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Chapter 9

REPRODUCTIVE SYSTEM AND PERINEUM

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OUTLINE

- Introduction to the reproductive system
- Male external genitalia
- Male internal genitalia
- Male accessory reproductive organs
- Perineum
- Histology of male genital organs
- Female external genitalia
- Female internal genitalia
- Histology of female internal genital organs
- Case study
- SAQ
- MCQ
- Answer

INTRODUCTION TO THE REPRODUCTIVE SYSTEM

The reproductive system is the human organ system responsible for the production and fertilization of gametes. It is the only human system with significant differences between males and females. In each of the sexes, organs of the reproductive system are grouped into internal and external genitalia.

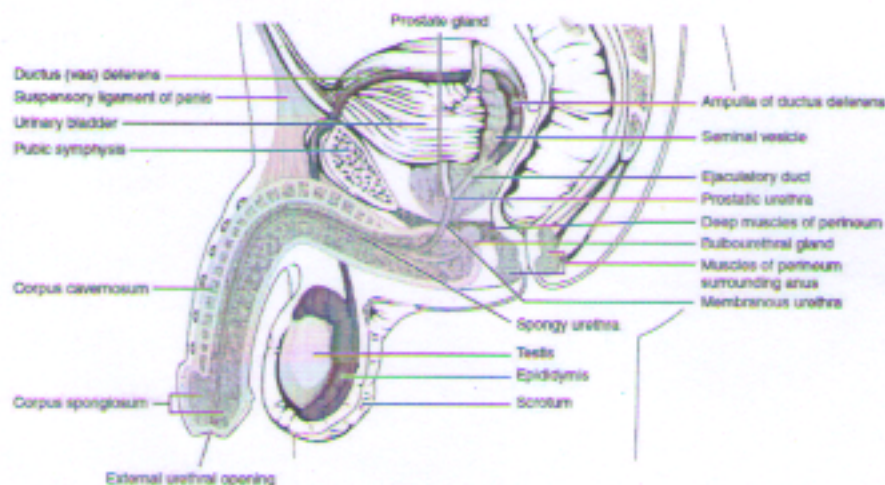


Figure 9.1 Male reproductive System

9.1 MALE EXTERNAL GENITALIA

The male external genitalia include the **scrotum** and **penis**.

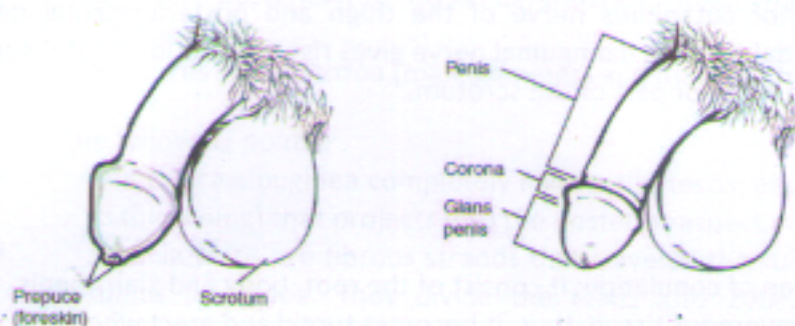


Figure 9.1: Male external genitalia

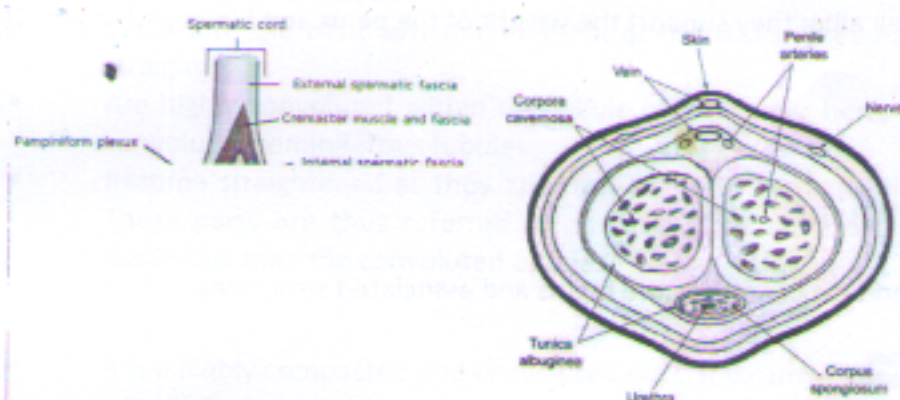


Figure 9.2: Scrotum and its contents

Figure 9.3: Transverse section of Penis

Scrotum

- The scrotum is a bag containing the testes, epididymis and spermatic cord in each of its halves.
It is made of several layers from the skin inwards, as shown in Fig 9.2 above
- It is supplied by the external pudendal and posterior scrotal arteries (from femoral and perineal arteries respectively). Cremaster branch of inferior epigastric artery also contributes.
- It is drained by external pudendal and dorsal scrotal veins (tributaries of great

saphenous and internal pudendal veins respectively)

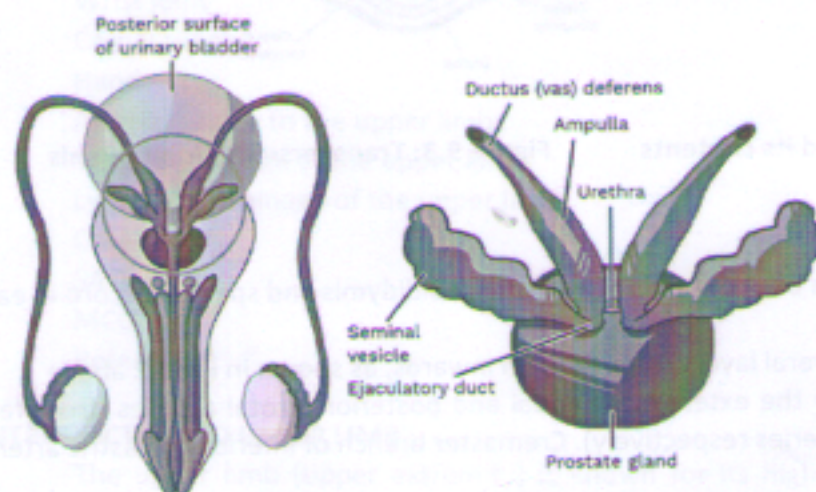
- Drains via efferent lymph vessels into superficial inguinal nodes
- Is innervated by ilioinguinal nerve, genital branch of genitofemoral nerve, perineal branches of posterior cutaneous nerve of the thigh and posterior scrotal nerves (branches of pudendal nerves). Ilioinguinal nerve gives rise to anterior scrotal nerves, which innervate the anterior part of the scrotum.

Penis

- This is the male organ of copulation; it consists of the root, body and glans penis
- It is rich in erectile cavernous tissue; thus, it becomes turgid and erect when engorged with blood
- Has suspensory and fundiform ligaments, which arise respectively from the pubic bone and linea alba; they support the weight of the penis and blend with its fascia.

9.2 MALE INTERNAL GENITALIA

The male internal genitalia comprises the testes and associated structures



Testis

- It is an oval organ located in the scrotum (outside the main body cavity). It is homologous to the ovary of the female
- It is about 4 cm long, 3 cm anteroposteriorly and 2.5 cm in breadth; it weighs approximately 10.5–14 g.

- Has upper and lower poles; medial and lateral surfaces, and anterior and posterior margins. The upper pole is related to appendix testis (a remnant of paramesonephric ducts);
- Is related posteriorly to the vas deferens and epididymis; the latter is lateral to the vas deferens.
- Produces spermatozoa (male gametes) and male sex hormones (androgens)

Note the following points:

- The tunica albuginea completely invests the testis; and it forms a mediastinum testis (a thickening) that projects into the posterior aspect of the testis
- Septula testis are fibrous strands that traverse the substance of the testis, from the tunica albuginea. They divide the testis into 200–300 lobules, each containing seminiferous tubules
- Seminiferous Tubules (Fig. 9.7)
- The seminiferous tubules
- Constitute the basic exocrine element of the testis. They have a convoluted and a straight part;
- Are highly convoluted within the lobule of the testis; here, they are referred to as convoluted seminiferous tubules
- Become straightened as they approach the rete testis (in the mediastinum testis). These parts are thus referred to as straight seminiferous tubules. They are less numerous than the convoluted tubules

Epididymis

- It is a highly compacted and convoluted duct, measuring about 5.5 m in length when uncoiled
- It is comma-shaped and has a head, body and tail (from above downward)
- It is located posterolateral to the testis (within the scrotum). A sinus of the epididymis separates the epididymis from the posterolateral aspect of the testis

The Vas Deferens

- Links the epididymis (in the scrotum) to the ejaculatory duct (in the pelvic cavity). It is tortuous at its commencement and termination
- It is characteristically thick, cord-like and firm; and it occupies the posterior aspect of the spermatic cord.
- It is about 45 cm in length and 2.5 mm in thickness

The ejaculatory duct

- A short slender tube, formed by the union of the vas deferens and the duct of the seminal vesicle, near the base of the prostate gland,
- Traverses the posterior part of the substance of the prostate, lateral to the prostatic utricle
- Opens onto the summit of the seminal colliculus, within or just outside the prostatic utricle, in the prostatic part of the urethra

9.3 MALE ACCESSORY REPRODUCTIVE ORGANS

These include the seminal vesicles, prostate gland and bulbo-urethral glands.

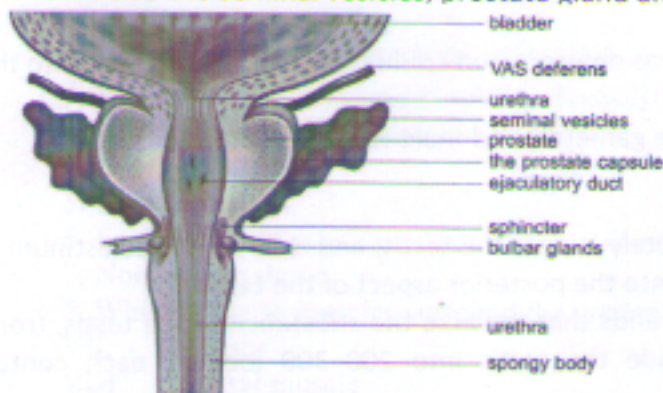


Illustration of prostate. Image Credit: Artemida-pry / Shutterstock

Seminal Vesicle

- This is an exocrine gland located behind the base of the urinary bladder; it resembles a pyramid, the base of which is directed upwards and laterally and the apex downwards and medially,
- It is actually a convoluted tube, bound together by connective tissue. It is 5–7 cm long and 2–3 cm in diameter in its coiled (undisturbed) state; but may be as long as 15 cm when uncoiled
- Produces a sticky, thick alkaline fluid that is rich in fructose, citric acid, prostaglandins and proteins. This constitutes about 60% of semen.

Prostate Gland

- The prostate gland is the largest accessory organ of reproduction.
- It is an exocrine gland located very low in the lesser pelvis, where it surrounds the prostatic part of the urethra.
- It has the size and shape of a chestnut.
- Has a base that is directed upwards, and which adjoins the neck of the bladder; and an apex that is directed downwards,
- Produces approximately 15–30% of the semen

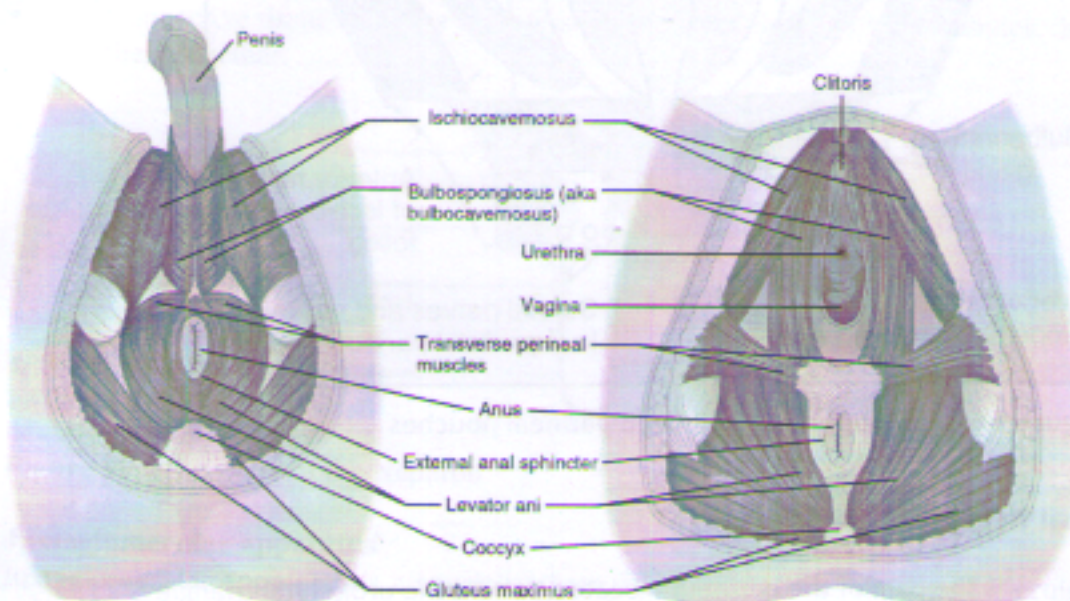
Bulbo-Urethral Gland

- This is a pea-shaped exocrine gland located in the deep perineal pouch (posterolateral to the membranous urethra)
- Produces a mucous secretion that lines the urethra and lubricates the penile tip during sexual arousal

9.4 PERINEUM

- It is the region of the body between the uppermost parts of the thigh and below the pelvic cavity (from which it is separated by the pelvic diaphragm)

- It is divided into two triangles – an anterior urogenital and a posterior anal triangle – by a transverse line that joins the anterior ends of ischial tuberosities



Male perineal muscles: inferior view

Female perineal muscles: inferior view

Figure 9.5: Muscles of the perineum

Urogenital triangle

This is further divided into superficial and deep perineal pouches -

Superficial perineal pouch and deep perineal pouch in males and its contents

Superficial perineal pouch and deep perineal pouch in females and its contents

Male Urogenital Triangle

- The urogenital triangle is the part of the perineum that lies anterior to the ischial tuberosities.
- It consists of superficial and deep perineal pouches.

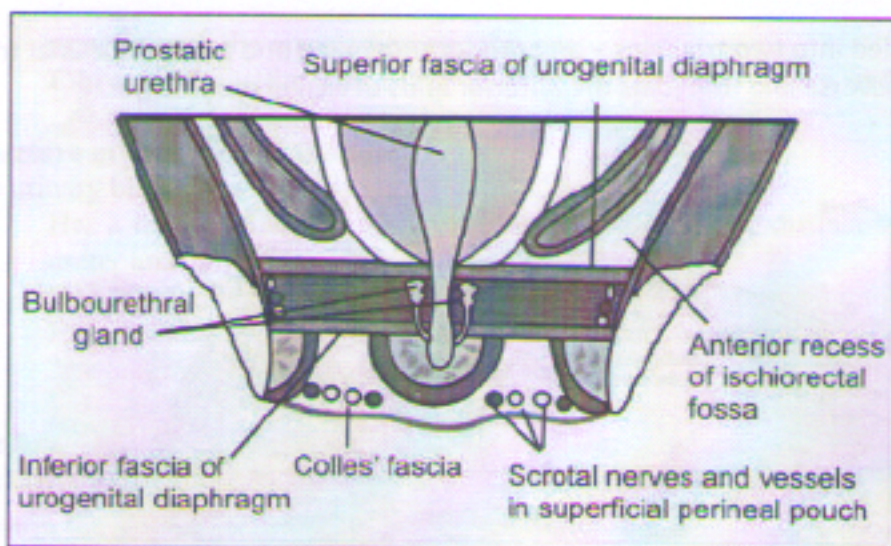


Figure 9.6 Male superficial and deep perineal pouches

Anal Triangle

- Is the part of the perineum located behind the urogenital triangle
- Contains the ischioanal fossae and terminal part of the anal canal

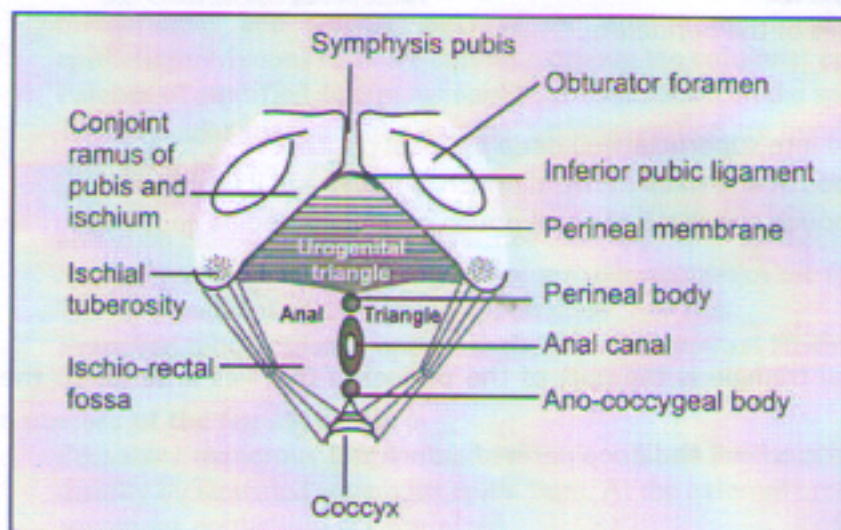


Figure 9.7: Anal triangle

FEMALE UROGENITAL TRIANGLE

This consist of the female external genitalia and the perineal muscles

The female external genitalia consists of:

- Mons pubis
- Labia majora

- Labia minora
- Vestibule
- Bulb of the vestibule
- Clitoris
- Greater vestibular glands

The superficial perineal muscles in the urogenital triangle include the superficial transverse perineal, ischiocavernosus and bulbospongiosus.

FEMALE INTERNAL GENITAL ORGANS

- The female internal genital organs include the ovaries, uterus, uterine tubes and vagina

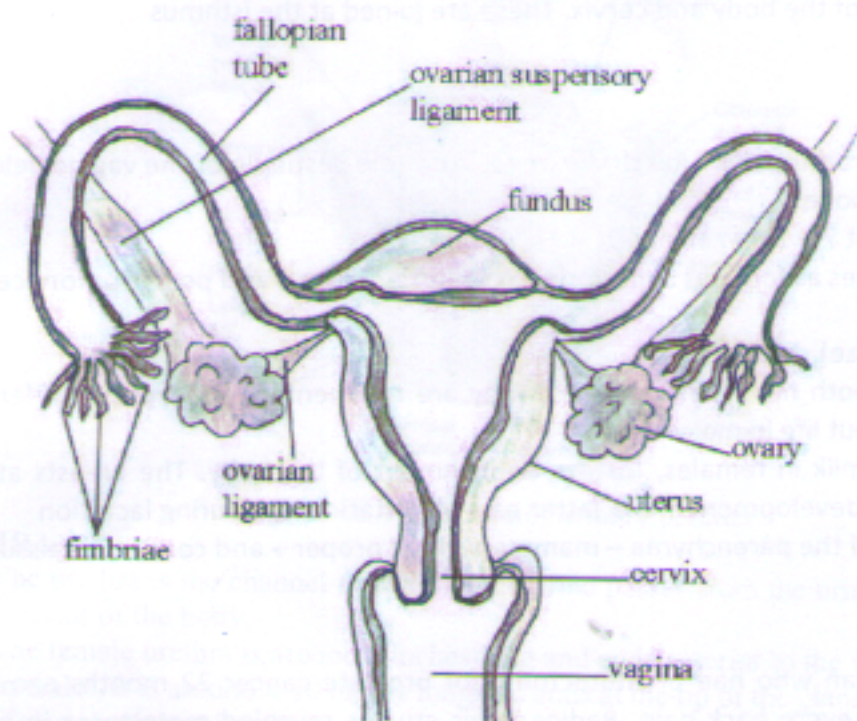


Figure 9.8 The female internal genitalia

Ovary

- It is the homologue of the testis; it is almond-shaped (ovoid)
- Its dimensions are approximately 3 x 2 x 1 cm
- It is located in the ovarian fossa, on the lateral wall of the lesser pelvis
- They are held in place by ligaments

Uterine Tube

- It is a muscular tube that extends from the ovary laterally to the uterus medially; it transports the ovum and zygote from the peritoneal cavity to the uterus
- Communicates with the peritoneal cavity via an abdominal ostium; and with the

- uterine cavity via the uterine ostium
- Consists of four parts that include, from medial laterally,
 - intramural (uterine) part,
 - isthmus,
 - ampulla, and
 - infundibulum.

Uterus

- It is a piriform, hollow, thick-walled muscular organ. It is located in the lesser pelvis, between the rectum posteriorly, and the urinary bladder antero-inferiorly
- It is continuous with the uterine tubes at its superolateral angles (or horns); and with the vagina at its lower end
- Consists of the body and cervix. These are joined at the isthmus

Vagina

- It is a fibromuscular tube that extends from the vestibule of the vagina below, to the uterus above.
- It is about 7 – 10cm in length
- Terminates as fornices superiorly into anterior, lateral and posterior fornices

Breasts (Mammae)

- Exist in both males and females. They are rudimentary in prepubertal females and throughout life in males
- Secrete milk in females, for the nourishment of the baby. The breasts attain their greatest development in the latter part of gestation and during lactation
- Consist of the parenchyma – mammary gland proper – and connective tissue stroma

CASE STUDY

A 65-year-old man who had prostatectomy for prostate cancer 22 months ago had been complaining of severe back pain. Radiographic studies revealed metastases in his lumbar vertebrae. How did the cancer cells reach the man's vertebrae; and where else could these cells form metastases?

SAQ

1. Outline the mechanisms of testicular thermoregulation; add a note on lymphatic drainage of the testis and scrotum.
2. Highlight the anatomic relations of the non-gravid uterus. Add a short note on the pouch of Douglas and its clinical importance.
3. What are the accessory organs of reproduction in male? And what are their functions
4. List the contents of the superficial perineal pouches

MCQ

1. Cancer cells from the ovary will form metastases primarily in the following:
 - a. Lumbar lymph nodes
 - b. Superficial inguinal lymph nodes
 - c. Popliteal lymph nodes
 - d. Parasternal lymph nodes
 - e. Paraaortic aortic lymph nodes
2. These statements are true except
 - a. Ligation of the tubes can be done for birth control
 - b. The uterus changes in size during different phases of life, being smallest at birth and biggest at menopause
 - c. Papanicolaou smear is a test to prevent cervical cancer
 - d. The vagina is a distensible organ
 - e. Culdoscopy is a procedure to view the pelvis through the rectouterine pouch
3. Bartholin's cyst is associated with
 - a. Bulbourethral gland
 - b. Seminal vesicle
 - c. Greater vestibular gland
 - d. Prostate gland
 - e. Ovary
4. Which of the following is not implicated in the descent of the testes
 - a. Enlargement of the testes
 - b. Raised intraabdominal pressure
 - c. Atrophy of the paramesonephric duct
 - d. Inhibition of mullerian inhibiting substance
 - e. Stimulation by androgen

ANSWER

1. e
2. b
3. c
4. e

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