REVISION OF URINARY MODULE

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Anatomy of Urinary System

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Anatomy of the Kidneys

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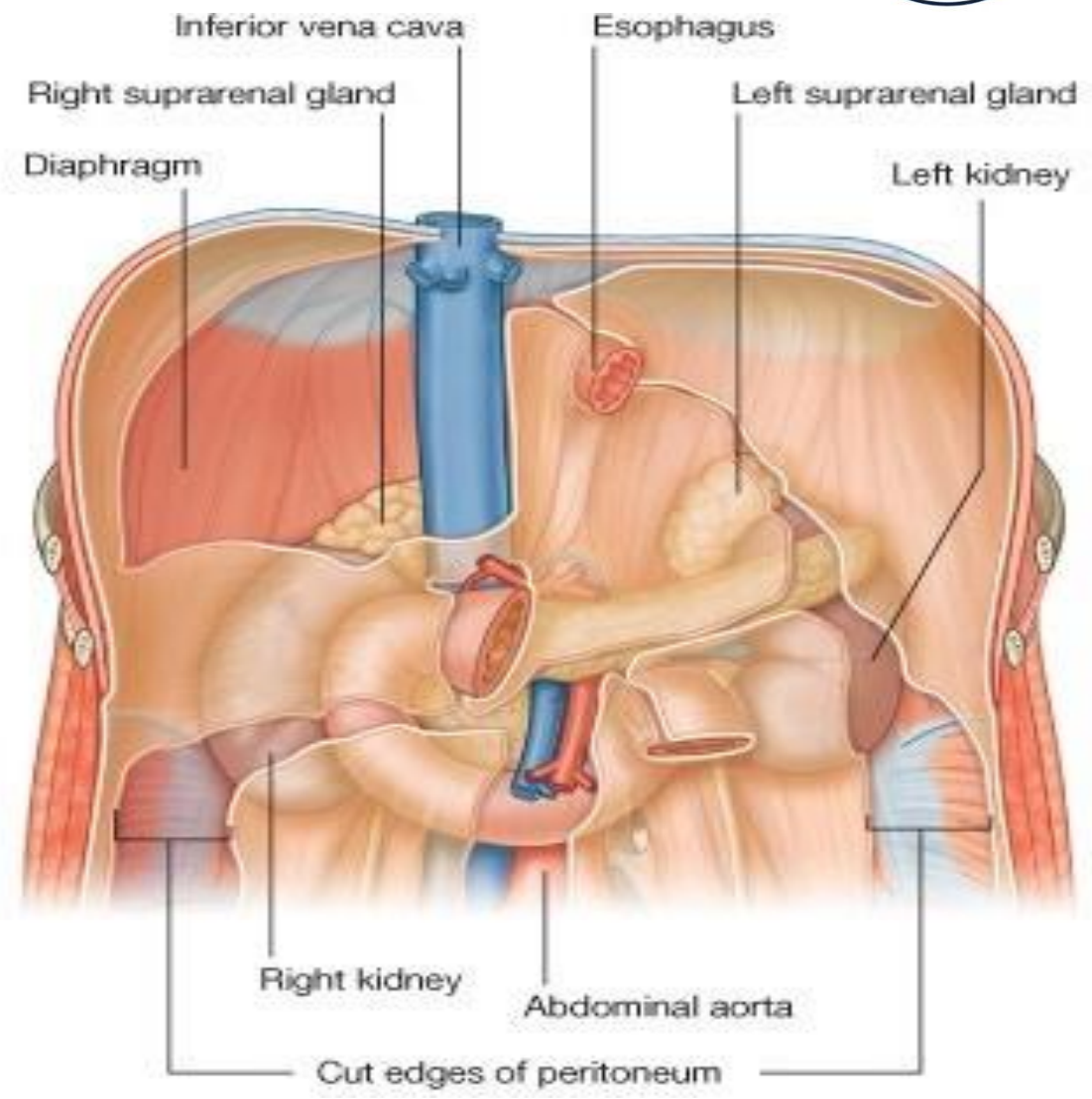
الصفحة الرسمية للجامعة

الموقع الرسمي للجامعة

Site & peritoneal covering:

The kidneys are **retroperitoneal**, i.e. lie behind the peritoneum. MCQ



Covering

SAQ

The kidney is surrounded by 4 layers:

2 fibrous and 2 fatty from within outwards:

1 Fibrous capsule:

It surrounds the kidney.

2 Perinephric (Perirenal) fat:

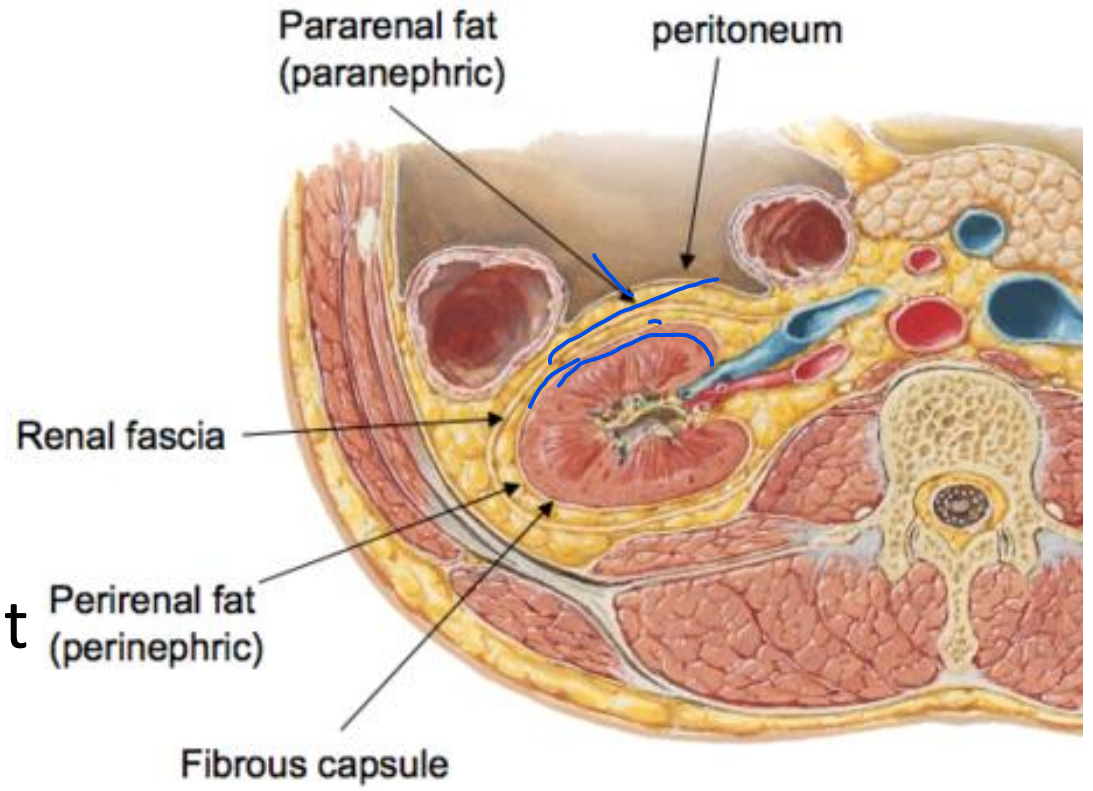
It covers the fibrous capsule

3 Renal fascia:

A condensation of connective tissue that encloses the kidneys and suprarenal glands

4- **Paranephric (Pararenal) fat:**

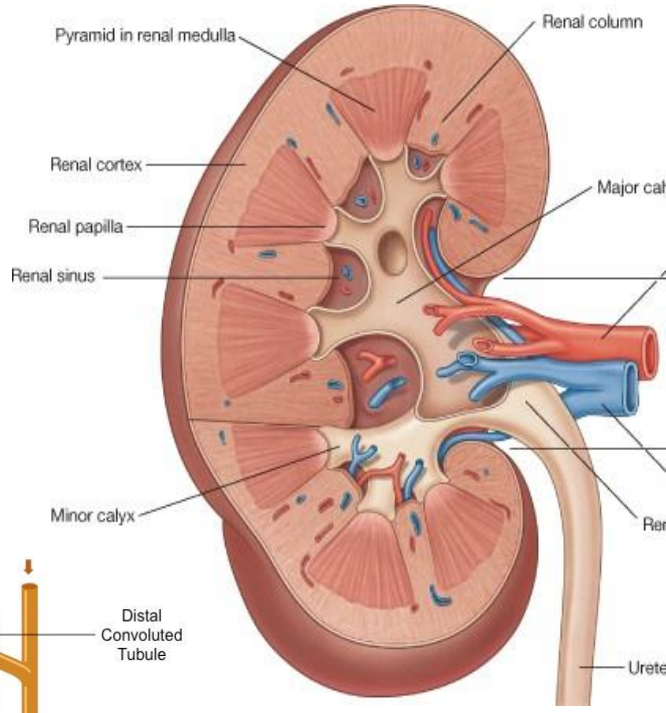
it lies external to the renal fascia

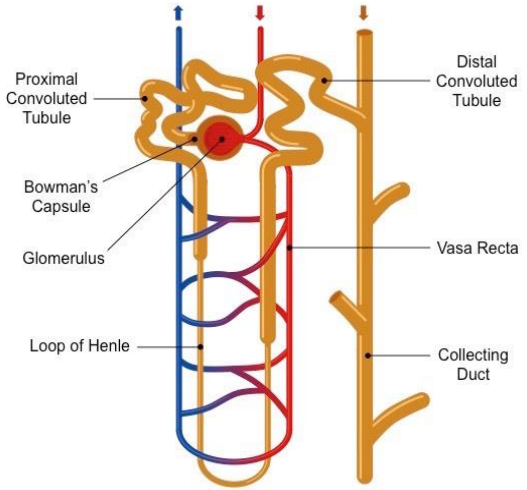


INTERNAL STRUCTURE

- **1- Renal cortex:**

- Reddish brown in color, lies immediately deep to the capsule and send **column** between the pyramids of medulla.
- The cortex contains about **one million nephrons**.
- The nephron is formed **of Bowmans's capsule, proximal convoluted tubule, loop of Henle and distal convoluted tubule**.
- Collecting ducts end in **renal (Malpighian) pyramids.**



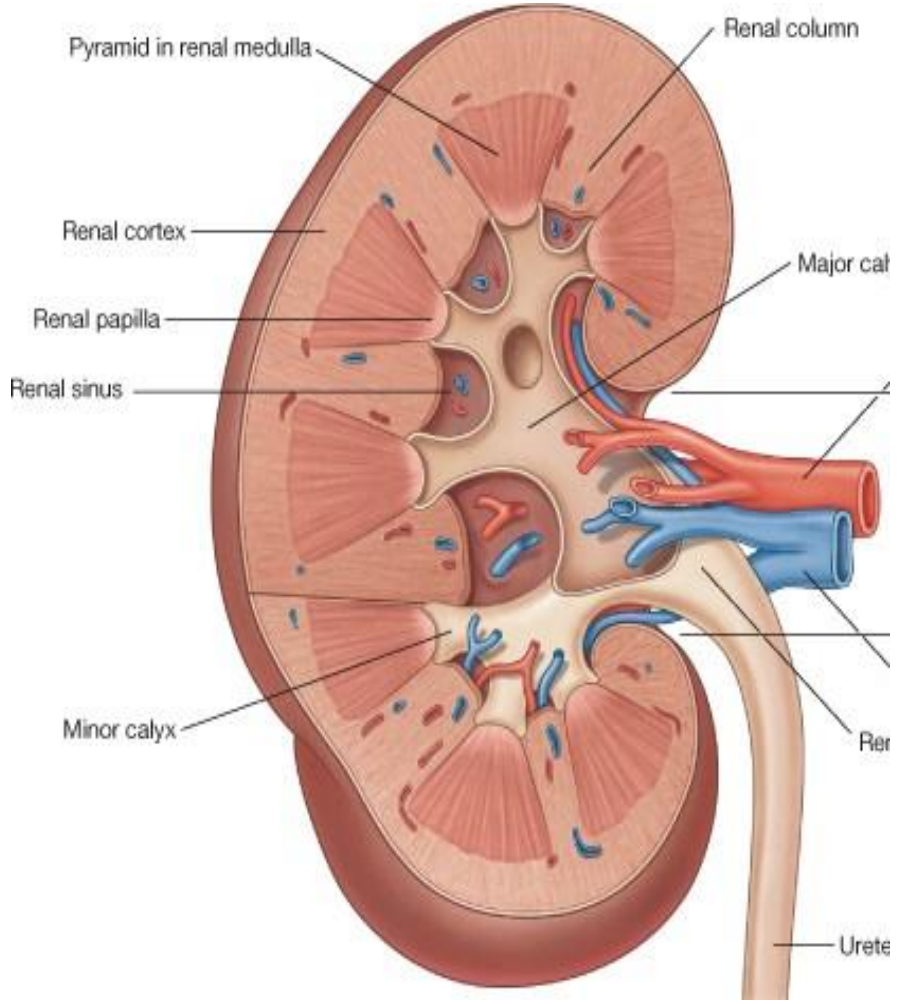


2- Renal medulla: medullary rays

- Formed of pale conical masses called renal **pyramids**.
- The bases of these pyramids are directed towards the cortex,
- the apices are directed inwards **papilla**

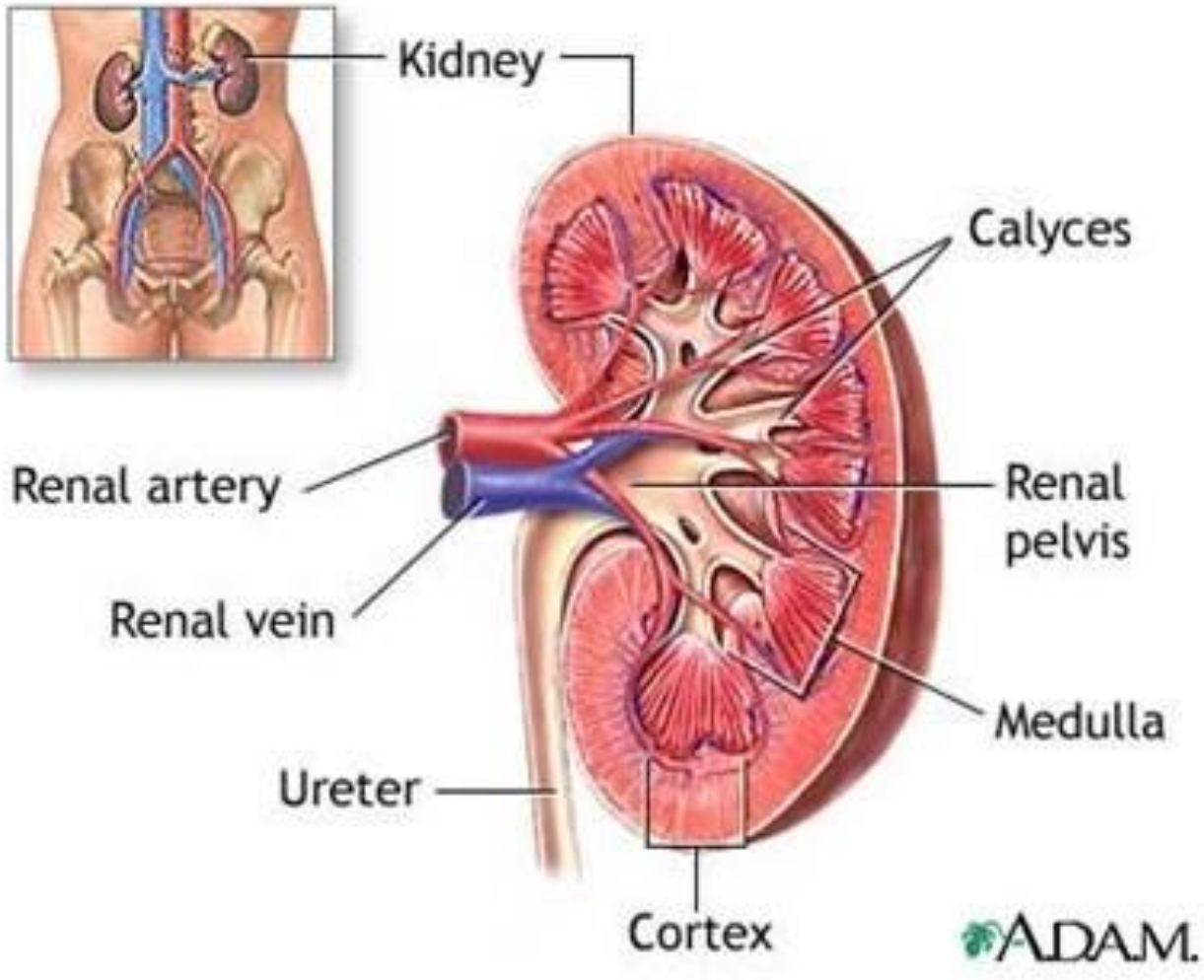
⟶ minor calyces ⟶ major calyces

(Renal pelvis) MCQ

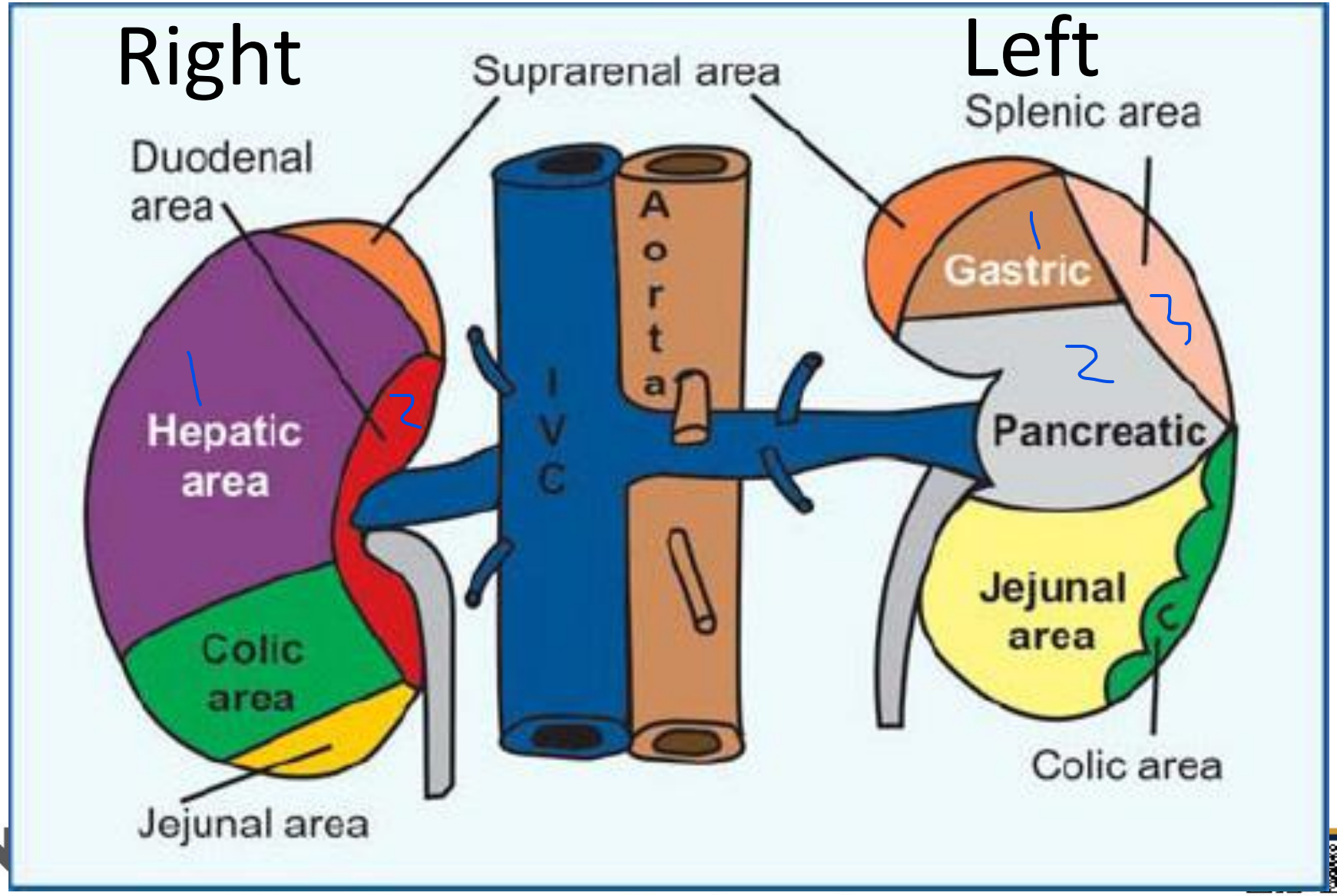


3. Renal pelvis:

Divides into **two or three major calyces**, which divides into **8 or 15 minor calyces**

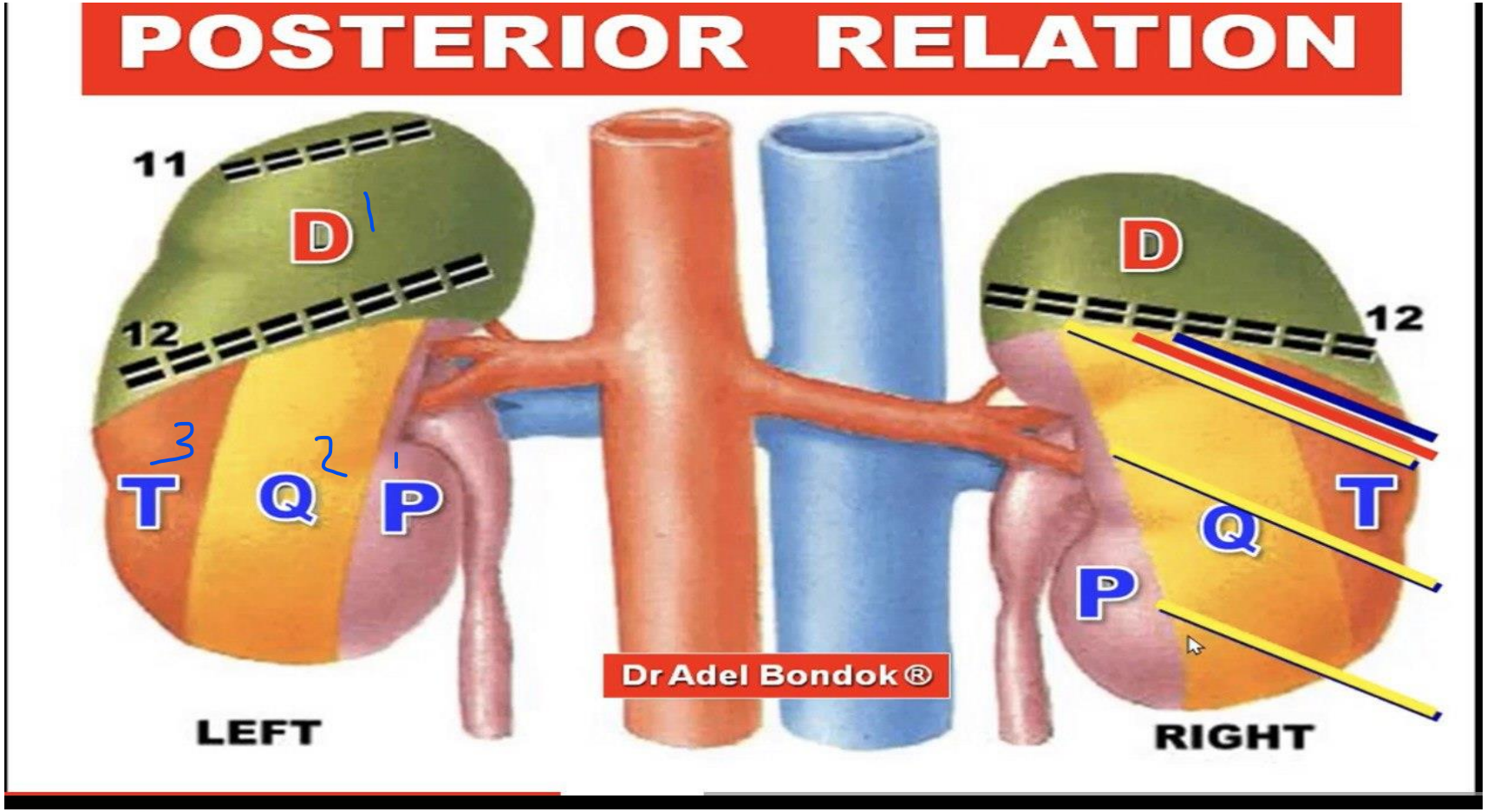


Anterior relation of the kidney



Anatomy of the Kidneys

➢ *Posterior relations: same in both kidneys*



Surface anatomy of the kidney

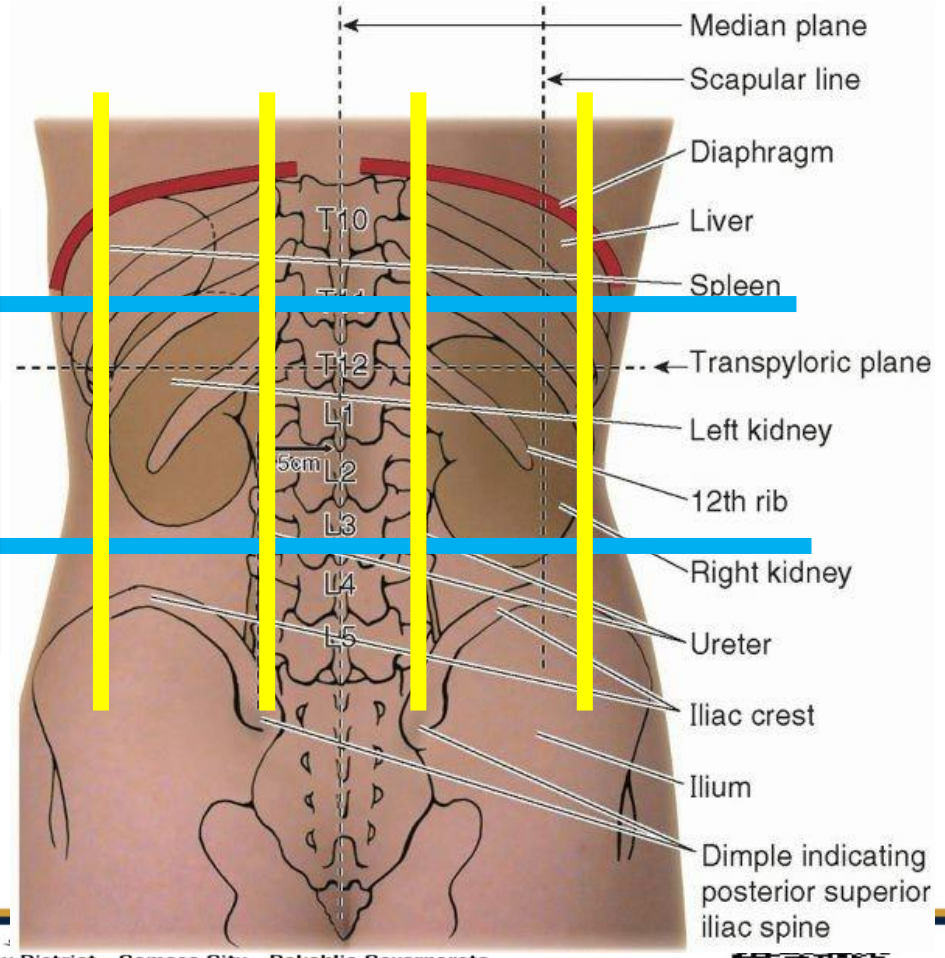
Morris parallelogram

- 2 parallel horizontal lines T11 &L3
- 2 vertical lines: l inch and 3 inches from the median plane.

❖ **Hilum**: L1 (transpyloric plane), 5 cm from median plane.

❖ **Upper pole**: T12, (2.5 cm from median plane).

❖ **Lower pole**: L3, (7.5 cm from median plane).



Anatomy of the Kidneys

Arterial supply: Renal artery

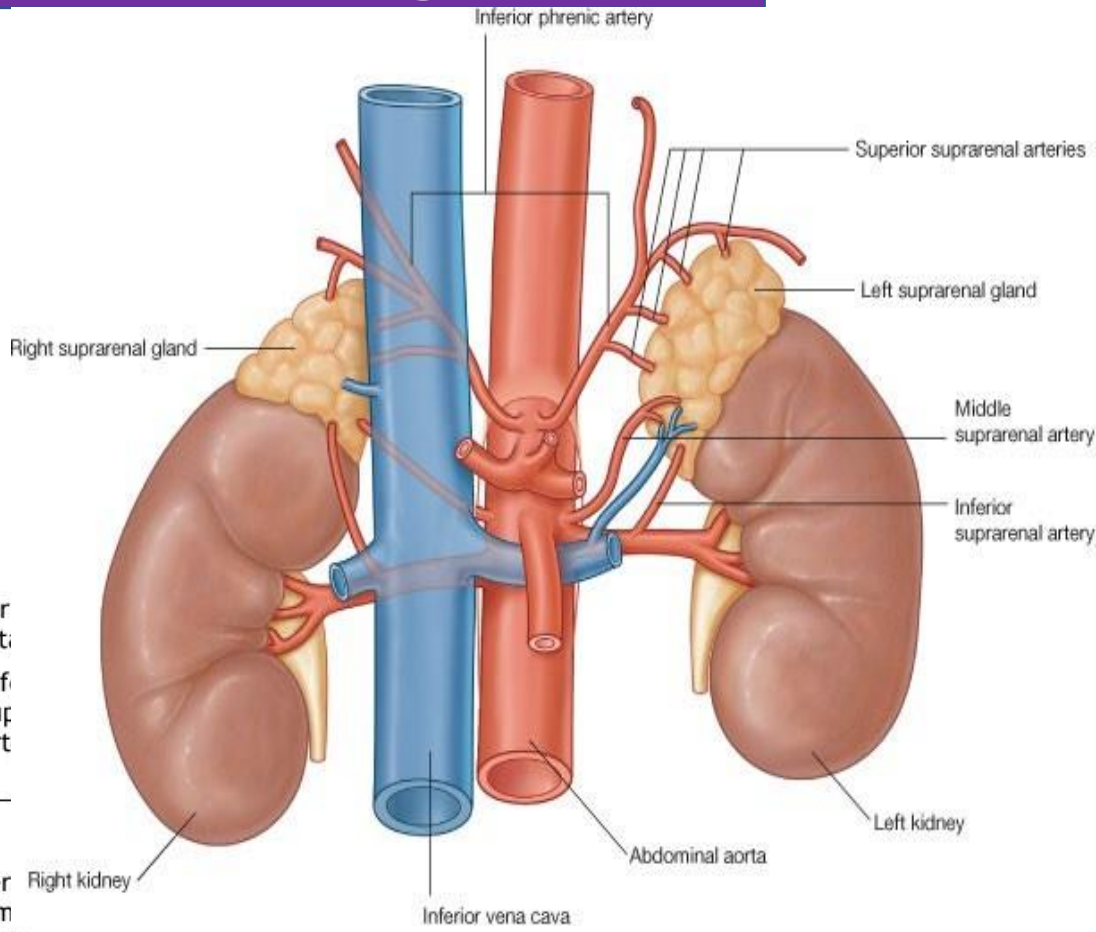
MCQ

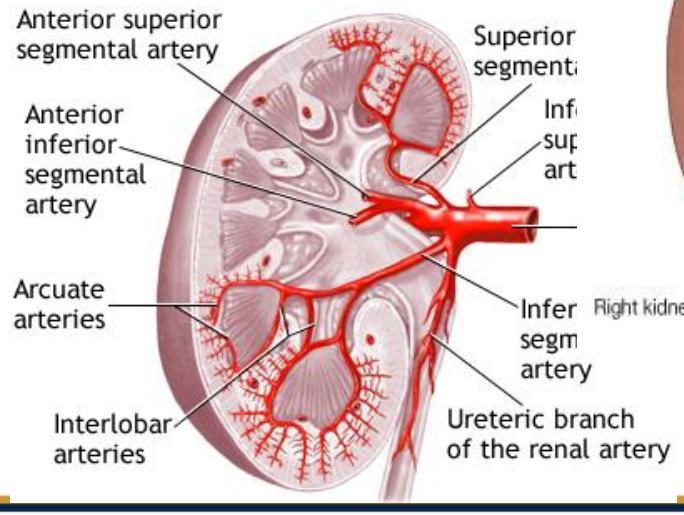
✓**Origin :**

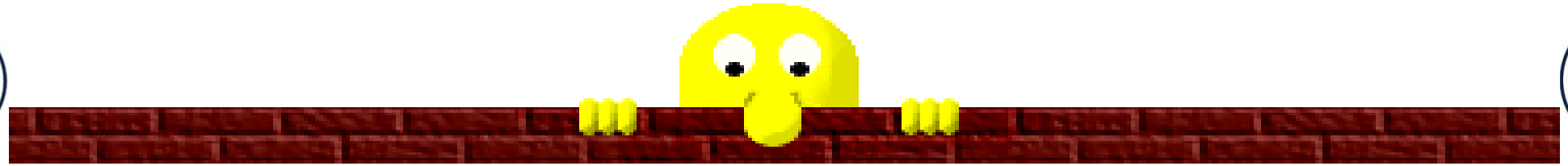
From aorta at level of 2nd lumbar vertebra

✓**Branches:**

- Inferior suprarenal
- Ureteric artery
- Gonadal artery







Anatomy of the Ureter

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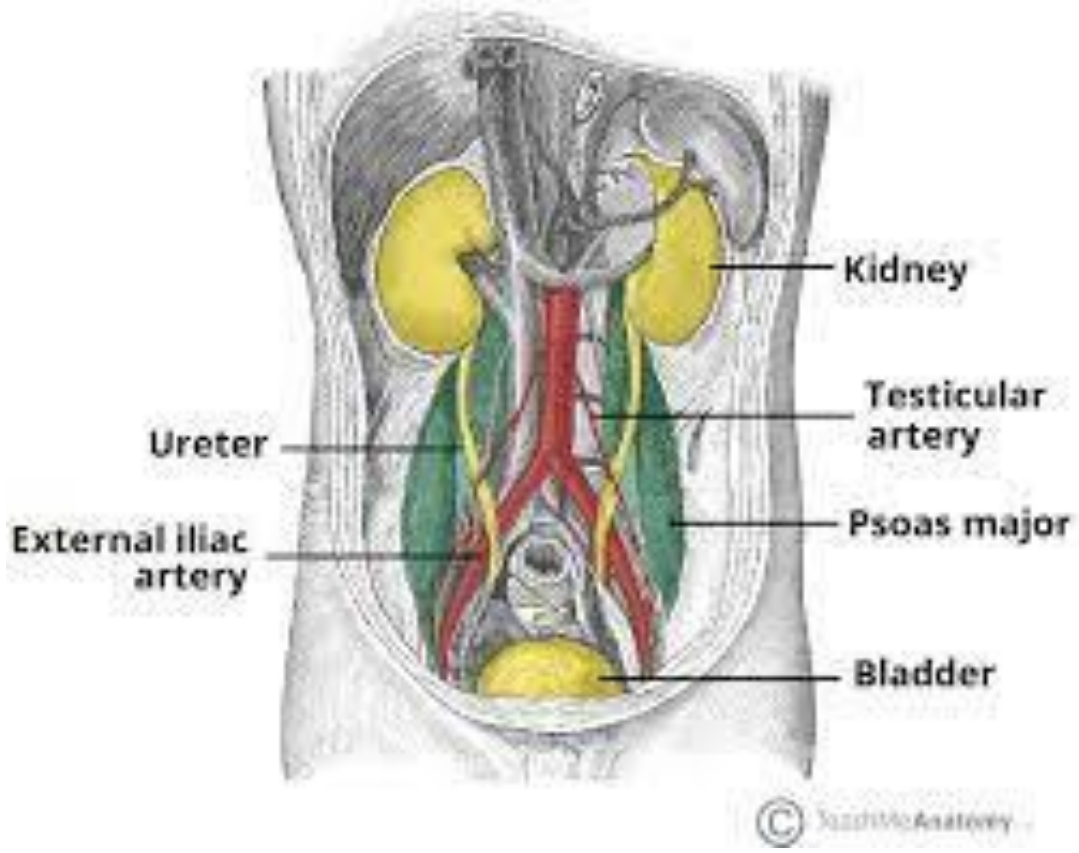
Anatomy of the ureter

Definition:

ureters are 2 muscular tubes which transport urine from kidneys to the urinary bladder.

Length:

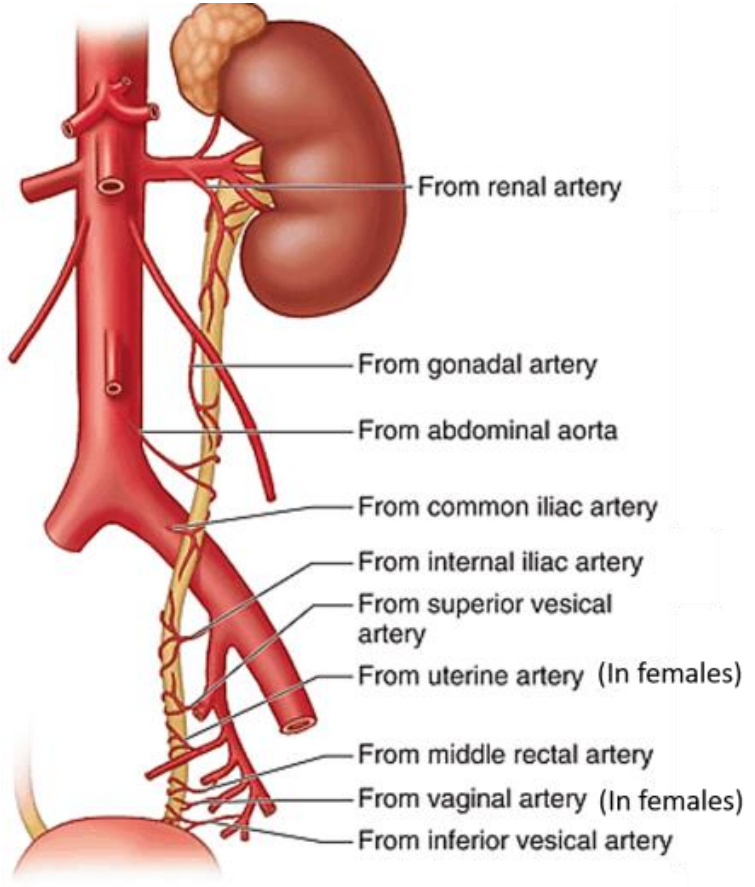
25 cm; its upper part lies in the abdomen while its lower part lies in the pelvis.



Anatomy of the ureter

Blood supply: the ureters receive blood supply from:

- Renal vessels.
- Abdominal aorta.
- Uterine & vaginal Vessels (in female).
- Superior & inferior vesical vessels.



Anatomy of the ureter

SAQ

Constrictions in the ureter:

1. At its junction with the renal pelvis (UPJ),
2. Where it crosses the iliac vessels
3. During its passage through the wall of the urinary bladder (intramural ureter) or ureterovesical junction

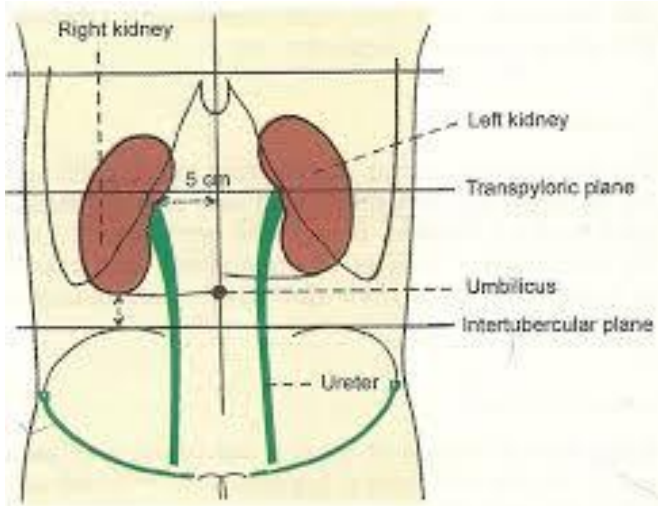
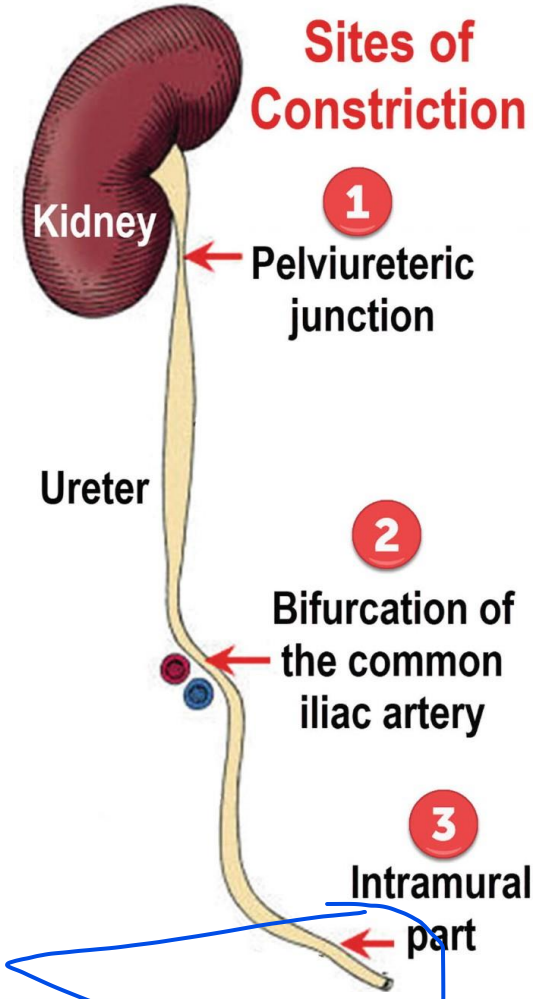


Fig. 24.2: Surface marking of kidneys from anterior aspect.



Anatomy of urinary bladder

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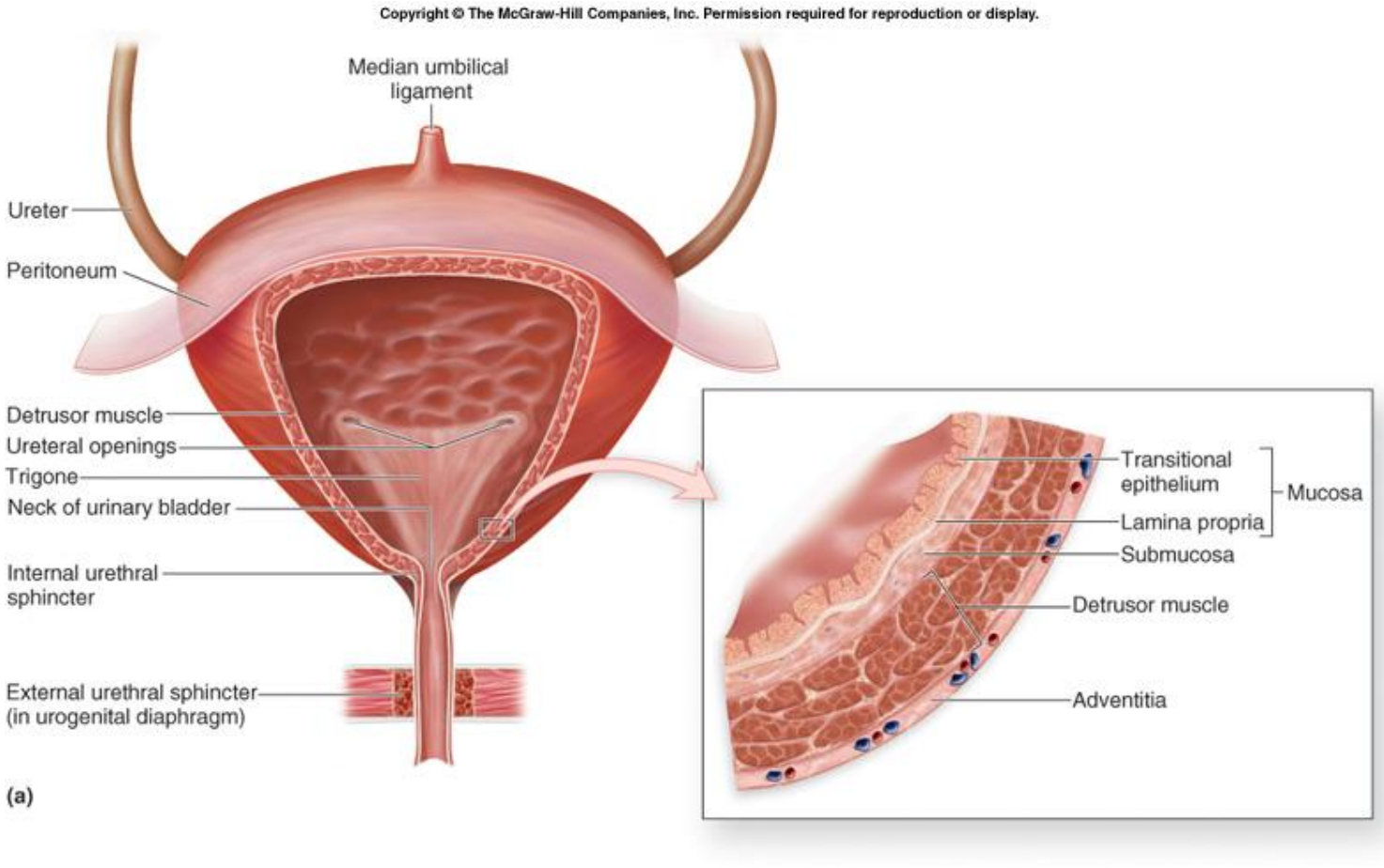
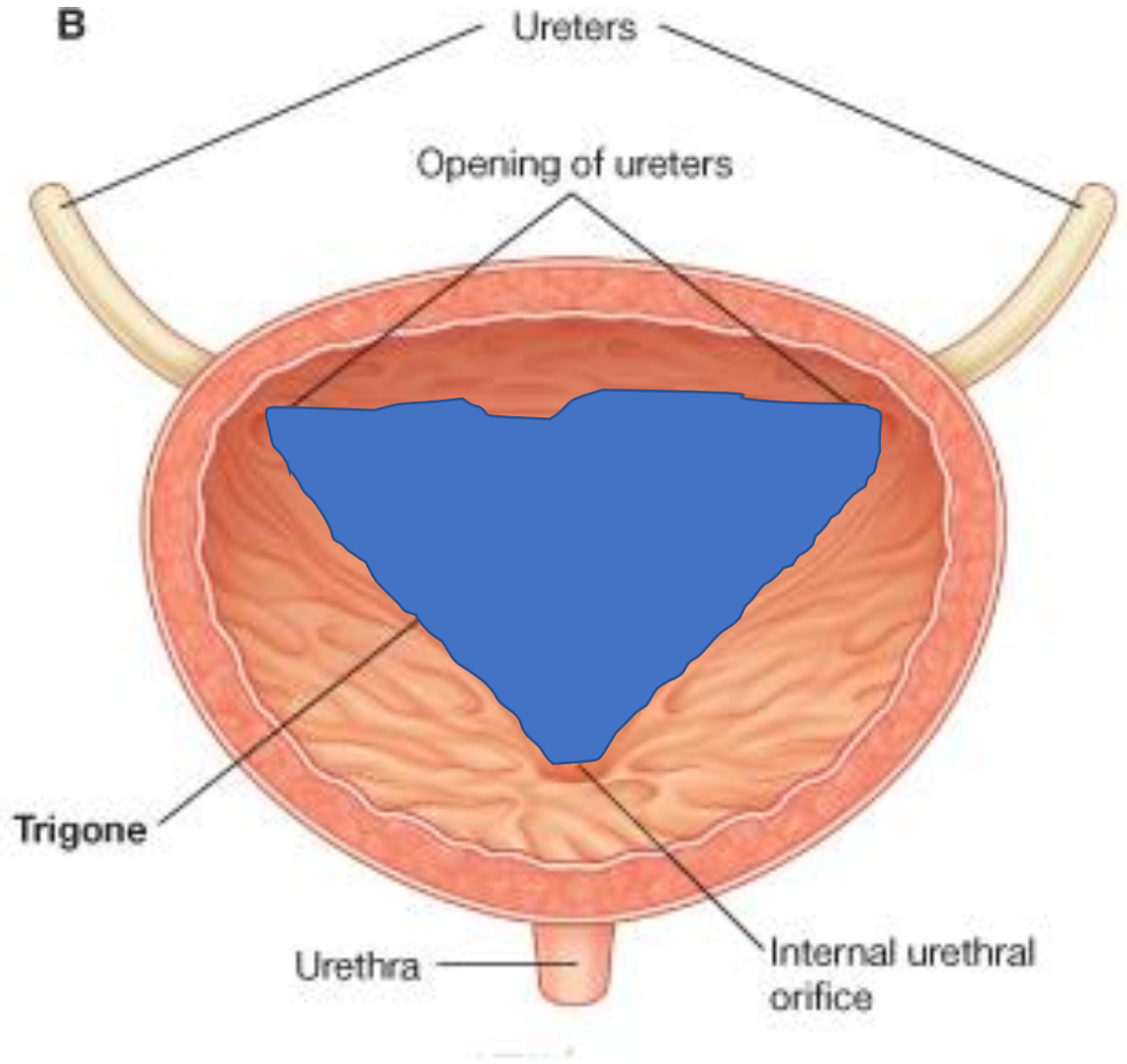
Interior of the bladder

The mucosa : in an empty bladder is thrown into folds due to

Trigone of the bladder: MCQ

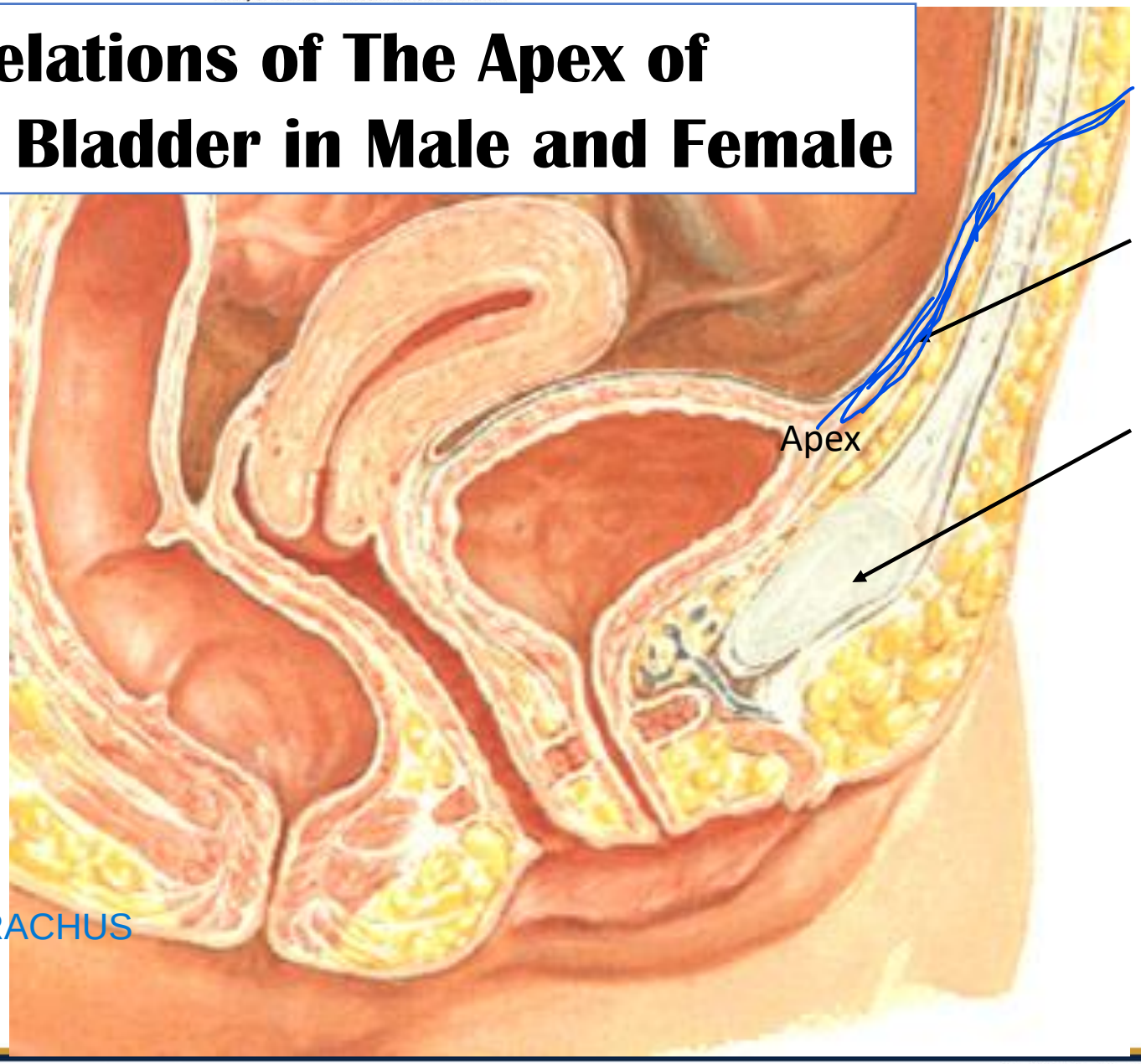
- Is a triangular area on the inner surface of the base of the bladder.
- The base of the trigone is directed upwards and the apex downwards.
- Its mucosa is smooth.
- Its inferior angle is formed by the internal urethral orifice and the posterolateral angles by the ureteric openings.




B
Ureters
Opening of ureters
Trigone
Urethra
Internal urethral orifice

Relations of The Apex of Urinary Bladder in Male and Female

Apex: Lies behind the symphysis pubis. It is continuous to the umbilicus with median umbilical ligament.



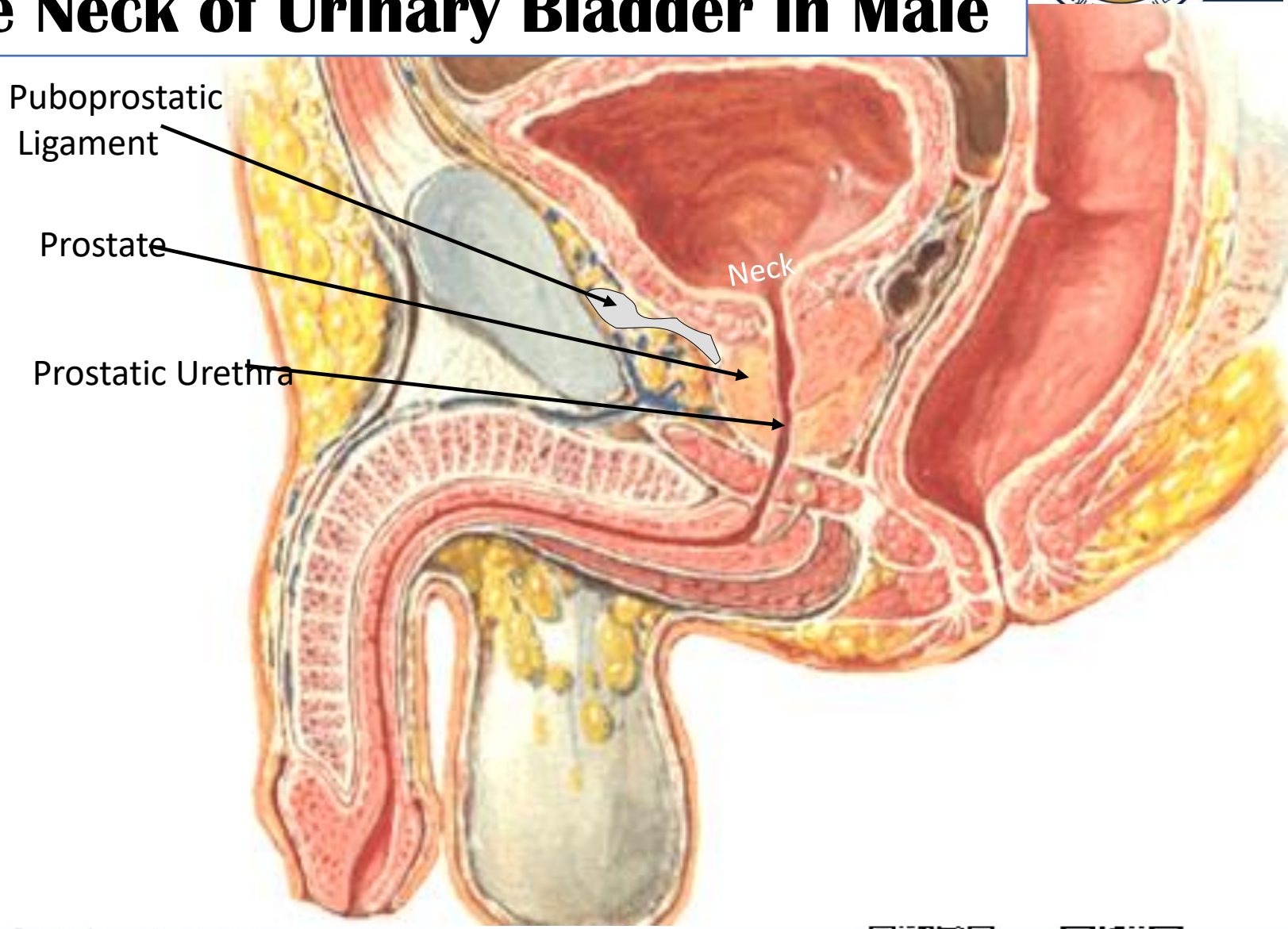
OBLITRARED URACHUS

MCQ

Relations of the Neck of Urinary Bladder in Male

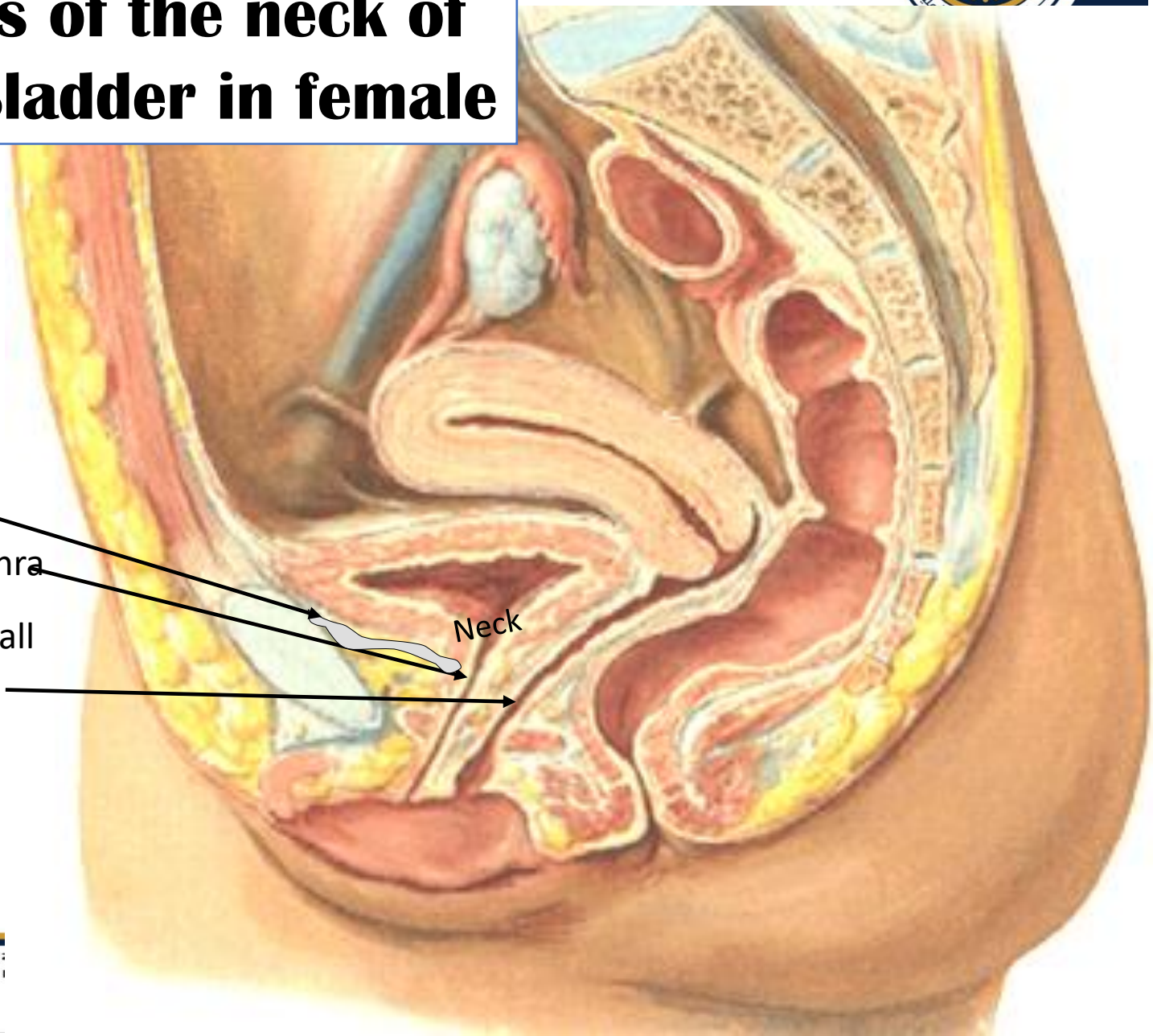
Neck In male:

it rests on the prostate and is continuous with the prostatic urethra



Relations of the neck of Urinary Bladder in female

Neck In female: it is continuous with the urethra.



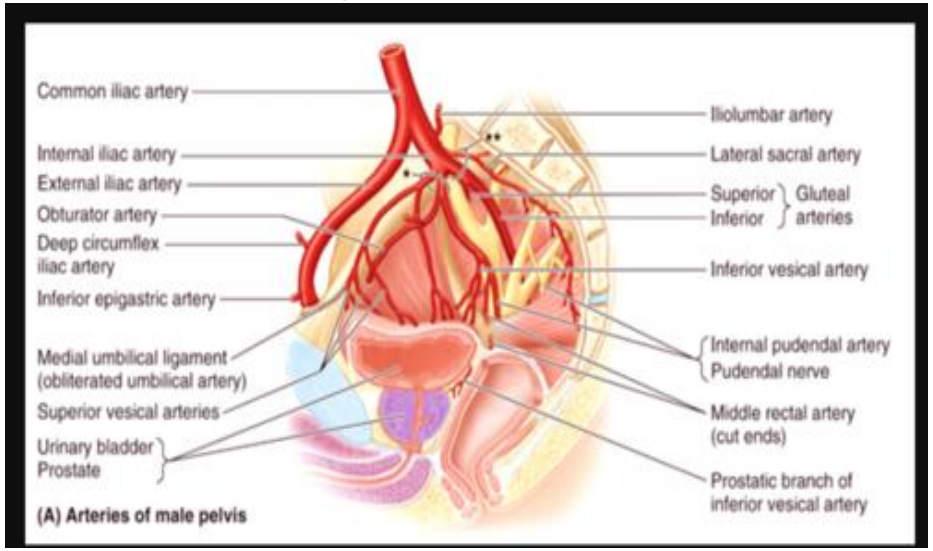
Arterial supply of the urinary bladder

Main supply : SAQ

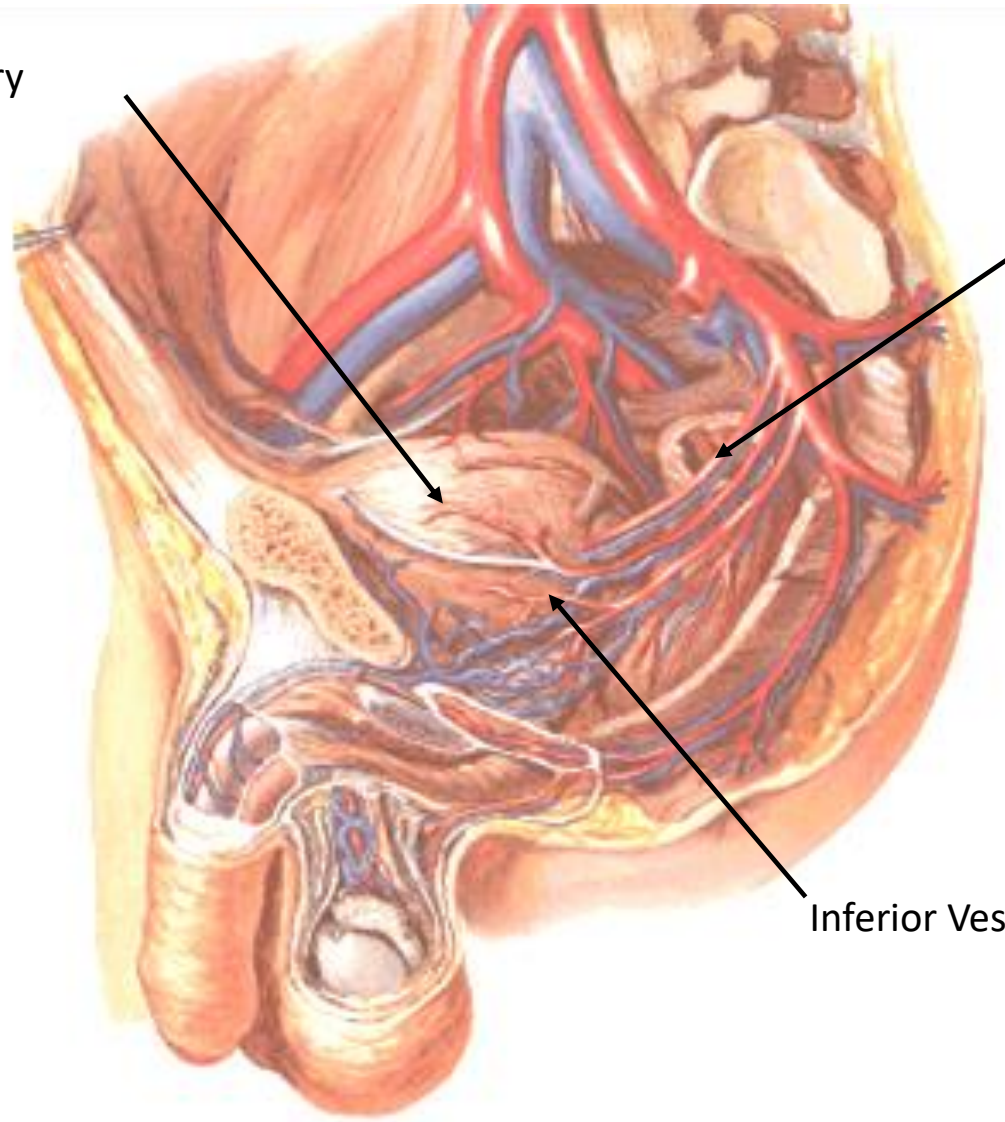
1. **Superior vesical artery:** **From umbilical artery**
2. **Inferior vesical artery:** **From the internal iliac artery.**

Additional supply from :

1. Obturator artery.
2. Inferior gluteal artery
3. Uterine arteries in females.



Superior Vesical Artery



Additional Branches from Obturator and Uterine

Inferior Vesical Artery

Ligaments of the bladder

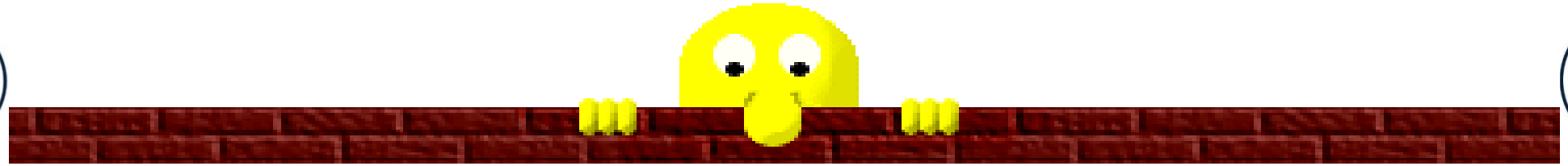
1. Median umbilical ligament: is the **remnant of the urachus** and it extends from the apex of the bladder to the umbilicus.

2. Lateral true ligament: extends from the side of the bladder to the pelvic fascia

3. Posterior ligament of the bladder: extends from each side of the base of the bladder to the posterior wall of the pelvis.

4. Puboprostatic ligaments (In males) : extend from the back of the pubic bone to the neck of the bladder.

5. Pubovesical ligaments (In females): extend from the back of the pubic bone to the neck of the bladder.



Anatomy of urethra

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Anatomy of the urethra

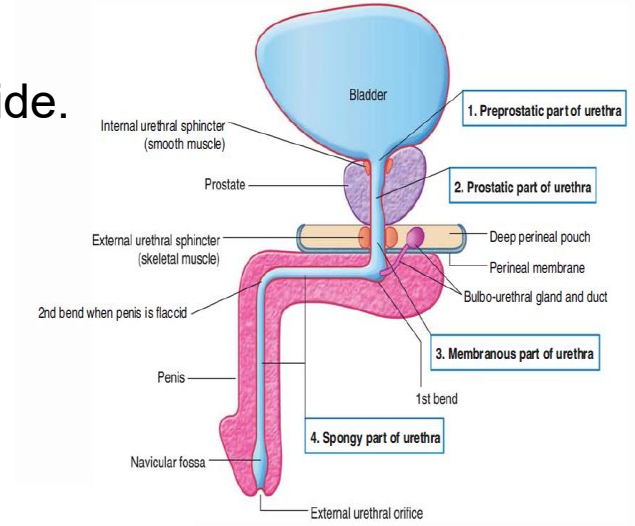
Definition:

it is a duct, which begins at the neck of the bladder and ends by opening into the outside.

Male urethra

Length: It is a long duct, about **8 inches (20 cm) long**.

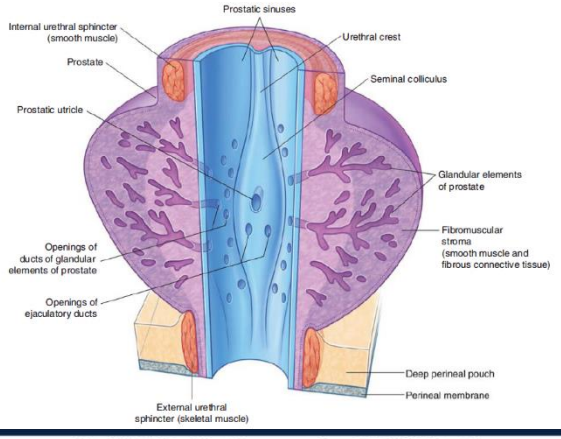
Course: It takes an S-shaped course. It can be divided into **three parts:** prostatic, membranous, and spongy.



1. Prostatic part: It is about **1.5 inches long**. It traverses the prostate mucous

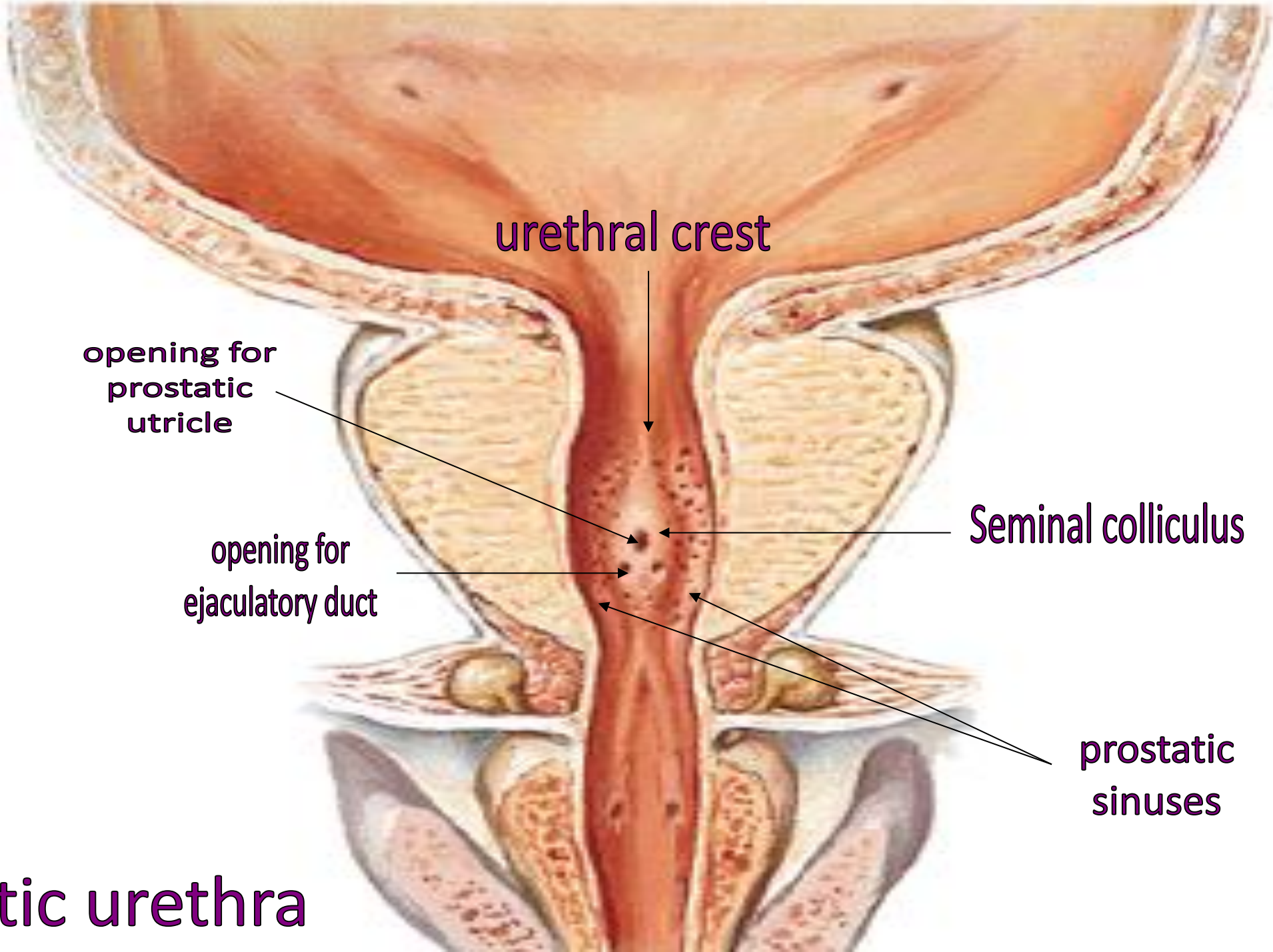
a. Urethral crest.
b. Seminal colliculus.
c. Prostatic sinus.
d. Prostatic utricle.

SAQ



2. Membranous urethra: It is about **0.5 inch long (1.5 cm).** It is surrounded with urethral sphincter and bulbourethral gland.

3. Spong (penile) urethra: It is about **6 inches long (15 cm).** It traverses the penis and receives the duct of the bulbourethral gland.

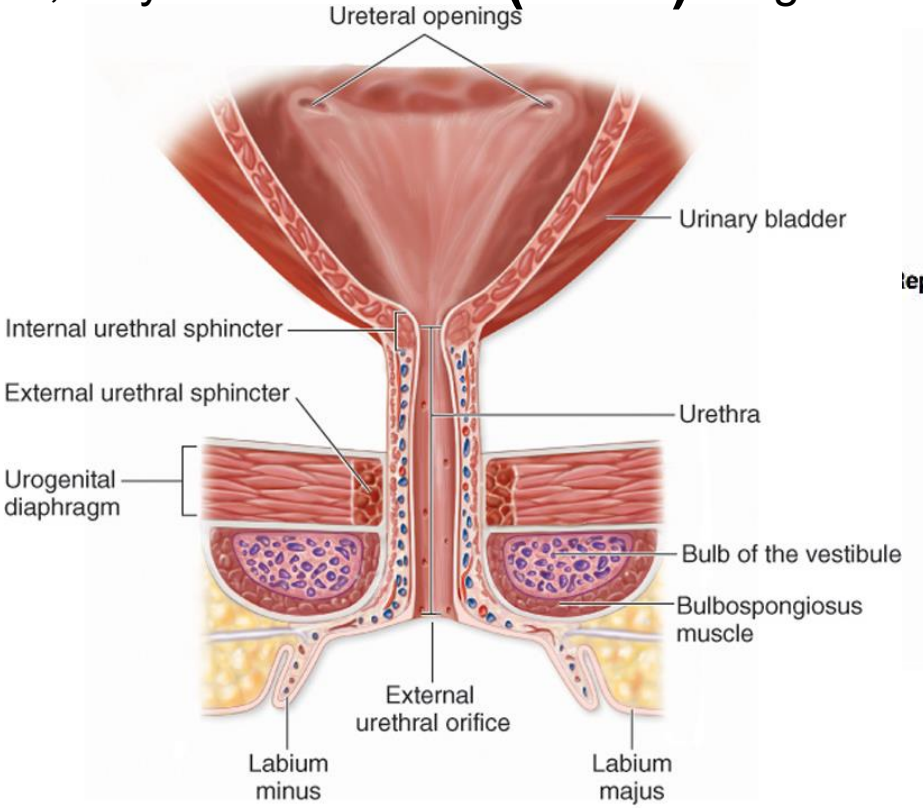


Prostatic urethra

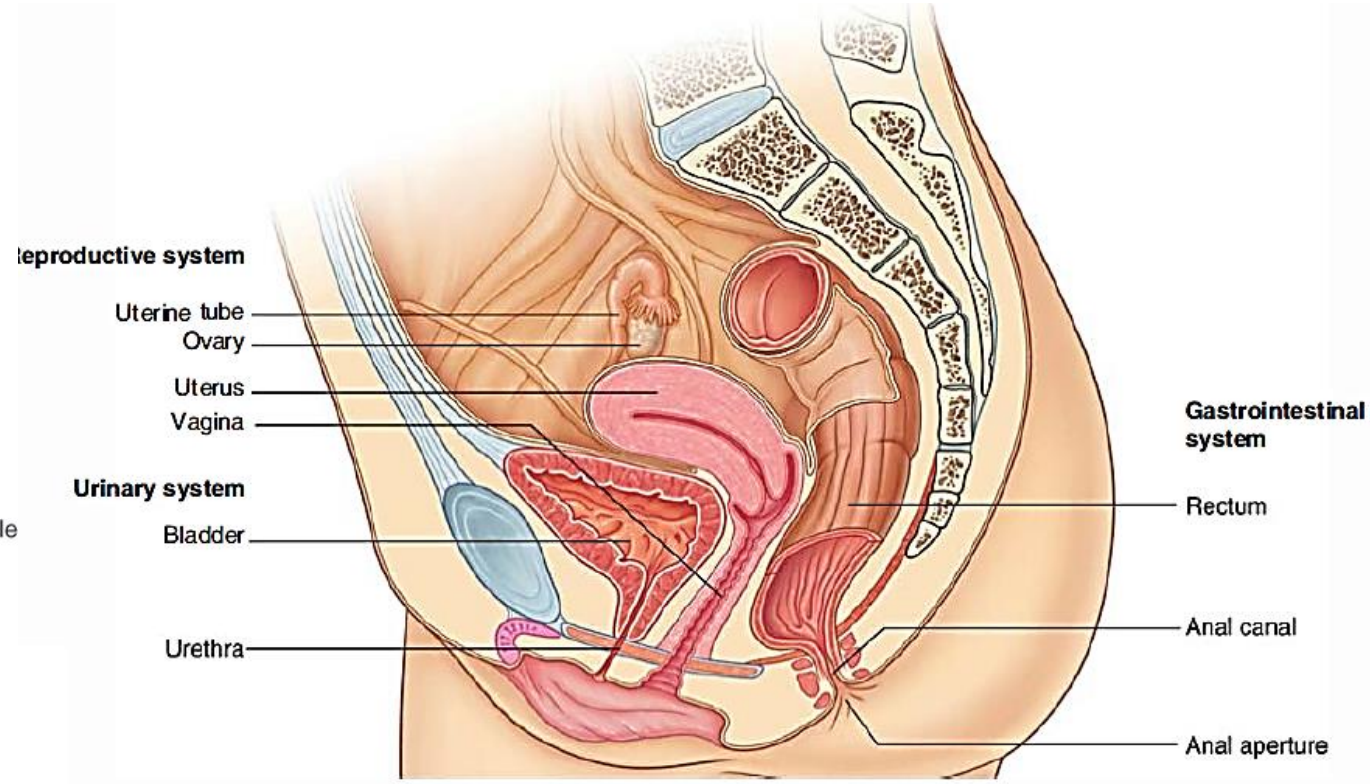
Anatomy of the urethra

Female urethra

It is a short, only **1.5 inches (4 cm)** long. It extends **from the neck of the bladder to the outside**.



(a) Female urethra



Anatomy of posterior abdominal wall and adrenal gland

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Edited by

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Muscles of the Posterior abdominal wall

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PSOAS MAJOR

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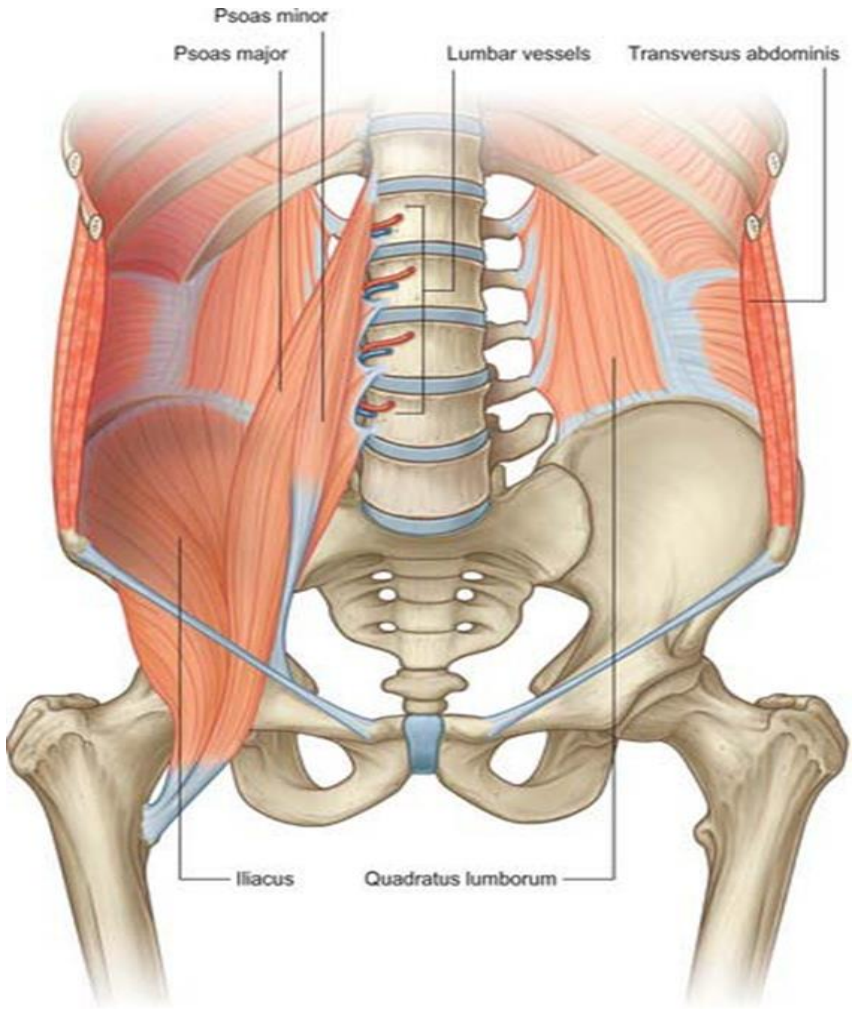
Nerve supply:

Ventral rami of **upper 3 lumbar nerves**

Action:

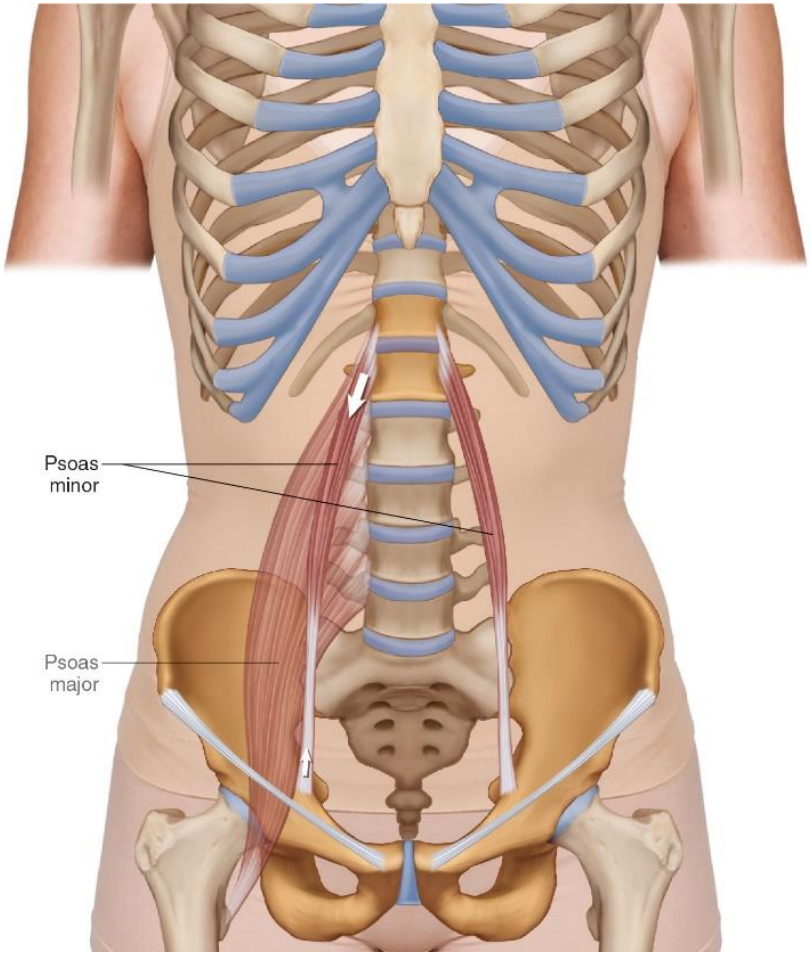
1. **Flexion & lateral** rotation of thigh.
2. **Bend the trunk** forward
3. **Lateral flexion** of vertebral column.



PSOAS MINOR

Nerve supply: First lumbar nerve.

Action: weak flexor of the trunk.



QUADRATUS LUMBORUM

Nerve supply:

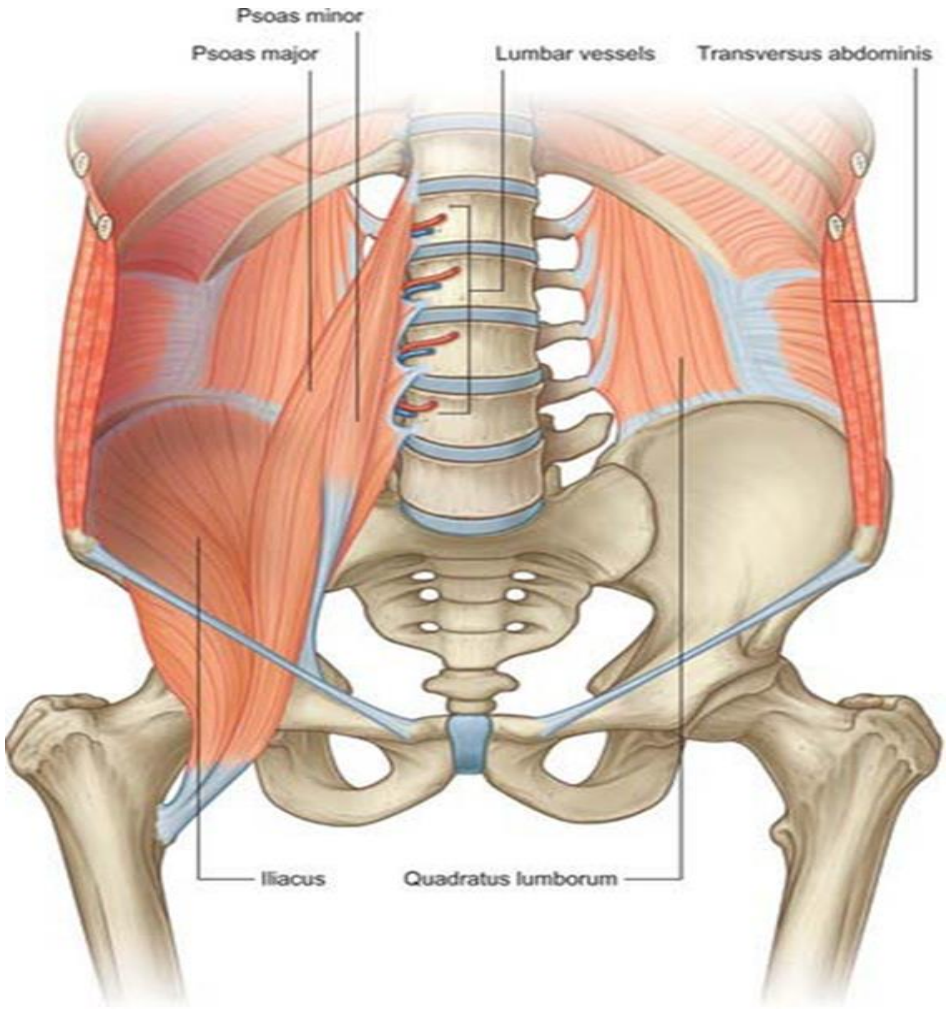
-Subcostal nerve.

-Ventral rami of upper 3 lumbar nerves

Action:

Unilateral: **Lateral flexion** of vertebral column.

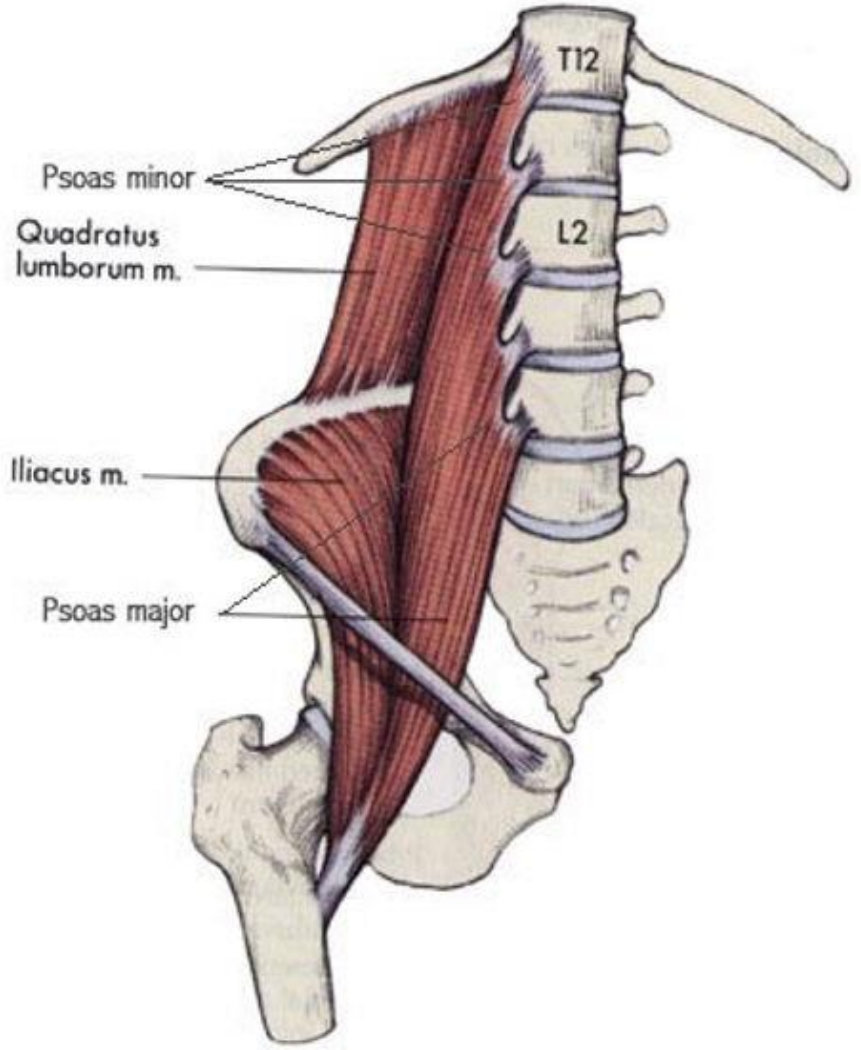
Bilateral: **Extend** vertebral column.



ILIACUS

Nerve supply: femoral nerve.

Action: assists psoas major in flexion of thigh.

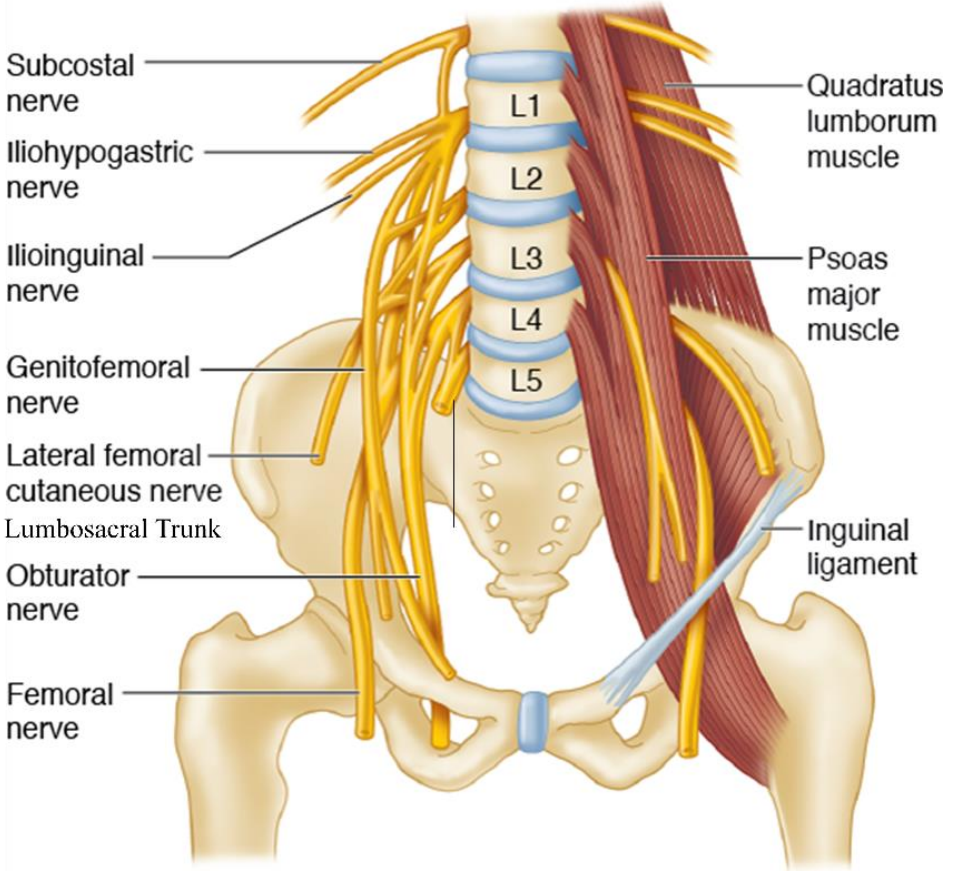


LUMBER PLEXUS

Lumbar plexus

Lumbar plexus

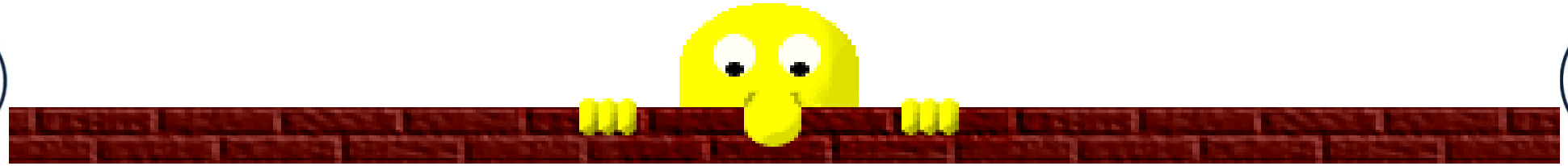
- ✓ **Location:** Inside the psoas major
- ✓ **Formation:** Ventral rami of upper 4 lumbar nerves.



Lumbar plexus

✓ Branches:

Muscular:	Named branches:
1. Psoas minor: L1. 2. Psoas major: L2, 3, 4. 3. Quadratus lumborum: L 1, 2, 3	1. Iliohypogastric: L1 2. Ilioinguinal: L1 3. Genitofemoral: L1, 2 4. Lateral cutaneous nerve of the thigh: L2, 3 5. Femoral nerve: L2, 3, 4 (posterior division) 6. Obturator nerve: L2, 3, 4 (anterior division) 7. Accessory obturator nerve: L2, L3 (anterior division)



Suprarenal glands

SAQ

Blood Supply

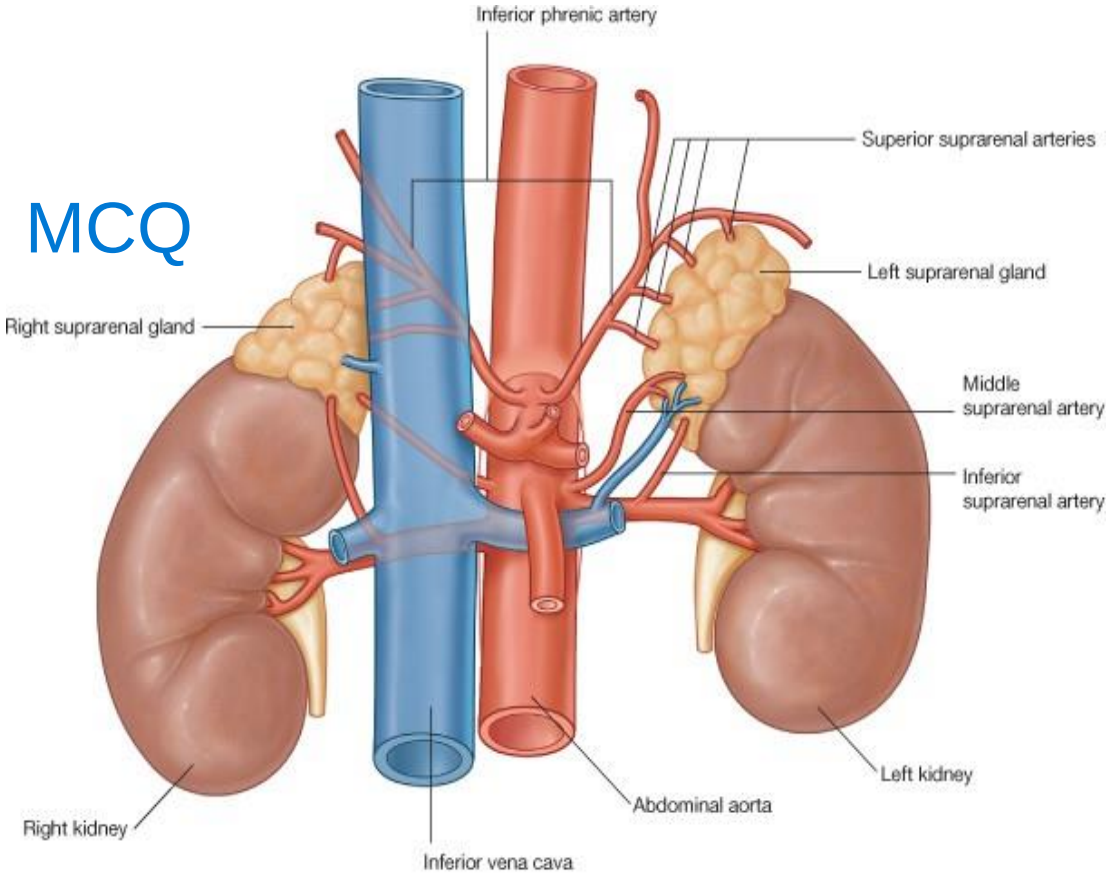
Arteries:

- **Three arteries** supplying each gland,

1- **Superior suprarenal arteries**: from **inferior phrenic artery** MCQ

2- **Middle suprarenal** from **aorta**. MCQ

3- **Inferior suprarenal** from **renal artery**. MCQ



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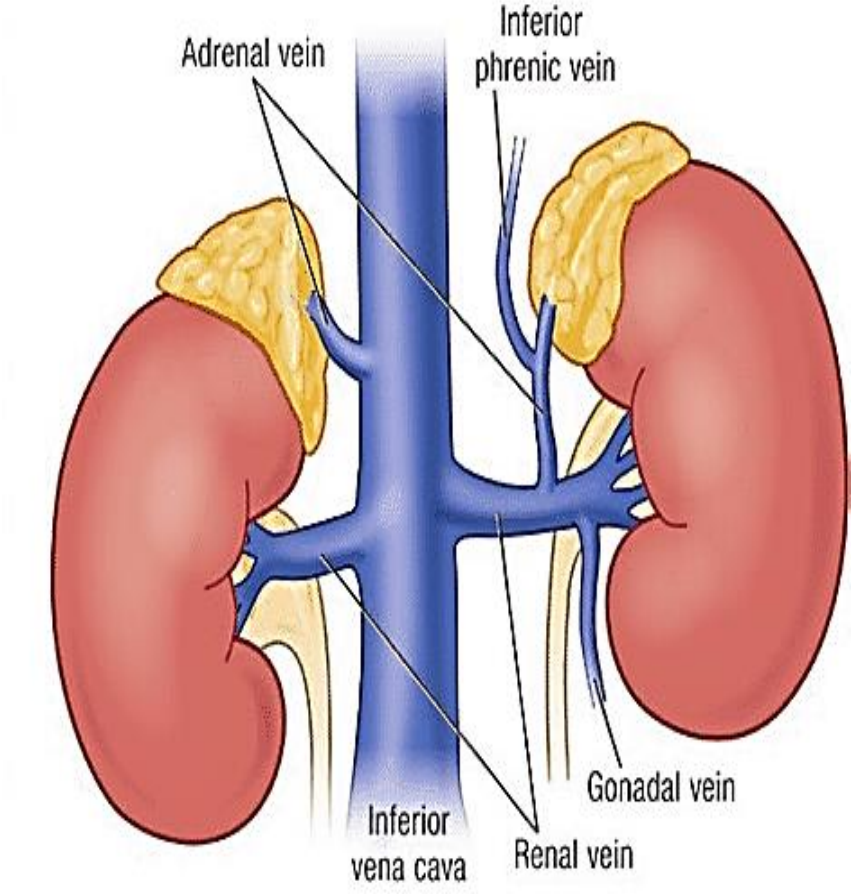
Veins:

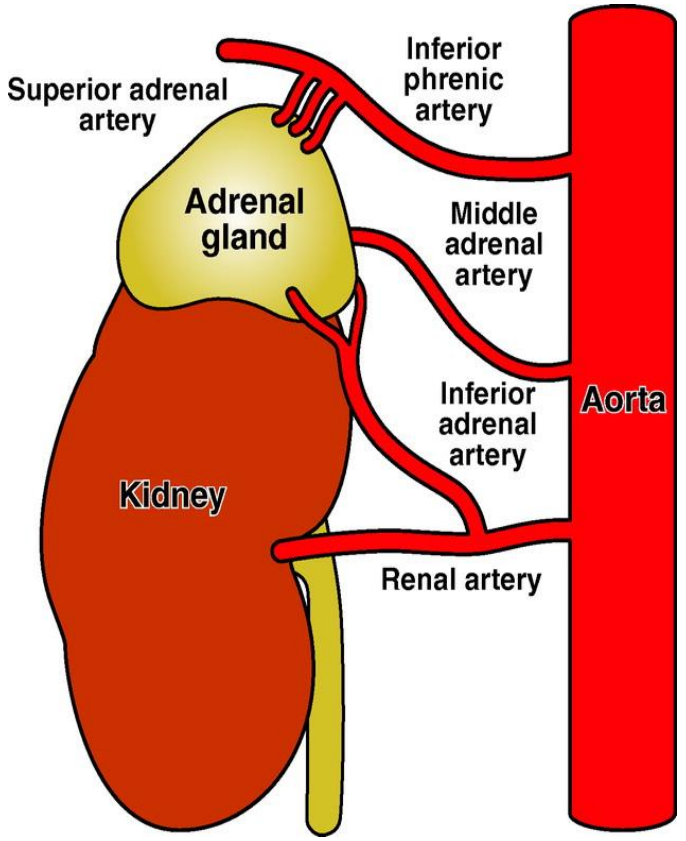
- one vein
- The **right suprarenal vein** drains into the **IVC** .
- The **left suprarenal vein** drains into the **left renal vein**

Anatomy of the suprarenal glands

	Right suprarenal gland	Left suprarenal gland
Shape	**pyramidal**	**semilunar**
Hilum	Directed **upwards**	Directed **downwards**
Suprarenal arteries	1. **Superior suprarenal arteries:** from inferior phrenic artery. 2. **Middle suprarenal artery:** from abdominal aorta 3. **Inferior suprarenal artery:** from the renal artery.	
Suprarenal veins	ends in the **inferior vena cava**.	ends in the **left renal vein**.
Posterior relations	➢ Right crus of diaphragm ➢ Right kidney.	➢ Left crus of diaphragm ➢ Left kidney.
Anterior relations	➢ IVC. ➢ Bare area of the **liver**.	➢ lesser sac (stomach bed) ➢ stomach.

Adrenal glands





Development of urinarysystem
Part 1

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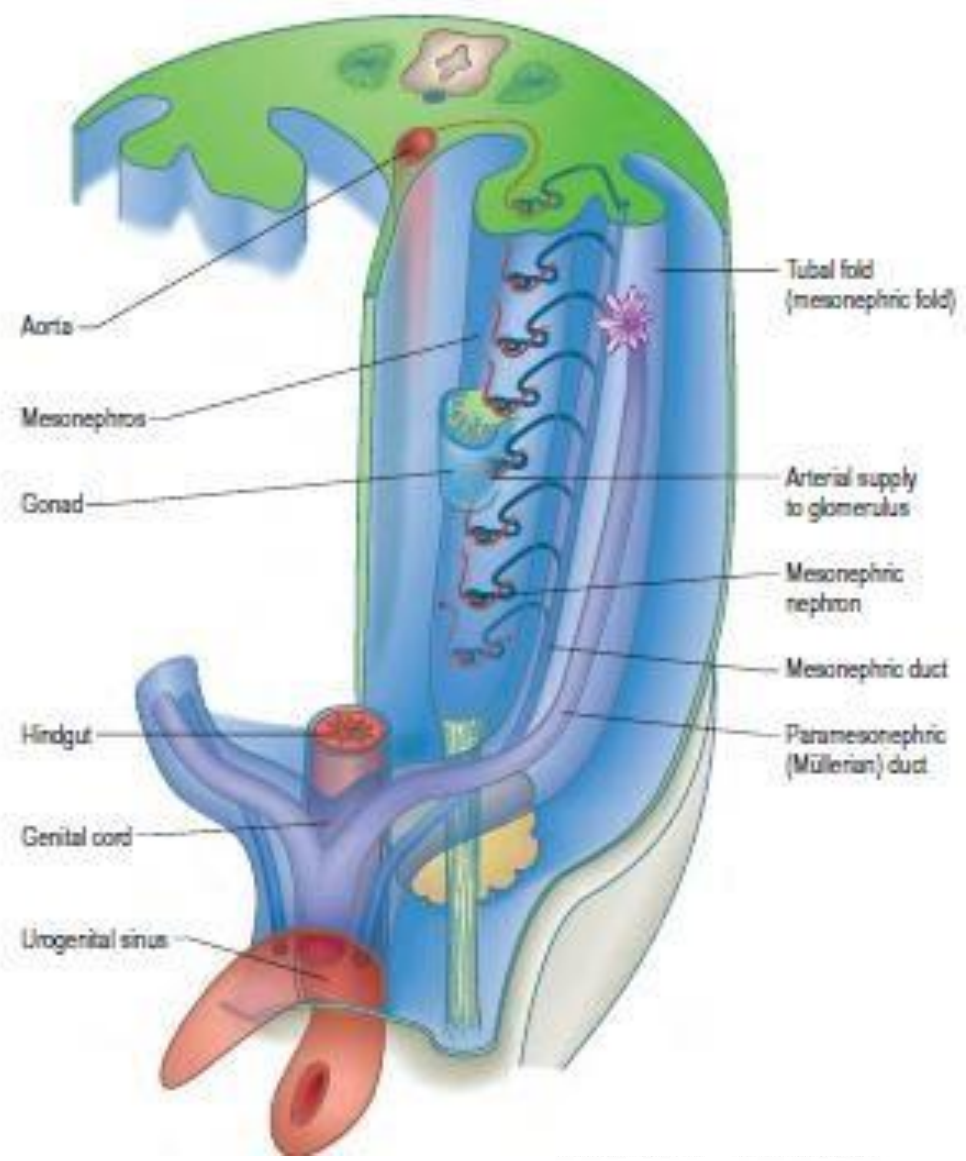
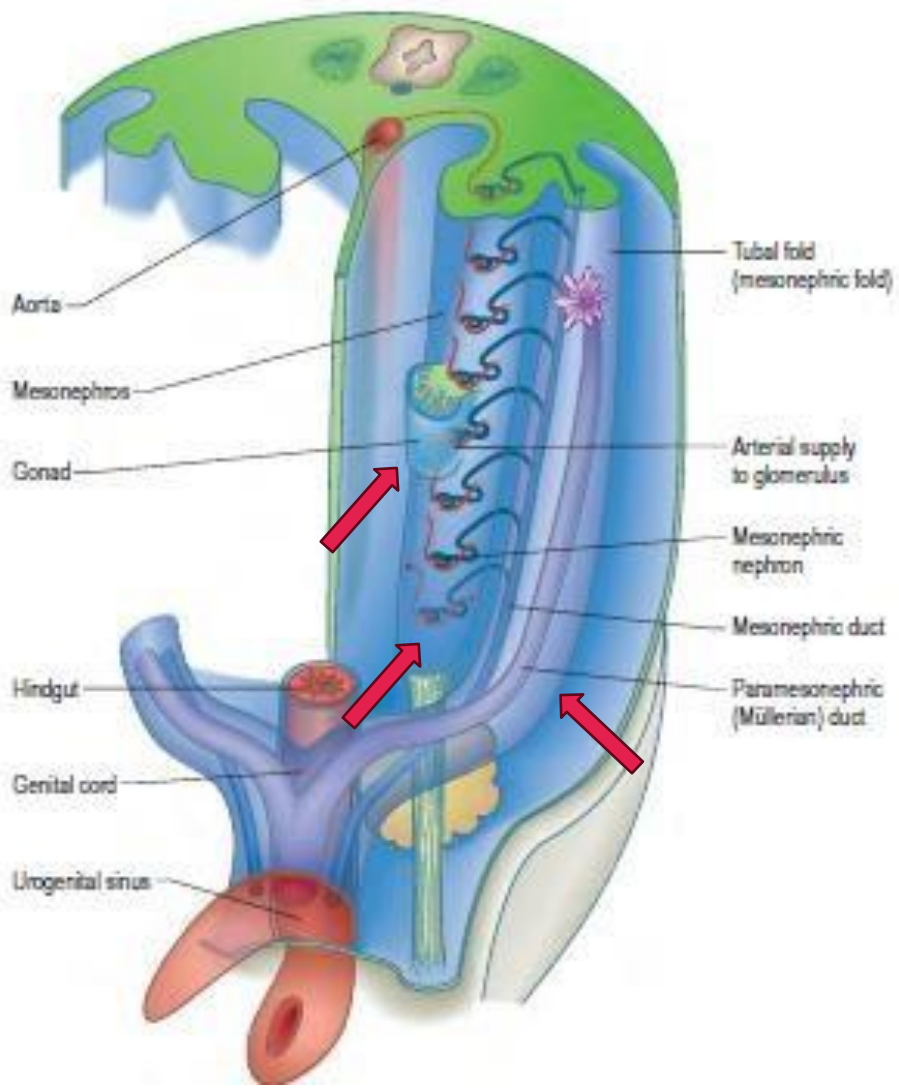
Development of the kidney

- The **intermediate mesoderm** forms a longitudinal elevation (urogenital ridge) on each side of the dorsal aorta extending from the cervical to the sacral region. This ridge differentiates into 2 elevations, which are (from medial to lateral):



1. *Genital ridge:* will give the 1ry sex organs.
2. *Nephrogenic cord:* will give the urinary system.

- Para-mesonephric duct appears as a longitudinal invagination of the surfac epithelium lateral to the urogenital ridge. It will give the genital ducts.



A) Pronephros:

Development:

- The mesoderm of the Nephrogenic cord in the cervical region divides into 7 - 10 ***segments*** *(*called *nephrotome)*
- Each segment becomes hollowed to form ***vesicle***.
- The vesicle elongates to form ***tubule***, which is called ***pronephric tubule***.
- Each pronephric tubule has 2 ends:

✓ ***Medial end:*** opens in the ***intraembryonic coelom***.

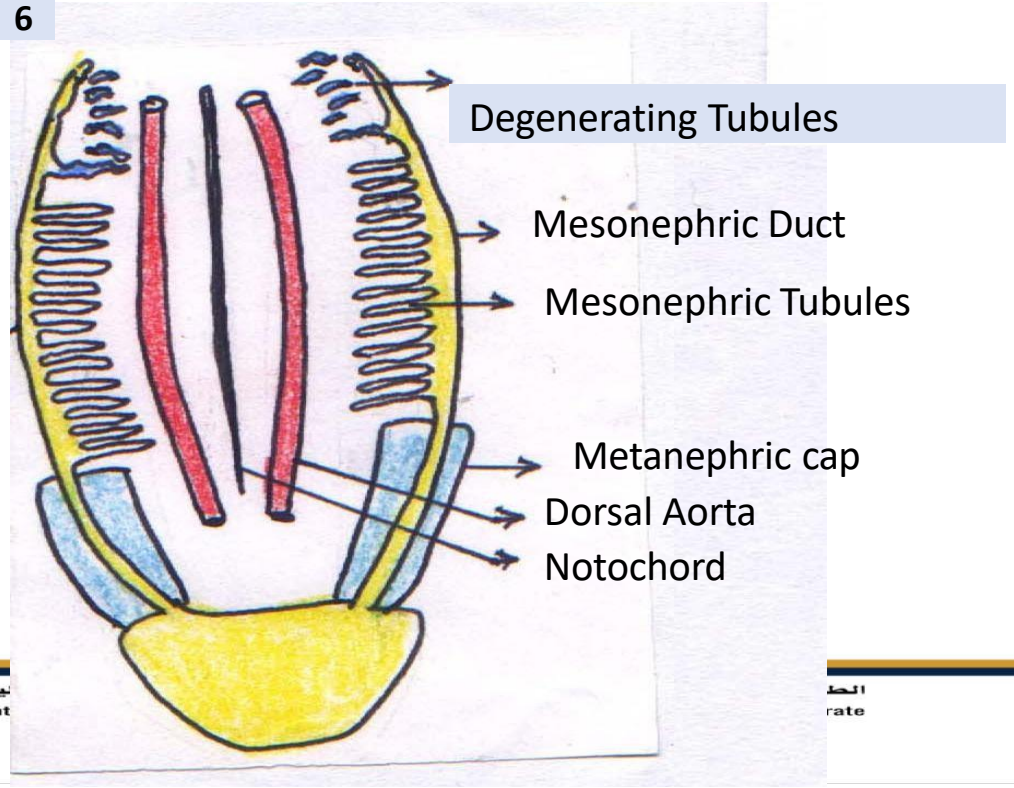
✓ ***Lateral end:*** fuse with each other to form ***pronephric duct***, which extends caudally to open in the ***cloaca***.

- Small branches from the dorsal aorta invaginates these tubules.

Fate:

- ✓ *Pronephric tubules:* degenerate and disappear at the end of the 4th week.
- ✓ *Pronephric duct:* its cranial part degenerates and disappears while its caudal part remains as mesonephric duct.

6



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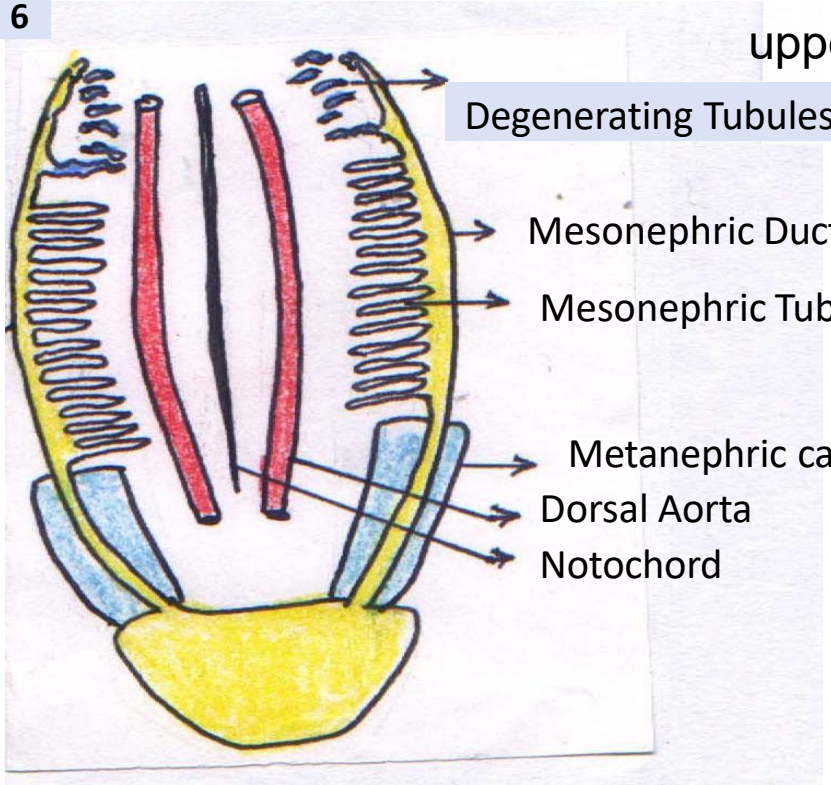
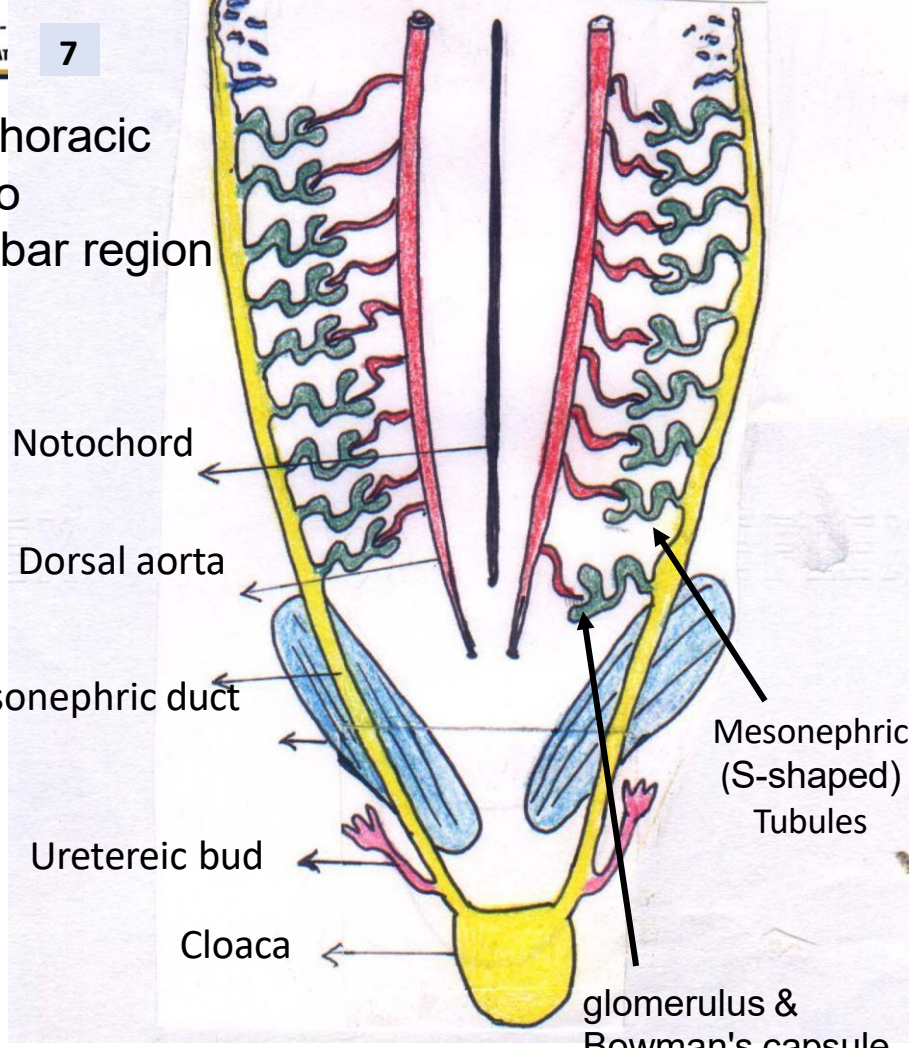


7

upper thoracic
to
upper lumbar region



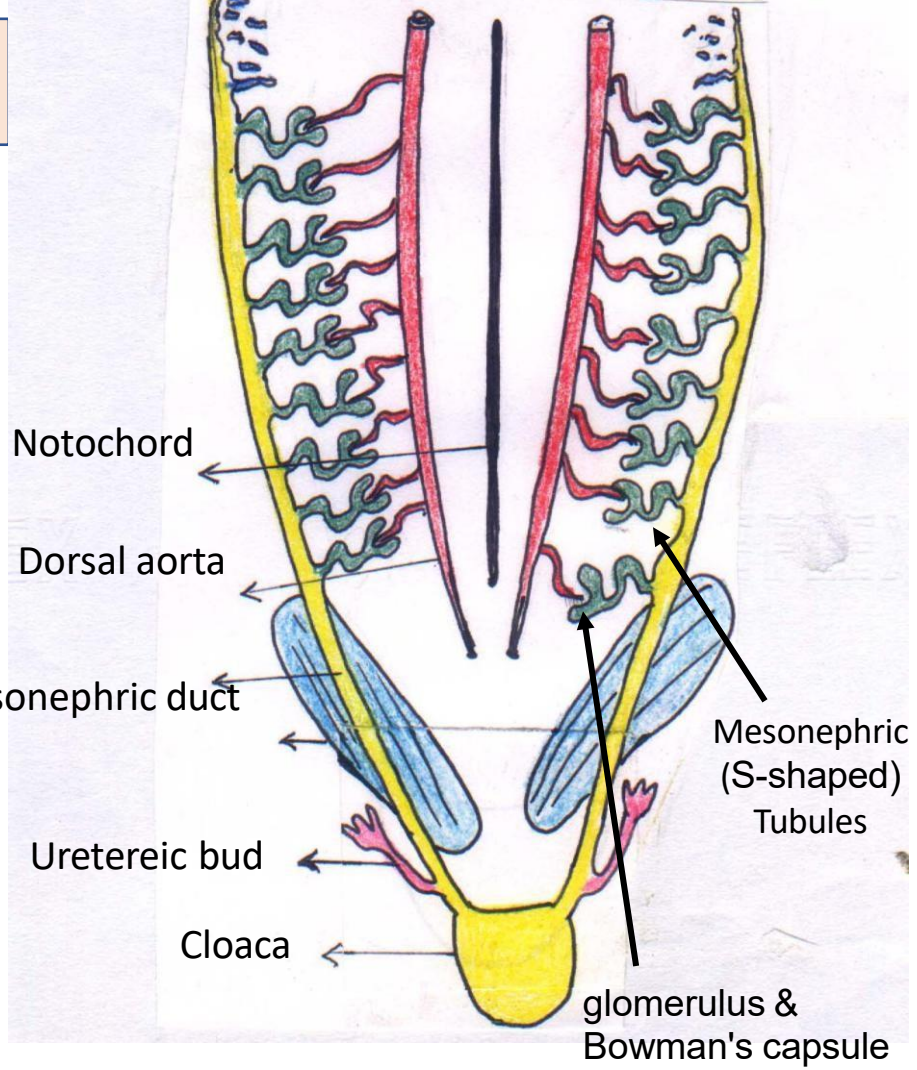
it is a temporary functioning stage (from the 6th to the 10th week

Mesonephros

B) Mesonephros:

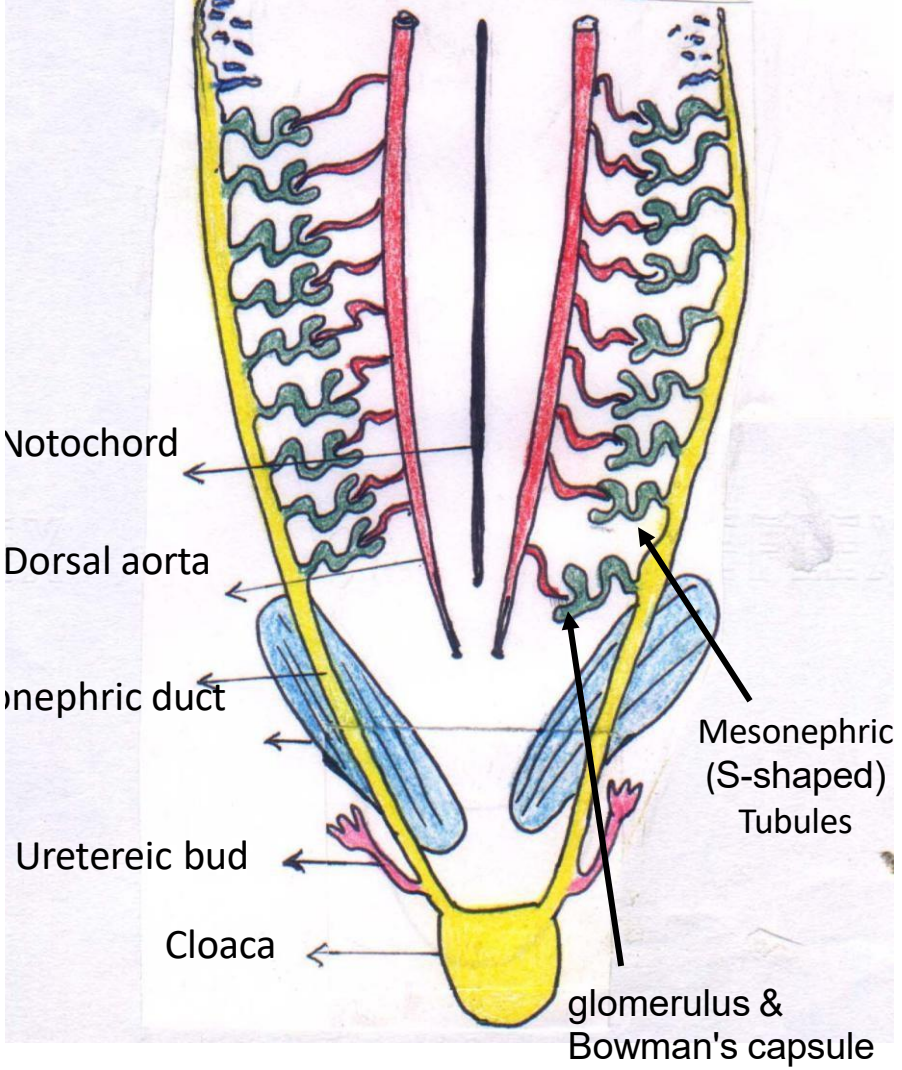
Time: early in the 4th week. ***Origin:*** mesoderm of nephrogenic cord from the upper thoracic to upper lumbar region.

Function: it is a temporary functioning stage (from the 6th to the 10th week).



Development:

- The mesoderm opposite the thoracic and upper 3 lumbar segments forms **groups of cells**. Each group becomes hollowed to form **vesicle**.
- The vesicle elongates to form **S- shaped tubule**, which has 2 ends (medial and lateral).
- The medial end is invaginated by capillaries to form **renal corpuscle** (glomerulus and Bowman's capsule).
- The lateral end **joins the mesonephric duct.**



4. The more caudal part gives a bud which forms the *seminal vesicle.*

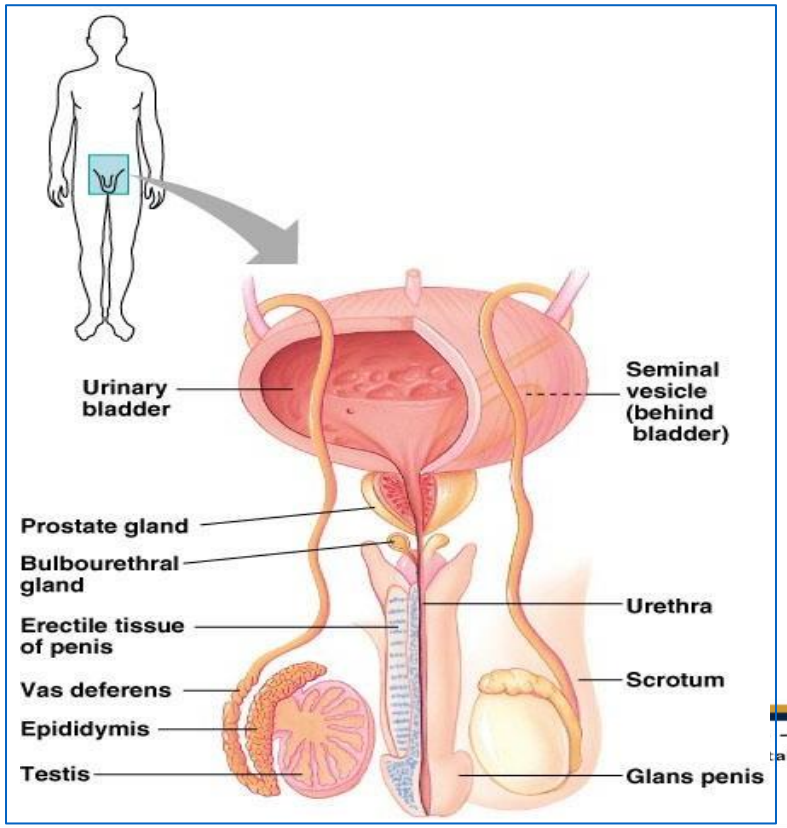
5. *ejaculatory duct.*

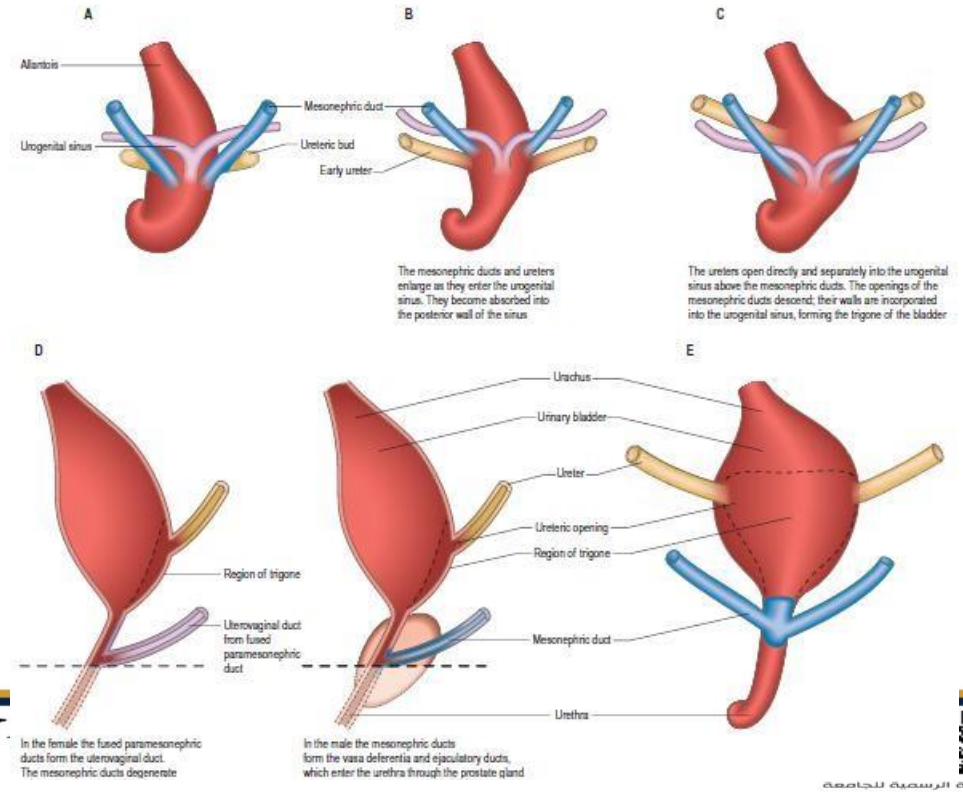
6. *Ureteric bud.*

7. *Trigone of the urinary bladder.*

8. *Posterior wall of prostatic urethra above the ejaculatory duct.*

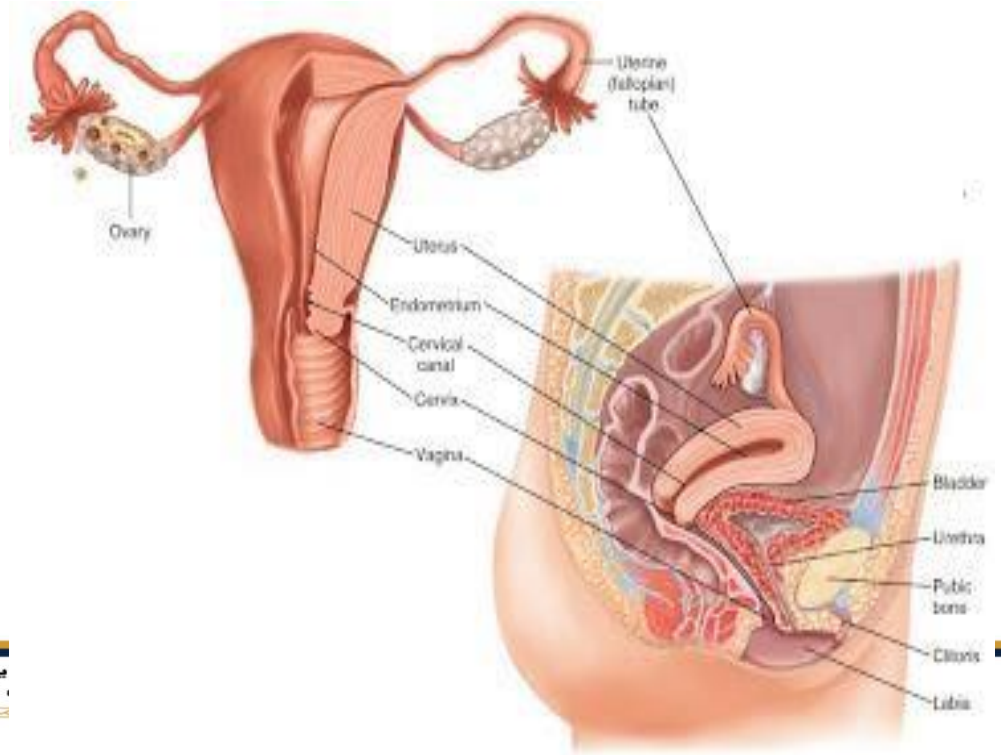
9. *Fibromusculature of the prostate.*



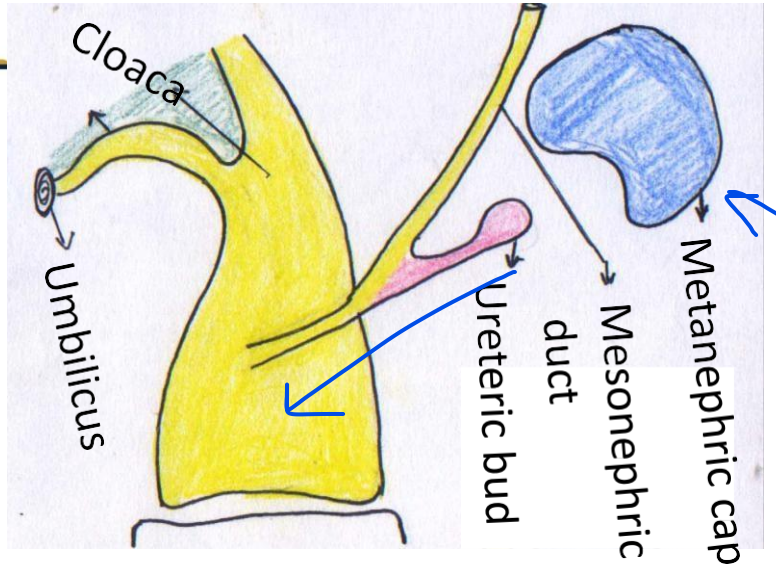


- ***In female:*** degenerate and disappear except:

1. **The caudal part forms:** *Ureteric bud.*
2. **The part caudal to it forms** *Trigone of urinary bladder and posterior wall of urethra.*
3. **The most caudal part forms** *Gartner's duct (vestigial structure in the wall of the uterus or vagina which may be inflamed giving gartner's cyst).*



Metanephros



C) Metanephros:

Time: early in the 5th week.

Origin:

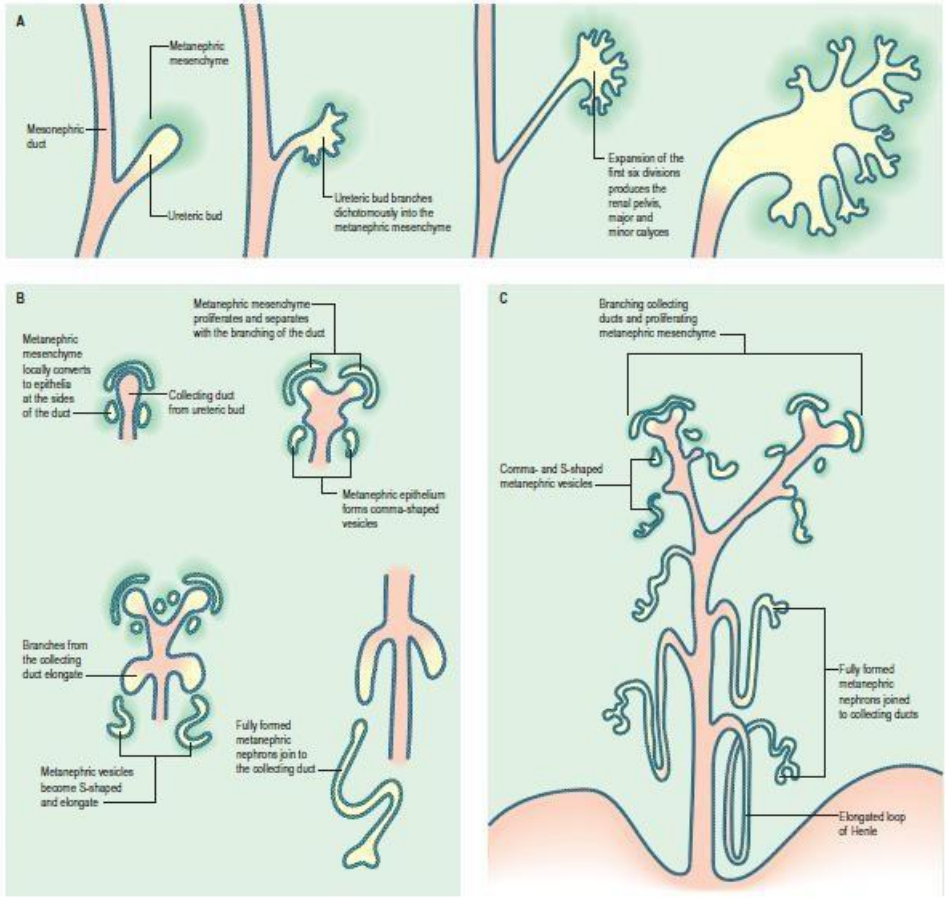
1) ***Metanephric cap:*** mesoderm of nephrogenic cord opposite the lower lumbar and sacral region.
2) ***Ureteric bud:*** outgrowth from the caudal end of mesonephric duct close to its entrance to the cloaca.

Function: it is the permanent human kidney.

Development:

1. ***Ureteric bud**: gives the collecting system.* MCQ

- The ureteric bud grows to form the *ureter.*
- Its upper end dilates to form the *renal pelvis.*
- It divides to form the *major calyces.* SAQ: DERIVATIVES OF URTERIC BUD
- Repeated divisions to form *minor calyces* and *collecting tubules* (approximately 1-3 million collecting tubules).



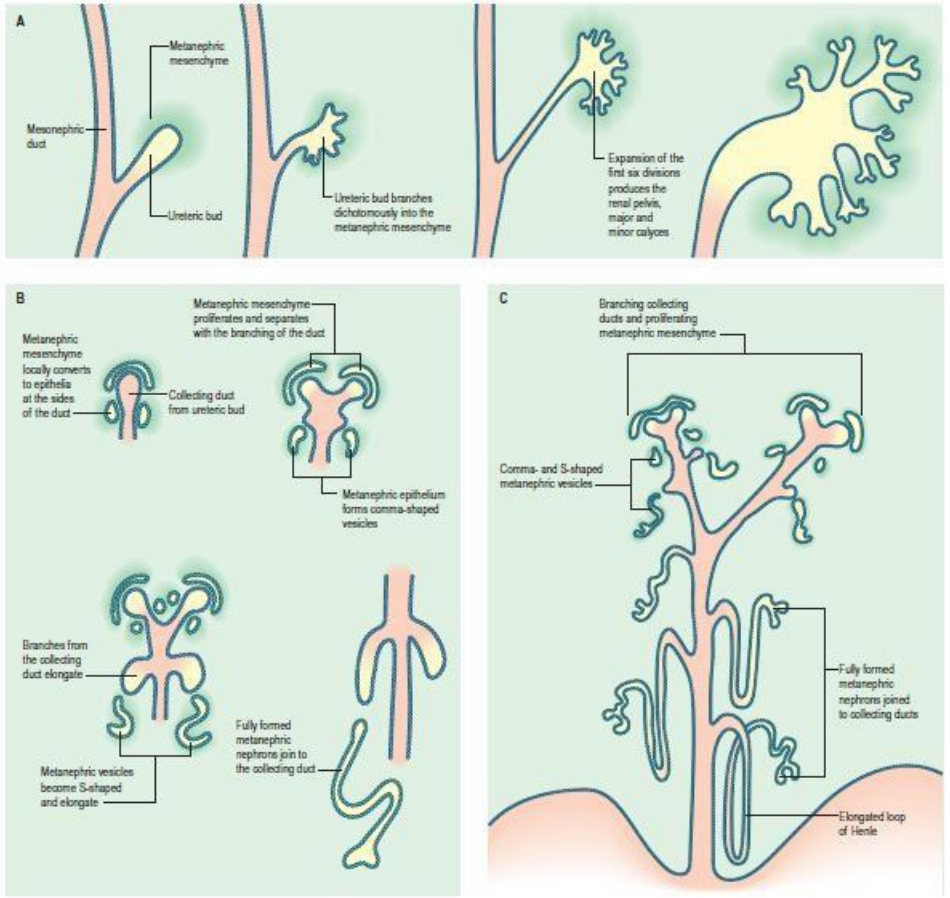
SAQ: DERIVATIVES OF METANEPHRIC CAP

***2. Metanephric cap**: gives the excretory system (the nephrons).*

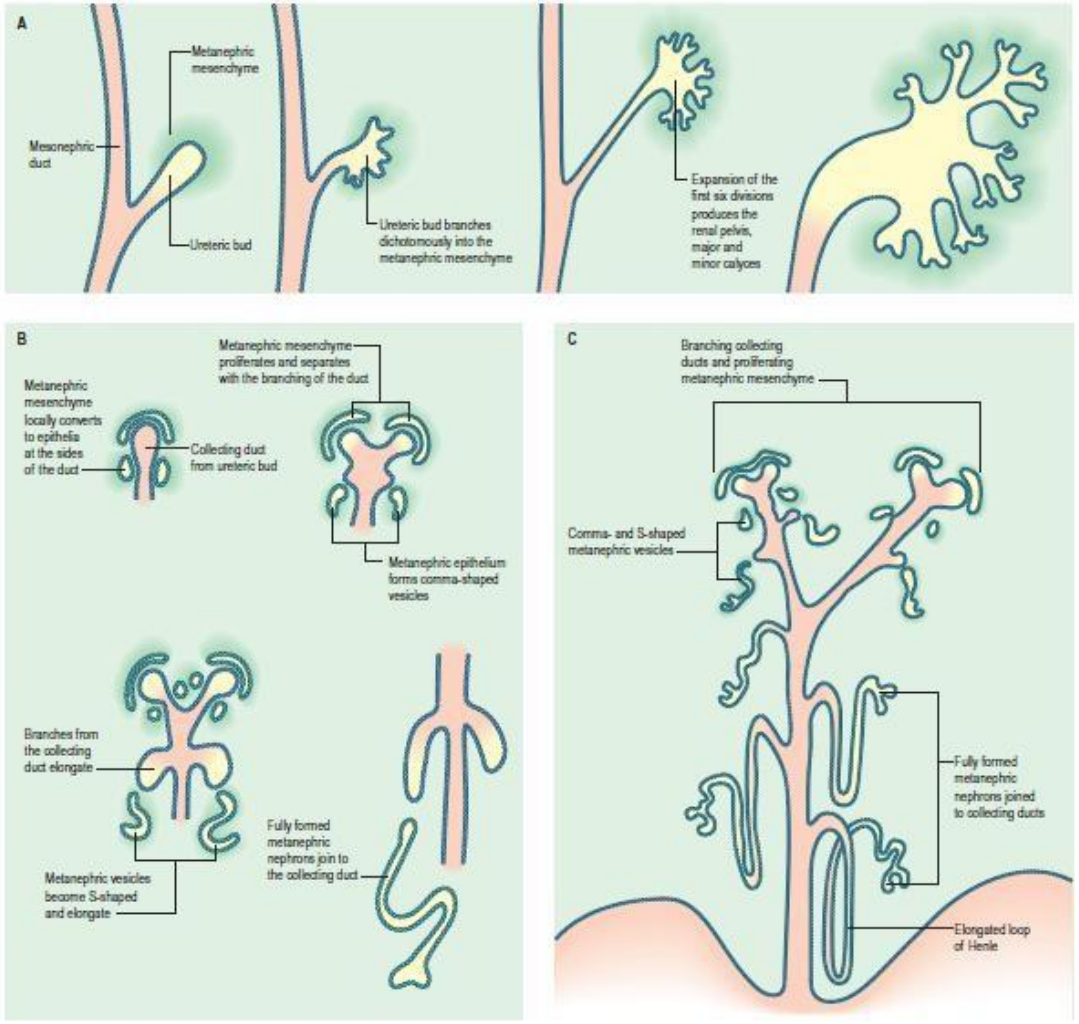
MCQ

- Mesoderm of metanephric cap becomes arranged to form vesicles *(renal **vesicles**)*.
- Each vesicle elongates to form ***S- shaped tubule*** (which has 2 ends; proximal and distal).
- Capillaries invaginate the ***proximal end*** of the tubule to form ***glomerulus***.

The proximal end of the tubule surrounds the glomerulus to form *Bowman's capsule*.



The ***distal end*** is connected to the ***collecting tubules***. The proximal and distal parts of the tube become convoluted to form the proximal and distal convoluted tubules, while the middle part elongates to form the loop of Henle.



Changes in the kidney

❑ Ascent of the kidney:

➢ At 1st the kidneys lie in the sacral region close to each other, then gradually ascend upwards and away from each other (in V-shaped manner) to reach the lumbar region.

❑ Blood supply of the kidney:

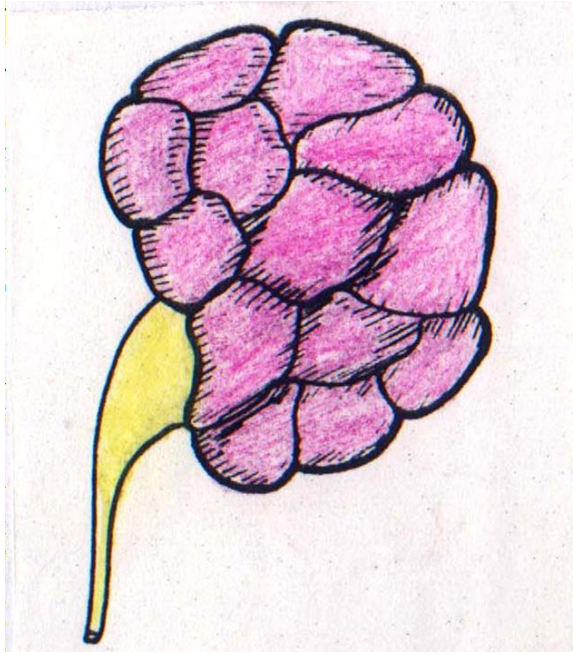
➢ As the kidney ascends it acquires blood supply from the median sacral then the common iliac then successive higher levels of abdominal aorta.

❑ Rotation of the kidney:

➢ At 1st the hilum of the kidney was directed forward, then the kidney rotates medially 90°. So, the hilum becomes medially.

Lobulation of the kidney:

- At 1st the fetal kidney was lobulated, then this lobulation disappears gradually.



Function of the kidney:

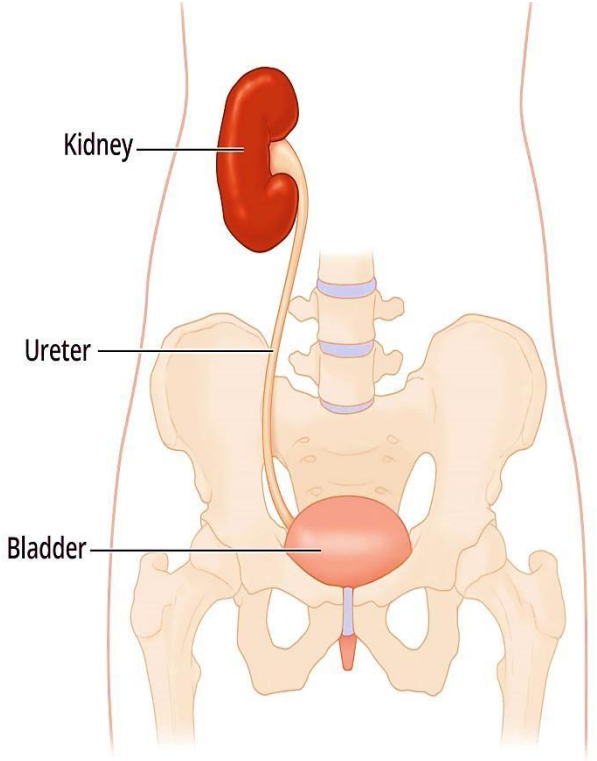
- The kidney starts to secrete urine approximately at the 10th – 12th week of intrauterine life.
- Urine passes to the amniotic fluid then swallowed by the fetus to be excreted again by the kidneys.

Congenital anomalies of the kidney

1. Anomalies in number:

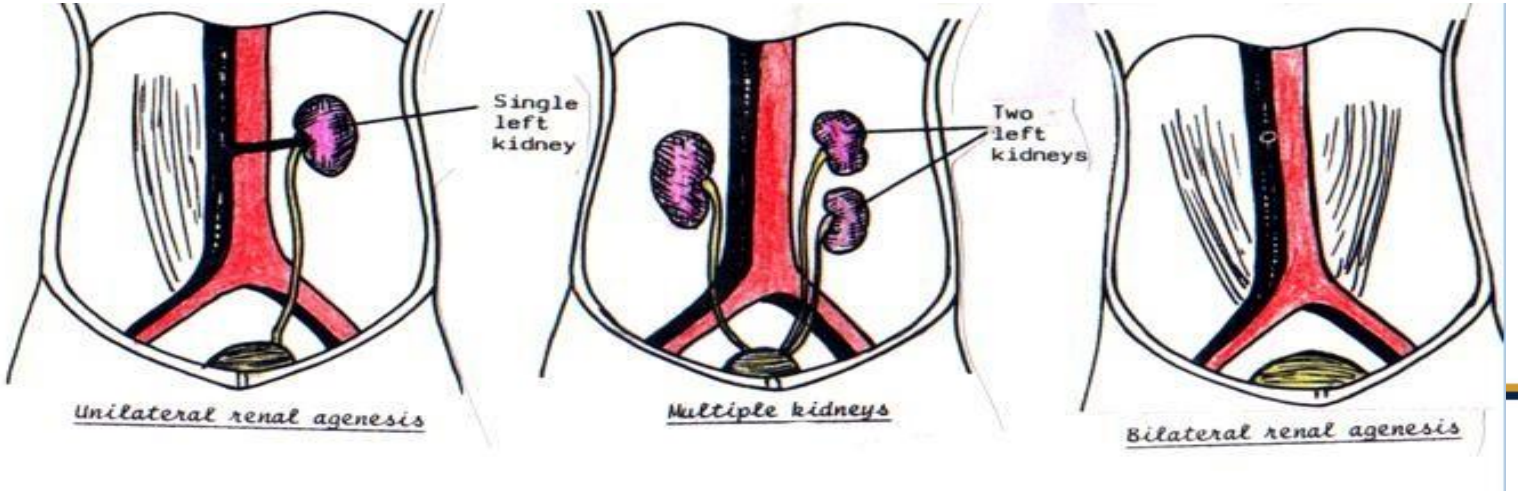
A. Unilateral agenesis:

- *Cause:* failure of development of ureteric bud or meta-nephric cap in one side.
- *Features:* no symptoms because the other kidney hypertrophies.



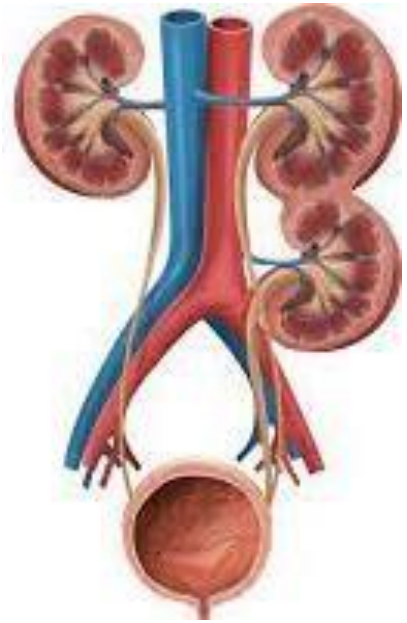
B. Bilateral agenesis:

- *Cause:* failure of development of Ureteric bud or meta-nephric cap in both sides.
- *Features:*
  1) Absent both kidneys.
  2) There is oligohydramnios.
  3) It is incompatible with postnatal life MCQ



C. Supernumerary Kidney

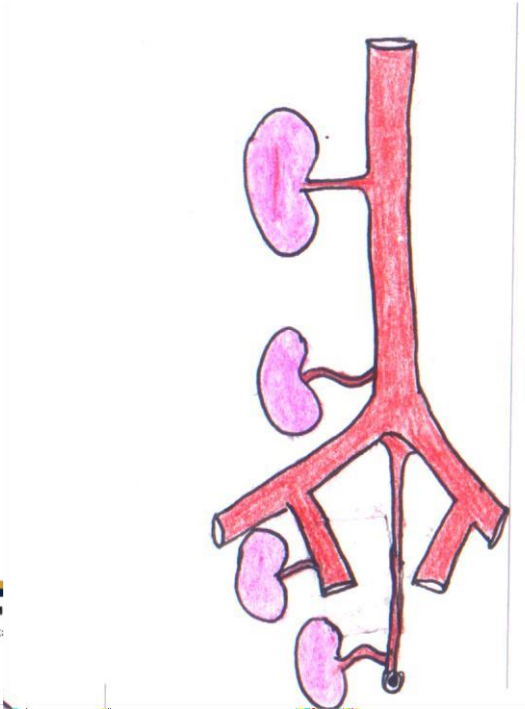
- *Cause:* development of other ureteric bud or branching of the ureteric bud.
- *Features:* it is a rare condition where there is more than one kidney in one side.



2. Anomalies in site:

Pelvic Kidney.

- *Cause:* failure of the kidney to ascend.
- *Features:* the kidney remains in the pelvis close to the common iliac artery.

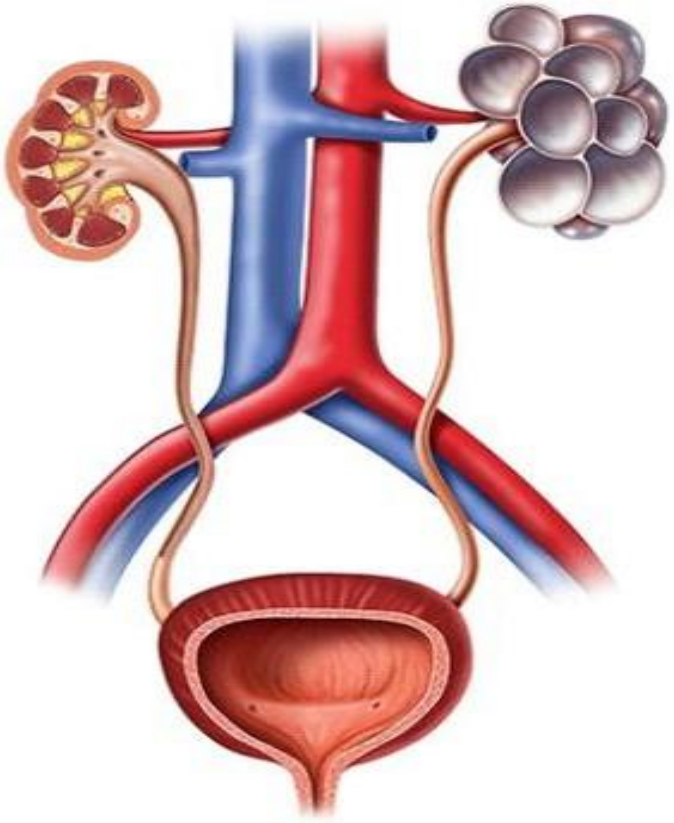


3. Anomalies in structure:

Congenital Polycystic

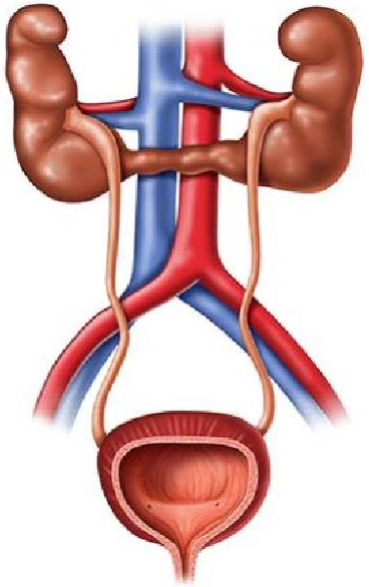
Kidney.

- *Cause:* failure of fusion between some nephrons (excretory unit) and the collecting tubules. May be inherited.
- *Features:* diffuse, bilateral, progressive cystic deformity of the kidneys, which compress the normal renal tissue ending in renal failure in infancy, childhood or adulthood.



4. Anomalies in shape: Horseshoe Kidney.

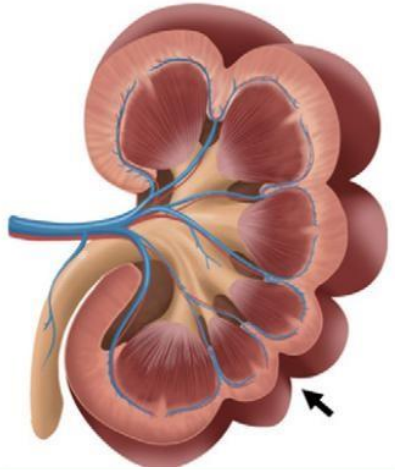
- *Cause:* fusion of both metanephric caps.
- *Features:*
  1) The lower poles of the 2 kidneys are connected by isthmus.
  2) The ureters are anterior and pass ventral to the isthmus.
  3) Lies at a lower level (the inferior mesenteric artery prevents its ascent).



5. Anomalies in lobulation:

Persistence of Fetal Lobulation.

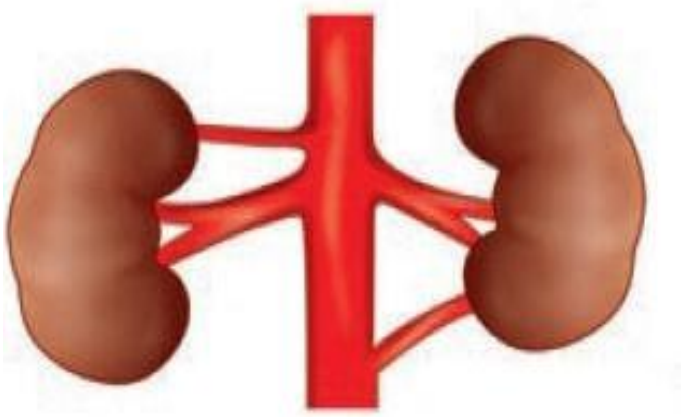
- *Features:* lobulated kidney without any symptoms.



6. Anomalies in vasculature:

Accessory Renal Arteries.

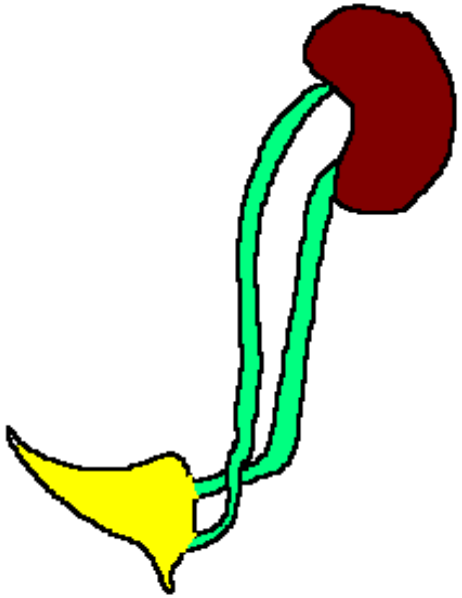
- *Cause:* failure of degeneration of the embryonic arteries (which develop during ascent of the kidney).
- *Features:* the extra artery usually arises from the aorta and enters the superior or inferior poles of the kidney.



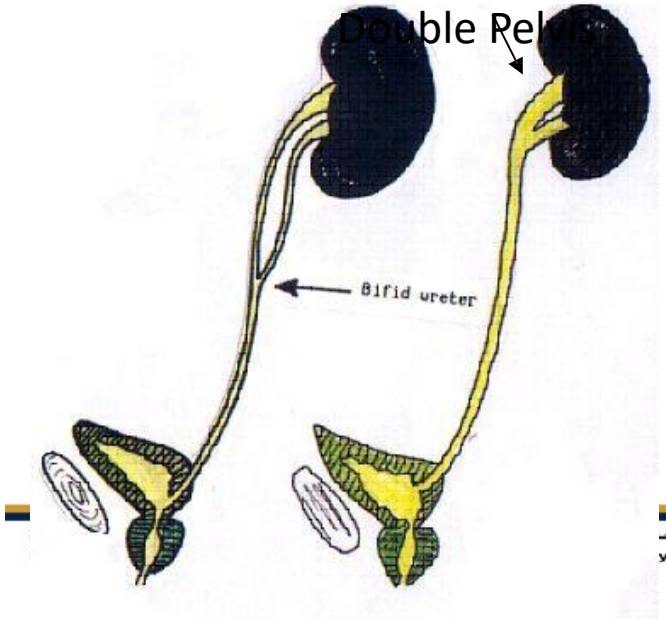
Congenital anomalies of the ureter

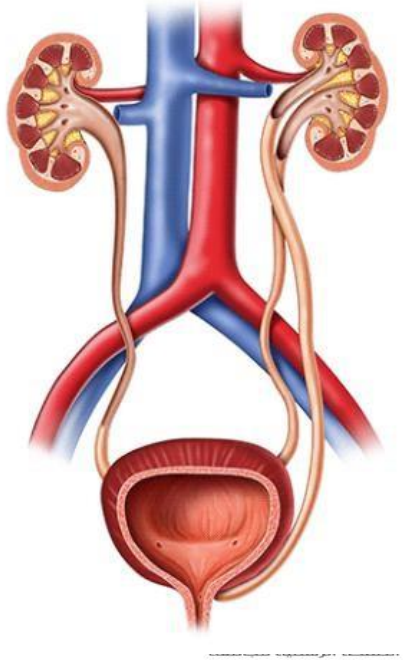
1) Duplication:

- *Cause:* division of ureteric bud.
- *Features:* may take one of the following pictures:
  1. *Double pelvis:* single ureter with double pelvis only.
  2. *Bifid ureter:* double pelvis and upper part of the ureter.
  3. *Double ureter:* double pelvis and double ureter. The lower ureter opens separately in the urinary bladder at a lower level.



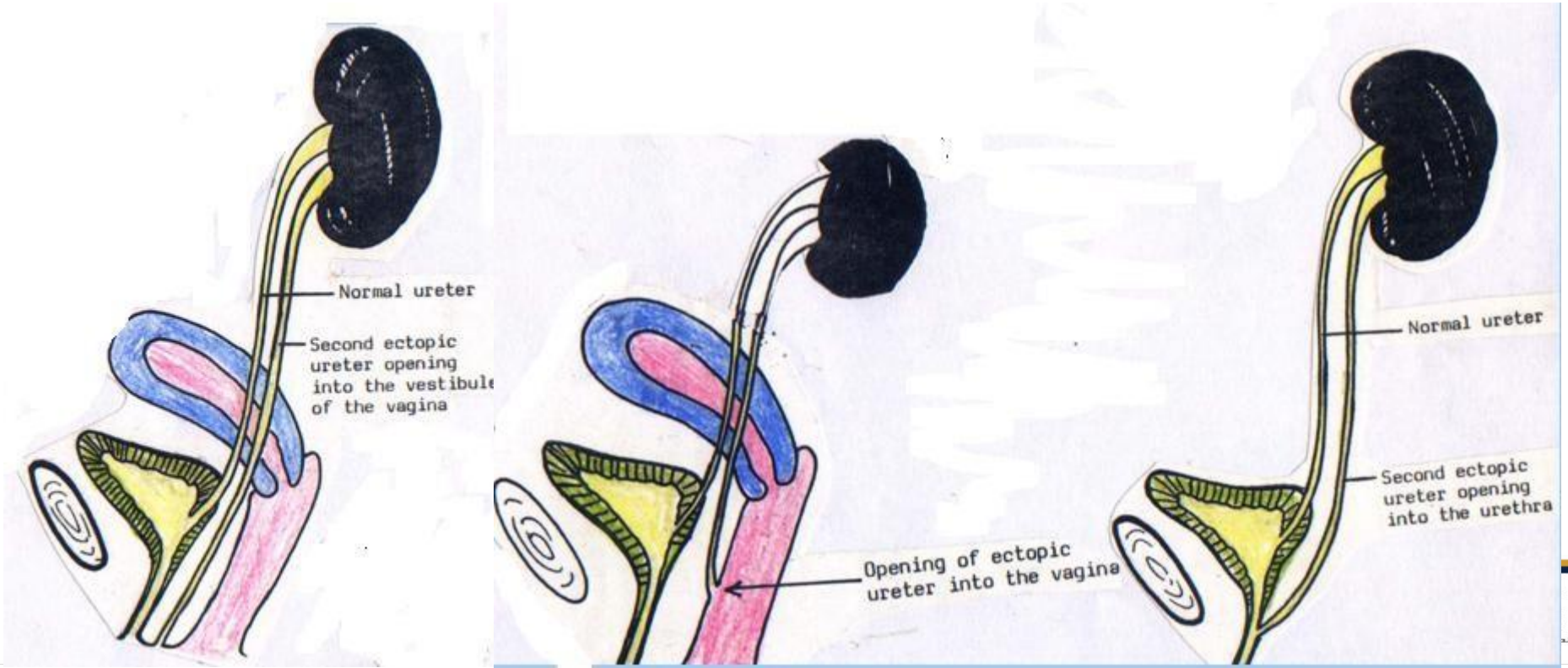
Double Ureter





2) Anomalies in termination: *Ectopic Ureteric Orifice*

- *Cause:* development of 2 ureteric buds, one is normal and the other moves down with the mesonephric duct.
- *Features:* the ectopic orifice may open in:
    1. *In male:* in the urinary bladder, urethra or ejaculatory duct.
    2. *In female:* in the urinary bladder, urethra or vagina.



- Development of the Renal System (Part II)

Department of human Anatomy and Embryology
Faculty of Medicine
Mansoura National University, Egypt

The Cloaca

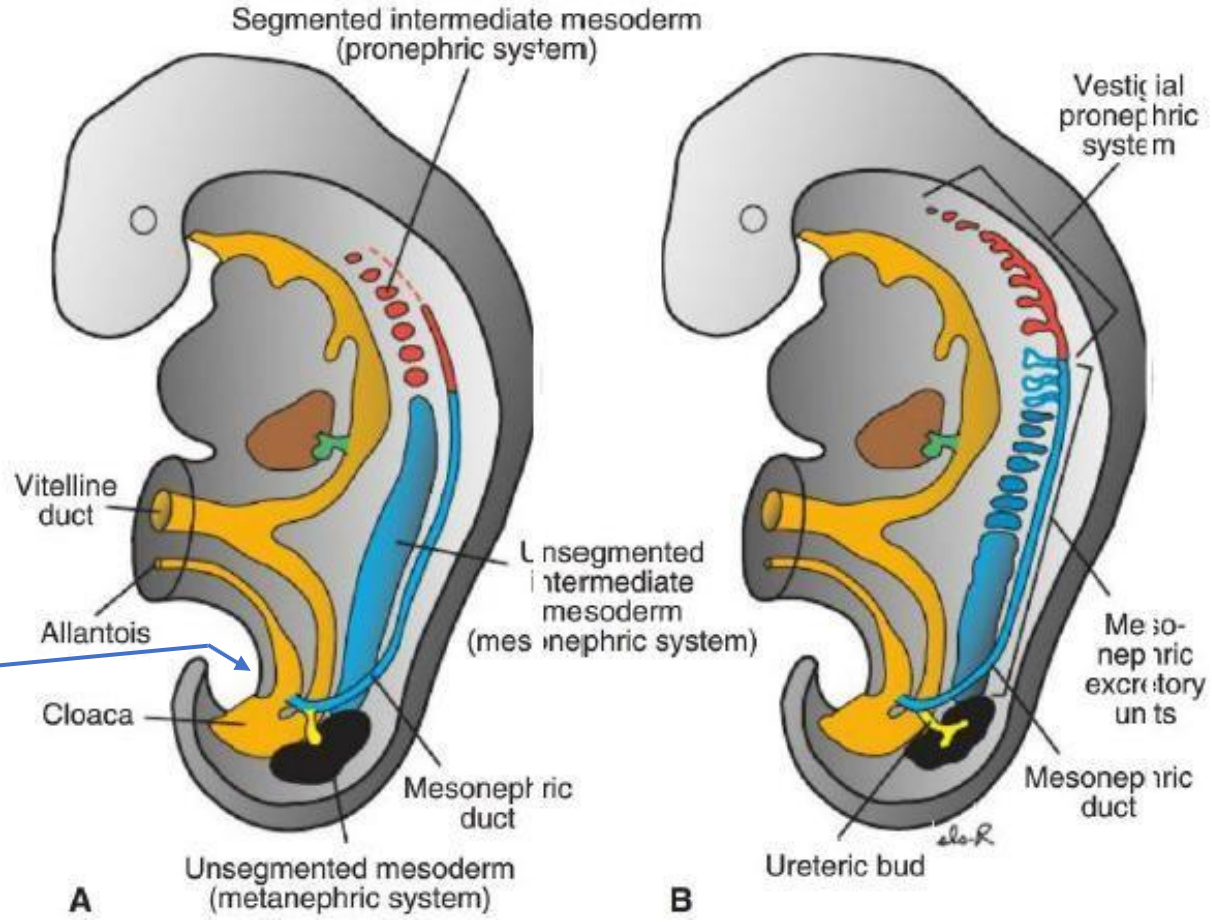
Definition: It is the dilated caudal end of the hindgut

Boundaries:

Cranially: continuous with the hindgut.

Caudally: It is separated form a depression called proctodeum by the cloacal membrane (N.B. the proctodeum is covered by ectoderm).

Ventrally: it is continuous with the allantois.



The Cloaca

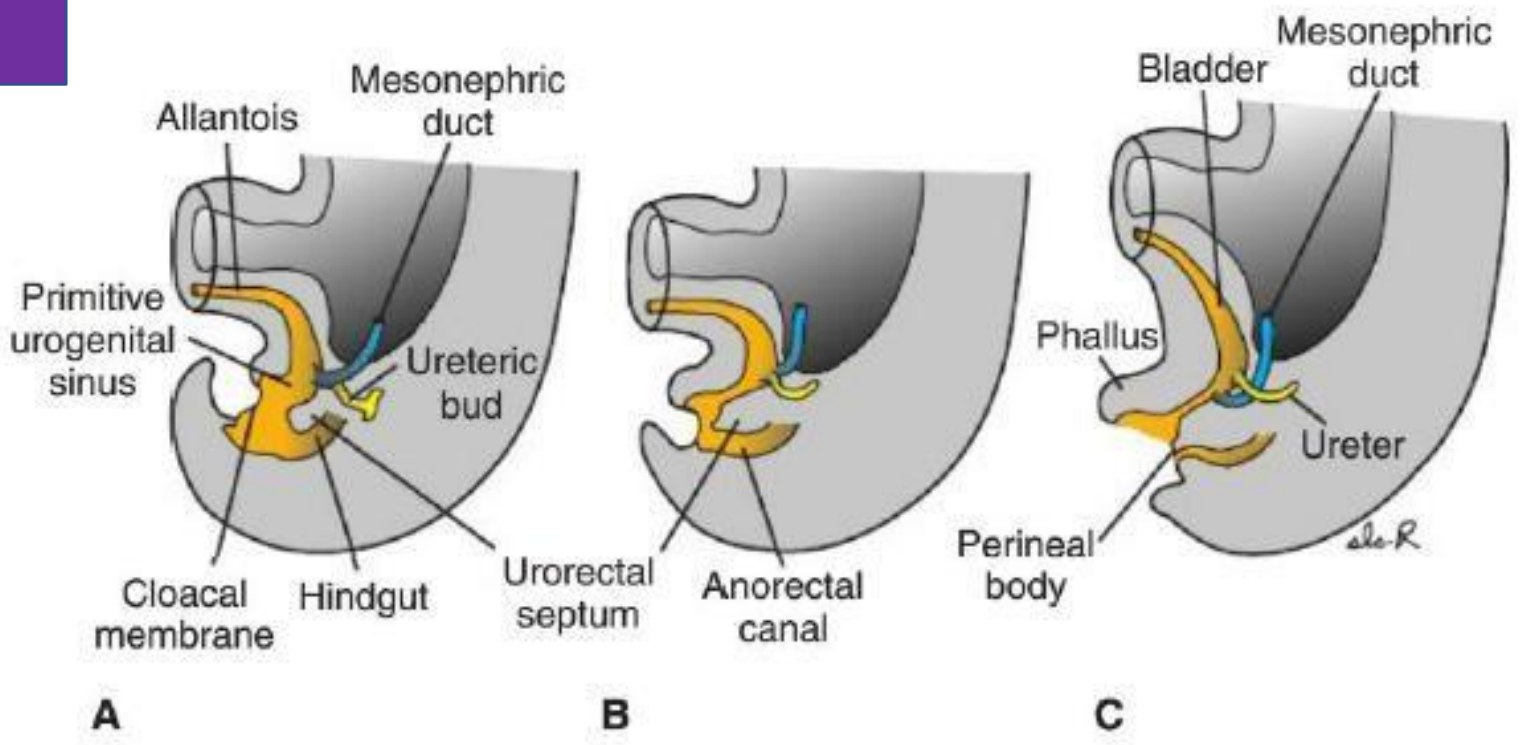
Division (partitioning) of the cloaca:

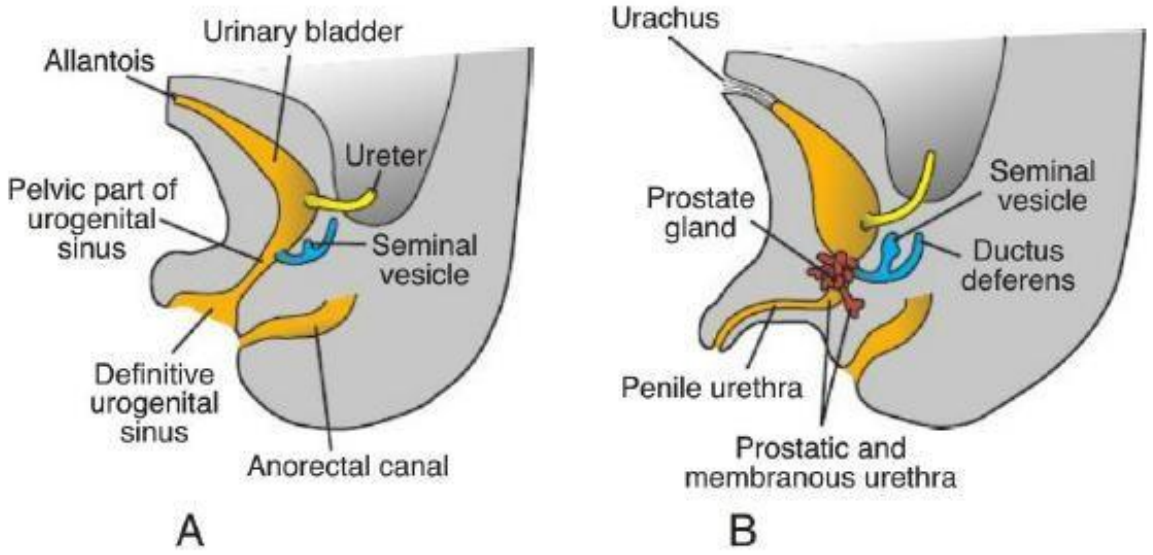
Extension of urorectal septum into the cloaca divides it into:

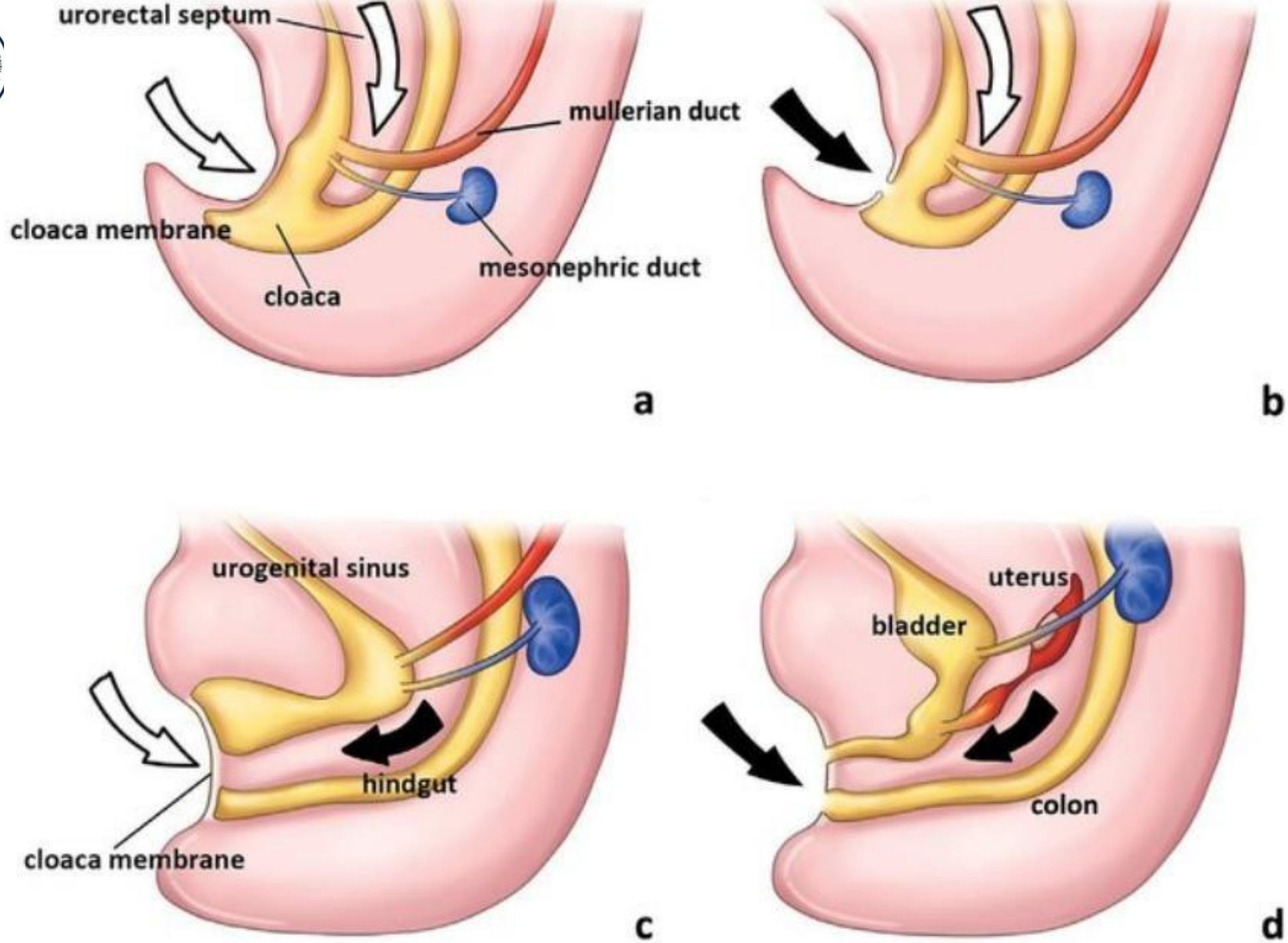
1 *Anorectal part* (dorsal)

2 *Primitive urogenital sinus* (ventral).

N.B.: Also the cloacal membrane is divided into anal membrane (dorsally) & urogenital membrane (ventrally).



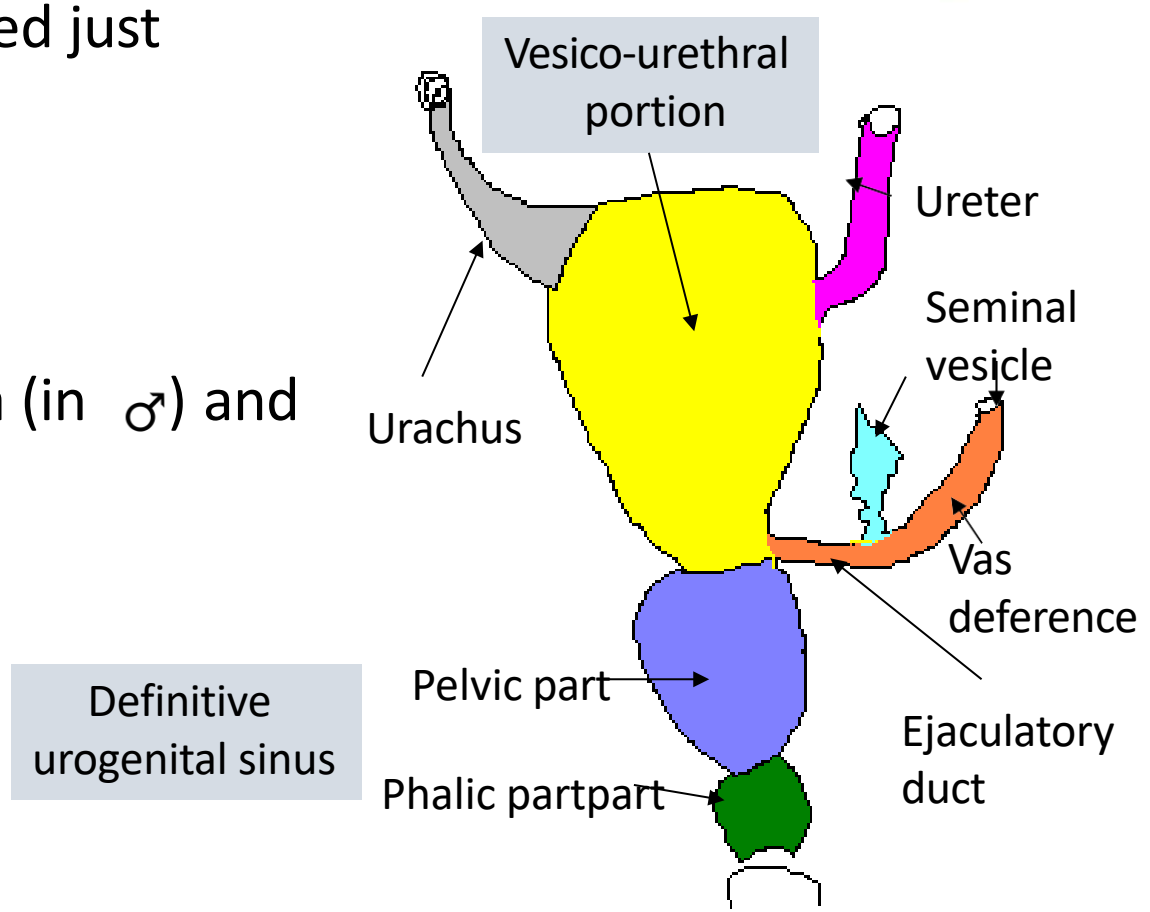



urorectal septum
mullerian duct
cloaca membrane
mesonephric duct
cloaca
a
b
urogenital sinus
hindgut
cloaca membrane
c
uterus
bladder
colon
d

The Cloaca

The *primitive urogenital sinus* is subdivided just caudal to the mesonephric duct into:

- ***Vesicourethral part:*** upper part which will give:
  - The urinary bladder.
  - Upper part of the anterior wall of prostatic urethra (in ♂) and the anterior wall of ♀ urethra.

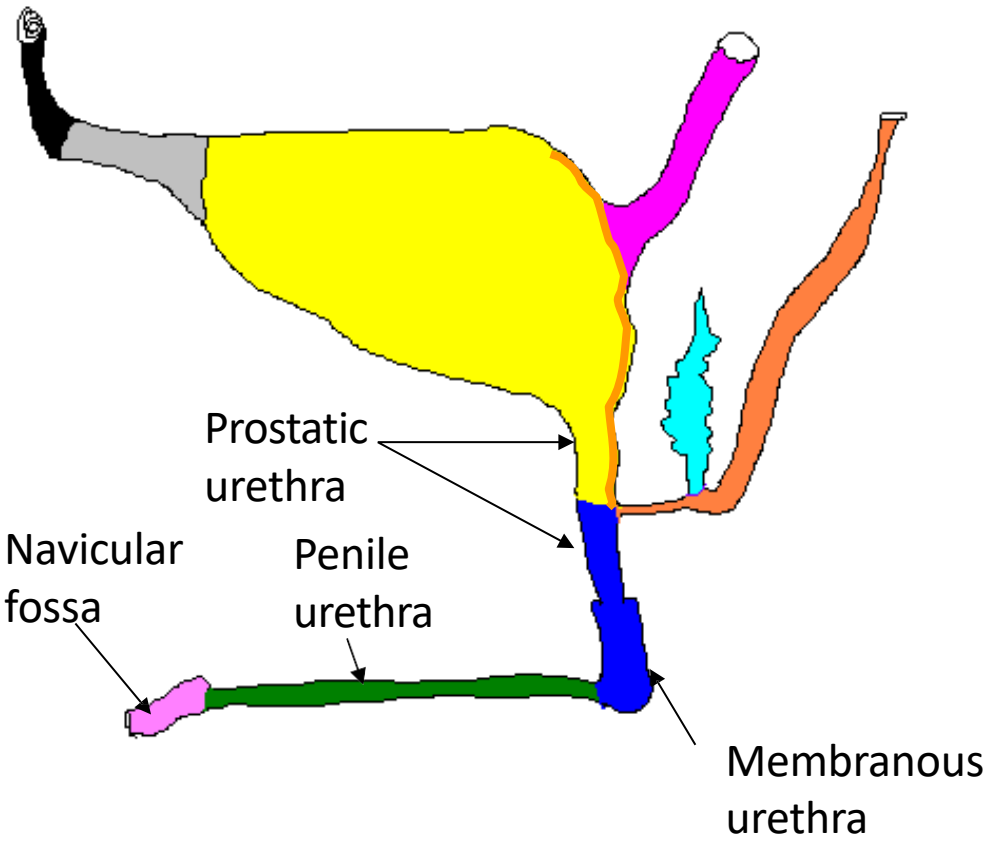


The Cloaca

- ***Definitive urogenital sinus:*** lower part which is subdivided into:

➢ *Pelvic part:* gives the lower part of prostatic urethra and membranous urethra.

➢ *Phallic part:* gives the penile urethra.

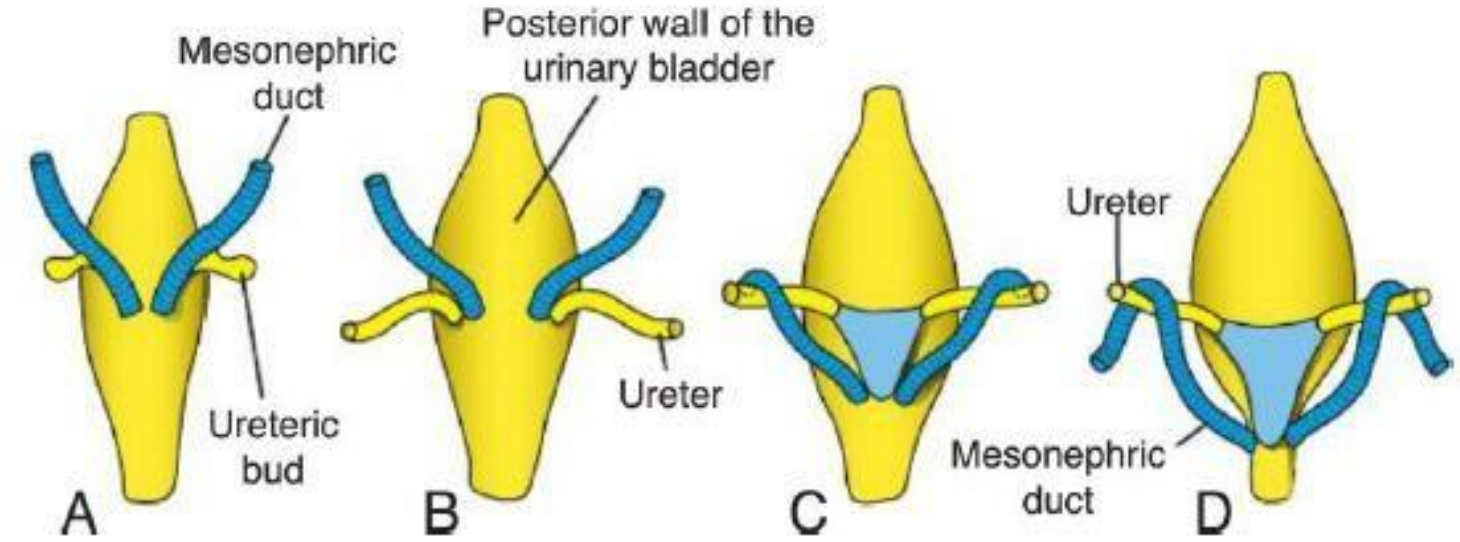


Development of the urinary bladder

SAQ

It develops from the following sources:

1. **The distal parts of mesonephric ducts:** become absorbed into the vesicourethral part giving the **trigone** of urinary bladder.



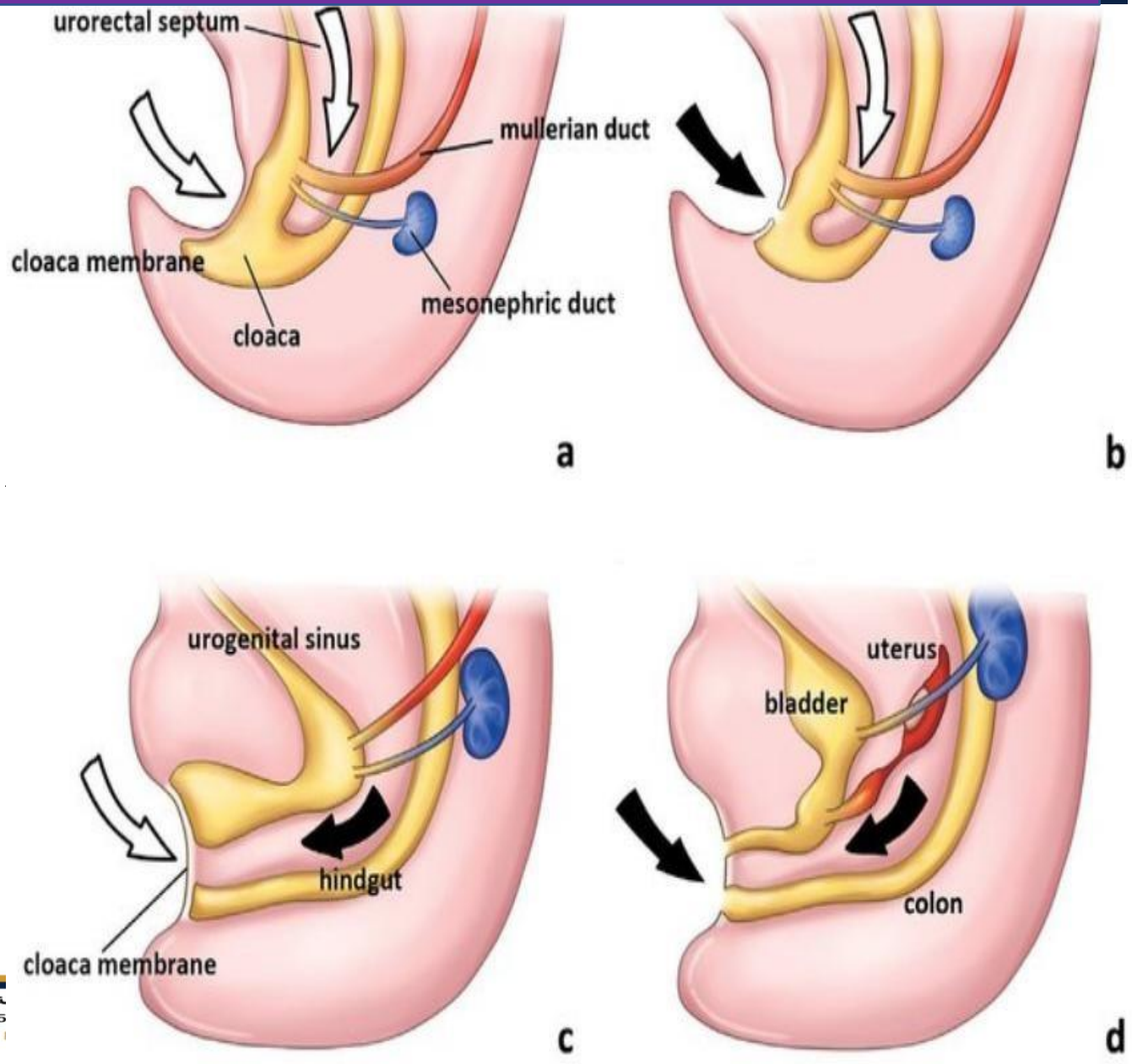
Development of the urinary bladder

It develops from the following sources:

2 The proximal part of allantois: gives the apex. (the distal part of allantois is obliterated and fibrosed giving the urachus which is represented in adults by the median umbilical ligament).

3 The upper part of Vesicourethral par of urogenital sinus: gives the rest of the urinary bladder.

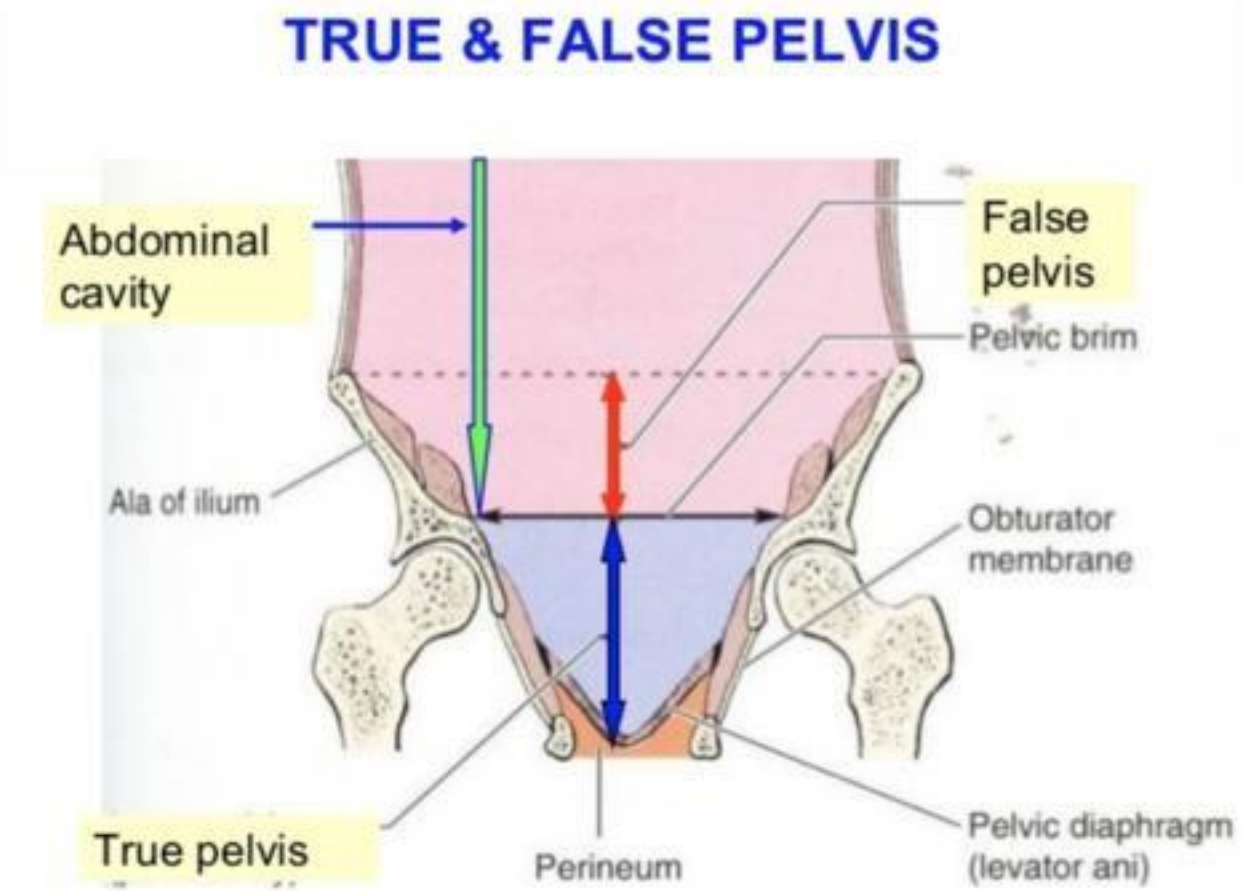
4 The Splanchnic mesoderm: gives the muscles and connective tissue.



Development of the urinary bladder

Changes in position of the urinary bladder:

- In infants and children: the bladder is abdominal (even when empty)
- At the age of 6 years: enters the lesser pelvis.
- At puberty: enters the true pelvis.



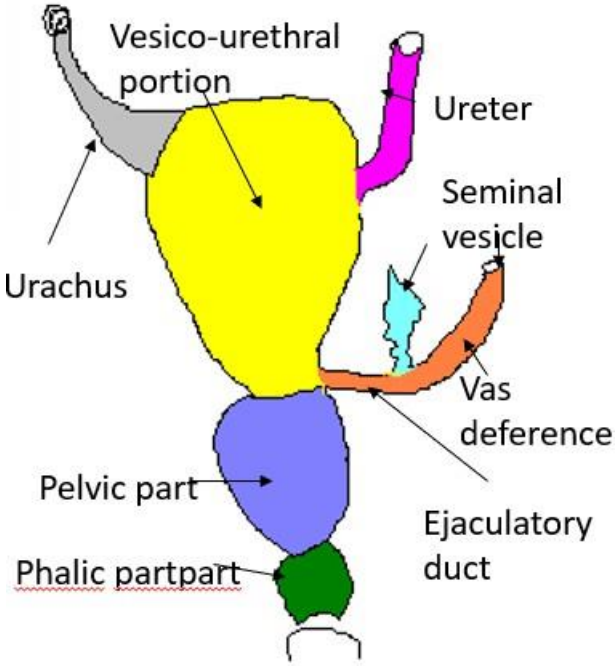
Development of the urethra

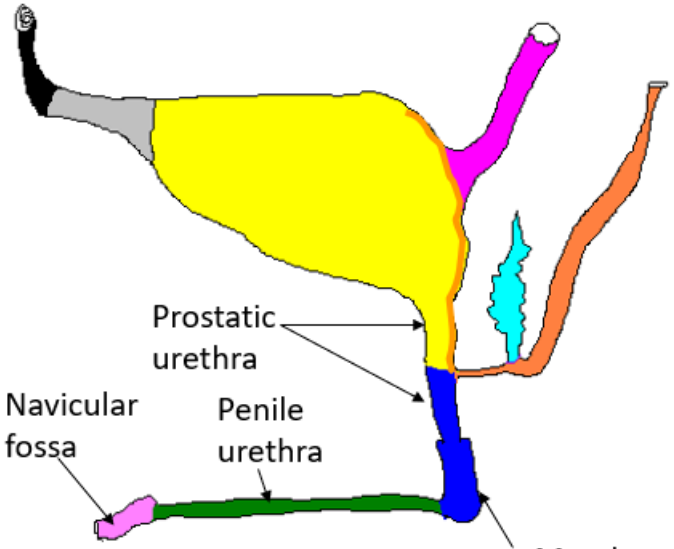
A. Development of male urethra: It develops from:

1. The posterior wall of prostatic urethra above the opening of ejaculatory duct: develops from the caudal ends of mesonephric ducts.

2. The anterior wall of prostatic urethra above the opening of ejaculatory duct: develops from the caudal part of vesicourethral part of urogenital sinus.

3. The lower part of prostatic urethra and the membranous urethra: develop from the pelvic part of definitive urogenital sinus.





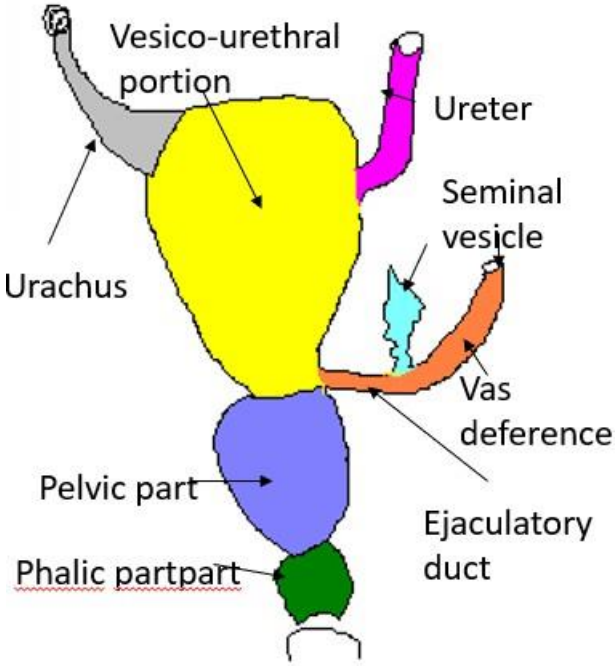
Development of the urethra

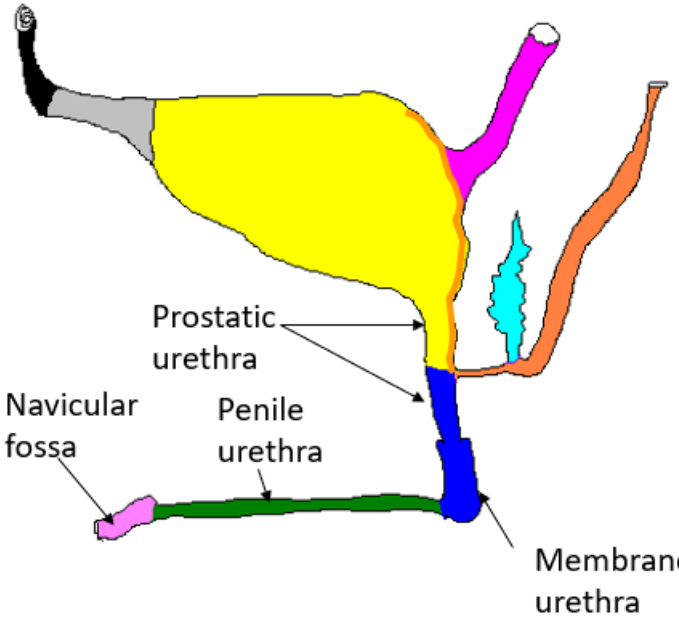
A. Development of male urethra: It develops from:

4 The spongy urethra: develops from the phallic part of definitive urogenital sinus.

5 The distal part of the penile urethra: develops from the glandular plate which is an ectodermal plate that grows from the tip of the glans penis to meet the spongy urethra then becomes canalized.

6 The connective tissue and smooth muscles: develop from the surrounding splanchnic mesoderm.

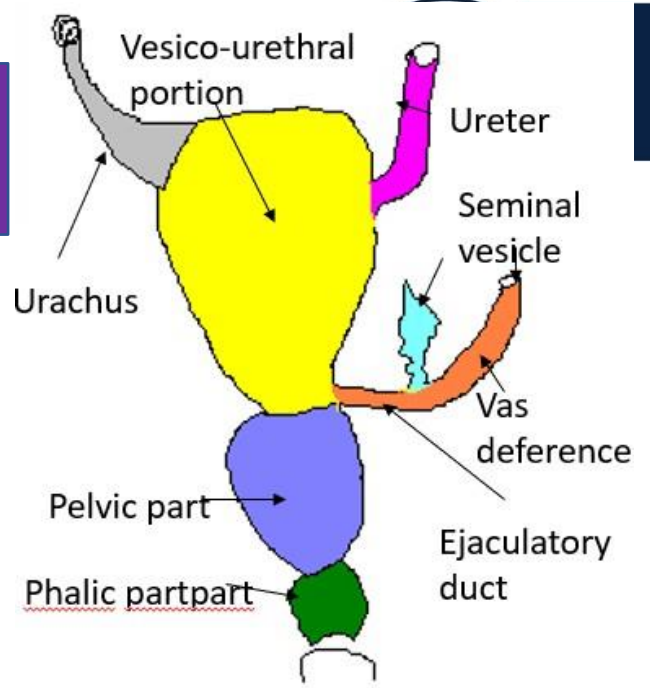


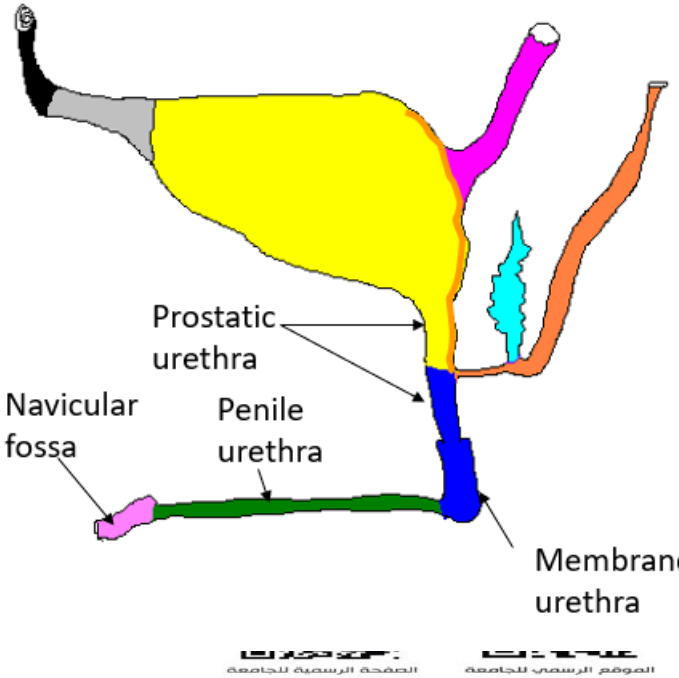


Development of the urethra

B- Development of female urethra: it develops from:

1) **The posterior wall:** develops from the caudal ends of mesonephric ducts.
2) **The rest of the urethra:** develops from the caudal part of vesicourethral part of urogenital sinus & pelvic part of definitive urogenital sinus.
3) **The connective tissue and smooth muscles:** develops from the Splanchnic mesoderm.



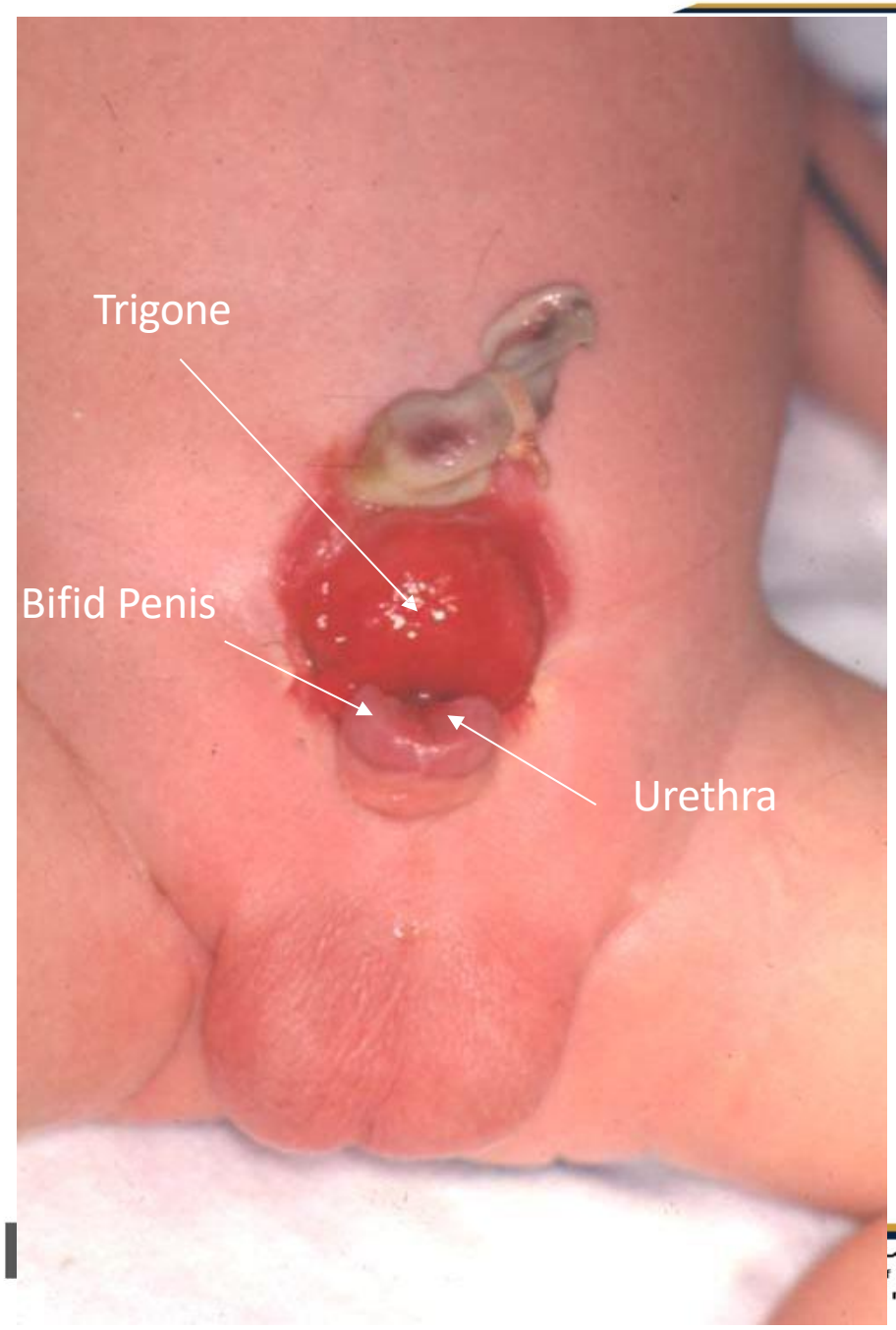


Anomalies of the Urinary Baldder

SAQ

1. Ectopia Vesica (Exstrophy of the bladder):

- ***Cause:*** failure of mesodermal migration to the region of anterior abdominal wall below the umbilicus.
- **Features:**
  - Absent anterior abdominal wall below the umbilicus.
  - Absent anterior wall of urinary bladder.
  - Exposure of the trigone of the bladder and ureteric orifices.
  - Usually associated with epispadius.


Trigone
Bifid Penis
Urethra

Anomalies of the Urinary Baldder

2- Anomalies of the urachus:

SAQ

A. Urachal fistula:

- ***Cause:*** persistence of all urachus.
- ***Features:*** fistula extending from the UB to the umbilicus.

B. Urachal sinus:

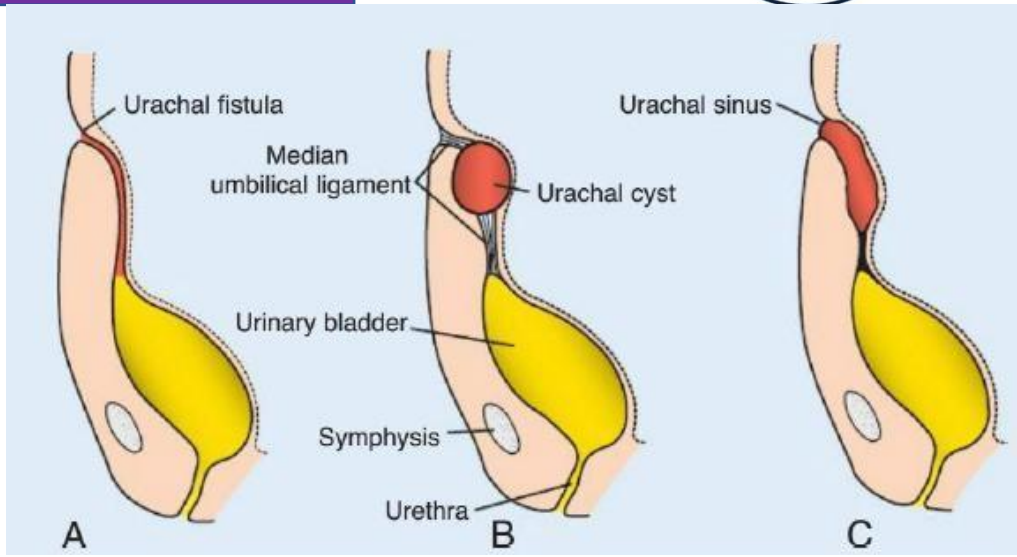
- ***Cause:*** persistence of the distal part of allantois.
- ***Features:*** sinus opening at the umbilicus. It may be infected.

C. Urachal diverticulum

- ***Cause:*** persistence of the proximal part of allantois.
- ***Features:*** a diverticulum extends from the bladder.

D. Urachal cyst:

- ***Cause:*** persistence of the middle part of allantois.
- ***Features:*** not detected unless infected.

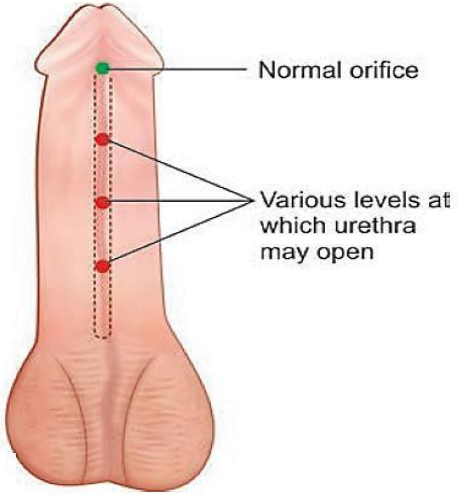


Anomalies of the Urethra

1. Hypospadius:

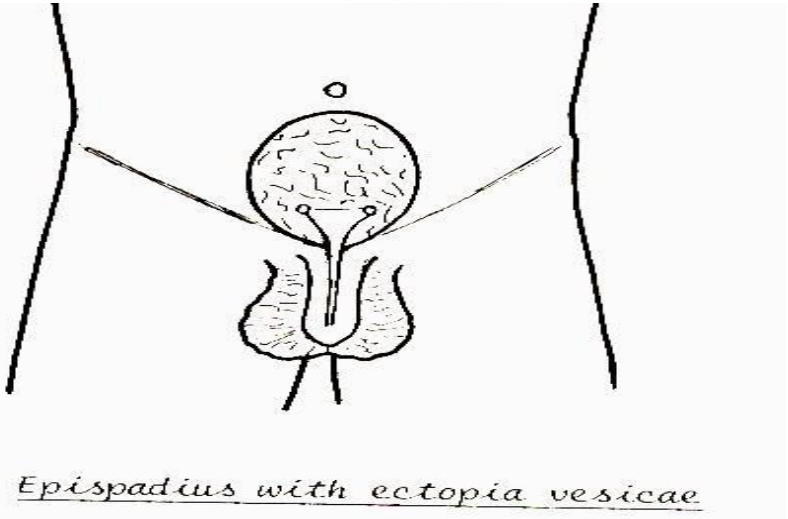
- ***Cause:*** failure of canalization of glandular part of urethra.
- ***Features:*** there are 4 types according to the site of opening of the urethra:

2. **Glandular hypospadius:** opens on the ventral surface of the glans penis.
3. **Penile hypospadius:** opens on the ventral surface of the shaft of the penis.
4. **Peno-scrotal hypospadius:** opens at the junction of the penis and scrotum.
5. **Perineal hypospadius:** opens in the perineum.



2. Epispadius:

- ***Cause:*** urethral orifice opens on the cranial aspect of the penis.
- ***Features:*** the urethra opens on the dorsum of the penis.


Epispadius with ectopia vesicae

3. Congenital urethral valve:

- ***Cause:*** incomplete canalization of the urethra.

- ***Features:*** there is partial obstruction of urine outflow.

Quiz

The urachal fistula develops because of ….

A) Persistence of the distal part of allantois.

B) Persistence of all urachus.

C) Persistence of the proximal part of allantois.

D) Persistence of the middle part of allantois.

E) Failure of mesodermal migration to the region of anterior abdominal wall

Quiz

The apex of the heart is formed by ……

A) left atrium
B) right atrium
C) left ventricle
D) right ventricle
E) both ventricles

Quiz

The right border of the heart is formed by:

A) left atrium only
B) right atrium only
C) right ventricle only
D) both ventricles
E) both atria

Quiz

What separates the rough part and the smooth part of the right atrium?

A) Musculi pectinati
B) Fossa Ovalis
C) Annulus ovalis
D) Crista Terminalis
E) Right auricle

Answer: D

Quiz

Muscles of the ventricles responsible for pumping blood are called…

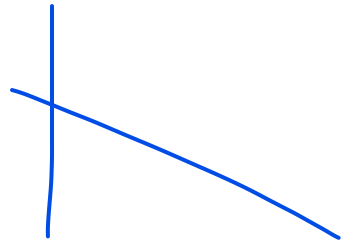
A) Musculi pectinati
B) Papillary muscles
C) Tracbeculae Carnae
D) Cordae Tendineae
E) Moderator band

Answer: C

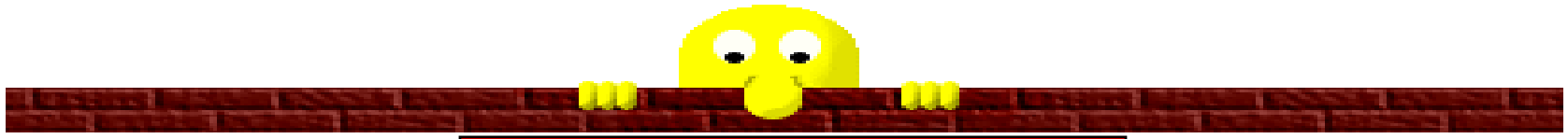
Quiz

Crescentic inferior margin of septum secundum will give ?

A) annulus ovalis.
B) Fossa ovalis .
C) ligamentum arteriosum.
D) ligamentum teres.
E) superior vena cava.



Answer: A



Quiz

Regarding fetal circulation, the majority of blood reaches IVC through:

A) Umbilical arteries.

B) Ductus arteriosus.

C) Ductus venosus.

D) SVC

E) Pulmonary veins

Answer: C

Quiz

Which aortic arch disappears completely?

A) 1st
B) 2nd
C) 3rd
D) 4th
E) 5th

Answer: E

Quiz

Which aortic arch gives rise to the common carotid artery?

A) 1st
B) 2nd
C) 3rd
D) 4th
E) 5th

Answer: C

Quiz

Which of the following nerves supplies the iliacus muscle?

a. Ilioinguinal
b. Iliohypogastric
c. Femoral
d. Sciatic

Answer: c

Quiz

Superior suprarenal artery arises from

a. Inferior phrenic artery
b. Aorta
c. Renal artery
d. Subcostal artery

Answer: a

Quiz

Middle suprarenal artery arises from

a. Inferior phrenic artery
b. Aorta
c. Renal artery
d. Subcostal artery

Answer: b

Quiz

Which organ develops in the pelvic region of the body?

A. Pronephros
B. Mesonephros
C. Metanephros
D. Heart
E. Lung buds

Answer: C

Quiz

Most primitive renal structures in humans?

A. Pronephros
B. Mesonephros
C. Metanephros
D. Ureteric bud
E. Metanephric cap

Answer: A

Quiz

Muscles of the ventricles responsible for pumping blood are called…

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D) Cordae Tendineae
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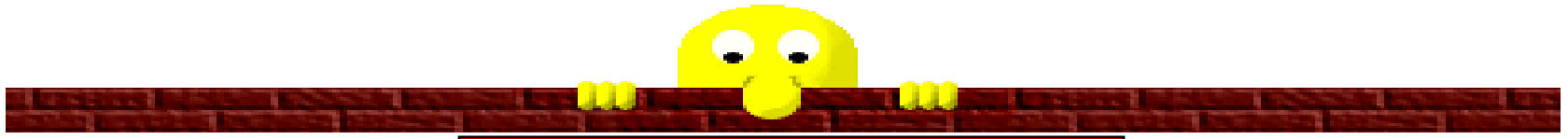

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Quiz

Which aortic arch gives rise to the common carotid artery?

A) 1st
B) 2nd
C) 3rd
D) 4th
E) 5th

Answer: C

Quiz

What is the structure lies anterior in Hilum of the kidney?

a) Renal artery .
b) Renal vein .
c) Pelvis of ureter.
d) Lymphatics .

Answer : B

Quiz

Which of the following is the correct sequence in which urine flows through the kidney toward the urinary bladder?

A. Renal pelvis, major calyx, minor calyx, papillary duct, ureter.

B. Papillary duct, minor calyx, major calyx, renal pelvis, ureter.

C. Minor calyx, major calyx, papillary duct, renal pelvis, ureter.

D. Papillary duct, major calyx, minor calyx, ureter, renal pelvis.

Answer :B

Quiz

What is the location of the kidney?

a) Located between last thoracic and 1st lumbar.
b) Located between last thoracic and 3rd lumbar.
c) Located between last thoracic and 5th lumbar.
d) Located between last thoracic and 4th lumbar.

Quiz

What is the level of origin of renal artery?

a) L1
b) L2
c) L3
d) L4
e) L5

Answer : B

Quiz

What is the length of the female urethrae?

a) 4 cm.
b) 4 inch.
c) 10.5 inch.
d) 1.5 cm

Answer : A

Quiz

Inferior suprarenal artery arises from

a. Inferior phrenic artery
b. Aorta
c. Renal artery
d. Subcostal artery

Answer: c

Quiz

middle suprarenal artery arises from

a. Inferior phrenic artery
b. Aorta
c. Renal artery
d. Subcostal artery

Answer: b

Quiz

superior suprarenal artery arises from

a. Inferior phrenic artery
b. Aorta
c. Renal artery
d. Subcostal artery

Answer: a

Quiz

- Which of the following anomalies is incompatible with life?

A) Horseshoe Kidney

B) Pelvic Kidney.

C) Bilateral agenesis

D) Supernumerary Kidney

Answer: C

Quiz

The pelvic part of the definitive urogenital sinus gives rise to……

A) penile urethra

B) membranous urethra

C) anal canal

D) urinary bladder

E) Urachus

Quiz

The trigone of the urinary bladder is derived from….

A) The proximal parts of the mesonephric ducts

B) The distal parts of the mesonephric ducts

C) The proximal part of the allantois

D) The distal part of the allantois

E) Splancnic mesoderm

SAQ

Describe Covering of the kidney

1 Fibrous capsule:

It surrounds the kidney.

2 Perinephric (Perirenal) fat:

It covers the fibrous capsule

3 Renal fascia:

A condensation of connective tissue that encloses the kidneys and suprarenal glands

4- **Paranephric (Pararenal) fat:**

it lies external to the renal fascia

SAQ

Summerize anomalies of the urachus:

A. *Urachal fistula:*
B. *Urachal sinus:*
C. *Urachal diverticulum*
D. *Urachal cyst:*


الحمد لله
Thank You
Thank You