Male Reproductive System
Lecture Objectives

• Describe the peritoneal foldings on the pelvic viscera in the male.
• Describe the male genital organs.
• Describe the relationship, blood supply, innervation, and lymph drainage of all the above.
Male Reproductive System

- **External genitalia:**
  - penis, scrotum (testis, epididymis, ductus deference), & spermatic cord
- **Internal genitalia:**
  - seminal vesicles, ductus deference, ejaculatory duct, prostate & bulbourethral glands
Penis

- Parts: Root & Body
- Root
  - Bulb of the penis
    - Attached in the midline to urogenital diaphragm
    - Traversed by urethra
    - Covered by the bulbospongiosus m.
  - Right & left crura of the penis
    - Attached to the pubic arch
    - Covered by the ischiocavernosus m.
Penis

• Body
  – Corpus spongiosum – ventrally
    • Continuation of the bulb
    • Contains the urethra
    • Ends with glans penis
      – Corona & neck of glans
      – External urethral meatus
  – Corpora cavernosa – dorsally
    • Continuation of the penile crura
    • Covered distally by the glans
  – Prepuce (foreskin): fold of skin covers the glans
    • Frenulum
Penis

- **Fascia**
  - Superficial fascia
    - Continuous with that of the scrotum (dartos fascia)
  - Deep fascia (Buck’s fascia): a tubular sheath of fascia
    - Covers the erectile columns

- **Ligaments**
  - Suspensory ligament of penis
    - From pubic symphysis to deep fascia
    - At junction between root & body
  - Fundiform ligament of penis
    - From linea alba to the superficial fascia
Penis

• Blood supply: branches of the internal pudendal a.
  – Deep aa. of the penis – corpora cavernosa
  – Artery of the bulb – corpus spongiosum
  – Dorsal artery of the penis

• Lymphatics:
  – Skin – superficial inguinal nodes
  – Deep structures – internal iliac nodes

• Nerve supply:
  – Dorsal nerve of the penis – pudendal n.
  – Parasympathetic – inferior hypogastric plexus
Scrotum

• Out pouching of the lower anterior abdominal wall

• Layers
  – Skin
  – Superficial fascia
    • Dartos m. (replace the fatty layer)
    • Colles’ fascia (continuation of Scarpa’s fascia)
      – Septum of scrotum
  – External spermatic fascia (ext. oblique m.)
  – Cremasteric fascia (int. oblique m.)
  – Internal spermatic fascia (fascia transversalis)
  – Tunica vaginalis (peritoneum)
    • Ease the movement of testes
Scrotum

- **Blood Supply:**
  - Anterior scrotal - external pudendal - femoral a.
  - Posterior scrotal - scrotal branches of internal pudendal aa.

- **Lymphatics:**
  - Superficial inguinal nodes

- **Nerve supply:**
  - Anterior scrotal – ilioinguinal n. & genital branch of the genitofemoral n.
  - Posterior scrotal – branches of the perineal n. & posterior cutaneous nerves of the thigh
Spermatic Cord: Coverings

- External spermatic fascia
  - Ext. oblique aponeurosis
- Cremasteric fascia
  - Int. oblique m.
- Internal spermatic fascia
  - Transversalis fascia
Spermatic Cord: Content

• The vas deferens
• The testicular artery - aorta
• Testicular vein (pampiniform plexus) – to IVC & left renal v.
• Testicular lymph vessels
  – Follow the artery
• Autonomic nerves
  – Sympathetic – follow the artery
• Remnants of processus vaginalis – peritoneum
• Genital branch of the genitofemoral nerve
  – Cremaster m.
Testes

- Paired oval glands measuring 2 in. by 1 in.
  - Left usually at a lower level
- Surrounded by dense white capsule called tunica albuginea
  - Septa form 200 - 300 compartments called lobules
  - Mediastinum - posteriorly
- Each is filled with 2 or 3 seminiferous tubules where sperm are formed
Pathway of Sperm Flow through the Ducts of the Testis

- Seminiferous tubules
- Straight tubules
- Rete testis
- Efferent ducts
- Ductus epididymis
- Ductus (vas) deferens

(a) Sagittal section of a testis showing seminiferous tubules
Temperature Regulation of Testes

• Sperm survival requires 3 degrees lower temperature than core body temperature

• Mechanisms of regulating temperature
  – Dartos muscle causes wrinkling of scrotal wall
  – Cremaster muscle in spermatic cord
    • Elevates testes on exposure to cold & during arousal
    • Warmth reverses the process
  – Countercurrent heat exchange
    • Pampiniform plexus & the branches of the testicular aa.
Descent of Testes

- Develop near kidney on posterior abdominal wall
- Descends into scrotum by passing through inguinal canal
  - during 7th month of fetal development
- Drag with it the blood, nerve & lymphatic supply
Epididymis

- Comma-shaped organ, 1.5in long along posterior border of each testis
- Ductus epididymis - 20 feet tube if uncoiled
- Head
  - Receive multiple efferent ducts
- Body
- Tail
  - Continues as ductus deferens on the medial side of epididymis
- Sinus of the epididymis
  - Laterally between epididymis & testis
Epididymis

- Site of sperm maturation
  - motility increases over 2 week period
- Storage for 1-2 months
- Absorbs excess fluid
- Add nutrient substances
- Propels sperm onward
Testes & Epididymis

- **Blood Supply:**
  - Testicular a. – aorta
  - Left testicular v. – left renal v.
  - Right testicular v. – IVC

- **Lymphatics:**
  - Lumbar lymph nodes

- **Nerve supply:**
  - Testicular plexus
    - Parasympathetic – vagus
    - Sympathetic – T7
Ductus (Vas) Deferens

- Pathway of 18 inch muscular tube
  - ascends along medial side of epididymis
  - passes up through spermatic cord and inguinal ligament
  - reaches posterior surface of urinary bladder
  - empties into prostatic urethra with seminal vesicle
- Lined with pseudostratified columnar epithelium & covered with heavy coating of muscle
  - convey sperm along through peristaltic contractions
  - stored sperm remain viable for several months
- Blood supply:
  - Branches from the vesicle arteries
  - Veins drain into the testicular or prostatic veins
Ductus (Vas) Deferens

- Traverse deep inguinal ring
- Cross inferior epigastric artery laterally
- Run on the pelvic floor backward and inferiorly
- Cross the ureters medially
- End with the ampulla medial to seminal vesicle & posterior to urinary bladder
Seminal Vesicles

- Pair of pouch-like organs found posterior to the base of bladder
- Anterior to rectum
  - Rectovesical pouch
- Alkaline, viscous fluid
  - neutralizes acidity of vagina & male urethra
  - fructose for ATP production
  - prostaglandins stimulate sperm motility & viability
  - clotting proteins for coagulation of semen
- Blood supply:
  - Inferior vesicle & middle rectal vessels
- Lymphatics: internal iliac nodes
Ejaculatory Ducts

- Formed from duct of seminal vesicle & ampulla of vas deferens
- About 1 inch long
- Adds fluid to prostatic urethra just before ejaculation
- Pierces prostate posteriorly and drain beside the utricle
Prostate Gland

- Conical shape gland
  - Base – above
  - Apex – below
- Surrounds the prostatic urethra
  - Urethral crest
    - Prostatic utricle – analog of uterus & vagina
    - Prostatic sinus
- Covered by fibrous capsule
- Fascial sheath covers the capsule
- Ligaments – connected to the fascial sheath
  - Anteriorly – puboprostatic ligament
  - Posteriorly – rectovesical septum (fascia of Denonvilliers)
Prostate Gland: Relations

- Superiorly – urinary bladder neck
- Inferiorly – urogenital diaphragm
- Laterally levator ani muscles
- Anteriorly – pubic symphysis
  - Retropubic space (cave of Retzius)
    - Extraperitoneal fat
- Posteriorly – rectal ampulla
Prostate Gland

• Lobes
  – Anterior (isthmus) – anterior to urethra
    • Musculofibrous - No glands
  – Posterior – posterior to urethra
  – Median (middle) – between urethra & ejaculatory duct
  – Right & left lateral – sides of urethra

• Zones
  – Central zone – drain directly into urethra
  – Transitional zone – drains into the sinus
  – Peripheral zone – drains into the sinus
Prostate Gland

• Blood supply:
  – Branches from the inferior vesicle & middle rectal aa.
  – Prostatic venous plexus – between capsule and fascial sheath
    • Drains into internal iliac v.
• Lymphatics: internal iliac nodes
• Nerve supply: Inferior hypogastric plexus
Bulbourethral or Cowper’s Gland

- Paired, pea-sized gland within the UG diaphragm
- Ducts pierce the perineal membrane
  - Opens into spongy urethra
- Secretes alkaline mucous that neutralizes acids and lubricates
Semen

• Mixture of sperm & seminal fluid
  – glandular secretions and fluid of seminiferous tubules
  – slightly alkaline, milky appearance, sticky
  – contains nutrients, clotting proteins & antibiotic seminal plasmin

• Typical ejaculate is 2.5 to 5 ml in volume

• Normal sperm count is 50 to 150 million/ml
  – actions of many are needed for one to enter

• Coagulates within 5 minutes -- reliquefies in 15 due to enzymes produced by the prostate gland

• Semen analysis----bad news if show lack of forward motility, low count or abnormal shapes
Erection & Ejaculation

• Erection
  – sexual stimulation dilates the arteries supplying the penis
  – blood enters the penis compressing the veins so that the blood is trapped.
  – parasympathetic reflex causes erection

• Ejaculation
  – muscle contractions close sphincter at base of bladder and move fluids through ductus deferens, seminal vesicles, & ejaculatory ducts
  – ischiocavernous & bulbospongiosus complete the job