductive, such as nulliparity; familial, such as inherited gene syndromes; and environmental and lifestyle, such as radiation exposure. Data on estrogen, estrogen metabolites, and estrogen-dependent growth factors are also implicated.
9. Most breast cancers arise from the ductal epithelium and then may metastasize to the lymphatics, opposite breast, abdominal cavity, lungs, bones, kidneys, liver, adrenal glands, ovaries, and pituitary glands.

10. Pathogenesis of breast cancer probably involves several steps: (1) modification of DNA, (2) growth factors increase the rate of growth, and (3) specific oncogenes that are progressively modified or specific suppressor genes that are lost, leading to metastatic disease. In addition, metastatic growth may be related to resistance to apoptosis and stromal cell interactions with cancer cells.
11. DCIS refers to a malignant heterogeneous group of lesions limited to ducts and lobules. Because not all DCIS lesions progress to invasion or become clinically significant, the main concern is which DCIS lesions become invasive.
12. The first clinical manifestation of breast cancer is usually a small, painless lump in the breast. Other manifestations include palpable lymph nodes in the axilla, dimpling of the skin, nipple and skin retraction, nipple discharge, ulcerations, reddened skin, and bone pain associated with bony metastases.
13. Treatment is based on the extent or stage of the cancer and includes surgery, radiation, chemotherapy, hormone therapy, and biologic therapy.
14. Gynecomastia is the overdevelopment (hyperplasia) of breast tissue in a male. It is first seen as a firm, palpable mass at least 2 cm in diameter located in the subareolar area. Gynecomastia affects 32% to 40% of the male population. Incidence is greatest among adolescents and men older than 50 years.
15. Gynecomastia is caused by hormonal or breast tissue alterations that cause estrogen to dominate. These alterations can result from systemic disorders, drugs, neoplasms, or idiopathic causes.
16. Although breast cancer is relatively uncommon in men, it has a poor prognosis because men tend to delay seeking treatment. Most breast cancers in men are ER+. Incidence is greatest in men in their 60s.