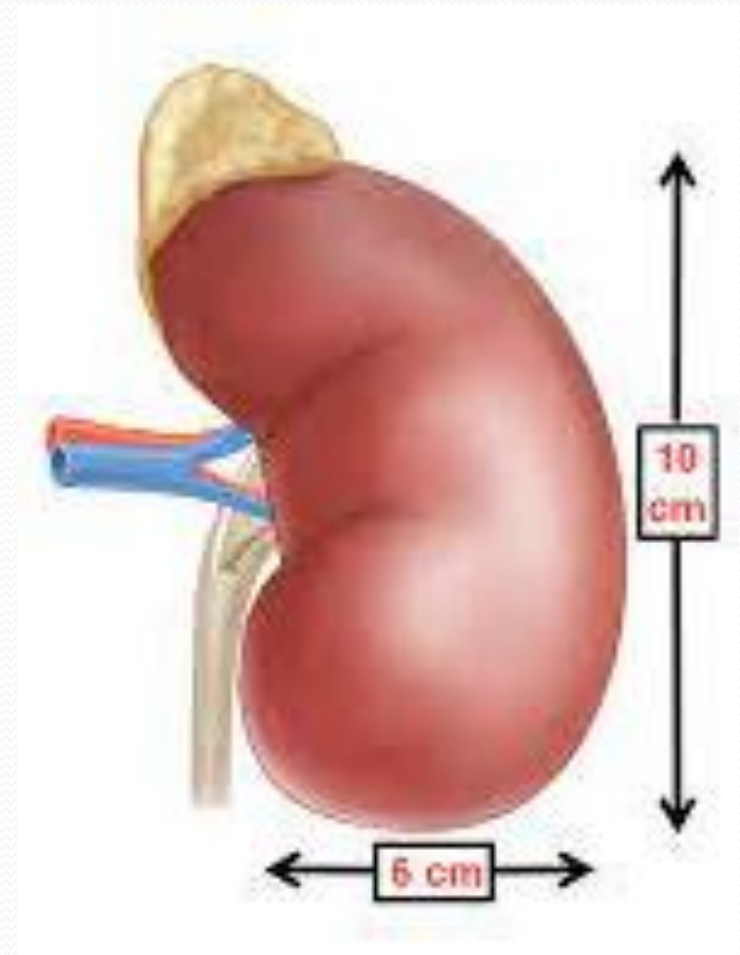


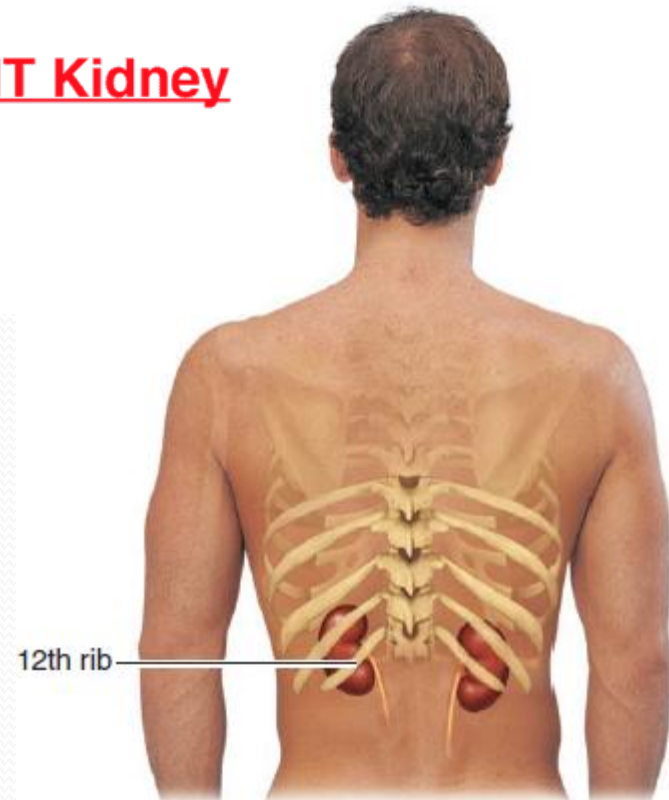
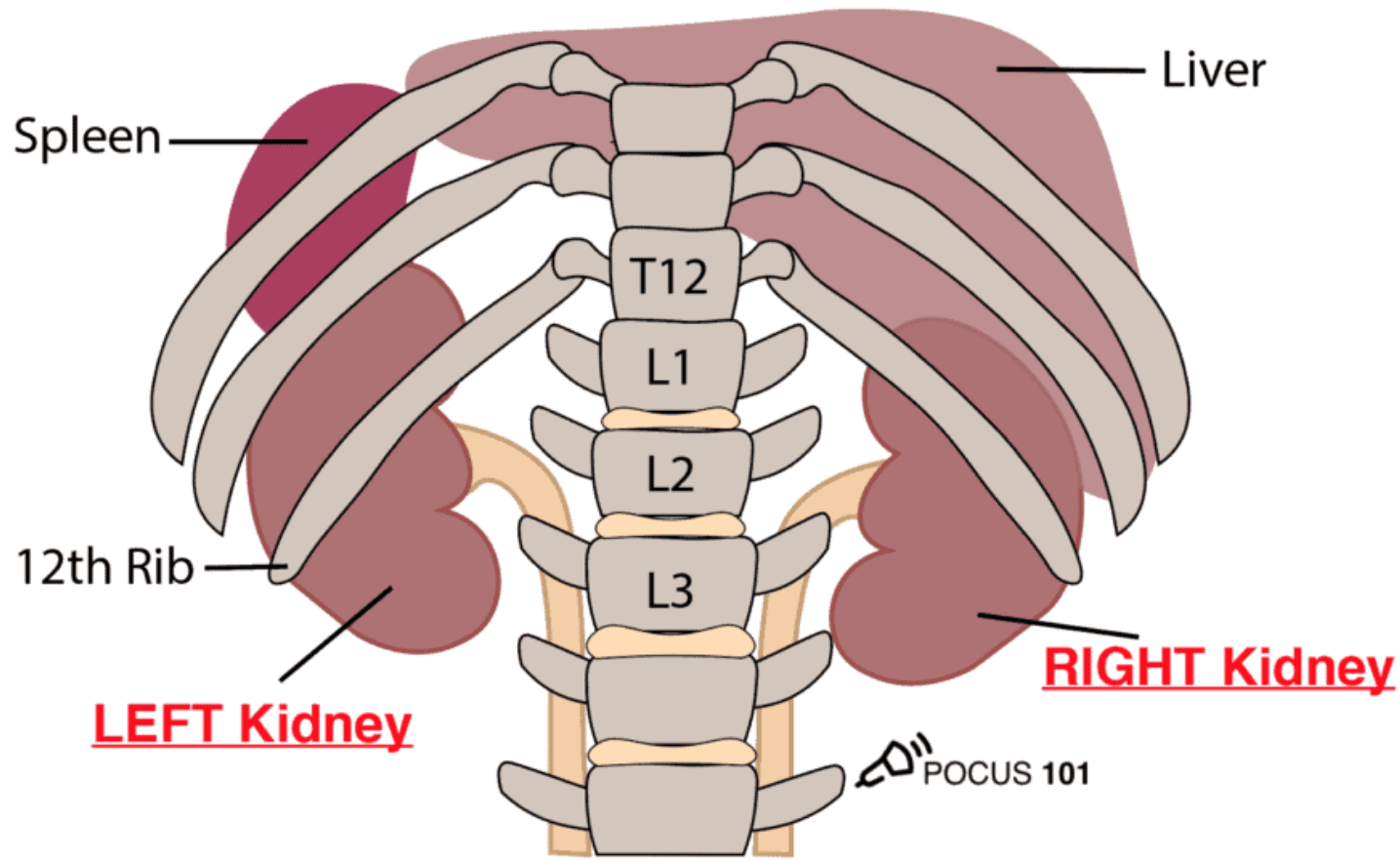
Anatomy of Renal System



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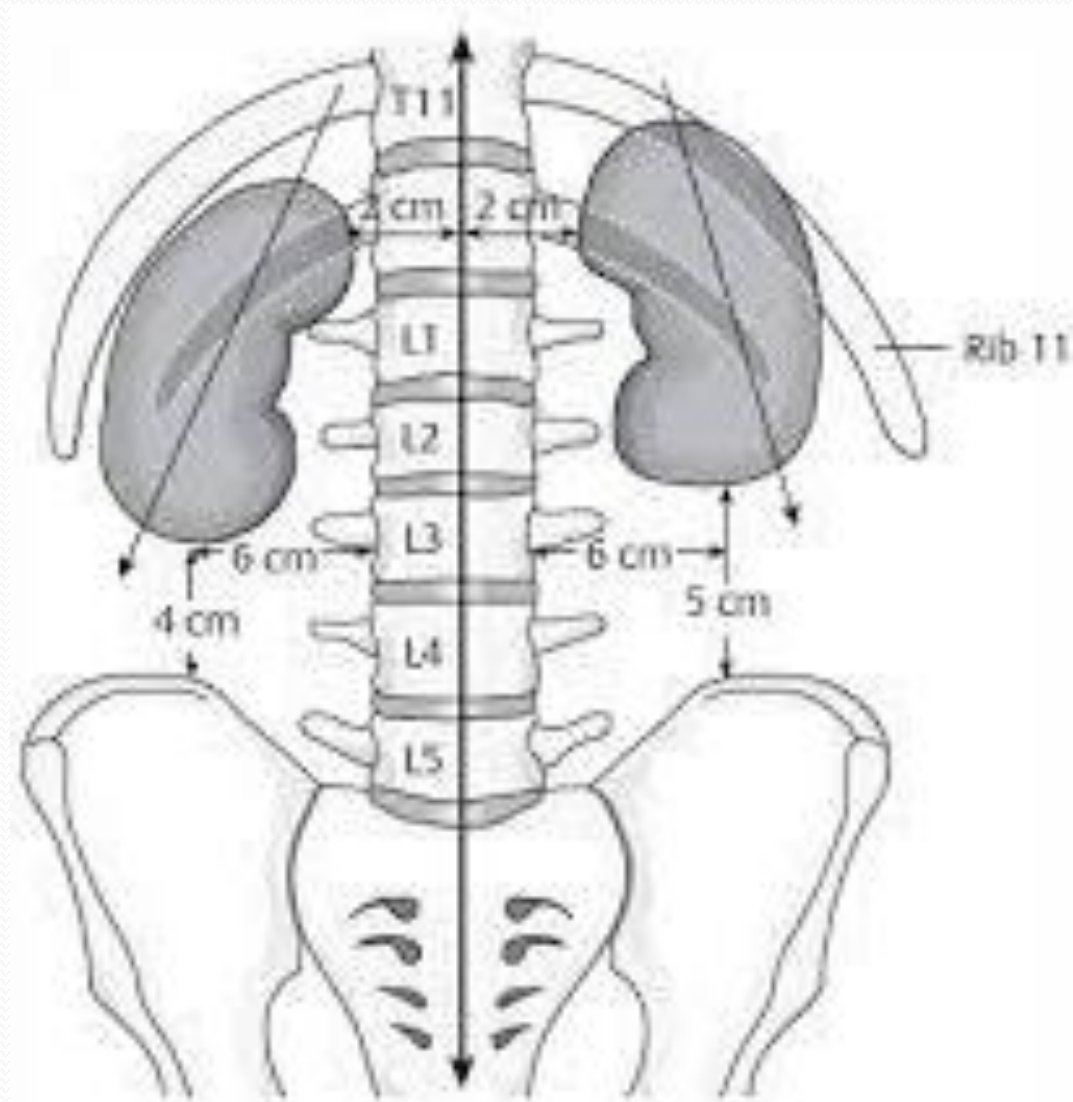
- **Size** : 12 cm long , 6 cm wide and 3 cm thickness
- **Site** : they are retroperitoneal organs , lying on the upper part of posterior abdominal wall opposite the last thoracic and upper 3 lumbar vertebrae .





- **Right** kidney is **0.5 inch** lower than **Left**:
 - Its upper end reaches the 11th intercostal space while the left kidney reaches the 11th rib.
 - Its lower end is 1.5 inches from the iliac crest, while that of the left kidney is 2 inches from the iliac crest.

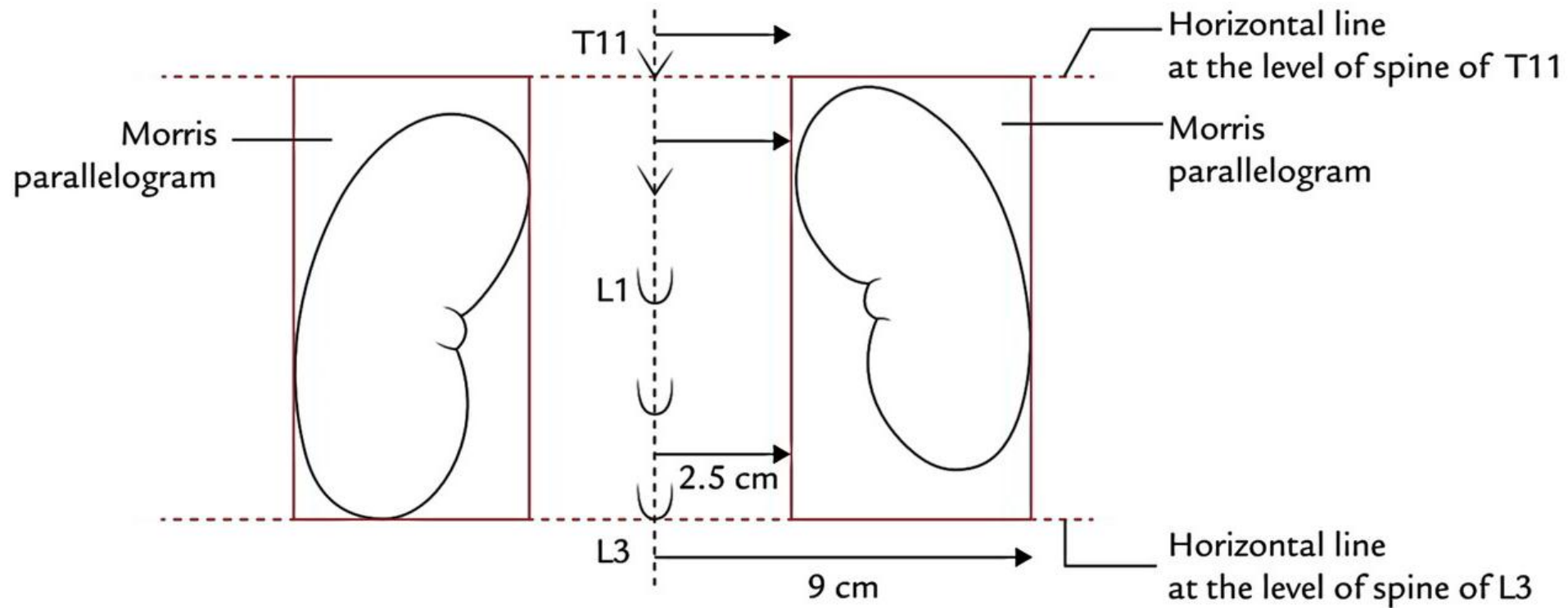
- The long axis of each kidney is directed **downwards & laterally**, so that the upper poles of the 2 kidneys are closer to the median plane than their lower poles.



Surface anatomy of the kidney

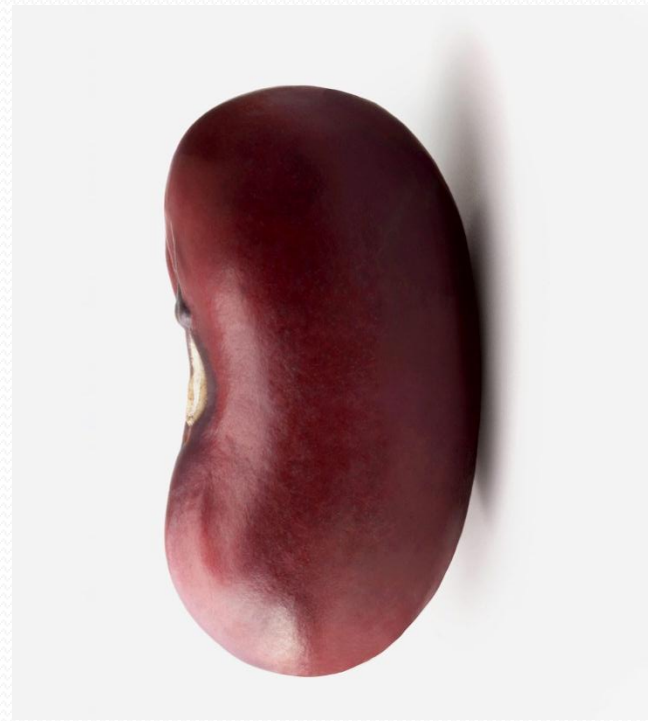
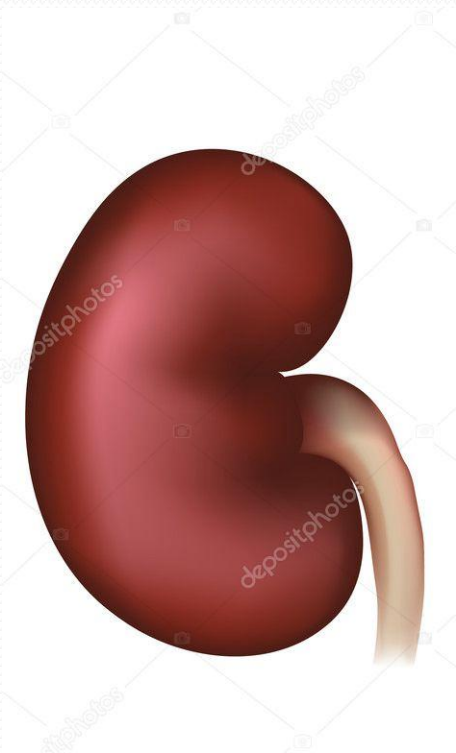
- **On the back** of the patient draw the following lines :
 - *2 vertical lines* : 1 inch & 3 inches apart from the median plane
 - *2 horizontal lines* : at the level of T11 & L 3 spines
 - The center of **the hilum** lies opposite the lower border of **L1** spine (in transpyloric plane) & 2 inch from median plane.

Morris parallelogram



General Features

The kidney is **reddish brown** bean-shaped organ having :



General Features

The kidney is **reddish brown** bean-shaped organ having :

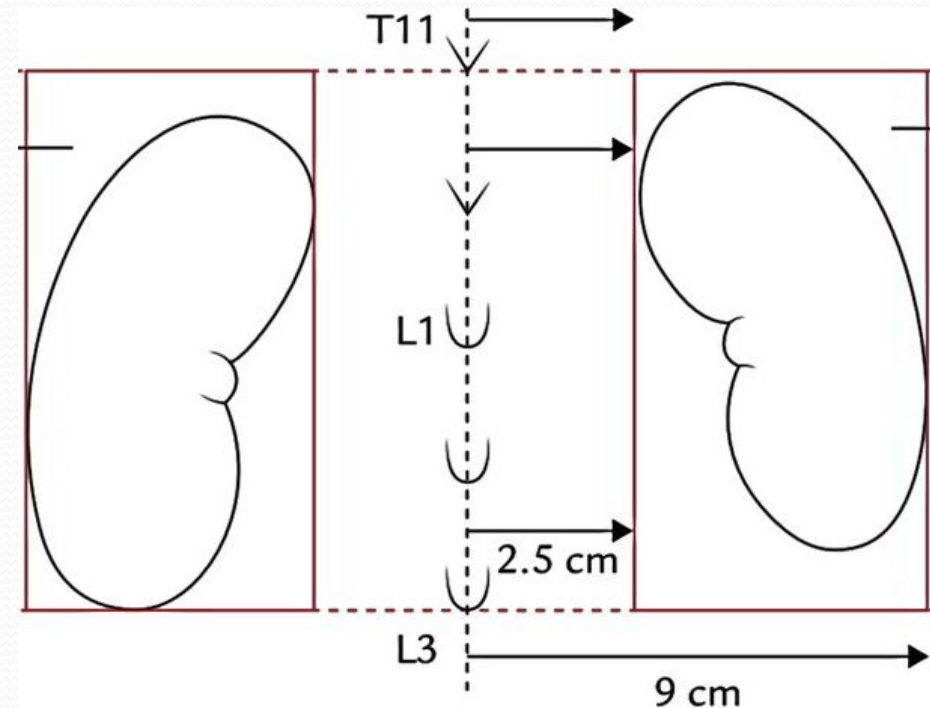
2
Ends

2
Borders

2
Surfaces

- **2 Ends**

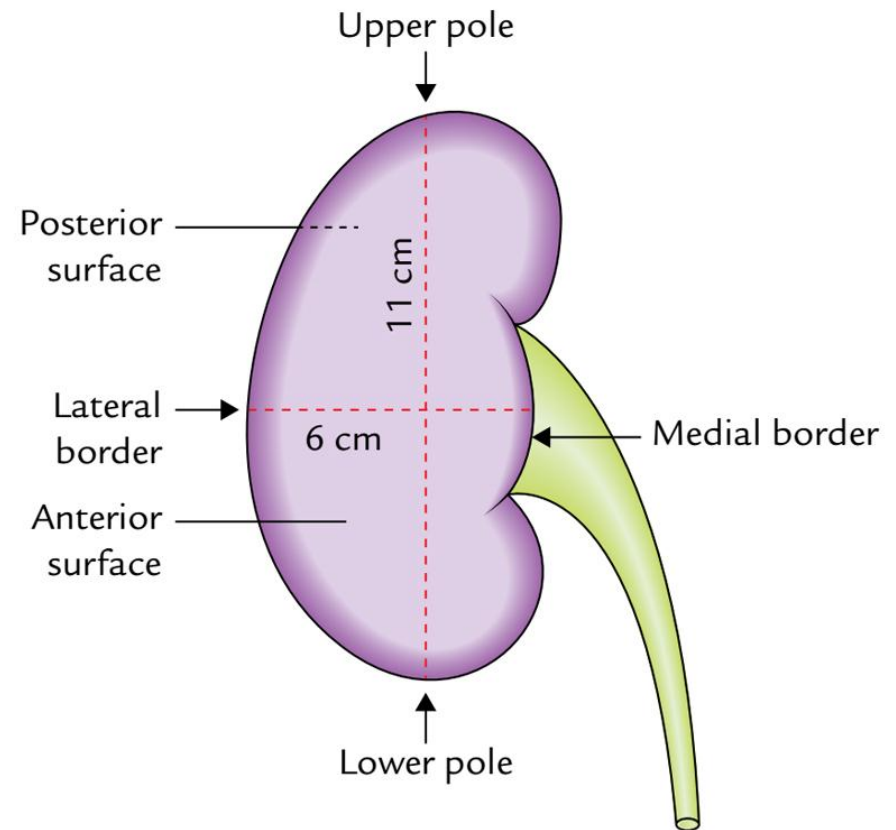
- *Upper end* : broader & 1 inch from median plane
- *Lower end* : rounded & 2 inch from median plane



- **2 Borders**

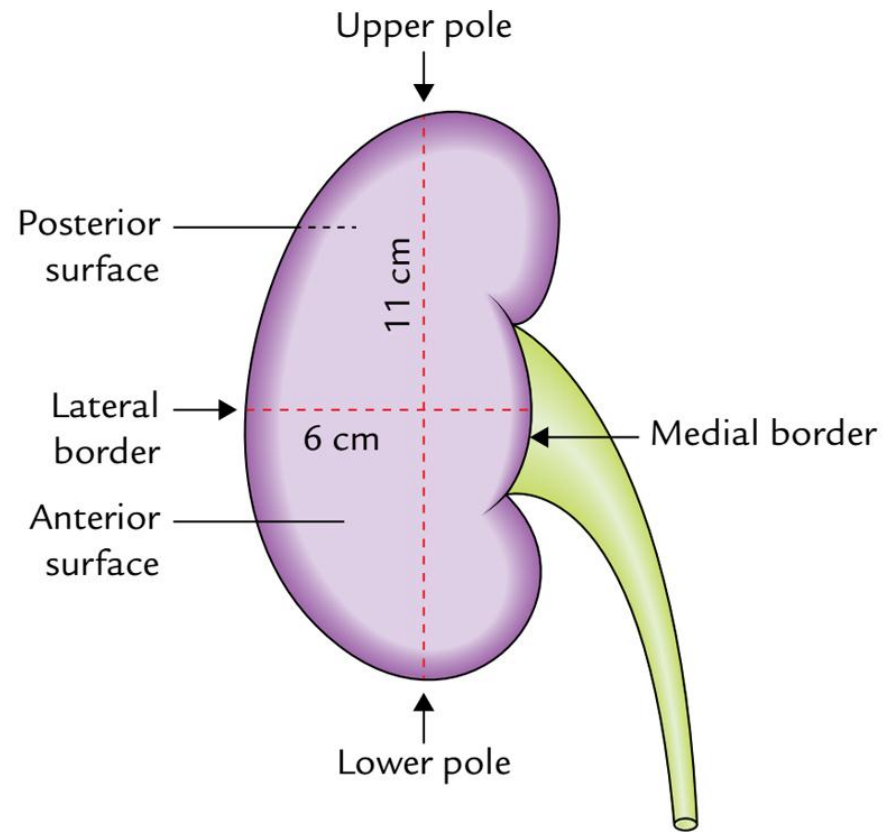
- *Medial* : concave & presenting the hilum

- *Lateral* : convex



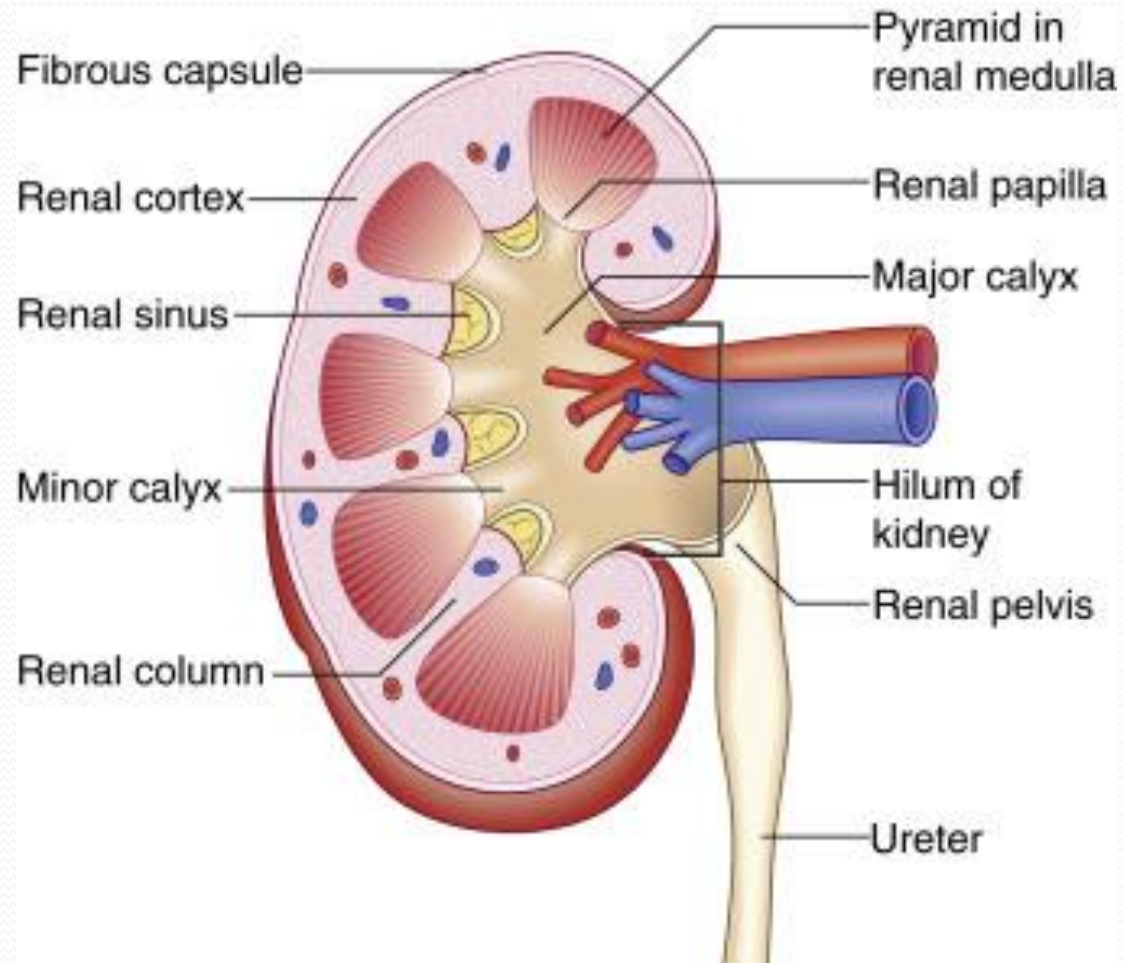
● 2 Surfaces

- *Anterior* : irregular & related to abdominal organs.
- *Posterior* : flat & applied to the posterior abdominal wall



Hilum of the Kidney

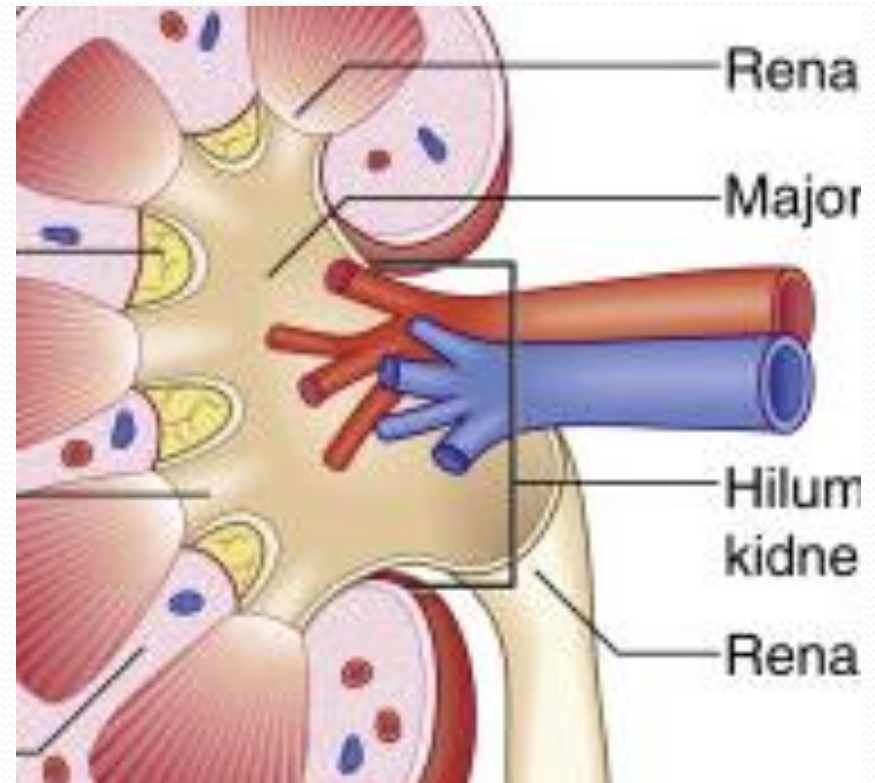
- Lies in the middle of medial border.
- It leads to a wide space inside the kidney called **renal sinus**.



Hilum of the Kidney

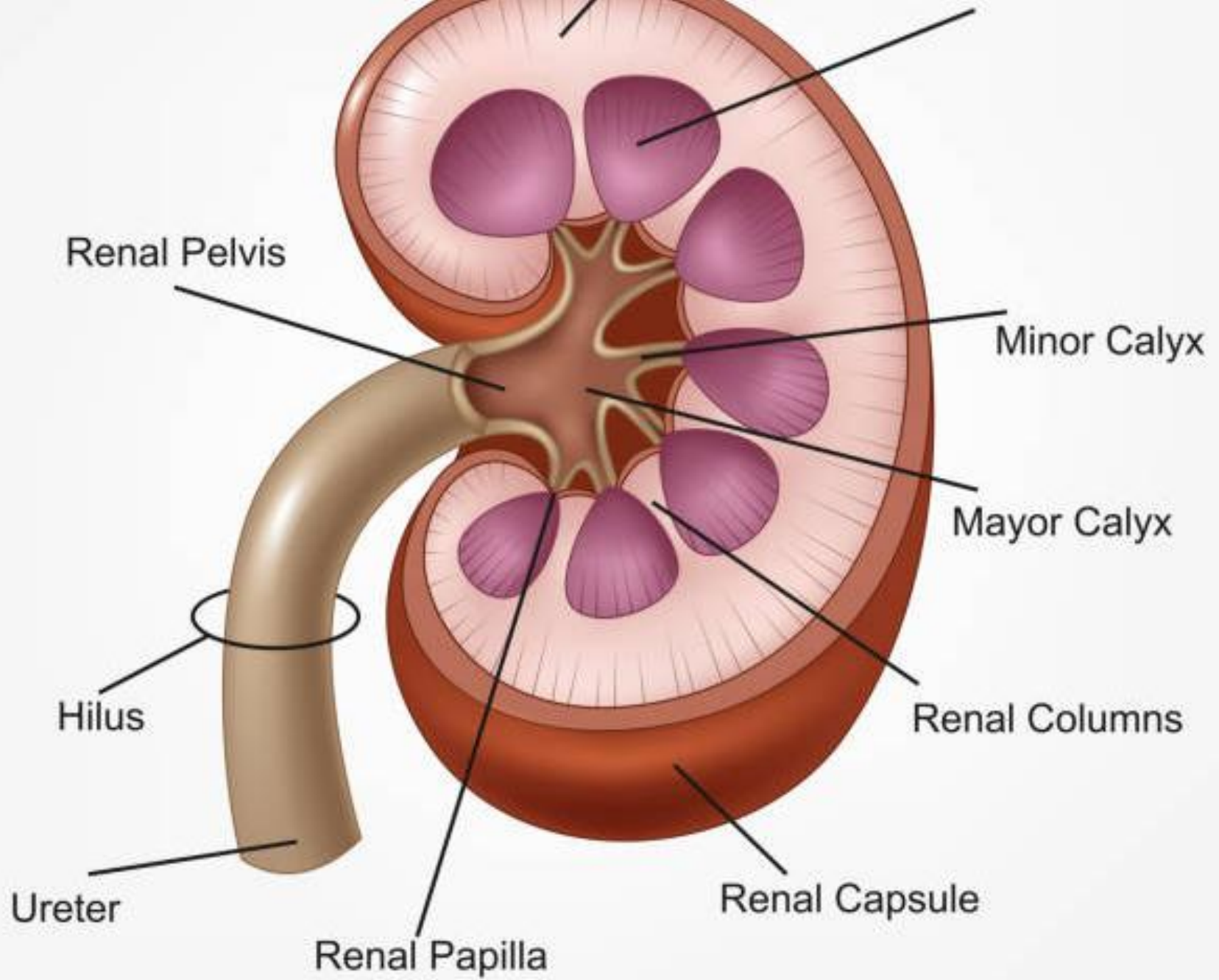
- It gives passage to the following structures :

- 1- Renal **V**ein :
most anteriorly
- 2- Renal **A**rtery :
in the middle
- 3- **P**elvis of the ureter :
most posteriorly

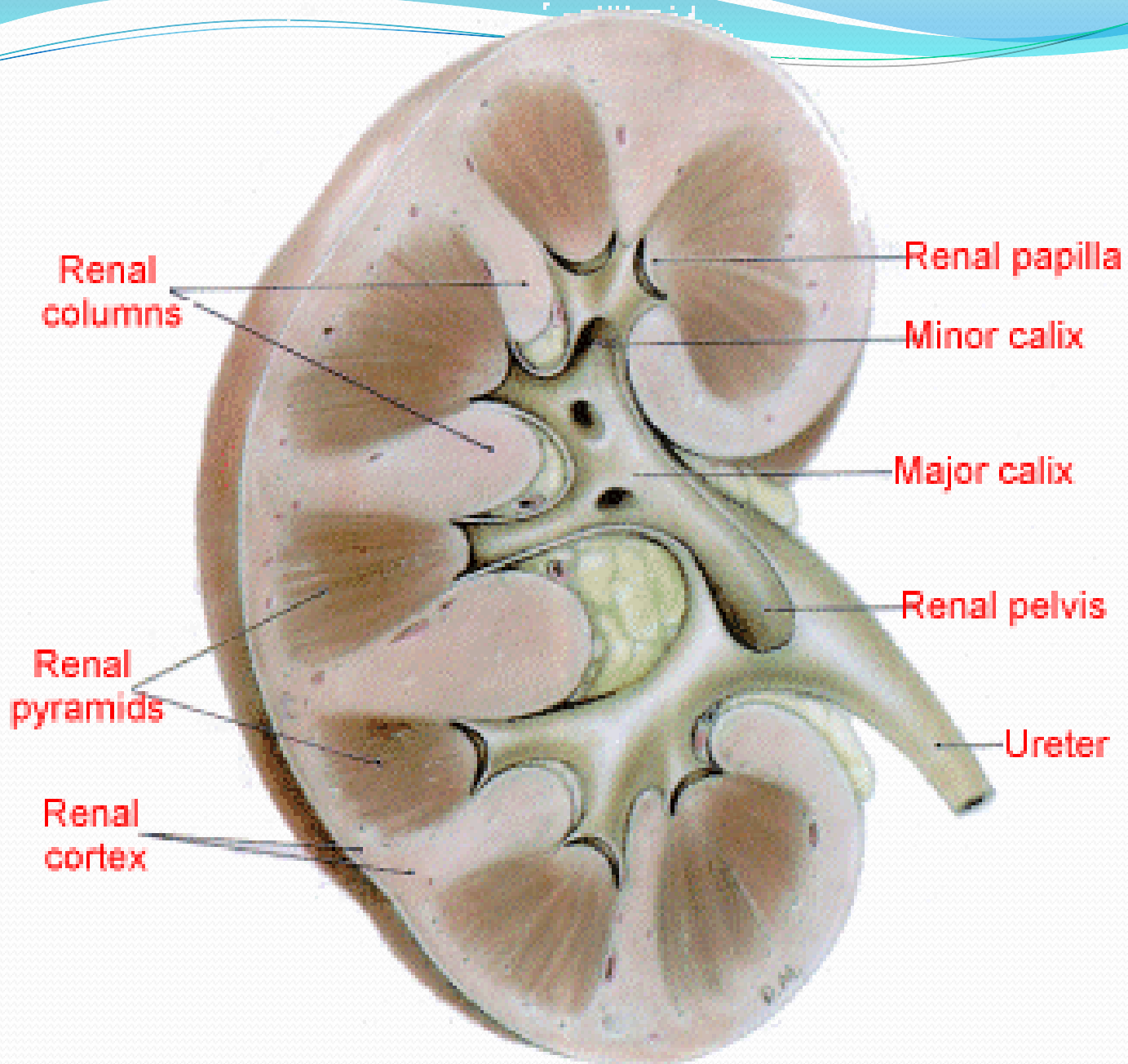


Structure of the kidney

- On sectioning, the kidney has :
 - # **Cortex** : a pale outer
 - # **Medulla** : a darker inner region.
- The medulla is divided into 8-18 conical regions, called the **renal pyramids**;
 - the base of each pyramid starts at the corticomedullary border,
 - the apex ends in **renal papilla** which merges to form **renal pelvis** and then on to form ureter.



- **The renal pelvis** is enlarged upper end of the ureter, the tube through which urine flows from the kidney to the urinary bladder.
- is shaped somewhat like a **funnel** that is curved to one side, is almost completely enclosed in the deep indentation on the concave side of the kidney, the sinus.
- It is divided into two or three spaces - the **major calyces**- which in turn divide into further **minor calyces**.



- 
- The walls of the calyces, pelvis and ureters are lined with smooth muscle that can contract to force urine towards the bladder by peristalsis.
 - The cortex and the medulla are made up of **nephrons**; these are the functional units of the kidney, and each kidney contains about 1.3 million of them.

- **How to identify the right kidney from the left kidney ?**

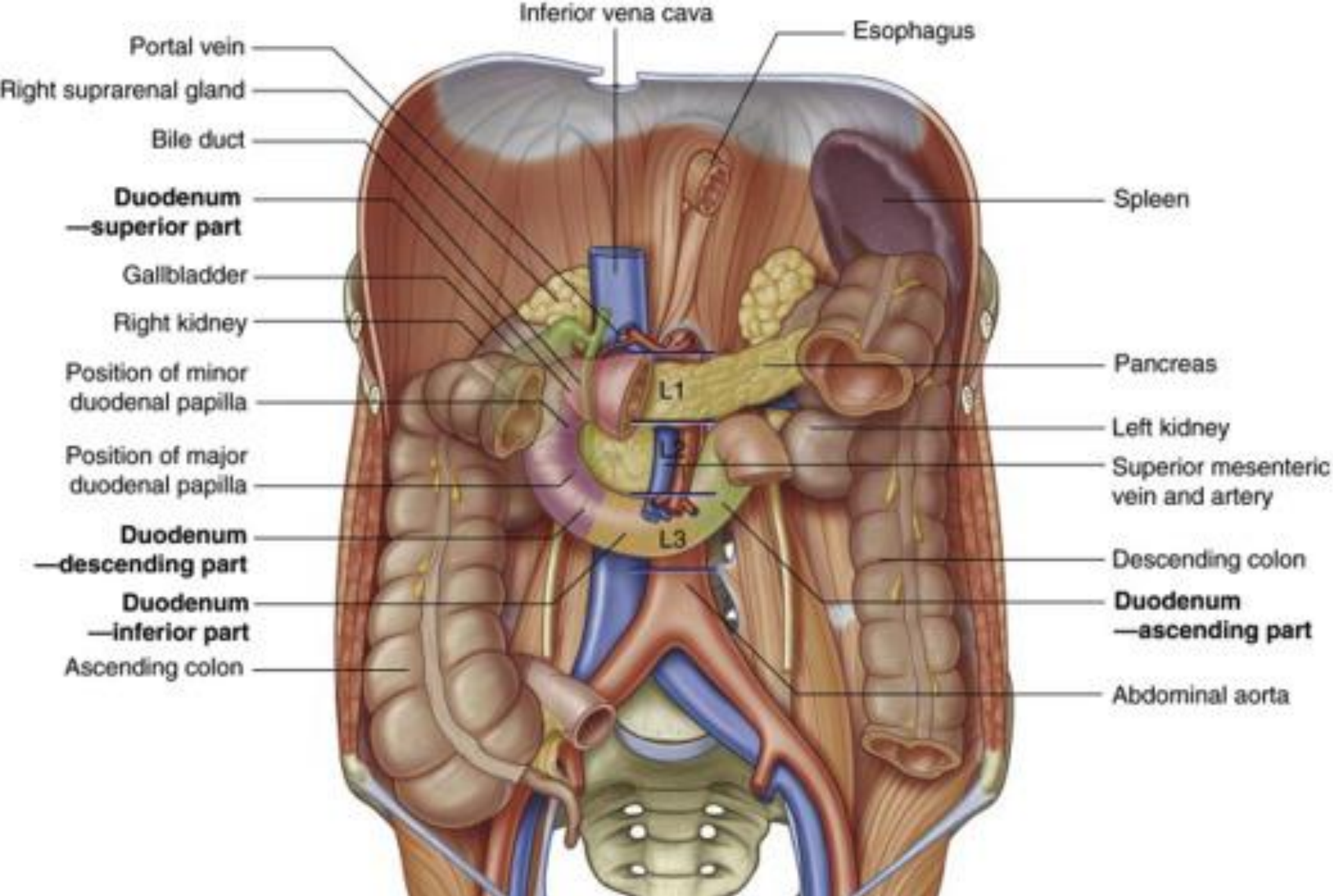
1. The medial border is identified by the hilum
2. The pelvis is the most posterior structure
3. The ureter projects downwards marking the lower pole



Relations of kidney

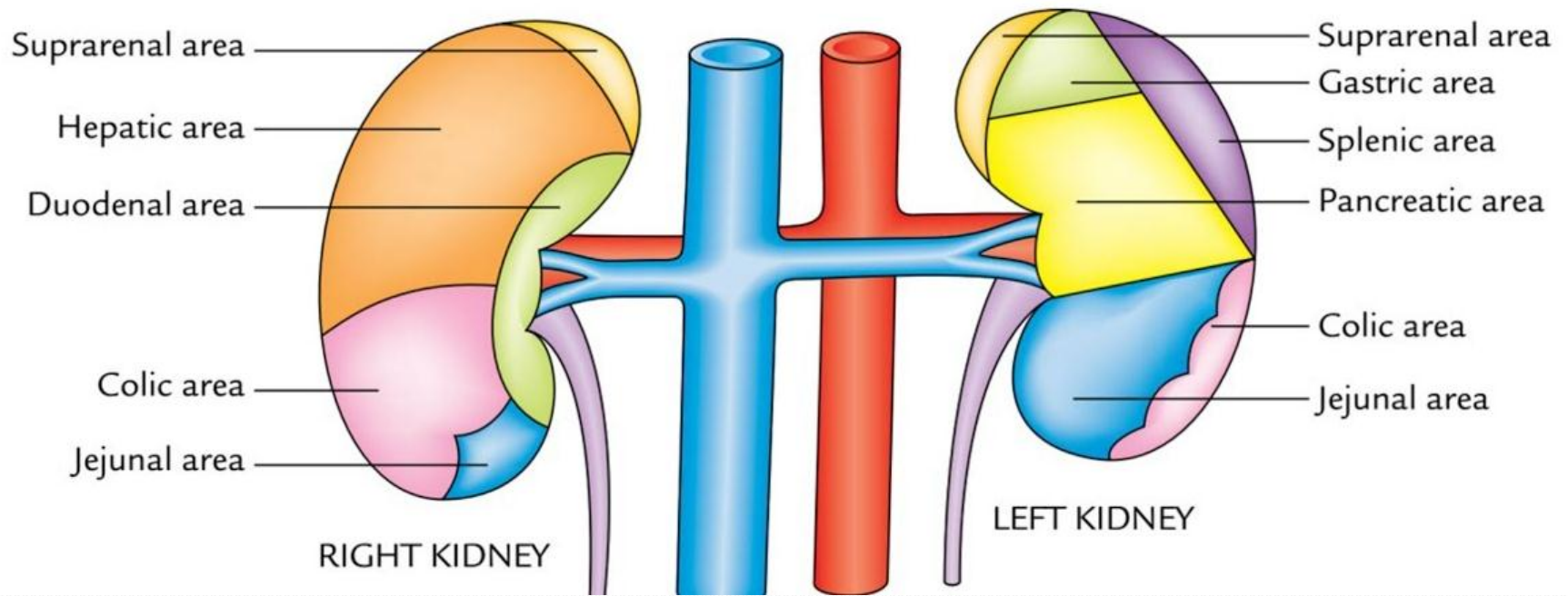
Anterior Relations of the Kidney

Right kidney	Left kidney
1. Rt <u>suprarenal</u> gland	1. Lt <u>suprarenal</u> gland
2. 2 nd part of <u>duodenum</u>	2. <u>Stomach</u>
3. Rt <u>liver</u> lobe	3. <u>Spleen</u>
4. <u>Rt colic flexure</u>	4. <u>Descending colon</u>
5. Colis of <u>Jejunum</u>	5. Colis <u>of Jejunum</u>
6. <u>Ascending branch</u> of Rt colic artery	6. <u>Ascending branch</u> of Lt colic artery
	7. Lateral part of <u>body of pancreas</u> (with splenic art. above it & splenic vein behind it)



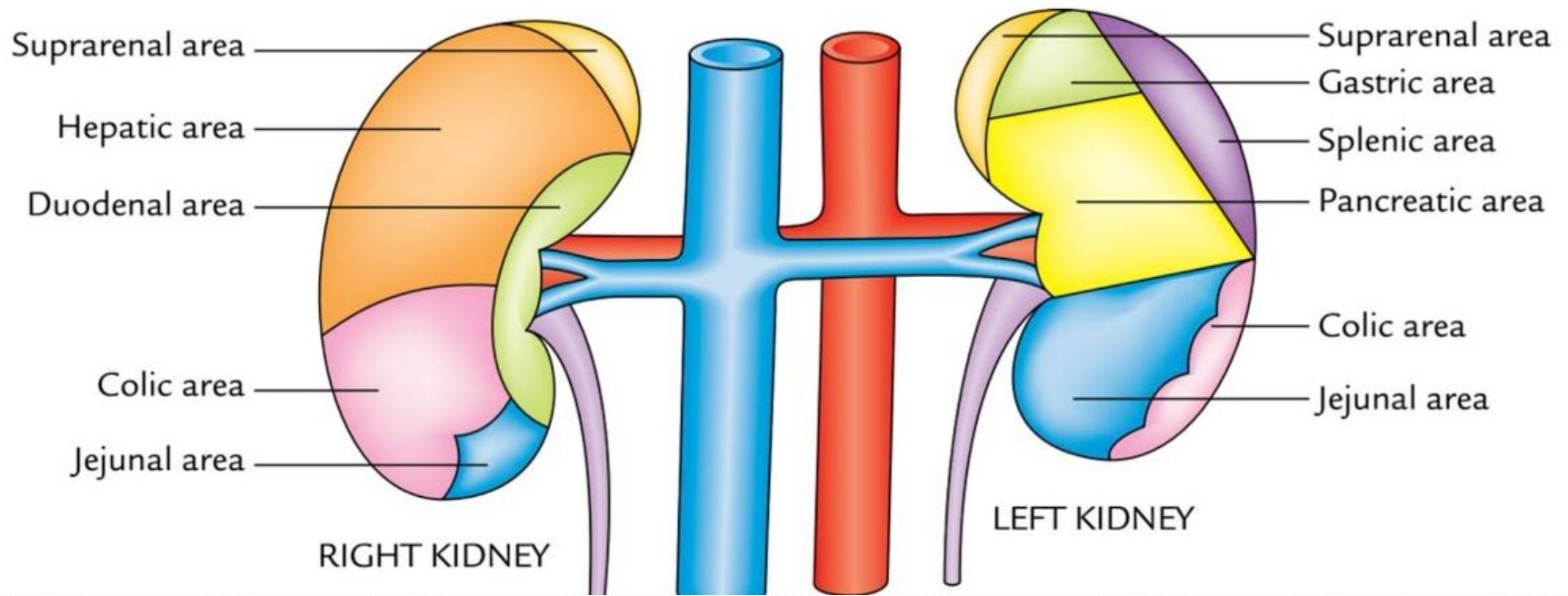
Anterior Relations of the Kidney

Right kidney	Left kidney
1. Rt <u>suprarenal</u> gland : along the anterior medial aspect of the upper pole	1. Lt <u>suprarenal</u> gland : along upper end & upper part of the medial border



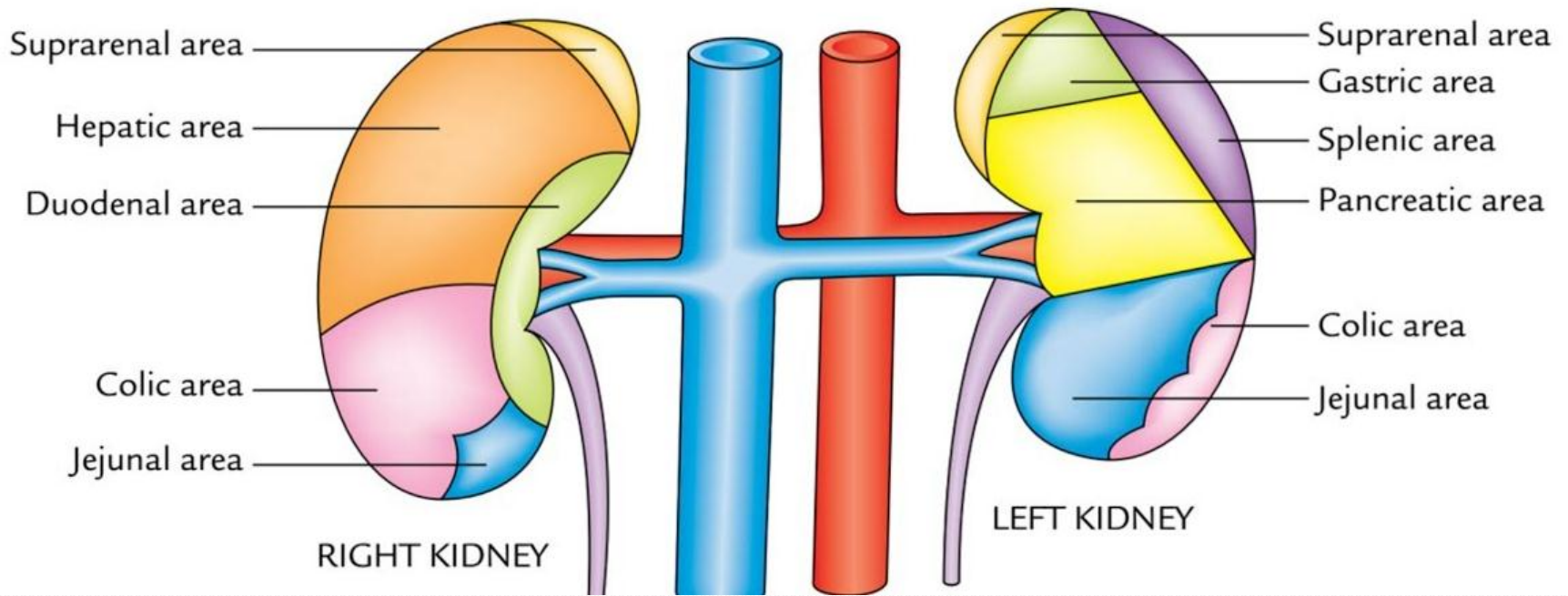
Anterior Relations of the Kidney

Right kidney	Left kidney
2. 2 nd part of <u>duodenum</u> : along the hilum & area adjoining it.	2. <u>Stomach</u> : related to triangular area in the upper part of the anterior surface



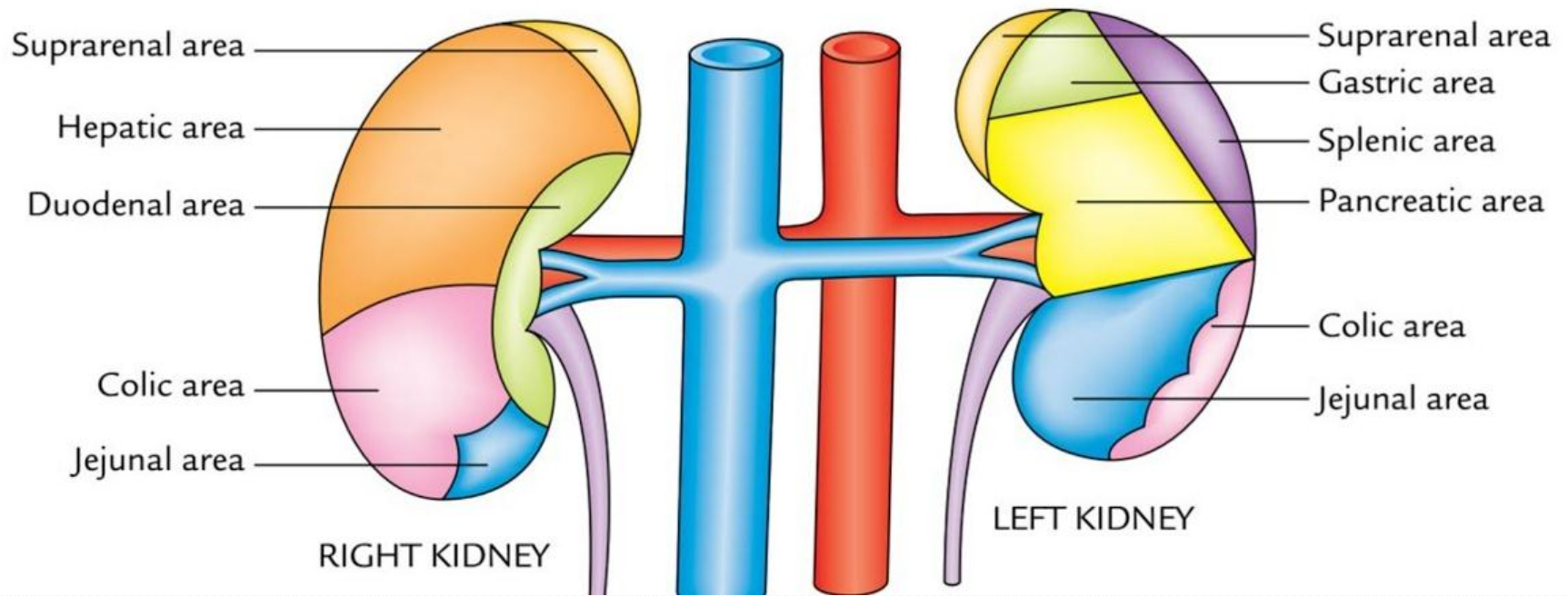
Anterior Relations of the Kidney

Right kidney	Left kidney
3. Rt <u>liver</u> lobe : related to the area between suprarenal, duodenum & colic areas.	3. <u>Spleen</u> : related to upper 2/3 of lateral part of anterior surface



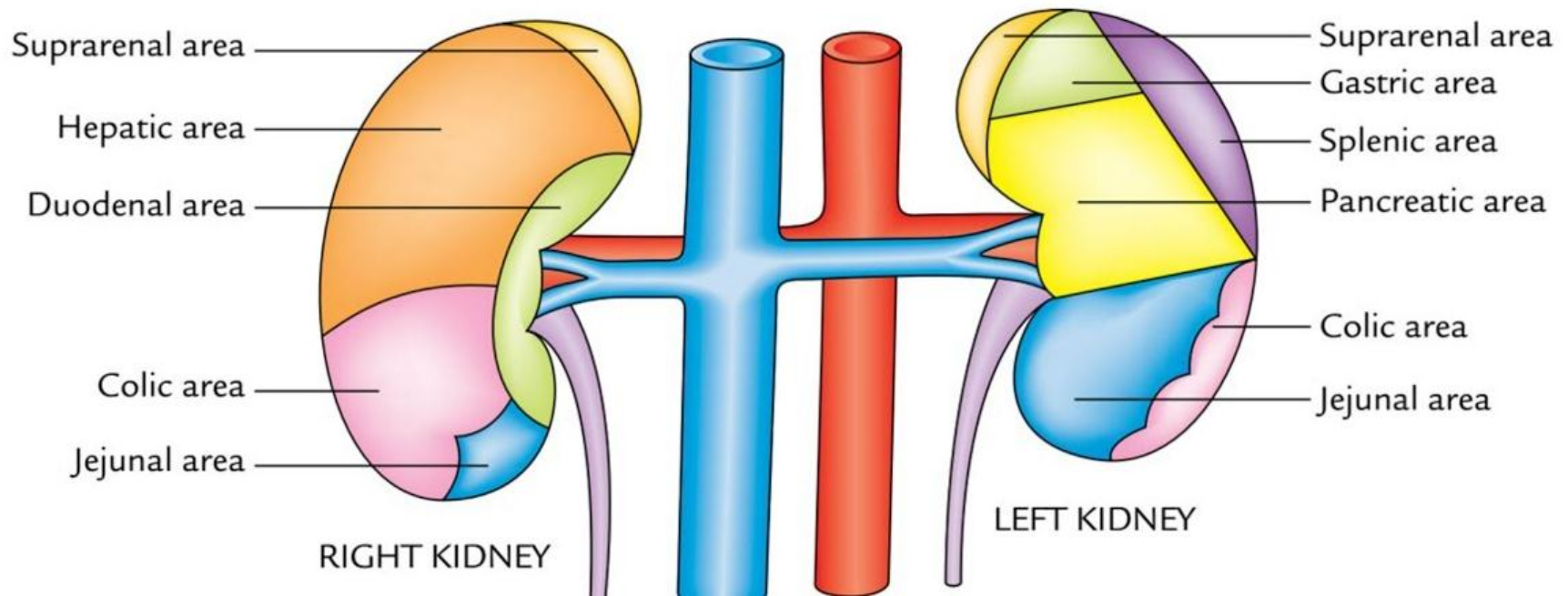
Anterior Relations of the Kidney

Right kidney	Left kidney
4. <u>Rt colic flexure</u> : in front of lateral part of lower 1/3 of anterior surface.	4. <u>Descending colon</u> : in front of lower 1/3 of lateral part of anterior surface.



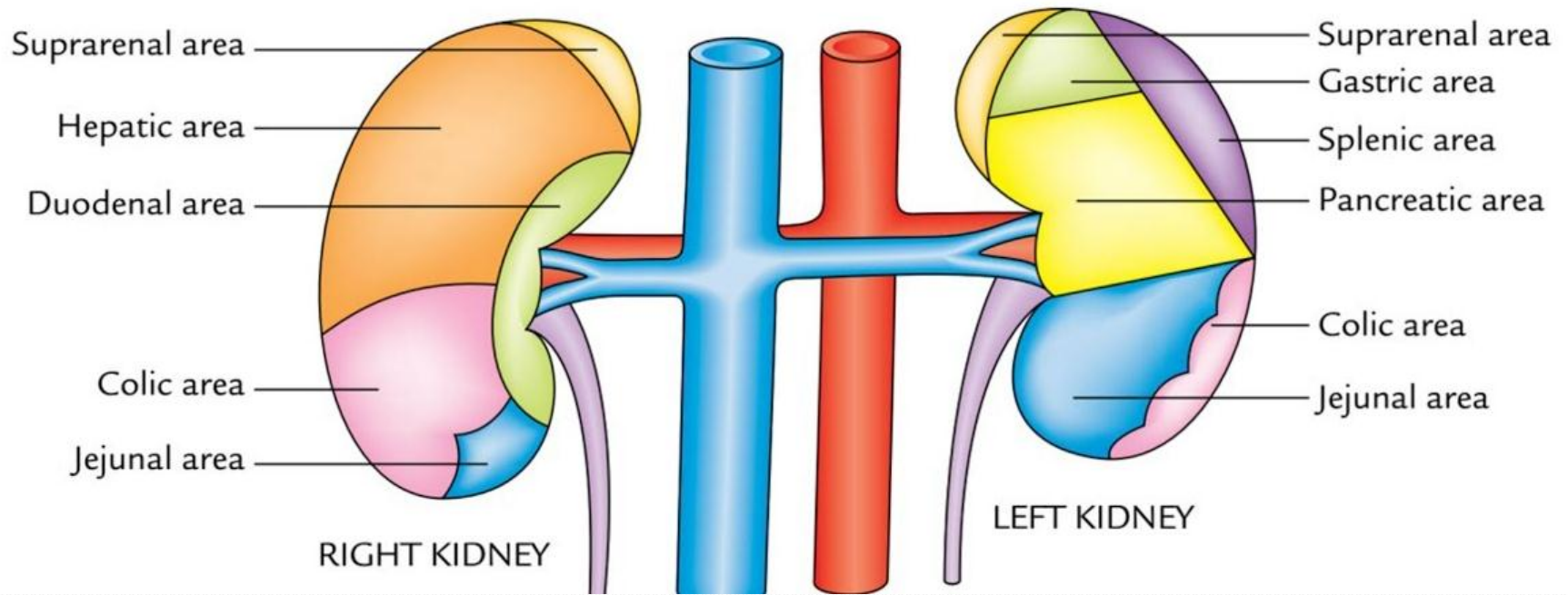
Anterior Relations of the Kidney

Right kidney	Left kidney
5. Colis of <u>Jejunum</u> : infront of lower medial part.	5. Colis <u>of Jejunum</u> : infront of lower medial part.



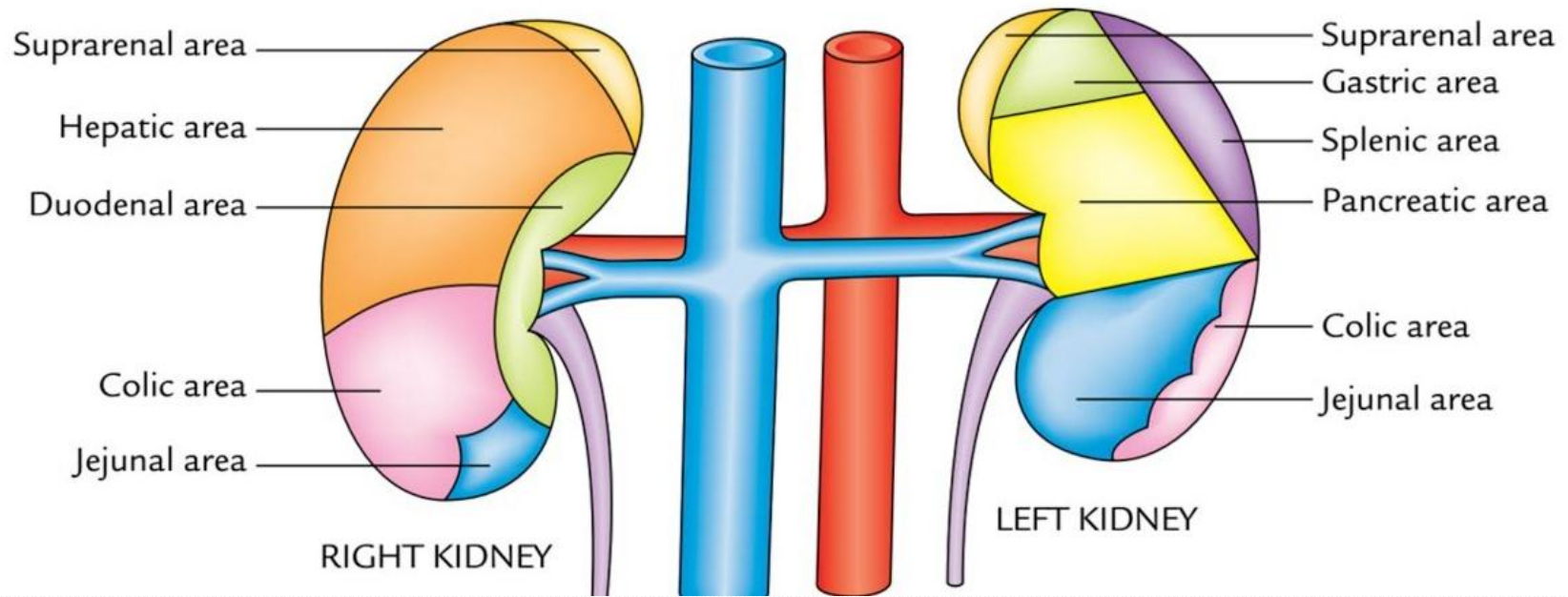
Anterior Relations of the Kidney

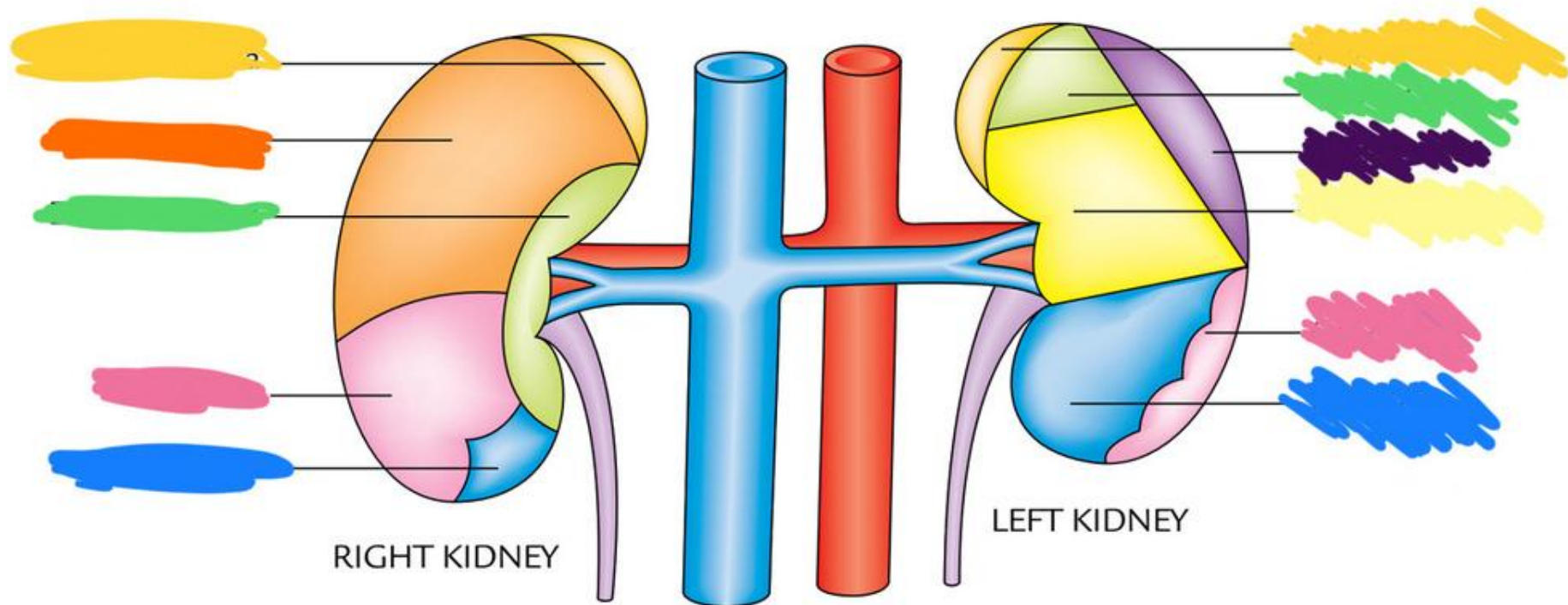
Right kidney	Left kidney
6. <u>Ascending branch</u> of Rt colic artery : infront of lower end	6. <u>Ascending branch</u> of Lt colic artery : infront of lower end



Anterior Relations of the Kidney

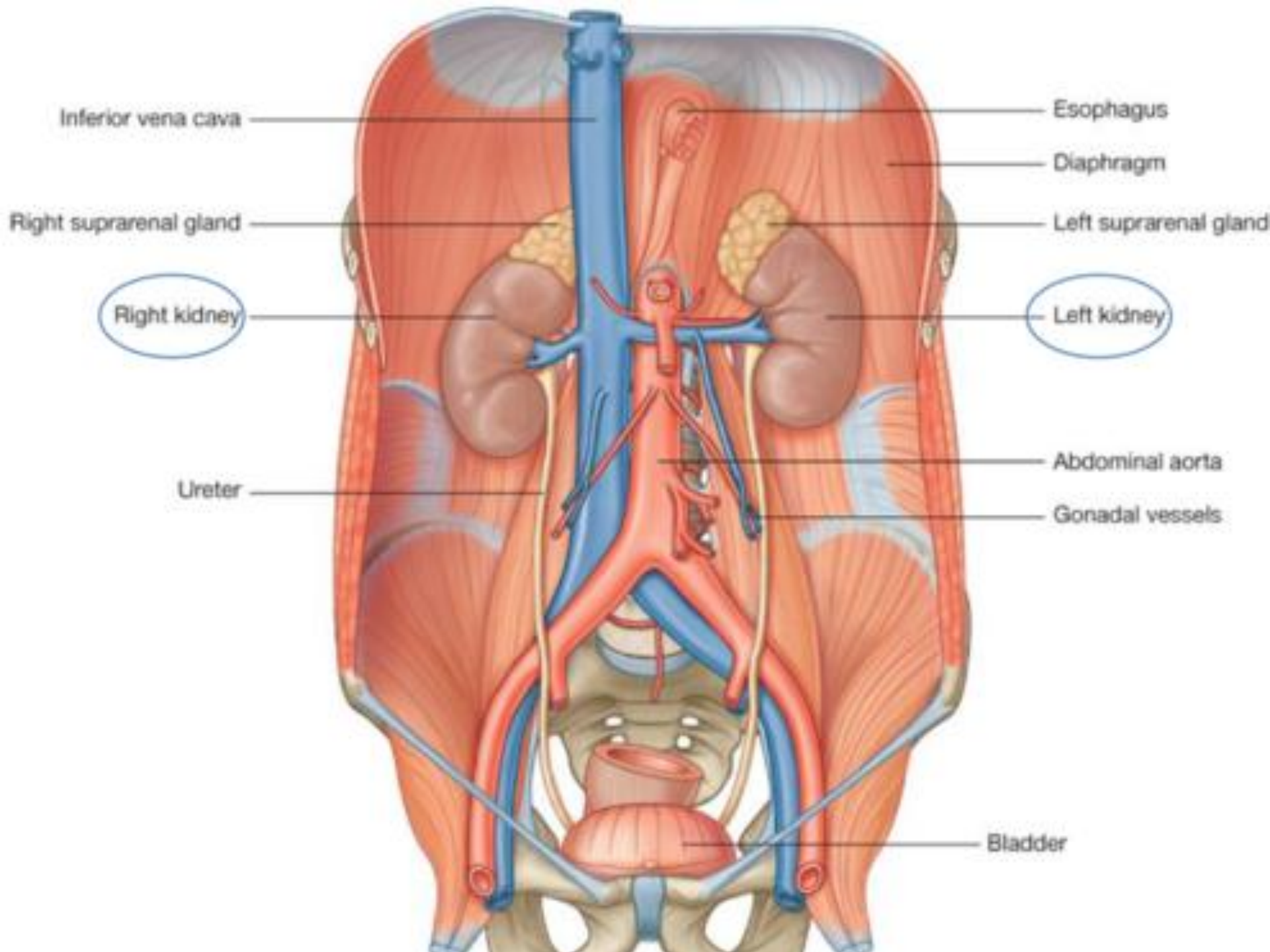
Right kidney	Left kidney
	7. Lateral part of <u>body of pancreas</u> (with splenic art. above it & splenic vein behind it) : in front of middle part of anterior surface





Posterior Relations of the Kidney

- The posterior relations of 2 kidney are **similar** & include :
 - >> 4 muscles
 - >> 4 neurovascular structures



(A) The 4 muscles : (D.P.Q.T)

1- Diaphragm “& med. + lat. Arcuate ligaments”

behind the upper part of kidney.

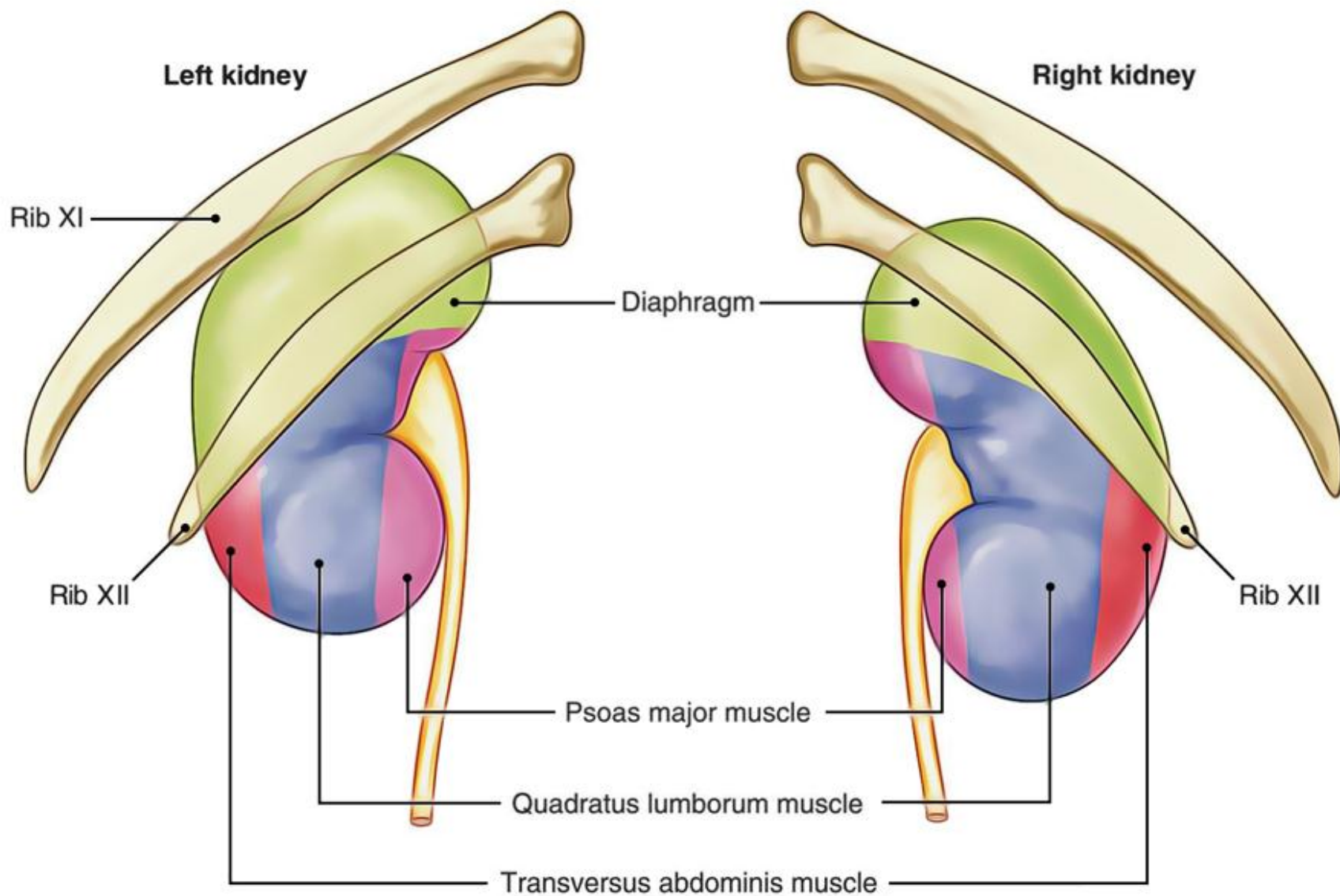
The diaphragm separates the kidney from costo-diaphragmatic recess of pleura & ribs 11 & 12 (on Lt side) or rib 12 (on Rt side).



2- *Psoas major (& minor if present)* : behind medial border & hilum of the kidney

3- *Quadratus lumborum muscle* : behind intermediate vertical part of posterior surface.

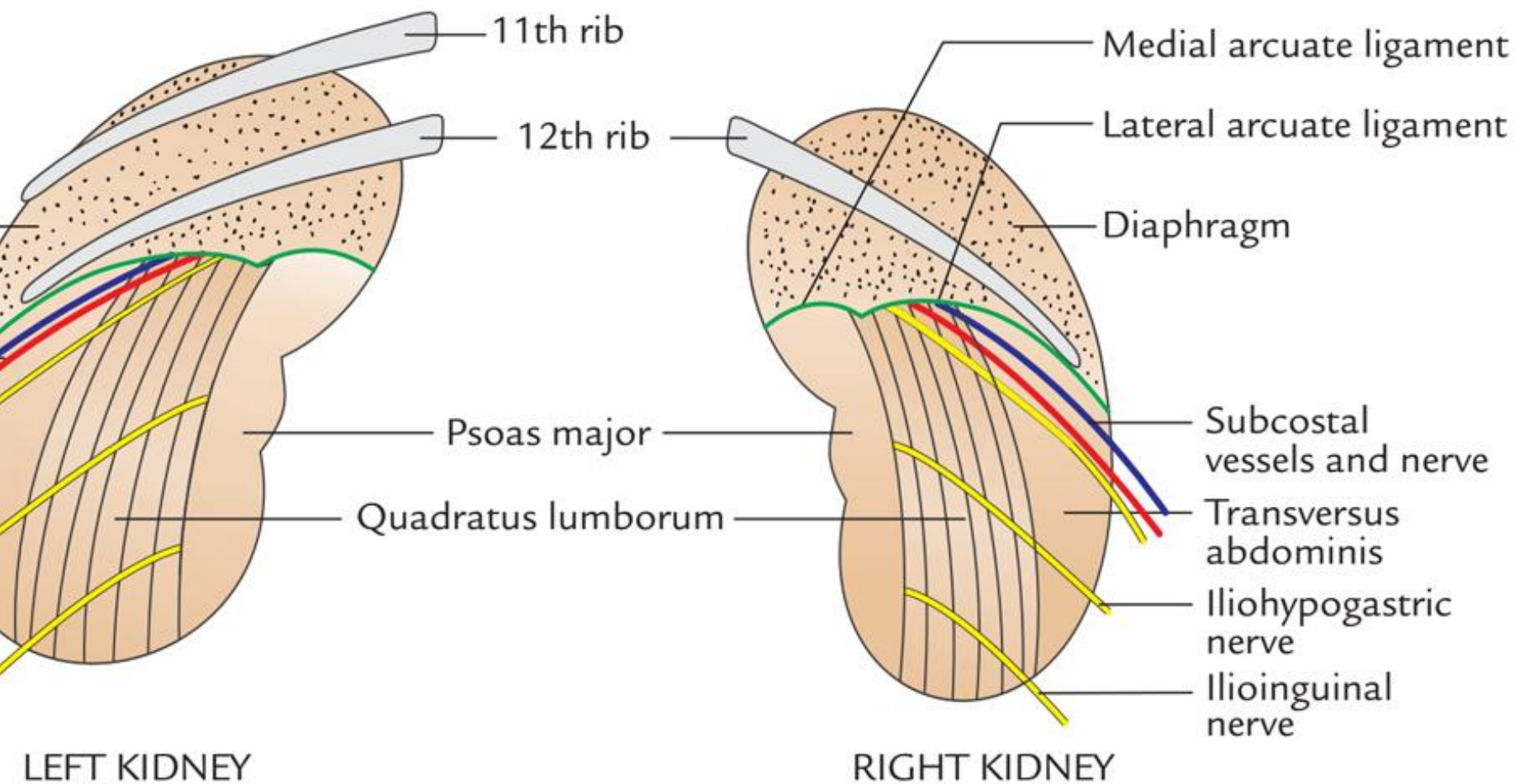
4. *Transversus abdominus muscle*: behind a vertical strip close to the lateral border of kidney



The 4 neurovascular structures :

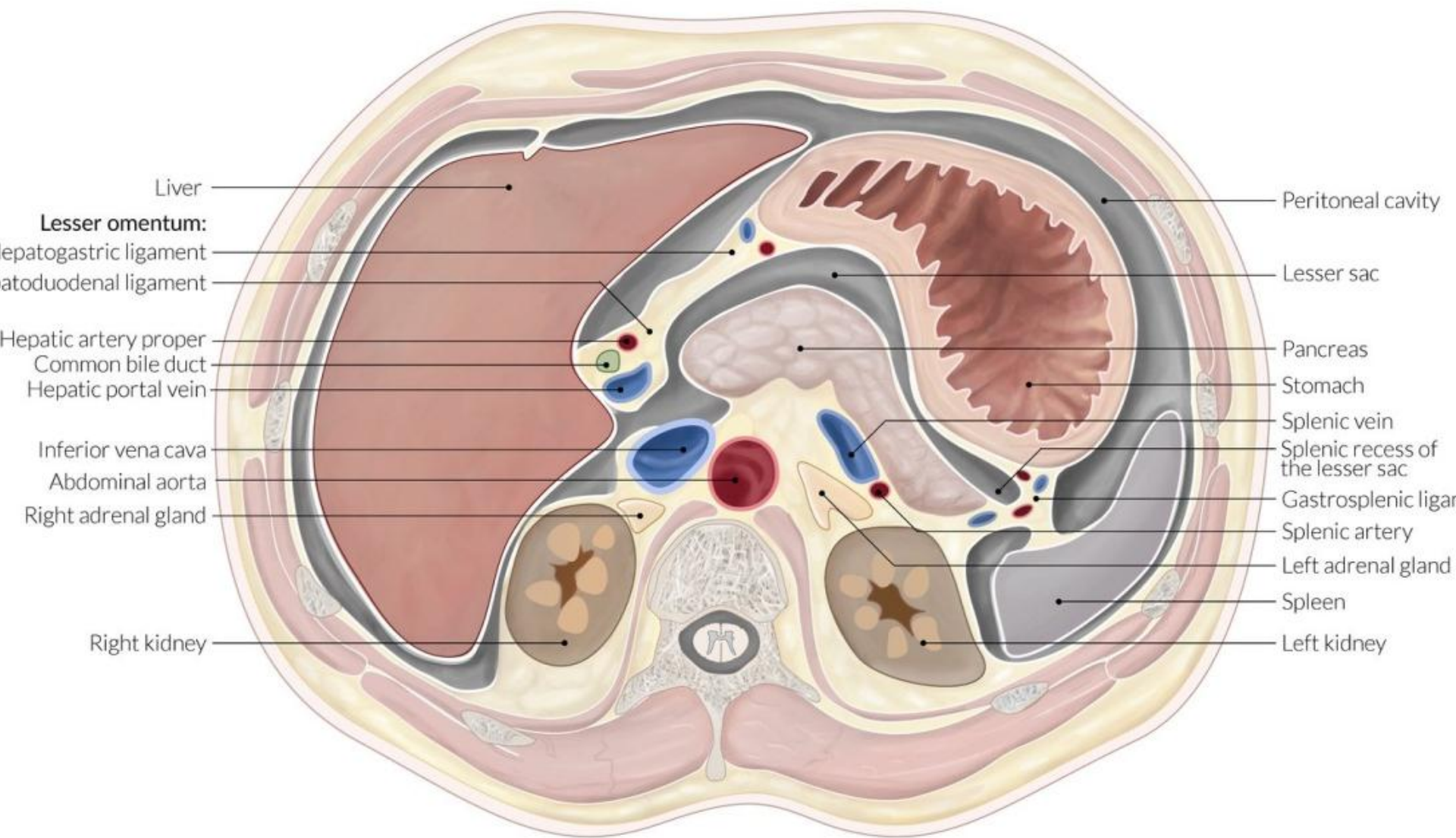
- 1- subcostal vessels
- 2- subcostal nerve
- 3- iliohypogastric nerve
- 4- ilioinguinal nerve

They intervene between the kidney and quadratus lumborum and transversus abdominus.



Peritoneal covering Kidneys

Right Kidney	Left Kidney
The anterior surface is covered by peritoneum only in areas related to: 1. Liver 2. Small intestine	The anterior surface is covered by peritoneum only in areas related to : 1. Spleen 2. Stomach 3. Small intestine
The other areas of the anterior surfaces are devoid of peritoneal covering	



Capsule of Kidney

(1) Fibrous capsule :

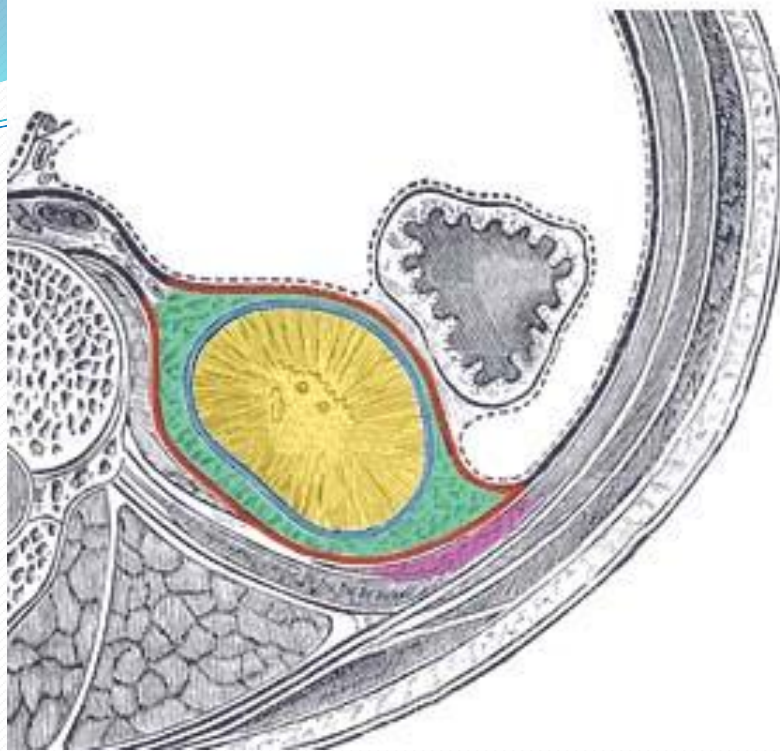
Is the inner true capsule that invests the kidney & extends to the renal sinus .

(2) Fatty capsule (peri-renal fat) :

Surrounds the kidney & suprarenal gland. Rapid depletions of this fat leads to drop of kidney.

(3) Fascial capsule (renal fascia)

It is derived from the *fascia transversalis* which divides at the lateral border of the kidney into :

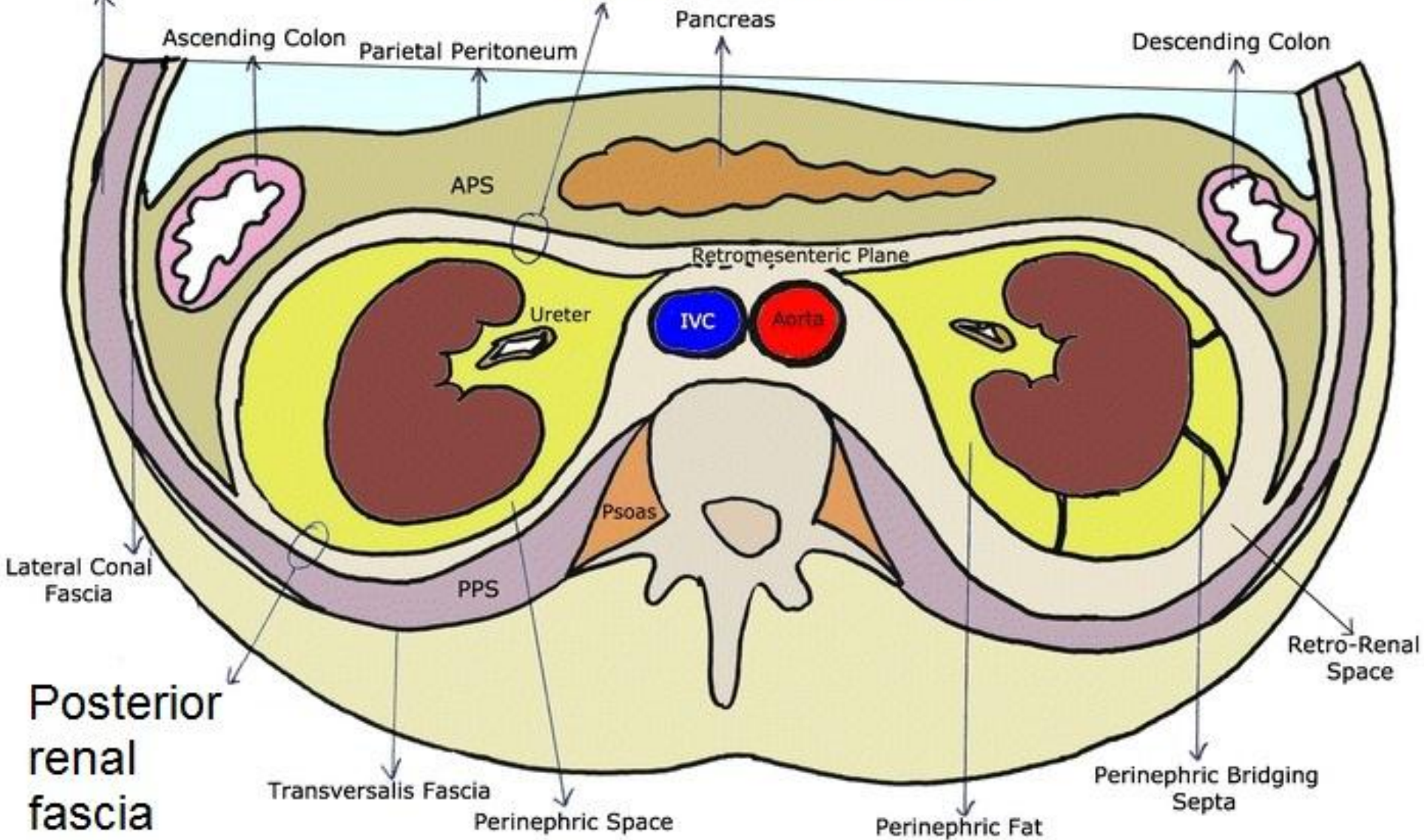


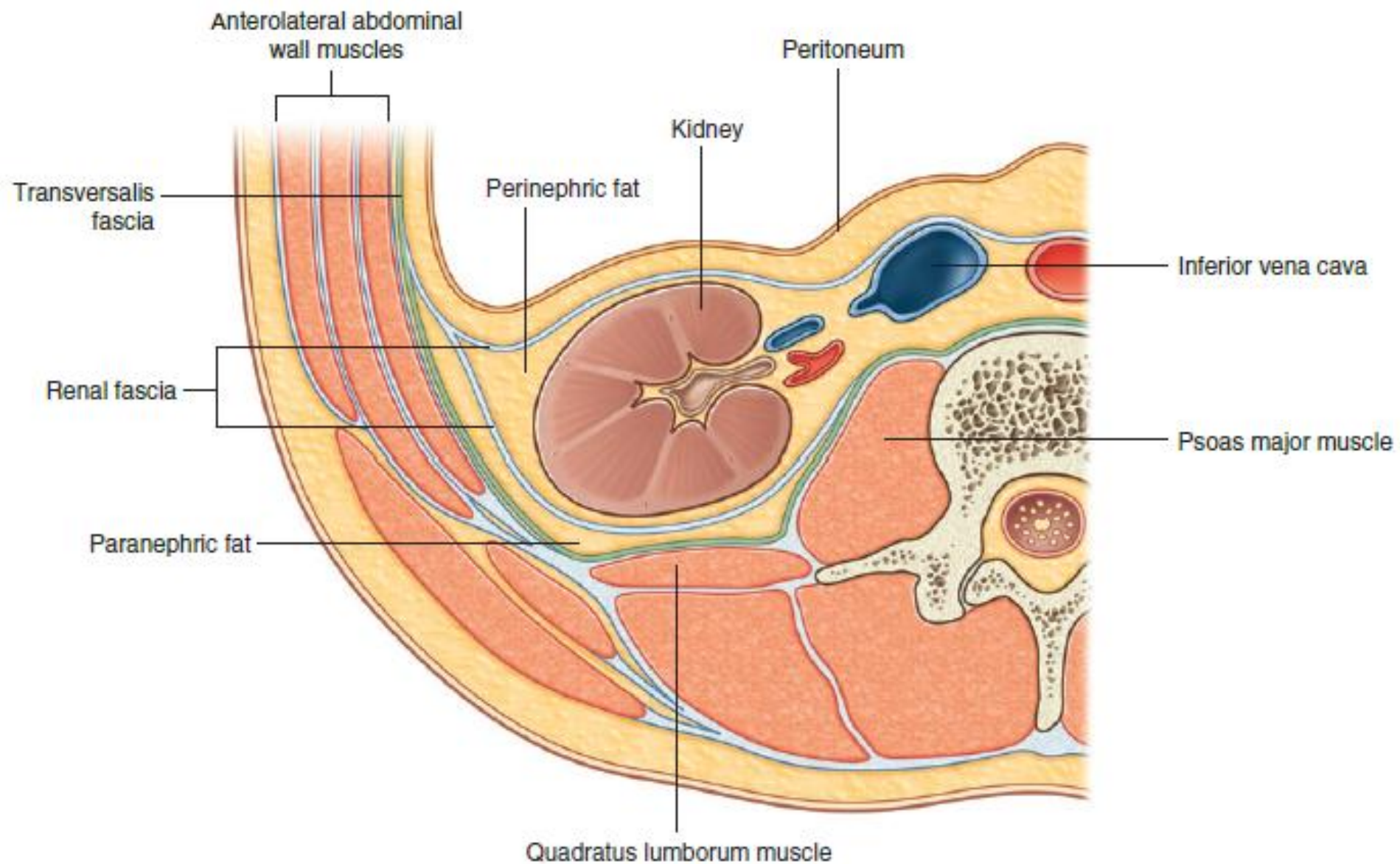
-  Kidney
-  Renal capsule
-  Perirenal fat
-  Renal fascia
-  Pararenal fat

- *Anterior layer (Gerota's fascia)* :
passes in front the kidney & fuses with C.T in front of
aorta & IVC
- *Posterior layer (Zuckercandle fascia)* :
passes behind kidney & fuses with vertebral column.

Lateral Extraparitoneal Space

Anterior renal fascia





Stability of Kidney

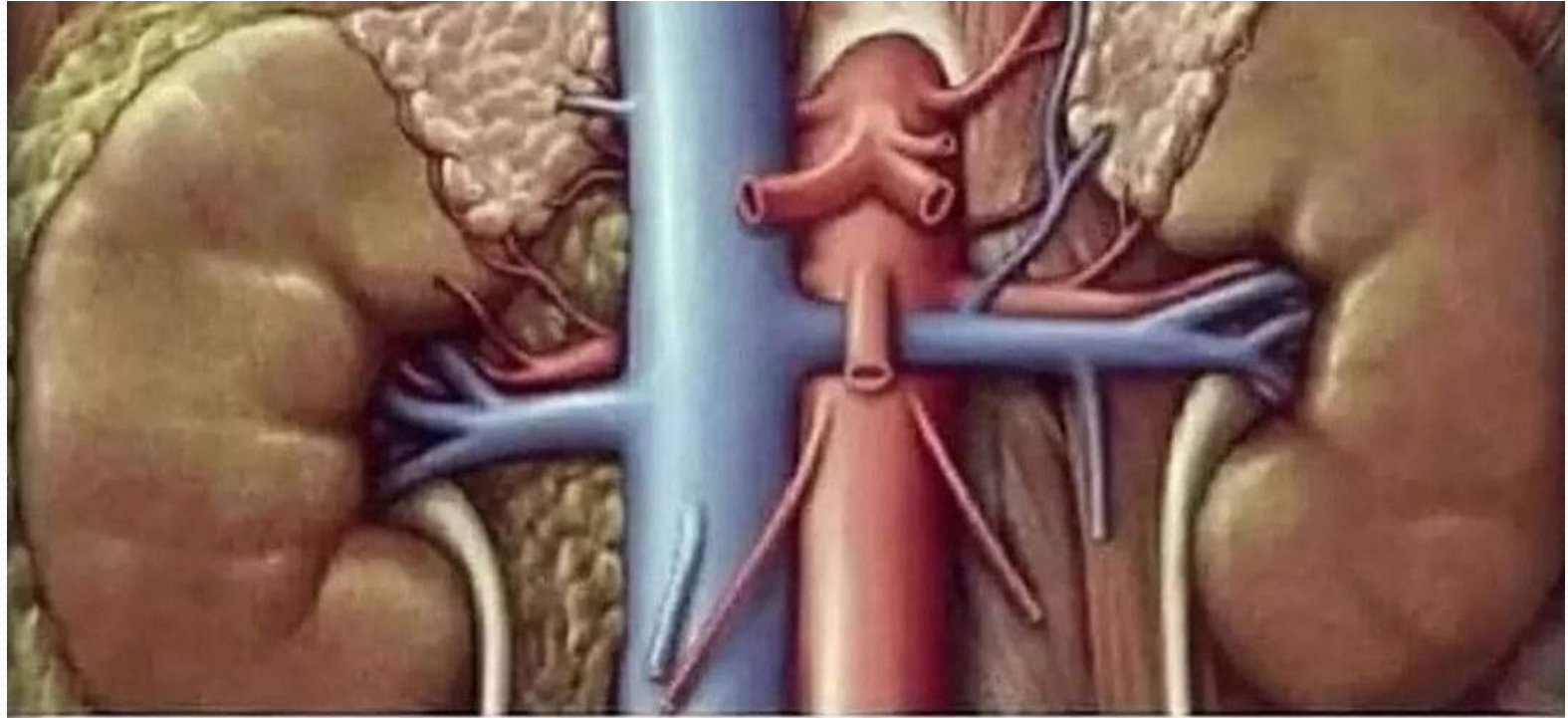
- The kidney is fixed in position by:
 - 1- its **position** in the depth of paravertebral gutter
 - 2- its **covering** of fatty & fascial capsules
 - 3- its **vascular** pedicle : renal vessels connecting the kidney to major vessels (aorta & IVC).
 - 4- positive **intra-abdominal pressure**: causing apposition of neighboring viscera to kidney

Arterial Supply of kidney

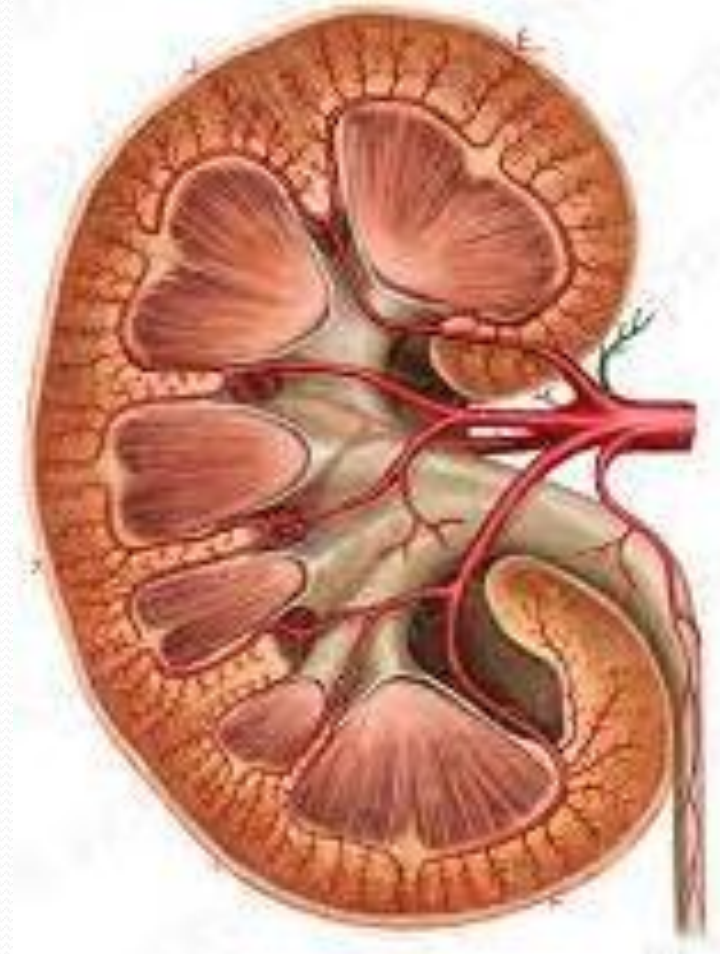
(1) Renal artery :

Arises from **aorta** at level **of L2**

- *Lt renal art* >> short & pass behind Lt renal vein
- *Rt renal art* >> long & pass behind IVC & renal vein

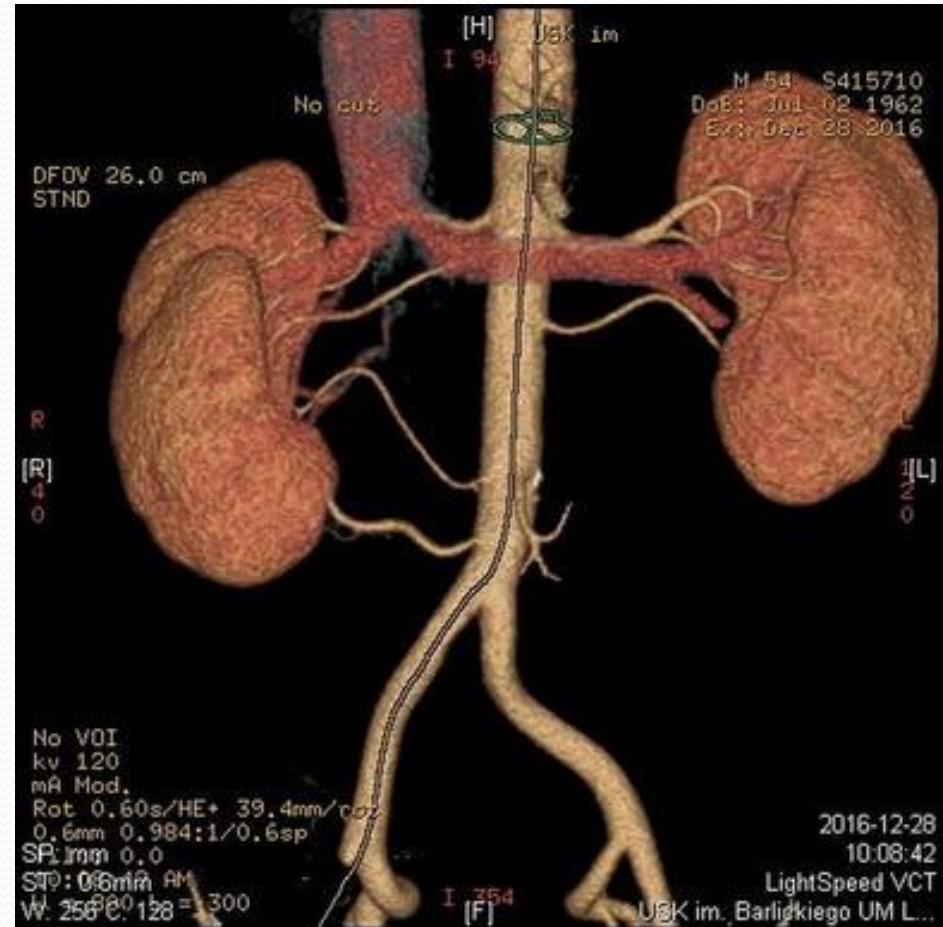


- Each renal artery divides into **5 segmental branches** (end arteries) which supply 5 pyramidal segments of kidney (apical, upper, lower, middle & posterior segments) which considered independent units



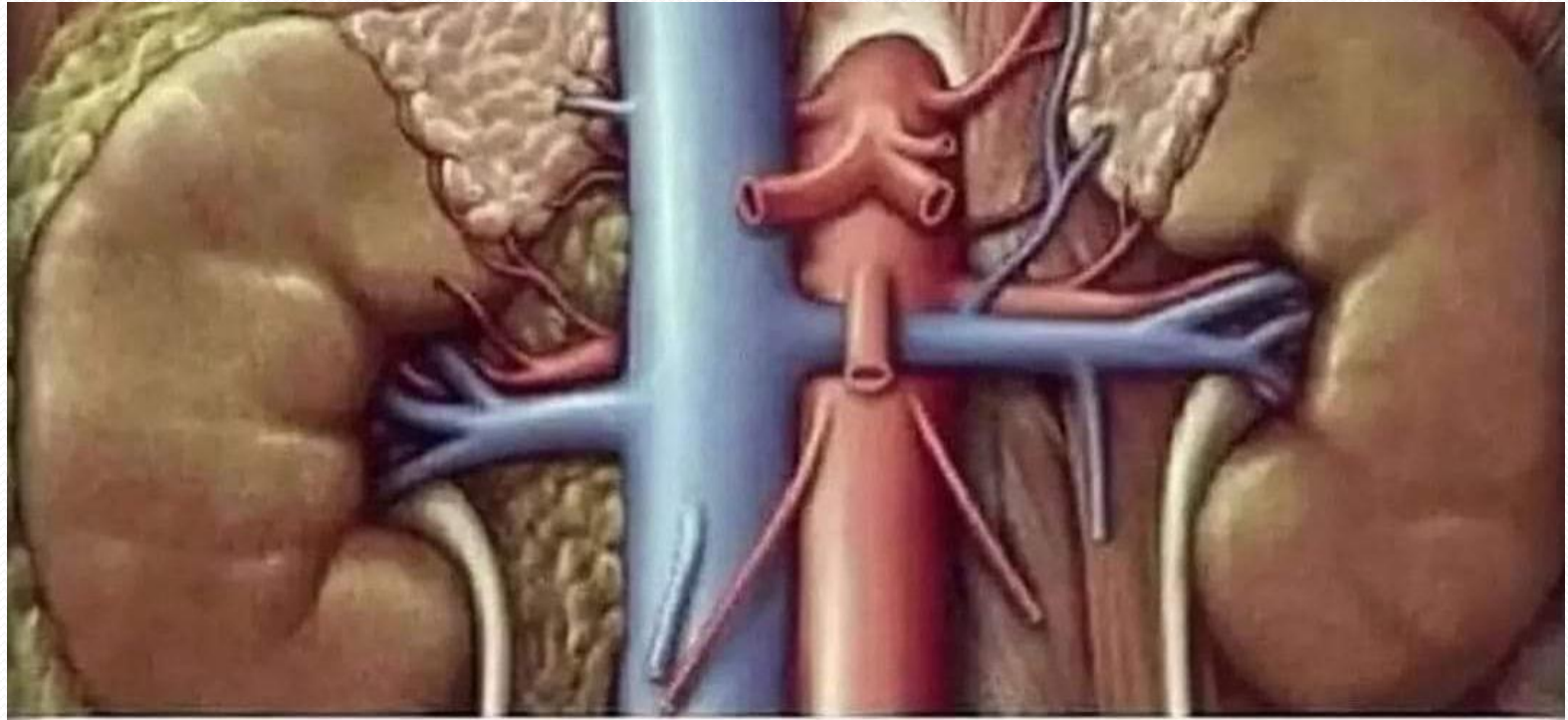
(2) Accessory renal artery

- 30% of individuals
- arises from the aorta , run parallel to renal artery, and enters kidney either at the hilum or at on of the 2 poles of the kidney (usually lower lobe)



Venous drainage of kidney

- Renal vein emerge from each kidney to open into the **I.V.C** :
 - Rt renal vein : short & pass infront of Rt renal artery .
 - Lt renal vein : long & pass infront of the abdominal aorta & the Lt renal artery.



Lymphatic drainage of kidney

- Into the para aortic LN at the level of origin of renal arteries (L2).

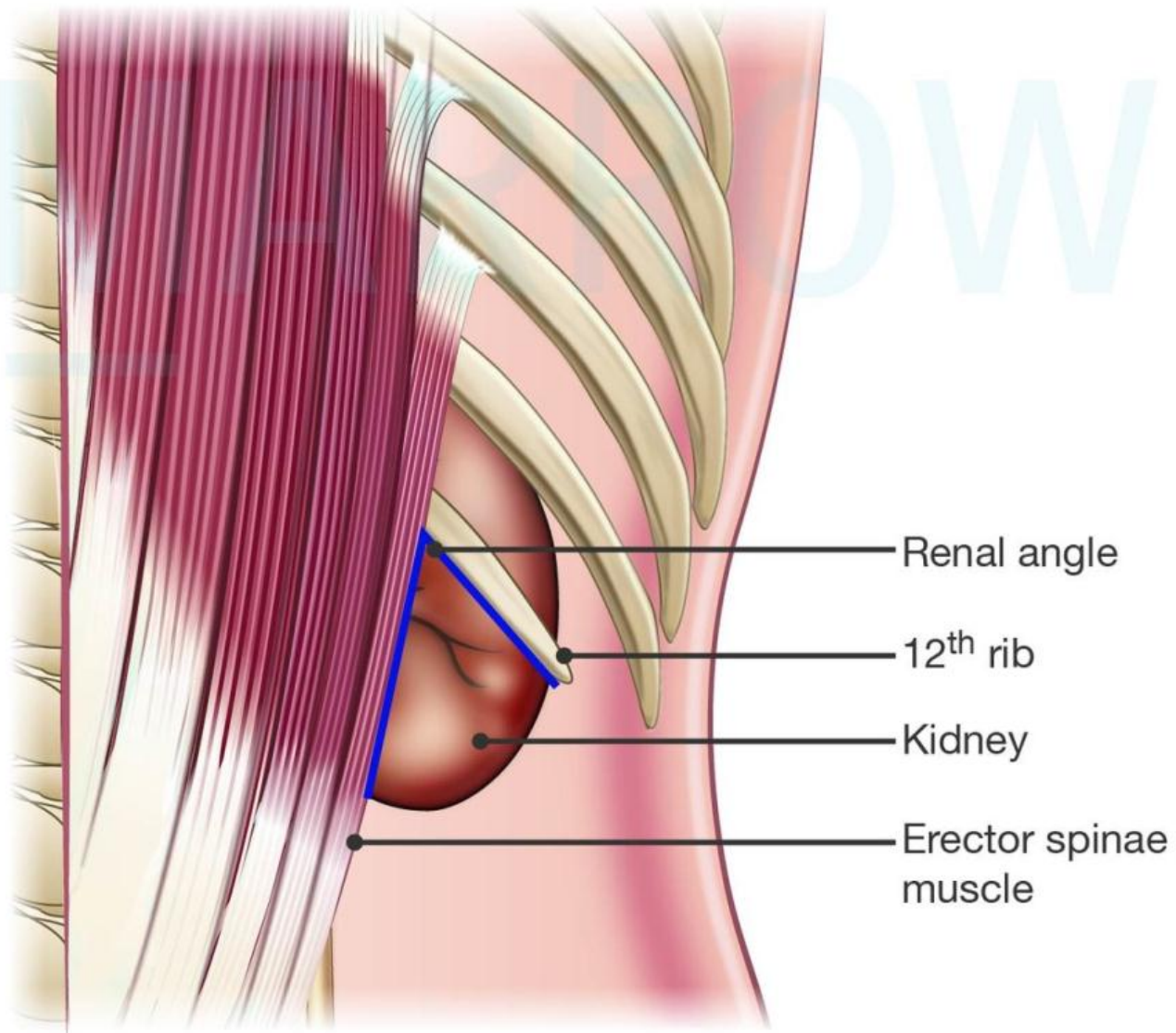
Nerve Supply of Kidney

- The renal plexus of nerves around renal artery (derived from the celiac plexus)
- It contains sympathetic vasomotor fibers arising from T10 >> L1 spinal segments.

Applied anatomy

- Kidney swelling are felt in the **renal angel** (the angel between the 12th rib & the lateral border of erector spinae muscles “sacrospinalis ms”).
- Incisions for kidney operation should be performed one inch below the renal angel to avoid injury of the parietal pleura.

Renal angle





Anatomy of Renal System

Ureters , urinary bladder & urethra



Dr Amjad A. Abu Alqumboz

Palestinian Board of General Surgery

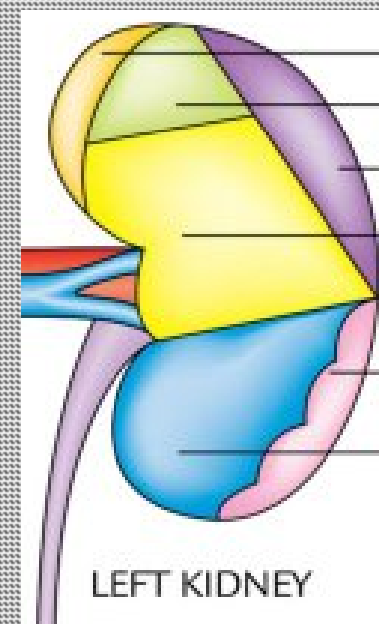
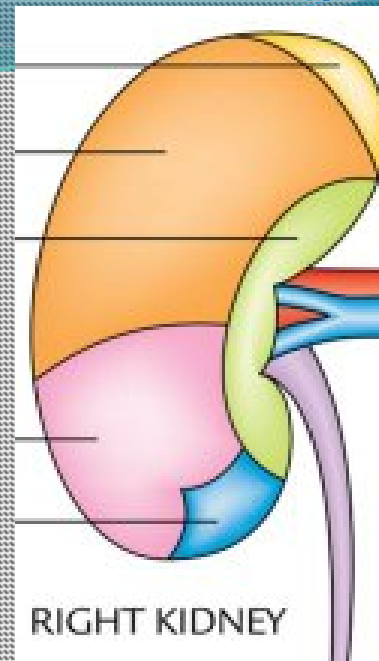
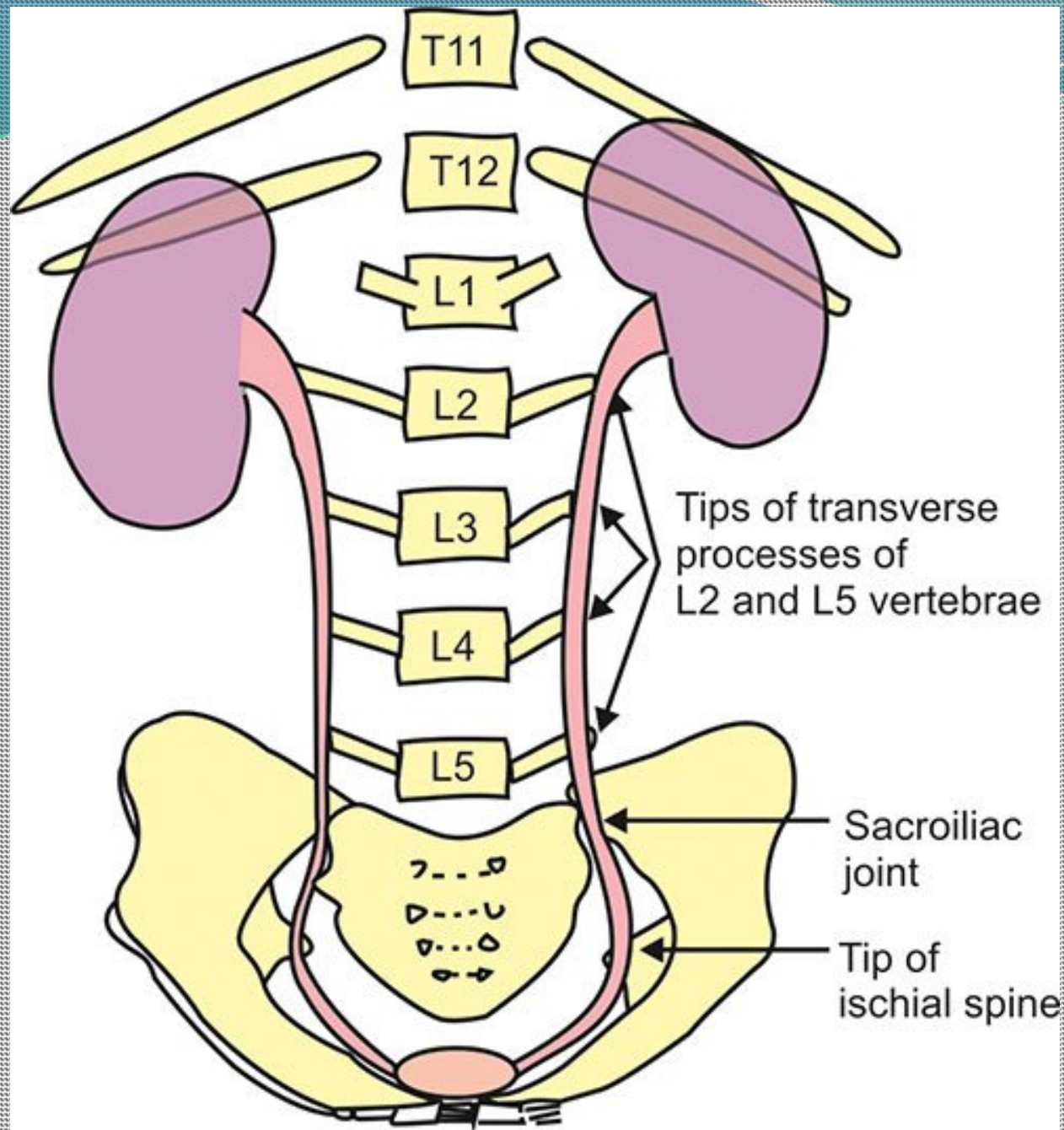
Al Makassed hospital – Jerusalem



URETERS

Shape & Size : Each ureter is a thick-walled retroperitoneal muscular tube 25-30 cm long , 6 mm in diameter.

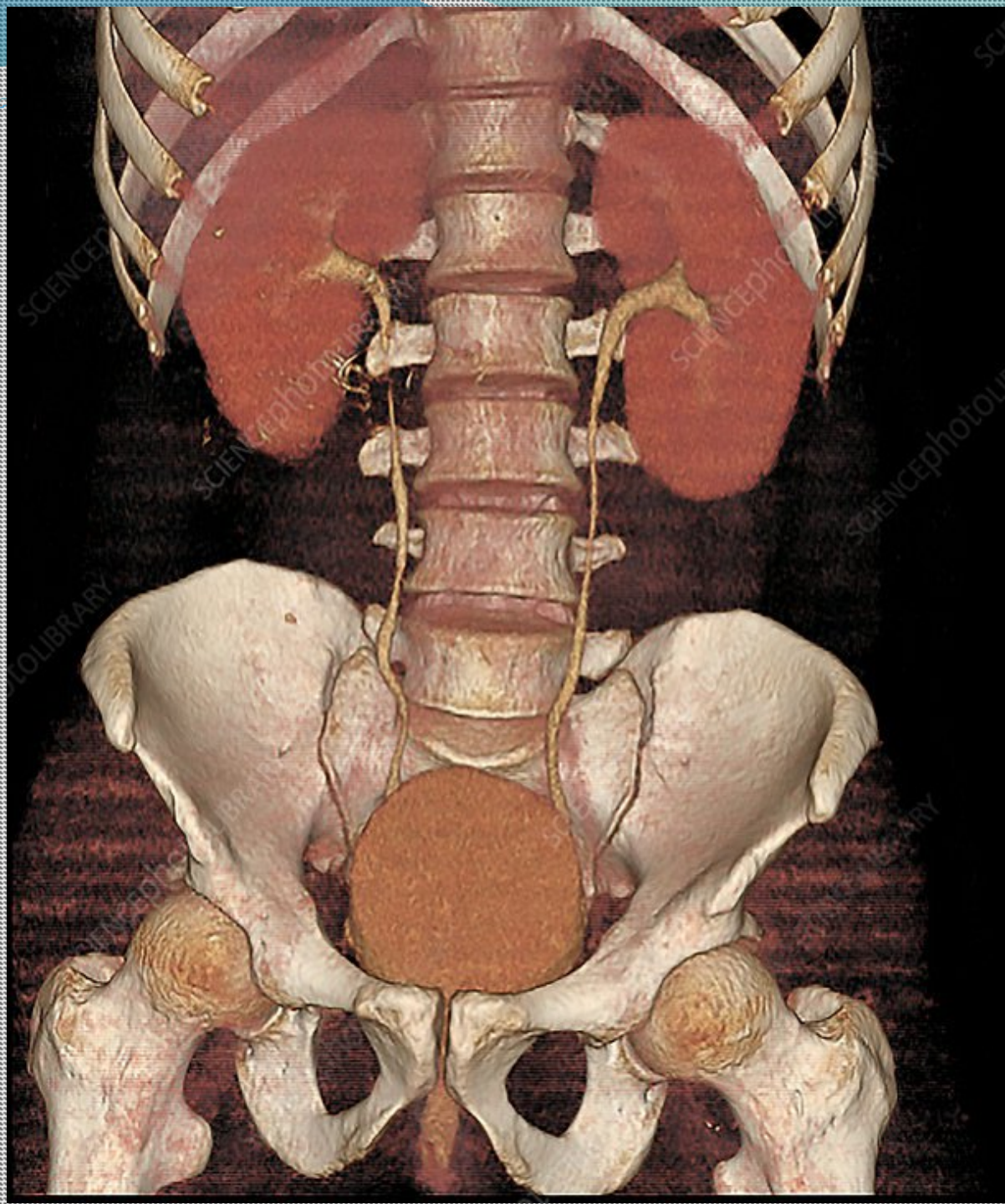
Beginning : in front of **transverse process of L1** by funnel shaped dilatation called pelvis of the ureter , which is related posteriorly to psoas major muscle & is related anteriorly to renal vessels & 2nd part of duodenum (right ureter) & body of pancreas (left ureter).



Termination : by opening into the postero-superior angle of the urinary bladder.

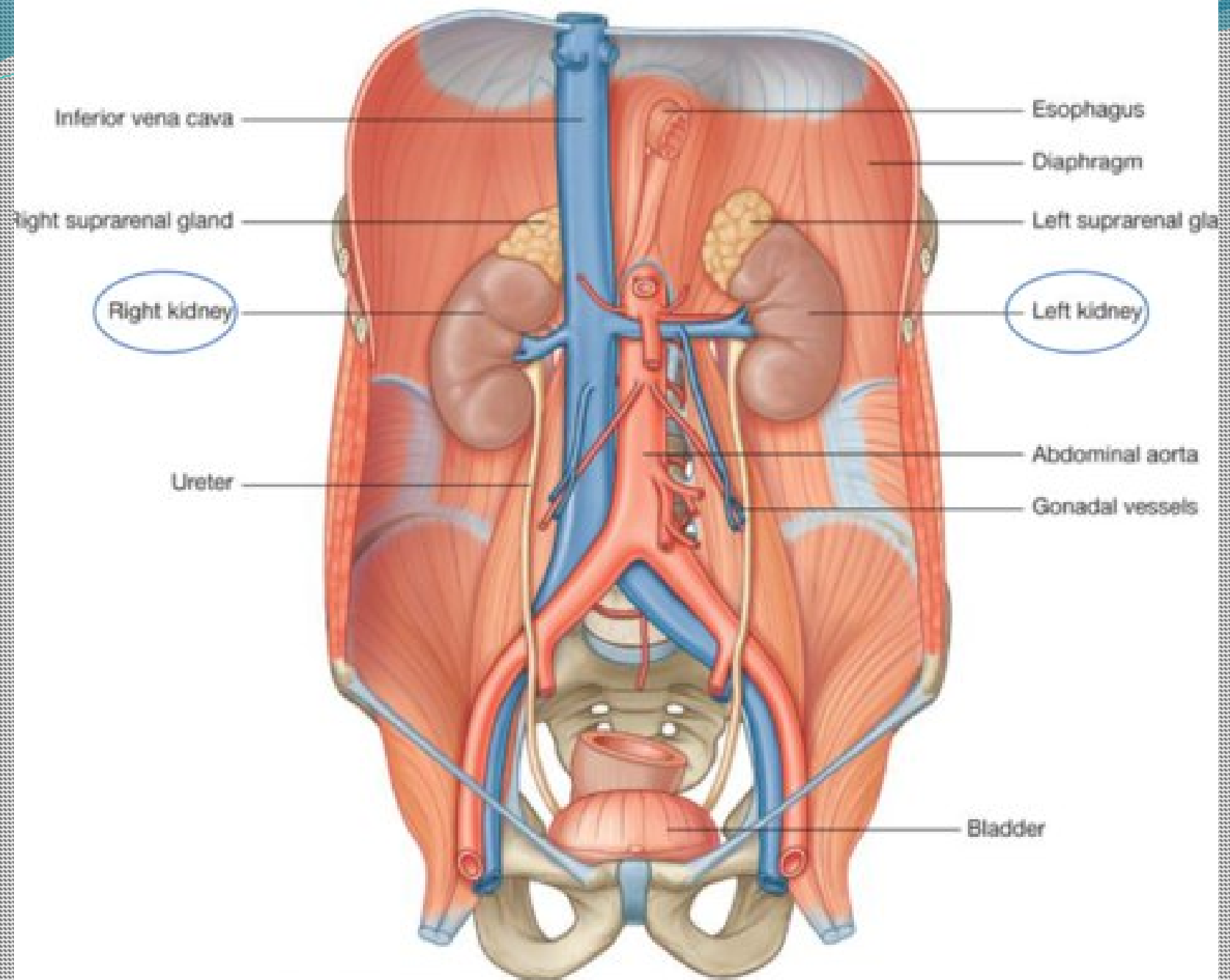
Course : is divided into 3 parts :

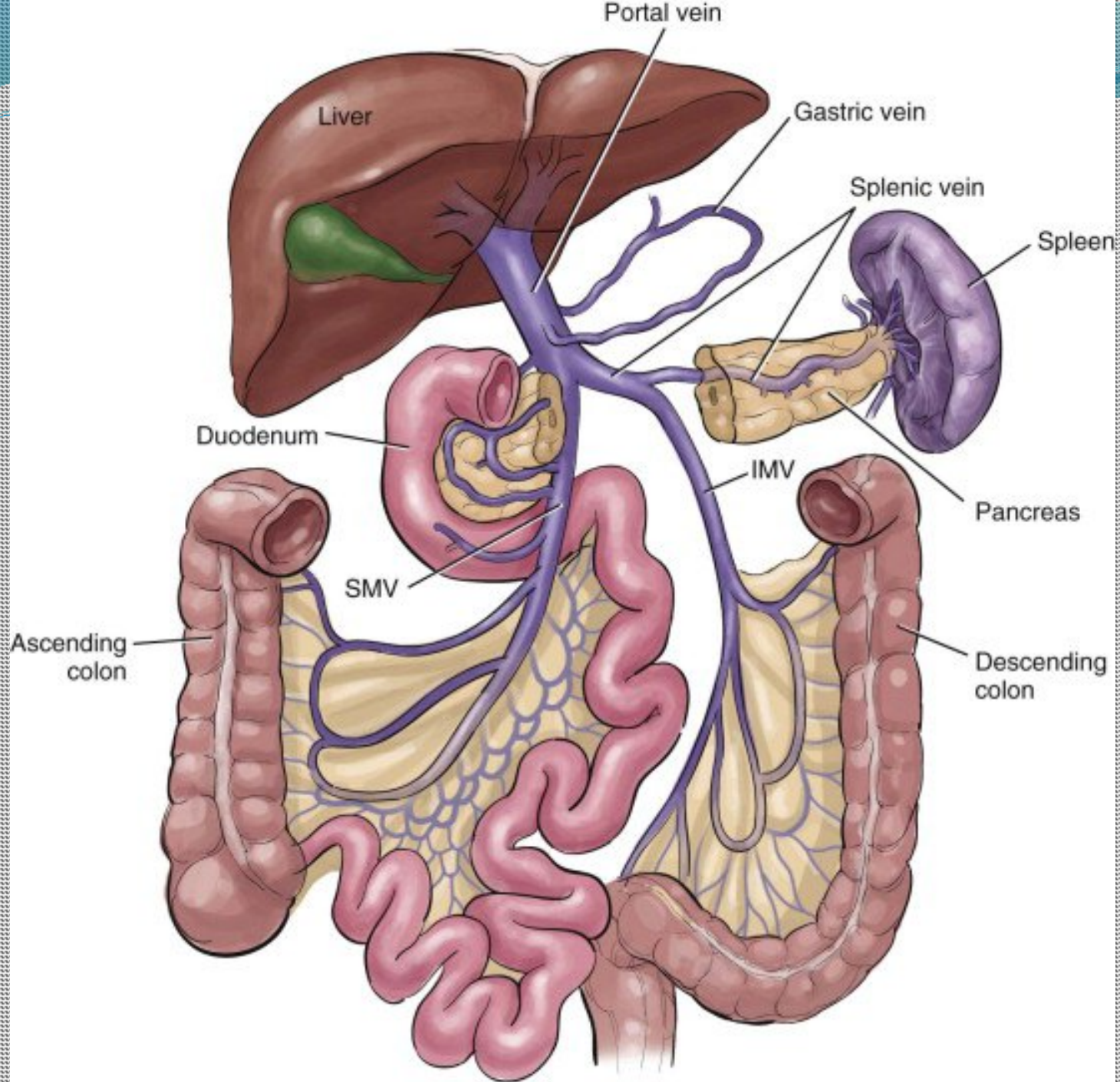
- a. **Abdominal part** : its upper $\frac{1}{2}$ (on posterior abdominal wall)
- b. **Pelvic part** : its lower $\frac{1}{2}$ (on lateral wall of pelvis)
- c. **Intramural part** : last 2 cm (inside bladder wall)



Abdominal part

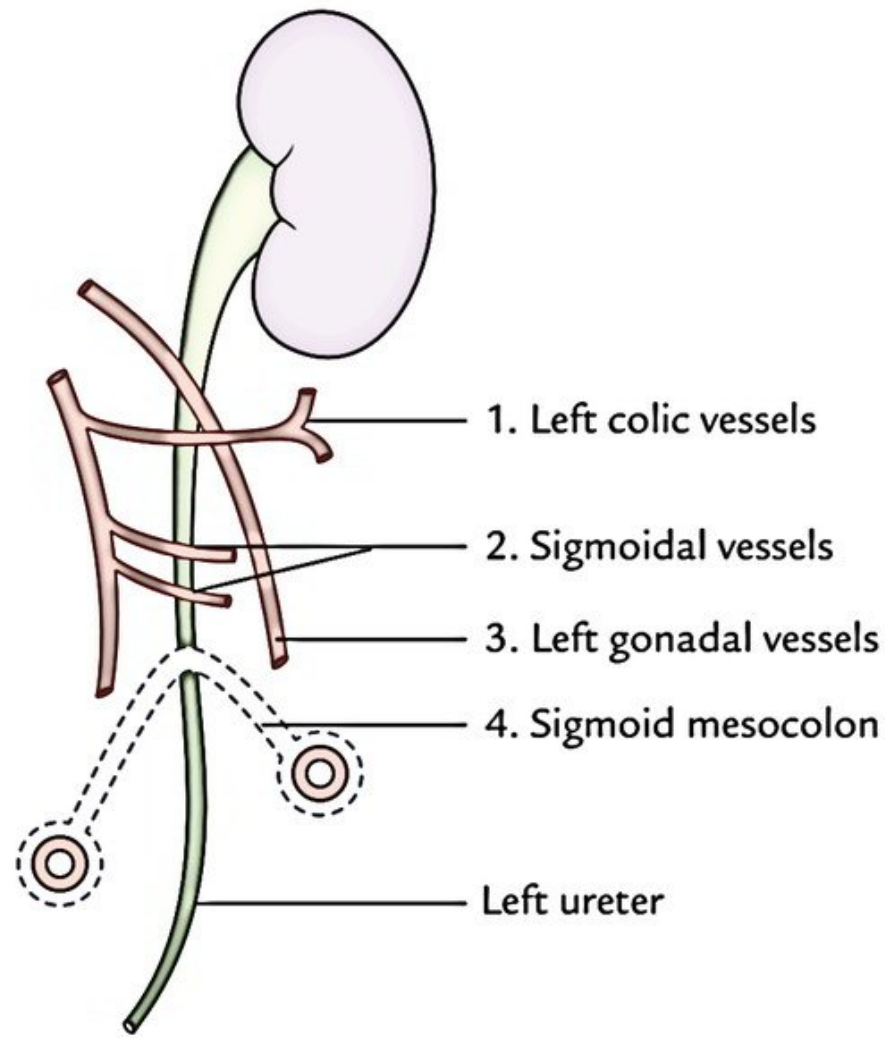
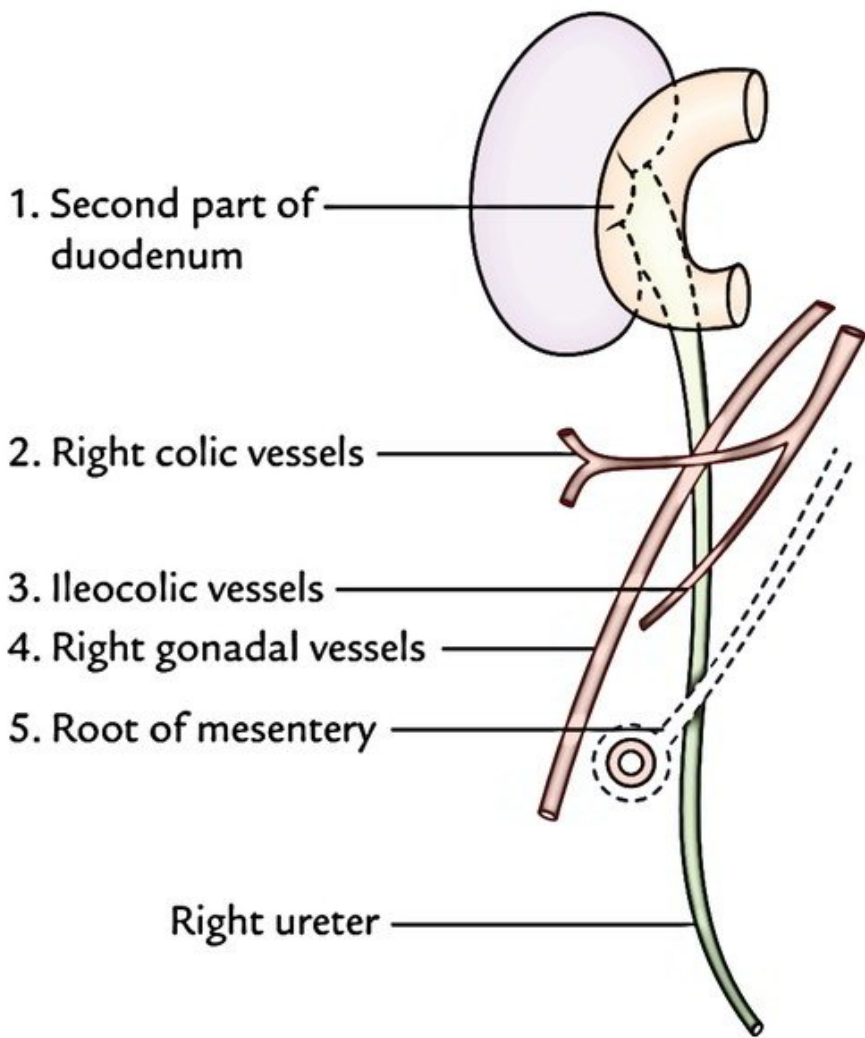
	RT ureter	LT ureter
Course	descends vertically behind peritoneum	
Posterior	1. medial border of psoas maior &	
Medial	Inferior vena cava (IVC)	Inferior mesenteric vein (IMV)
relations	are tips of L4 processes of lower 4 lumbar vertebrae transverse processes of lower 4 lumbar vertebrae	





Abdominal part

	RT ureter	LT ureter
Anterior relations (parietal peritoneum)	(a) 3rd part duodenum (b) 3 arteries : - Rt gonadal art. - Rt colic art. - Iliocolic art (c) 3 structures related to mesentery - Its root - Sup. Mesenteric vss	(a) 3 arteries - Lt gonadal art. - Upper Lt colic art - Lower Lt colic art (b) Sigmoid colon (c) Sigmoid mesocolon.

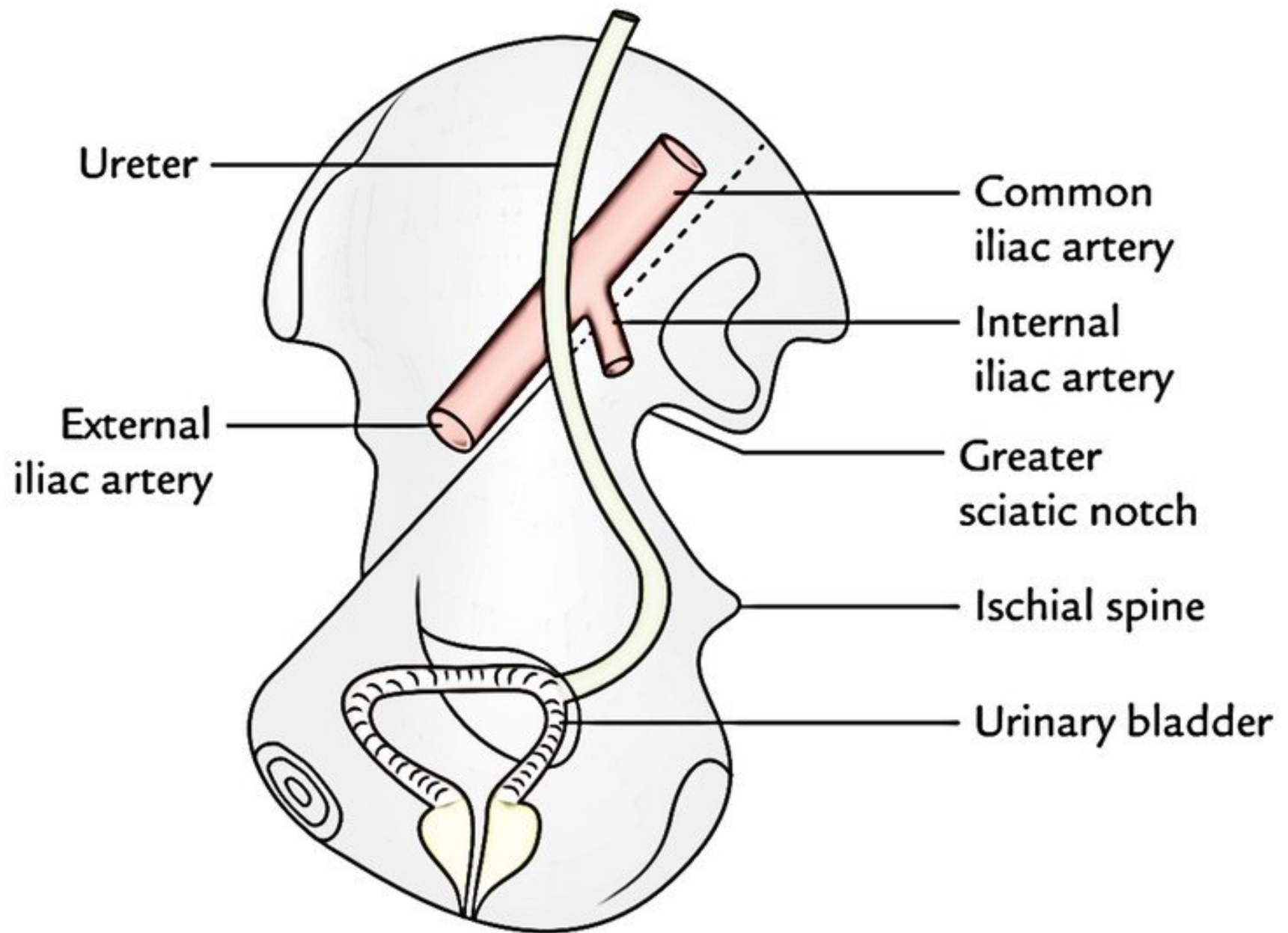


Pelvic part

It enters the pelvis by crossing **infront** the bifurcation of common iliac artery.
(opposite sacro-iliac joint)

It runs downwards & backwards on the side of pelvis wall till it reach **ischial spine** with the following relations :

- anterior >> peritoneum
- posterior >> internal iliac vessels
- lateral >> obturator nerve & vss + umbilical art.



Pelvic part

At level of ischial spine , it curves antero-medially to open into the postero-superior angle of urinary bladder.

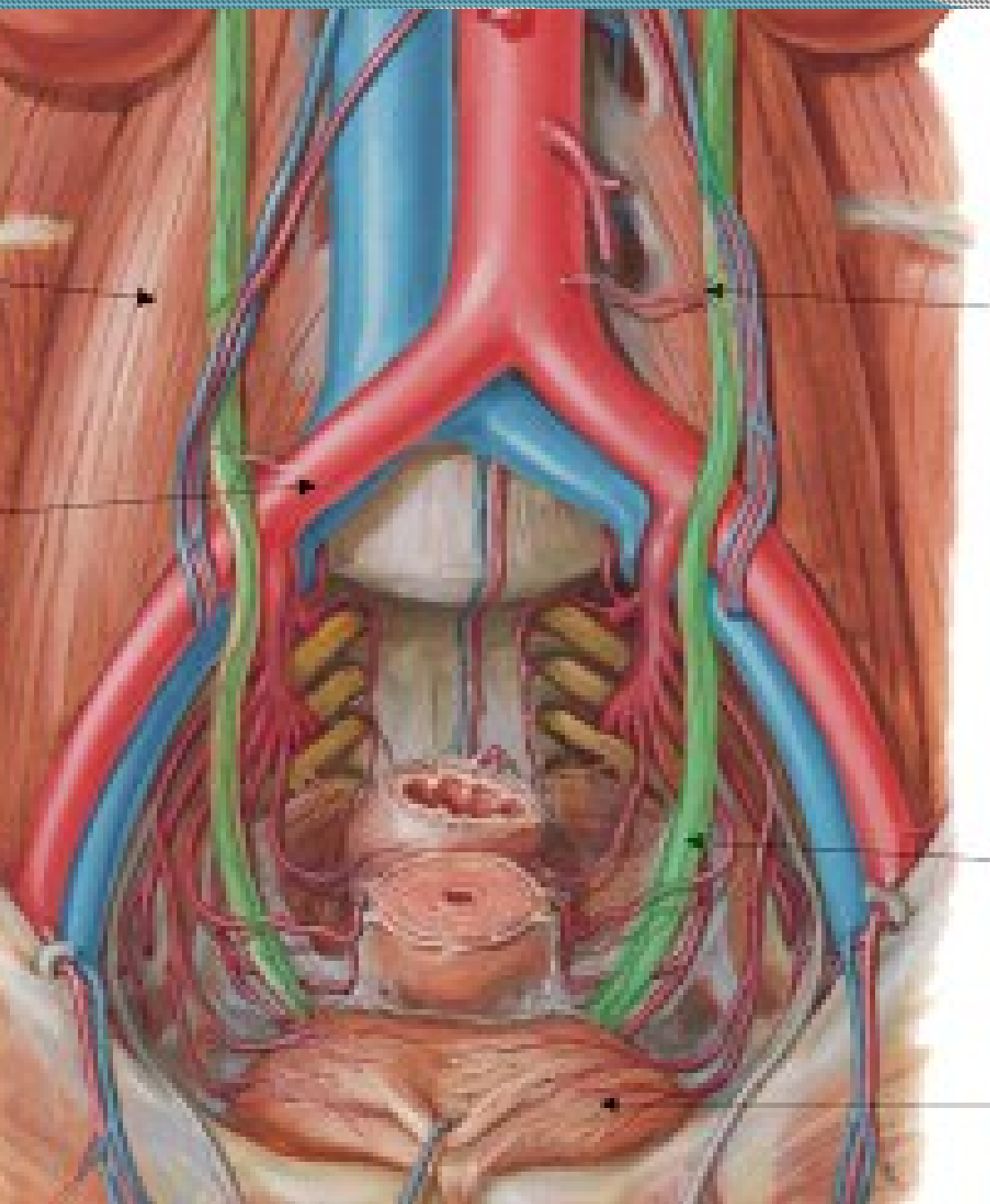
Here it ;

passes on the side of vagina in

female

is crossed by the vas deferens in

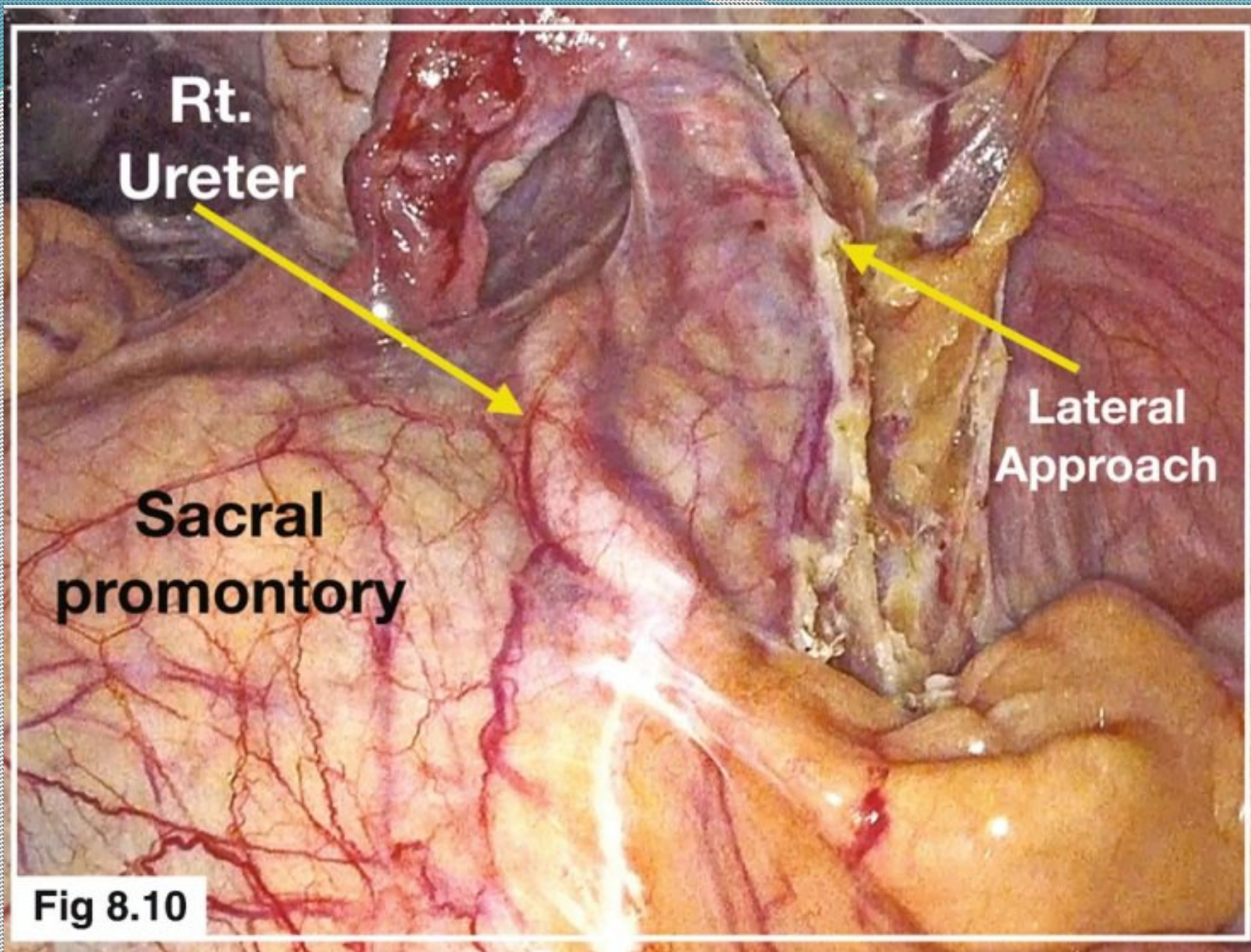
male.



Abdominal part of ureter

Pelvic part of ureter

Urinary bladder

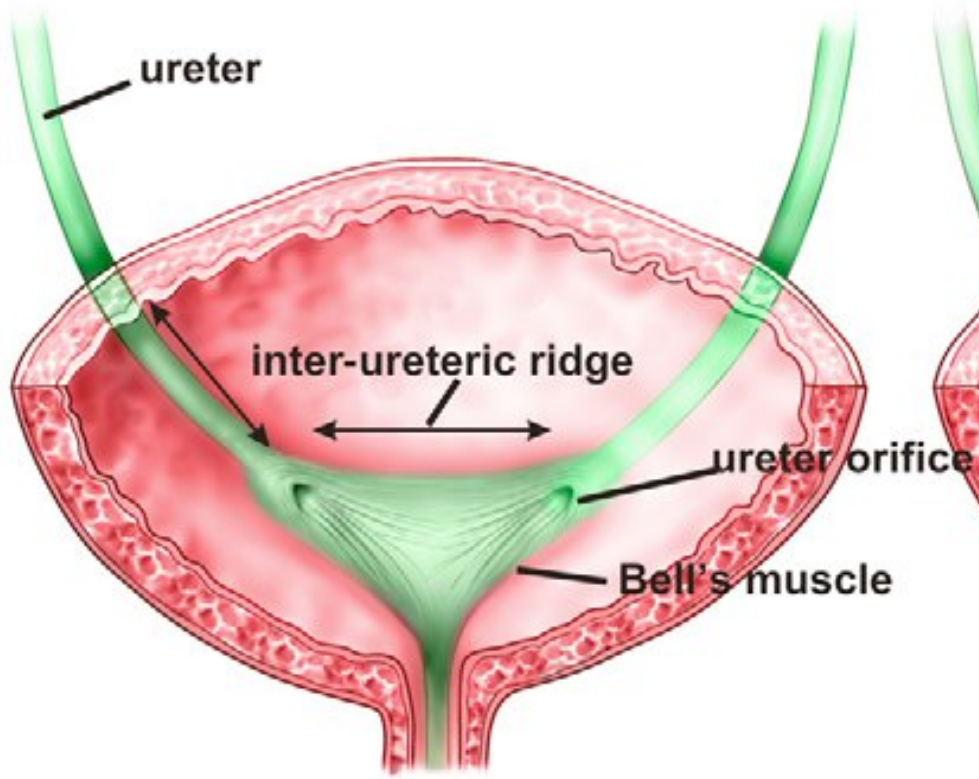


Intramural part

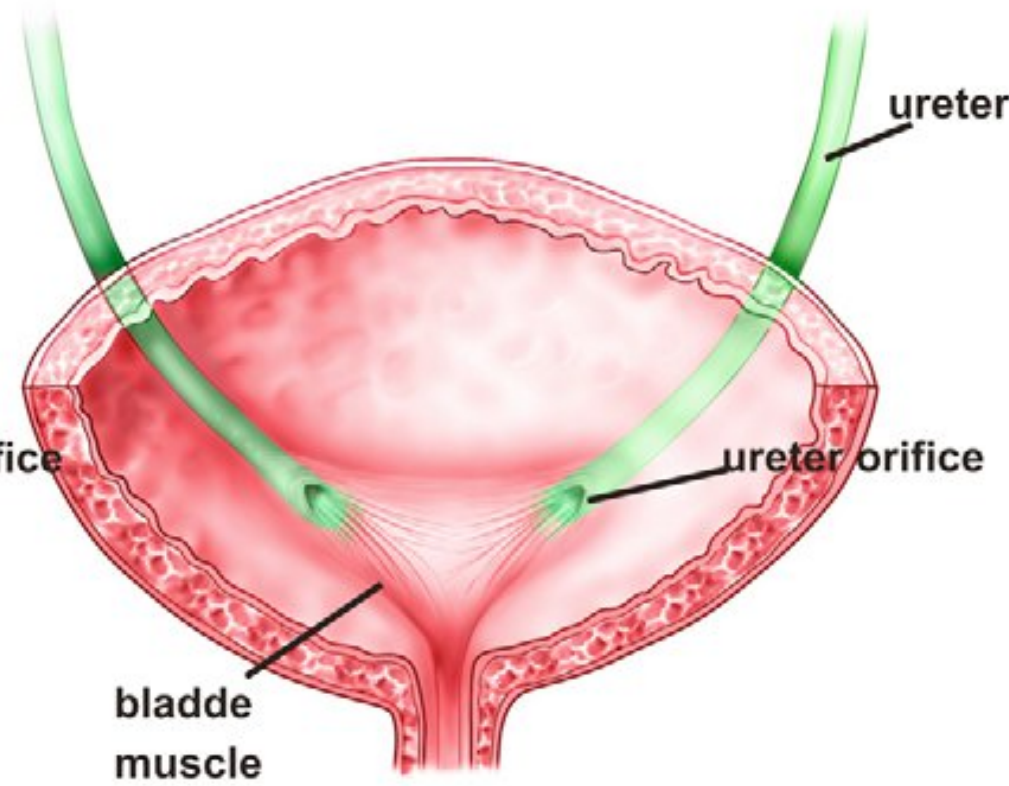
The ureter joins the postero-superior angle of the urinary bladder & runs a very oblique course through its wall for 2 cm before opening.

This arrangement provides a valve-like mechanism preventing regurgitation of urine from bladder to the ureter.

A



B

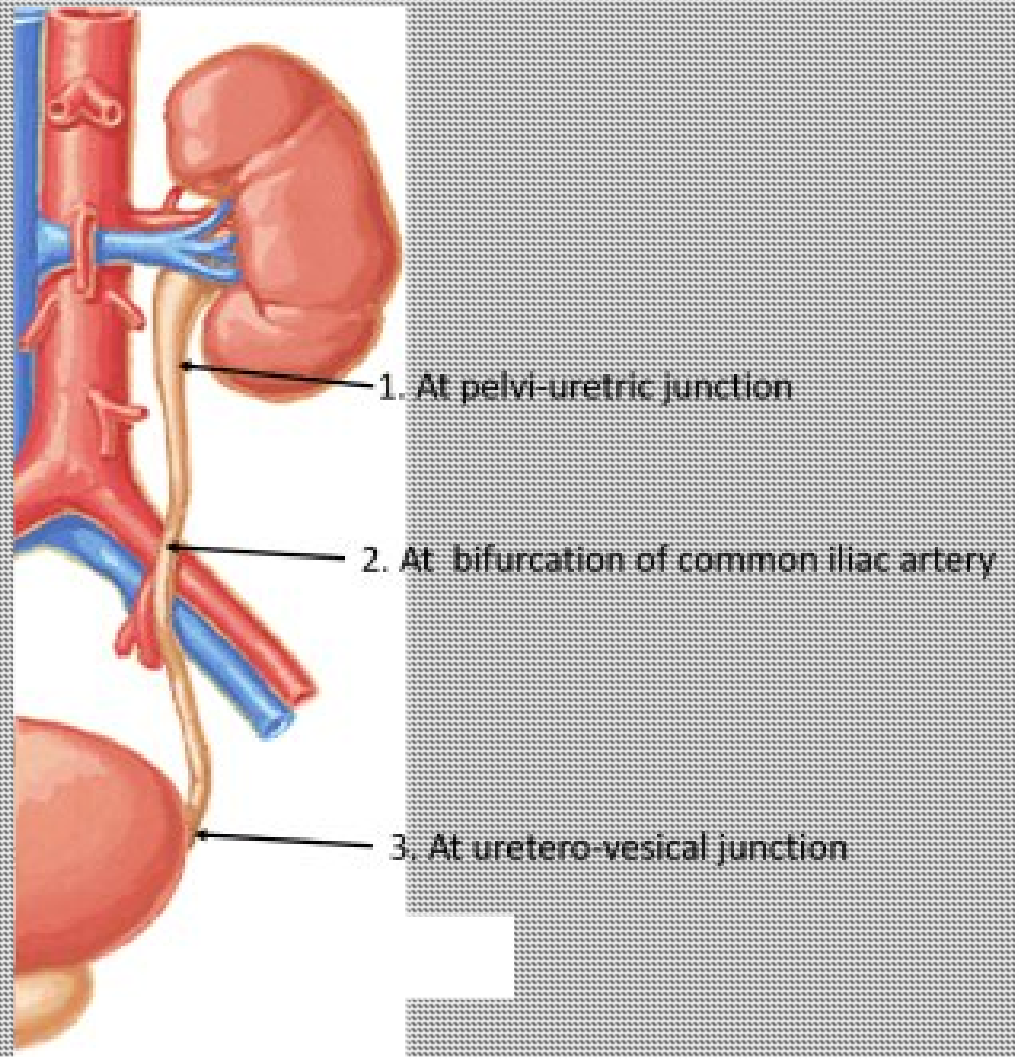
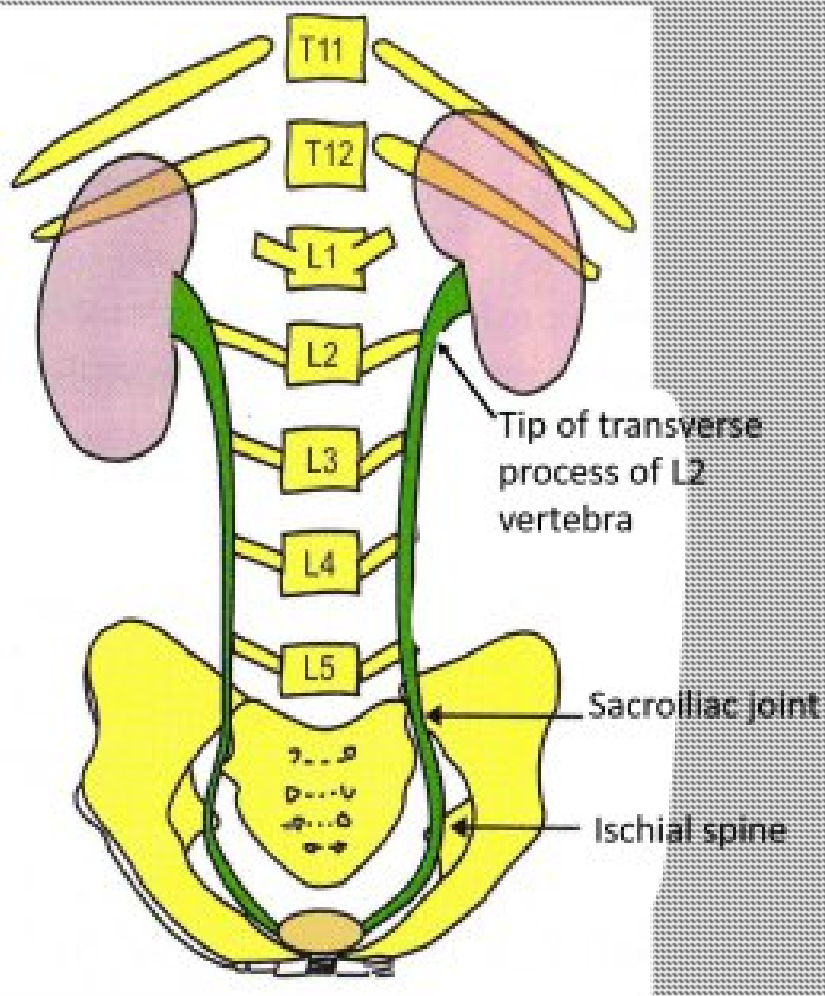


Constrictions of the ureter

* The ureter shows 4 normal constrictions :

1. At the pelvi-uretric junction (L2)
2. At pelvic brim (bifurcation common iliac)
3. Opposite the ischial spine
4. The intramural part (inside bladder)

Sites of Constrictions



Arterial blood supply

a rich segmental supply from all arteries along its course:

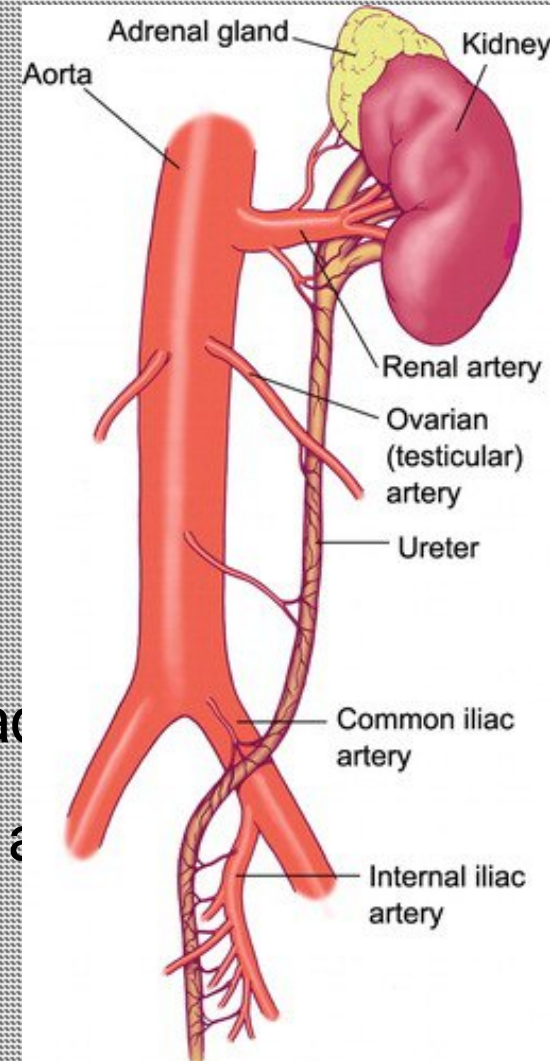
A : Abdominal aorta

R : Renal artery

T : Testicular or ovarian artery (Gonadal)

I : Inferior vesical artery (br. of int. iliac a.)

C : Common iliac artery



Surface anatomy

Anterior surface

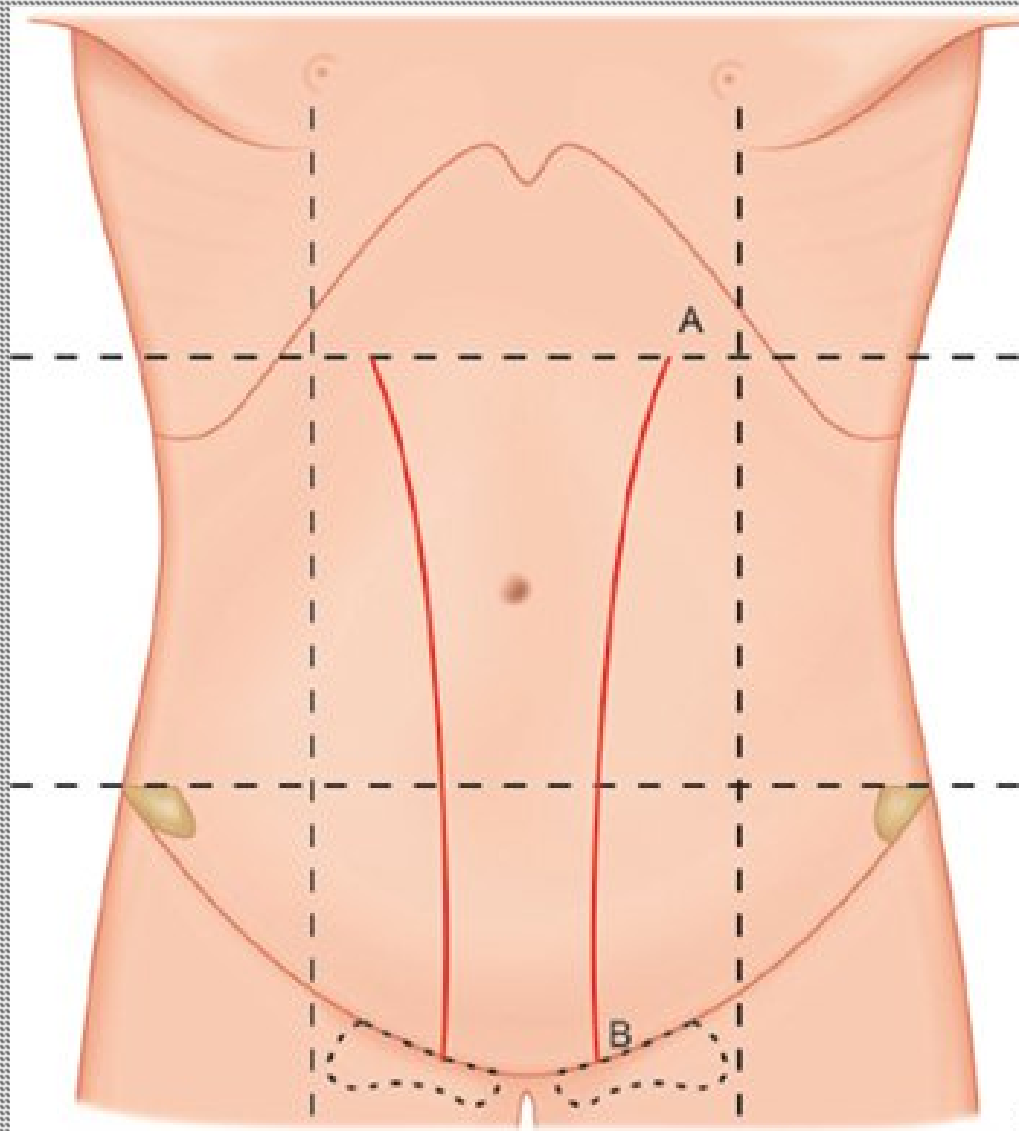
Represented by a line drawn downwards & medially between 2 points:

- A point on the transpyloric plane 2 inch from median plane.
- A point at pubic tubercle .

Posterior surface

Draw a vertical line on the back extending between 2 points:

- A point 2 inch from median plan at the level of L1 spine
- A point at the posterior superior iliac spine.



A → 5 cms from midline
along the transpyloric
plane
B → Pubic tubercle
AB → Ureter

Nerve supply

All nerves are sensory in function:

1. Sympathetic fibers from **T11 >> L1** spinal segments
2. Parasympathetic from **S2, 3 & 4** segments.

Applied anatomy

The ureter is identified at operation by :

- it appears as thick muscular tube with longitudinal blood vessels along its wall
- it shows peristalsis & gives urine on aspiration.

Ureteric pain (in renal colic) is referred to the skin of anterior abdominal wall supplied by T10 to L1 spinal nerves . Pain starts in the loin & extends to the groin and



URINARY BLADDER

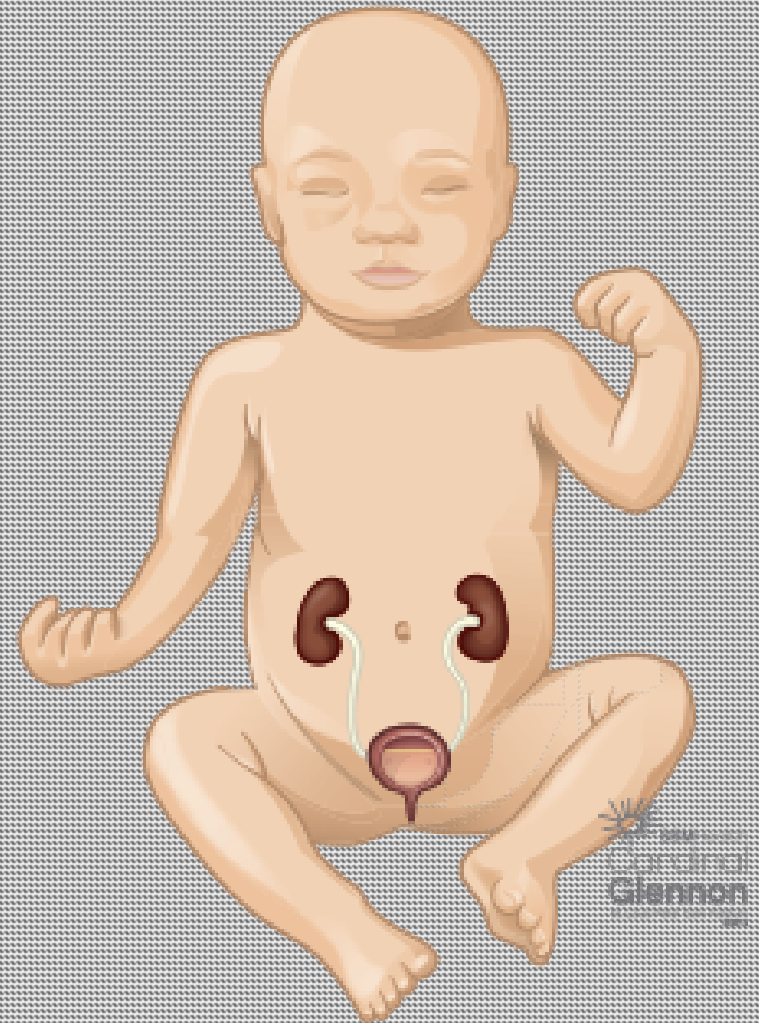
Site

At birth :

it lies completely in abdominal cavity (due to the small size of the pelvis).

In children :

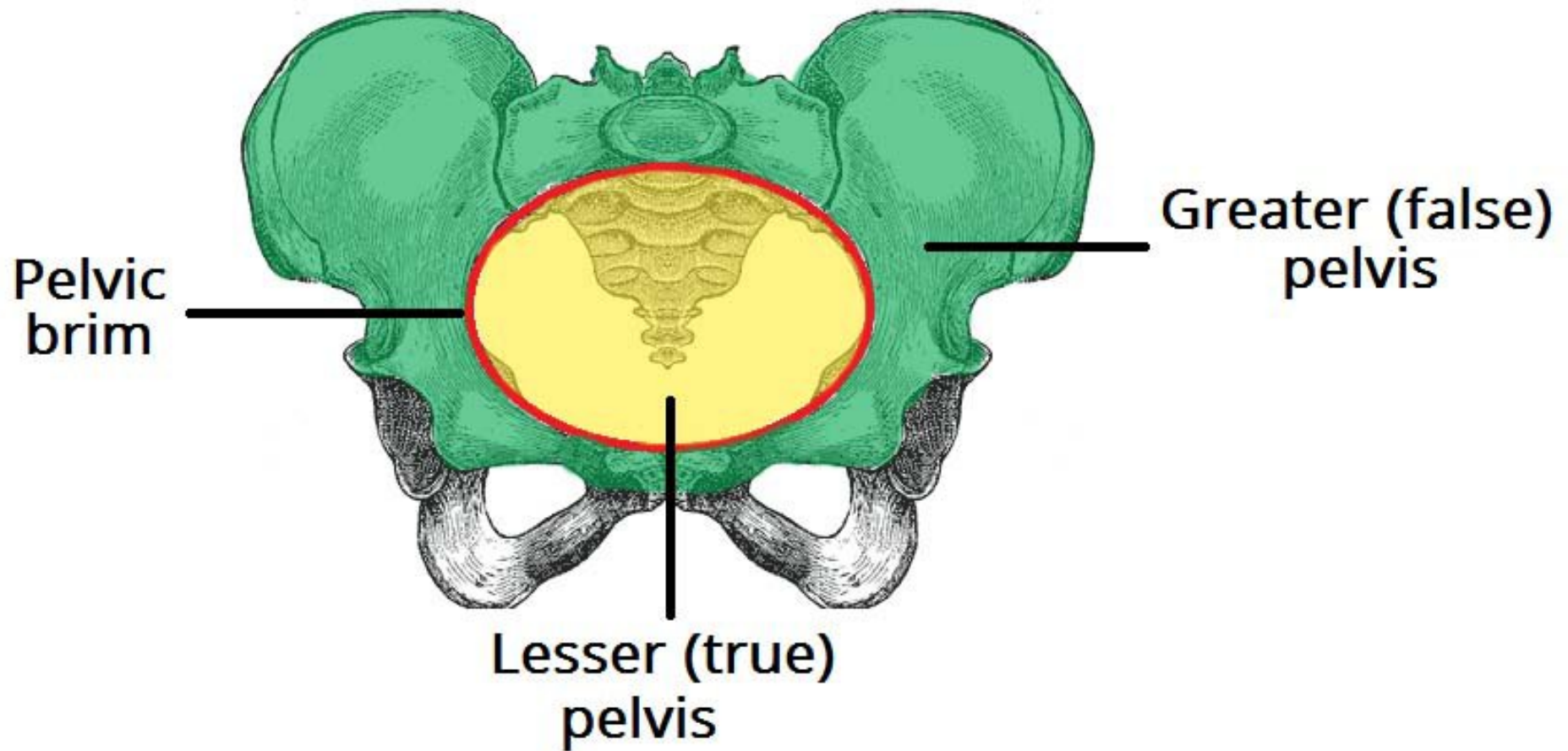
it becomes a pelvi-abdominal organ.



Site

In adult :

- An empty bladder is pelvic organ, occupying the most anterior compartment of the lesser pelvis, directly behind the symphysis pubis.
- When the bladder distends , it ascends into the abdomen & pushes up the parietal peritoneum lining the lower part of the anterior abdominal wall.



Size

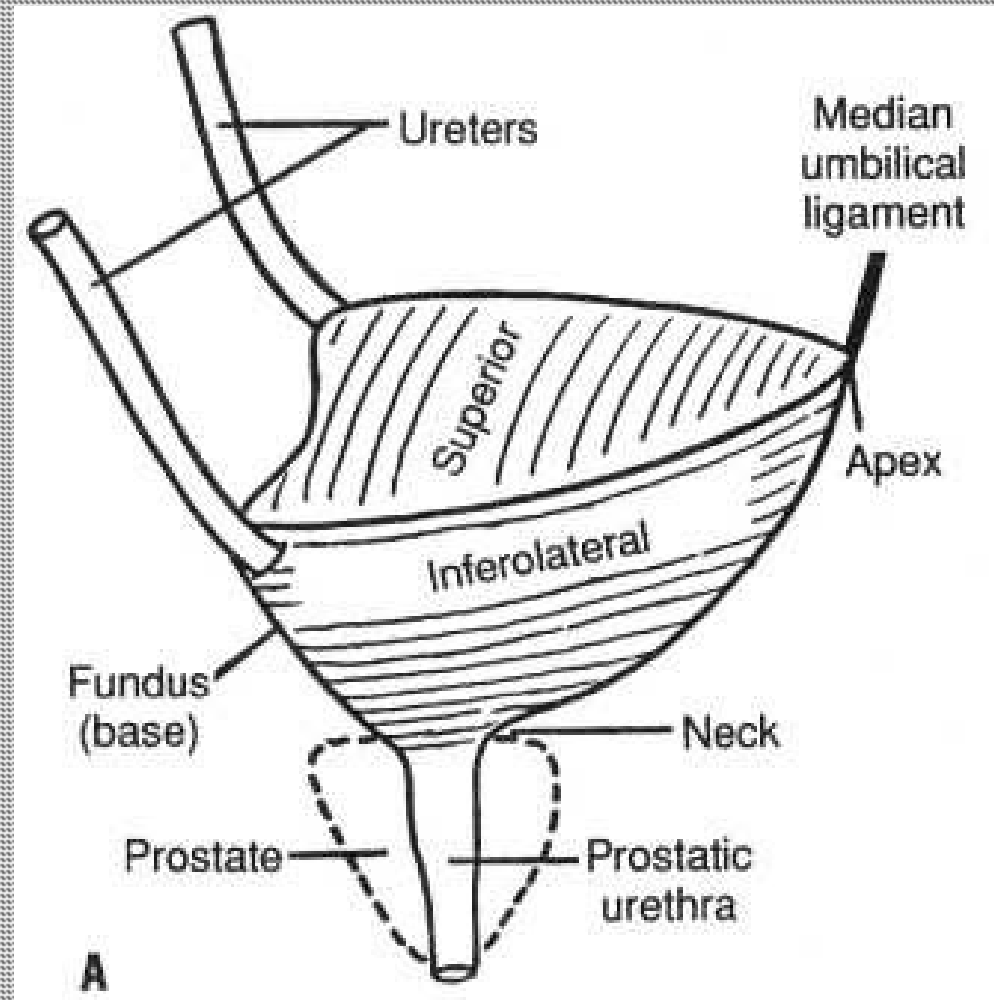
The average capacity of the adult bladder is **220 cc** .

A volume beyond 220 cc causes desire to micturate (it can accommodate up to 500 cc , beyond which it becomes painful).

Shape , Surfaces & Borders

(A) Empty bladder :

Is 4 sided pyramid (resembling a cut anterior part of a ship) , having :



* **4 surfaces** (superior, posterior, Lt&Rt inferolateral)

* **4 angles** :anterior (apex).. in front ,
inferior (neck) .. below &
2 postero-superior angles.. behind

* **4 ducts** are related to angles of the bladder
2 ureters open into the 2 posterosuperior
angles

urethra comes out from the neck (inferior
angle)

urachus (obliterated after birth to form
median umbilical lig.) is attached to anterior

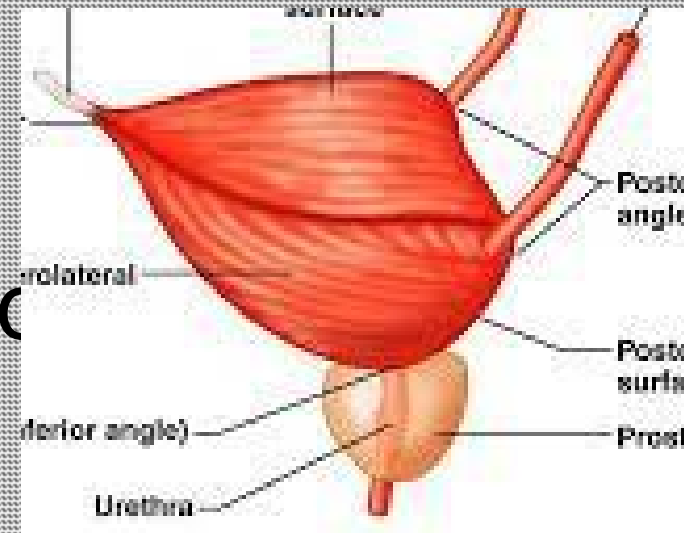
Shape , Surfaces & Borders

(B) Full bladder :

Is ovoid in shape having :

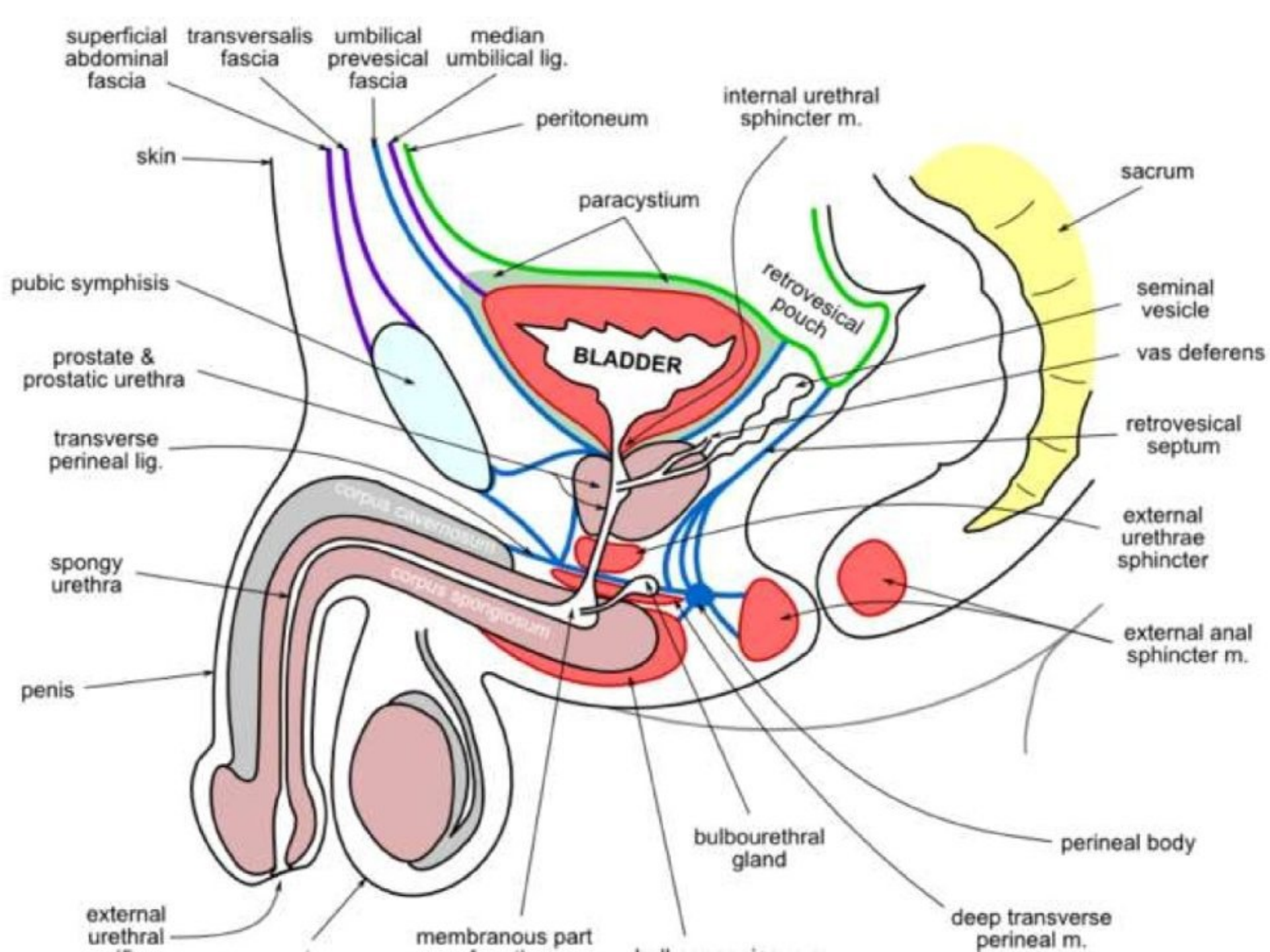
4 surfaces : antero-inferior
postero-superior & 2
lateral surfaces)

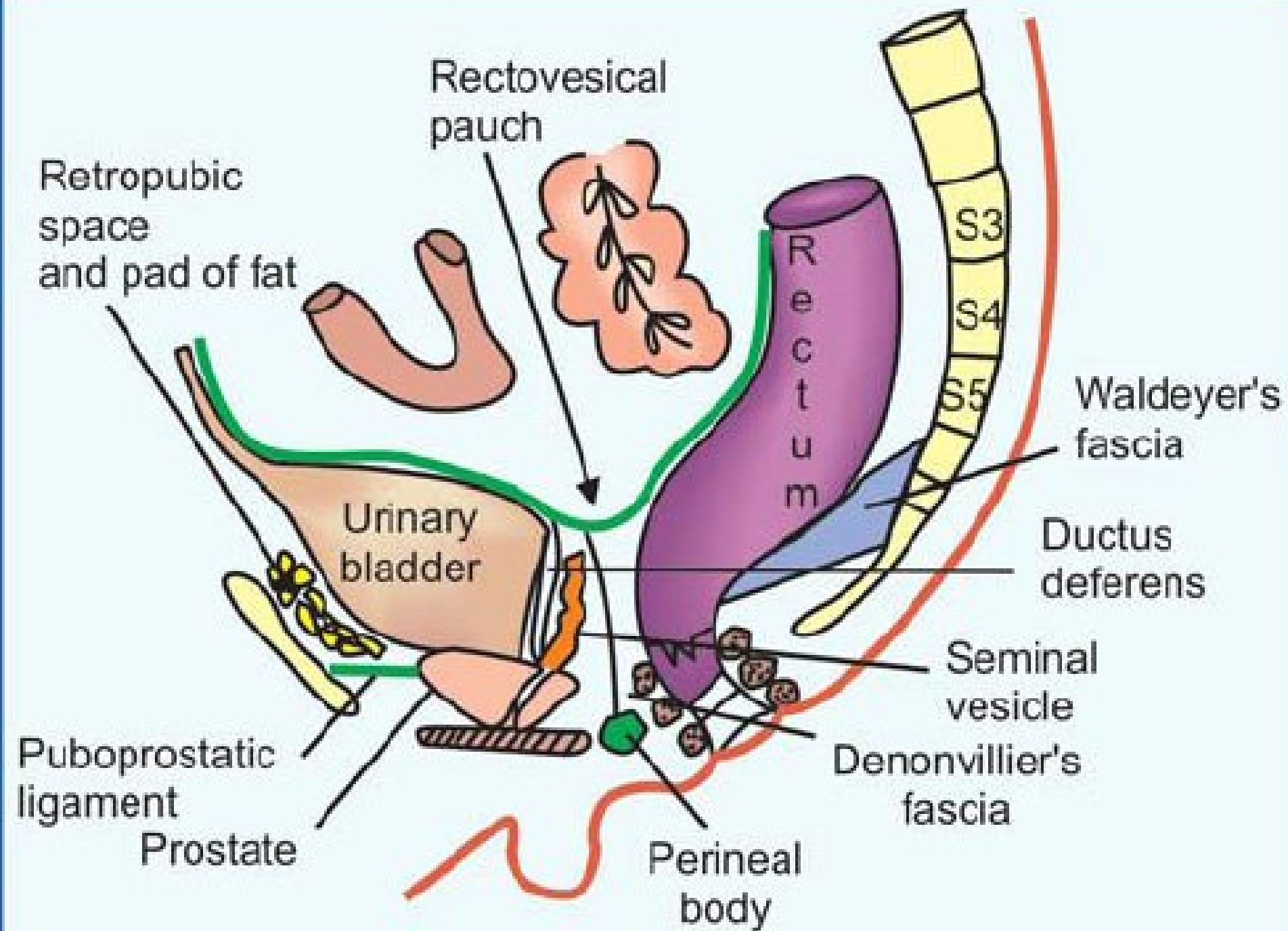
2 angles : apex : directed upwards
neck : directed downwards



Relations of UB in Male

- (A) Apex (anterior angle)
- (B) Inferolateral surface
- (C) Anterior border (the meeting of 2 inferolateral surface)
- (D) Superior surface
- (E) Posterior surface (Base)
- (F) Neck (inferior angle)





Relations of UB in Male

(A) Apex (anterior angle) :

lies behind the upper border of the symphysis pubis & give attachment to the median umbilical ligament.

(B) Anterior border

(the meeting of 2 inferolateral surface) :
is related to retropubic fat , separating it from the symphysis pubis.

Relations of UB in Male

(C) Inferolateral surface: has no peritoneal covering & related to:

1- retropubic space (Retzius cave)
containing fat

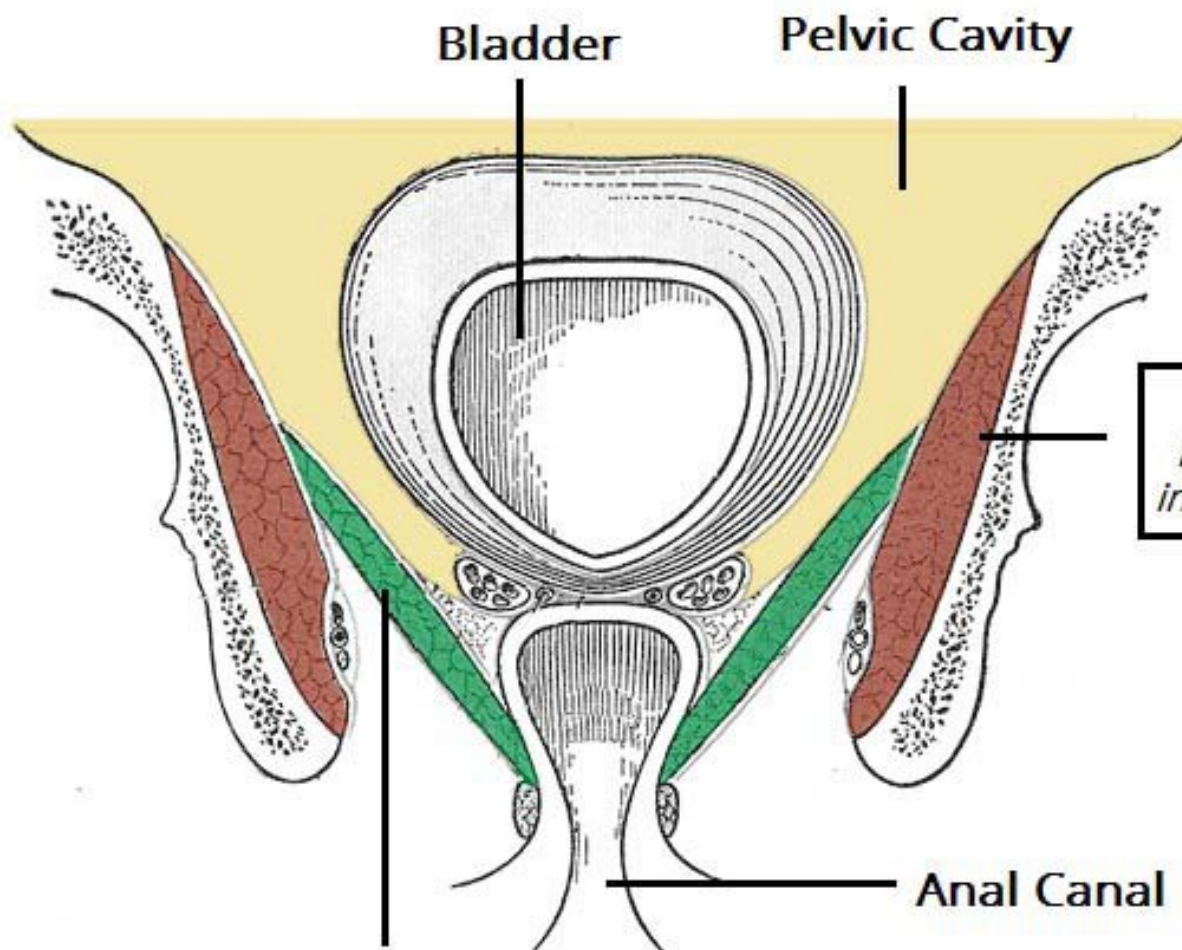
2- obturator internus muscle

3- levator ani muscle

(D) Superior surface : is covered by peritoneum & related to

1- pelvis (sigmoid) colon

2- coils of ileum



Bladder

Pelvic Cavity

Lateral Wall

Formed by obturator internus and piriformis

Anal Canal

Pelvic Floor

Formed by the levator ani and the coccygeus



teachmeanatomy

The #1 Applied Human Anatomy Site on the Web.

Relations of UB in Male

(E) Posterior surface (Base) :

- Its upper $\frac{1}{2}$ an inch is covered by peritoneum.
- It is related to rectum but separated from it by:
 1. Rectovesical pouch containing coils of ileum „ in upper part.
 2. Vasa deferentia & seminal vesicles „ in lower part

Relations of UB in Male

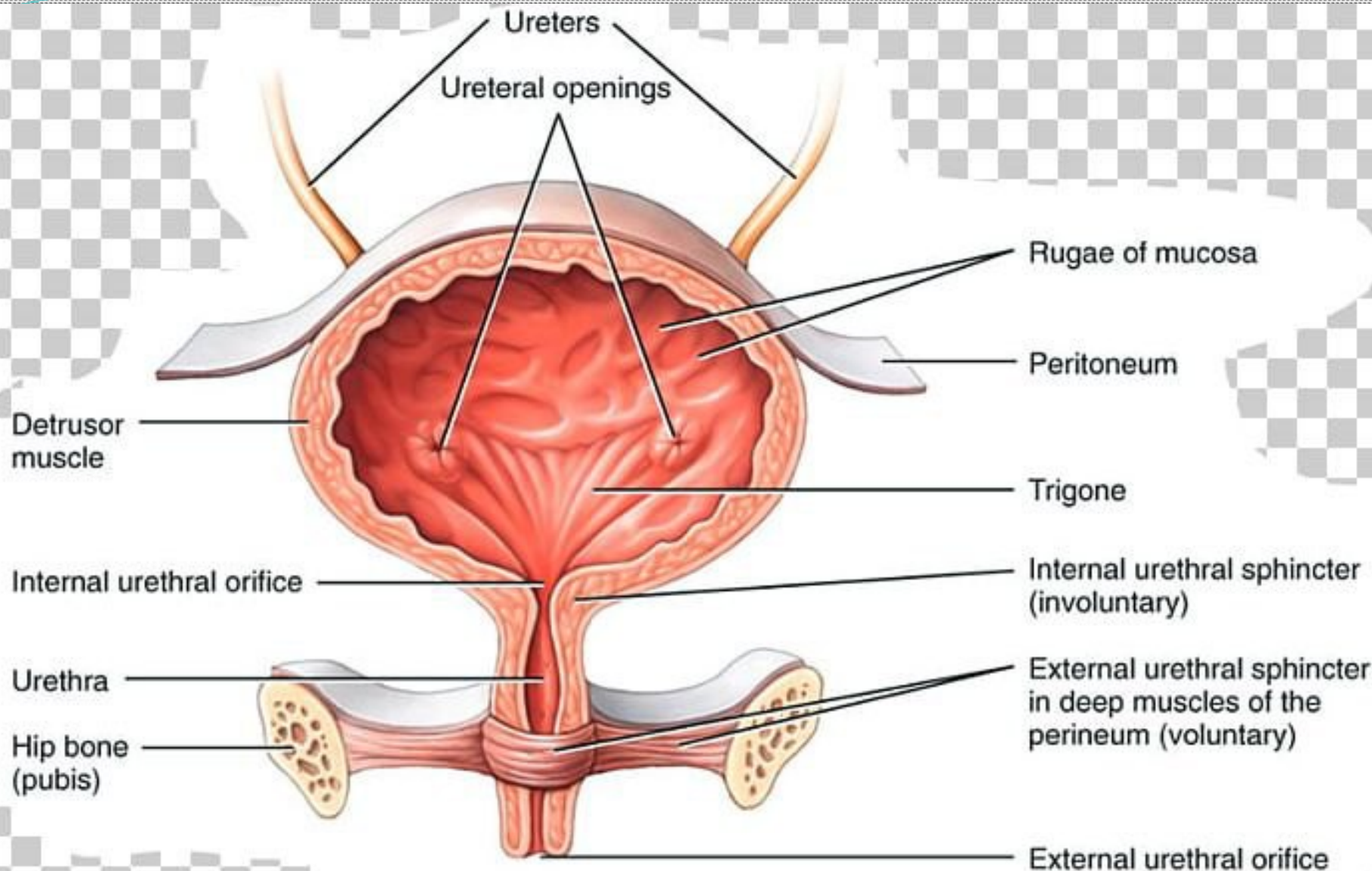
(F) Neck (inferior angle) :

the lowest & most fixed part of bladder :

It lies 1 ½ inch behind the lower border of symphysis pubis .

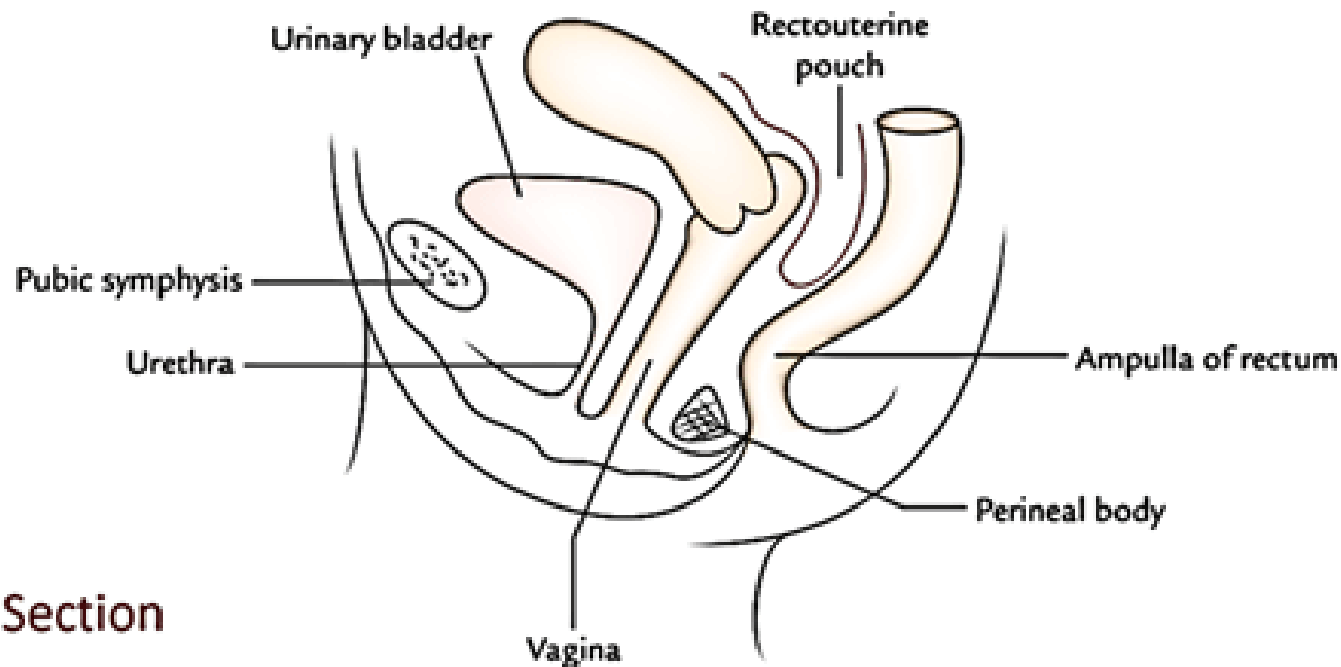
It is pierced by internal urethral meatus.

It rests on base of prostate gland.



Anterior view of frontal section

Relations of UB in Female



Sagittal Section

Relations of UB in Female

- (A) Apex (anterior angle)
- (B) Inferolateral surface
- (C) Anterior border

Have the same relations as in the
Male

Relations of UB in Female

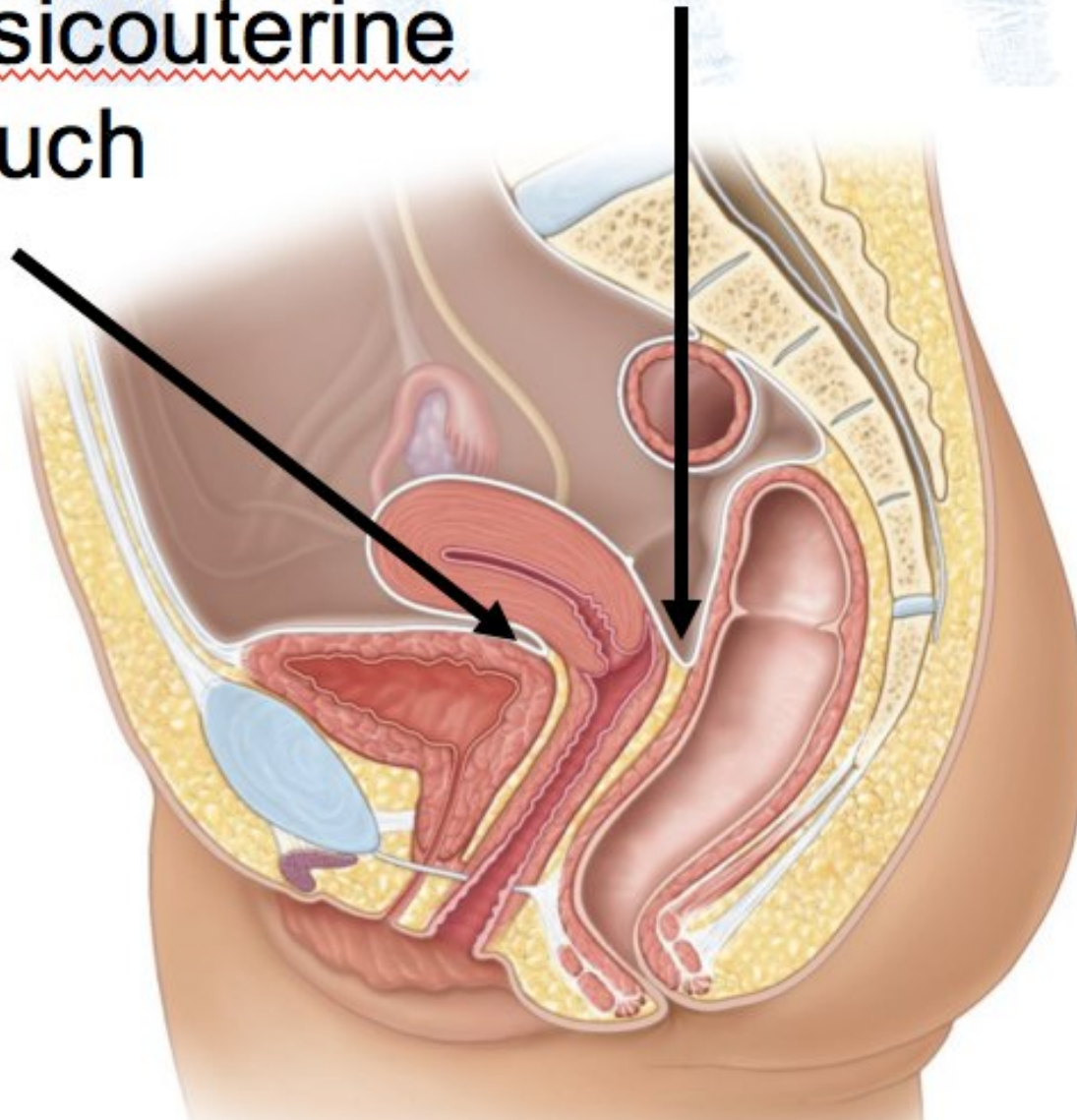
(D) Superior surface :

Its greater part is covered by peritoneum & related to anterior (vesical) surface of uterus with **vesico-uterine pouch** pouch in-between.

Its most posterior part is devoid of peritoneum & is related to supravaginal part of cervix.

rectouterine
pouch

vesicouterine
pouch



Relations of UB in Female

(E) Posterior surface (base) : is devoid of peritoneum & related to upper part of anterior vaginal wall .

(F) Neck (inferior angle) :

Rest on the pelvic fascia

Gives attachment to pubo-vesical ligament.

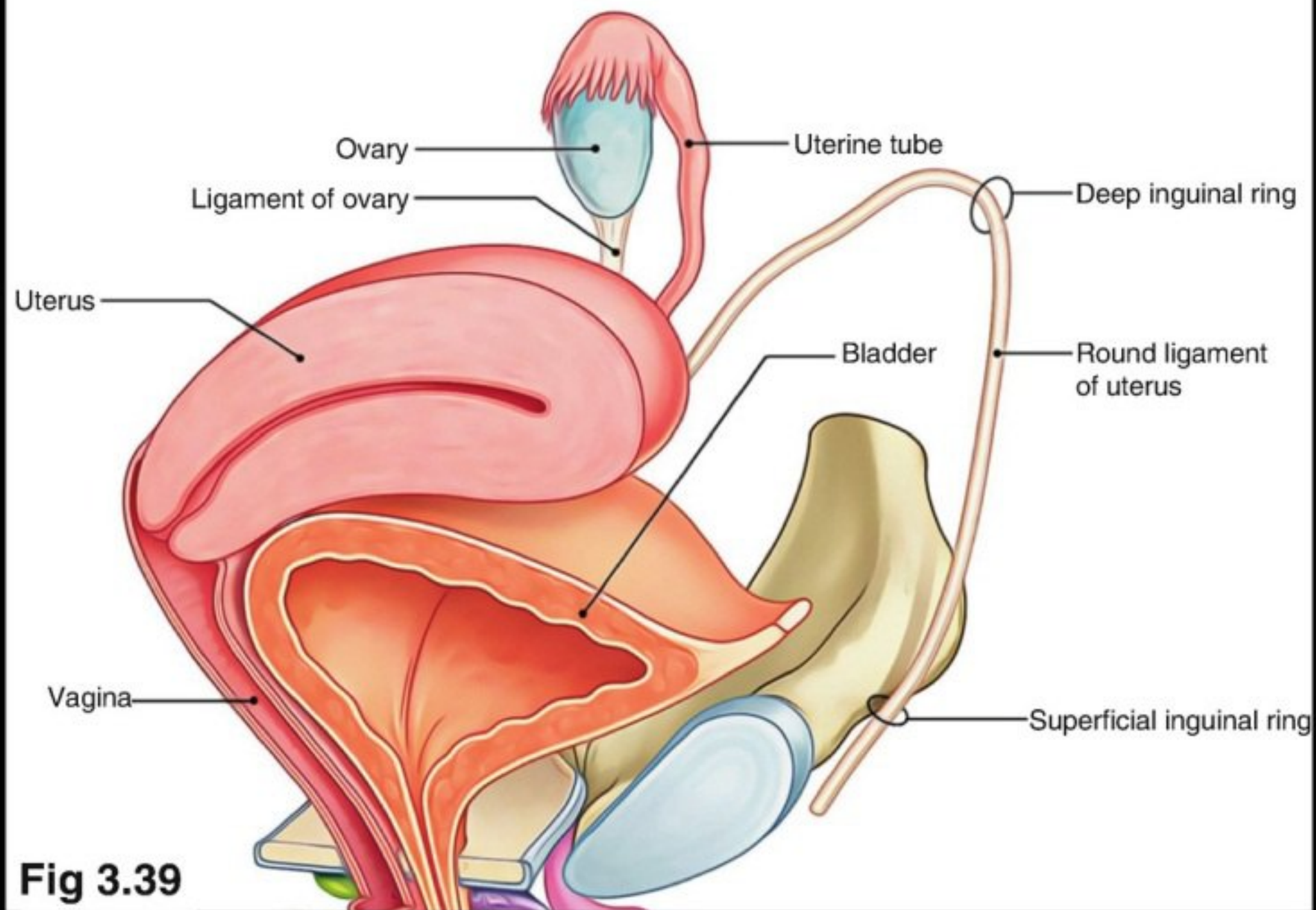
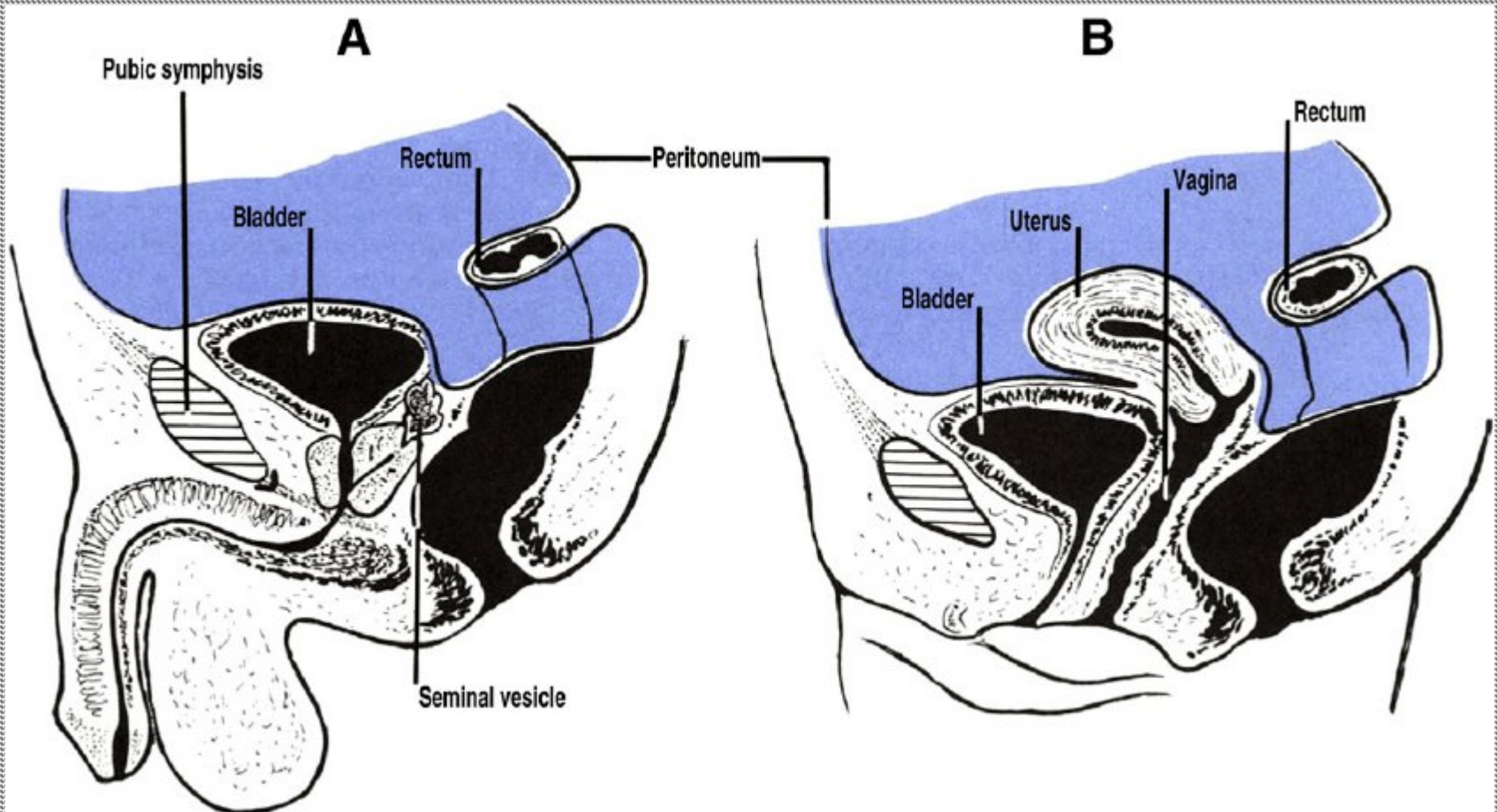


Fig 3.39

Peritoneum of UB

In Male	In Female
It covers the superior surface & the upper part of posterior surface (base) then reflected into the rectum forming the recto-vesical fossa.	It covers the superior surface only then reflected into the anterior surface of the uterus forming the utero-vesical pouch.

Peritoneum of UB



Ligaments of the bladder

(A) True ligaments :

1- Median umbilical ligament (obliterated urachus) : extend from the apex of bladder to inner aspect of umbilicus .

2- Puboprostatic lig. (pubo-vesical in female) :

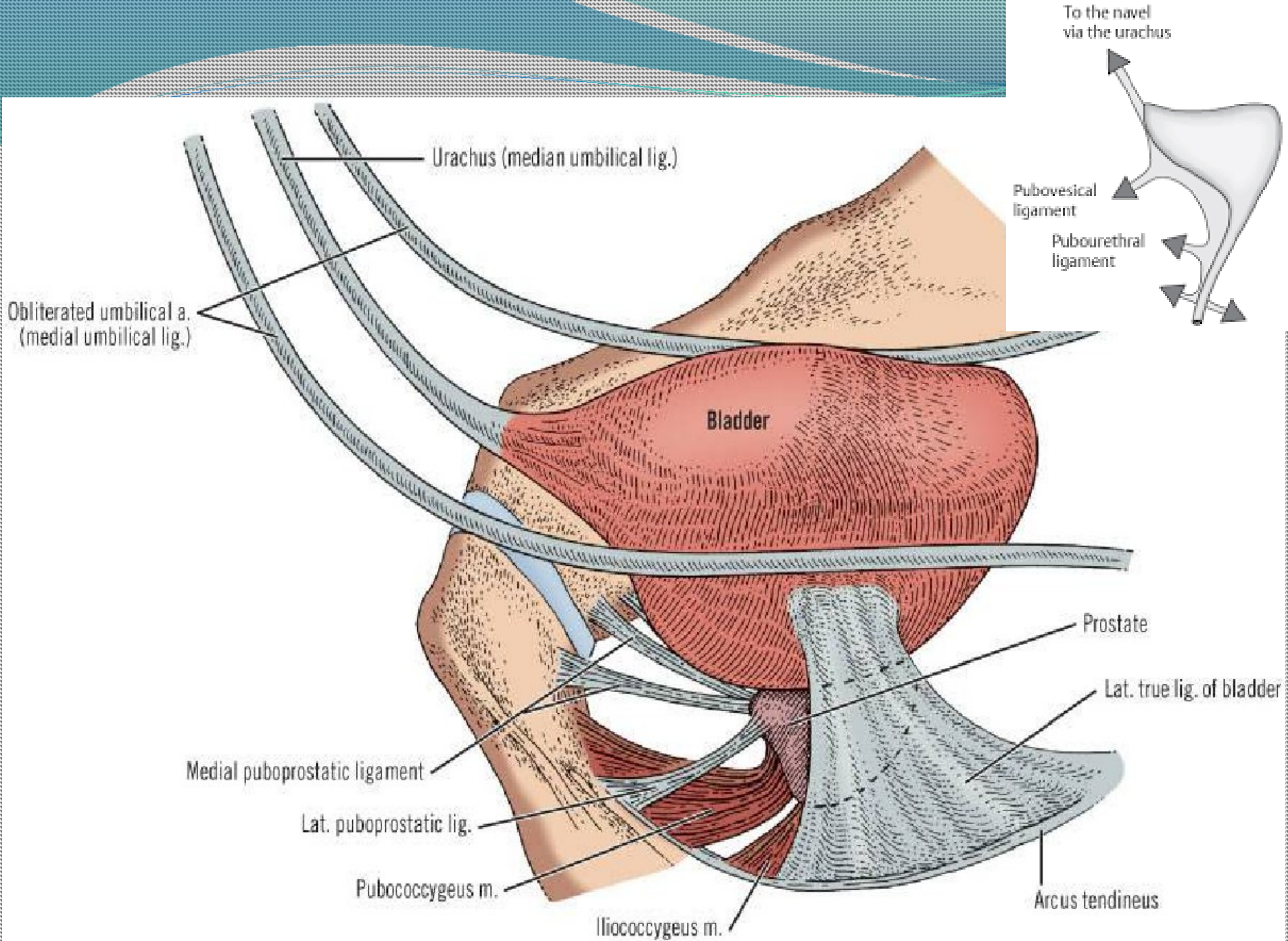
- They are 2 ligaments on each side (med & lat)
- They extend from back of pubis to prostatic fascia (in male) or neck of bladder

Ligaments of the bladder

(A) True ligaments :

3- Posterior ligament : extends from lateral edge of base of bladder to the front of the scrotum.

4- lateral ligament : extends from the side of the bladder to the tendinous arch of the fascia covering the obturator internus muscle.



Ligaments of the bladder

(B) False ligaments :

they are peritoneal folds which include :

1- median umbilical fold :

cover median umbilical Ligament.

2- medial umbilical folds (Right & Left) :

cover obliterated umbilical art.

Ligaments of the bladder

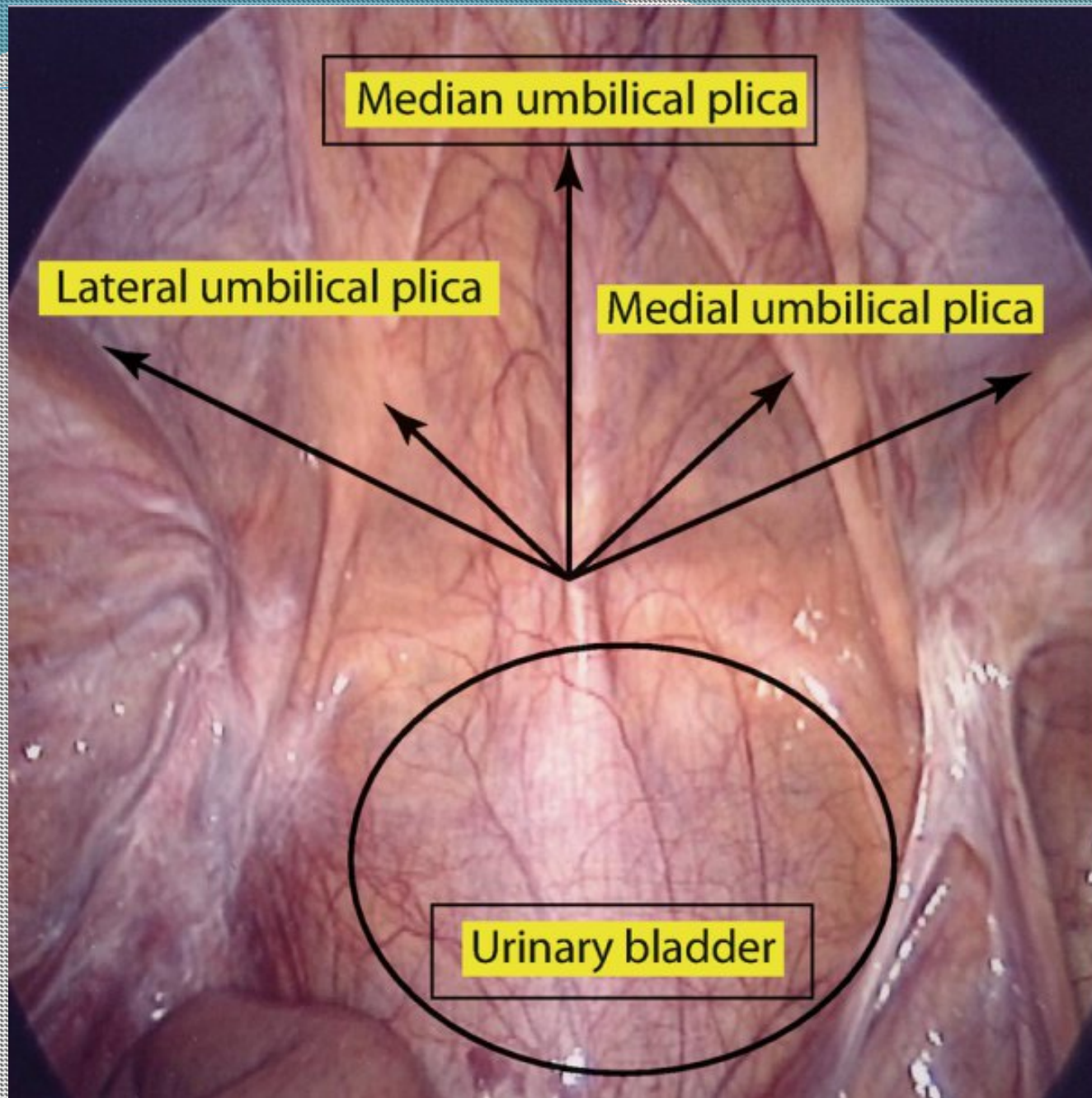
(B) False ligaments :

3- Lateral false ligament :

is reflection of peritoneum from the side of the bladder to the side of pelvis

4- Posterior false ligament (sacrogenital fold):

Is a peritoneal fold extending from the side of the bladder to the front of the sacrum.



Interior of the bladder

Mucosa shows fold (rugae) except the trigone which is smooth .

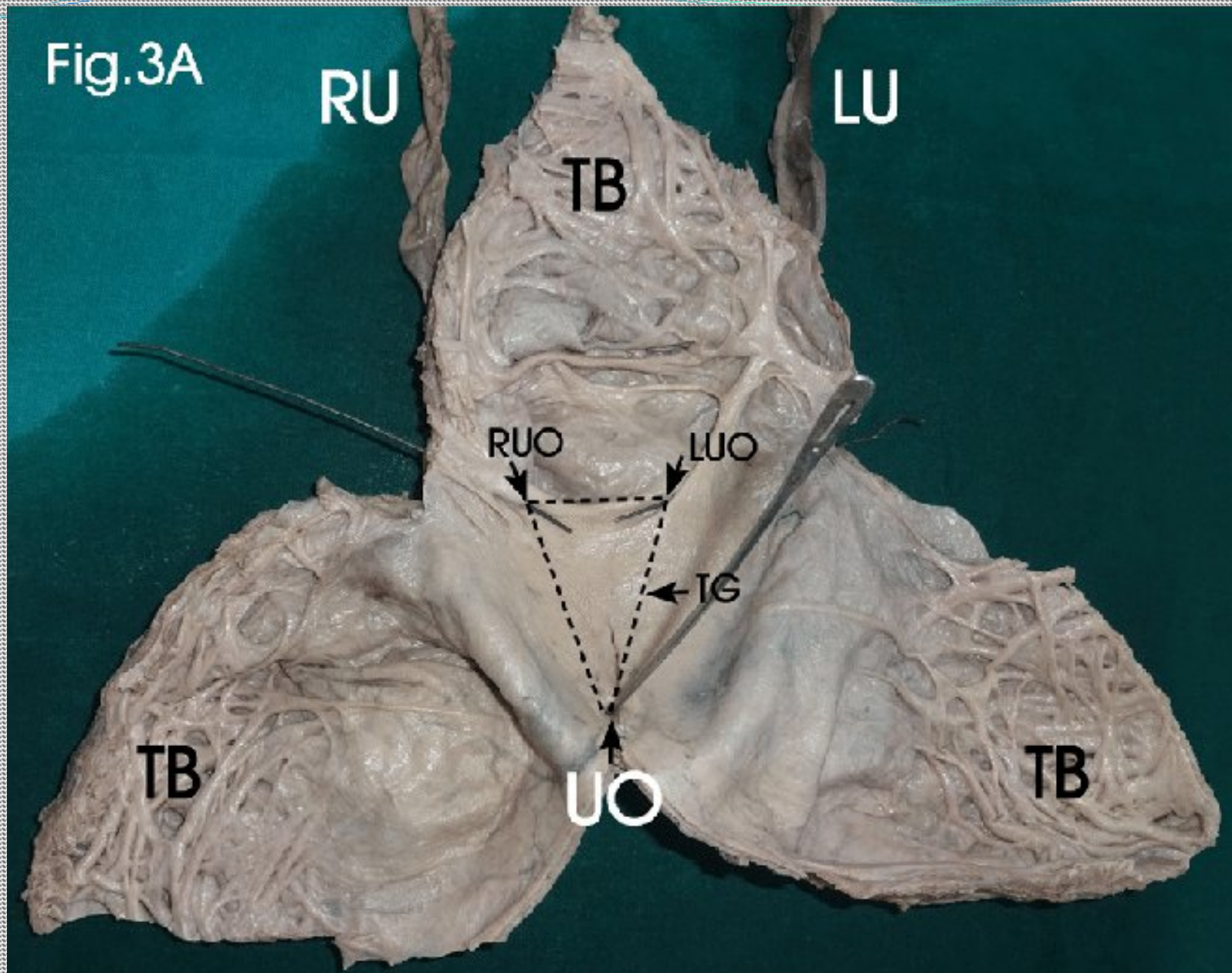
the Trigone :

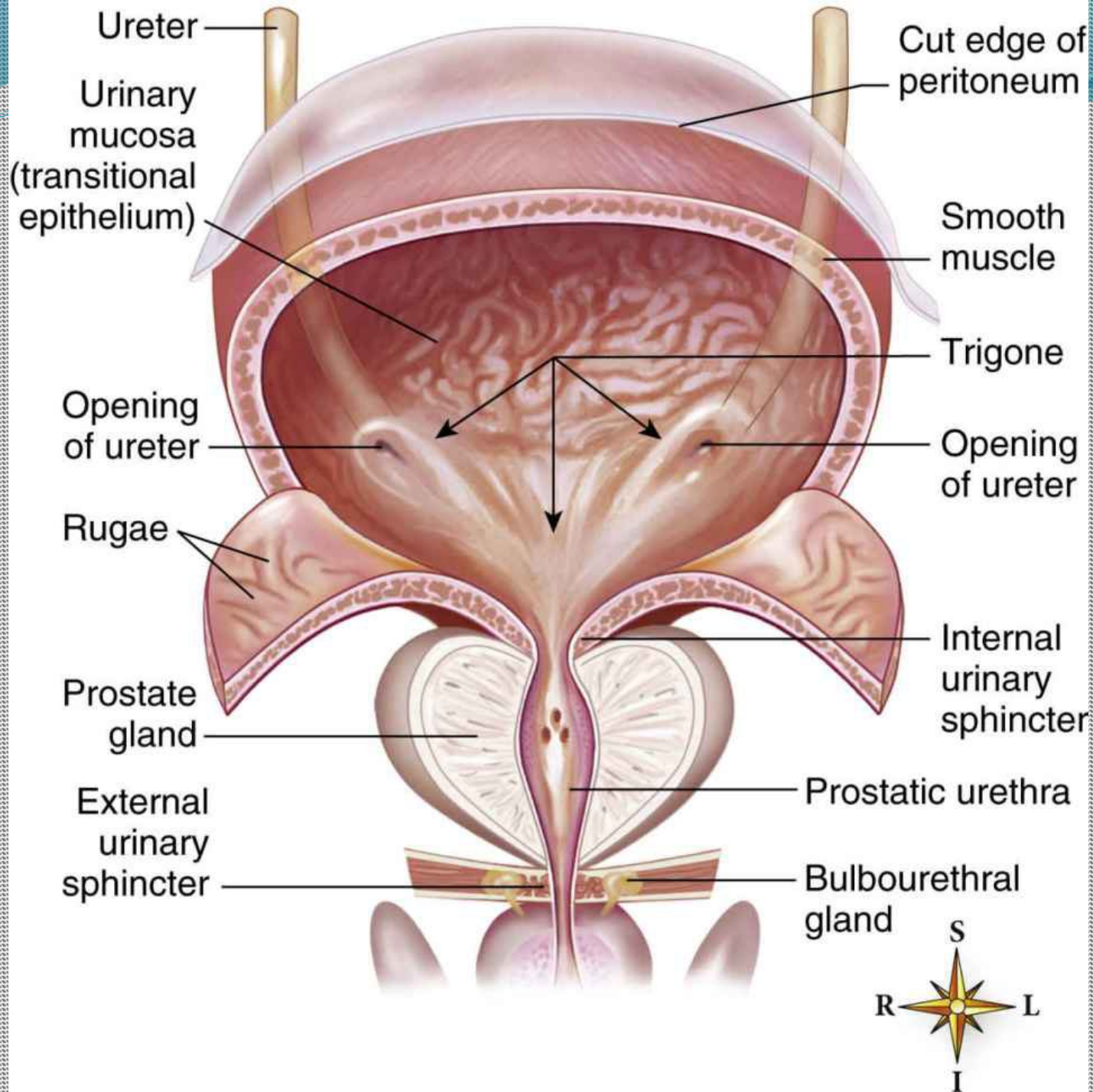
Is a triangular area on the inner aspect of the posterior wall of bladder

It is bounded by 3 lines connecting the 2 ureteric orifices & internal urethral meatus.

- Is shows : smooth mucosa + inter-ureteric ridge + uvula vesica + internal urethral meatus

Fig.3A





Interior of the bladder

Internal urethral meatus :

is situated at the apex of trigone in the most dependent part of bladder & is surrounded by the sphincter vesicae.

Arterial supply of UB

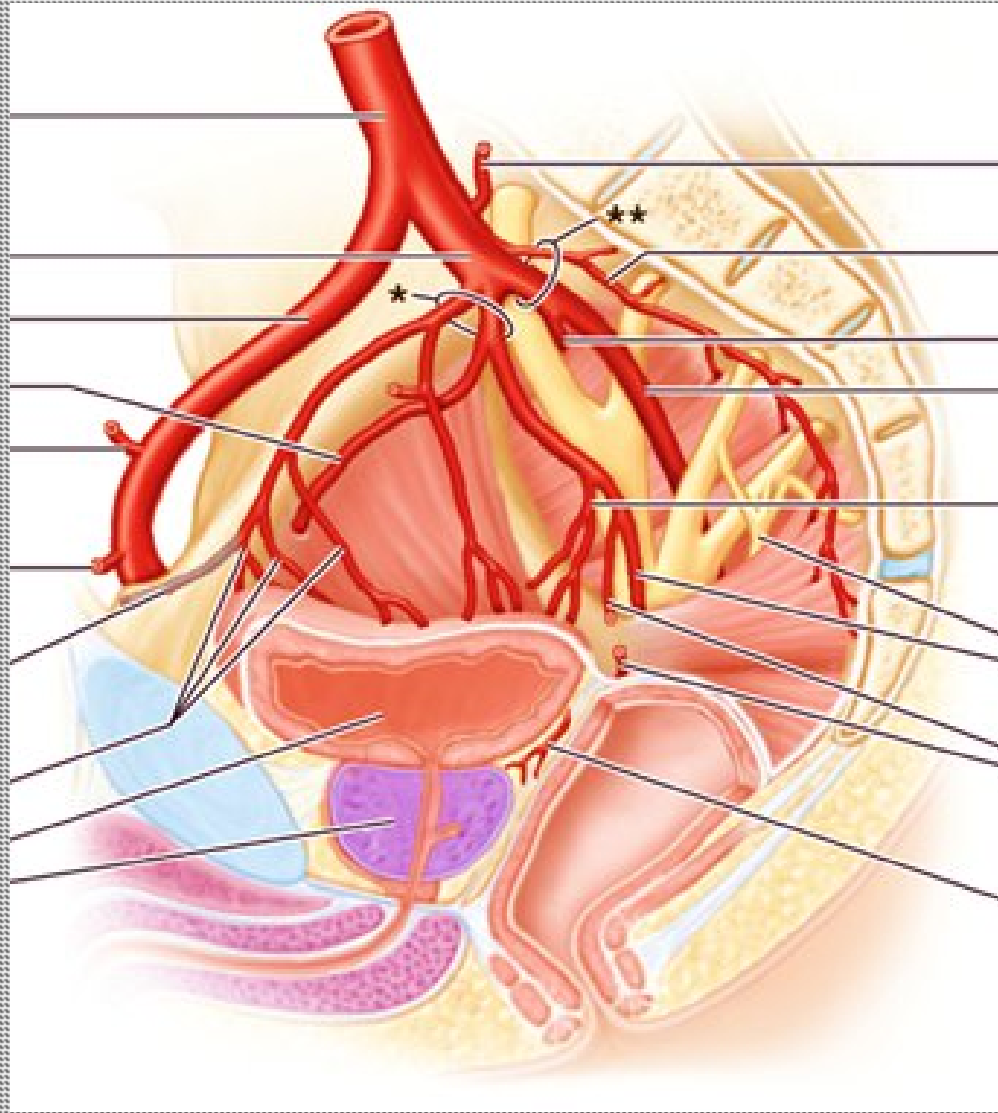
1- superior vesical art : from the proximal patent part of the obliterated umbilical artery

2- inferior vesical art (vaginal artery in female):

From anterior division of internal iliac artery.

3- additional branches arise from obturator , inferior gluteal arts. & in female from uterine artery.

Arterial supply of UB



Venous drainage of UB

The vesical veins from a plexus (vesical venous plexus) on each infero-lateral surface then drain into the internal iliac veins.

Lymphatic drainage of UB

Into the external iliac LNs

Nerve supply of bladder

1- Sympathetic : from T11, 12 & L1, 2 segments of the spinal cord.

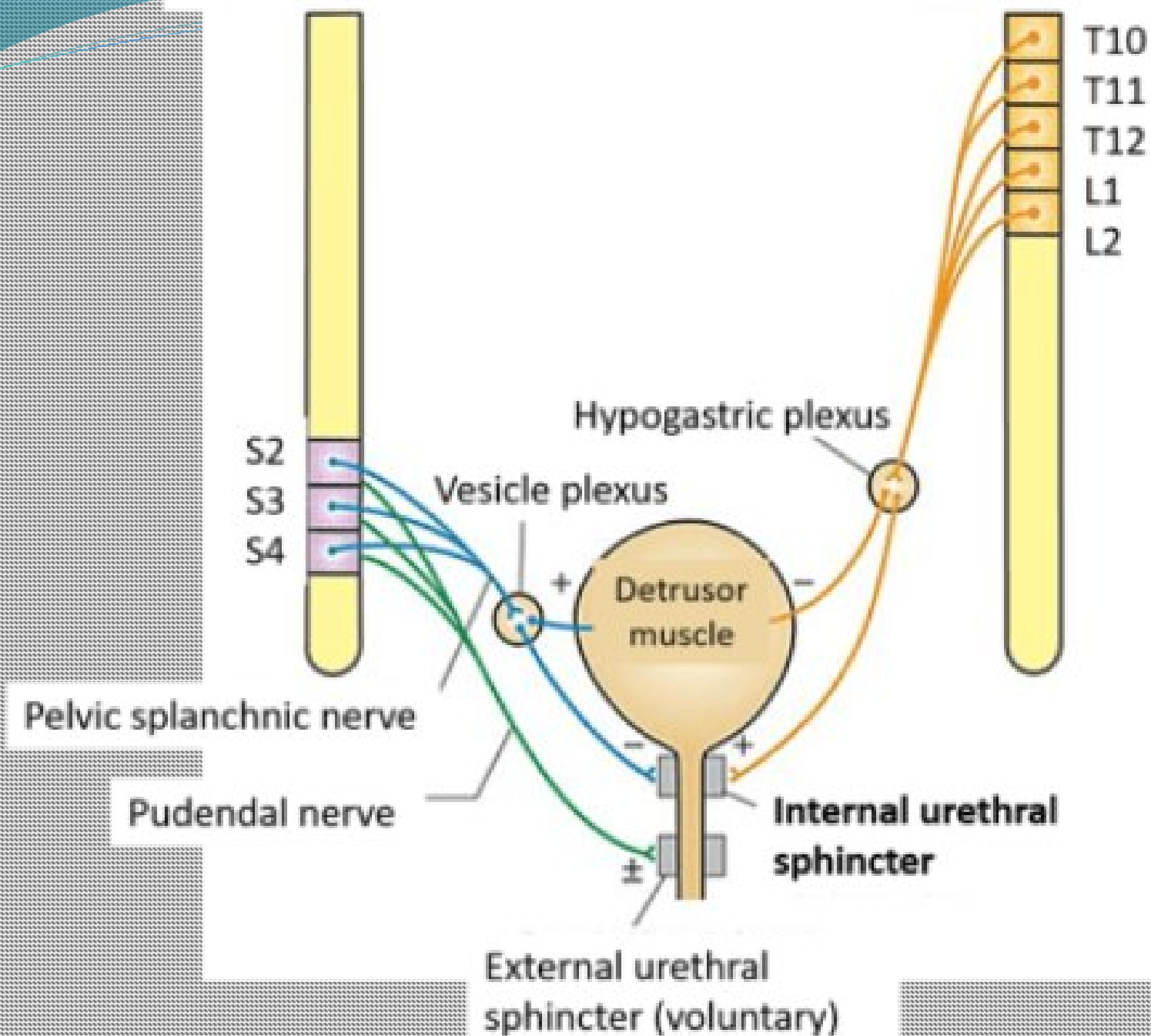
It is inhibitory to the muscular wall & motor to the sphincter vesicae .

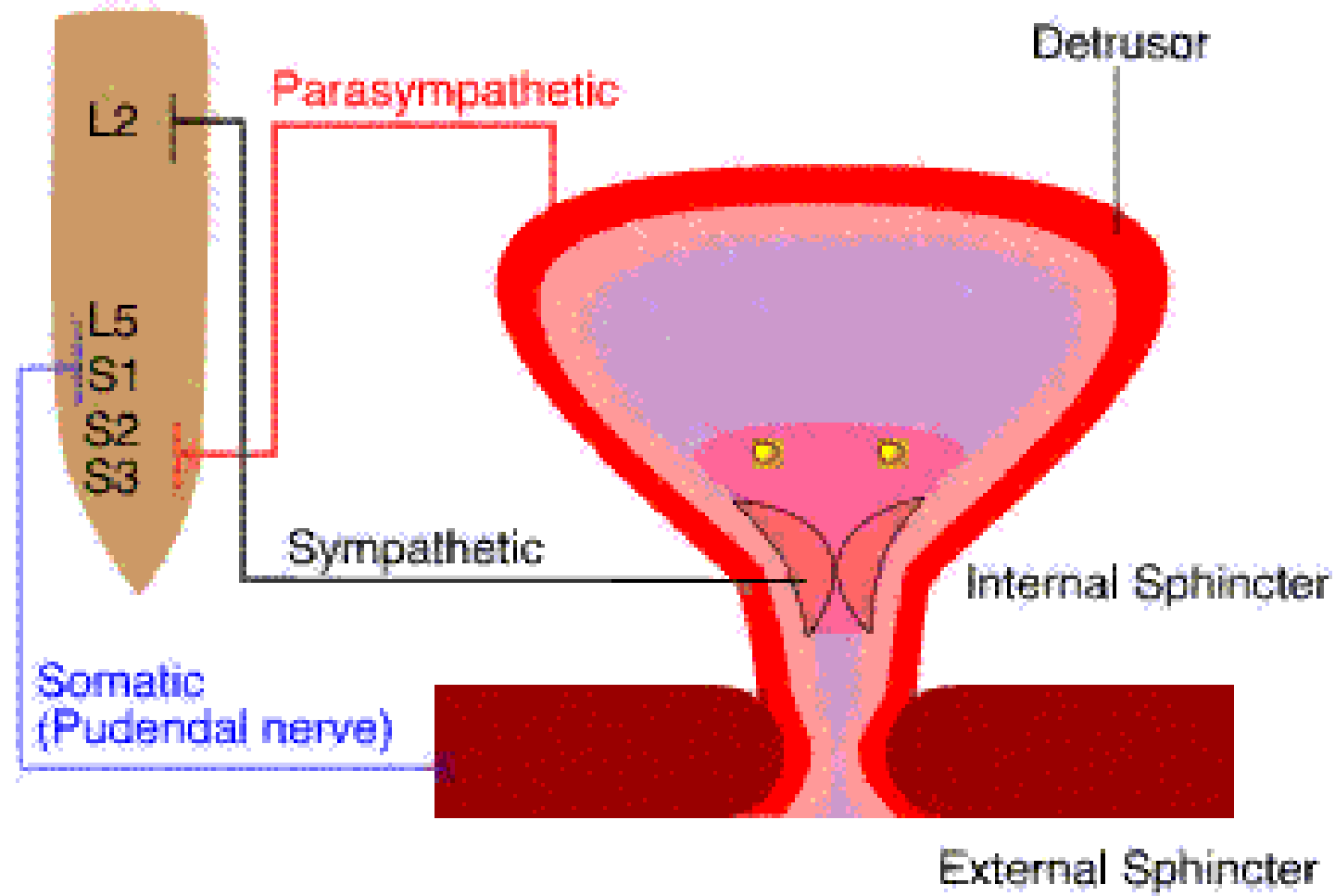
2- Parasympathetic: from pelvic splanchnic nerve (S2,3,4).

It is motor to muscular wall & inhibitory to sphincter vesicae.

Parasympathetic

Sympathetic







MALE URETHRA

Length : 8 inches (20 cm)

Shape : S-shaped

Extension :

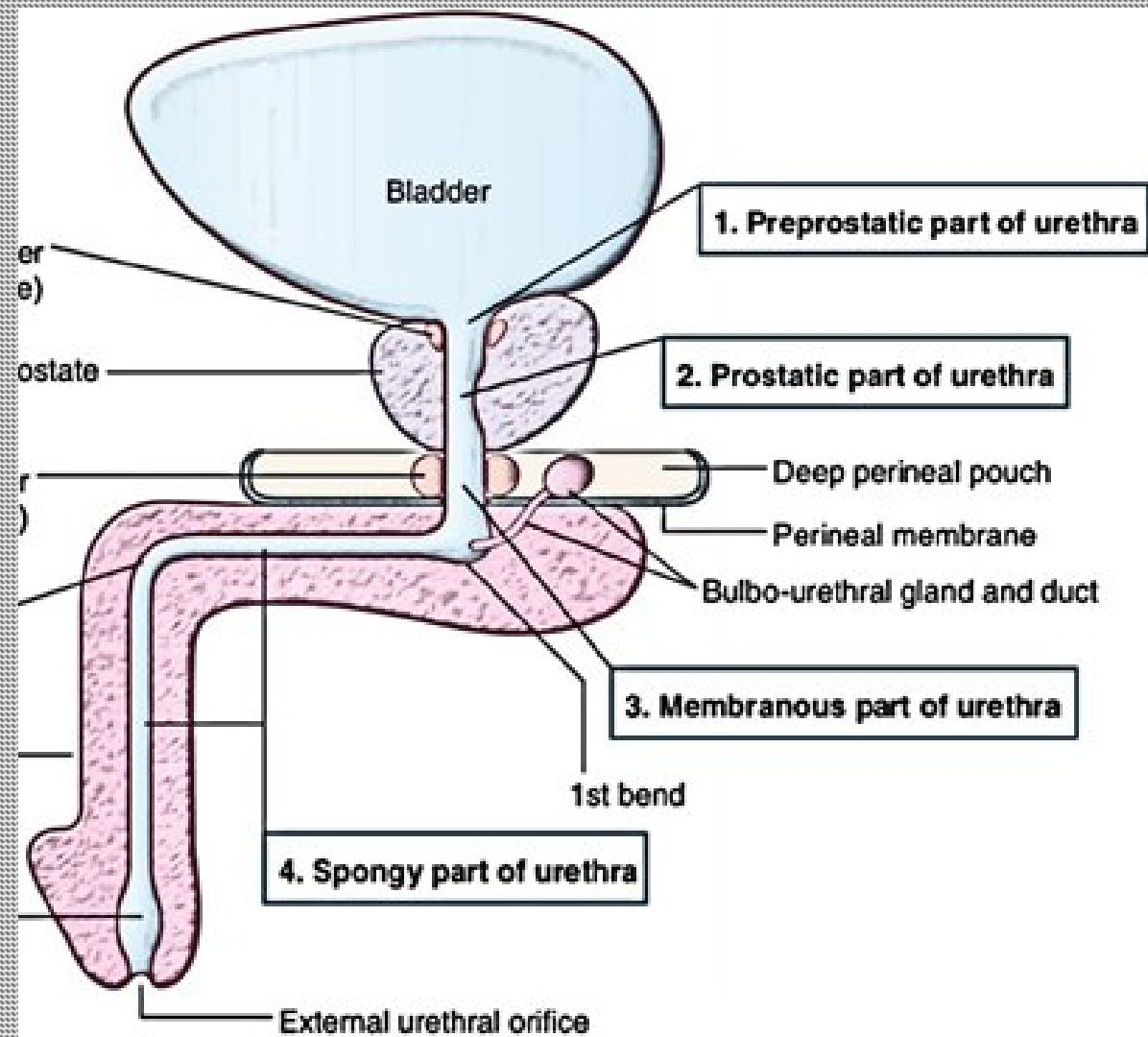
It begins at the internal urethral
meatus of bladder

It ends at the external urethral
meatus at the tip of glans of penis

Parts of Male Urethra

It has 4 parts

1. Pre-prostatic
2. Prostatic
3. Membranous
4. Penile



(1) Pre-prostatic part : ($\frac{1}{2}$ inch)

Site : extends vertically from internal urethral meatus to superior aspect of prostate

Character : has a stellate lumen

Relations : is surrounded , together with bladder neck , by the internal urethral sphincter (sphincter vesicae) formed of circular muscle fibers supplied by sympathetic fibers . **This sphincter contracts at ejaculation preventing the**

(2) Prostatic part : (1 ½ inches)

Site :

- it traverses the prostate gland from base to apex , lying closer to the anterior than posterior surface of the gland
- It emerge from prostate slightly anterior to its apex .

(2) Prostatic part : (1 ½ inches)

Character :

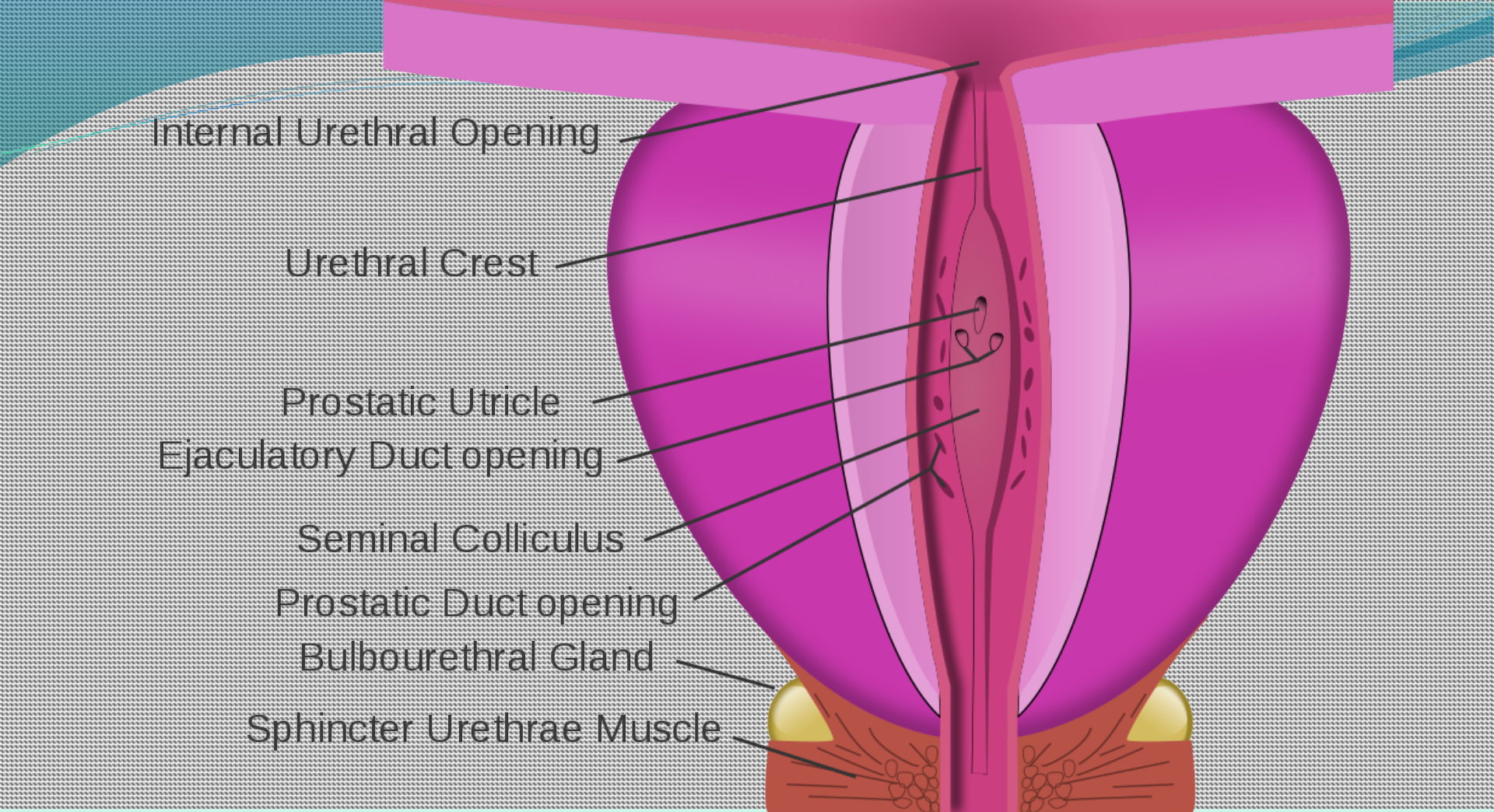
The widest & most dilatable part of the urethra.

The posterior wall of its lumen shows the following features :

Urethral crest ,, median longitudinal elevation

Seminal colliculus ,,

Prostatic sinus ,, shallow groove around urethral crest receive prostate openings



Internal Urethral Opening

This diagram shows a cross-section of the male urethra and its associated structures. The urethra is shown as a central canal passing through the prostate gland. The prostate is depicted as a large, pink, glandular structure. The urethra enters the prostate at the internal urethral opening, passes through the prostatic utricle, and then continues through the prostatic duct opening. The ejaculatory ducts are shown opening into the prostatic utricle. The seminal colliculus is shown as a swelling in the middle of the urethral crest. The bulbourethral gland is shown as a small, yellow, glandular structure located below the prostate. The sphincter urethrae muscle is shown as a ring of muscle surrounding the urethra at the base of the prostate.

Urethral Crest

Prostatic Utricle

Ejaculatory Duct opening

Seminal Colliculus

Prostatic Duct opening

Bulbourethral Gland

Sphincter Urethrae Muscle

Seminal colliculus ,,

Swelling in the middle of urethral crest

Showing 3 openings :

- opening of prostatic utricle (in middle)

- 2 lateral openings of ejaculatory ducts (on each side of utricle)

(3) Membranous urethra: ($\frac{1}{2}$ inch)

Site : it descends downward piercing 2 membranes (pelvic fascia + perineal membrane)

Character : the narrowest & least dilatable part of the urethra .

Relations : surrounded by sphincter urethra muscle

(4) Penile “spongy” urethra: (6 inches)

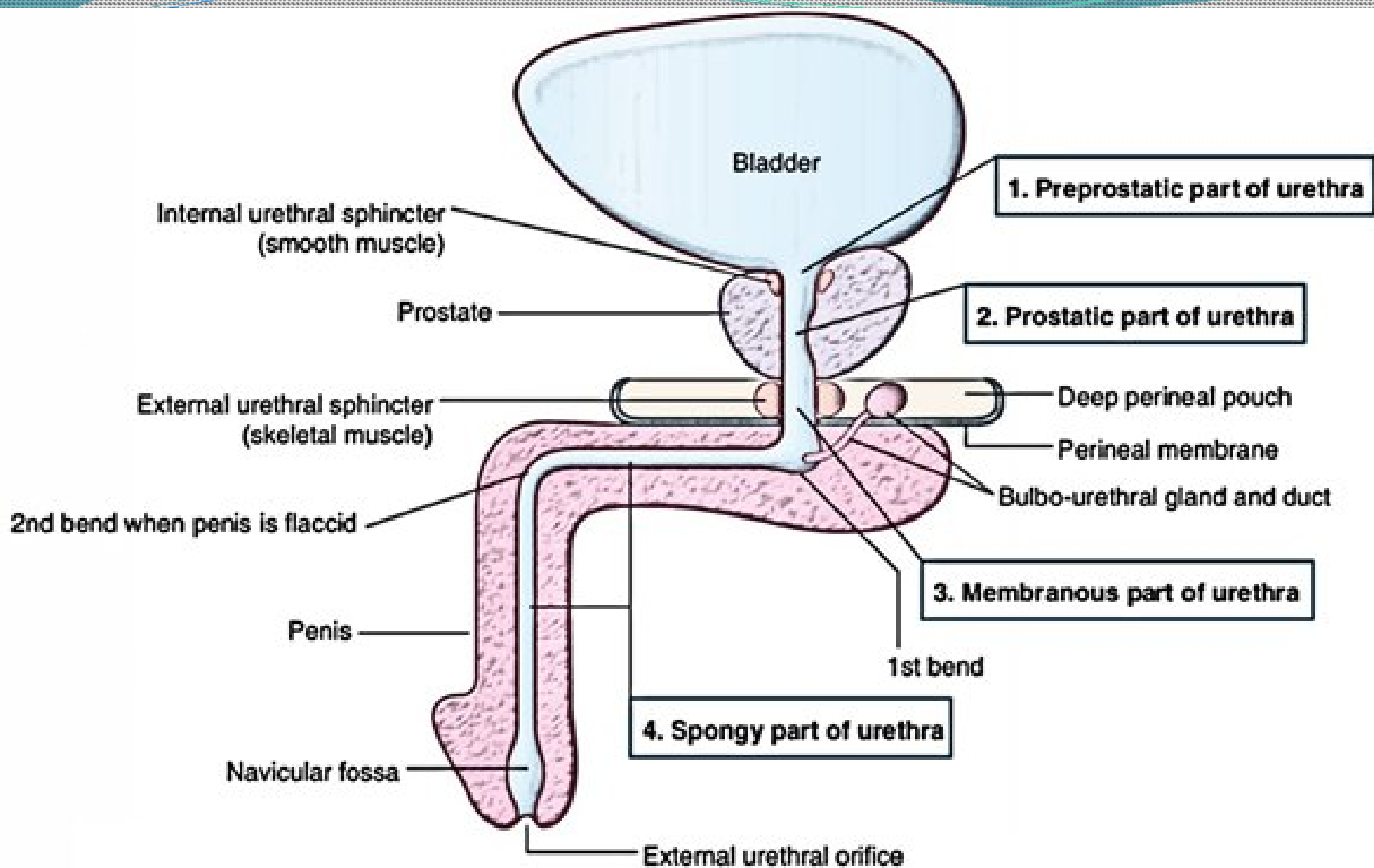
Site : it begins at the end of membranous urethra , traverses bulb of penis , the whole length of the corpus spongiosus & the glans penis to end at external urethral meatus

Character : - It is narrow transverse slit (when empty)

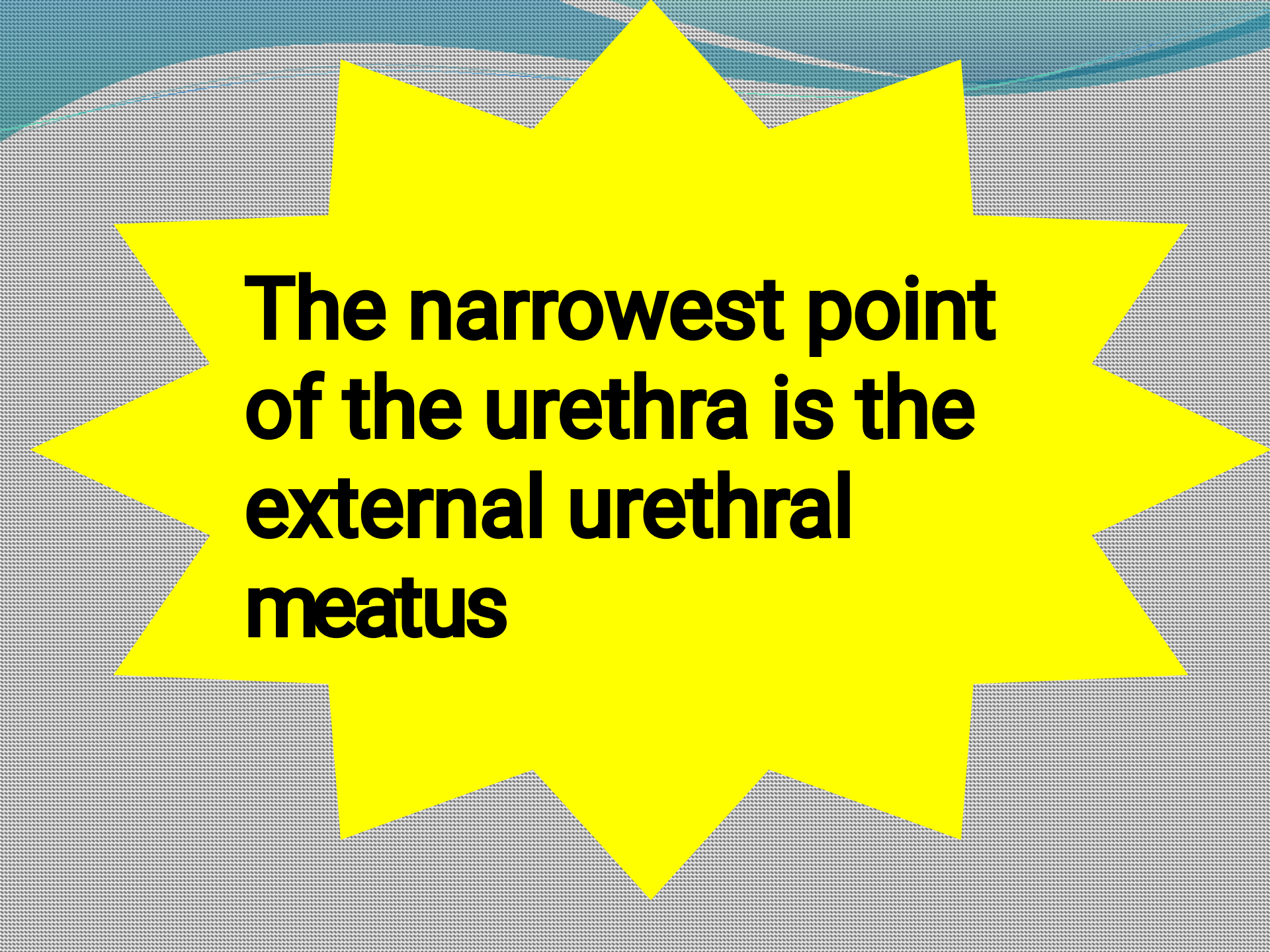
- It has a dilatation at its beginning (intrabulbar fossa)

- It has a dilatation at its end (navicular fossa)

It receive the openings of bulbo-urethral glands one inch below perineal membrane



Men

A large, bright yellow starburst shape is centered on the page. The background consists of a light blue sky with white clouds at the top, transitioning into a grey, textured area below. The starburst has multiple points and is the primary focus of the image.

**The narrowest point
of the urethra is the
external urethral
meatus**

Urethral sphincters

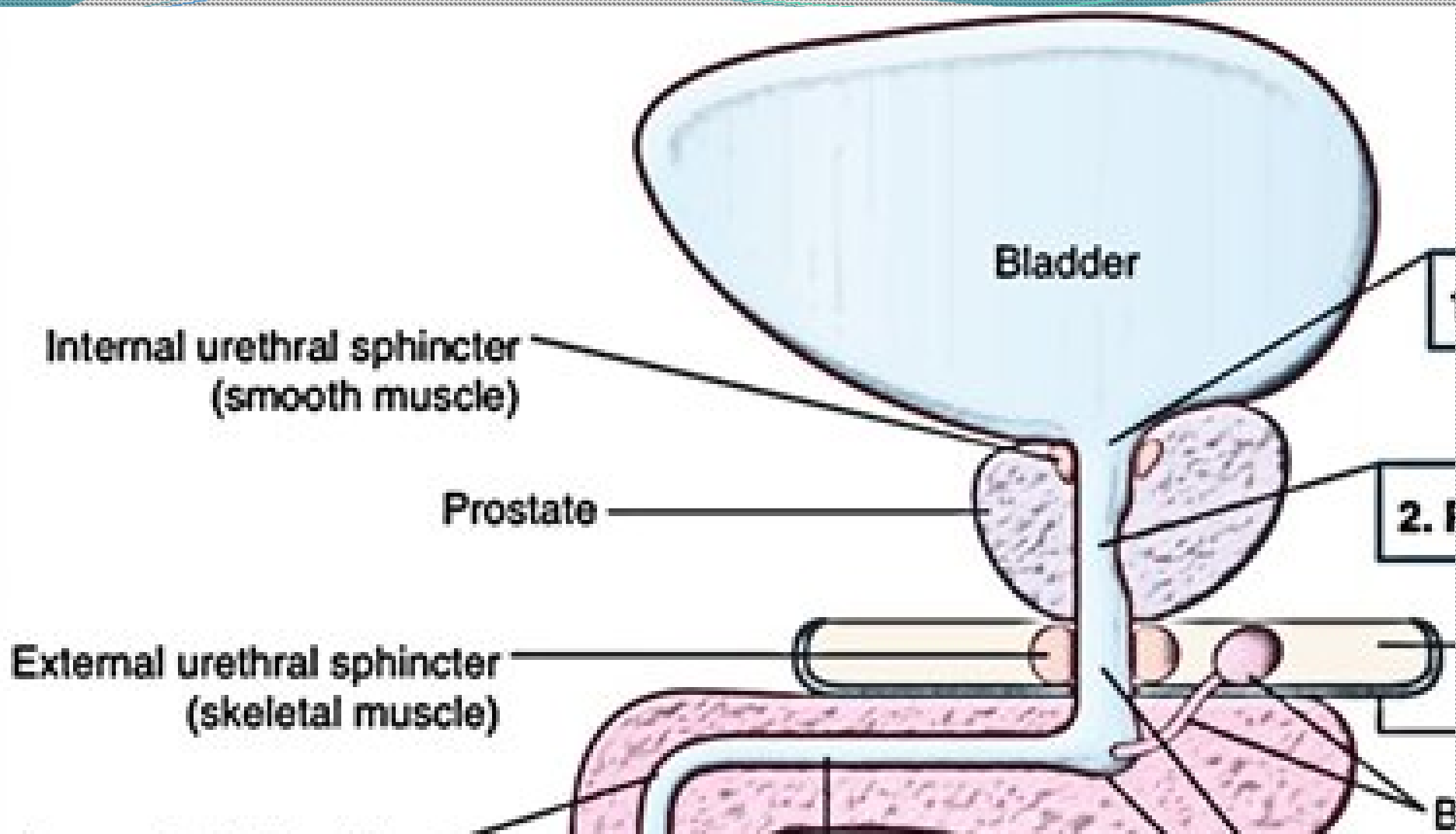
1 Internal urethral sphincter

Site	Surrounds bladder neck. pre-prostatic
Nature	Circular collar of smooth muscle fibers
N. Supply	Sympathetic fibers
Function	Prevent retrograde flow of ejaculate into the bladder

Urethral sphincters

2 External urethral sphincter

Site	Surrounds the membranous urethra in
Nature	Striated muscle fibers (skeletal muscle)
N. Supply	Perineal branch of pudendal nerve
Function	- Voluntary holding of urine - Relaxes during micturition, but contract to expel the last drops of urine or semen.





FEMALE URETHRA

Length : 4 cm

Diameter : 6 mm (wider & more dilatable than male urethra)

Begins : at internal urethral meatus 2 inch behind the middle symphysis pubis.

Course : it runs downwards & forwards , embedded in anterior vaginal wall , traversing deep perineal pouch.

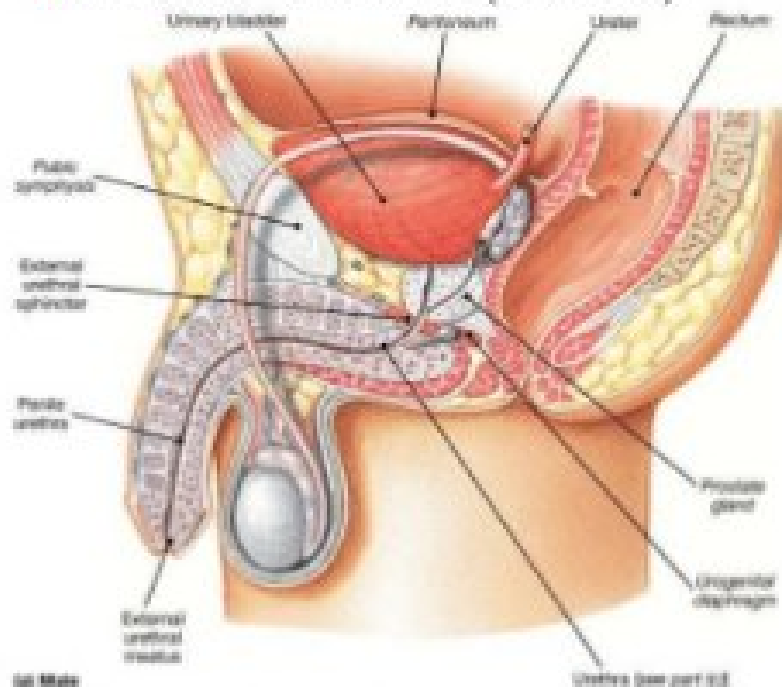
Ends : at the external urethral meatus which is a sagittal slit with 2 lips lying in the vaginal vestibule directly in front of the vaginal orifice & one inch behind clitoris.

Sphincter : the female urethra is surrounded by an internal urethral sphincter (sphincter urethrae) which is weaker than of the male.

difference

Male urethra

- 1** Long
- 2** Length= 18- 20 cm
- 3** Function—
 - i) urination
 - ii) ejaculation of semen
- 4** Course— curved (double)



Female urethra

- 1 Short,,
- 2 Length= 4 cm
- 3 Function—only urination
- 4 Course– nearly straight
- 5 Foley catheterisation is easy

