

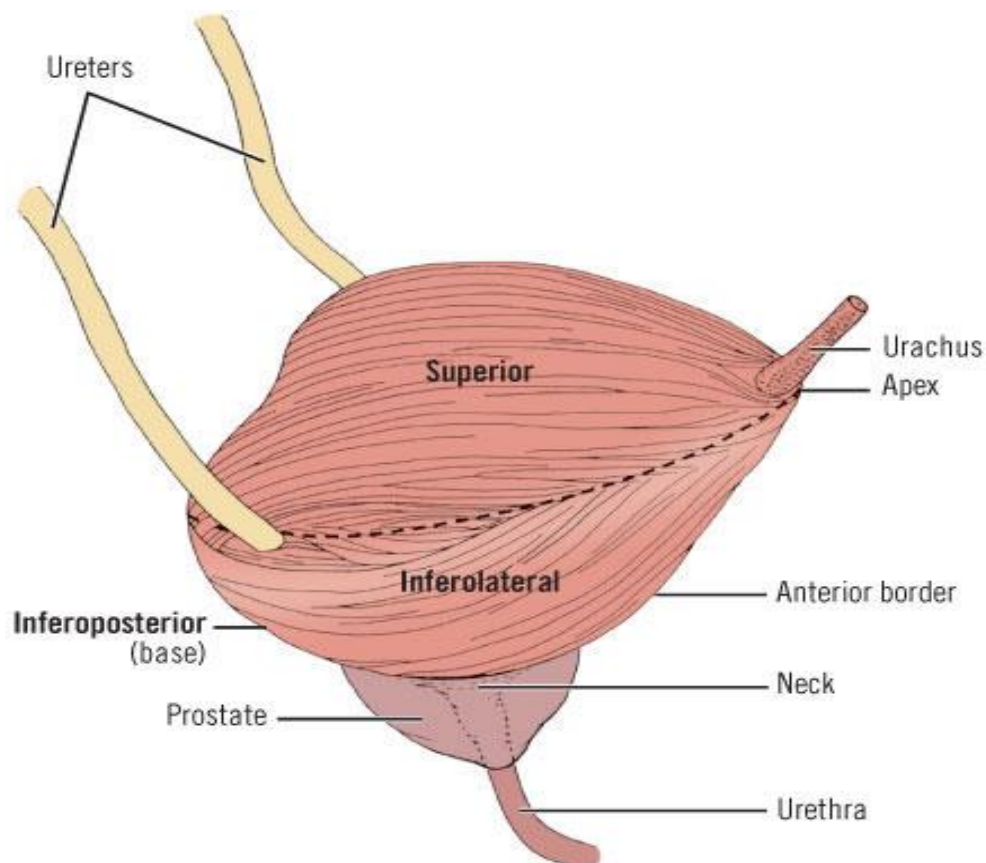
# Urinary Bladder

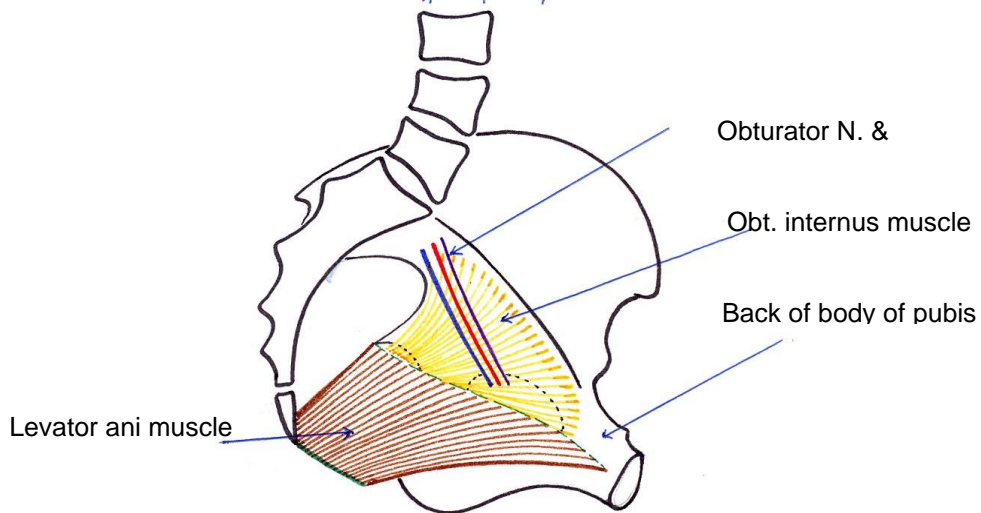
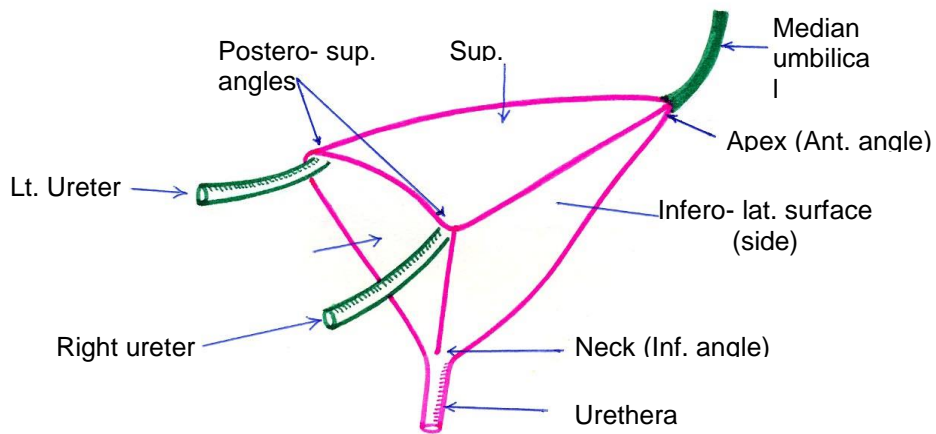
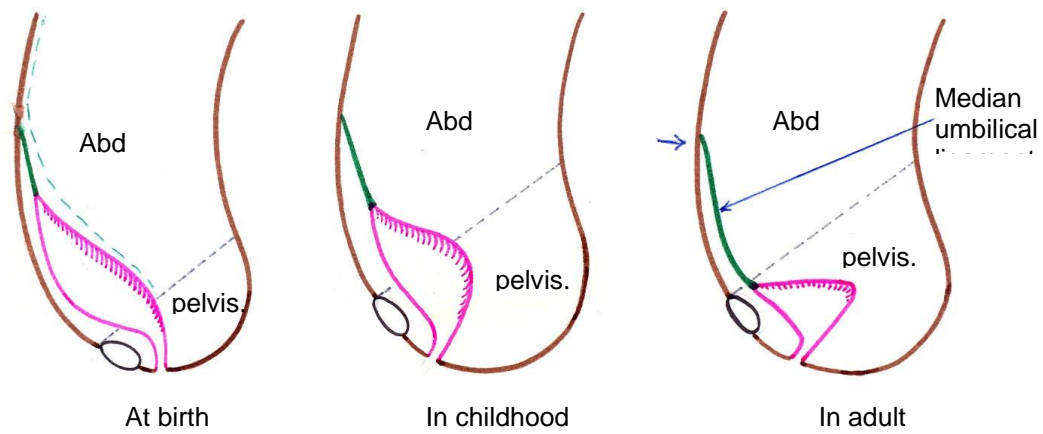
## ★ Site:

- **At birth**, it lies in the abdomen but **in adults**, it lies in the anterior part of pelvis, behind the pubic bones.
- When it is **distended** it raises upwards & strips the parietal peritoneum lining the anterior abdominal wall, coming in contact with fascia transversalis.

## ★ Shape:

- **Full** bladder is **ovoid** with a mean **capacity 300 ml**.
- When **empty** it is a 3 sided **pyramidal** which has:
  - **4 angles:** anterior angle or apex, inferior angle or neck & 2 postero- superior angles.
  - **4 surfaces:** superior surface , posterior surface or base & 2 infero-lateral surfaces.





**Relations of Infero- lat. surface (N.B. Urinary bladder is removed to see the relations)**

★ **Capacity of the bladder is average 300 cc.** .Distension of the bladder by 500 ml may be tolerated. Beyond this, distension of the bladder is painful

★ **Relations:**

**1. Superior Surface:**

- a) **In males:** Small intestine & pelvic colon.
- b) **In females:** Uterus and utero-vesical pouch.

**2. Base: (posterior surface)**

- a) **In males:** ampula of vas deferens, seminal vesicles and separated from the rectum by recto-vesicle pouch and recto-vesical (**Denonvillier's**) fascia.
- b) **In females:** Anterior wall of vagina.

**3. Infero-lateral surfaces:** Pubic bone, obturator internus, levator ani & obturator nerve & vessels.

**4. Apex: (Anterior angle)**

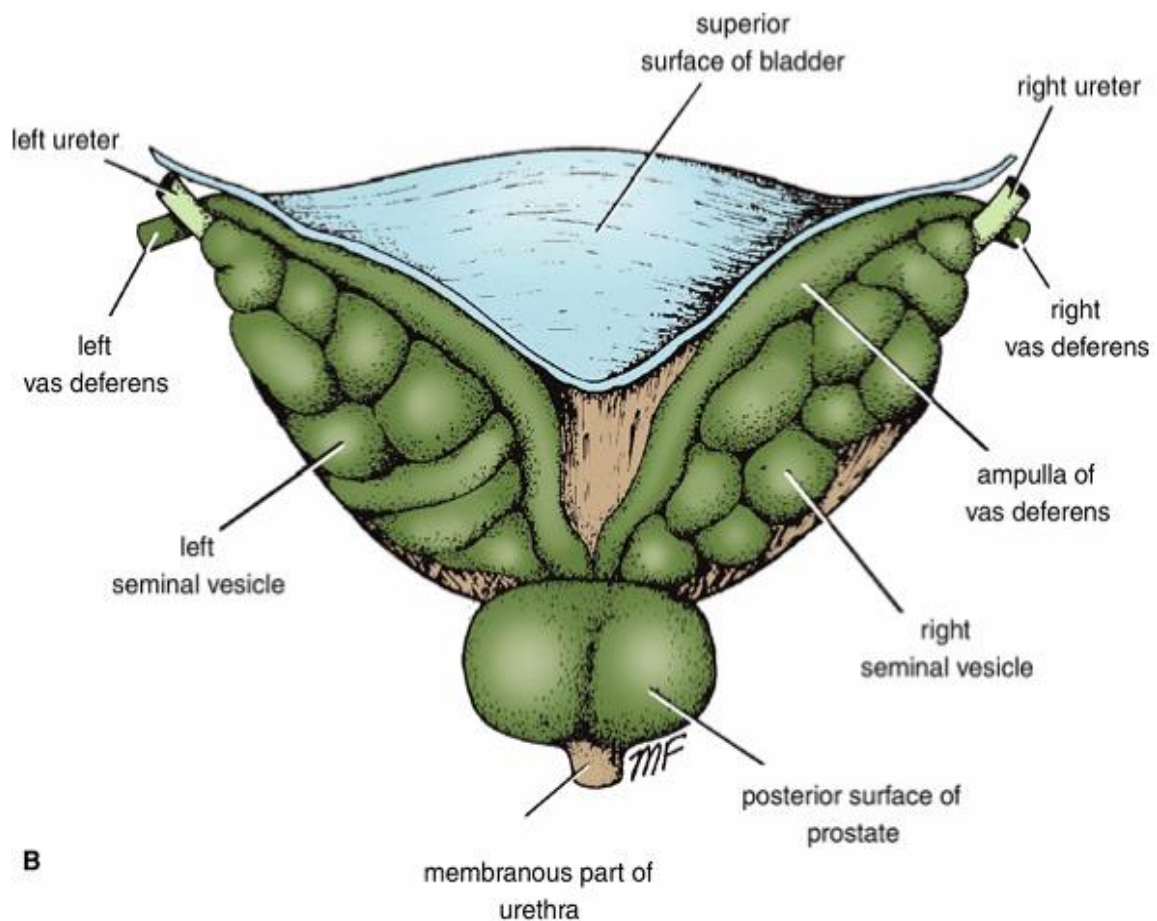
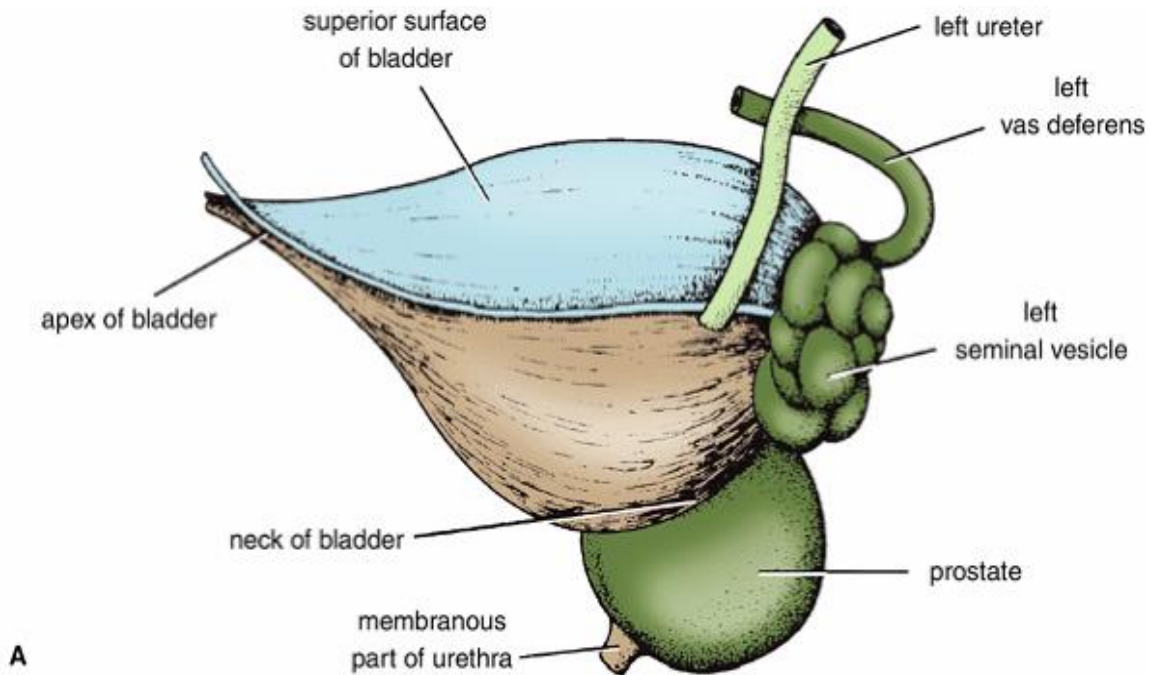
- It lies **behind** the upper part of **symphysis pubis** and connected to umbilicus by **median umbilical ligament** (obliterated urachus)

**5. Neck: (inferior angle)**

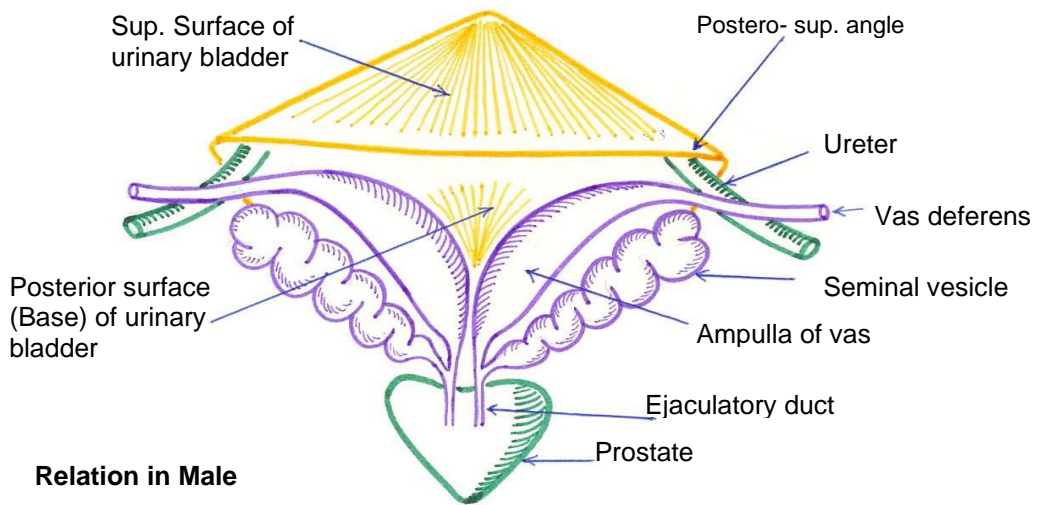
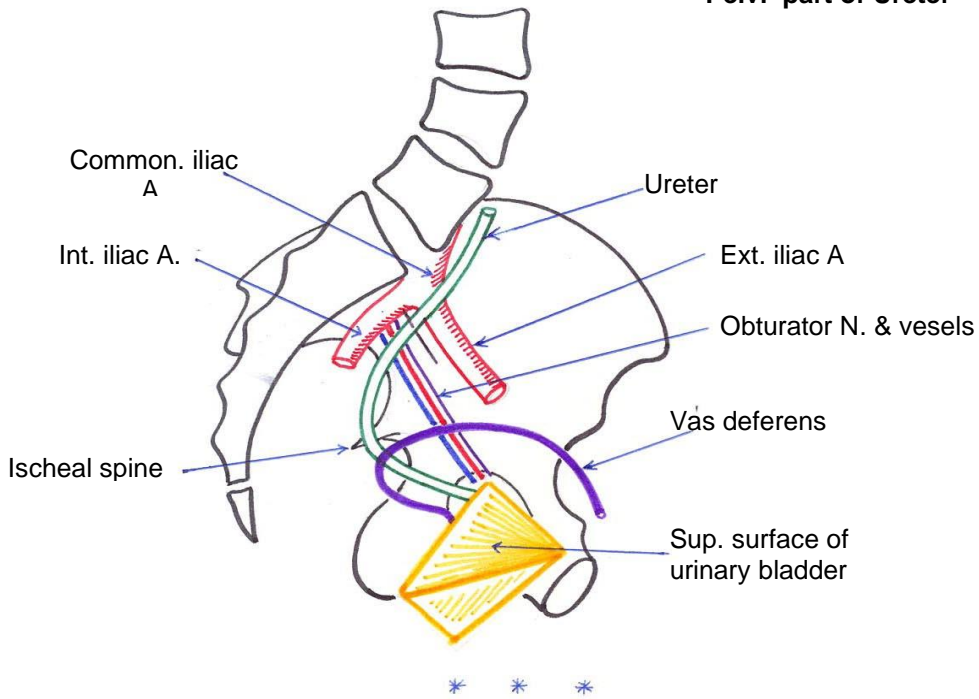
- It is the **lowest and most fixed** part of the urinary bladder and **continuous below** with the internal urethral meatus.
- It is **surrounded by** thickening of involuntary smooth muscle fibers forming the **internal urethral sphincter** (sphincter vesicae).
- It **gives attachment to** puboprostatic ligament in male and pubovesical ligament in females.

- It **lies** 2 inches behind the lower part of the symphysis pubis just above the base of the prostate in males.

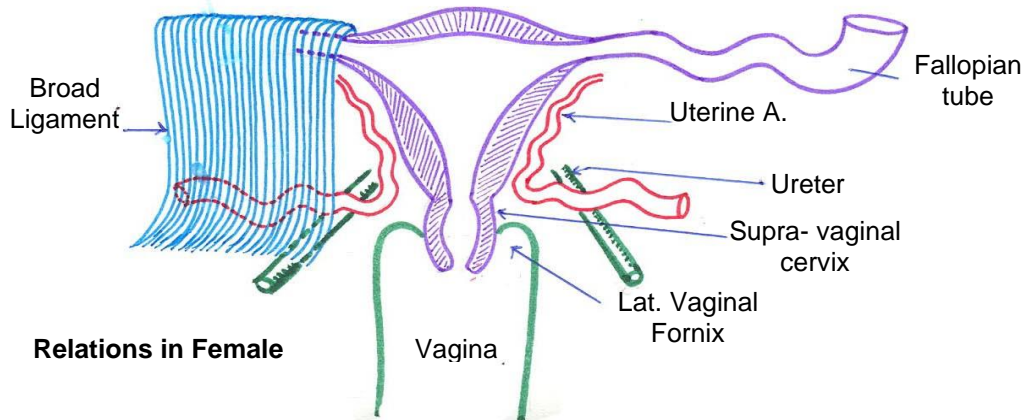
**6. 2 Postero-superior angles:** receive the ureters.



**Pelvi part of Ureter**



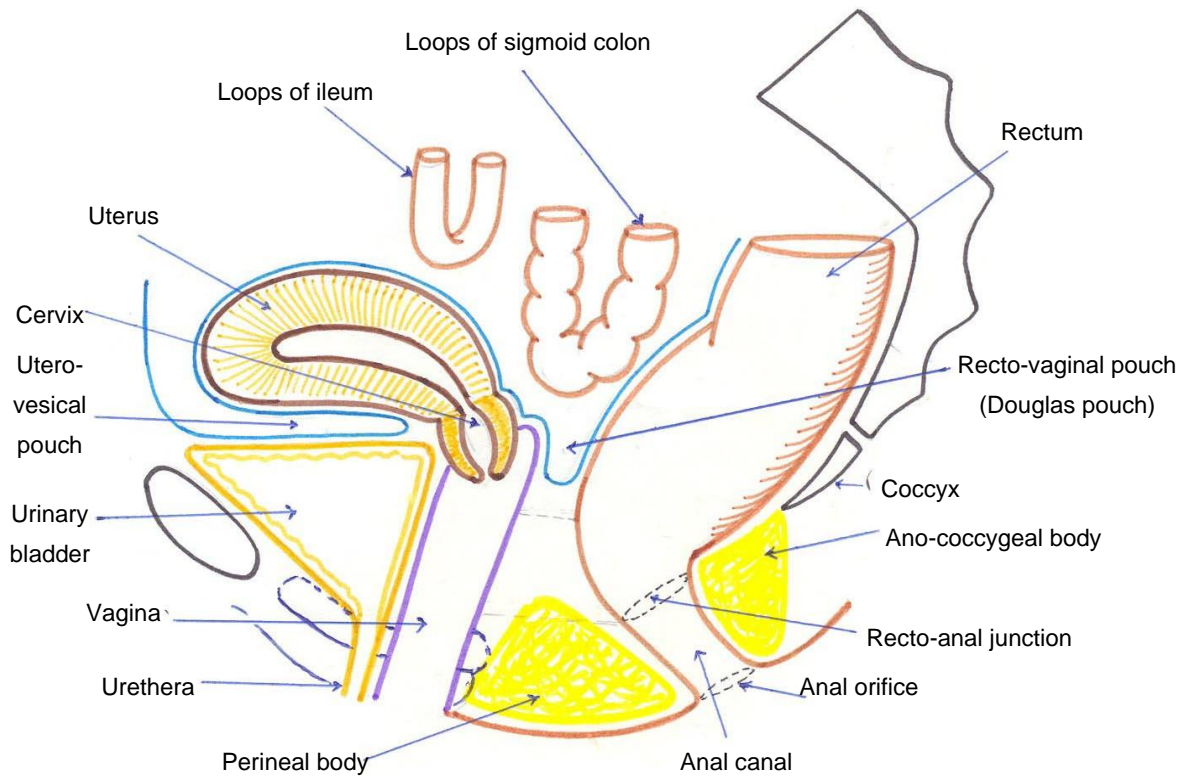
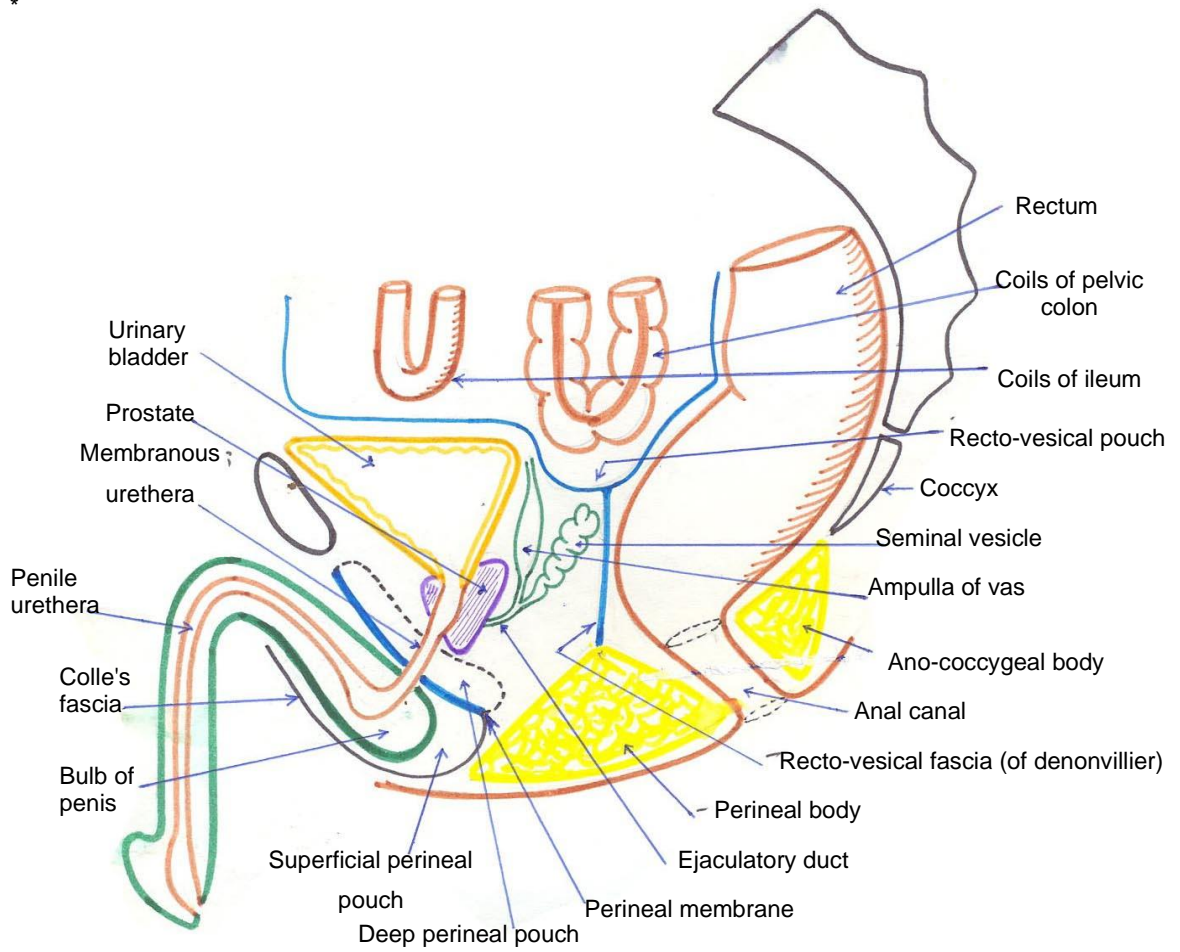
**Relation in Male**

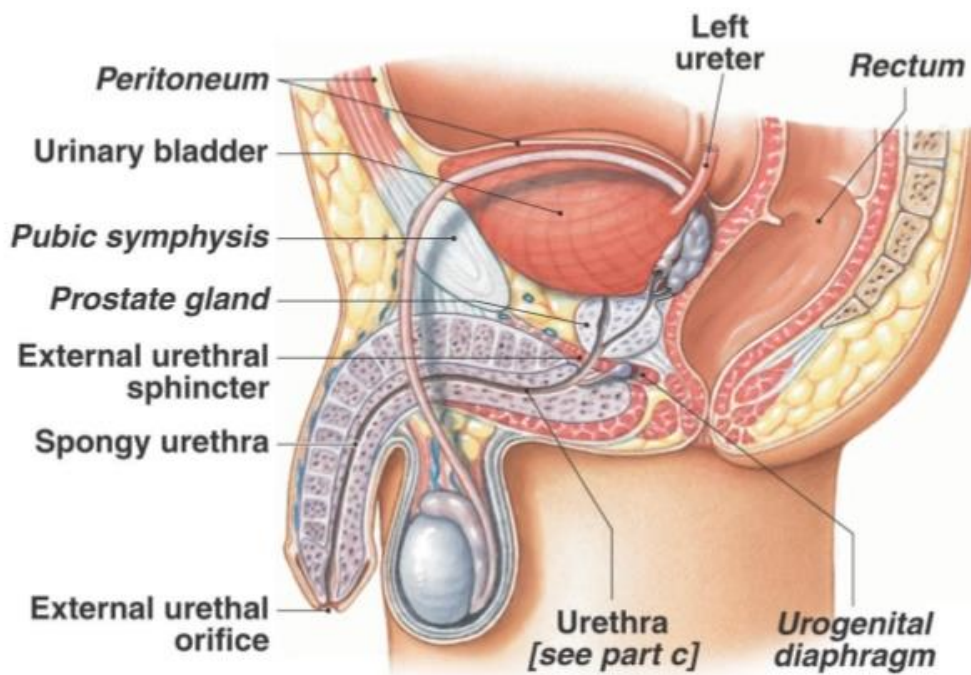


**Relations in Female**

**Sagittal section in Male Pelvis:**

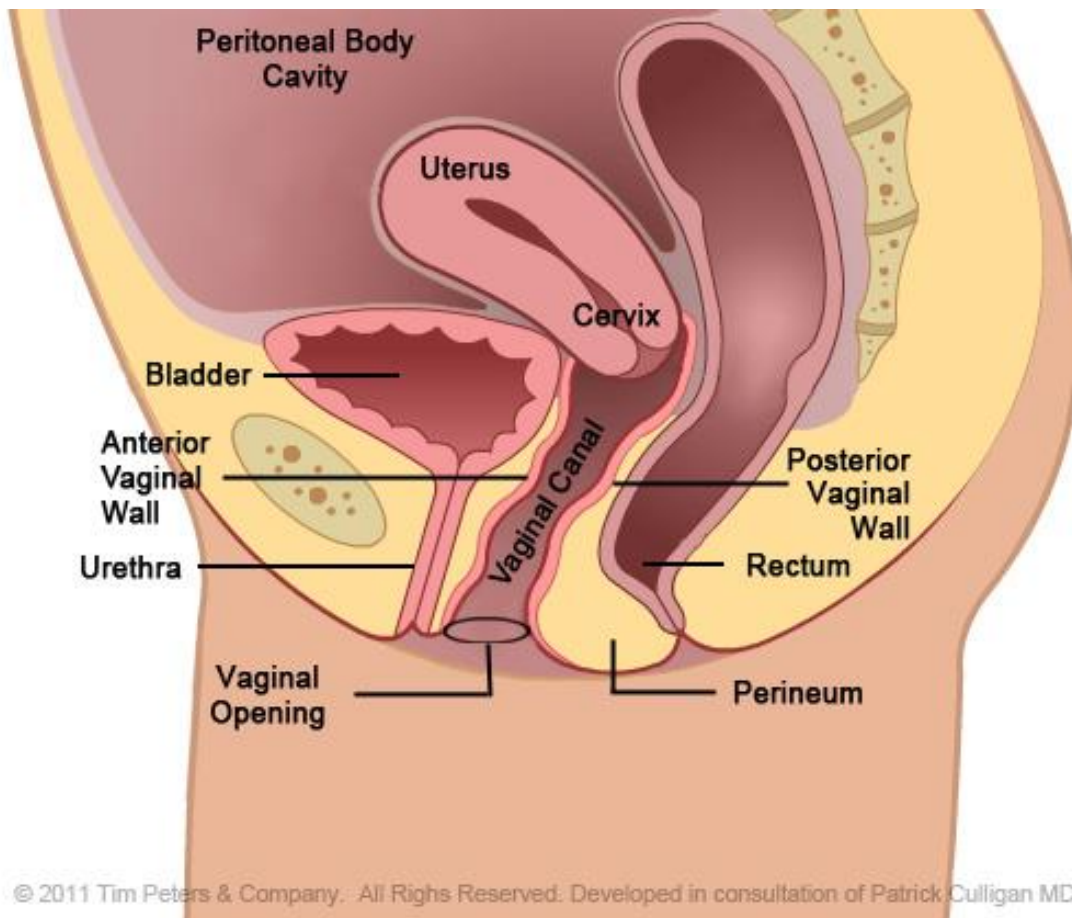
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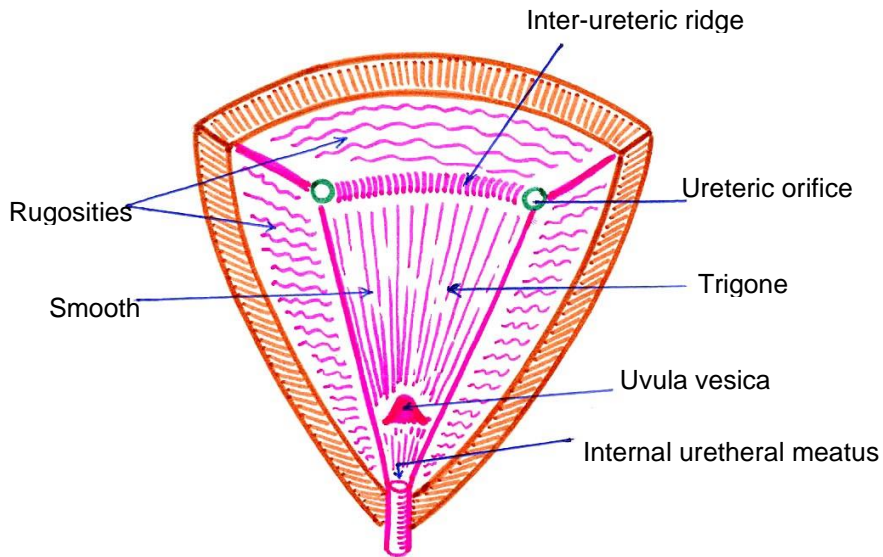


(a) Male pelvis, sagittal section

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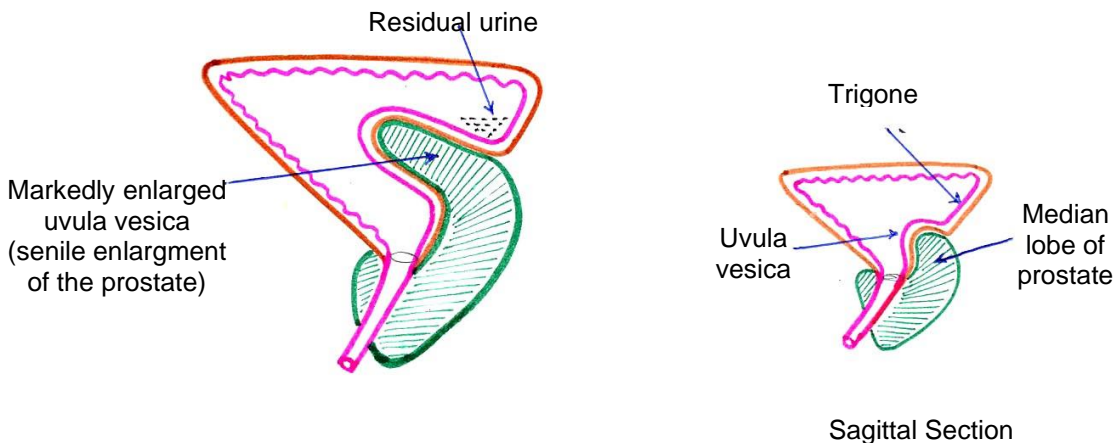
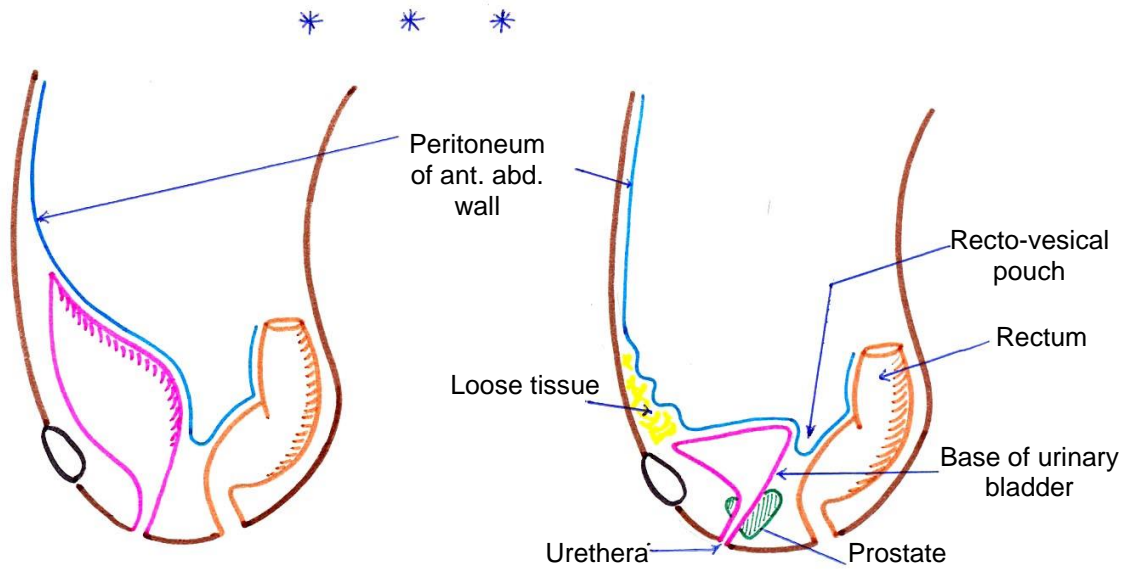


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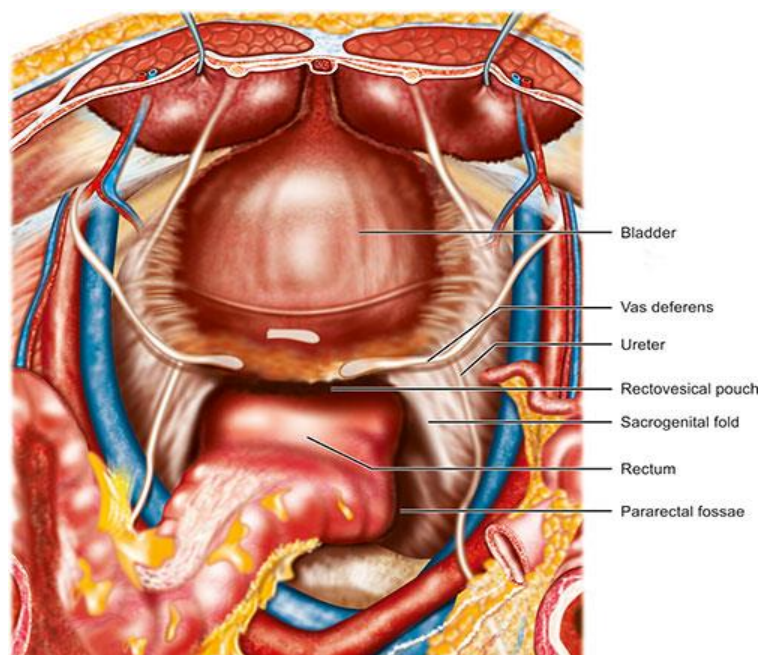
Urinary bladder seen from infront after cutting its apex and ant. part to see the inside of the bladder

**Trigone**



★ **Peritoneal relation:**

- **In males:** The superior surface and upper part of the posterior surface are covered with peritoneum and continuous behind with recto-vesical pouch.
- **In females:** The superior surface is covered with peritoneum and continuous behind with utero-vesical pouch.
- **On each side** of the urinary bladder the peritoneum cover a shallow depression called para-vesical fossa.

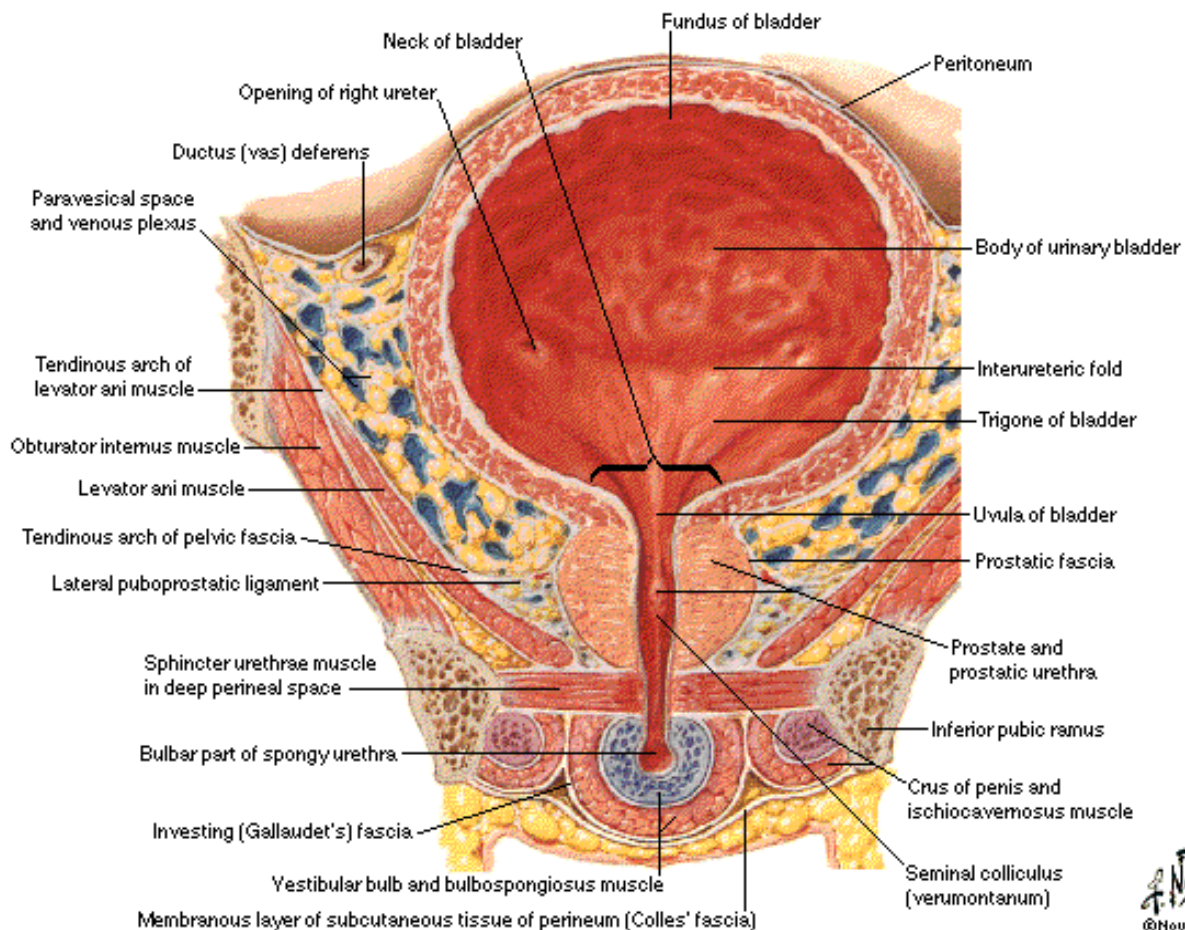


★ **Interior of the bladder:**

- The mucosa is folded (endodermal) except over the trigone (mesodermal).
- **The trigone** is triangular area between the 2 ureteric orifices at the 2 postero-superior angles & the internal urethral meatus at the inferior angle. It shows an interureteric ridge between the 2 ureteric orifices.
- The uvula which is an elevation projecting just above the internal urethral meatus (produced by median lobe of

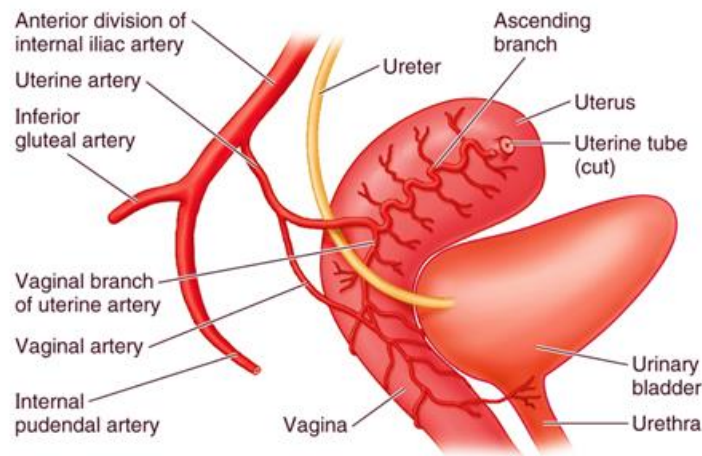
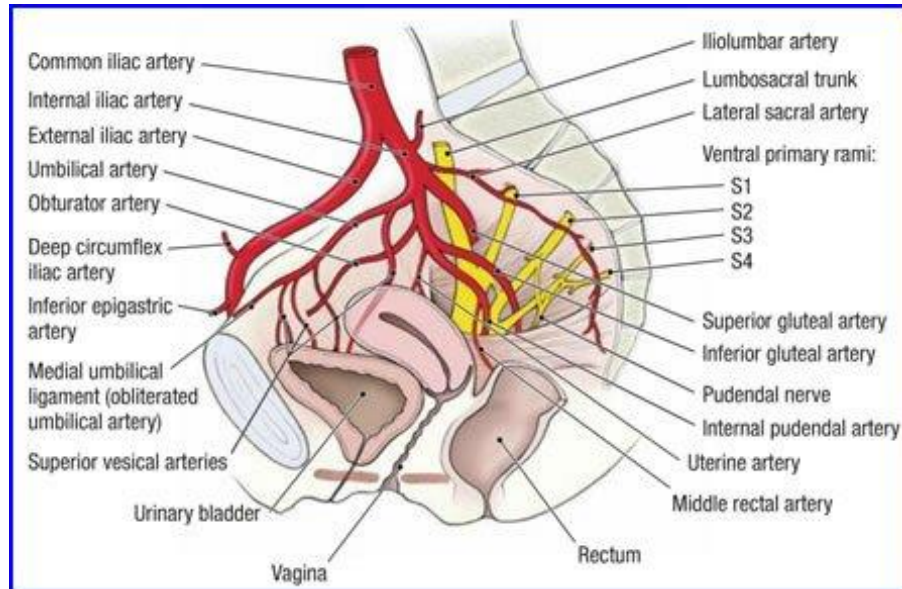
prostate). The mucosa of trigone is smooth, elastic, more vascular & more sensitive.

## Urinary Bladder of Male Frontal Section



★ **Arterial supply:** Branches of anterior trunk of **internal iliac artery**.

- a) **Superior vesical arteries:** are branches from proximal part of umbilical artery. It supplies the **superior part** of the urinary bladder.
- b) **Inferior vesical** arteries in males (or **vaginal** arteries in females) and **middle** rectal artery supply the **lower part** and the **base** of the bladder.
- c) **Obturator artery:** Supply the **infero-lateral surface** of the urinary bladder.

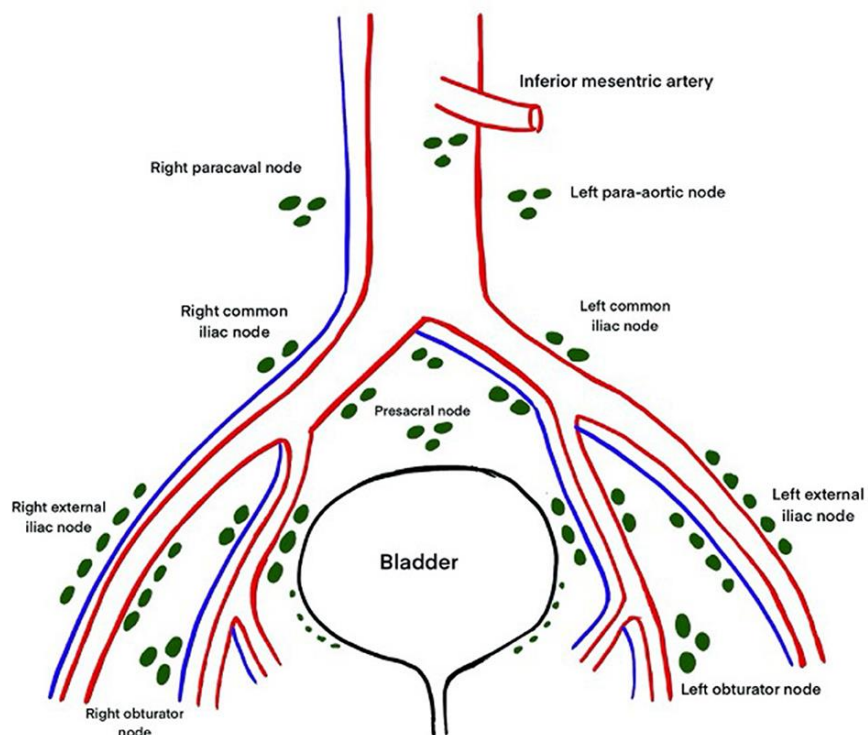
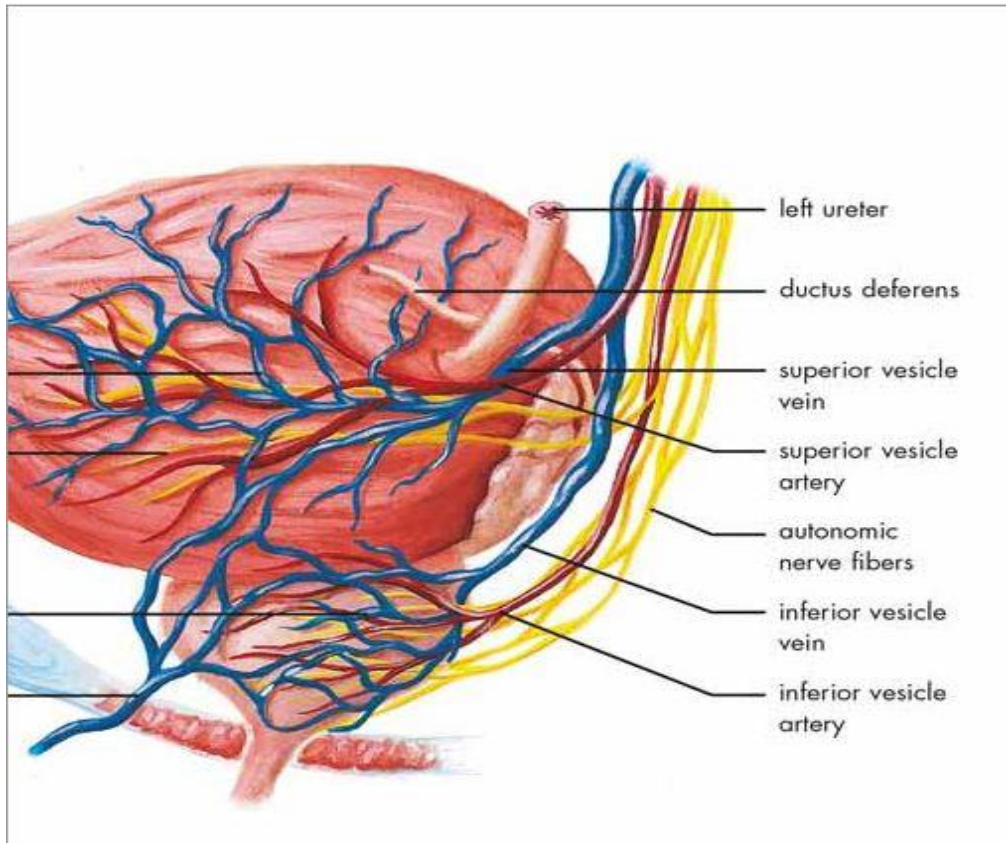


(A) Lateral view

A: The origin of the arteries from the anterior division of the internal iliac artery and distribution to the uterus and vagina are shown.

★ **Venous drainage:** To the perivesical venous plexus → internal iliac vein but the lower part of trigone is drained to the prostatic venous plexus.

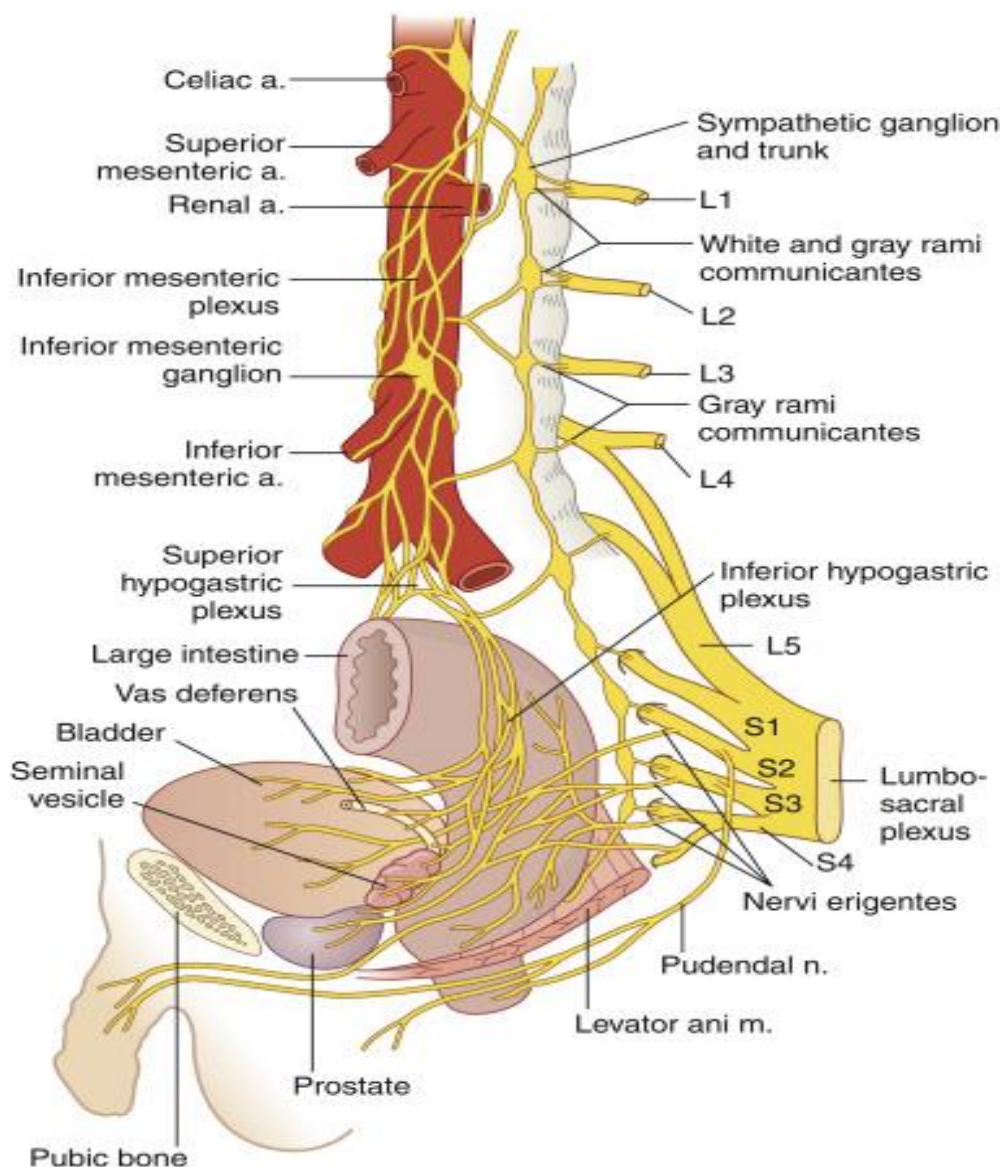
★ **Lymphatic drainage :** perivesical L.Ns → internal & External iliac L.Ns → common iliac L.Ns → para-aortic L.Ns → cisterna chyli.

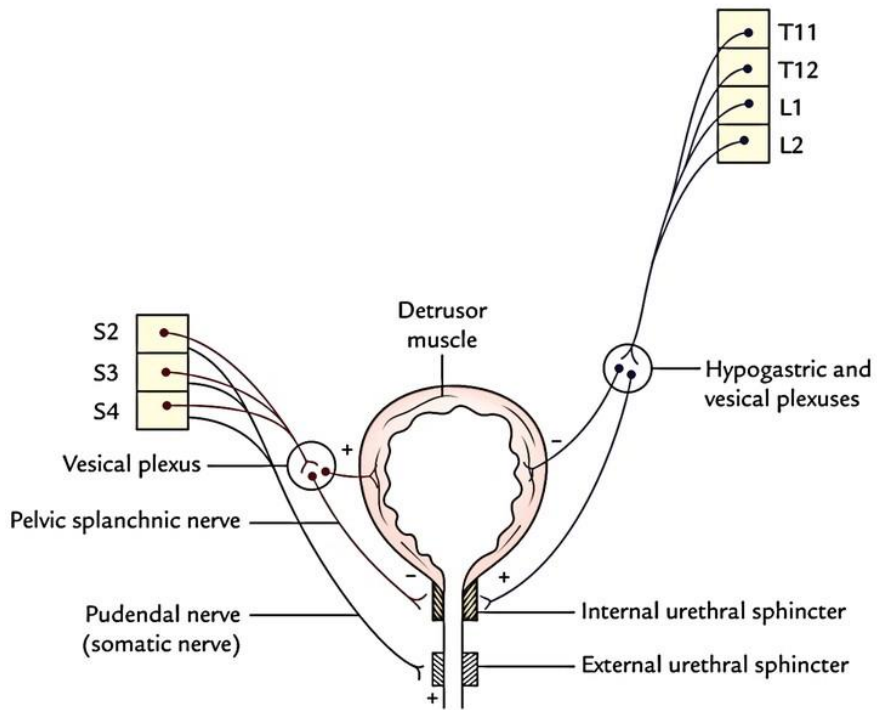


**Venous and lymphatic drainage of urinary bladder**

★ **Nerve supply: Inferior hypogastric plexus gives vesical plexus containing:**

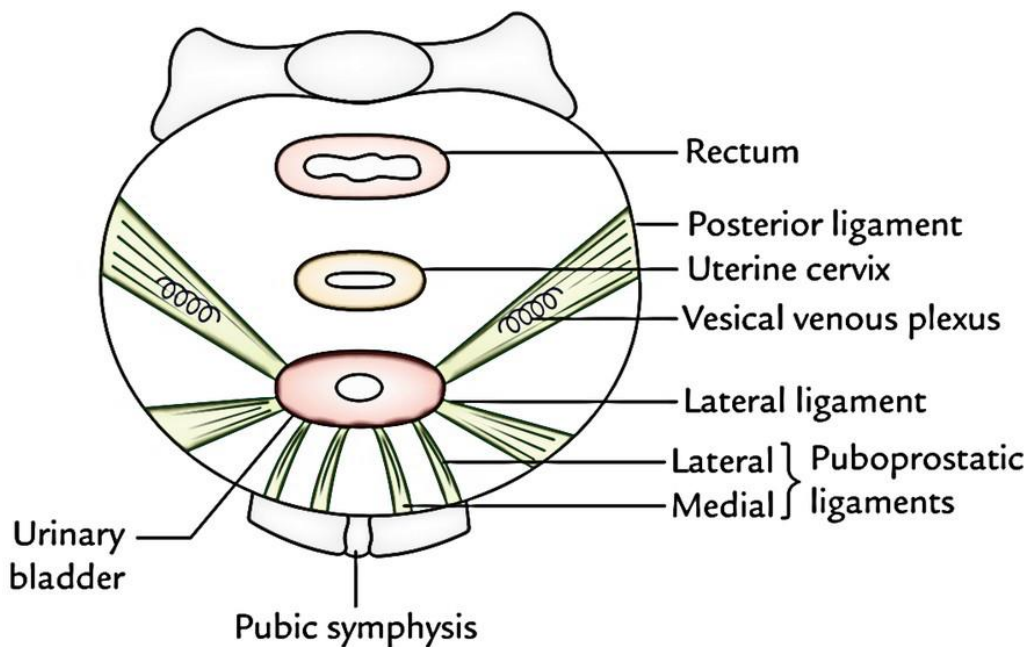
- 1- Parasympathetic:** from **pelvic splanchnic nerve (nervi erigentes) S2, S3, S4**. It empties the bladder (contracts the wall and relaxes the sphincter). Injury to these nerves can lead to erectile dysfunction, voiding issues, and impaired vaginal lubrication.
- 2- Sympathetic:** from **T10 to L2 segments** of the spinal cord. It relaxes the wall of the bladder and contracts the sphincter.





★ **Ligaments of the bladder:**

**I) True ligaments:** Condensation of pelvic fascia around the urinary bladder forms the following true **supportive ligaments** of the urinary bladder:



### 1) Medial and lateral pubo-vesical ligaments:

- They extend from the **bladder neck** and adjoining part of the **urethra** to the back of the **pubic bone**.
- They form the floor of the **retro-pubic space (Cave of Retzius)**.
- In **males**, they are continuous below with the **pubo-prostatic ligaments**.

### 2) Lateral ligaments of the urinary bladder:

- Each ligament extends laterally from the **infero-lateral** surface of bladder to the **tendinous arch of obturator fascia**.
- These ligaments enclose **arteries and nerves** of the bladder.

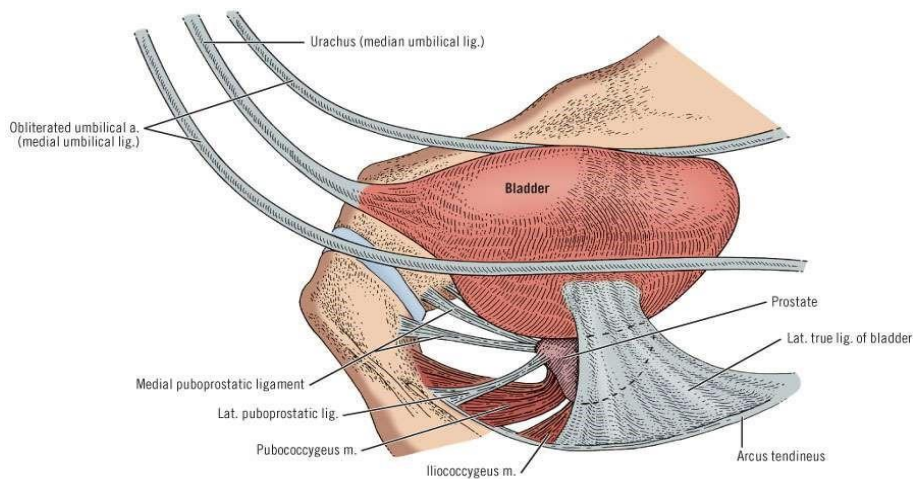
### 3) Posterior ligaments of the urinary bladder:

- They extend from the **lateral margin of the base** of the urinary bladder to the **lateral pelvic wall along the internal iliac vein** and enclose the **vesical venous plexus**.

**II) Median umbilical ligament** is a true fibrous ligament formed due to obliteration of the **urachus**.

### III) False peritoneal ligaments:

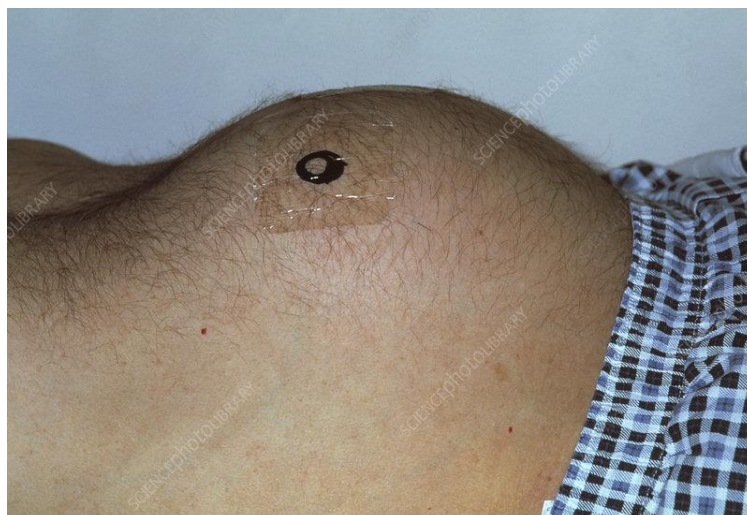
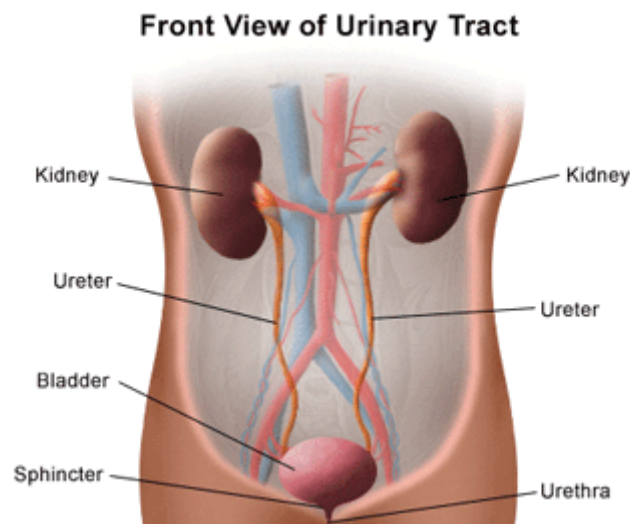
- These are peritoneal folds extend anterior, lateral and posterior from the urinary bladder to the abdominal and pelvic walls.



★ **Muscular coat** of the bladder is composed of smooth muscle and is arranged as three layers known as the **detrusor muscle**.

★ **Applied anatomy:**

1. **Bladder pain** is felt in the suprapubic region and radiate to the urethra and external genitalia because both are supplied by S<sub>2,3,4</sub>.
2. **Bladder swelling** in retention of urine, can be felt as a median pyriform suprapubic swelling, dull on percussion, may reach upwards to the umbilicus and you can't insinuate your hand between the swelling and the symphysis pubis.



3. As the bladder expands, it lifts the parietal peritoneum from the suprapubic part of the anterior abdominal wall and becomes adjacent to this wall and consequently the following techniques can be considered:

- a. **Ultrasonic guided percutaneous suprapubic puncture** and catheter insertion, under local anaesthesia, to drain acute retention of urine.
- b. The distended bladder is approached surgically by midline **suprapubic extra-peritoneal incision**.

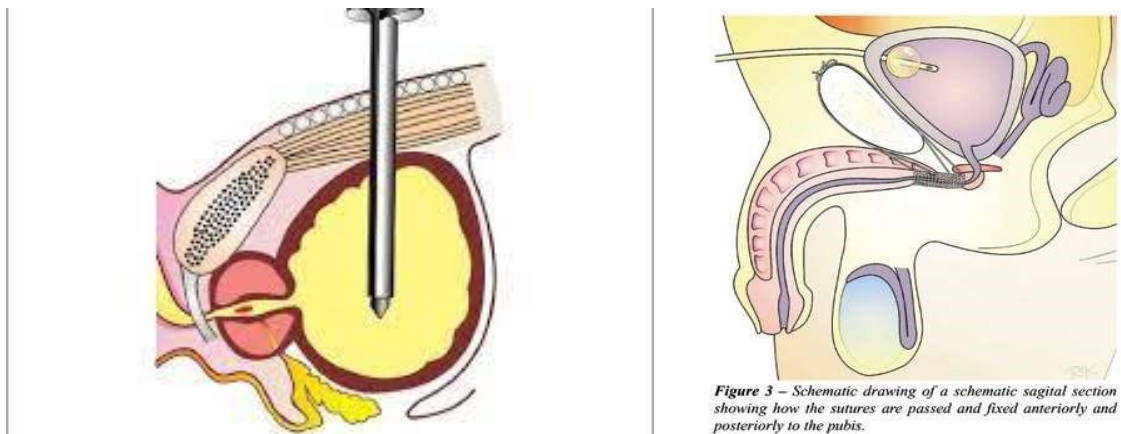
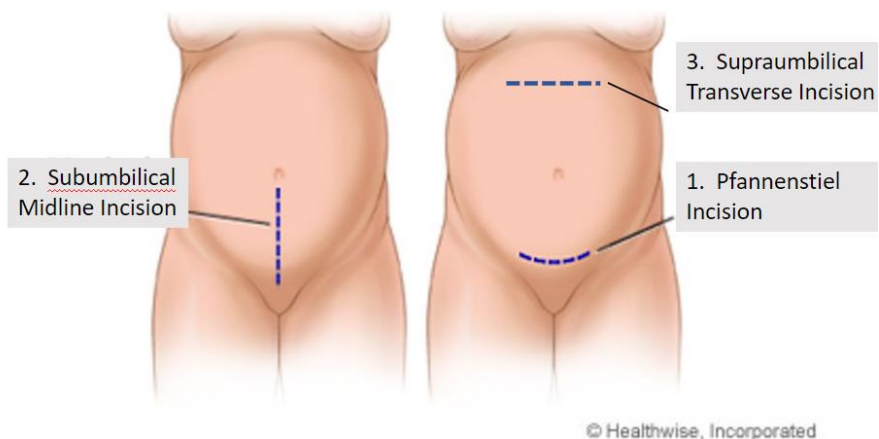


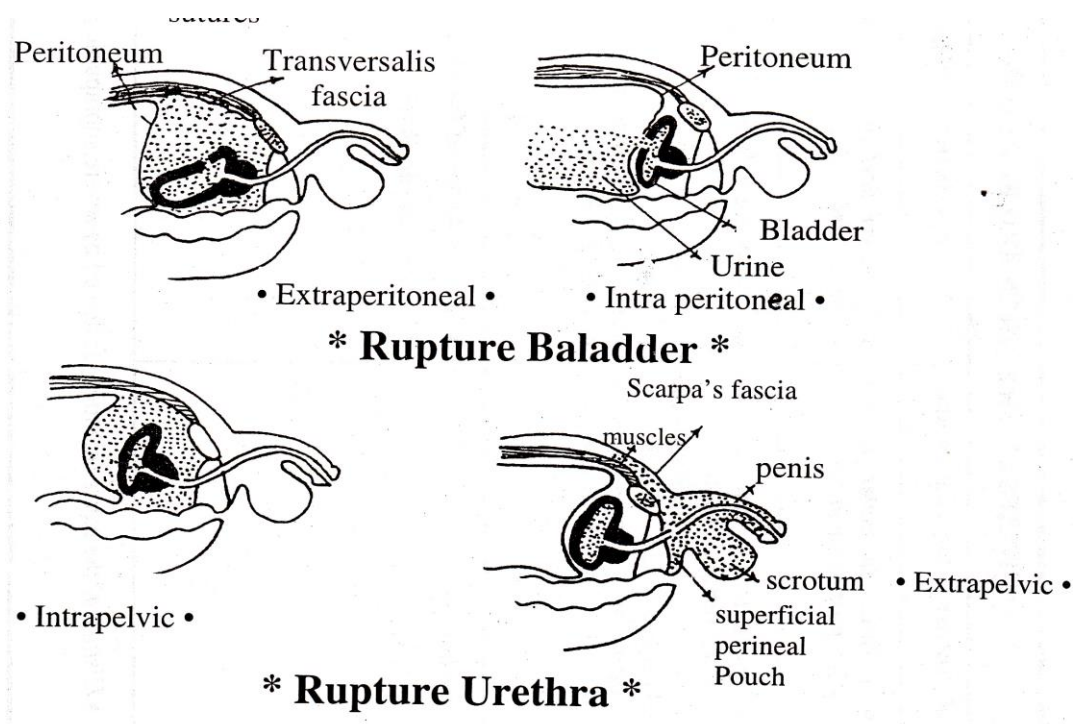
Figure 3 – Schematic drawing of a schematic sagittal section showing how the sutures are passed and fixed anteriorly and posteriorly to the pubis.



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4. The bladder may be **ruptured by** injuries to the lower part of the anterior abdominal wall or fractures of pelvis.

5. Rupture of the superior wall of the bladder frequently tears the peritoneum → extravasation of urine into the peritoneal cavity (**intra-peritoneal rupture**).
6. **Rupture** of the posterior or inferolateral walls of the bladder → extravasation of urine **extra-peritoneally** into the periprostatic and perivesical tissues producing cystic swelling on P-R examination.

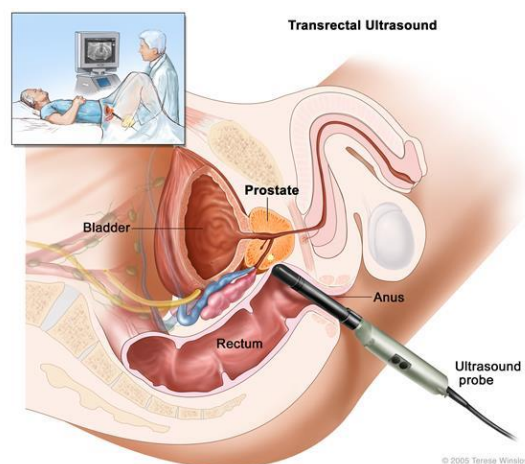


7. The **perivesical venous plexus** is the site for the inhabitants of urinary bilharziasis (*Schistosoma haematobium*).
8. The perivesical venous plexus mainly lies on the inferolateral walls of the bladder → urinary bilharziasis , metaplasia and cancer on top of bilharziasis mainly affect the inferolateral wall of the urinary bladder.
9. Carcinoma of urinary bladder **spread directly** to the surrounding structures e.g. seminal vesicles and prostate in

males or uterus and vagina in females or rectum and pelvic wall in both sexes.

10. **Direct spread** of carcinoma of urinary bladder, **posteriorly** to the rectum is delayed due to the presence of Denonvillier's fascia.
11. **Lymphatic spread** of cancer bladder: to the perivesical L.Ns → internal & External iliac L.Ns → common iliac L.Ns → para-aortic L.Ns → cysterna chyli → thoracic duct → retrograde lymphatic spread → left supraclavicular L.Ns (Vichow's gland).
12. **At operation:** It appears as a thick brownish red muscular organ with trabeculated appearance & small blood vessels on its surface.
13. **Pathology** in the urinary bladder can be felt either by P-V or P-R examination, bimanual examination and abdominal examination.
14. The urinary bladder can be **visualized radiologically** by ultrasound (external abdominal, transurethral, transrectal and transvaginal), descending cystography, ascending cystography, C.T scan and MRI.

## Transrectal ultrasound



**Urinary Bladder stones  
in plain x-ray.**

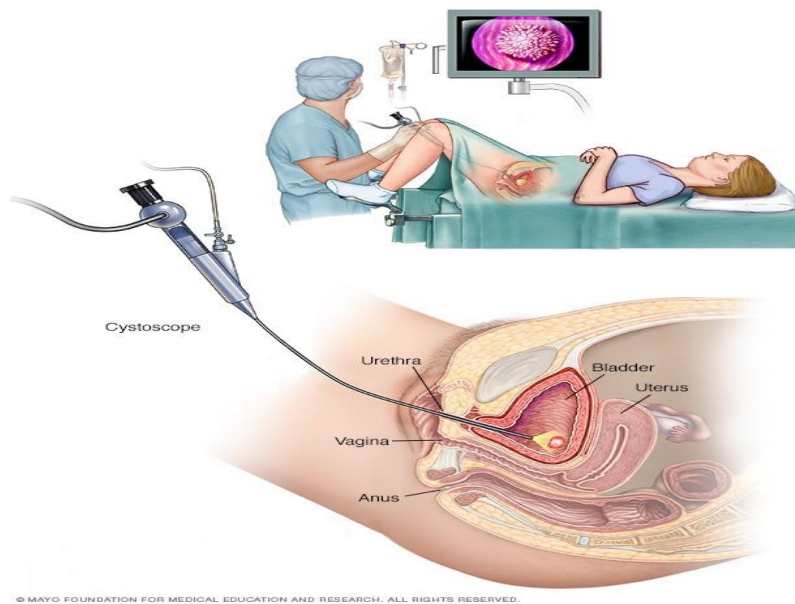


**Cystography in female ( left ) and male ( right )**

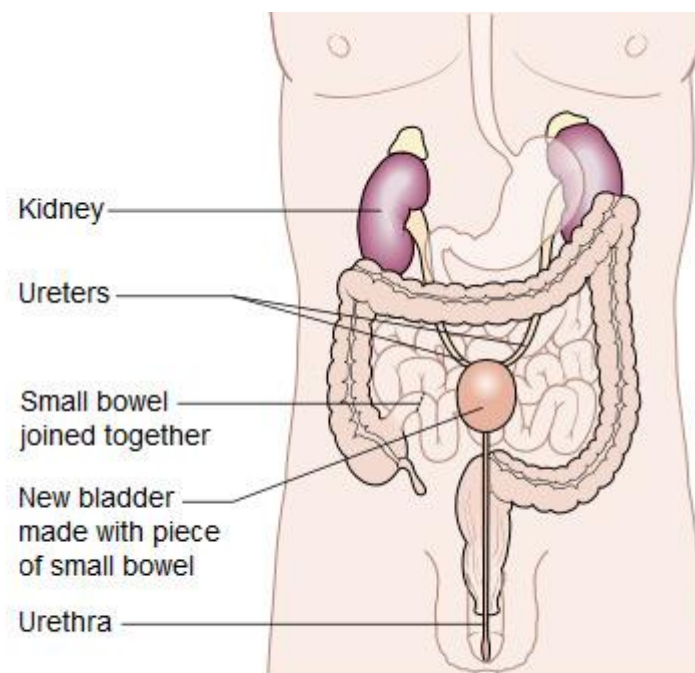
**Bladder stone in  
CT scan**



15. **The interior** of the urinary bladder can be examined by cystoscope.



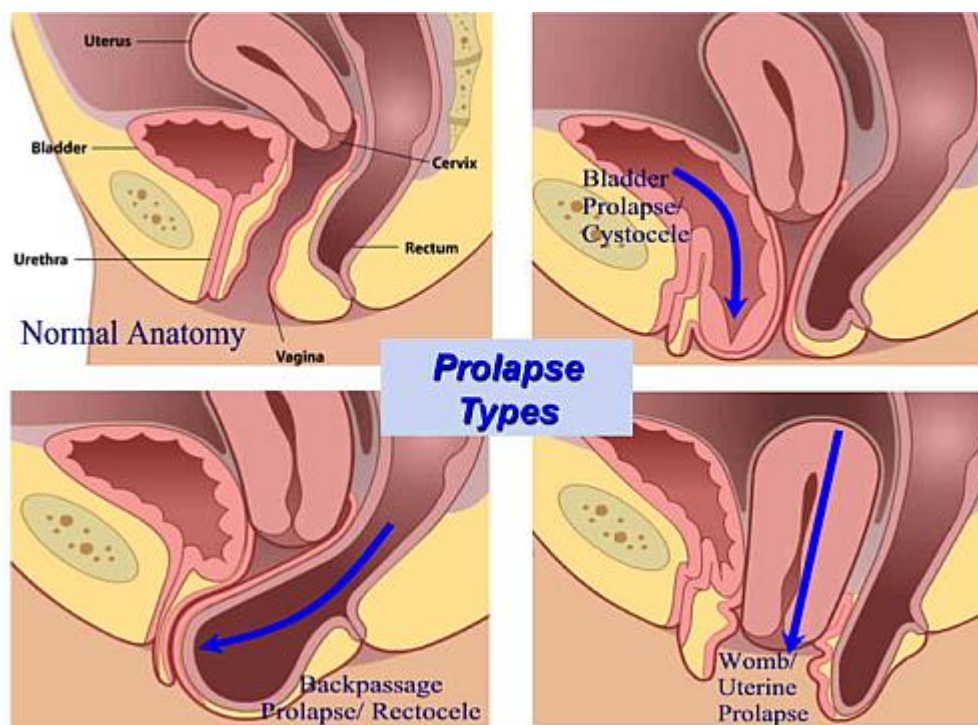
17. After cystectomy, **continent urine diversion** is done by replacing the bladder by a segment of intestine (ileocaecal region, ileum or colon). Continence of urine in this case depends on external urethral sphincter (voluntary) which surrounds the membranous urethra.



18. **Irritation of trigone** by stone or inflammation → frequency.

19. **Terminal haematuria** usually indicate a **bladder cause** for haematuria.

20- In female , after repeated labor , the muscles of pelvic floor becomes very weak → **cystocele** ( the bladder push the anterior wall of vagina and protrude through the vaginal orifice .



21- The urinary bladder is separated from the back of symphysis pubis and pubic bone by the **retro-pubic space** (Cave of Retzius) which is bounded by the medial and lateral pubo-prostatic ligaments in male or pubovesical ligament in female. This space should be drained in any open surgery on the urinary bladder.