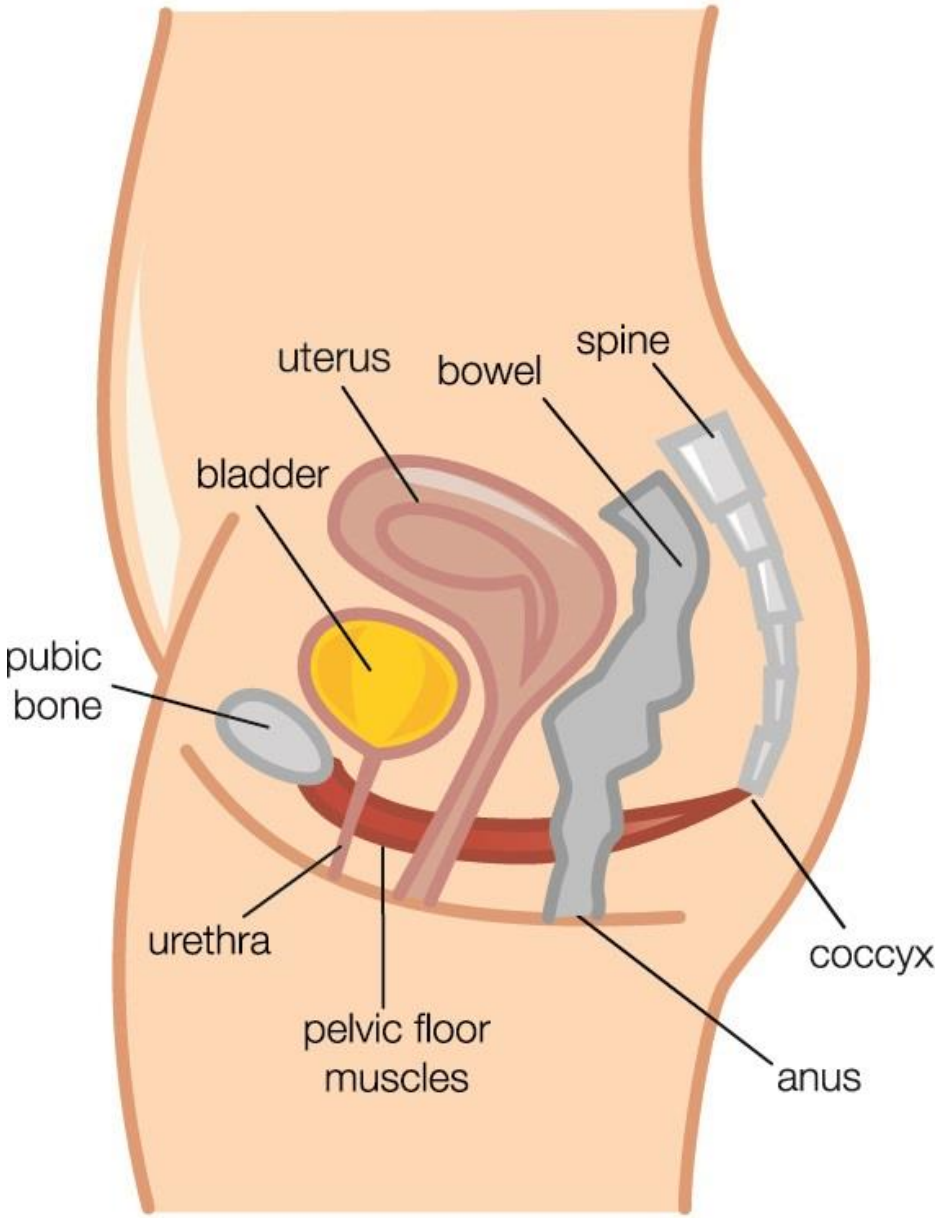
URINARY BLADDER


uterus
bowel
spine
bladder
pubic bone
urethra
pelvic floor muscles
coccyx
anus

Other name- **vesica urinaria, cystis urinaria**

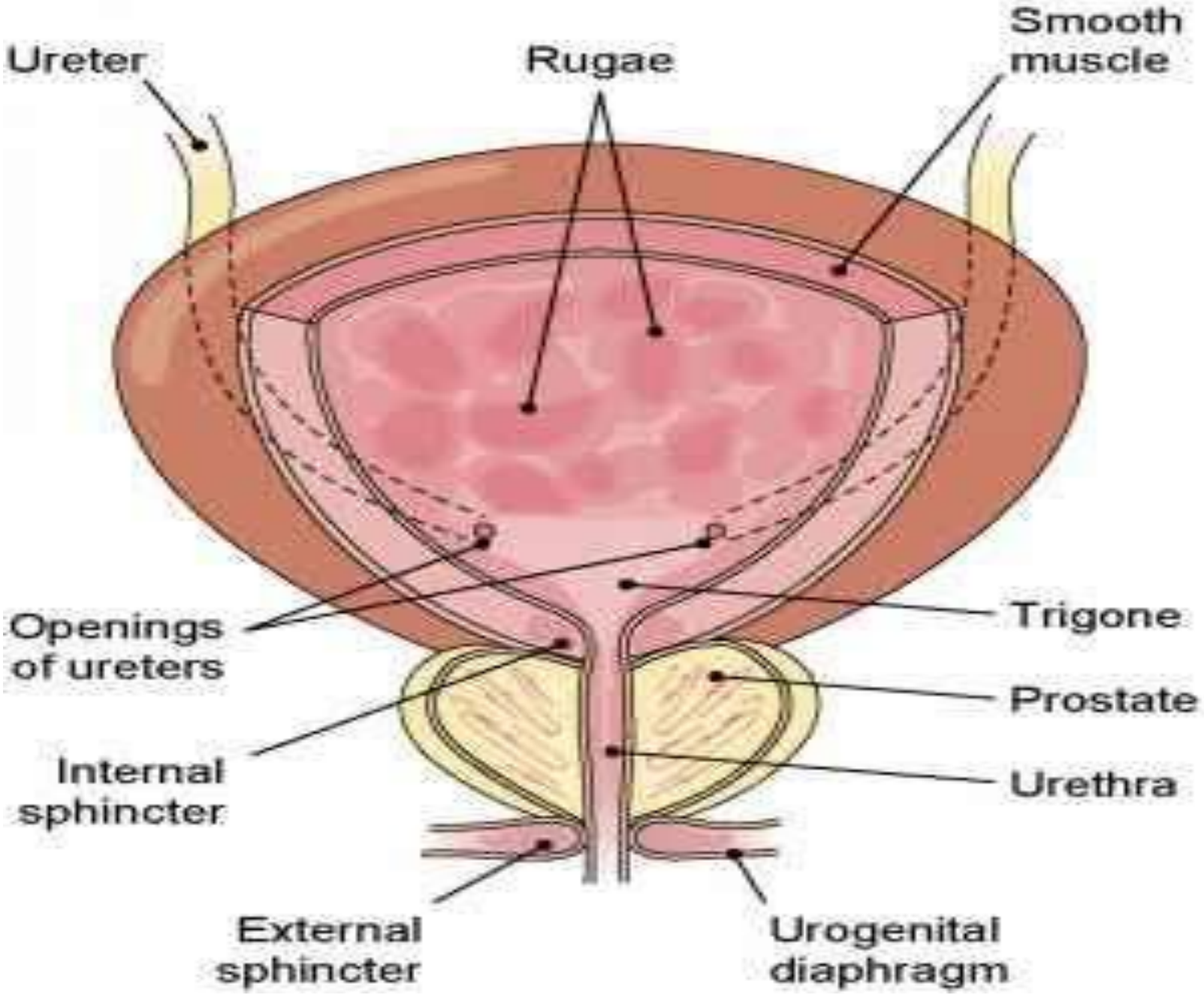
The bladder is an organ of the urinary system. It plays two main roles:

- **Temporary storage of urine – the bladder is a hollow organ with distensible walls. It has a folded internal lining (known as rugae), which allows it to accommodate up to 300-400ml of urine in healthy adults.**
- **Assists in the expulsion of urine – the musculature of the bladder contracts during micturition, with concomitant relaxation of the sphincters.**

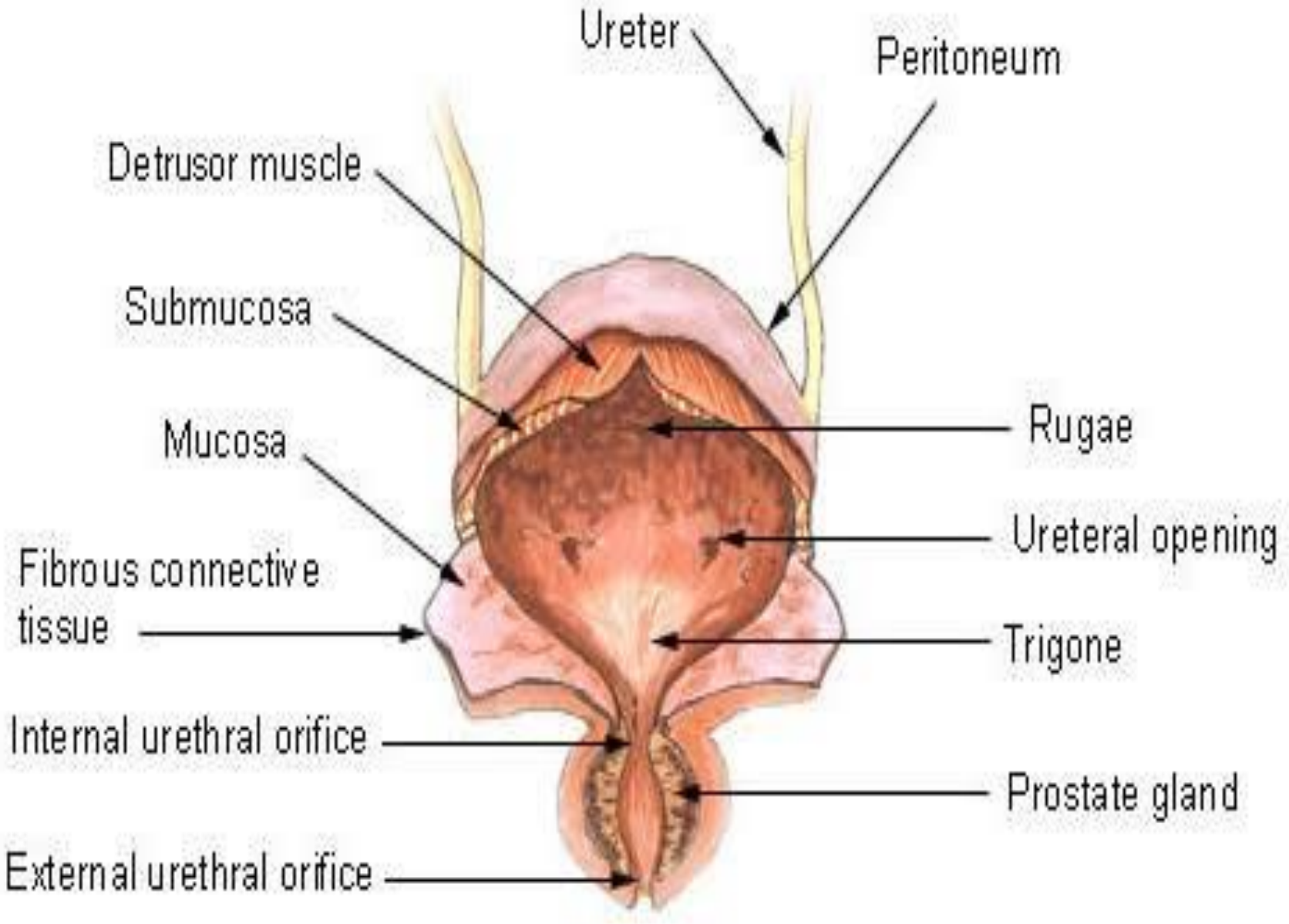
- **Size, shape and position-**

The bladder varies in its size, shape and position according to the amount of urine it contains.

- **When empty- it lies in the pelvis**
- **when full- it expands and extends upwards into the abdominal cavity.**


Ureter
Rugae
Smooth muscle
Openings of ureters
Trigone
Prostate
Internal sphincter
Urethra
External sphincter
Urogenital diaphragm

Urinary Bladder

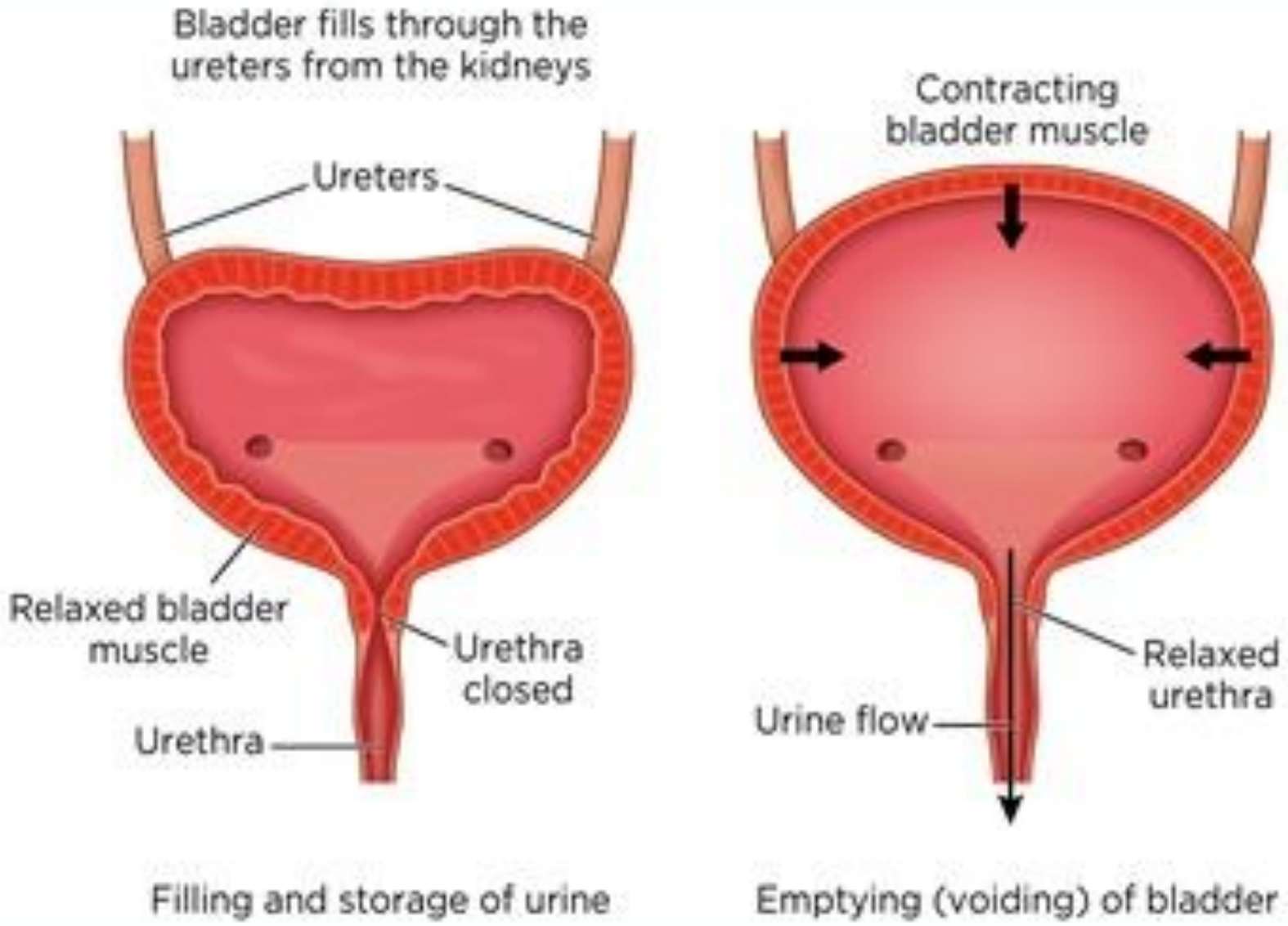


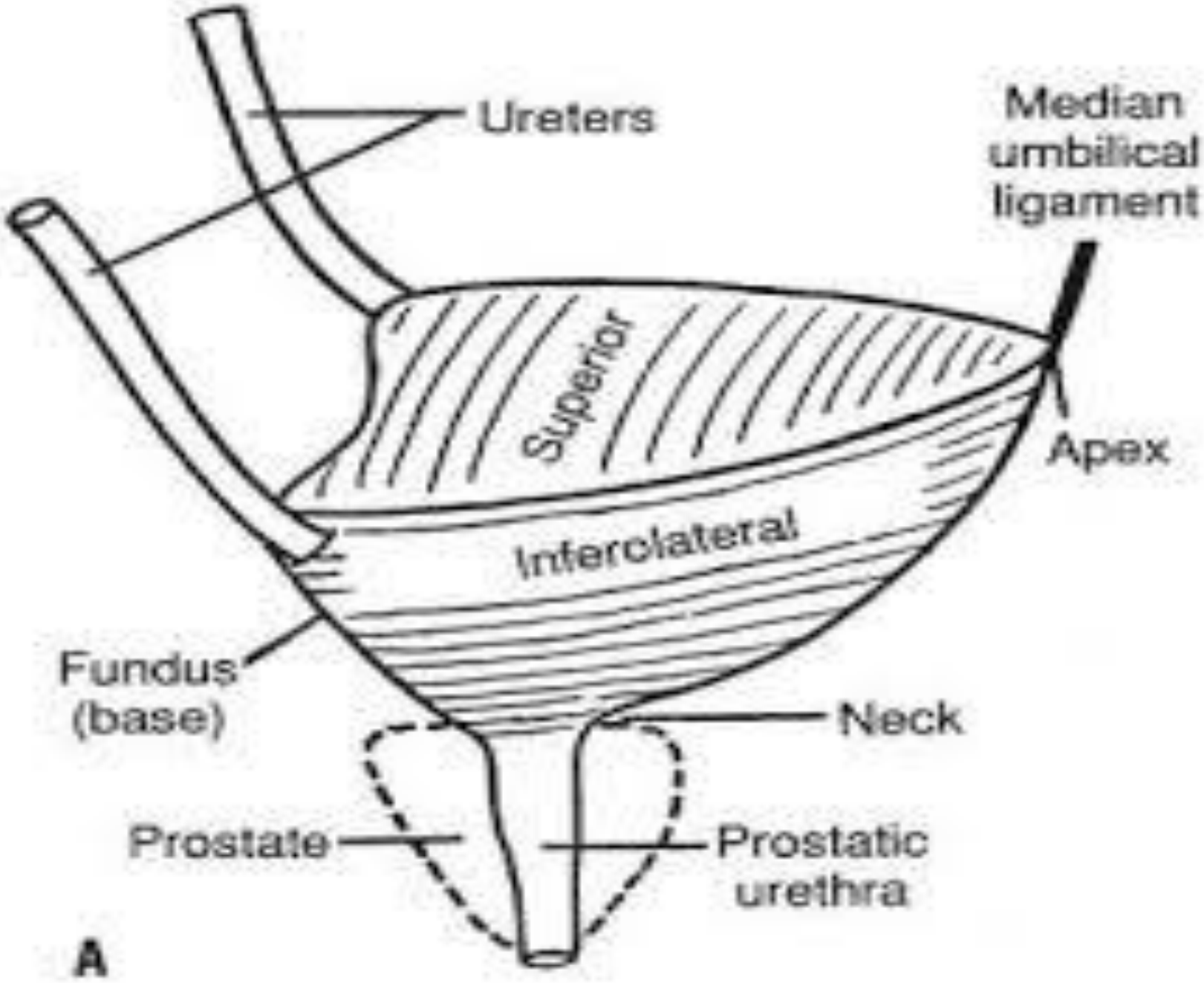
- **External features-**

Empty- tetrahedral in shape and has

1. **apex- forwards, It is connected to the umbilicus by the median umbilical ligament (a remnant of the urachus).**
2. **Base or fundus- backwards**
3. **Neck- lowest and most fixed part, It is continuous with the urethra.**
4. **3 surfaces- superior, right and left inferolateral**
5. **4 borders- 2 lateral, 1 anterior, 1 posterior**

Fig 1. **Filling and emptying of the bladder**




Ureters
Median umbilical ligament
Superior
Apex
Interolateral
Fundus (base)
Neck
Prostate
Prostatic urethra
A

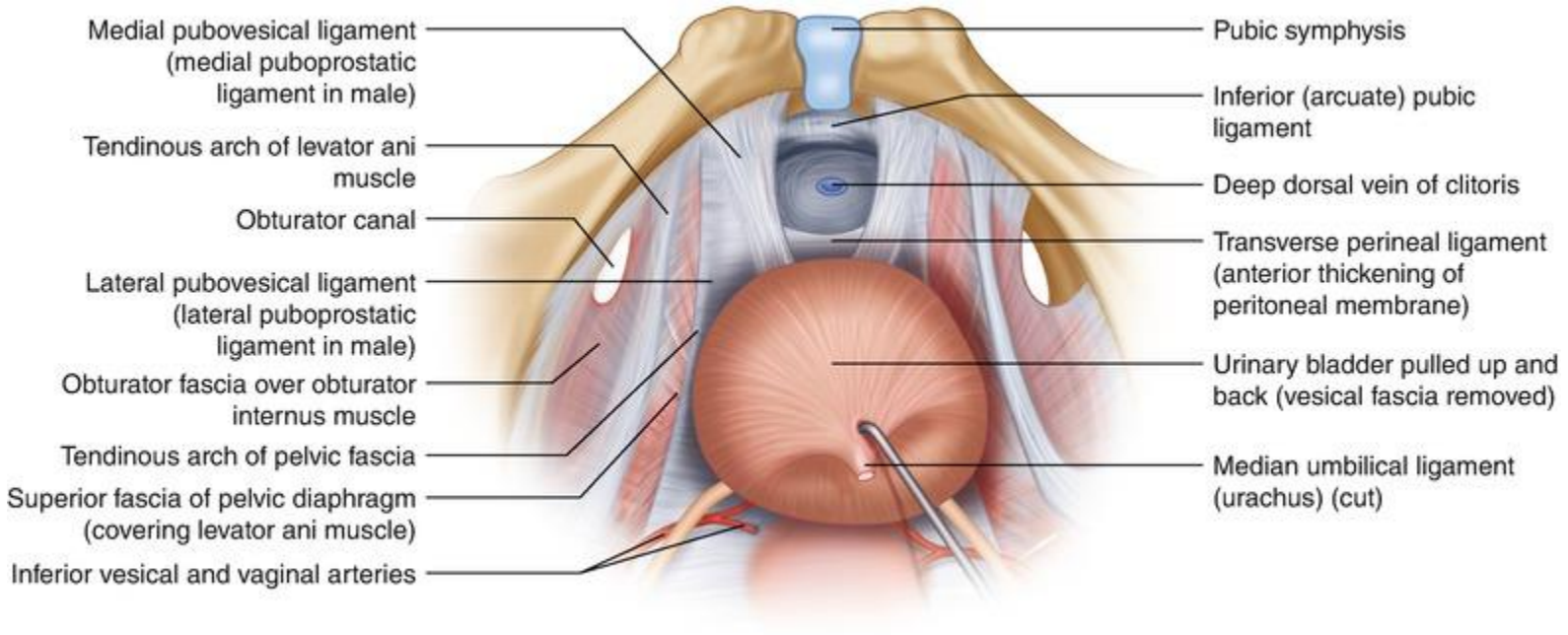
Full bladder- ovoid shape

1. **Apex- upwards towards umbilicus**
2. **Neck- downwards**
3. **2 surfaces- anterior, posterior**

Ligaments-

These are condensation of pelvic fascia around the neck and base of the bladder.

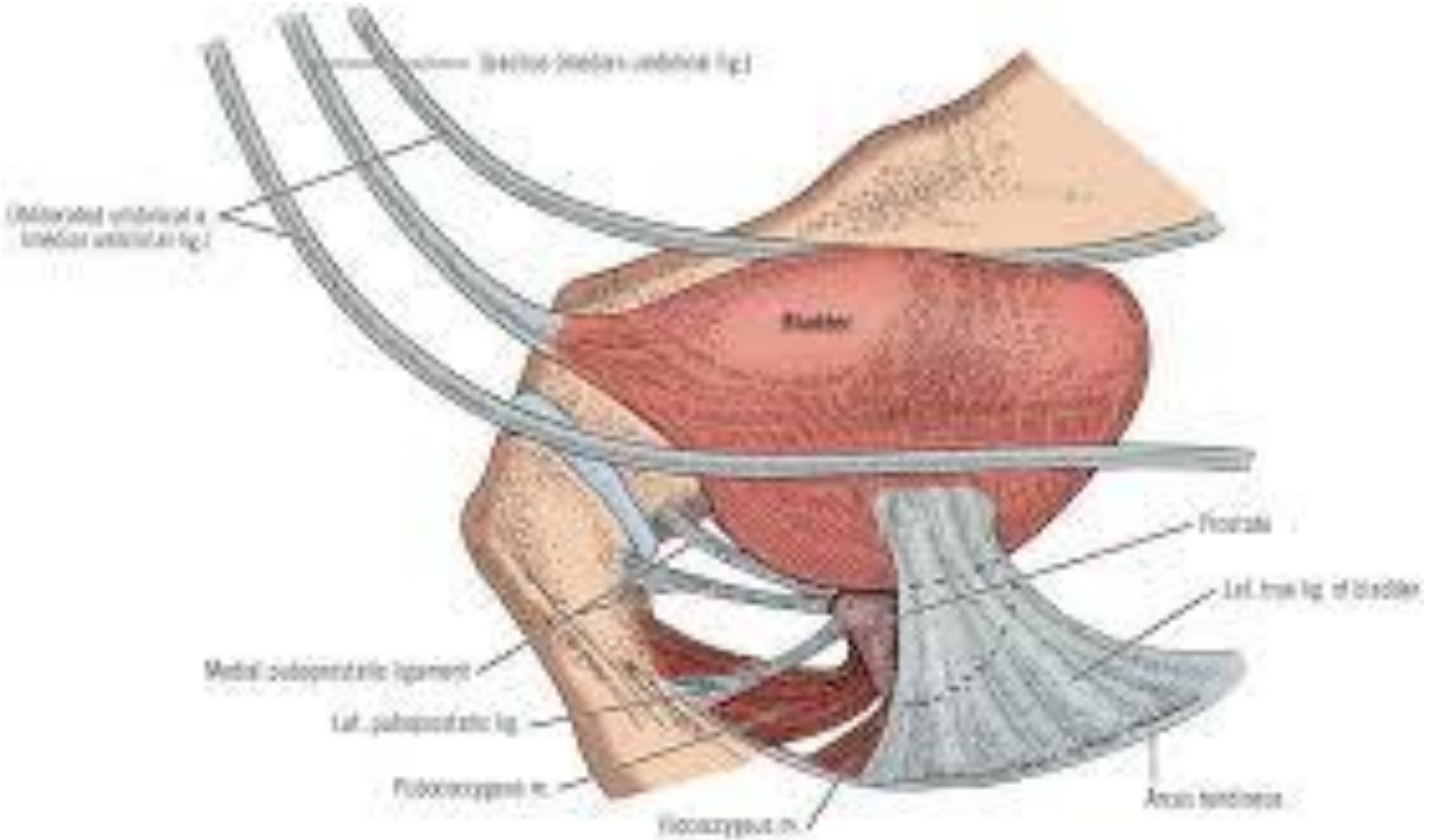
- **Lateral true ligament of the bladder- It extends from the side of the bladder to the tendinous arch of the pelvic fascia**
- **Lateral puboprostatic ligament- it extends from the anterior end of the tendinous arch of the pelvic fascia to the upper part of prostatic sheath.**

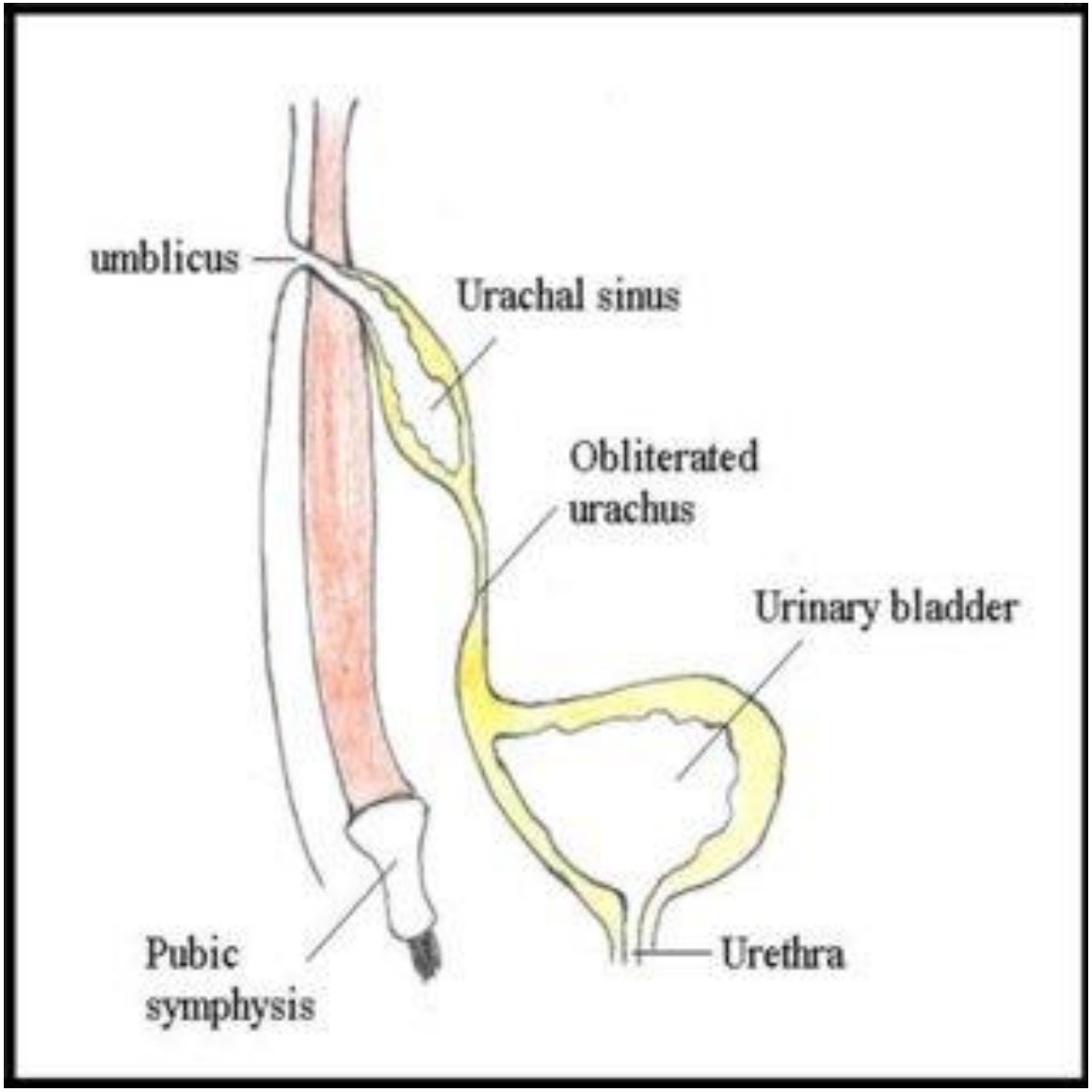

Medial pubovesical ligament (medial puboprostatic ligament in male)
Tendinous arch of levator ani muscle
Obturator canal
Lateral pubovesical ligament (lateral puboprostatic ligament in male)
Obturator fascia over obturator internus muscle
Tendinous arch of pelvic fascia
Superior fascia of pelvic diaphragm (covering levator ani muscle)
Inferior vesical and vaginal arteries
Pubic symphysis
Inferior (arcuate) pubic ligament
Deep dorsal vein of clitoris
Transverse perineal ligament (anterior thickening of peritoneal membrane)
Urinary bladder pulled up and back (vesical fascia removed)
Median umbilical ligament (urachus) (cut)

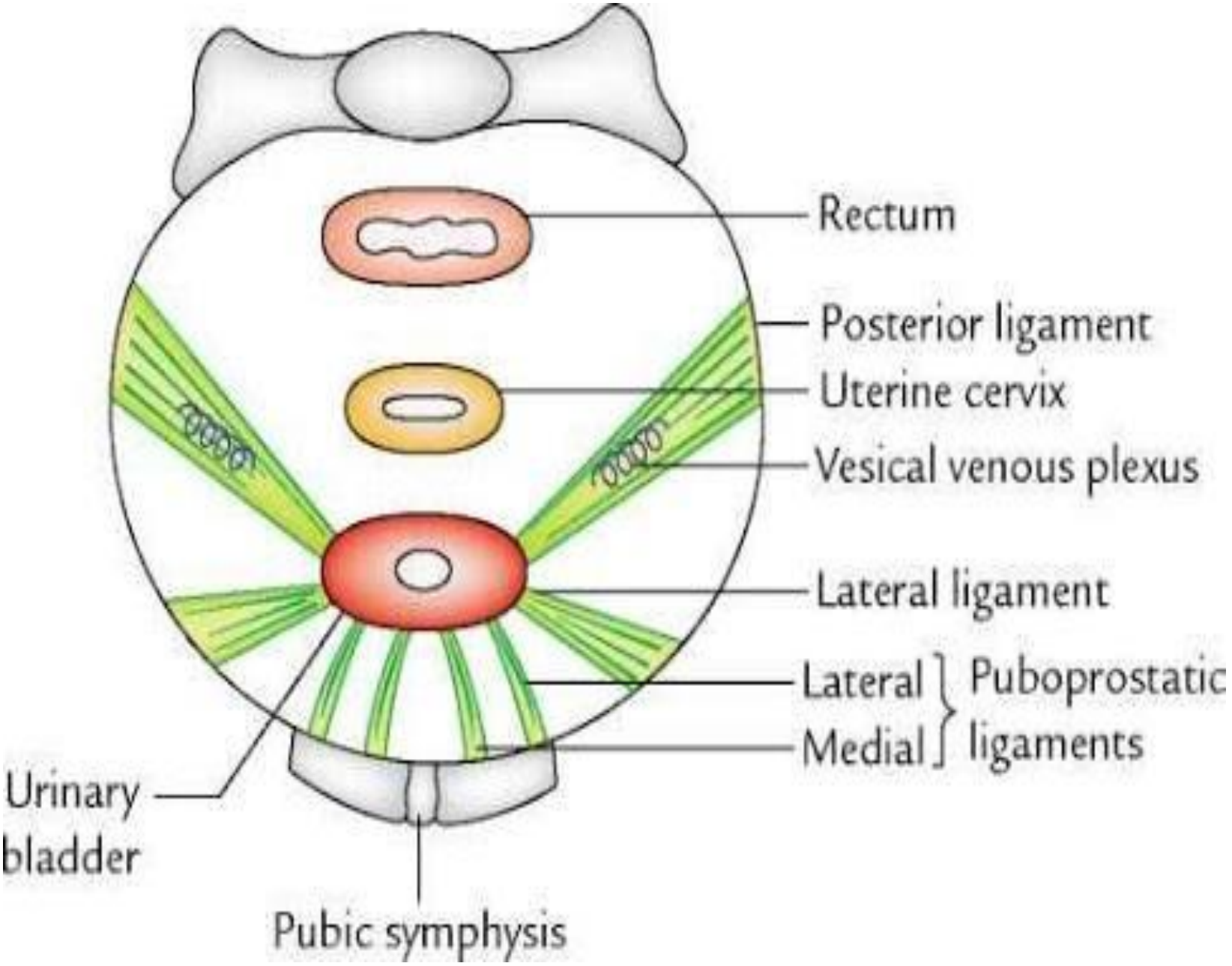
- **Medial puboprostatic ligament-** it extends from the back of the pubic bone to the prostatic sheath.

In females, bands similar to the puboprostatic ligaments are known as the pubovesical ligaments.

- **Median umbilical ligament-** remnant of the urachus.
- **Posterior ligament of bladder-** it extends from the base of bladder to the wall of pelvis.


Bladder
Prostate
Medial pubovesicalis ligament
Puborectalis m.
Arcus tendineus


umblicus
Urachal sinus
Obliterated
urachus
Urinary bladder
Pubic
symphysis
Urethra


Rectum
Posterior ligament
Uterine cervix
Vesical venous plexus
Lateral ligament
Lateral
Medial
Puboprostatic ligaments
Urinary bladder
Pubic symphysis

Capacity-

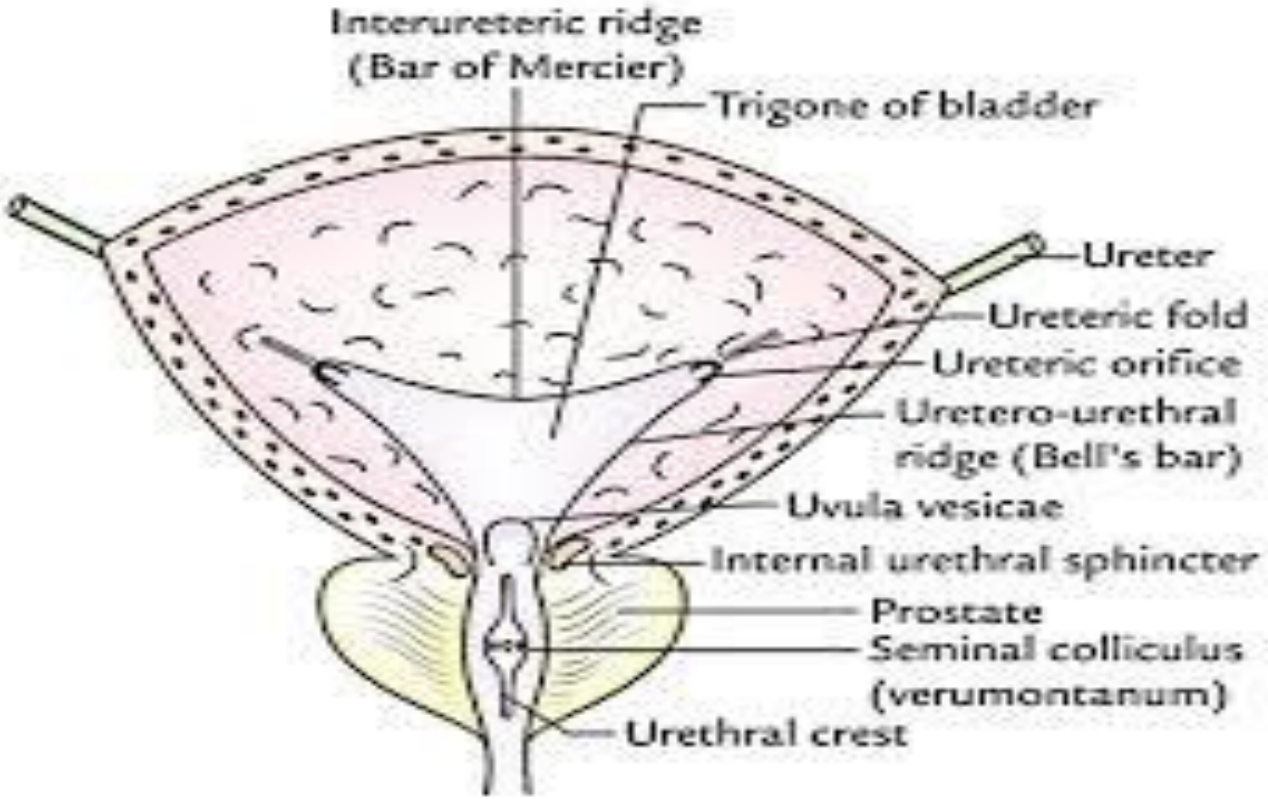
- In adult male- 220 ml (120-320 ml)
- Filling beyond 220 ml causes a desire to micturate.
- Filling up to 500 ml may be tolerated but beyond this it become painful.

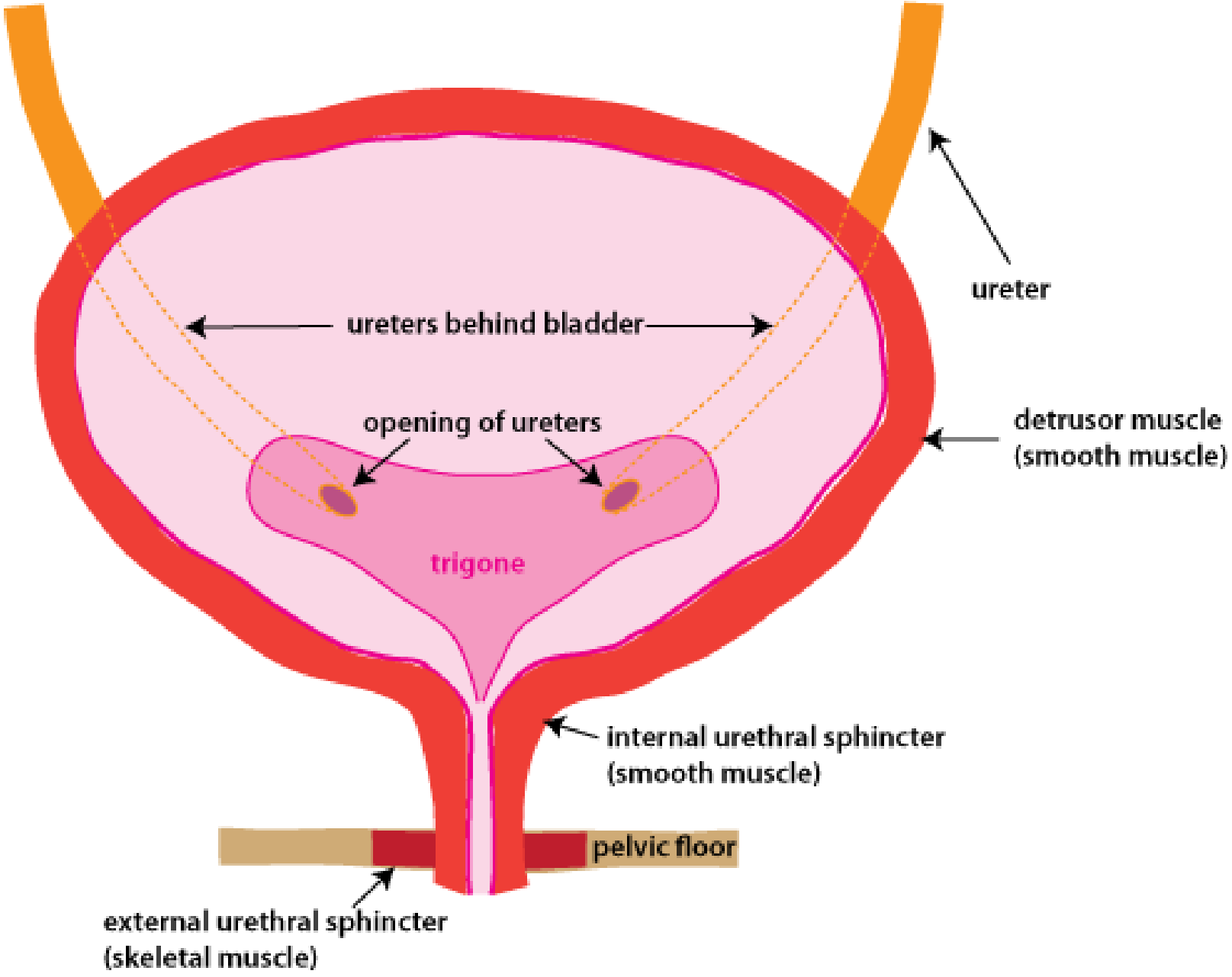
Interior of the bladder-

- ❖It can be examined by cystoscopy
- ❖In an empty bladder- the greater part of mucosa shows irregular folds due to its loose attachment to the muscular coat.
- ❖In a small triangular area over the lower part of the base of the bladder, the mucosa is smooth due to its firm attachment to the muscular coat. This area is known as the **trigone of the bladder.**

- **The apex of the trigone is directed downwards and forwards.**
- **Internal urethral orifice, opening into the urethra is located here.**
- **The ureters open at the posterolateral angles of the trigone.**
- **A slight elevtion on the trigone immediately posterior to the urethral orifice produced by the median lobe of the prostate, is called the uvula vesicae.**

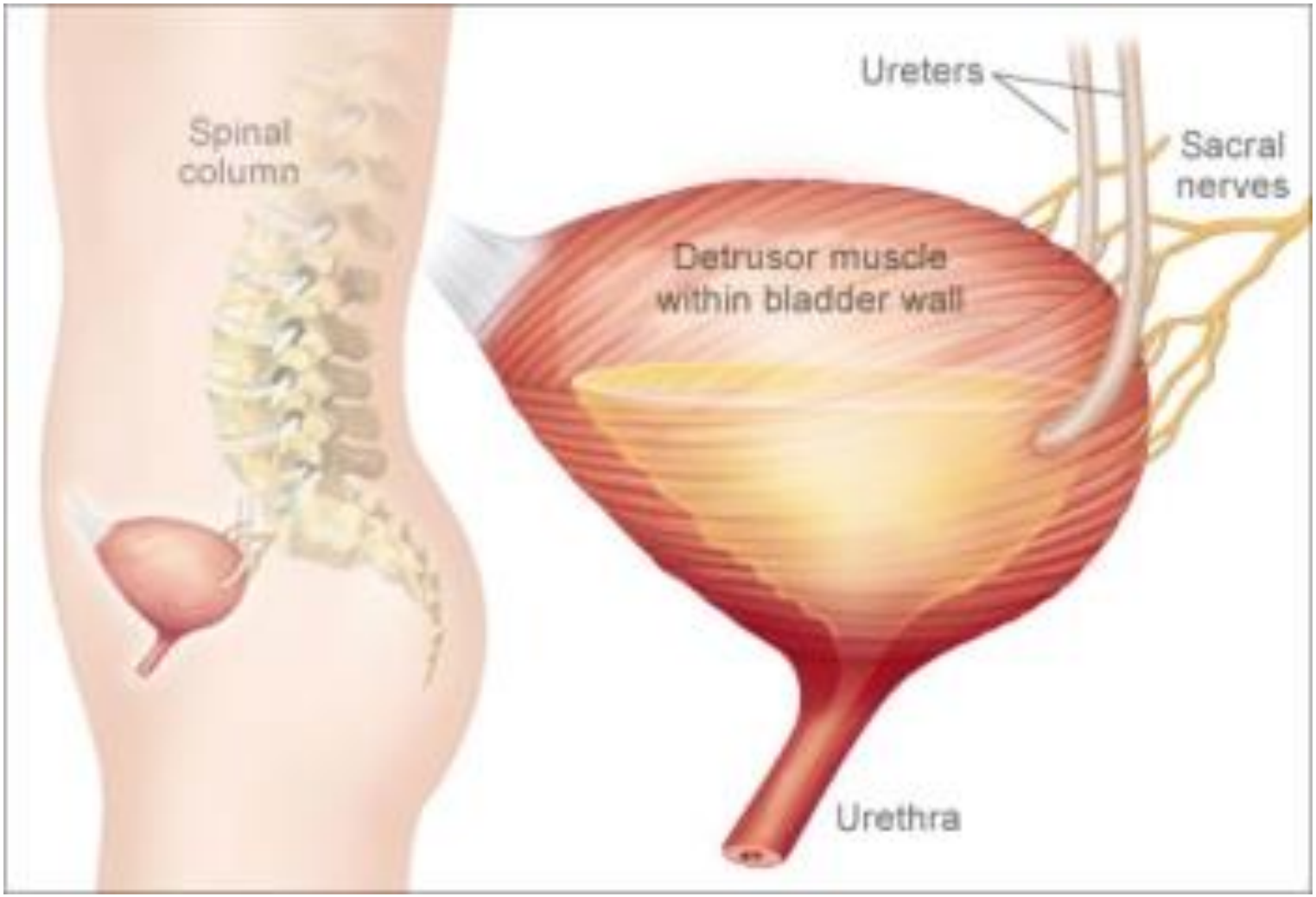
- **The base of the trigone is formed by the interureteric ridge or bar of mercier produced by the continuation of the inner longitudinal muscle coats of 2 ureters.**




ureter
ureters behind bladder
opening of ureters
detrusor muscle
(smooth muscle)
trigone
internal urethral sphincter
(smooth muscle)
pelvic floor
external urethral sphincter
(skeletal muscle)

Musculature-

- **The musculature of the bladder plays a key role in the storage and emptying of urine.**
- **In order to contract during micturition, the bladder wall contains specialised smooth muscle – known as detrusor muscle. Its fibres are orientated in multiple directions. It receives innervation from both the sympathetic and parasympathetic nervous systems.**


Ureters
Sacral nerves
Spinal column
Detrusor muscle within bladder wall
Urethra

Arterial supply-

Superior and inferior vesical arteries

Venous drainage-

Lying on the inferolateral surfaces of the bladder there is a vesical venous plexus. Veins from this plexus drain into the internal iliac veins.

- **Nerve supply-**

Neurological control is complex, with the bladder receiving input from both the autonomic (sympathetic and parasympathetic) and somatic arms of the nervous system:

- **Sympathetic – hypogastric nerve (T12 – L2). It causes relaxation of the detrusor muscle, promoting urine retention.**
- **Parasympathetic – pelvic nerve (S2-S4). Increased signals from this nerve causes contraction of the detrusor muscle, stimulating micturition.**
- **Somatic – pudendal nerve (S2-4). It innervates the external urethral sphincter, providing voluntary control over micturition.**

- **Lymphatics-** **The superolateral aspect of the bladder drains into the external iliac lymph nodes. The neck and fundus drain into the internal iliac, sacral and common iliac nodes.**