

Male External Genital Organ

? Introduction

- The **male external genital organs** include:
 1. **Penis**
 2. **Scrotum**
 3. **Testes** (partly external)
 4. **Spermatic cords**
 - These structures lie in the **perineal region**, anterior to the pubic symphysis.
 - Functionally associated with **urination** and **sexual intercourse**.
-

? Dissection Notes

- Identify the **penis**, **scrotum**, and **spermatic cord** emerging from the **superficial inguinal ring**.
- Reflect the skin to observe:
 - **Superficial fascia of penis (Dartos fascia)**

- **Deep fascia (Buck's fascia)** enclosing erectile tissues and vessels.
 - Expose the **three erectile bodies** and trace the **urethra** running within the corpus spongiosum.
-

? Penis

Structure

- Composed of **root**, **body**, and **glans penis**.
 - Consists of **three erectile masses** enclosed in a fascial sheath:
 1. **One corpus spongiosum** (contains urethra).
 2. **Two corpora cavernosa** (main erectile tissues).
-

? Root of Penis

- **Fixed part**, attached to the **perineal membrane**.
- Formed by:
 - **Bulb of penis** (posterior enlargement of corpus spongiosum).
 - **Two crura of penis** (posterior ends of corpora cavernosa).

Muscles covering root:

- **Bulbospongiosus** ? covers bulb; aids in ejaculation and emptying urethra.
- **Ischiocavernosus** ? covers each crus; compresses veins to maintain erection.

Relations:

- Lies between **perineal membrane** (superiorly) and **superficial perineal fascia** (inferiorly).
- Traversed by **urethra** within corpus spongiosum.

? Body of Penis

- The **free pendulous portion** extending from the root to the glans.
- Enclosed by **deep fascia (Buck's fascia)**, which binds the erectile tissues together.

Components:

1. **Two corpora cavernosa** — dorsal position, surrounded by tough **tunica albuginea**.
2. **One corpus spongiosum** — ventral position, enclosing the **spongy urethra**.

Blood supply:

- From **deep arteries of penis** (branches of internal pudendal artery).
- **Dorsal arteries** run on each side of deep dorsal vein.

Venous drainage:

- **Superficial dorsal vein** ? external pudendal vein.
- **Deep dorsal vein** ? prostatic venous plexus.

Nerve supply:

- **Sensory:** Dorsal nerve of penis (from pudendal).
- **Parasympathetic (S2–S4):** Erection via pelvic splanchnic nerves.
- **Sympathetic (L1–L2):** Ejaculation and detumescence.

? Histology of the Body of Penis

- Each corpus (cavernosum or spongiosum) contains **trabeculae of smooth muscle and connective tissue**, enclosing **blood-filled cavernous spaces**.
- **Tunica albuginea** is thick around corpora cavernosa, thin around corpus spongiosum.
- The **central lumen of corpus spongiosum** is the **urethra**, lined by **stratified columnar epithelium**, becoming **stratified squamous near meatus**.
- **Endothelial-lined vascular spaces** fill with blood during erection, leading to rigidity.

? Glans Penis

- Expanded distal end of corpus spongiosum covering the tips of corpora cavernosa.
- Contains **external urethral meatus** at its summit.

- Margin projects as the **corona glandis**, separated by the **neck** from the body.
 - **Prepuce (foreskin)**: Fold of skin covering glans; attached by **frenulum preputii**.
-

?? Clinical Anatomy

1. Phimosis:

- Prepuce too tight ? cannot retract over glans.
- May cause **pain, infection**, and **urinary obstruction**.

2. Paraphimosis:

- Retracted tight foreskin constricts glans ? **venous congestion and pain**.

3. Hypospadias:

- Urethral opening on **ventral surface** of penis (due to incomplete urethral fold fusion).

4. Epispadias:

- Urethral opening on **dorsal surface**, often with **bladder exstrophy**.

5. Priapism:

- Prolonged painful erection due to venous drainage failure.

6. Circumcision:

- Surgical removal of prepuce; prevents infection and carcinoma.

7. Carcinoma Penis:

- Common in **uncircumcised males**; spreads via **inguinal lymph nodes**.

8. Erectile Dysfunction:

- Failure of parasympathetic-mediated vasodilation in penile arteries.

? Scrotum

- The **scrotum** is a **cutaneous pouch** that contains the **testes**, **epididymides**, and **lower parts of spermatic cords**.
- It is divided into **right and left compartments** by a **median septum**, visible externally as the **raphe**.

Layers of the Scrotum

From superficial to deep:

1. **Skin** – thin, pigmented, rich in sweat and sebaceous glands.
2. **Superficial fascia (Dartos fascia)** – contains **smooth muscle fibres** (dartos muscle) but **no fat**.
 - Responsible for **wrinkling of scrotal skin** and **thermoregulation**.
3. **External spermatic fascia** – from **external oblique aponeurosis**.
4. **Cremasteric fascia and muscle** – from **internal oblique**; raises the testis.

5. **Internal spermatic fascia** – from **fascia transversalis**.
6. **Tunica vaginalis** – serous sac around testis (parietal and visceral layers).

Nerve Supply

- **Anterior one-third:** L1 (ilioinguinal + genital branch of genitofemoral).
- **Posterior two-thirds:** S3 (pudendal and perineal branches of posterior cutaneous nerve of thigh).

Blood Supply

- **Arteries:** External pudendal, internal pudendal, and cremasteric arteries.
- **Veins:** Follow arteries and drain into external pudendal veins.

Lymphatics

- Drain into **superficial inguinal lymph nodes**.

?? Clinical Anatomy of Scrotum

- **Scrotal oedema:** Due to dependent position and loose areolar tissue.
- **Sebaceous cysts:** Common due to rich sebaceous glands.
- **Difficult anaesthesia:** Supplied by distant dermatomes (L1 and S3).
- **Hydrocele:** Fluid accumulation in **tunica vaginalis**; may be:

- **Vaginal, Infantile, Congenital, or Encysted.**

- **Procedure of tapping hydrocele:** Needle passes through
skin ? dartos ? external spermatic fascia ? cremasteric fascia ? internal spermatic fascia
? parietal tunica vaginalis

Volume 2, BD Chaurasia's Human ...

.

- **Other scrotal conditions:** Tumour, epididymitis, varicocele, spermatocele.

? Testis

- **Male gonad** homologous with the **ovary**.
- Suspended in the **scrotum** by the **spermatic cord**.
- **Left testis** lies slightly **lower** than the right.

Shape and Size

- Oval, slightly compressed laterally.
- **3.75 cm long, 2.5 cm broad, 1.8 cm thick.**
- **Weight:** 10–15 g.

Coverings

1. **Tunica vaginalis** – parietal and visceral layers (from processus vaginalis).

2. **Tunica albuginea** – dense white fibrous capsule forming **mediastinum testis**.
 3. **Tunica vasculosa** – innermost vascular coat.
-

? Internal Structure

- Testis divided by septa into **200–300 lobules**.
- Each lobule contains **2–3 seminiferous tubules** (each ~60 cm long if uncoiled).
- Tubules unite to form **straight tubules ? rete testis ? efferent ductules ? epididymis**

Volume 2, BD Chaurasia's Human ...

? Arterial Supply

- **Testicular artery** — branch of abdominal aorta at L2 level.
- Accompanied by **pampiniform plexus of veins**, which form the **testicular vein**:
 - **Right ?** drains into **inferior vena cava**.
 - **Left ?** drains into **left renal vein**

Volume 2, BD Chaurasia's Human ...

Lymphatics:

- Drain to **preaortic and para-aortic lymph nodes (L2 level)**.

Nerve Supply:

- **Sympathetic fibres** from **T10** via renal and aortic plexuses.

? Histology of Seminiferous Tubule

- Lined by **4–8 layers** of cells:
 - **Spermatogenic cells** – spermatogonia ? primary ? secondary spermatocytes ? spermatids ? spermatozoa.
 - **Sertoli (sustentacular) cells** – tall, columnar; support, nourish, and regulate developing germ cells.
- **Leydig (interstitial) cells** between tubules ? secrete **testosterone** under control of **ICSH (LH)**.
- **Spermatogenesis** regulated by **FSH**

Volume 2, BD Chaurasia's Human ...

?? Clinical Anatomy of Testis

- **Monorchism/Anorchism:** Absence of one or both testes.
- **Cryptorchidism (Undescended Testis):**

- May lie in lumbar, inguinal, or upper scrotal region.
- Prone to **malignancy**, **infertility**, and **torsion**.
- **Ectopic Testis:** Deviates from normal descent; may lie in thigh, perineum, or near penis.
- **Varicocele:** Dilated veins of pampiniform plexus (more common on **left**).
- **Torsion of testis:** Twisting of spermatic cord ? acute ischemia.
- **Orchitis:** Inflammation, often post-mumps infection.

? Epididymis

Structure

- Highly **coiled tubular organ**, acts as a **reservoir and site of maturation for spermatozoa**.
- **Parts:**
 - **Head (Caput):** Formed by coiled **efferent ductules**, connected to upper pole of testis.
 - **Body (Corpus):** Middle portion, formed by a **single coiled duct** (duct of epididymis).
 - **Tail (Cauda):** Lower end, continuous with **ductus deferens**.

Vessels and Nerves

- **Arterial supply:** From a **branch of testicular artery**, which anastomoses with the **artery to ductus deferens**.
- **Venous and lymphatic drainage:** Similar to that of the testis.
- **Nerve supply:** Sympathetic fibres from **testicular plexus (T11–L1)**.

Clinical Anatomy

- **Epididymitis / Epididymo-orchitis:** Inflammation due to **tuberculosis, filariasis, gonococcal or pyogenic infections**.
- May present with **painful scrotal swelling**, tenderness, and fever.
- Chronic infection can lead to **fibrosis and infertility**.

Histology

- **Lining:** Pseudostratified **columnar epithelium with stereocilia**.
- **Supporting tissue:** Rich in connective tissue and smooth muscle to aid sperm movement.

? Development of Male Reproductive System

- **Testis** develops from **three sources**:
 - **Spermatogenic cells:** From endoderm of dorsocaudal yolk sac.
 - **Sertoli cells:** From coelomic epithelium.

- **Leydig cells:** From mesoderm.

- **Descent of Testis:**

- Develops near mesonephros (T10–T12 level).
- Begins to descend in **2nd month** of intrauterine life.
- **3rd month:** Reaches iliac fossa.
- **4th–6th month:** Lies at deep inguinal ring.
- **7th month:** Passes through inguinal canal.
- **8th month:** Reaches superficial inguinal ring.
- **9th month:** Descends into scrotum.
- Process guided by **gubernaculum** (fibrous band connecting testis to scrotum).
- **Processus vaginalis** precedes the testis and later forms **tunica vaginalis**.

Factors aiding descent:

- Hormones (testosterone, maternal gonadotropins)
- Differential growth of body wall
- Action of **gubernaculum**
- Intra-abdominal pressure and temperature changes

Clinical note:

- Failure of descent ? **cryptorchidism** (undescended testis).
 - Abnormal route ? **ectopic testis** (e.g., thigh, perineum).
-

? Ducts Derived from Mesonephric System

- **Mesonephric (Wolffian) duct** forms:
 - Epididymis
 - Ductus deferens
 - Seminal vesicle
 - Ejaculatory duct
 - Trigone of urinary bladder
 - **Paramesonephric (Müllerian) duct** ? vestigial **appendix testis**.
 - **Mesonephric tubules** ? rete testis, paradidymis, and aberrant ductules.
-

? External Genitalia Development

- **3rd week:** Mesenchymal cells from primitive streak surround cloacal membrane ? **cloacal folds**.
- **6th week:** Cloacal folds divide into:

- **Urethral folds (anterior)**
 - **Anal folds (posterior)**
 - **Genital swellings** appear lateral to urethral folds.
 - Fusion and elongation form **genital tubercle**, giving rise to **penis** in males.
-

? Molecular Regulation

- **SRY gene** (Sex-determining Region of Y chromosome):
 - Encodes **Testis Determining Factor (TDF)** ? initiates testicular differentiation.
- **SOX9** gene: Works with SRY; activates **Müllerian Inhibiting Substance (MIS)** gene.
- **FGF9 (Fibroblast Growth Factor 9)**: Induces mesonephric tubules to form testicular cords.
- **SF1 (Steroidogenic Factor 1)**: Promotes differentiation of **Leydig and Sertoli cells**, enhances **AMH** secretion, and stimulates **testosterone synthesis**.
- **Testosterone** ? differentiates **mesonephric duct derivatives** (epididymis, ductus deferens, seminal vesicles).
- **Dihydrotestosterone (via 5 α -reductase)** ? forms **male external genitalia**.

Facts to Remember

- The **epididymis** acts as a **reservoir and site of maturation of spermatozoa**; sperm gain motility here.
- It consists of **head, body, and tail**, continuous below with the **ductus deferens**.
- **Sertoli cells** provide support and nutrition to developing sperm cells and secrete **inhibin**.
- **Leydig cells** secrete **testosterone**, the main male sex hormone.
- The **testicular artery** arises directly from the **abdominal aorta** at **L2 level**.
- **Venous drainage** forms the **pampiniform plexus**, which regulates testicular temperature.
- **Lymph from the testis** drains to **preaortic and para-aortic lymph nodes**, not inguinal nodes.
- **Gubernaculum** guides the descent of the testis from abdomen to scrotum.
- The **processus vaginalis** forms the **tunica vaginalis**; if it remains patent, may cause **congenital hydrocele**.
- **Cryptorchidism** (undescended testis) increases risk of **infertility and malignancy**.
- **Mesonephric (Wolffian) duct** gives rise to epididymis, ductus deferens, seminal vesicle, and ejaculatory duct.
- **Paramesonephric (Müllerian) duct** regresses under the influence of **Müllerian Inhibiting Substance (MIS)** secreted by Sertoli cells.

- **SRY gene** on the Y chromosome triggers testicular differentiation via **Testis Determining Factor (TDF)**.
 - **Dihydrotestosterone (DHT)** derived from testosterone is responsible for development of **male external genitalia**.
 - **Hypospadias** and **epispadias** result from defects in urethral fold fusion and genital tubercle formation.
 - **Varicocele** is more common on the **left** due to perpendicular drainage of left testicular vein into the left renal vein.
 - **Epididymo-orchitis** can follow mumps or urinary tract infection, leading to infertility.
 - **Temperature regulation** is vital; testes are maintained 2–3°C below body temperature for normal spermatogenesis.
 - **Cremasteric reflex** serves to protect testis by elevating it during cold or threat.
-

?? Clinicoanatomical Problems

1. A 20-year-old male presents with painless swelling in the scrotum that transilluminates.

? **Diagnosis:** Hydrocele due to accumulation of fluid in tunica vaginalis.

? **Anatomical reason:** Patent processus vaginalis or imbalance between secretion and absorption of fluid.

2. A 25-year-old man presents with a “bag of worms” feel in the scrotum, more prominent on standing.

? **Diagnosis:** Varicocele (dilated pampiniform plexus).

? **Cause:** Left testicular vein drains into left renal vein at right angle ? venous stasis.

3. A 30-year-old patient complains of acute pain and swelling in scrotum with fever.

? **Diagnosis:** Epididymo-orchitis.

? **Cause:** Bacterial infection via vas deferens from urinary tract.

? **Complication:** Fibrosis and sterility.

4. A 7-year-old boy has an empty scrotum on one side.

? **Diagnosis:** Cryptorchidism (undescended testis).

? **Complication:** Infertility and risk of malignant change.

5. A 12-year-old boy has testis located in the upper thigh.

? **Diagnosis:** Ectopic testis.

? **Cause:** Abnormal migration of gubernaculum during descent.

6. A neonate presents with bilateral inguinal swellings that reduce on lying down.

? **Diagnosis:** Congenital inguinal hernia with patent processus vaginalis.

7. A patient has defective spermatogenesis despite normal hormone levels.

? **Diagnosis:** Sertoli cell dysfunction ? defective spermatogenic support.

8. A young male has ambiguous genitalia with male gonads and female external genitalia.

? **Diagnosis:** 5 α -reductase deficiency.

? **Cause:** Inadequate conversion of testosterone to dihydrotestosterone (DHT).

9. A 40-year-old man reports dull dragging pain in the scrotum.

? **Diagnosis:** Varicocele causing venous congestion of pampiniform plexus.

10. A patient complains of infertility with low sperm motility but normal count.

? **Diagnosis:** Epididymal dysfunction ? impaired sperm maturation.

? More Clinicoanatomical Problems

11. A 3-month-old infant presents with a cystic swelling in the spermatic cord above the testis. The swelling transilluminates and is separate from the testis.

? **Diagnosis:** Encysted hydrocele of the cord.

? **Anatomical basis:** Partial persistence of **processus vaginalis** between the internal ring and the upper pole of the testis.

12. A 22-year-old patient presents with severe pain after sudden twisting of the scrotum during sports.

? **Diagnosis:** Torsion of testis.

? **Anatomical explanation:** Twisting of **spermatic cord** cuts off **testicular artery** and venous drainage ? ischemic necrosis.

? **Note:** More common when **gubernaculum** or **scrotal ligaments** are underdeveloped (bell-clapper deformity).

13. A 30-year-old man has pain radiating to the groin during urination. Palpation reveals a thickened epididymis.

? **Diagnosis:** Tuberculous epididymitis.

? **Mechanism:** Retrograde spread of infection from prostate or seminal vesicle via **vas deferens**.

14. A 5-year-old boy's mother notices that one scrotal half enlarges whenever he cries or coughs.

? **Diagnosis:** Congenital inguinal hernia.

? **Cause:** Persistent **processus vaginalis** allows abdominal contents to enter the tunica vaginalis.

15. A 32-year-old man with mumps develops painful scrotal swelling a week after parotid symptoms.

? **Diagnosis:** Mumps orchitis.

? **Complication:** Atrophy of seminiferous tubules ? possible **infertility** due to destruction of germinal epithelium.

16. A 25-year-old male has small, firm testes and azoospermia but normal secondary sexual characteristics.

? **Diagnosis: Sertoli-cell-only syndrome (Del Castillo syndrome).**

? **Explanation:** Germinal epithelium absent; only Sertoli cells remain ? infertility with normal testosterone levels.

17. During inguinal hernia repair, the surgeon accidentally ligates the testicular artery.

? **Outcome:** Testis may **undergo ischemic necrosis**, unless collateral supply from **artery to vas deferens** and **cremasteric artery** maintains perfusion.

18. A newborn has ambiguous genitalia with partial fusion of the urethral folds and small phallus.

? **Diagnosis: Hypospadias** (glandular or penile type).

? **Cause:** Failure of **urethral folds** to fuse completely in the midline.

19. A teenage boy complains of a dull, aching scrotal pain that worsens on standing and improves when lying down.

? **Diagnosis: Varicocele.**

? **Anatomical reason:** Vertical drainage of **left testicular vein** into **left renal vein** under pressure ? venous reflux and dilation of pampiniform plexus.

20. A patient presents with painless, hard swelling in the testis that does not transilluminate.

? **Diagnosis: Testicular tumour.**

? **Clinical importance:** Lymphatic spread is to **para-aortic nodes** at the **L2 level**, not inguinal nodes.

21. A 7-year-old boy develops an infection in the scrotal skin. Later, the inguinal nodes are enlarged.

? **Explanation:** Scrotal skin drains into **superficial inguinal lymph nodes**, whereas testicular infection would enlarge **para-aortic nodes**.

22. A 2-year-old child has a swelling that changes in size and position during the day.

? **Diagnosis: Communicating hydrocele.**

? **Cause:** Incomplete obliteration of processus vaginalis communicating with the peritoneal cavity.

23. An elderly man presents with testicular atrophy after long-term anabolic steroid use.

? **Explanation:** **Negative feedback inhibition** of pituitary gonadotropins ? decreased **FSH and LH** ? suppressed **Leydig and Sertoli activity**.

24. A man presents with infertility but normal sperm count; motility is markedly reduced.

? **Diagnosis:** **Epididymal blockage or ciliary defect.**

? **Reason:** Failure of maturation in **epididymal duct** or defective **stereocilia-mediated absorption** of testicular fluid.

25. A 45-year-old diabetic patient develops a rapidly spreading necrosis of the scrotum with foul odour and crepitus.

? **Diagnosis:** **Fournier's gangrene.**

? **Anatomical note:** Involves superficial fascia (Dartos and Colles'), spreading rapidly through **continuous fascial planes**.

? Frequently Asked Questions — Epididymis & Male Reproductive System

1. What are the coverings of the testis?

? From inside outward:

1. **Tunica vasculosa**
2. **Tunica albuginea**
3. **Tunica vaginalis (visceral and parietal layers)**
4. **Internal spermatic fascia**
5. **Cremasteric fascia**
6. **External spermatic fascia**

7. Dartos fascia and skin

2. What are the parts of the epididymis?

? Head, body, and tail.

- Head ? receives **efferent ductules**.
 - Body ? long coiled **duct of epididymis**.
 - Tail ? continuous with **ductus deferens**.
-

3. What is the function of the epididymis?

? Maturation, concentration, and storage of spermatozoa; absorption of testicular fluid.

4. What is the blood supply of the testis?

? **Testicular artery** (from abdominal aorta).

? Accompanied by **pampiniform plexus of veins** forming **testicular vein**.

5. Why is the left testis lower than the right?

? Because the **left spermatic cord is longer**.

6. Why is temperature lower in the scrotum than in the body cavity?

? For **spermatogenesis**; maintained by **pampiniform plexus** and **dartos muscle thermoregulation**.

7. What is the lymphatic drainage of the testis and scrotum?

? **Testis**: Preaortic and para-aortic nodes (L2).

? **Scrotum**: Superficial inguinal nodes.

8. What is the difference between hydrocele and varicocele?

? **Hydrocele**: Fluid in tunica vaginalis.

? **Varicocele**: Dilated veins of pampiniform plexus.

9. What are the causes of undescended testis (cryptorchidism)?

? Defective gubernaculum, hormonal deficiency, or obstruction in inguinal canal.

10. What is the function of Sertoli cells?

? Nourish and protect developing sperm; secrete **inhibin** and **androgen-binding protein (ABP)**.

11. What is the function of Leydig cells?

? Secrete **testosterone** under **LH (ICSH)** control.

12. What is the homologous organ of testis in females?

? **Ovary**.

13. What is the processus vaginalis?

? Peritoneal diverticulum descending with testis; forms **tunica vaginalis** when closed.

14. What is the difference between cryptorchidism and ectopic testis?

? **Cryptorchidism**: Testis arrested in normal path of descent.

? **Ectopic testis**: Testis deviates to an abnormal position (perineum, thigh, etc.).

15. What are the derivatives of the mesonephric (Wolffian) duct?

? Epididymis, ductus deferens, seminal vesicle, and ejaculatory duct.

16. What are the derivatives of the paramesonephric (Müllerian) duct in males?

? **Appendix testis** and **prostatic utricle**.

17. What guides the descent of the testis?

? **Gubernaculum testis**, a fibrous cord connecting testis to scrotal wall.

18. What hormones influence testicular descent?

? **Testosterone**, **maternal gonadotropins**, and **Müllerian inhibiting substance (MIS)**.

19. What is the role of the SRY gene?

? Triggers testicular differentiation via **Testis Determining Factor (TDF)**.

20. What happens if the SRY gene is absent?

? Gonads develop as **ovaries** (female differentiation).

21. What is hypospadias?

? Urethral opening on the **ventral surface** of penis due to failure of urethral fold fusion.

22. What is epispadias?

? Urethral opening on the **dorsal surface** of penis, usually associated with **bladder exstrophy**.

23. What is the difference between spermatic cord and vas deferens?

? **Spermatic cord** contains **vas deferens**, vessels, nerves, and fascial coverings; **vas deferens** is just one of its components.

24. Why is testicular tumour dangerous?

? Lymph spreads **retroperitoneally** to para-aortic nodes near **L2**, often unnoticed until late.

25. What is the function of Dihydrotestosterone (DHT)?

? Responsible for development of **male external genitalia** (penis, scrotum, prostate).

? Multiple Choice Questions — Epididymis and Male Reproductive System

1. The epididymis is derived from:

- a. Paramesonephric duct
 - b. Mesonephric tubules and duct
 - c. Cloacal folds
 - d. Mesonephric duct ?**
-

2. The testicular artery arises from:

- a. External iliac artery
-

- b. Internal iliac artery
 - c. Abdominal aorta ?**
 - d. Inferior epigastric artery
-

3. Lymph from the testis drains into:

- a. Superficial inguinal nodes
 - b. Deep inguinal nodes
 - c. Para-aortic (lumbar) nodes ?**
 - d. External iliac nodes
-

4. The left testicular vein drains into:

- a. Inferior vena cava
 - b. Left renal vein ?**
 - c. Common iliac vein
 - d. Internal iliac vein
-

5. The function of the epididymis is:

- a. Secretion of testosterone
 - b. Storage and maturation of spermatozoa ?**
 - c. Production of seminal fluid
 - d. Spermatogenesis
-

6. Which of the following structures prevents the descent of the testis in ectopic testis?

- a. Tunica vaginalis
 - b. Gubernaculum abnormality ?**
 - c. Processus vaginalis
 - d. Dartos muscle
-

7. The processus vaginalis of peritoneum gives rise to:

- a. Tunica albuginea
 - b. Tunica vaginalis ?**
 - c. Dartos fascia
 - d. Cremasteric fascia
-

8. Which of the following cells secrete testosterone?

- a. Sertoli cells
 - b. Leydig cells ?**
 - c. Germ cells
 - d. Spermatogonia
-

9. Which hormone is responsible for the development of male external genitalia?

- a. Testosterone
 - b. Dihydrotestosterone (DHT) ?**
 - c. Estrogen
 - d. Müllerian inhibiting substance
-

10. The epididymis continues below as:

- a. Ejaculatory duct
 - b. Ductus deferens ?**
 - c. Rete testis
 - d. Seminal vesicle
-

11. The failure of closure of processus vaginalis results in:

- a. Varicocele
 - b. Epididymitis
 - c. Congenital hydrocele or hernia ?**
 - d. Torsion of testis
-

12. Which of the following does *not* pass through the spermatic cord?

- a. Vas deferens
 - b. Testicular artery
 - c. Ilioinguinal nerve ?**
 - d. Pampiniform plexus
-

13. The cremasteric muscle is derived from:

- a. External oblique
 - b. Internal oblique ?**
 - c. Transversus abdominis
-

d. Rectus abdominis

14. Which of the following represents the female homologue of the testis?

- a. Clitoris
 - b. Labia majora
 - c. Ovary ?**
 - d. Vestibule
-

15. In descent of testis, the structure that guides its movement is:

- a. Gubernaculum ?**
 - b. Dartos fascia
 - c. Processus vaginalis
 - d. Pampiniform plexus
-

16. Which of the following is derived from the paramesonephric duct in the male?

- a. Epididymis
 - b. Ductus deferens
 - c. Appendix testis ?**
 - d. Ejaculatory duct
-

17. Which of the following structures is *not* derived from the mesonephric duct?

- a. Epididymis
 - b. Ductus deferens
 - c. Prostatic utricle ?**
 - d. Ejaculatory duct
-

18. The scrotal raphe represents:

- a. Site of gubernaculum attachment
 - b. Line of fusion of labioscrotal swellings ?**
 - c. Line of descent of testis
 - d. Fusion of urethral folds
-

19. In hypospadias, the external urethral opening is present:

- a. At the tip of glans
-

b. On ventral surface of penis ?

- c. On dorsal surface of penis
 - d. On perineum
-

20. In epispadias, the urethral opening is present:

- a. On ventral surface of penis
 - b. On dorsal surface of penis ?**
 - c. In perineum
 - d. On scrotum
-

21. The main venous structure involved in varicocele is:

- a. Cremasteric vein
 - b. Deep dorsal vein
 - c. Pampiniform plexus ?**
 - d. External pudendal vein
-

22. The gene responsible for testis differentiation is:

- a. SRY gene on Y chromosome ?**
 - b. SOX9 gene
 - c. SF1 gene
 - d. DAX1 gene
-

23. Which of the following regulates the secretion of testosterone?

- a. Luteinizing hormone (ICSH) ?**
 - b. Follicle-stimulating hormone
 - c. ACTH
 - d. Thyroxine
-

24. The first structure formed during testicular descent is:

- a. Processus vaginalis ?**
 - b. Tunica albuginea
 - c. Epididymis
 - d. Dartos fascia
-

25. Failure of descent of testis into scrotum is known as:

- a. Cryptorchidism ?**
 - b. Ectopic testis
 - c. Hydrocele
 - d. Varicocele
-

? Key MCQ Focus Areas

- Developmental derivatives (Wolffian vs Müllerian)
- Descent and coverings of testis
- Hormonal and genetic control (SRY, DHT, MIS)
- Clinical correlations (cryptorchidism, hydrocele, varicocele, hypospadias)
- Microscopic and vascular anatomy

? Viva Voce — Epididymis & Male Reproductive System

1. What are the coverings of the testis?

? Tunica vasculosa, tunica albuginea, tunica vaginalis, internal spermatic fascia, cremasteric fascia, external spermatic fascia, dartos fascia, and skin.

2. What is the function of the epididymis?

? Storage, maturation, and transport of spermatozoa; absorption of testicular fluid.

3. Which part of the epididymis continues as the vas deferens?

? The **tail (cauda)**.

4. What is the function of Sertoli cells?

? Support and nourish developing sperm; form the **blood–testis barrier**; secrete **inhibin** and **androgen-binding protein (ABP)**.

5. What is the function of Leydig cells?

? Secrete **testosterone** under the influence of **luteinizing hormone (ICSH)**.

6. What is the blood supply of the testis?

? **Testicular artery** (from the abdominal aorta) and veins forming the **pampiniform plexus**.

7. What is the lymphatic drainage of the testis?

? To **preaortic and para-aortic lymph nodes** at the level of **L2**.

8. What is the lymphatic drainage of the scrotum?

? To **superficial inguinal lymph nodes**.

9. What is the nerve supply of the scrotum?

? **Anterior:** Ilioinguinal and genital branch of genitofemoral nerve.

? **Posterior:** Pudendal and posterior cutaneous nerve of thigh.

10. Why is the testis located in the scrotum?

? To maintain a temperature **2–3°C below body temperature**, which is optimal for spermatogenesis.

11. What is the significance of the pampiniform plexus?

? Acts as a **countercurrent heat exchanger**, cooling arterial blood to maintain testicular temperature.

12. What is cryptorchidism?

? Failure of one or both testes to descend into the scrotum.

13. What is ectopic testis?

? Testis deviated to an abnormal site outside its usual path of descent (thigh, perineum, etc.).

14. What is the gubernaculum testis?

? A fibrous cord guiding descent of the testis from posterior abdominal wall to scrotum.

15. What is the processus vaginalis?

? A peritoneal diverticulum that precedes the testis during descent and later forms **tunica vaginalis**.

16. What is the homologous structure of the testis in females?

? **Ovary**.

17. What is the homologous structure of the scrotum in females?

? **Labia majora**.

18. What is the homologous structure of the penis in females?

? **Clitoris**.

19. What are the derivatives of the mesonephric (Wolffian) duct in males?

? Epididymis, ductus deferens, seminal vesicle, and ejaculatory duct.

20. What are the derivatives of the paramesonephric (Müllerian) duct in males?

? Appendix testis and prostatic utricle (vestigial remnants).

21. What hormone causes regression of the Müllerian duct in males?

? **Müllerian Inhibiting Substance (MIS)** from **Sertoli cells**.

22. What is the gene responsible for testis formation?

? **SRY gene** on the Y chromosome, producing **Testis Determining Factor (TDF)**.

23. What is the function of Dihydrotestosterone (DHT)?

? Development of **male external genitalia** (penis, scrotum, prostate).

24. What is hypospadias?

? Urethral opening on the **ventral surface of the penis** due to failure of urethral fold fusion.

25. What is epispadias?

? Urethral opening on the **dorsal surface**, often associated with **bladder exstrophy**.

26. Why is varicocele more common on the left side?

? Left testicular vein drains into **left renal vein** at right angle, causing higher venous pressure.

27. What is torsion of the testis?

? Twisting of the spermatic cord ? obstruction of blood flow ? ischemia and necrosis.

28. What is hydrocele?

? Accumulation of serous fluid in the **tunica vaginalis** around the testis.

29. What is the difference between infantile and congenital hydrocele?

? **Infantile:** Processus vaginalis closed at internal ring but patent distally.

? **Congenital:** Processus vaginalis communicates with peritoneal cavity.

30. What is the effect of failure of testicular descent on fertility?

? High intra-abdominal temperature damages germinal epithelium ? **infertility** and increased risk of **malignancy**.