

Academic year 2019-2020
3rd year S 5/6

REPRODUCTION SYSTEM MODULE

SESSION 5:

LECTURE: 1

DURATION: 1hr Clinical anatomy of Male reproductive system

presented by Dr nawal Mustafa

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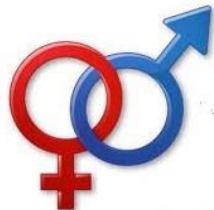
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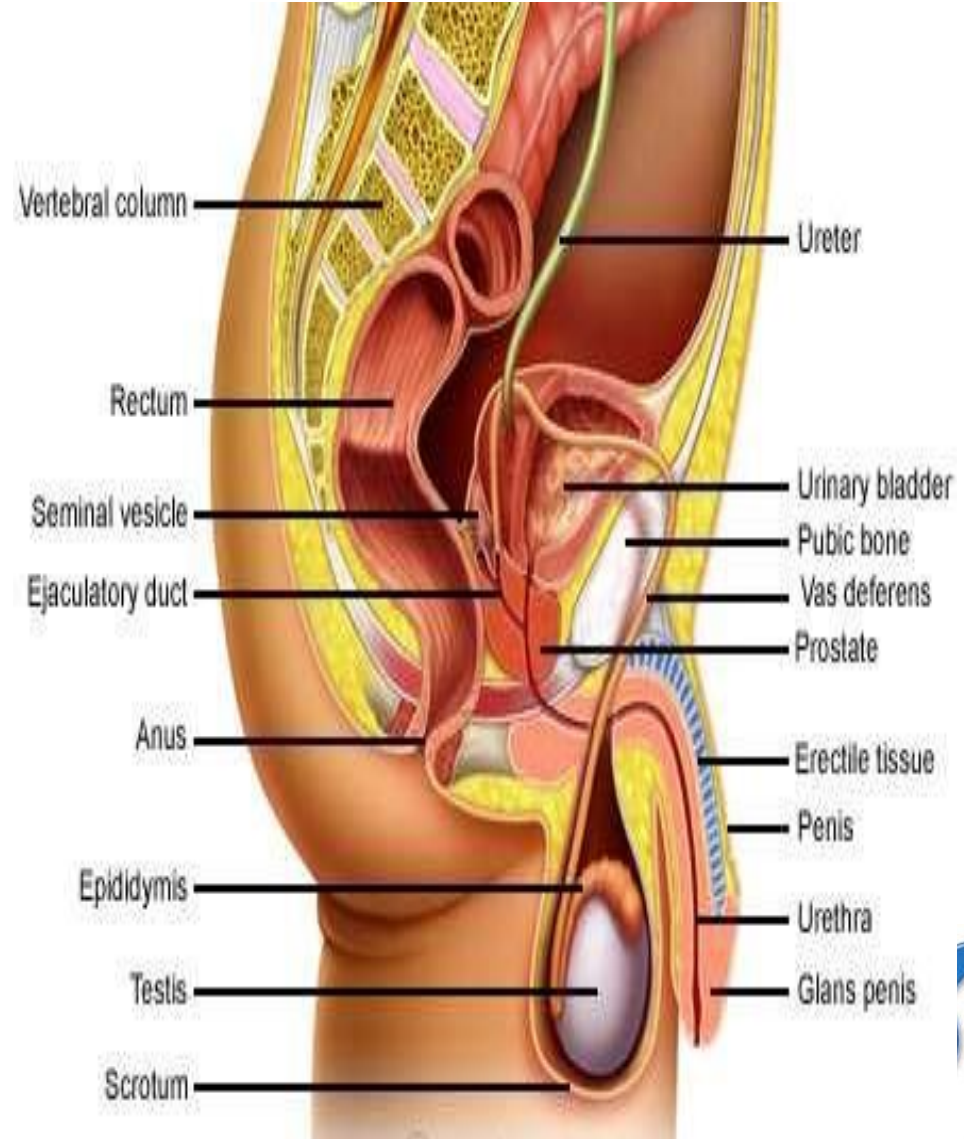
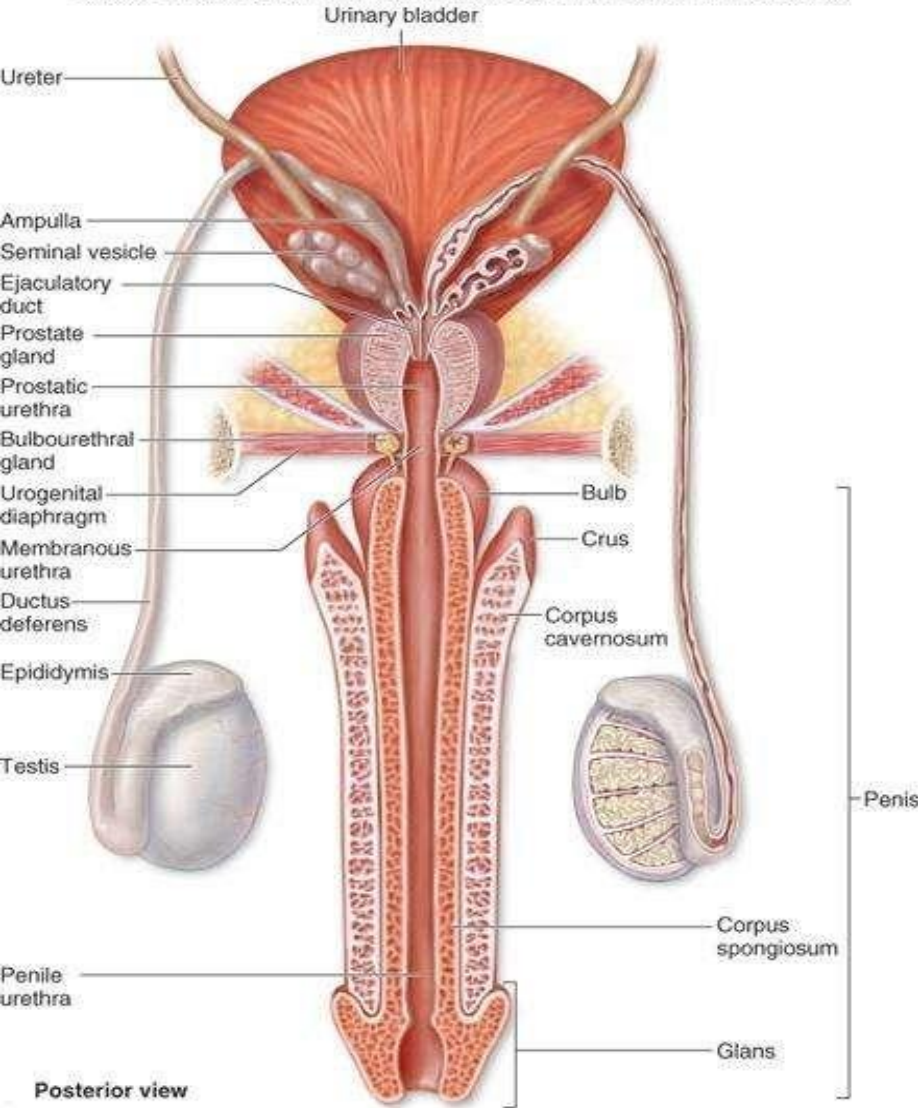
Snell clinical anatomy , Moore and Dalley
Janquara functional histology



Male reproductive system

Lo1

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Learning Objectives

By the end of this session
you should be able to:

1. Describe and identify the main anatomical structures of the male reproductive system
2. Describe the anatomy of each structure with associated blood vessels and lymphatics
3. Clinical investigation and assessment (imaging techniques)
4. Common clinical conditions

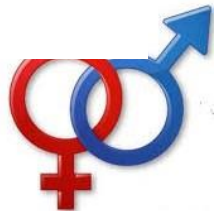
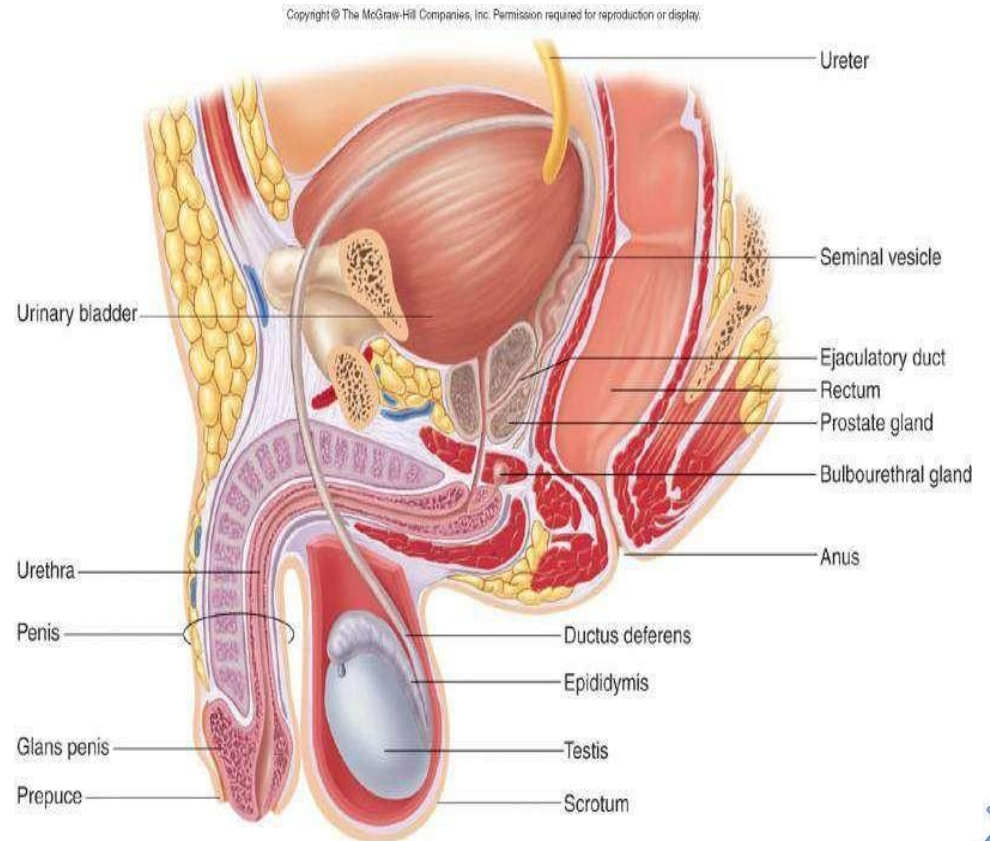


Male Reproductive System

The reproductive system in men has components in the

Abdomen
Pelvis,
Perineum

:



Male Reproductive System

The major components are

Testis

Epididymis

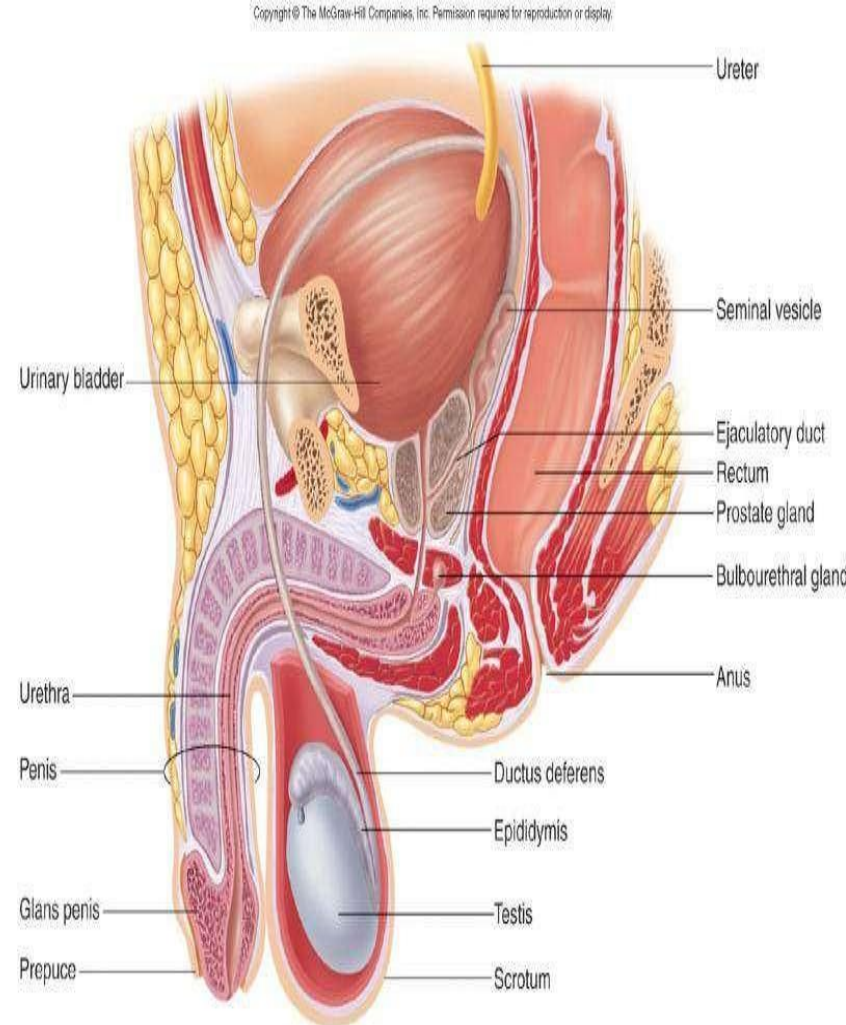
Ductus deferens

Ejaculatory duct on each side,

• **Urethra** and **Penis** in the midline.

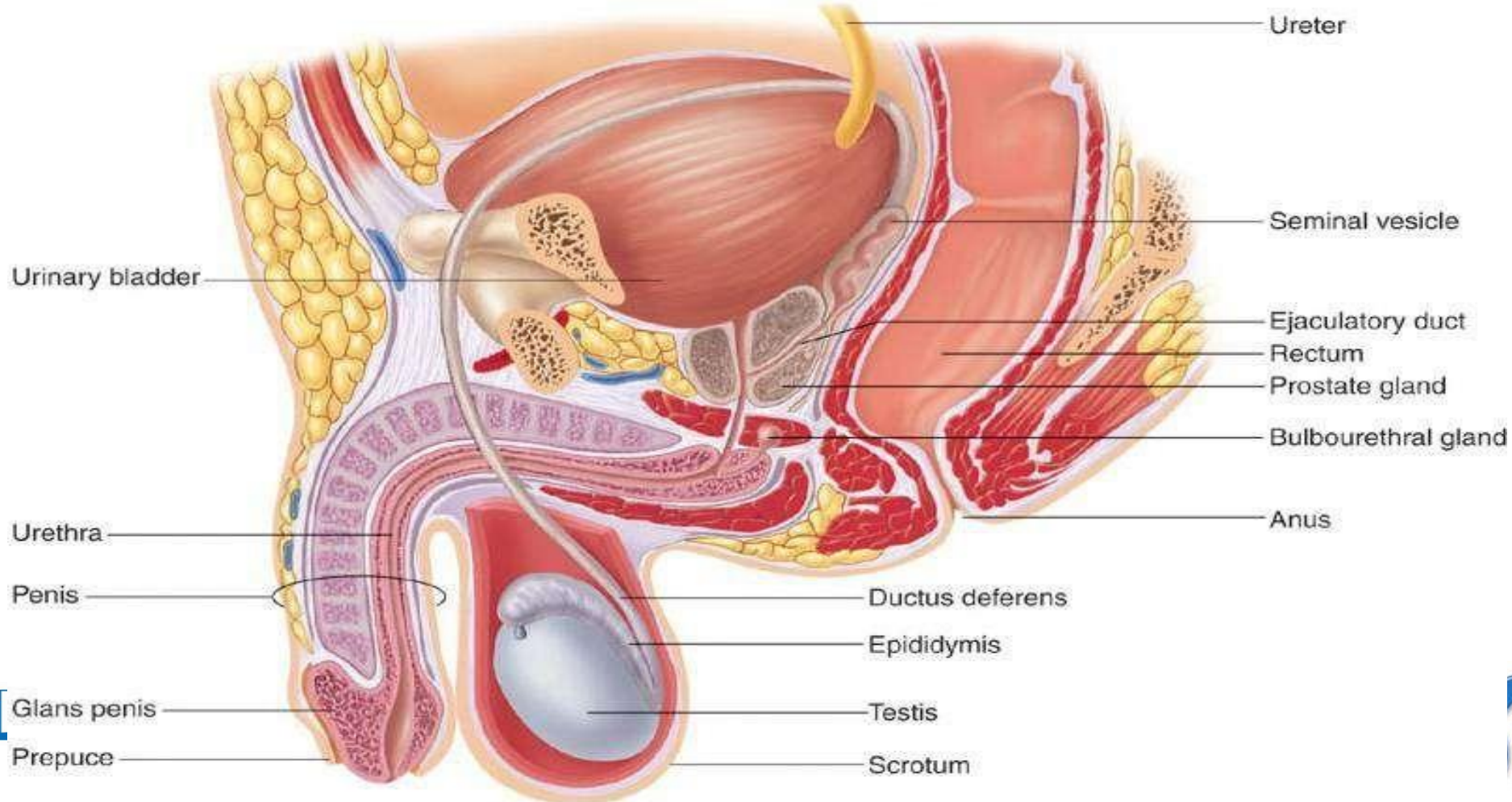
• Three types of **accessory glands** are associated with the system:

- A single **prostate**;
- A pair of **seminal vesicles**;
- A pair of **bulbourethral glands**.



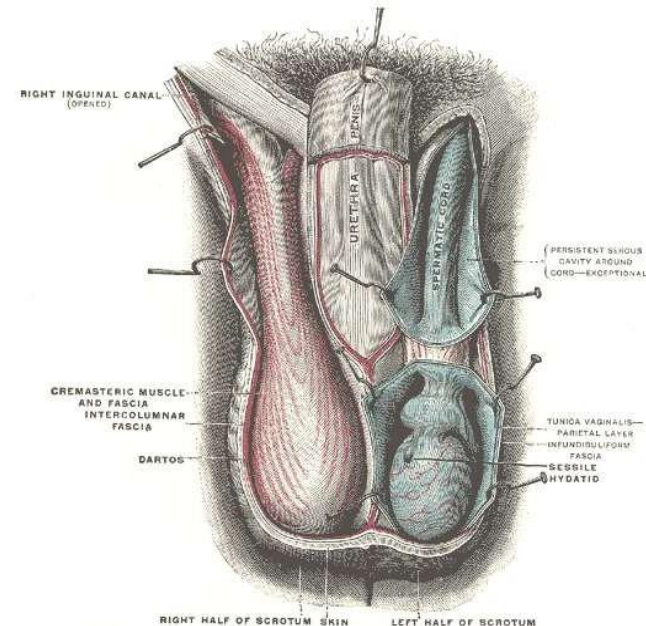
Male Reproductive System

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The scrotum

- an **outpouching** of the lower part of the anterior abdominal wall.
- It contains the testes, the epididymides, and the lower ends of the spermatic cords
- The **scrotum** keeps the testes at a temperature slightly cooler than body temperature
- It is divided on its surface into two compartments by a **raphé**
- Each compartment contains one of the two testes, and one of the epididymides
- The wall of the scrotum has the following layers:
 - Skin
 - Superficial fascia
 - Spermatic fasciae
 - Tunica vaginalis



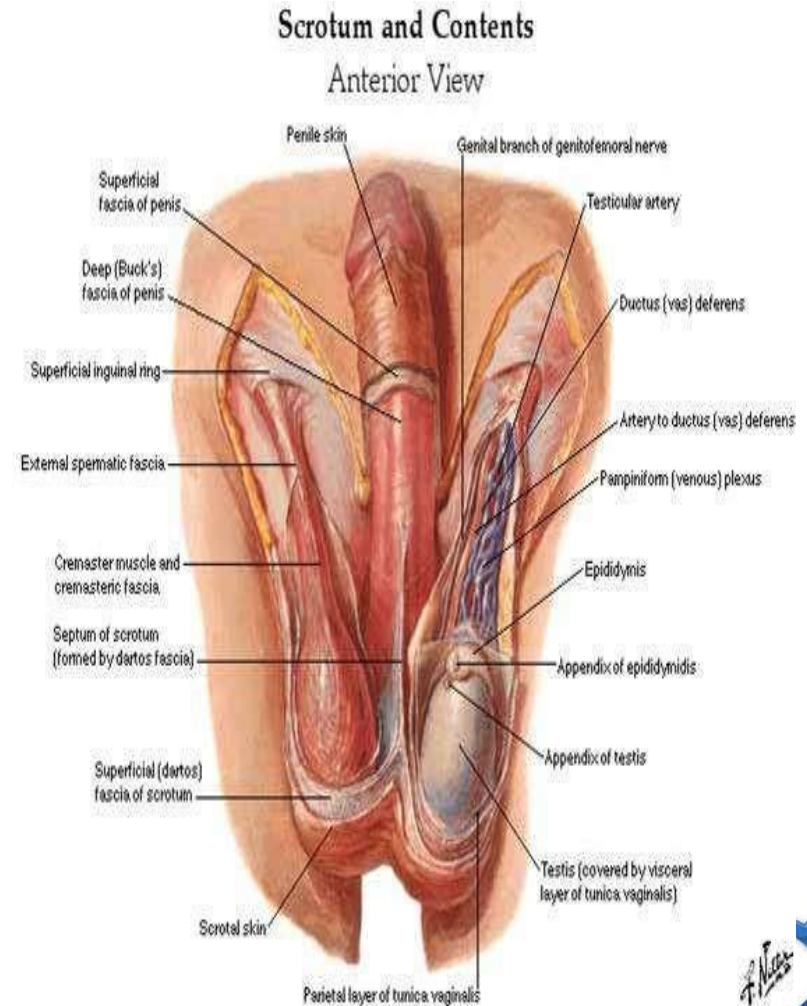
Scrotum

The skin :

is thin, **wrinkled**, and pigmented and forms a single pouch. A slightly raised ridge in the midline indicates the line of fusion of the two lateral **labioscrotal swellings**

Superficial fascia

- This is continuous with the fatty and membranous layers of the anterior abdominal wall.
- The fat is replaced by smooth muscle called the **dartos muscle**.
- This is innervated by **sympathetic nerve** fibers and is responsible for the **wrinkling** of the overlying skin



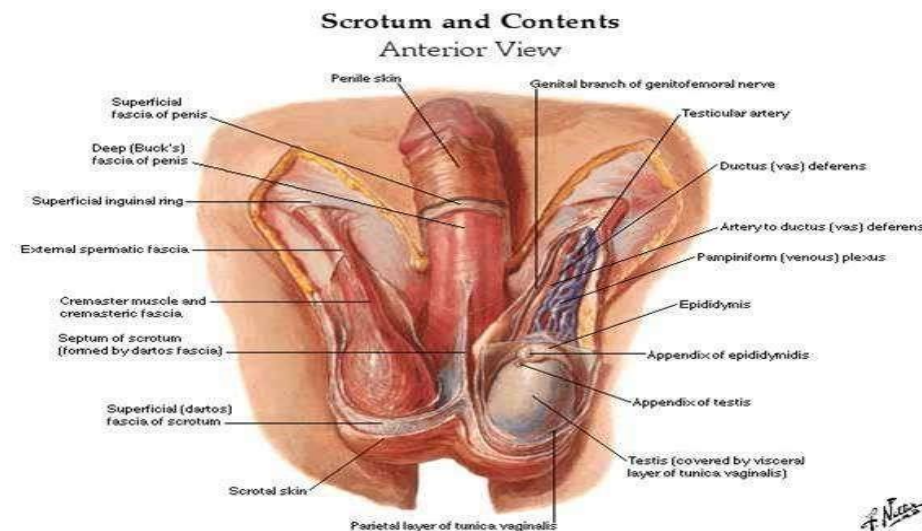
Scrotum

Spermatic fasciae

- It has **three layers** which lie beneath the superficial fascia and are derived from the **three layers** of the anterior abdominal wall on each side.
- The **external spermatic fascia** is derived from the aponeurosis of the external oblique muscle; the **cremasteric fascia** is derived from the internal oblique muscle; and, finally, the **internal spermatic fascia** is derived from the fascia transversalis.

Tunica vaginalis

- This lies within the spermatic fasciae and covers the anterior, medial, and lateral surfaces of each testis.

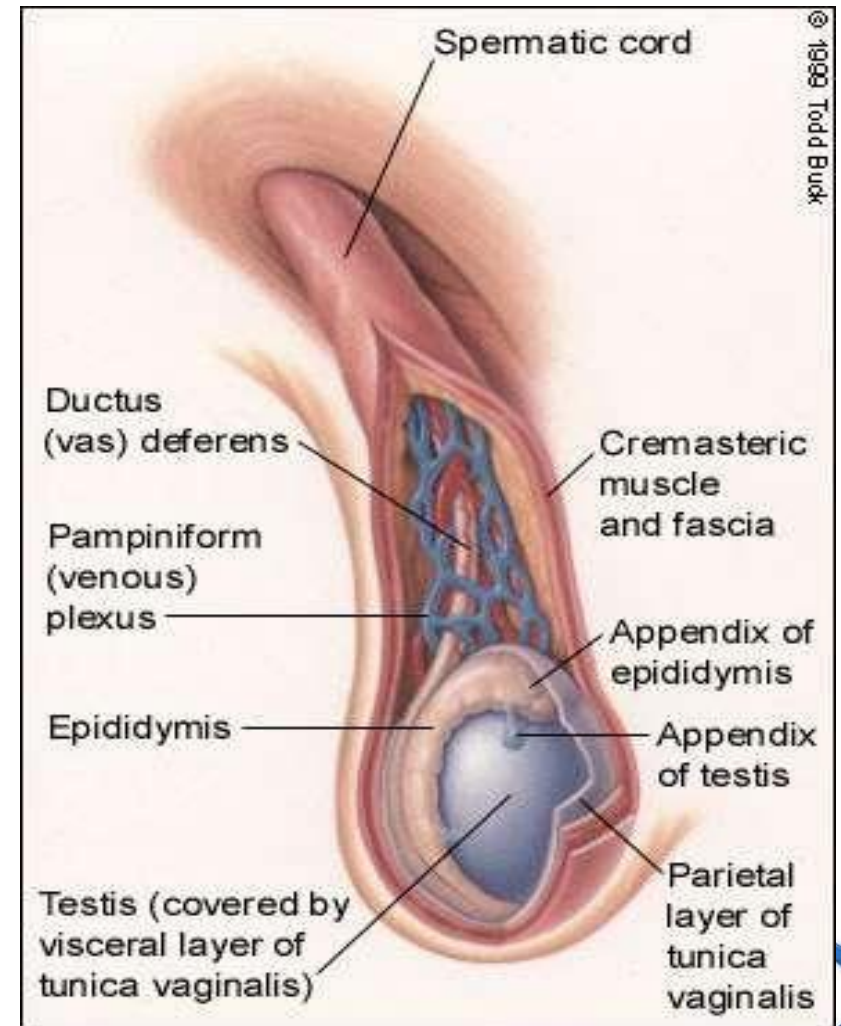


Testis

Testes **develop** in the abdomen and move before birth into the scrotum.

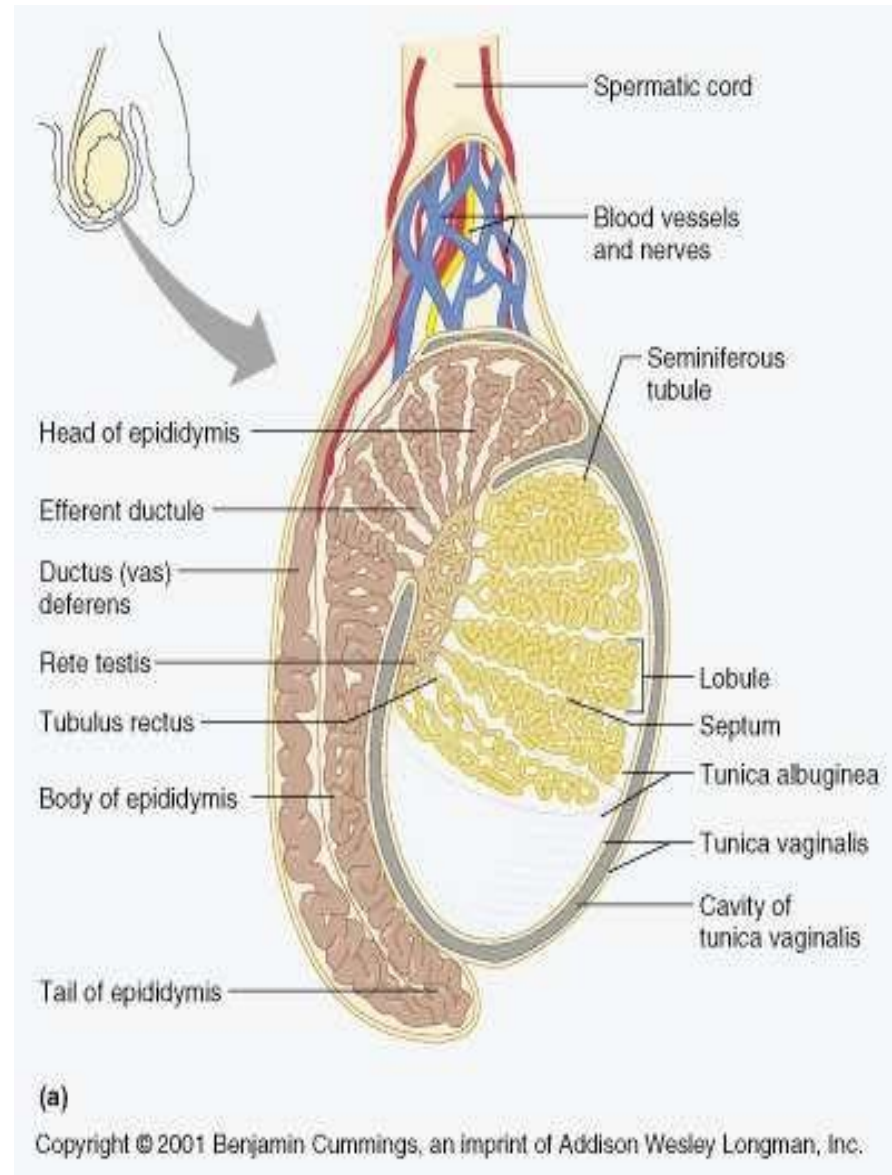
The testes are the two- **oval** shaped male organs that produce sperm and hormone testosterone

The left testis usually lies at a **lower** level than the right

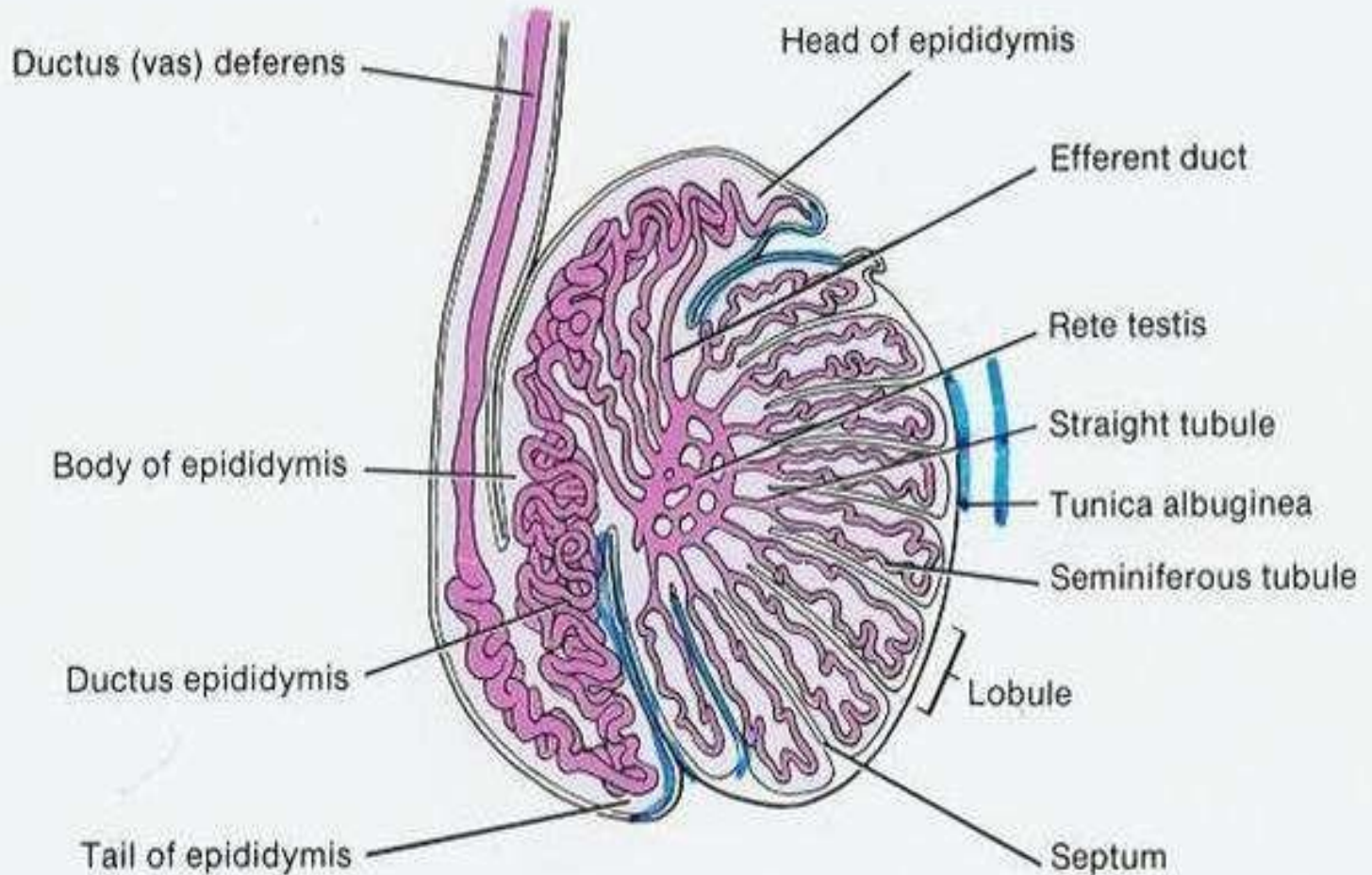
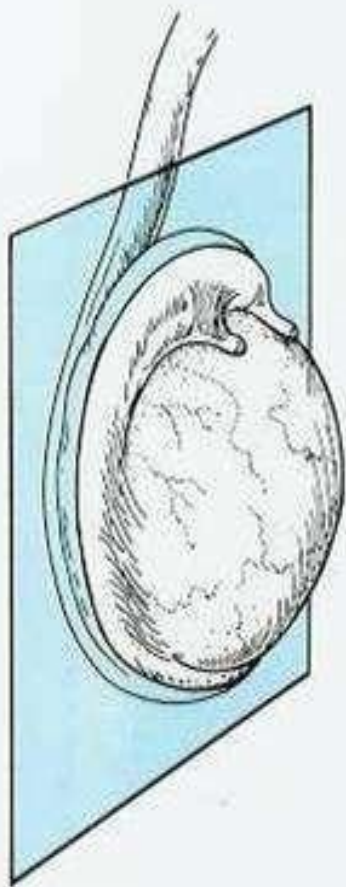


Testis

- In the inner surface of the **capsule** is a series of fibrous septa that divide the interior of the organ into lobules.
- Lying within each lobule are 1 to 3 coiled **seminiferous tubules**.
- The tubules open into a network of channels called the **rete testis**.
- Small efferent ductules connect the rete testis to the upper end of the **epididymis**.



Testis

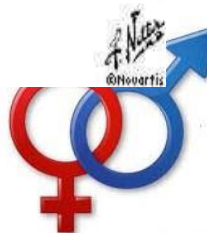
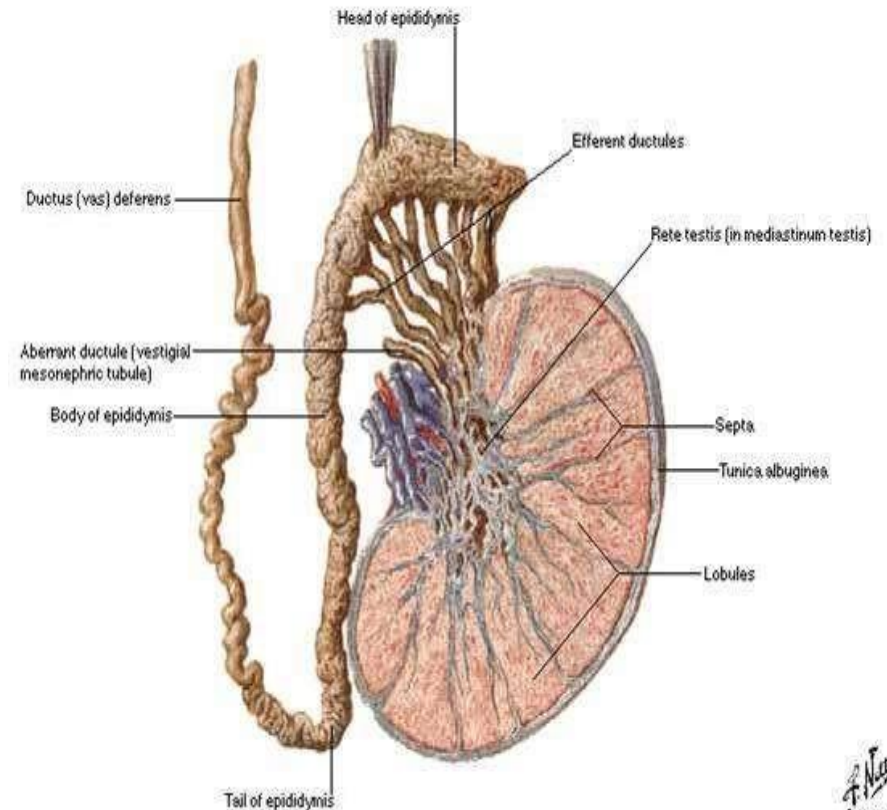


(c) Sagittal section of a testis

Epididymis

- The **epididymis** is a single, long **coiled** duct that courses along the posterolateral side of testis. (**head, body, tail**)
- The tunica vaginalis **covers** the epididymis with the exception of the posterior border.

Testis, Epididymis and Ductus Deferens
Frontal Section



Blood supply of testis and epididymis

Lo1,2

- **Arteries:**

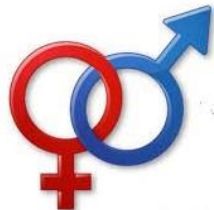
- The **testicular artery** is a branch of the **abdominal aorta**.

- **Veins:**

- **Testicular veins** emerge from the testis and the epididymis
- as venous network, the **pampiniform plexus**.
- This becomes reduced to a **single vein** as it ascends through the inguinal canal.
- The **right testicular vein** drains into the **inferior vena cava**, and the **left vein** joins the **left renal vein**.

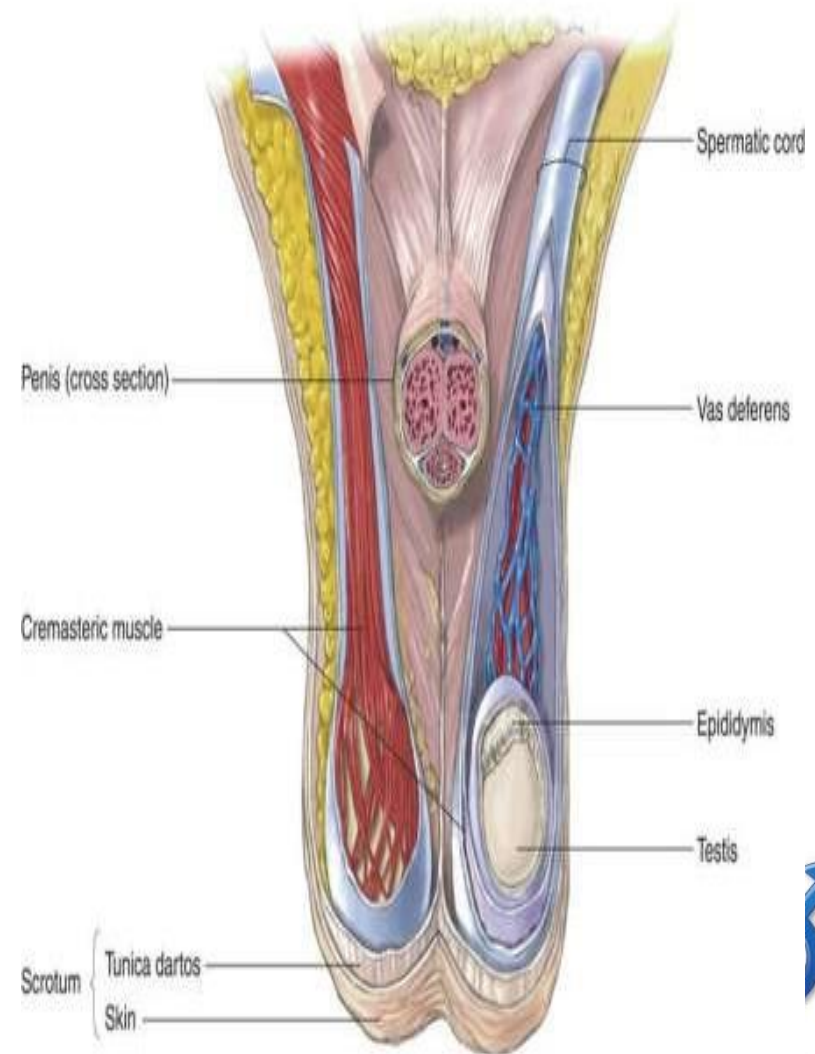
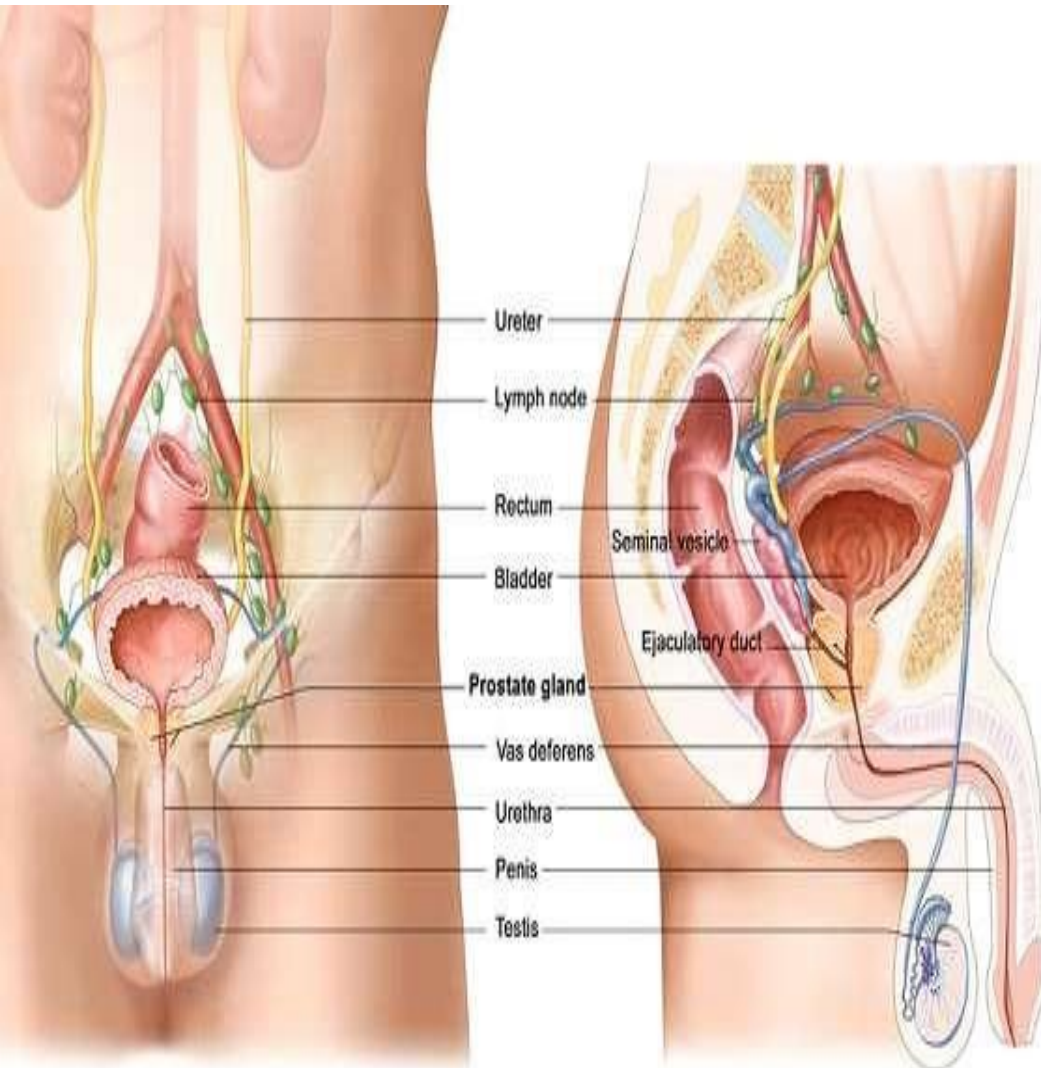
Lymphatic drainage:

- of the testes is to the para- aortic lymph nodes.



Blood supply of testis and epididymis

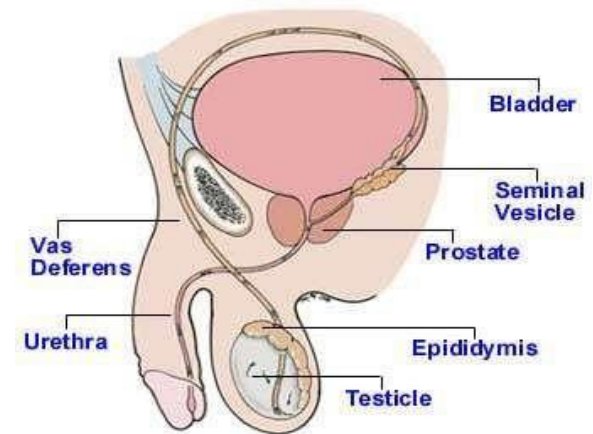
Lo1,2



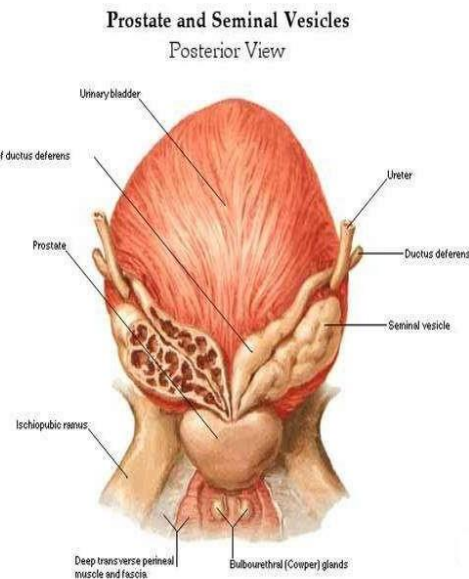
Ductus deferens =Vas deference

Lo1,2

- long muscular duct that **transports** spermatozoa from the tail of the epididymis to the ejaculatory duct
- Traverses the **inguinal canal** to the **deep ring** , passes downwards then turns medially to cross the **ureter** posterior to the bladder.
- It continues inferomedially along the base of the **bladder**, anterior to the **rectum**, where it is **joined** by the duct of the **seminal vesicle** to form the **ejaculatory duct**.
- The terminal part of the vas deferens is dilated to form the **ampulla** of the vas deferens.
- The **ejaculatory duct** penetrates through the **prostate gland** to connect with the prostatic urethra.



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Accessory gland of the male reproductive system .

Seminal vesicle

- are two lobulated organs about 2 in. (5 cm) long lying on the posterior surface of the bladder
- **Relation:**
- On **medial side** of each vesicle lies the terminal part of the vas deferens
- **Posteriorly**, the seminal vesicles are related to the rectum
- **Inferiorly**,
- each seminal vesicle narrows and joins the vas deferens of the same side to form the ejaculatory duct

Blood vessels

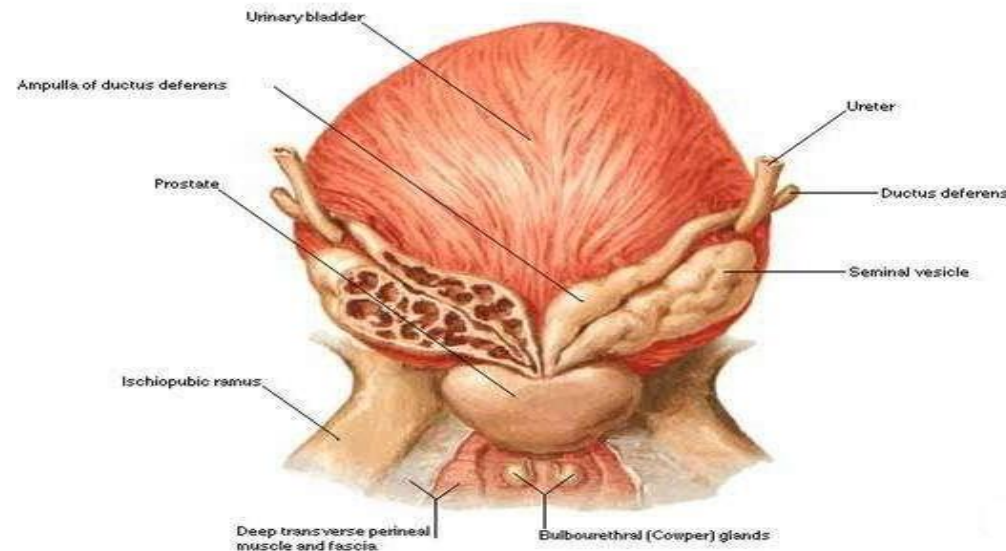
Arteries

the inferior vesicle and middle rectal arteries.

Veins

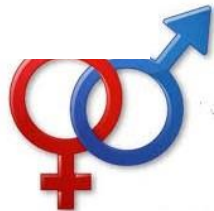
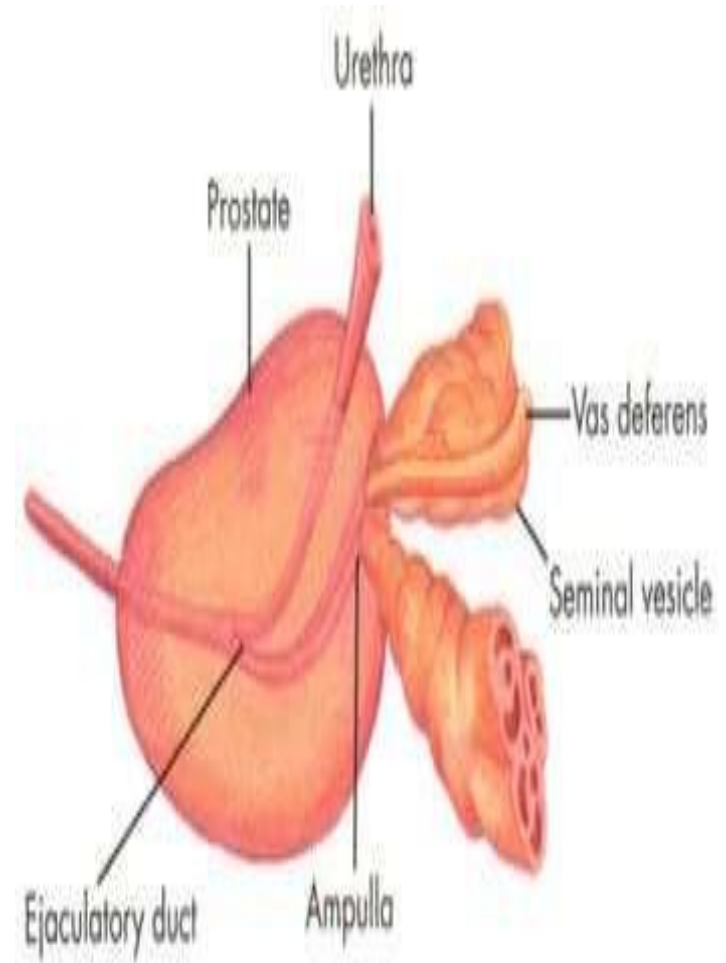
The veins drain into the internal iliac veins

Prostate and Seminal Vesicles
Posterior View



Ejaculatory ducts

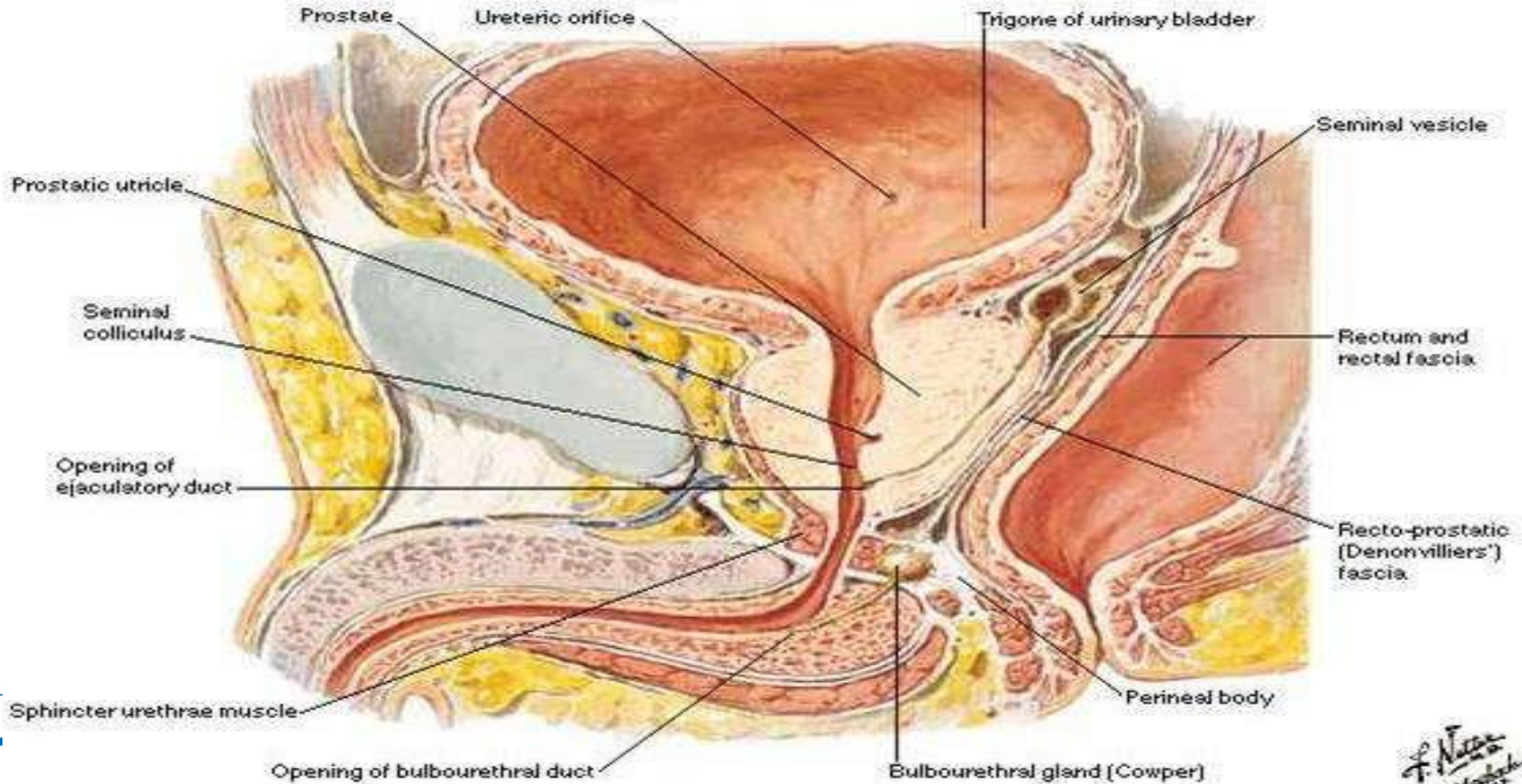
- **Two** ejaculatory ducts are each less than 1 in. (2.5 cm) long
- formed by the union of the vas deferens and the duct of the seminal vesicle.
- ejaculatory ducts pierce the posterior surface of the prostate and open into the **prostatic part** of the urethra, close to the margins of the prostatic utricle
- their function is to drain the **seminal fluid** into the prostatic urethra.



Male Reproductive System

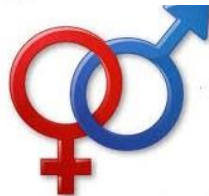
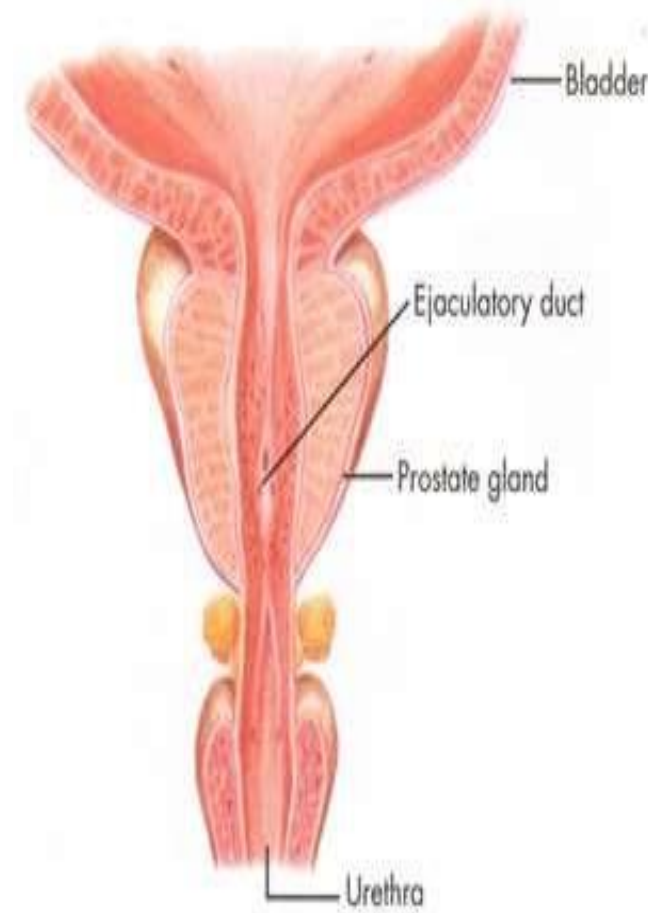
Lo1,2

Prostate and Seminal Vesicles Sagittal Section



Prostate

- **Prostate**
- an unpaired accessory structure of the male reproductive system that surrounds the urethra in the pelvic cavity .
- **Relation:**
- lies immediately **inferior** to the bladder, **above** the the urogenital diaphragm, **posterior** to the pubic symphysis, and **anterior** to the rectum.
- :
- The prostate is shaped like an **inverted rounded cone** with a larger base, which is continuous above with the neck of the bladder, and a narrower apex, which rests below on the pelvic floor.
- The inferolateral surfaces of the prostate are in contact with the **levator ani** muscles that together cradle the prostate between them.

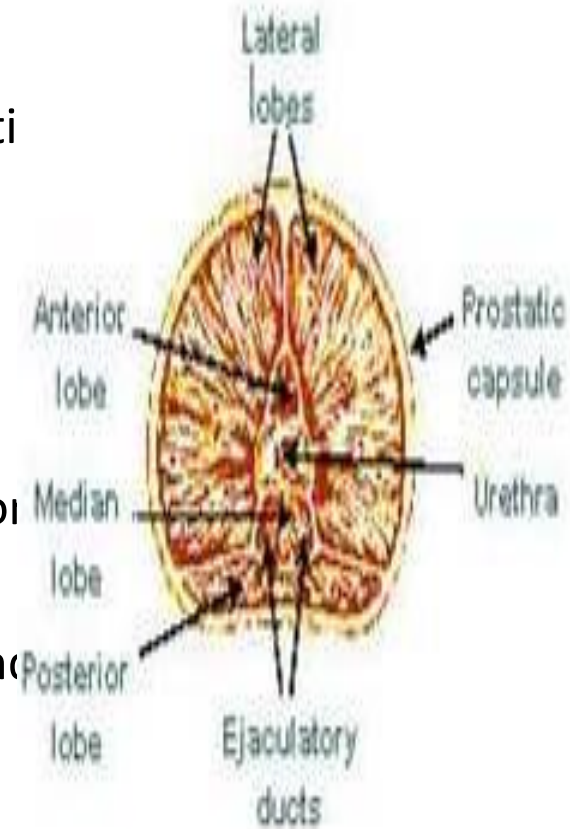


Prostate

- Enclosed within thin dense **fibrous capsule**
- Inner loose sheath derived from pelvic fascia – “prostatic sheath”
 - Continuous inferiorly with superior fascia of urogenital diaphragm
 - Posteriorly it is part of rectovesical septum
 - Separates bladder, seminal vesicles and prostate from rectum
- Prostatic venous plexus lies between fibrous capsule and prostatic sheath

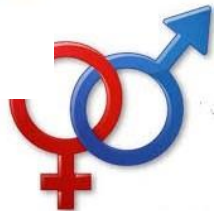
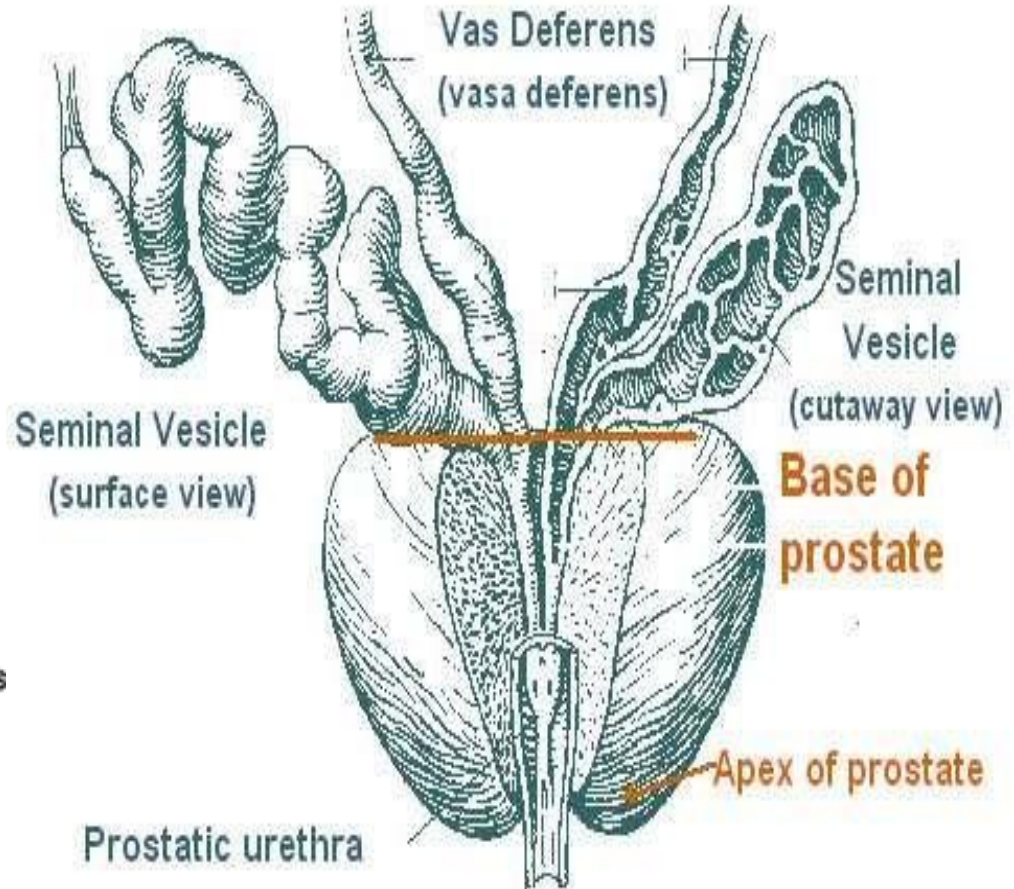
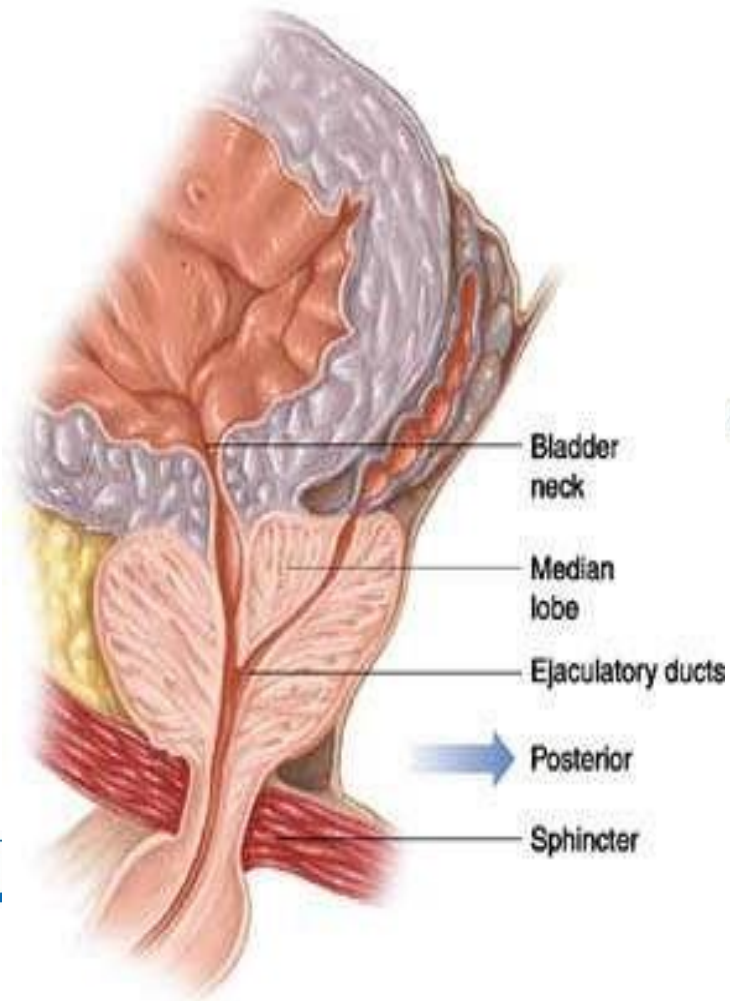
Prostate divided into: **5 lobes:**

- Two **lateral** lobes
- One **median** lobe
- **Anterior** and **posterior** lobes



Male Reproductive System

Side View



- **Arterial supply**

- Arteries derived from *internal pudendal, inferior vesical and middle rectal arteries* (branches of internal iliac)

- **Venous drainage**

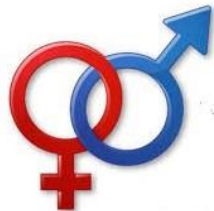
- Veins form prostatic venous plexus around sides and base of prostate – located between capsule and sheath
- Drains into *internal iliac veins*
- Also communicates with vesical venous plexus and vertebral venous plexuses.

- **Lymphatic drainage**

- Lymph vessels terminate in internal iliac and sacral lymph nodes
- Some vessels from posterior surface pass with lymph vessels from bladder to external iliac LN's

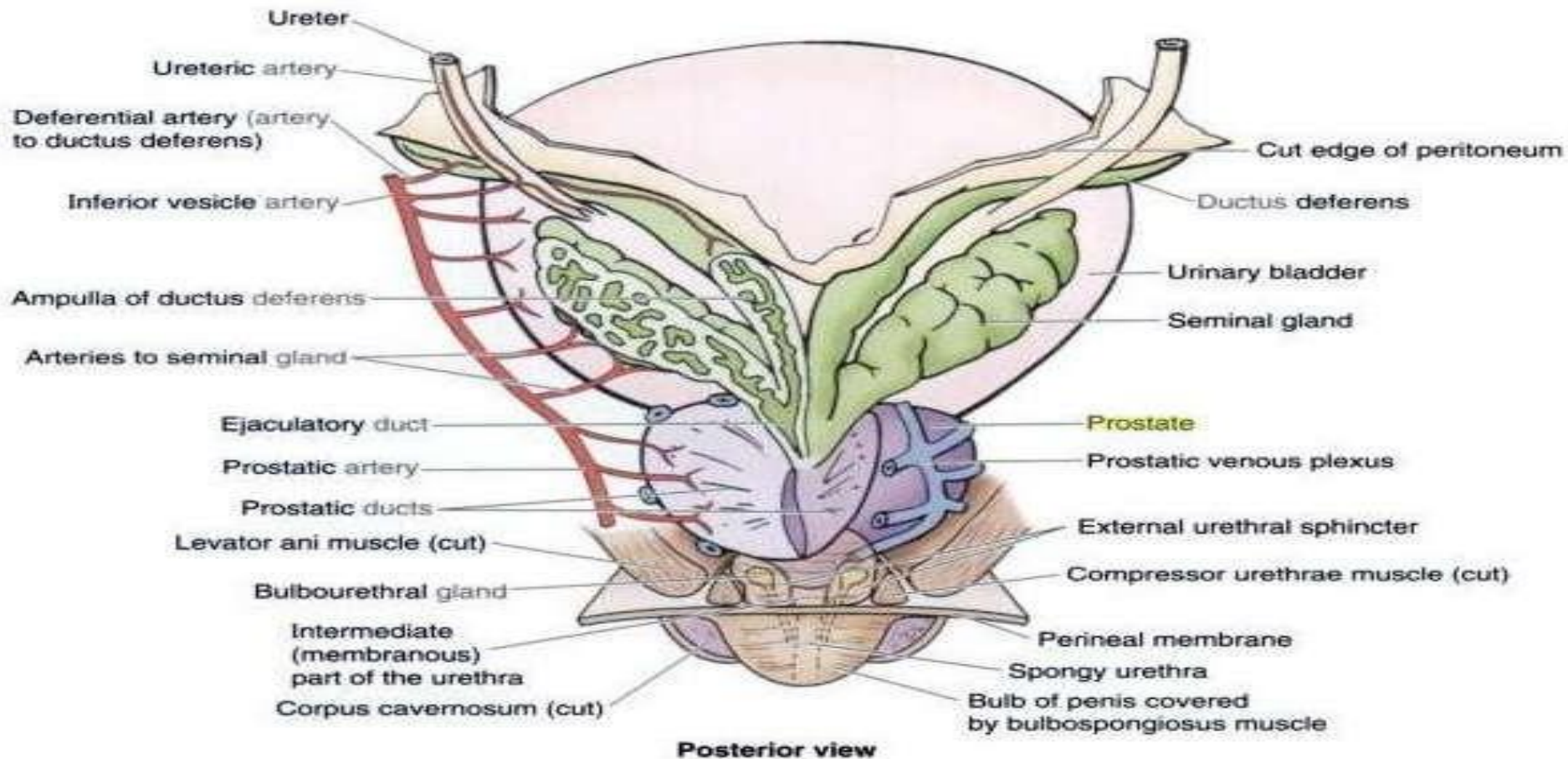
- **Innervation**

- Parasympathetic fibres arise from pelvic splanchnic nerves
- Sympathetic fibres from inferior hypogastric plexuses



Prostate

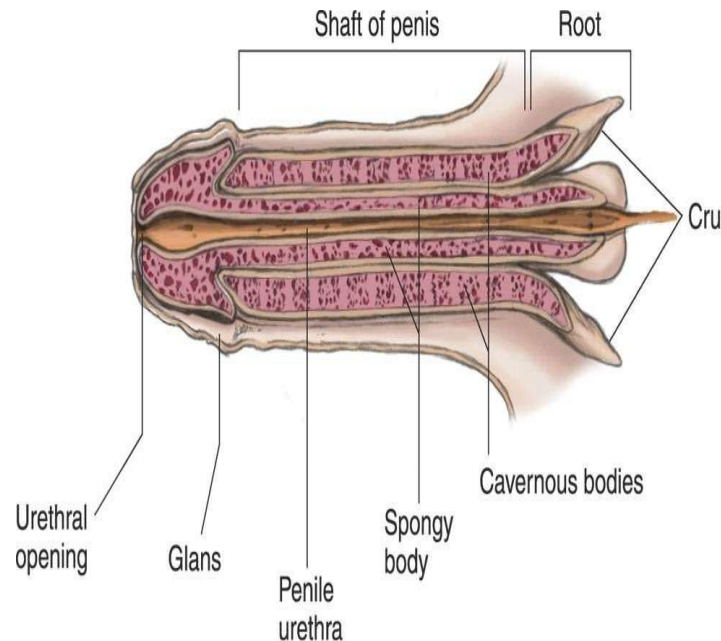
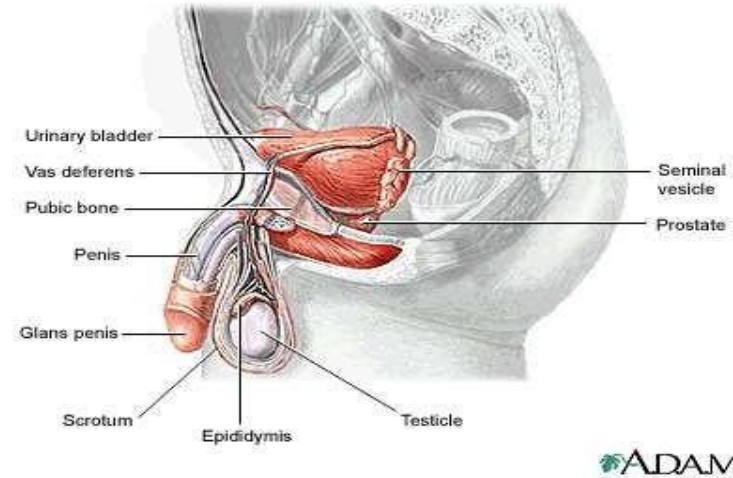
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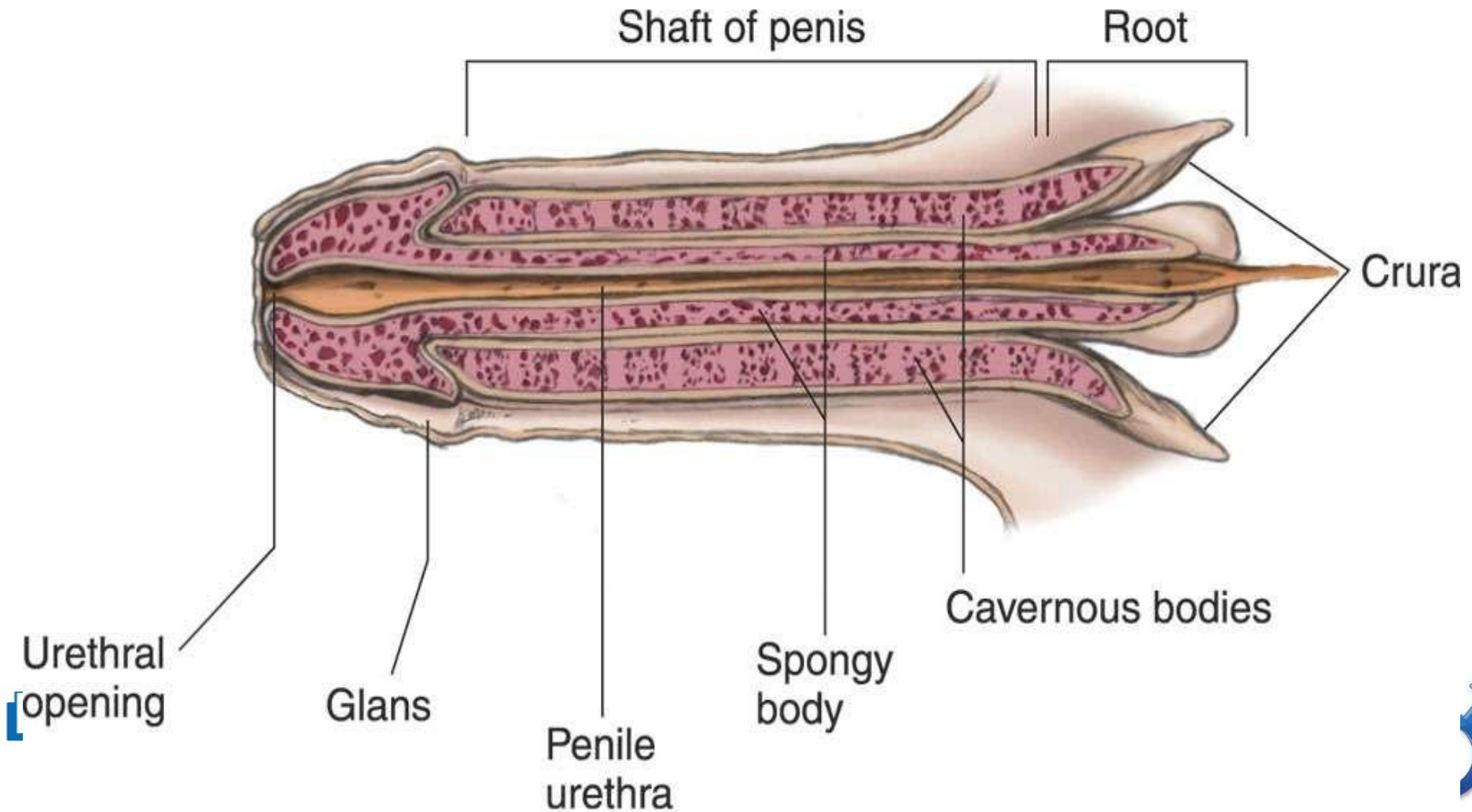
Penis

Lo1,2

- The penis is a pendulous organ suspended from the front and sides of the pubic arch and containing the greater part of the urethra.
- It consists of **internal root**, **external shaft**, & **glans**.
 - **Root**: the portion of the penis that extends internally into the pelvic cavity.
 - **Shaft**: the length of the penis between the glans and the body.
 - **Glans**: the head of the penis; has many nerve endings.
- **Foreskin**: a covering of skin over the penile glans



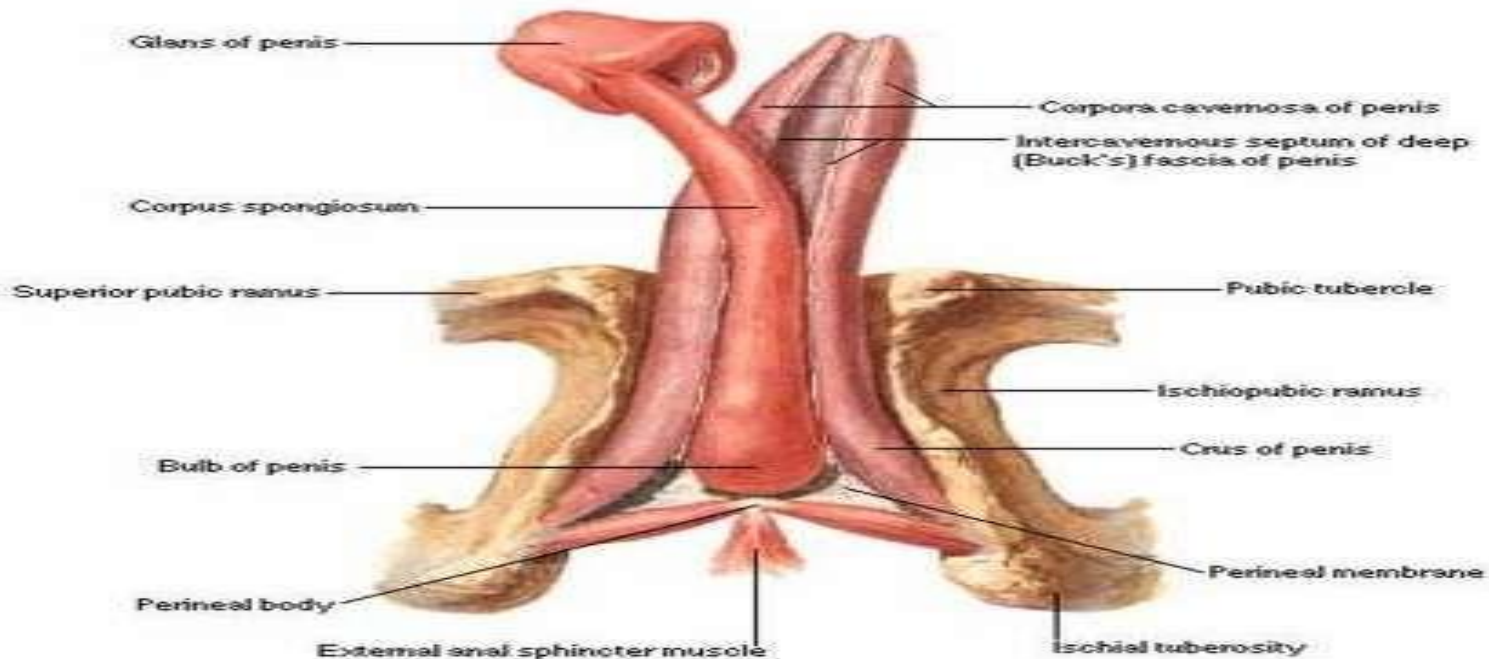
Penis



Penis

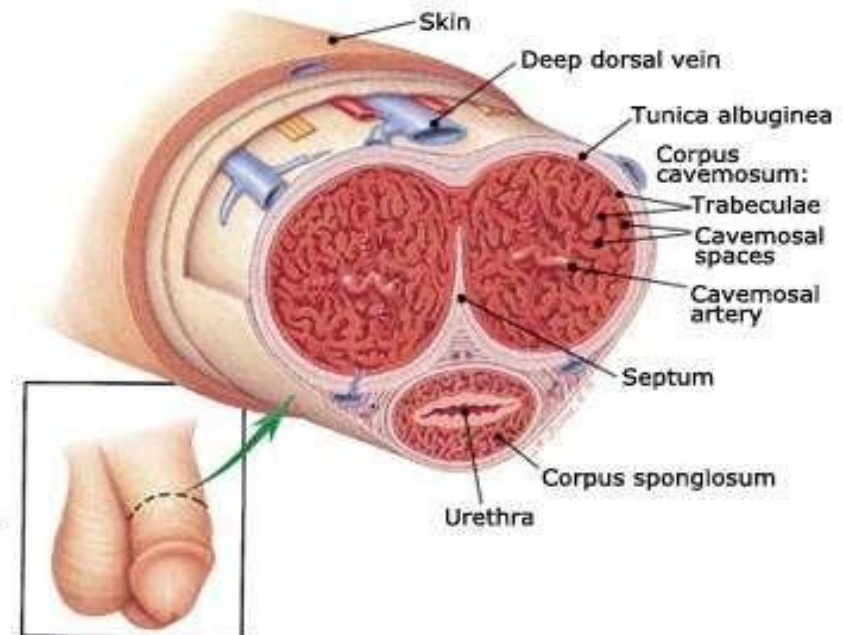
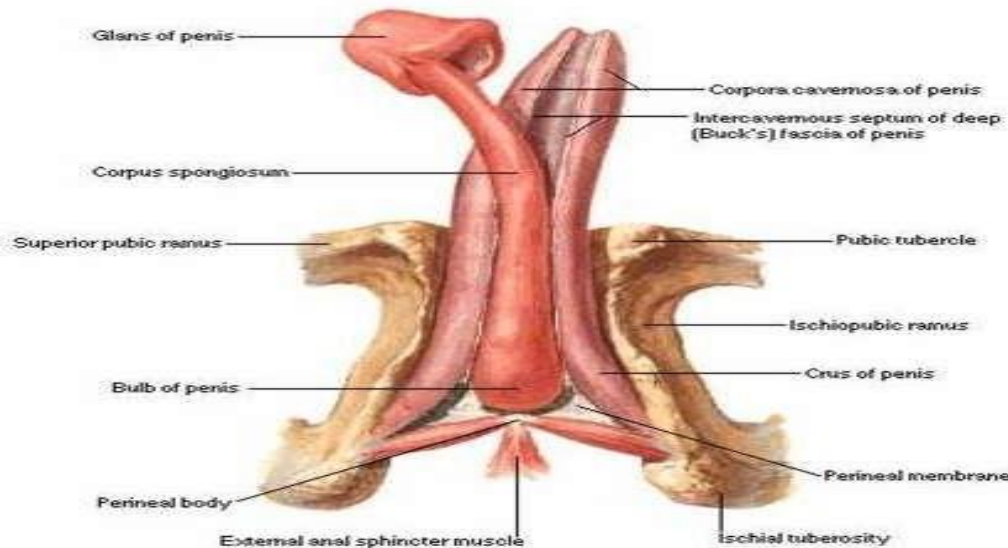
The **root of penis** consists of **two** **drura**;

- 1. corpora cavernosa** attached to the pubic arch, and **bulb of penis**,
- 2. corpus spongiosum** anchored to the perineal membrane



Penis

- The body of the penis is essentially composed of three cylinders of erectile tissue enclosed in a tubular sheath of fascia (Buck's fascia).
- The erectile tissue is made up of two dorsally placed corpora cavernosa and a single corpus spongiosum applied to their ventral surface.
- At its distal extremity, the corpus spongiosum expands to form the glans penis, which covers the distal ends of the corpora cavernosa.
- On the tip of the glans penis is the slitlike orifice of the urethra, called the external urethral meatus.

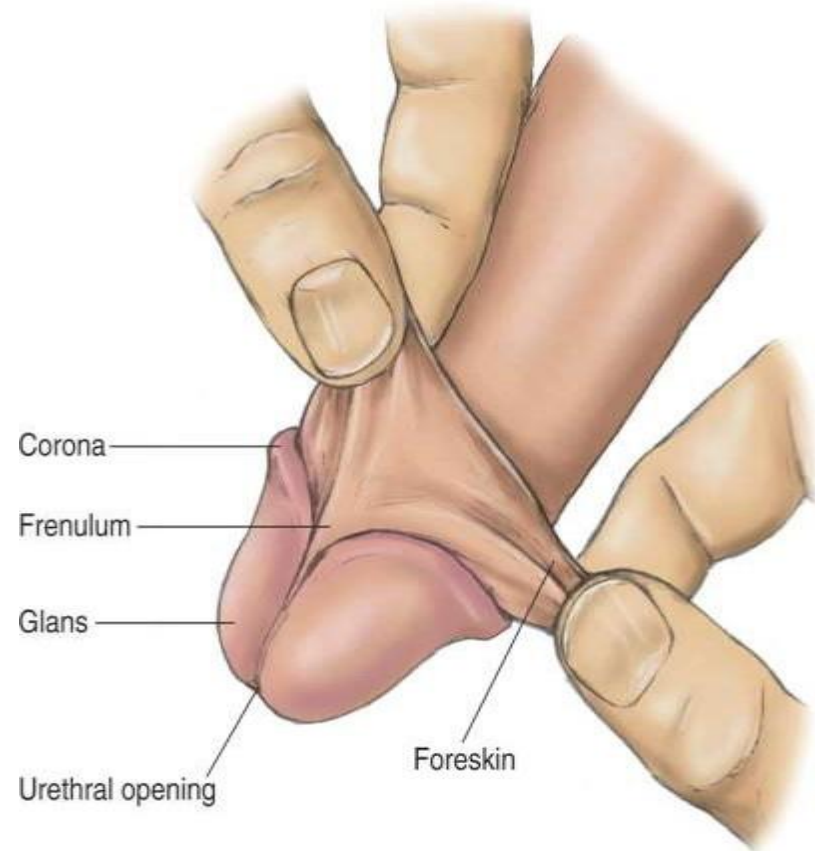


Lo1,2

External penile structures

- **Corona:** the rim of the penile glands.
- **Frenulum:** thin strip of skin connecting the glans to the shaft on the underside of the penis.

: Both are highly sensitive areas to the touch



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Blood supply

Arteries

- The corpora cavernosa are supplied by the **deep arteries of the penis** ;
- the corpus spongiosum is supplied by the **artery of the bulb**.
- In addition, there is the **dorsal artery of the penis**.
- *All the above arteries are branches of the **internal pudendal artery**.*

Veins

- The veins drain into the **internal pudendal veins**.

Lymph Drainage

- The skin of the penis is drained into the medial group of **superficial inguinal nodes**.
- The deep structures of the penis are drained into the **internal iliac nodes**.

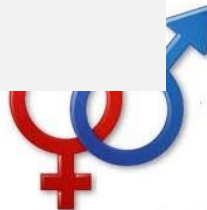
Nerve Supply

Sensation

- The nerve supply is from the **pudendal nerve** and the pelvic plexuses.

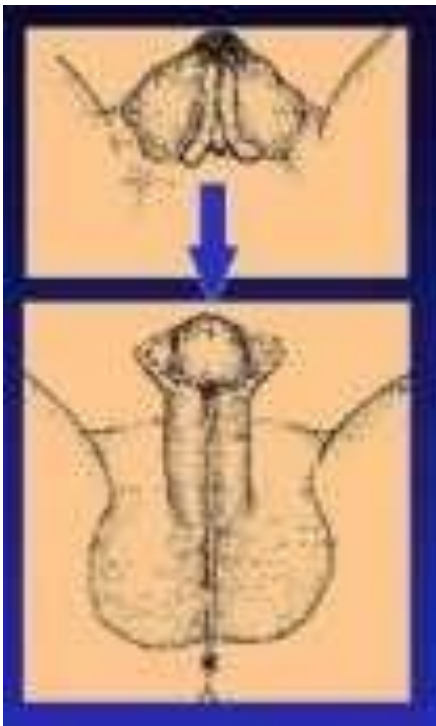
Erectile function

- Parasympathetic(excitatory)
- Sympathetic (inhibitory)



Analogous structures in male and female sexual anatomy

Lo1,2



Male	Female
Glans _____	Clitoris
Foreskin _____	Clitoral hood
Shaft _____	Labia minora
Scrotal sac _____	Labia majora
Testes _____	Ovaries



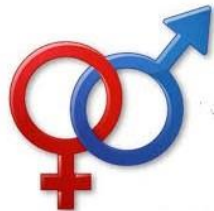
Imaging techniques

X ray

Ultra sounds

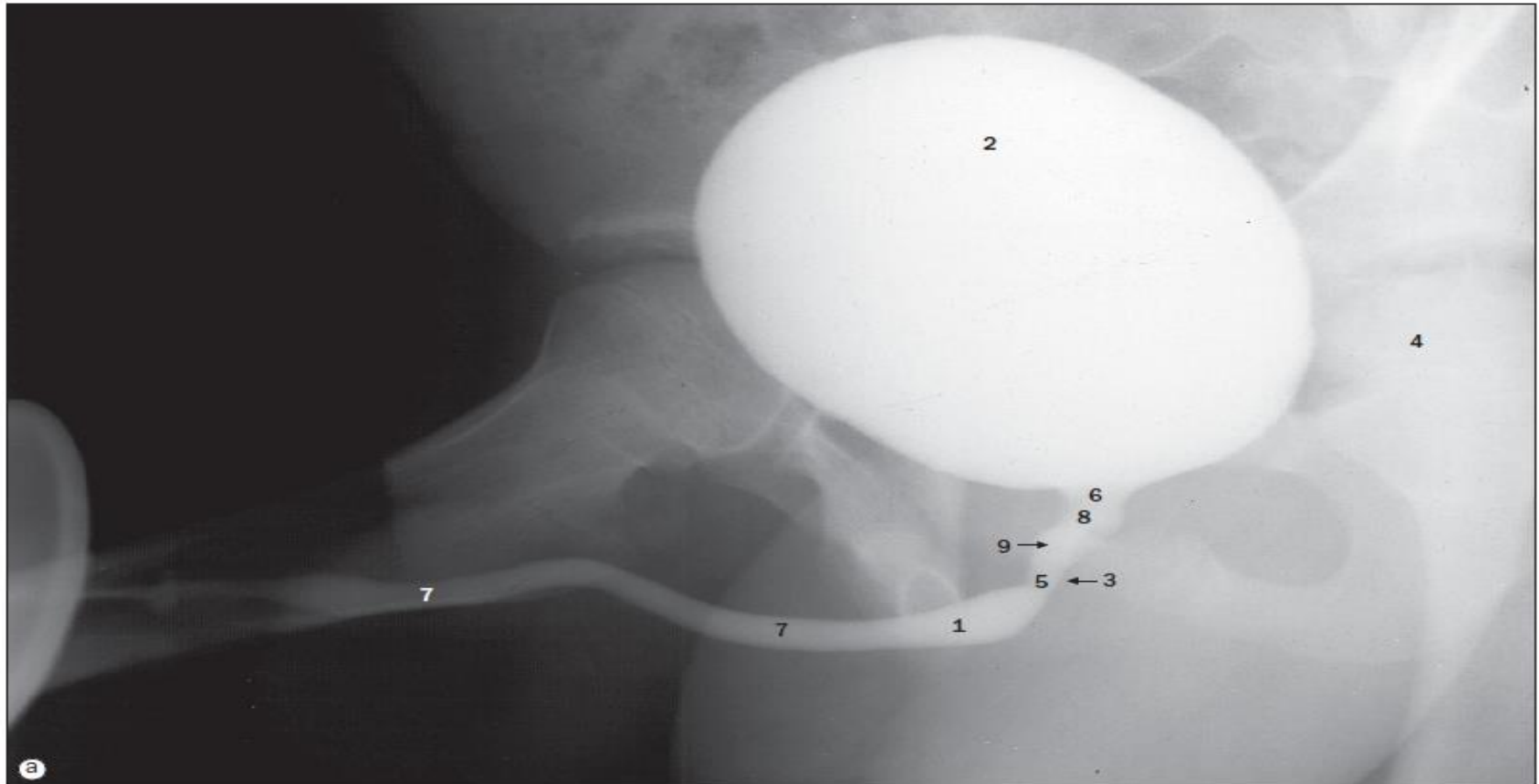
: C T scan

MRI



Male urethrogram

Lo3



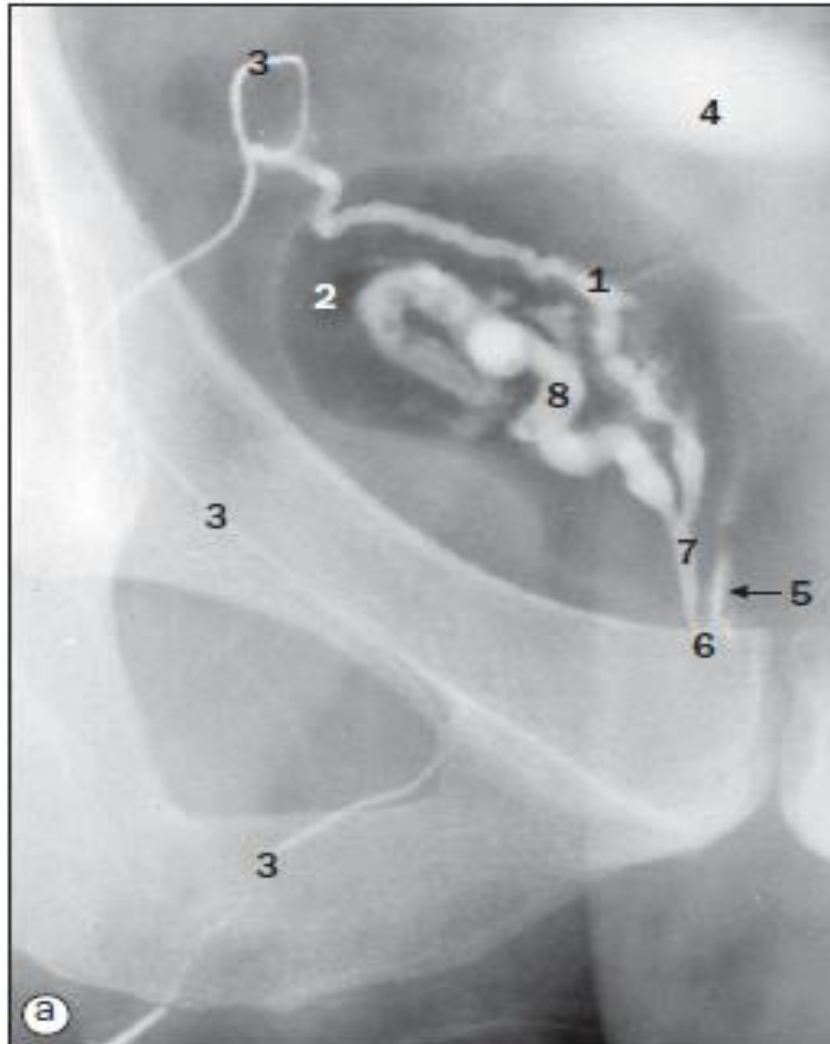
(a) Male urethrogram, oblique image.

(b) Penile arteriogram.

(c) Cavernosogram.

- | | |
|--|--|
| 1 Bulbous urethra | 6 Neck of urinary bladder |
| 2 Contrast in urinary bladder | 7 Penile urethra |
| 3 External sphincter
(sphincter urethrae) | 8 Prostatic urethra |
| 4 Head of femur | 9 Seminal colliculus
(verumontanum) |
| 5 Membranous urethra | |

Seminal vesiculogram



(a) Seminal vesiculogram.

- 1 Ampulla of ductus deferens
- 2 Colonic gas
- 3 Ductus deferens (vas deferens)
- 4 Full urinary bladder
- 5 Left ejaculatory duct
- 6 Position of seminal colliculus (verumontanum)
- 7 Right ejaculatory duct
- 8 Seminal vesicle

Ultra sound Testis

Lo3

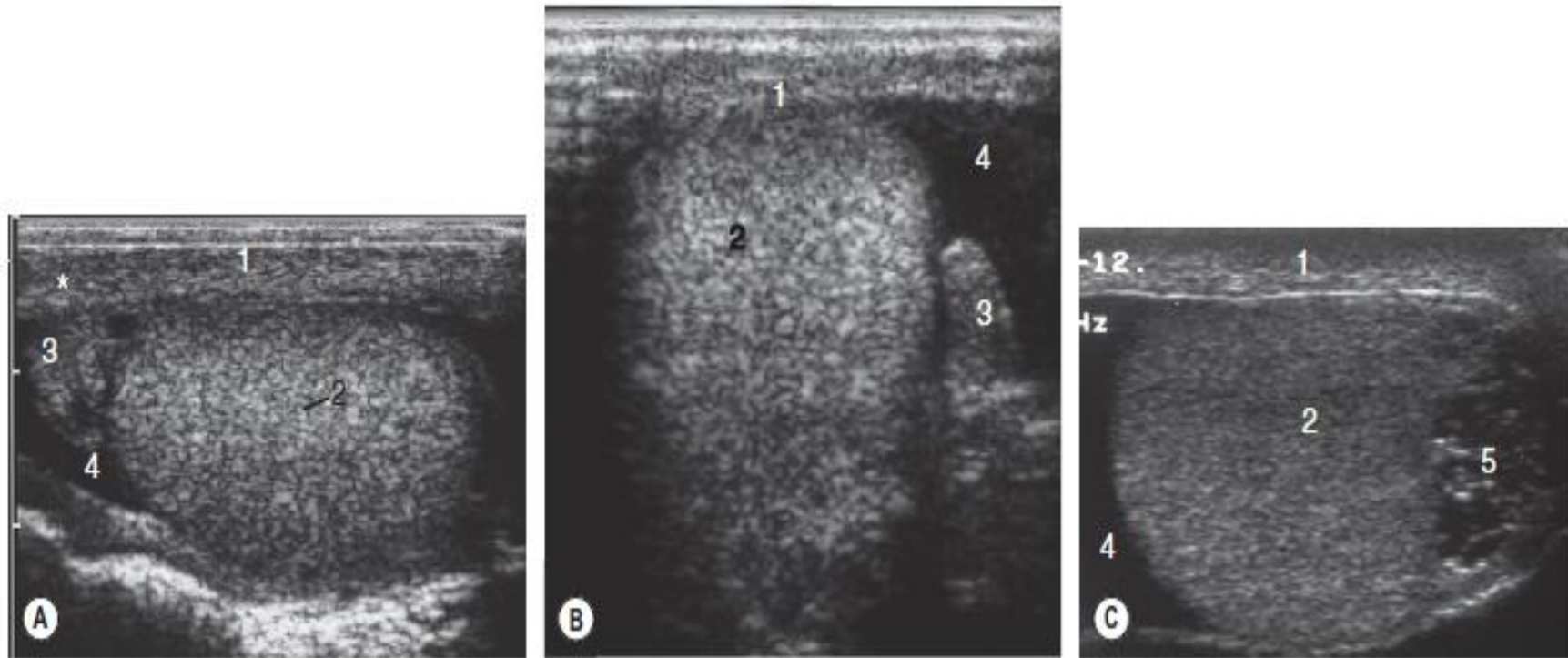
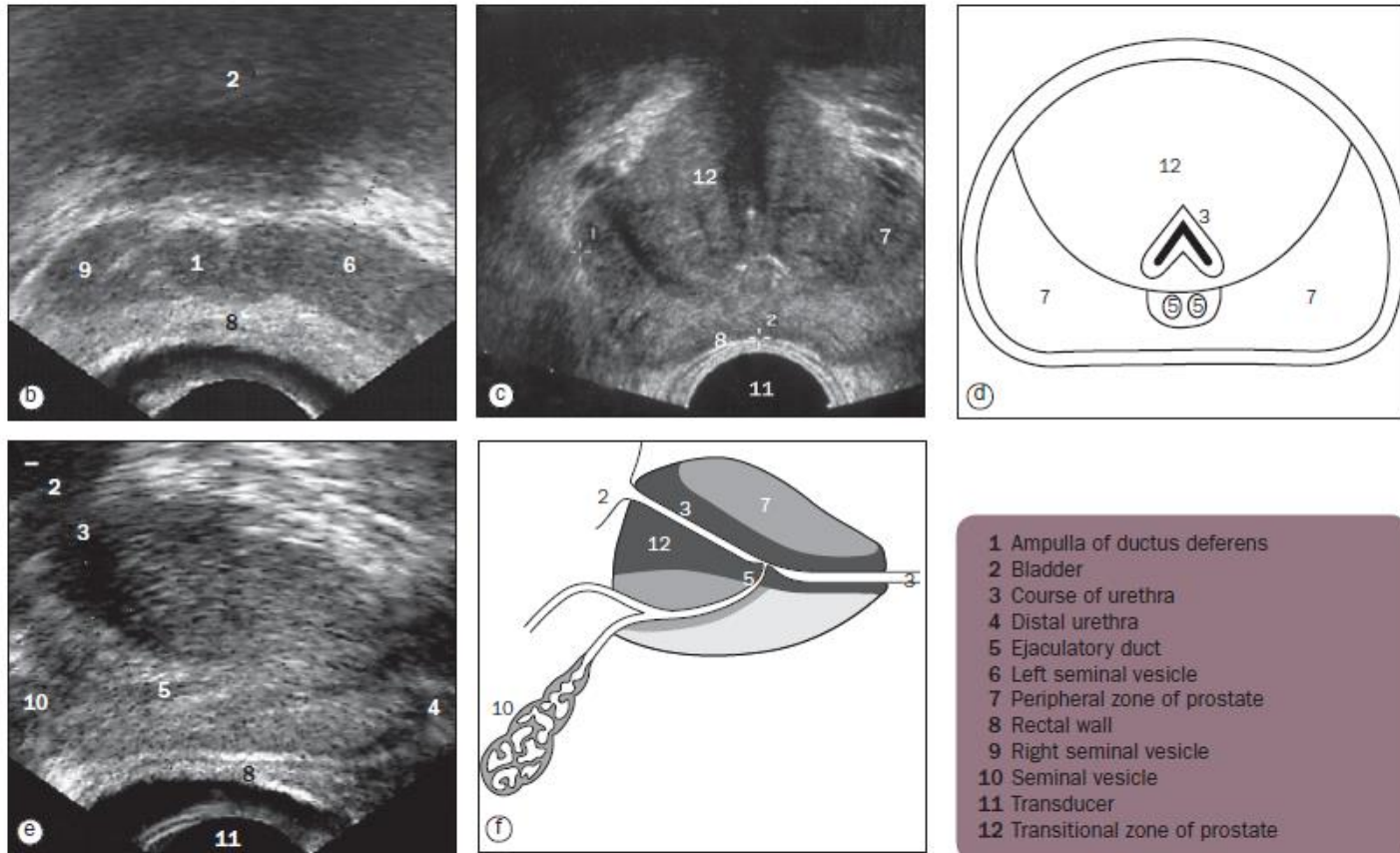


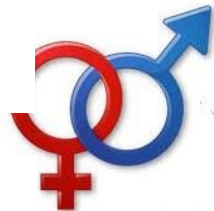
Figure 6.19 • Ultrasound of testis: (A) longitudinal image; (B) transverse image; (C) transverse image showing prominent rete testis – a normal variant.

1. Skin
2. Testis
3. Epididymis
4. Fluid in scrotal sac
5. Rete testis

Rectal ultrasound of prostate

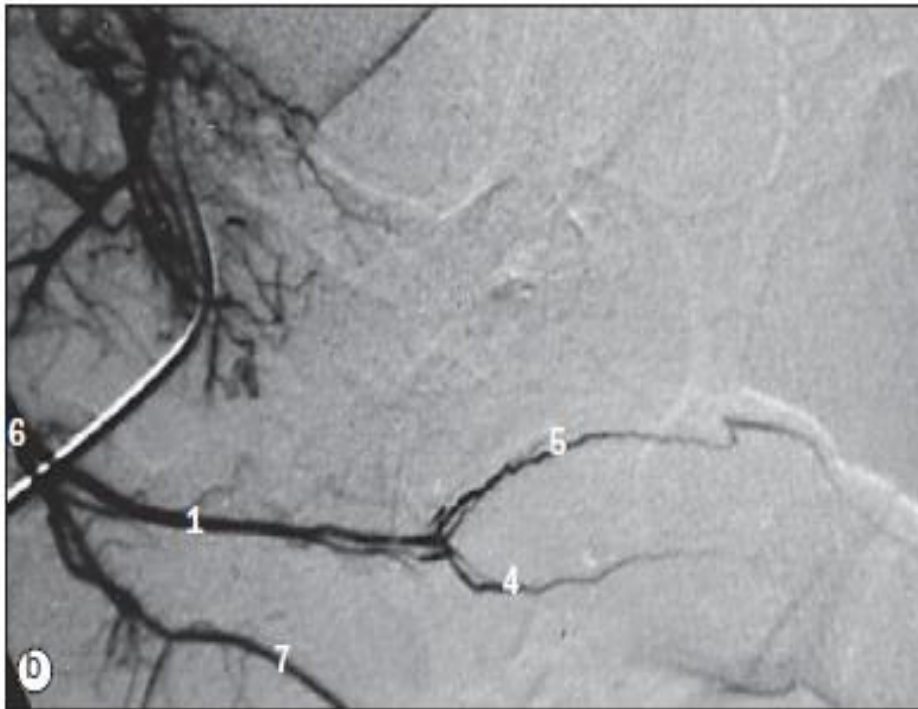


Rectal ultrasound of the prostate, (b) axial scan through bladder base, (c) axial scan through mid prostate, (d) line drawing of axial scan prostate, (e) sagittal midline scan, (f) line drawing of midline sagittal scan.



Angiography Penis

Lo3



- | | |
|-----------------------------|------------------------------|
| 1 Artery of the penis | 5 Dorsal artery of the penis |
| 2 Corpus cavernosum | 6 Internal pudendal artery |
| 3 Crus of corpus cavernosum | 7 Perineal artery |
| 4 Deep artery of the penis | |

MRI of male pelvis

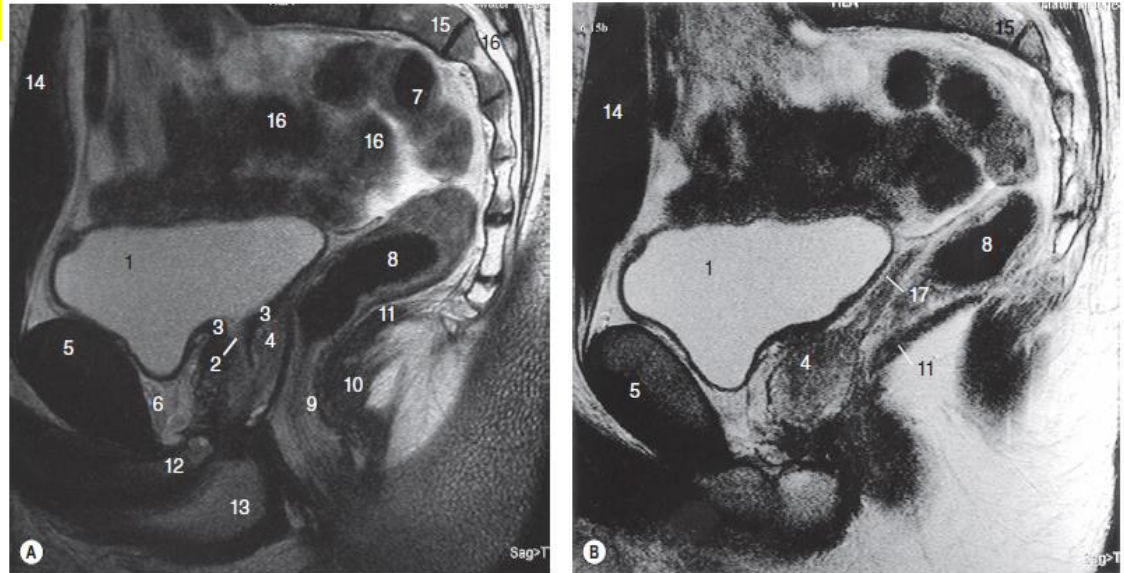
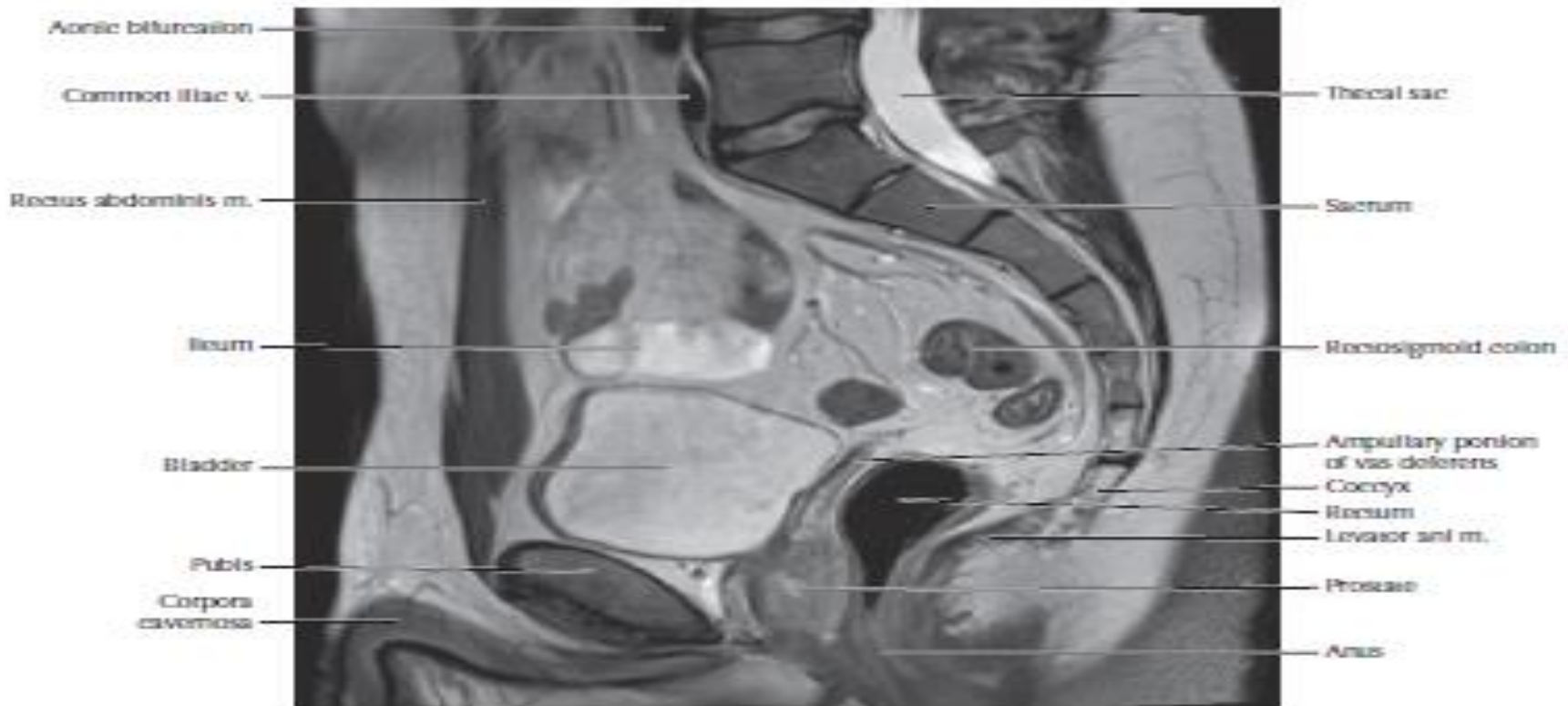


Figure 6.17 • MRI scan of male pelvis: (A) sagittal image through midline showing urethra; (B) sagittal image to the right of midline showing seminal vesicle.

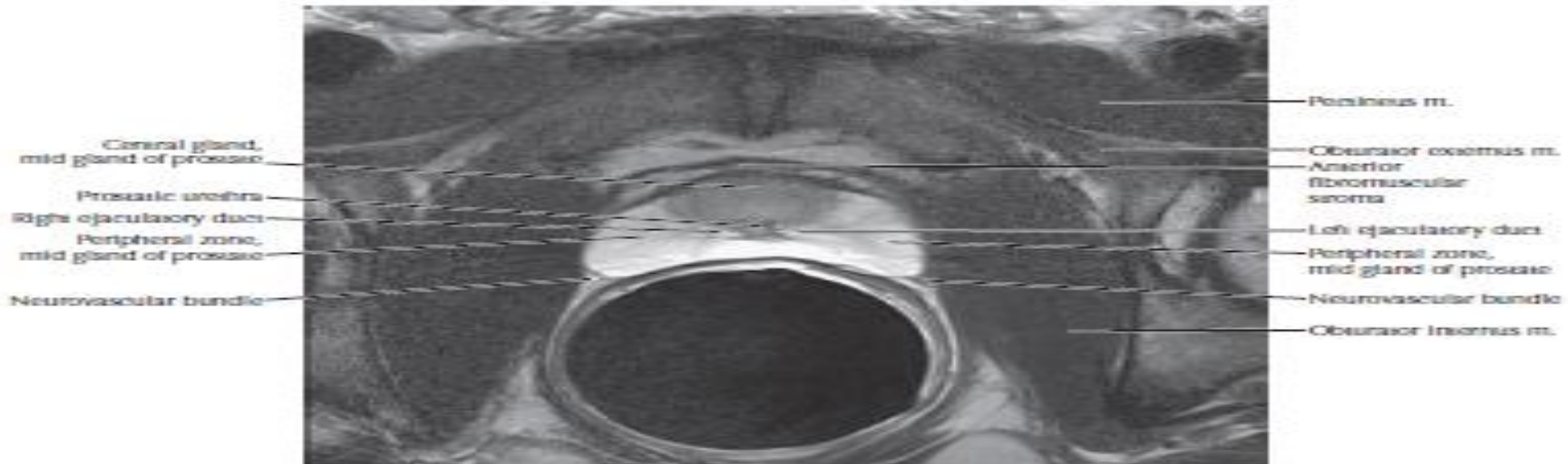
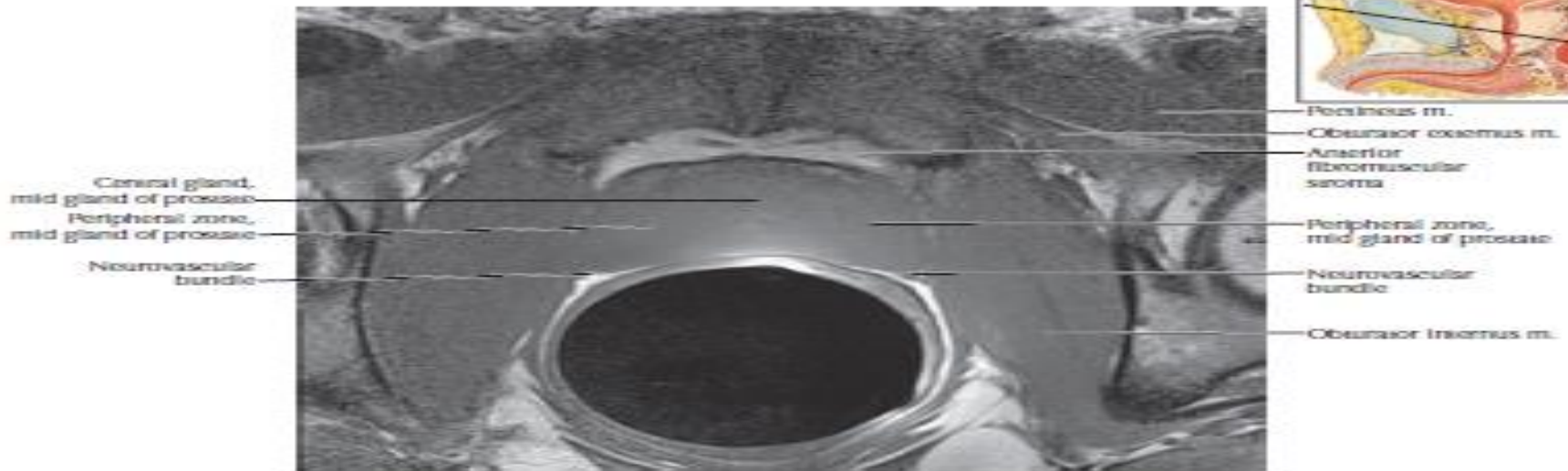
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|--|--|
| 1. Bladder | 10. Coccygeus muscle |
| 2. Proximal urethra | 11. Levator ani |
| 3. Internal urethral sphincter | 12. Corpus spongiosum |
| 4. Prostate gland | 13. Part of corpus cavernosum |
| 5. Symphysis pubis | 14. Rectus muscle |
| 6. Retropubic fatty space (of Retzius) | 15. Sacrum |
| 7. Sigmoid colon | 16. Spinal canal containing CSF and sacral nerve roots |
| 8. Rectum | 17. Seminal vesicle |
| 9. Anal canal | |



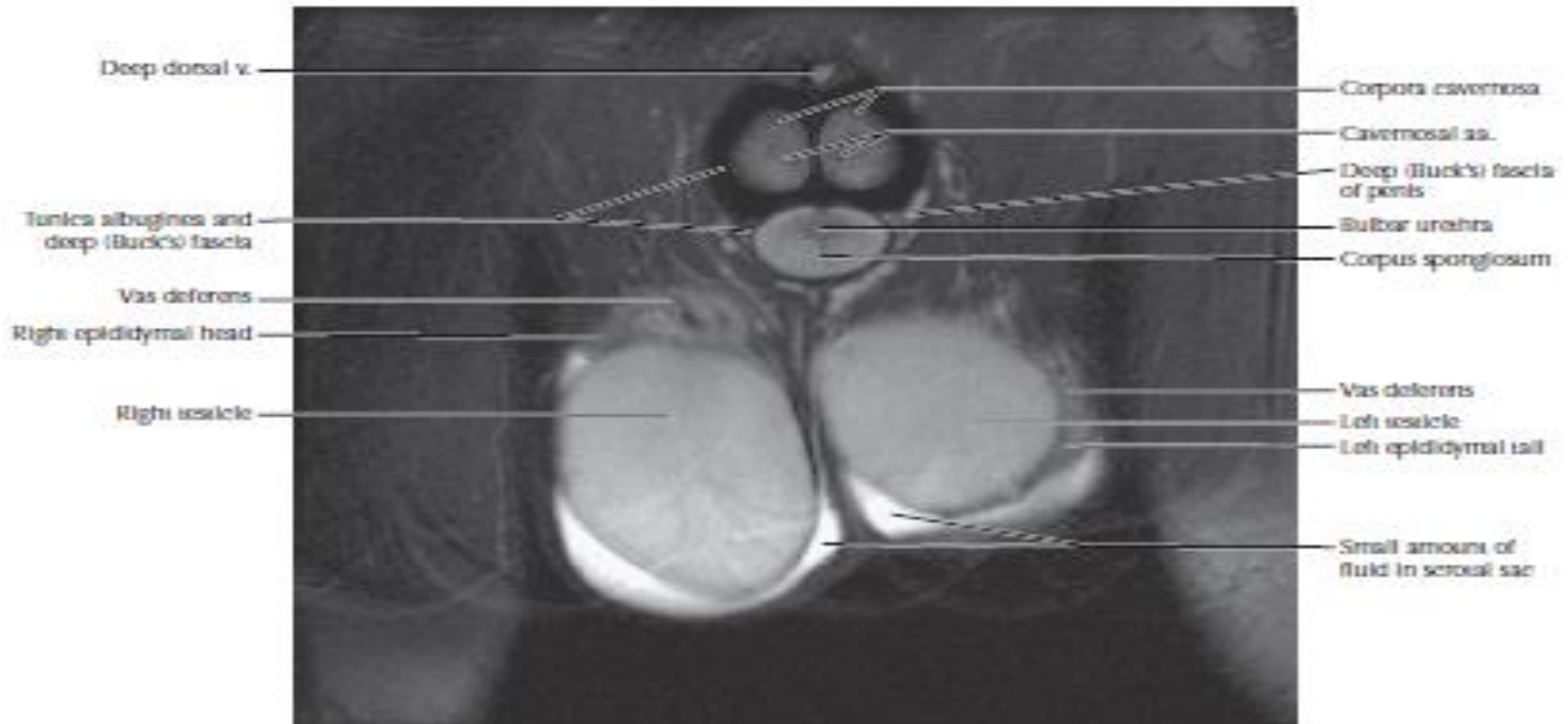
MRI



MRI



MRI

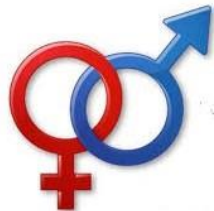


Clinical correlates

Oligozoospermia :

a clinical condition where there is an abnormally low number of spermatozoa in the semen.

:Azoospermia : no sperms appear in the ejaculate.



Clinical correlates

LO4

Cryptorchid = Cryptorchidism (maldescended) = undesended testis :

- is defined as failure of the testis to descend from its intra-abdominal location into the scrotum
- spermatogenesis is impaired because of the elevated temperature.
- The germ cells are absent, while the Sertoli cells and Leydig cells secrete male sex hormones.
- Cryptorchid testes are associated with increased incidence of malignant testicular tumors (20-48 times more likely to undergo malignant Degeneration)

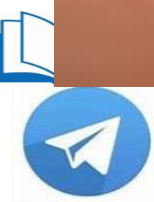
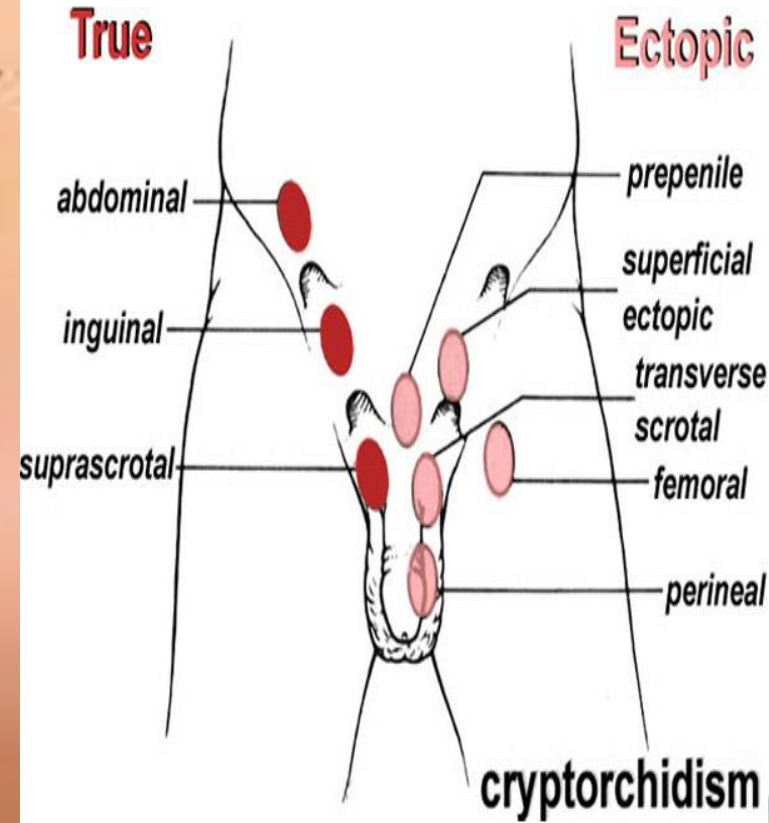
Preterm infants (28-32weeks)

 Unilateral or bilateral



Maldescended testes

Lo4



Clinical correlates

Orchitis : inflammation of the testis

= occurs in some individuals who suffer mumps after puberty.

= This results in impaired spermatogenesis, occasionally leading to seminiferous tubule degeneration or at times, infertility.

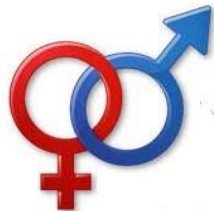
: = Absence of germ cells may be congenital or acquired (e.g. drugs, viral infections, irradiation, cryptorchidism).

= Testicular tumours are rare; most of them arise from germ cells,, with a high degree of malignancy.

The tumors present as a swelling or lump in the testis.

73 malignancy

Hydrocele ,varicocele .testicular torsion

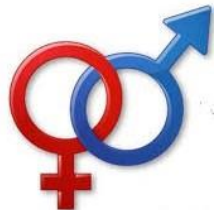


Epididymitis

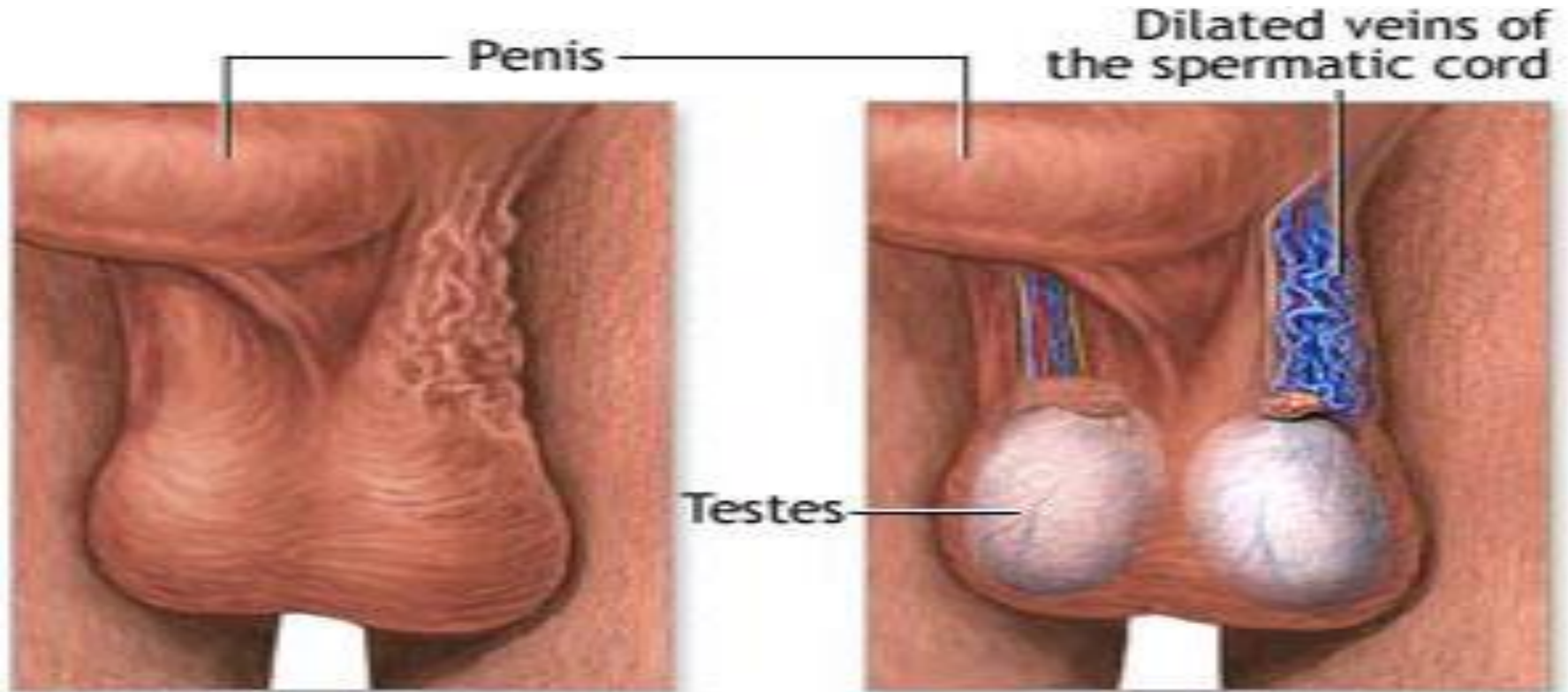
= Infections of the epididymis, vas deferens, seminal vesicles or urethra by bacteria

= May result in obstruction of the ducts, pain and general swelling of the structures;

= The ejaculate contains few or no sperms.

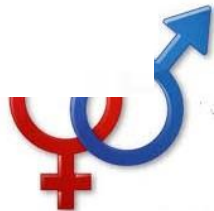


Varicocele



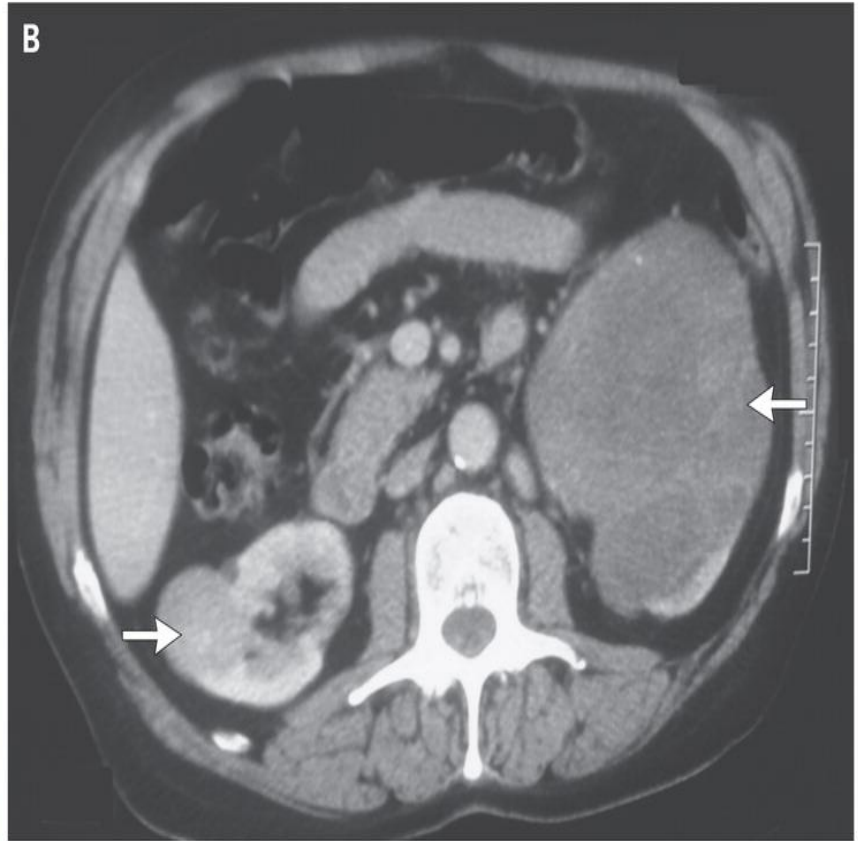
A varicocele can be felt and sometimes be seen as a tortuous mass on the surface of the scrotum

A varicocele is made up of veins that contain inadequate valves



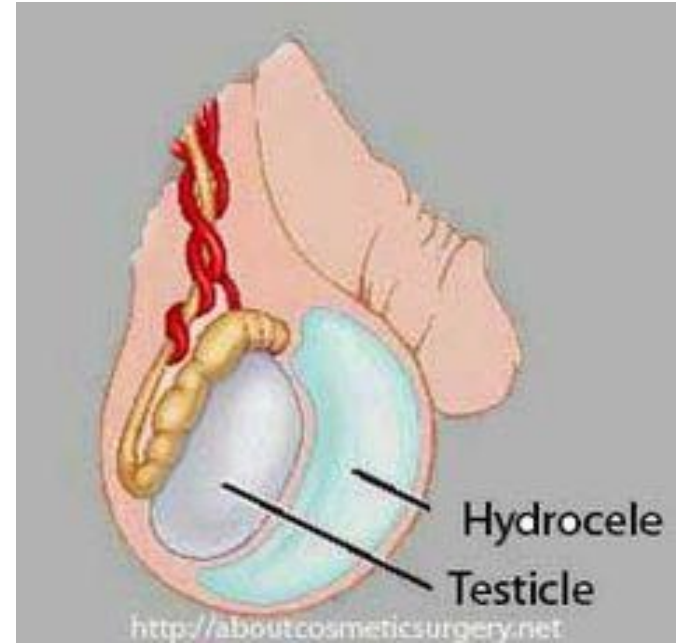
Varicocele

Lo4



HYDROCELE

Lo4



Prostate

Lo4

. Benign prostatic hyperplasia

= The prostate gland enlarges in old age

=is sex hormone dependent and its symptoms include urinary obstruction and bladder irritation

Prostatic cancer |

Second most common cause of cancer-related deaths in men; genetic, hormonal, environmental, etc. factors are implicated in its pathogenesis.

Blood levels of **prostatic-specific antigen** (PSA) produced by normal or abnormal prostatic epithelial cells is often elevated in prostatic disorders.

This finding is one of a range of diagnostic tests used to assess and differentiate between prostate hyperplasia, prostatitis (inflammation) and carcinoma.

