ANATOMY OF THE URINARY BLADDER AND URETHRA

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Objectives of the Lecture:

By the end of the lecture the student should be able to:

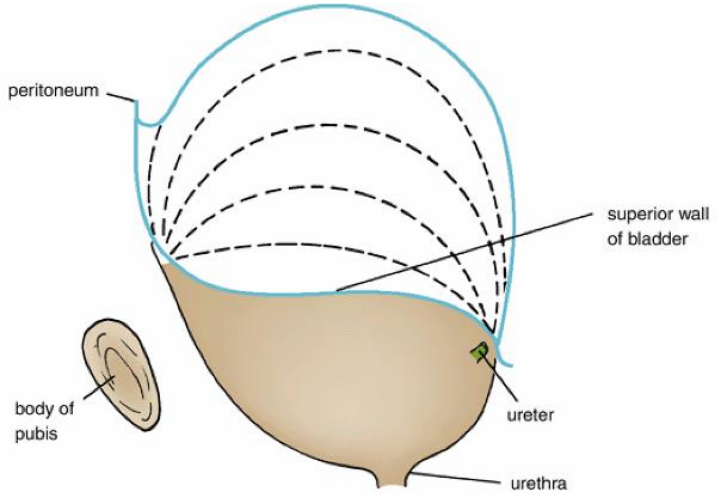
. Describe the normal anatomy of the urinary bladder (Position, Shape, Surfaces, Relations, Trigone and sphincters, Peritoneal coverings, Blood supply, Lymphatic drainage and Innervation).

. Describe the normal anatomy of the male and female urethra (Length, Parts and Lymphatic drainage).

. Describe the normal anatomy of the female urethra (Length and Lymphatic drainage).

URINARY BLADDER

- Situated immediately behind pubic bones within the pelvis.
- Receptacle for storage of urine.
- In adult, has maximum capacity of about 500 ml.
- Has strong muscular wall.
- Its shape and relations vary according to amount of urine it contains.



- In adult, empty bladder lies within pelvis.
- As the bladder fills, its superior wall rises up into hypogastric region.

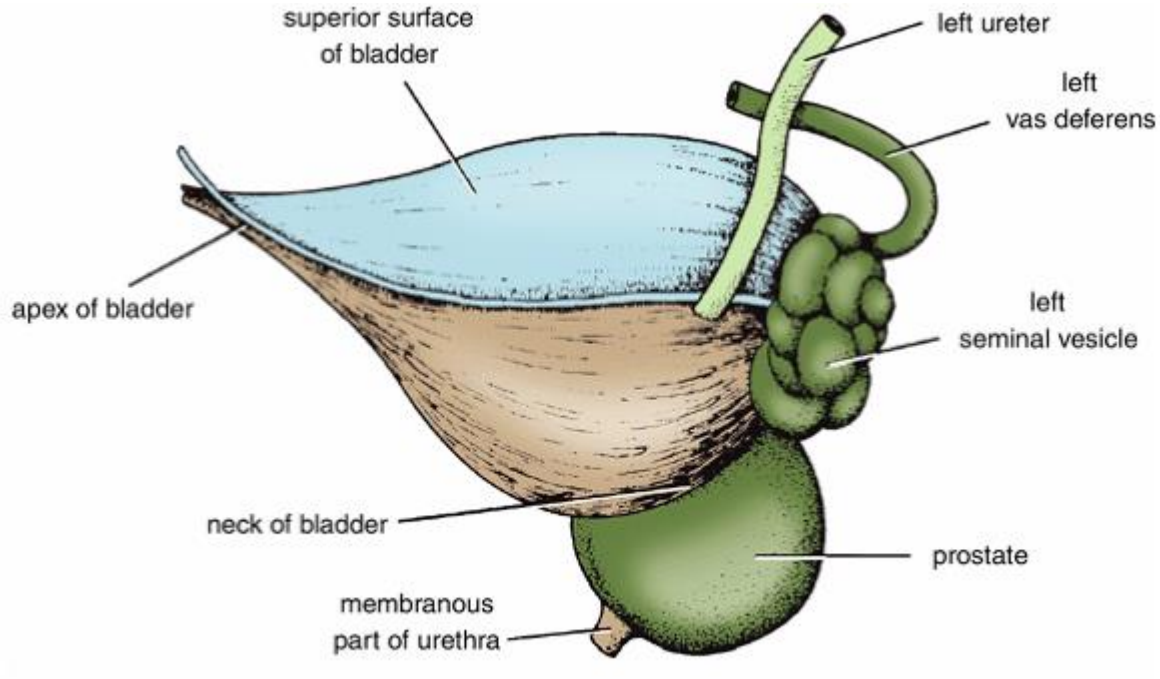
- In young child, empty bladder projects above pelvic inlet.
- When pelvic cavity enlarges, the bladder sinks into the pelvis to take up the adult position.

- **Empty bladder**: Pyramidal in shape, having apex, base, superior, 2 inferolateral surfaces and neck.

Apex of the bladder:

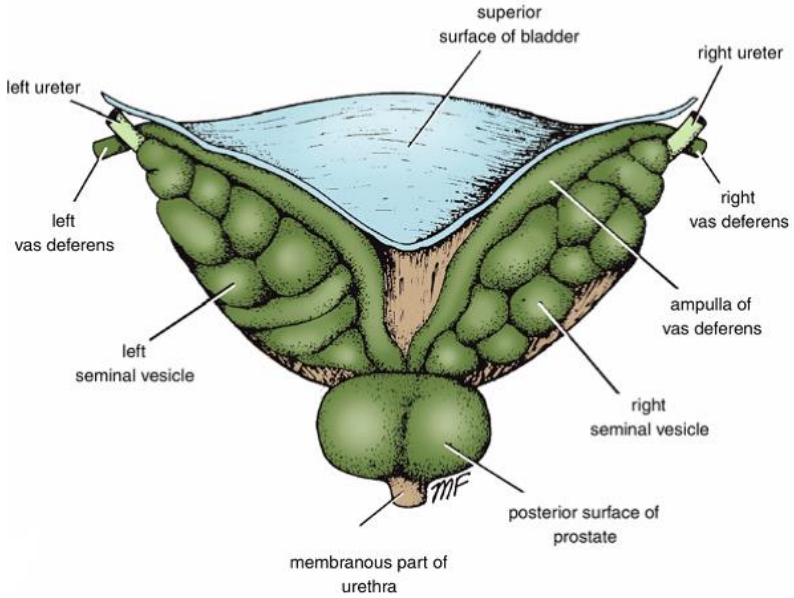
- Points anteriorly and lies behind upper margin of symphysis pubis

- Fibrous cord; urachus (remains of allantois) passes upward in extraperitoneal fat to the umbilicus forming median umbilical ligament



Base (posterior surface) of the bladder:

- Faces posteriorly - Triangular in shape



Superolateral angles: Joined by the ureters

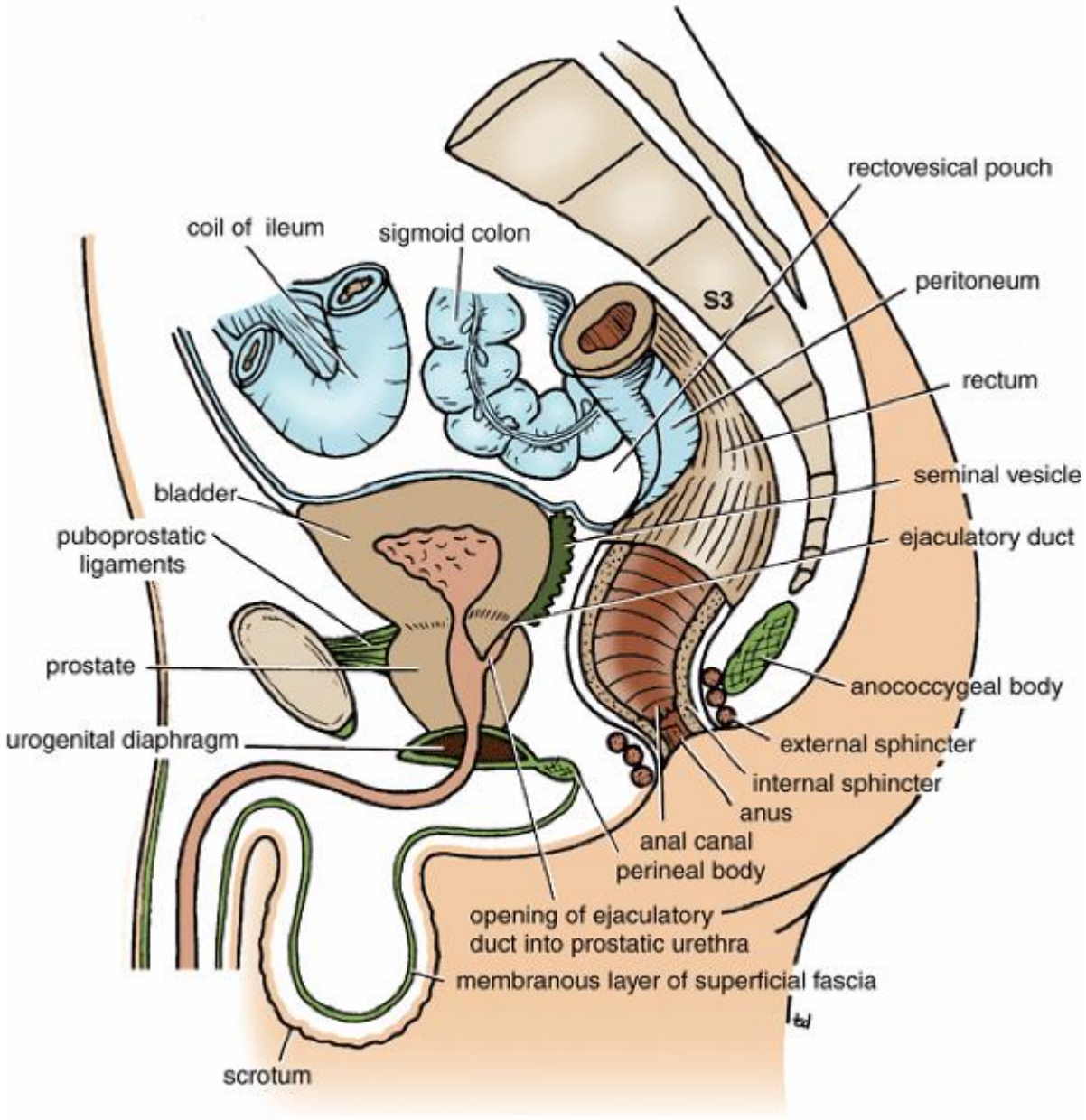
Inferior angle: Gives rise to urethra

2 vasa deferentia: Lie side by side on posterior surface of the bladder and separate seminal vesicles from each other

Upper part of posterior surface of the bladder: Covered by peritoneum forming anterior wall of rectovesical pouch

Lower part of posterior surface separated from rectum by:

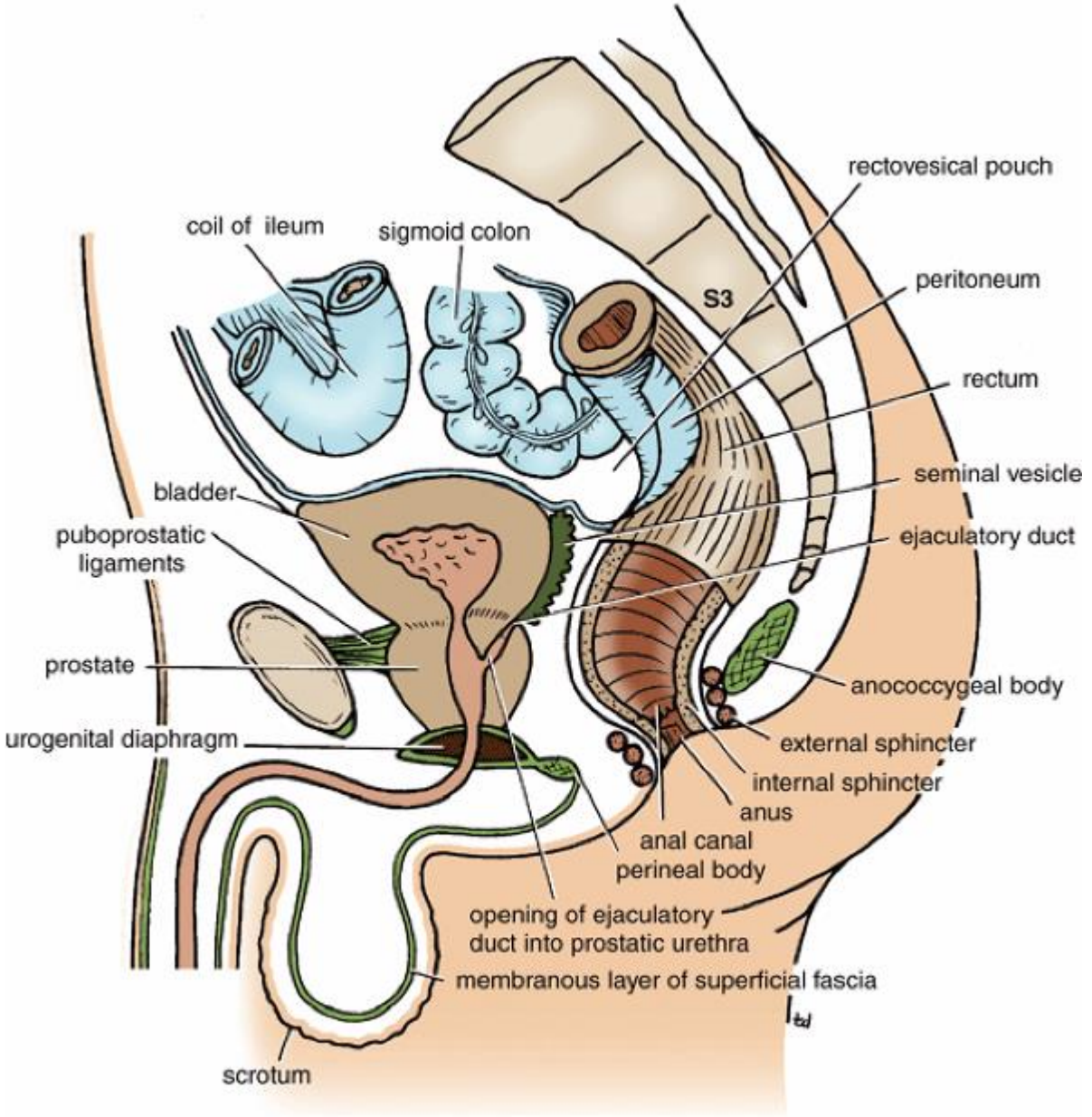
1. Vasa deferentia
2. Seminal vesicles
3. Rectovesical pouch



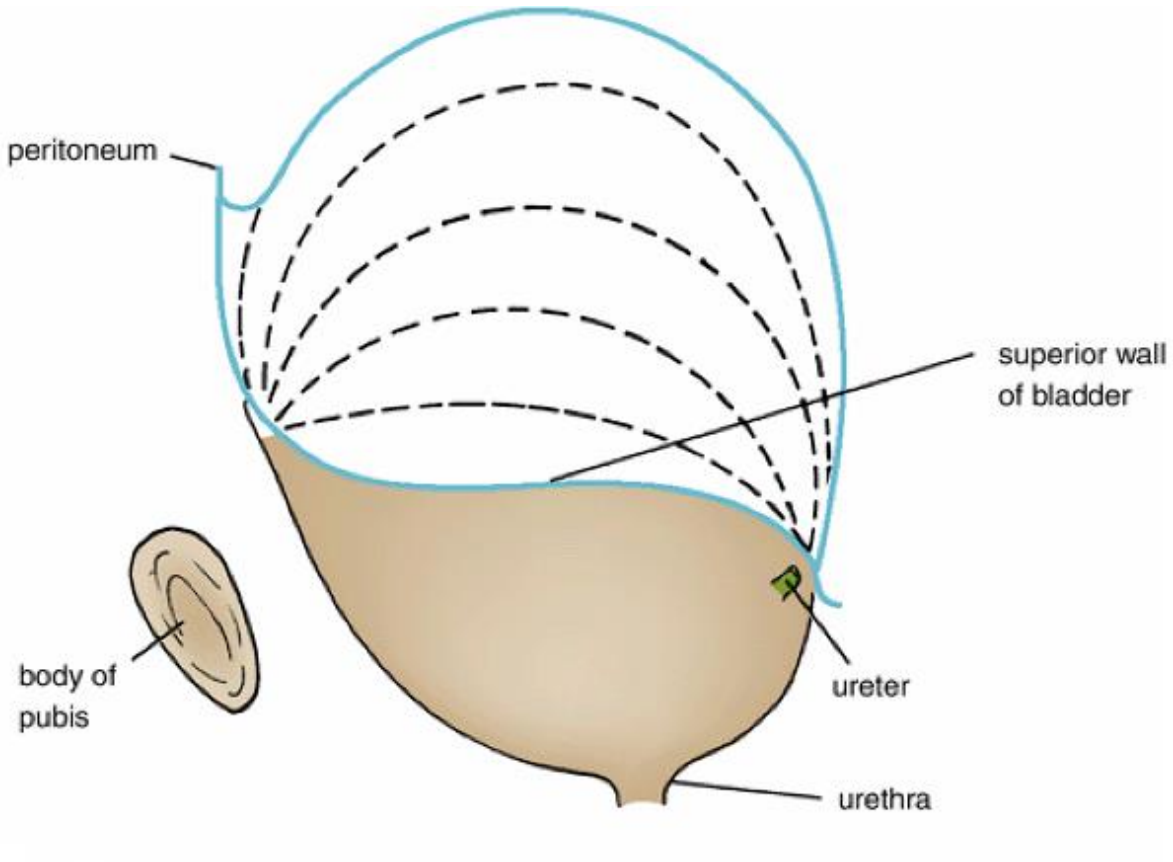
Superior surface of the bladder:

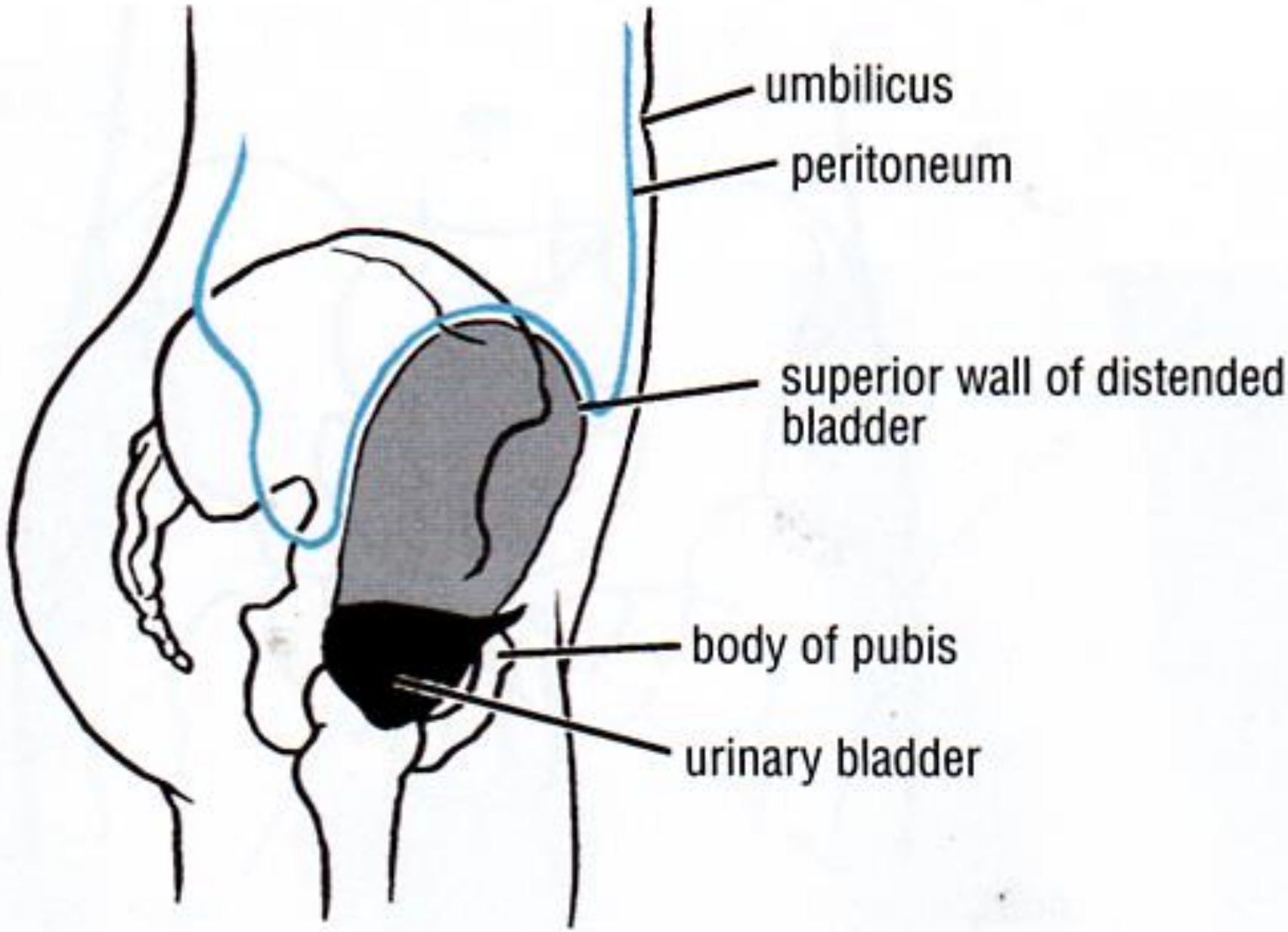
- Completely covered with peritoneum.
- Along lateral margins of superior surface, peritoneum reflected onto lateral pelvic walls.

- **Related to**: Coils of ilium, sigmoid colon.



➢**As bladder fills**: Becomes ovoid and superior surface bulges upward into abdominal cavity, peritoneum pealed off lower part of anterior abdominal wall, so that the bladder comes into contact with anterior abdominal wall.




umbilicus
peritoneum
superior wall of distended bladder
body of pubis
urinary bladder

Inferolateral surfaces of the bladder:

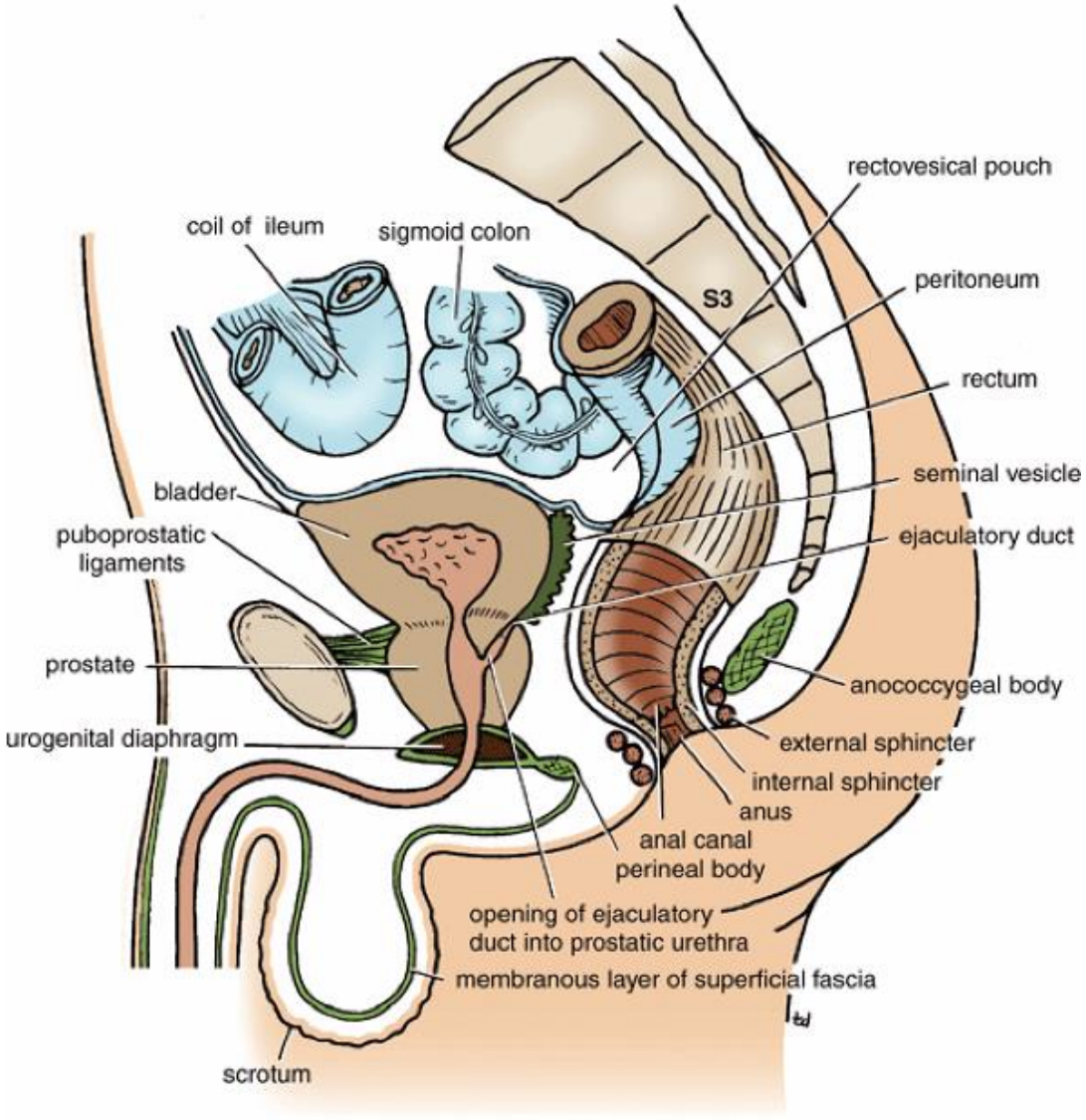
Related to:

In front

1. Retropubic pad of fat
2. Pubic bones

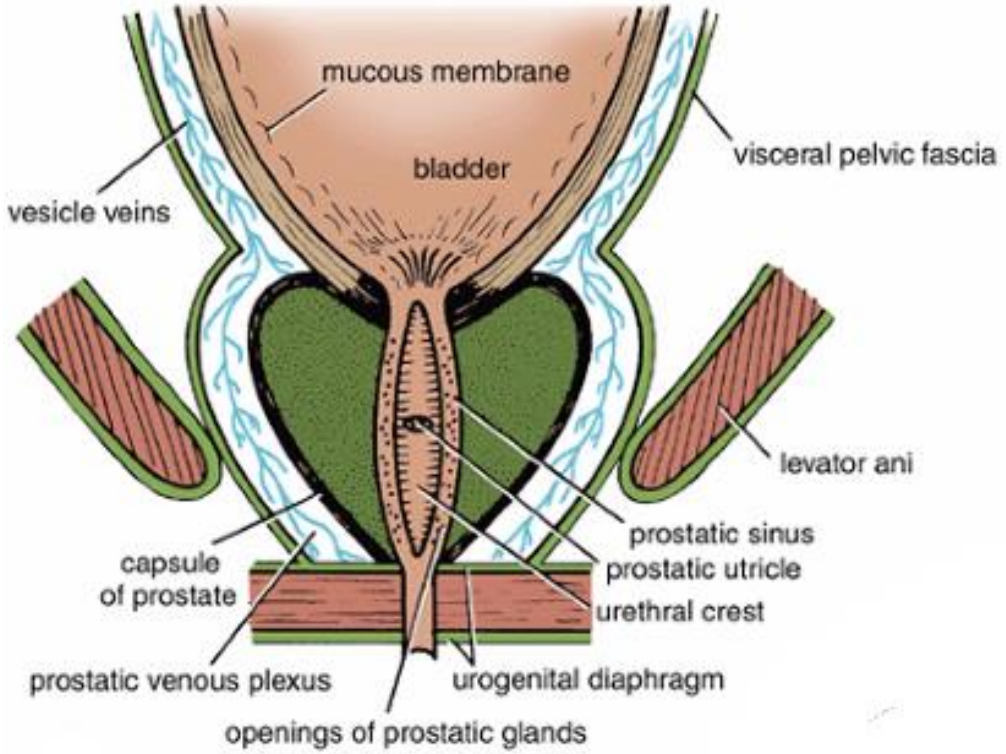
Posteriorly to:

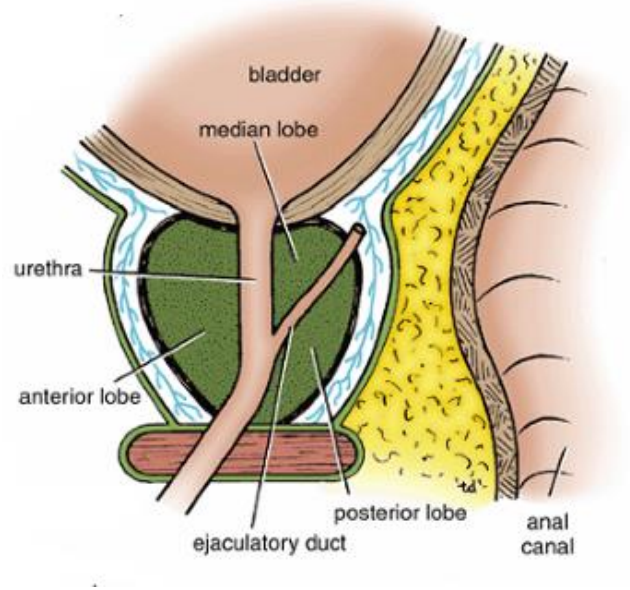
1. Obturator internus muscle (above)
2. Levator ani muscle (below)



Neck of the bladder:

- Lies inferiorly
- Rests on upper surface of the prostate
- Here, smooth muscle fibers of bladder wall are continuous with those of the prostate
- Held in position by puboprostatic ligaments in male and pubovesical ligaments in female



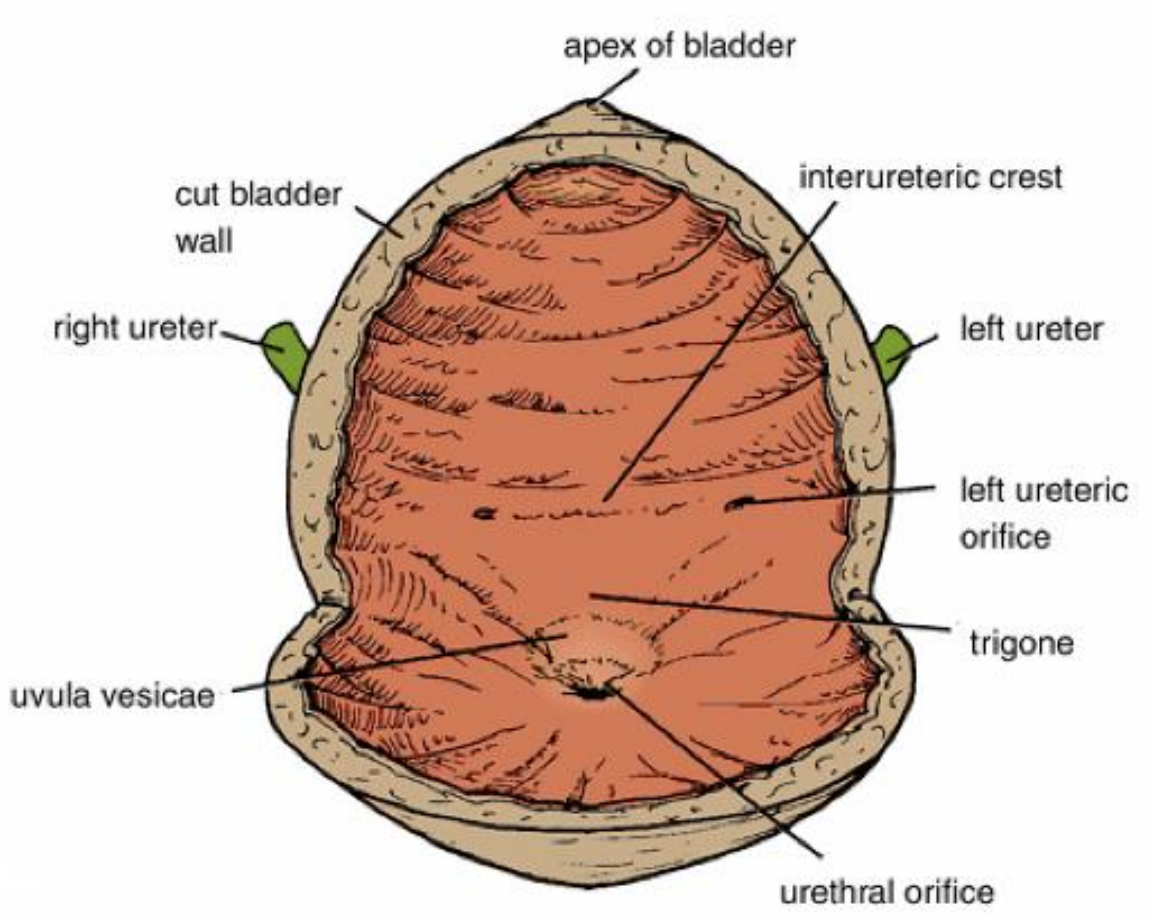


Mucous membrane of greater part of empty bladder:

❖Thrown into folds, but these disappear when the bladder is full.

Trigone of the bladder:

❖Area of mucous membrane covering internal surface of base of the bladder (mucous membrane is always smooth, even when the viscus is empty, because mucous membrane over trigone is firmly adherent to underlying muscular coat).



Superior angles of the trigone:

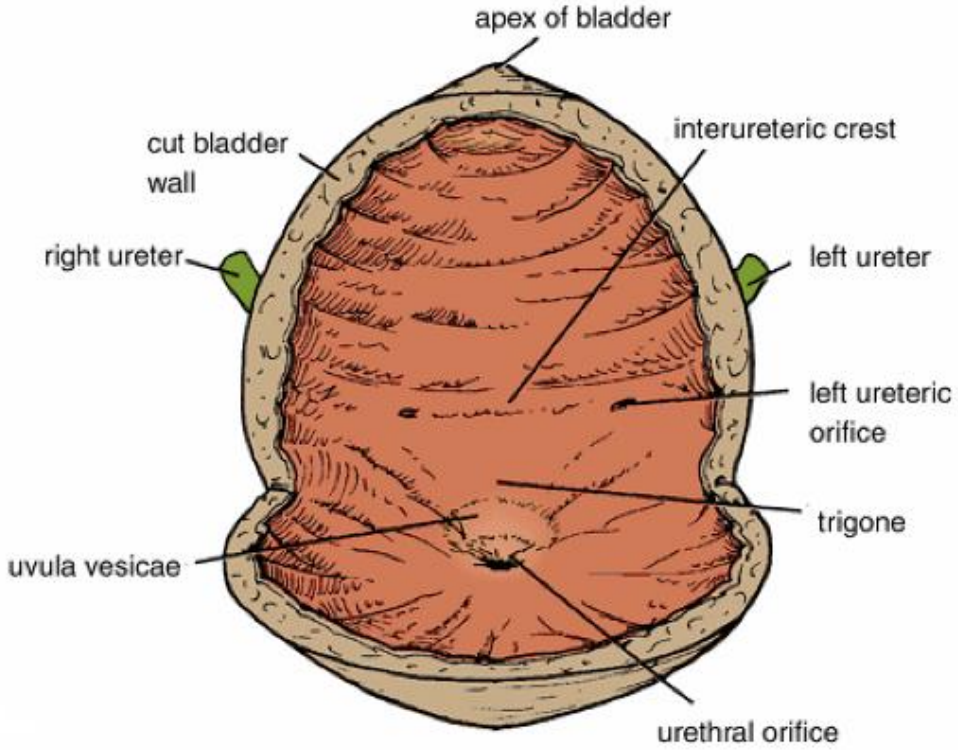
- Correspond to openings of ureters.

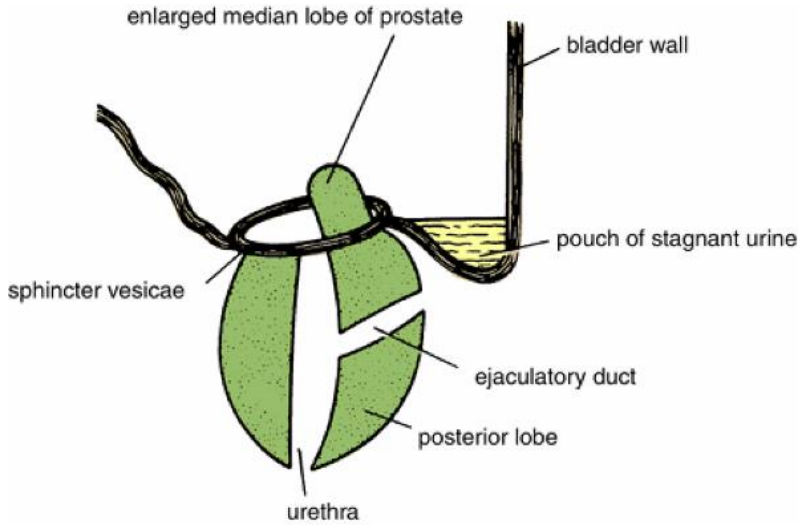
Inferior angle of trigone:

- Corresponds to internal urethral orifice

Notes:

- **Trigone** limited above by interureteric ridge (muscular ridge between openings of the ureters).
- **Uvula vesicae**: Small elevation situated immediately behind urethral orifice, produced by underlying median lobe of prostate.



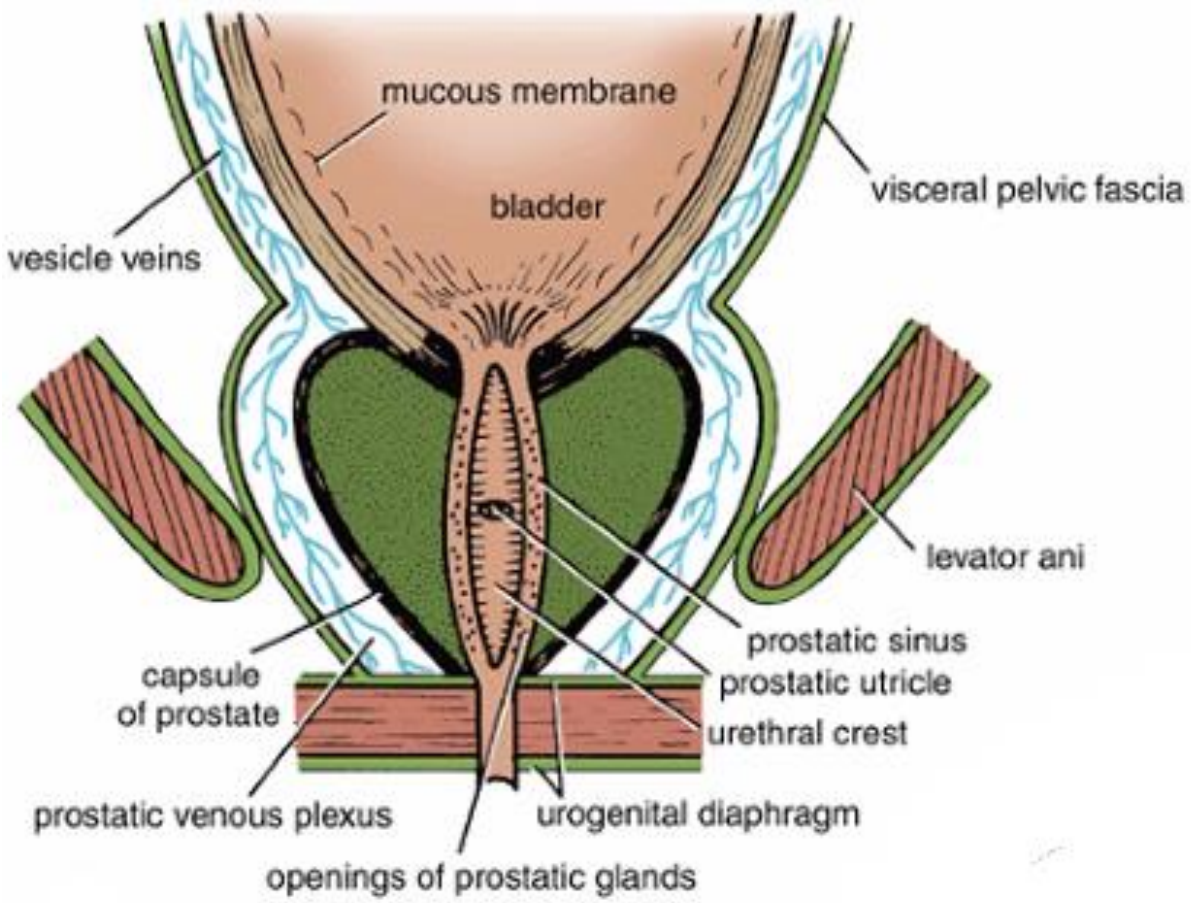


Muscular coat of the bladder:

- Composed of smooth muscle
- Arranged as 3 layers of interlacing bundles detrusor muscle.

Sphincter vesicae:

- Thickening of circular component of muscle coat at neck of the bladder.



URINARY BLADDER IN THE FEMALE

- Situated immediately behind pubic bones
- Lies at lower level than in male pelvis due to absence of the prostate

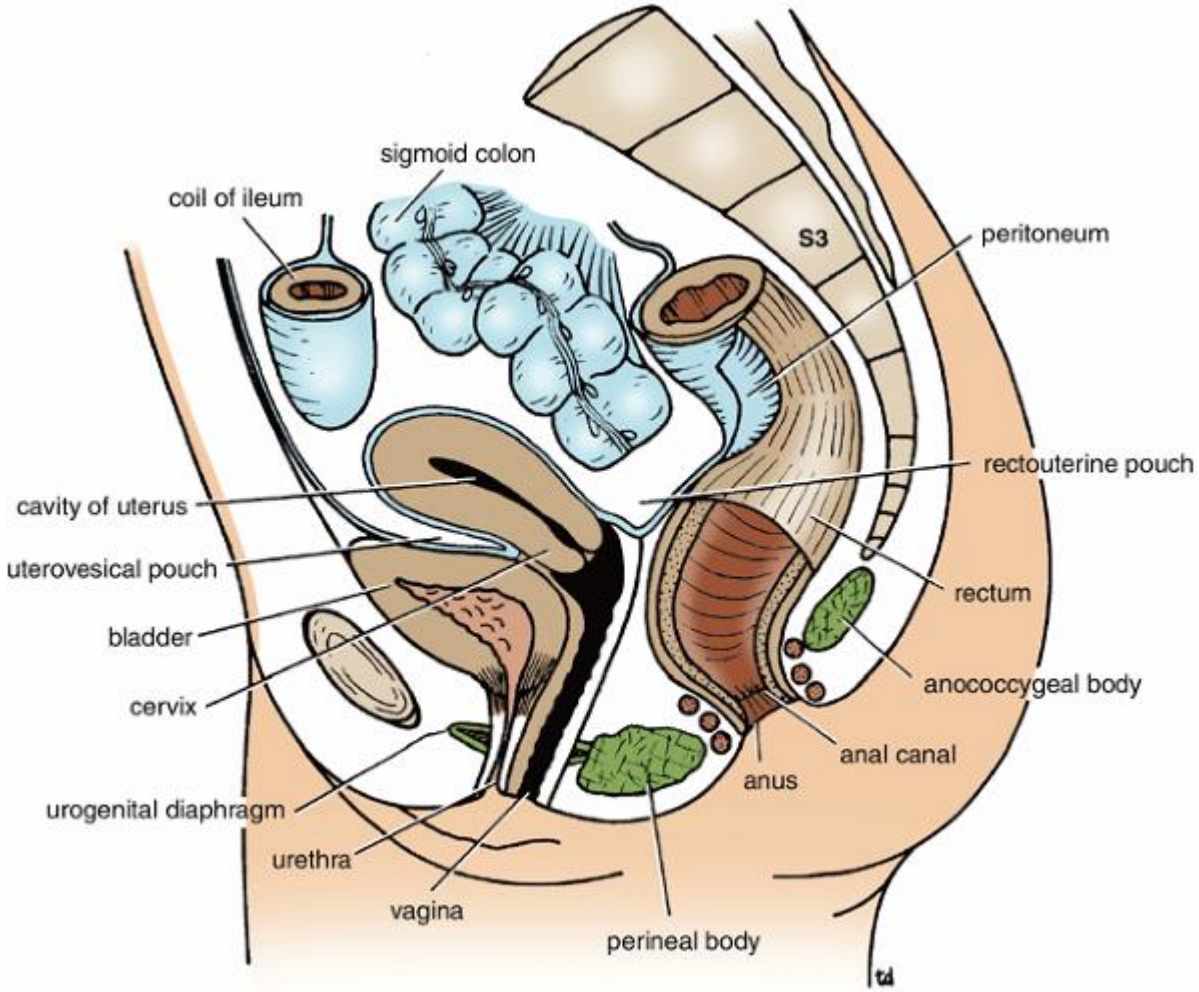
Neck: Rests directly on urogenital diaphragm

Apex: Behind symphysis pubis

Base (posterior surface):

Related to:

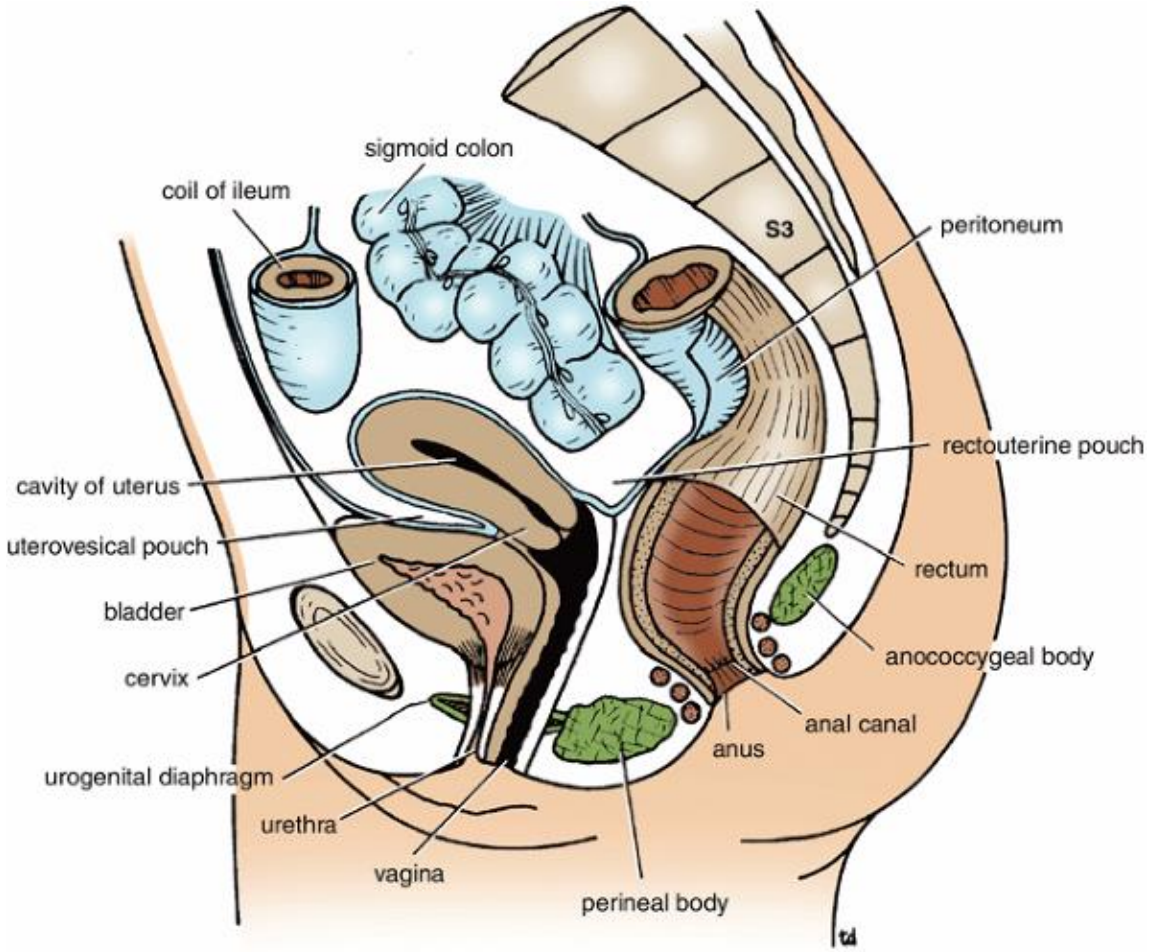
1. Vagina
2. Rectum



Superior surface of urinary bladder in female:

Related to:

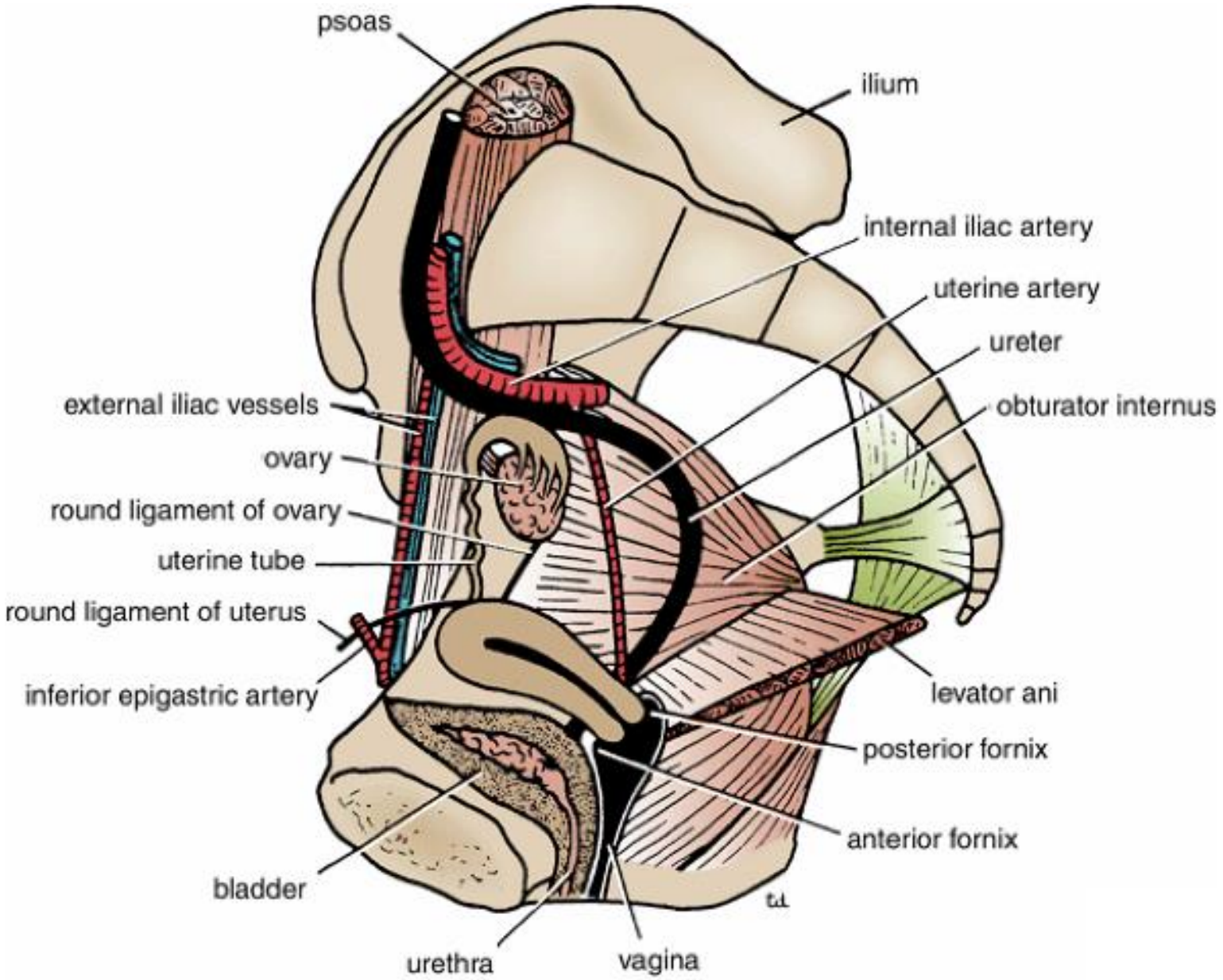
1. Uterovesical pouch of peritoneum
2. Body of uterus



Inferolateral surfaces:

Related to:

1. Retropubic pad of fat
2. Pubic bones
3. Obturator internus
4. Levator ani



BLOOD SUPPLY OF THE URINARY BLADDER

ARTERIES: Branches of internal iliac artery

1. **Superior vesical artery**
2. **Inferior vesical artery**

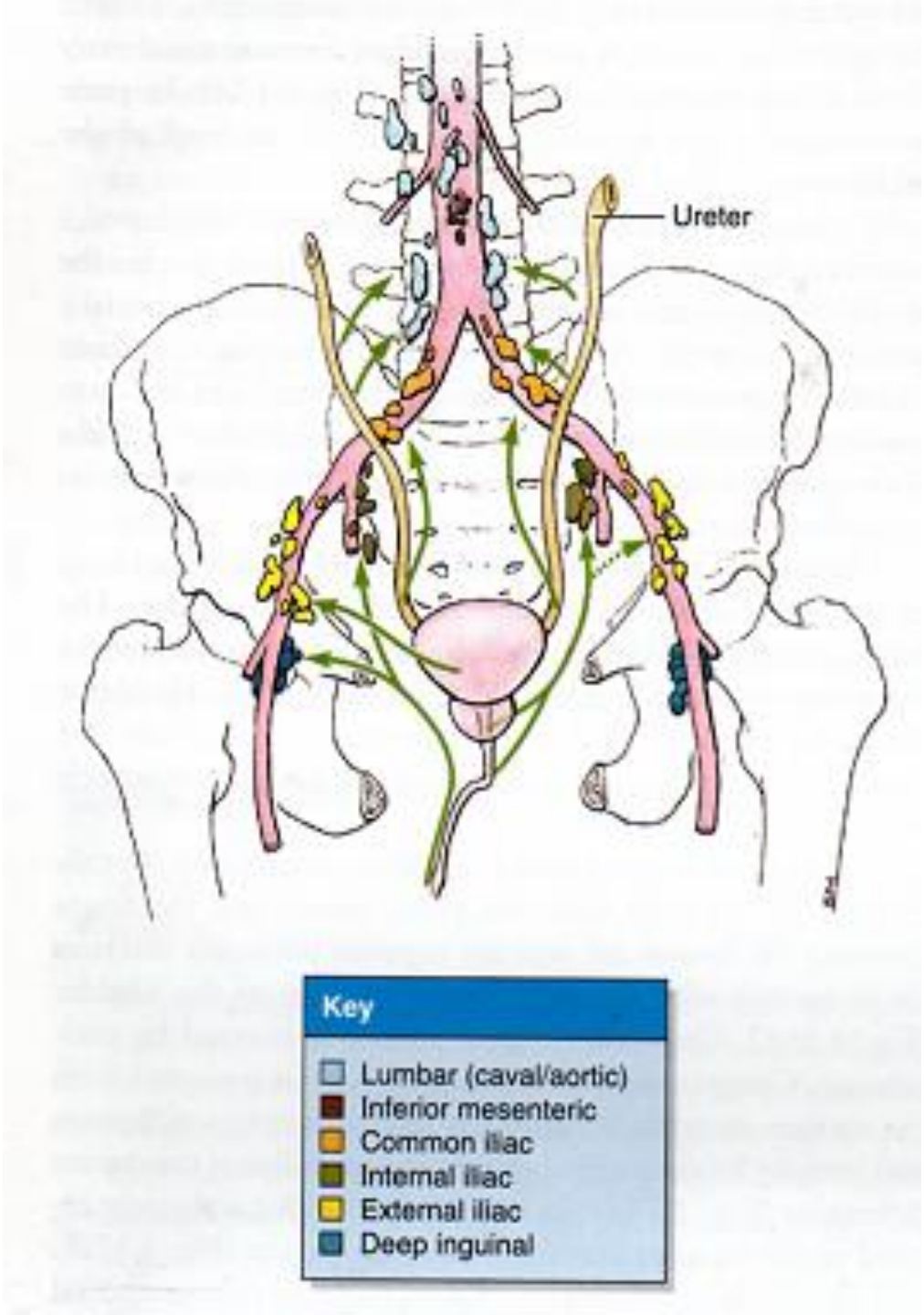
VEINS:

The veins form: Vesical venous plexus: communicates below with prostatic venous plexus and drain into internal iliac vein

Lymph drainage of urinary bladder:

The lymph vessels drain into:

1. Internal iliac lymph nodes
2. External iliac lymph nodes



NERVE SUPPLY OF THE URINARY BLADDER:

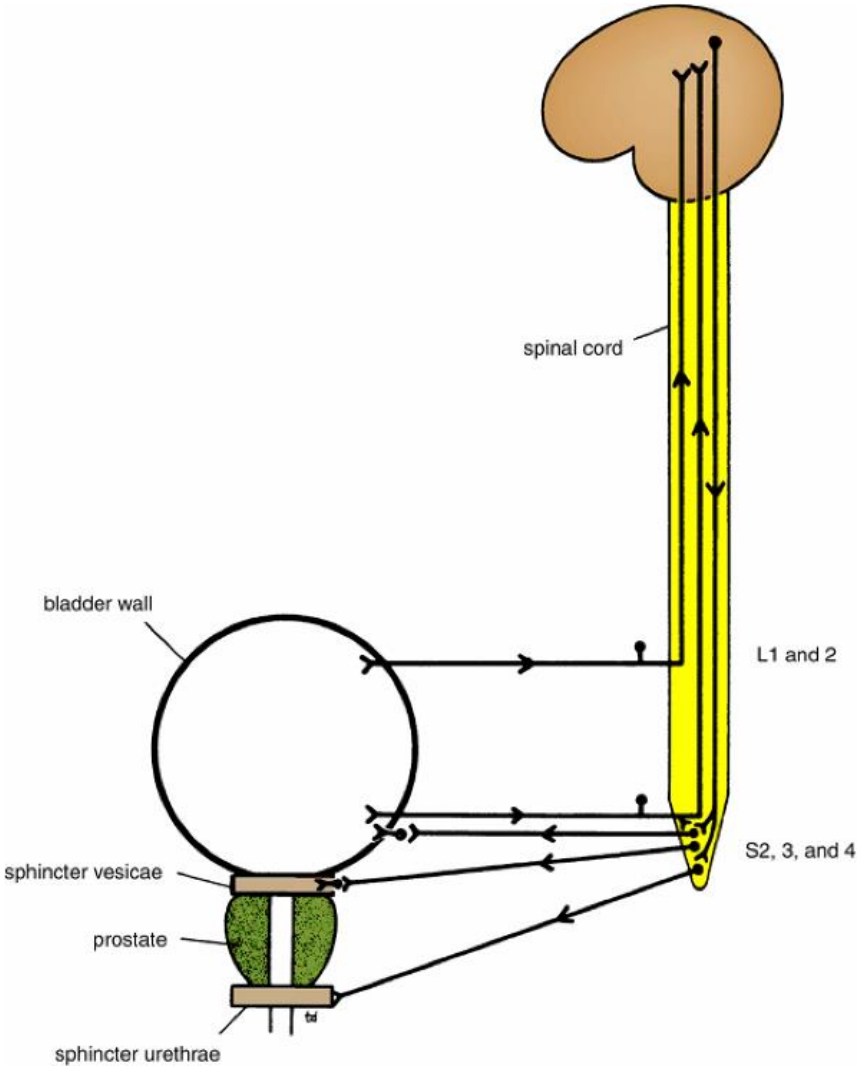
Inferior hypogastric plexuses

Sympathetic postganglionic fibers:

- Originate in 1st and 2nd lumbar ganglia
- Descend to bladder via hypogastric plexuses

Parasympathetic preganglionic fibers:

- Arise as pelvic splanchnic nerves from 2nd, 3rd and 4th sacral nerves
- They pass through inferior hypogastric plexuses to reach the bladder wall, where they synapse with postganglionic neurons

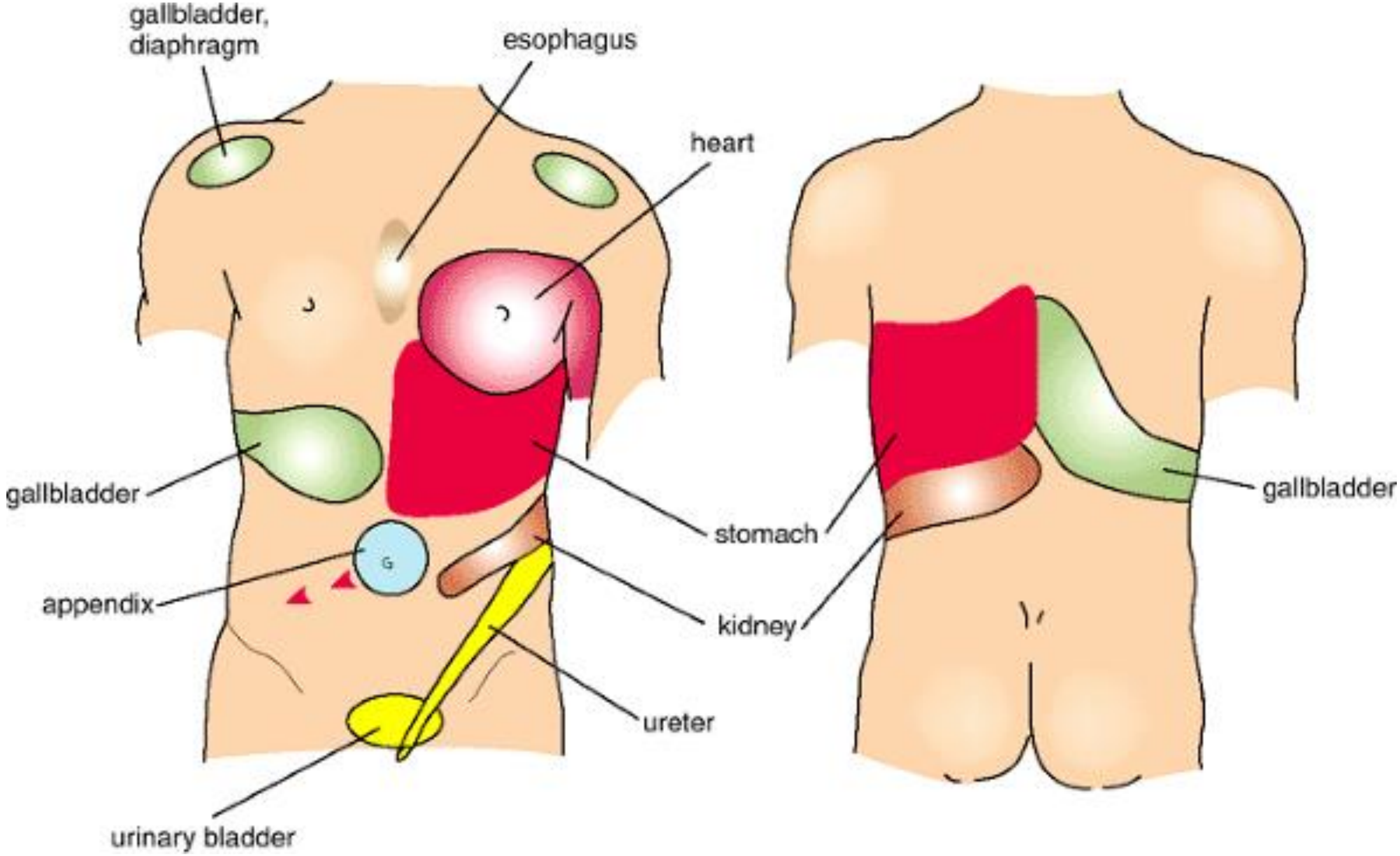


Majority of afferent sensory fibers:

- Arising in the bladder reach central nervous system via pelvic splanchnic nerves

Some afferent fibers:

- Travel with sympathetic nerves via hypogastric plexuses and enter 1st and 2nd lumbar segments of spinal cord


gallbladder,
diaphragm
esophagus
heart
gallbladder
stomach
appendix
kidney
ureter
urinary bladder
gallbladder

MALE URETHRA

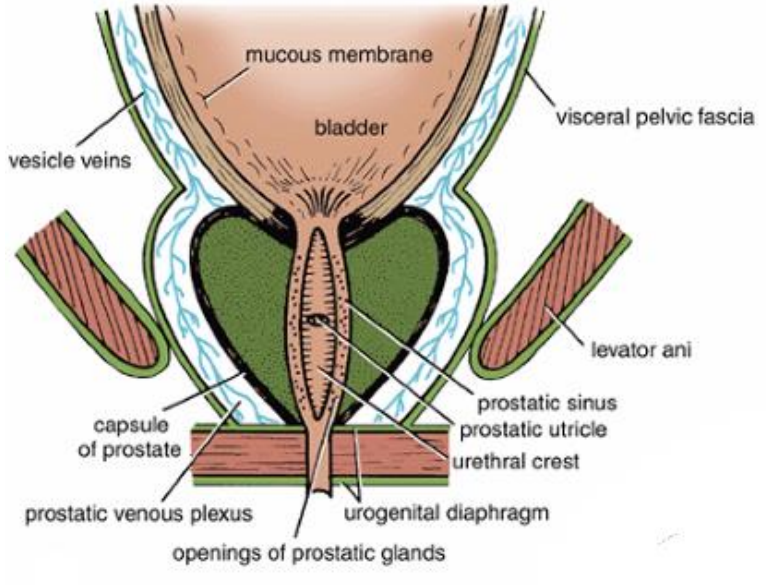
About: 8 inches (20 Cm) long

Extends: From neck of the bladder to external urethral meatus on the glans penis

PARTS OF MALE URETHRA:

1. Prostatic urethra:

- About 1 ¼ inches (3 Cm) long
- Begins at neck of the bladder
- Passes through prostate from base to apex
- Becomes continuous with membranous part of urethra



The widest and most dilatable part of the entire urethra

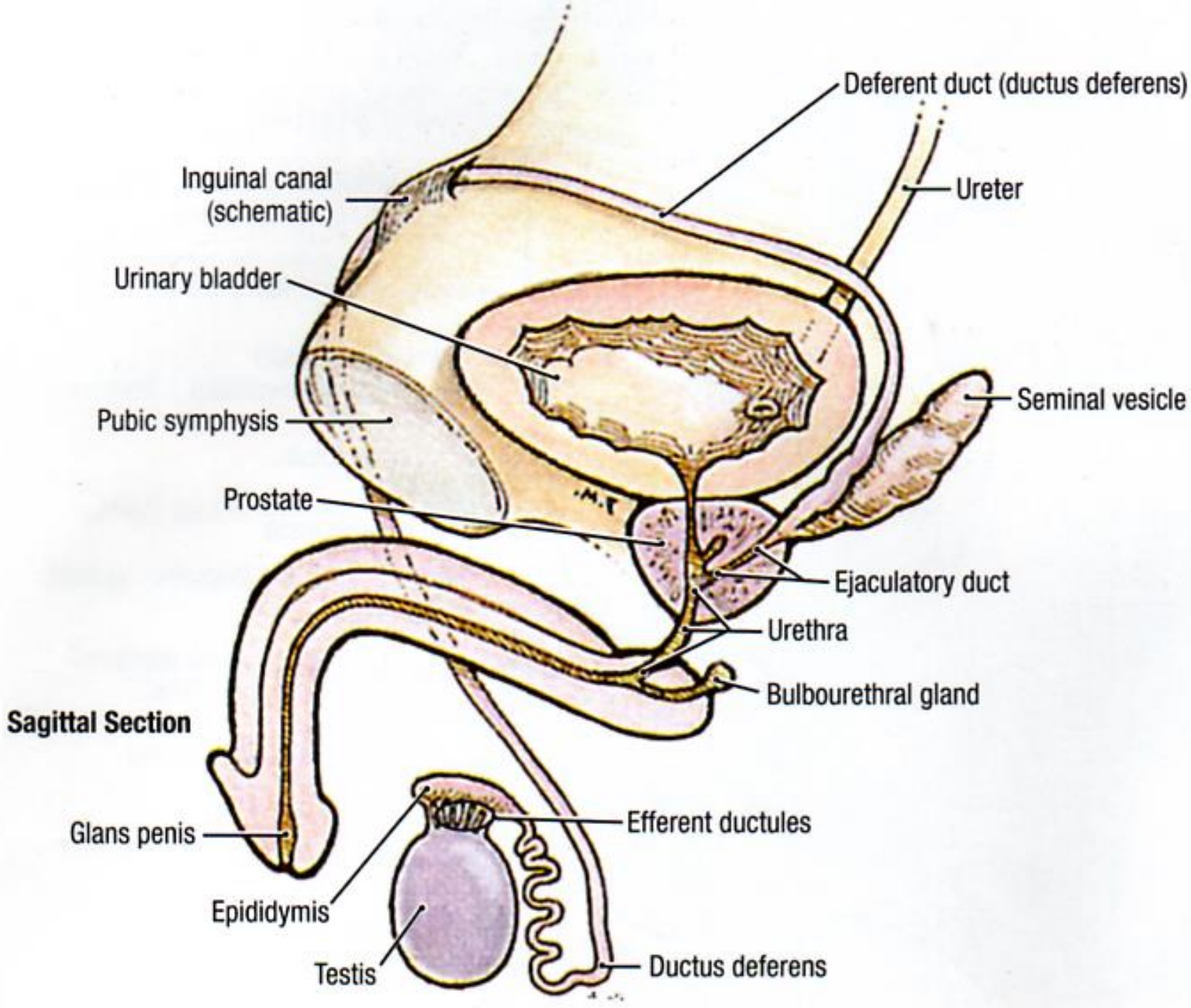
Urethral crest: Longitudinal ridge on its posterior wall.

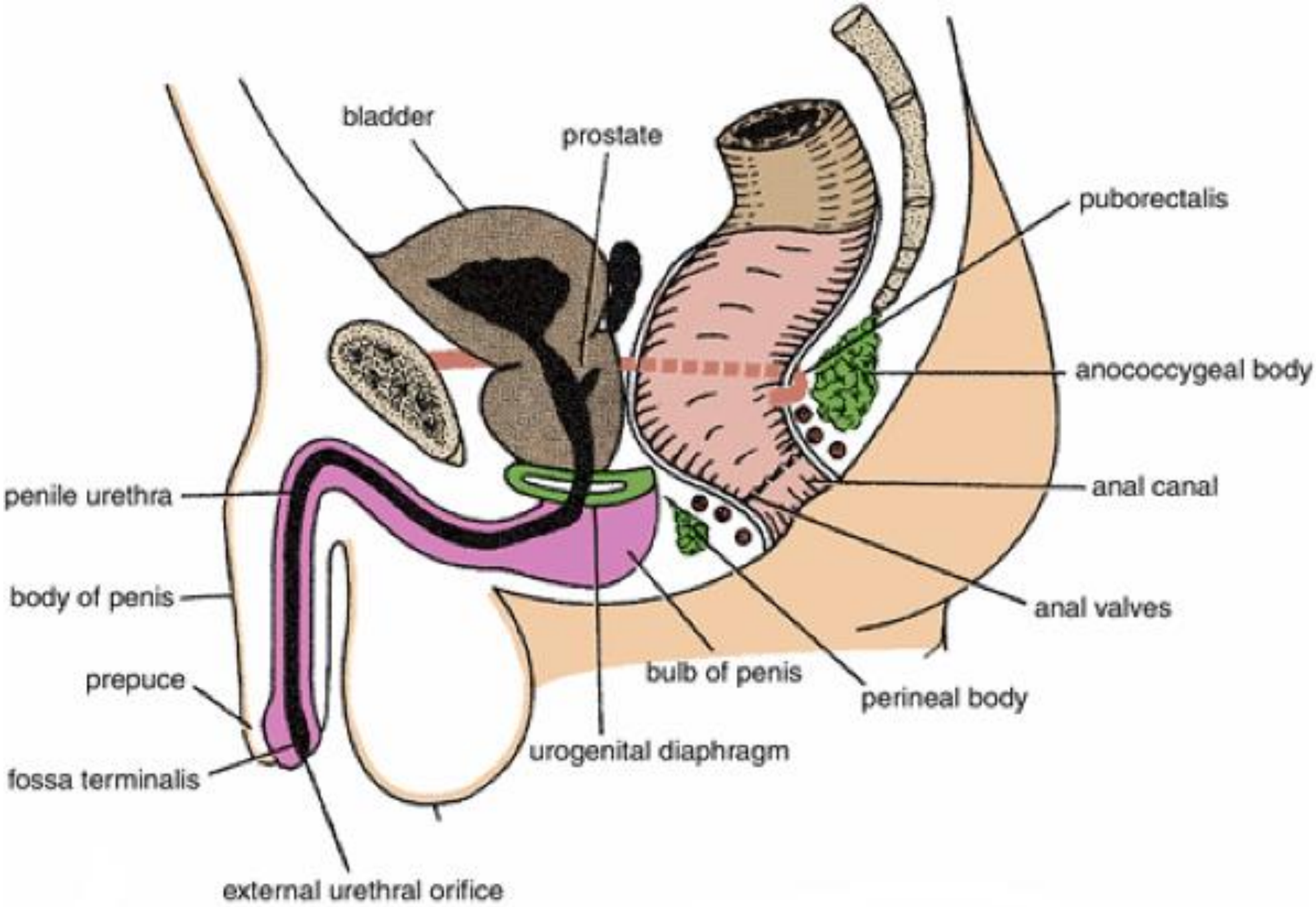
Prostatic sinus: Groove on each side of the ridge.

Prostatic glands: Open into the prostatic sinuses.

Prostatic utricle: Analogue of the uterus and vagina in females, depression on summit of urethral crest.

Ejaculatory ducts: Open on edge of mouth of prostatic utricle.

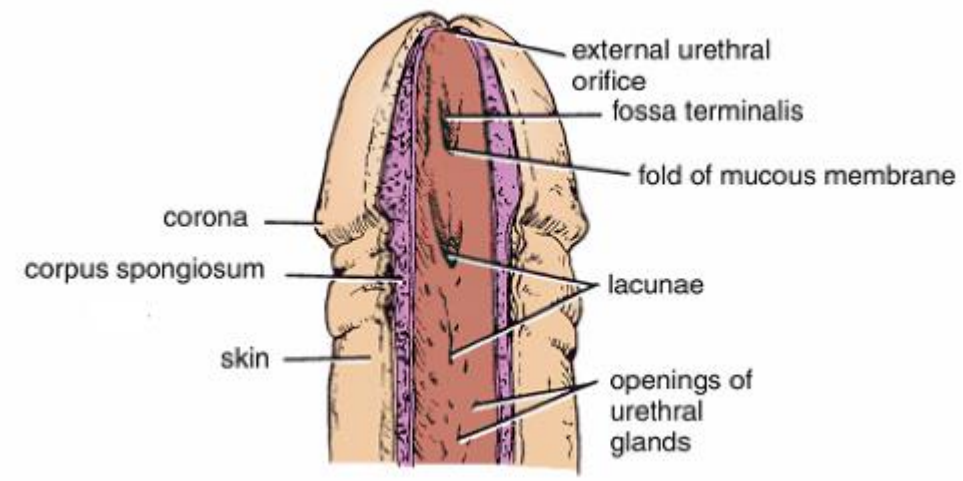

Deferent duct (ductus deferens)
Ureter
Inguinal canal (schematic)
Urinary bladder
Seminal vesicle
Pubic symphysis
Prostate
Ejaculatory duct
Urethra
Bulbourethral gland
Sagittal Section
Efferent ductules
Glans penis
Epididymis
Testis
Ductus deferens


bladder
prostate
puborectalis
anococcygeal body
penile urethra
anal canal
body of penis
anal valves
prepuce
bulb of penis
perineal body
urogenital diaphragm
fossa terminalis
external urethral orifice

2. Membranous urethra:

- About ½ inch (1.25 Cm) long
- Lies within urogenital diaphragm
- Surrounded by sphincter urethrae muscle

The least dilatable portion of urethra.

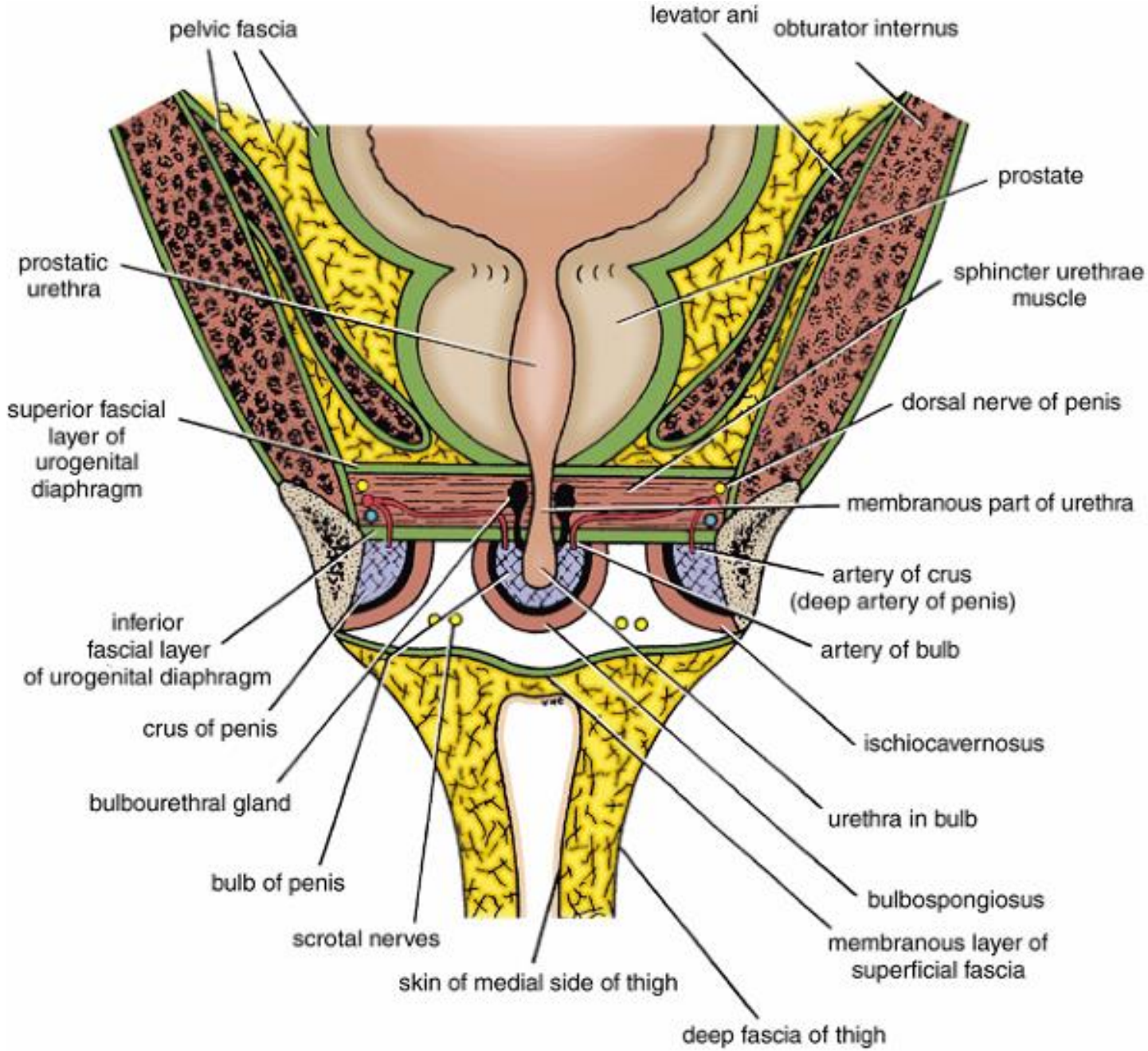


3. Penile urethra:

- About 6 inches (16 Cm) long
- Enclosed in bulb and corpus spongiosum of the penis
- The external meatus is the narrowest part of the entire urethra

Fossa terminalis (navicular fossa): Part of urethra that lies within the glans penis.

Bulbourethral glands: Open into penile urethra below the urogenital diaphragm.


pelvic fascia
levator ani
obturator internus
prostate
prostatic urethra
sphincter urethrae muscle
superior fascial layer of urogenital diaphragm
dorsal nerve of penis
membranous part of urethra
artery of crus (deep artery of penis)
inferior fascial layer of urogenital diaphragm
artery of bulb
crus of penis
ischiocavernosus
bulbourethral gland
urethra in bulb
bulb of penis
bulbospongiosus
membranous layer of superficial fascia
scrotal nerves
skin of medial side of thigh
deep fascia of thigh

FEMALE URETHRA

- About 1 ½ inches (4 Cm) long

Extends: From neck of the bladder to the external urethral meatus

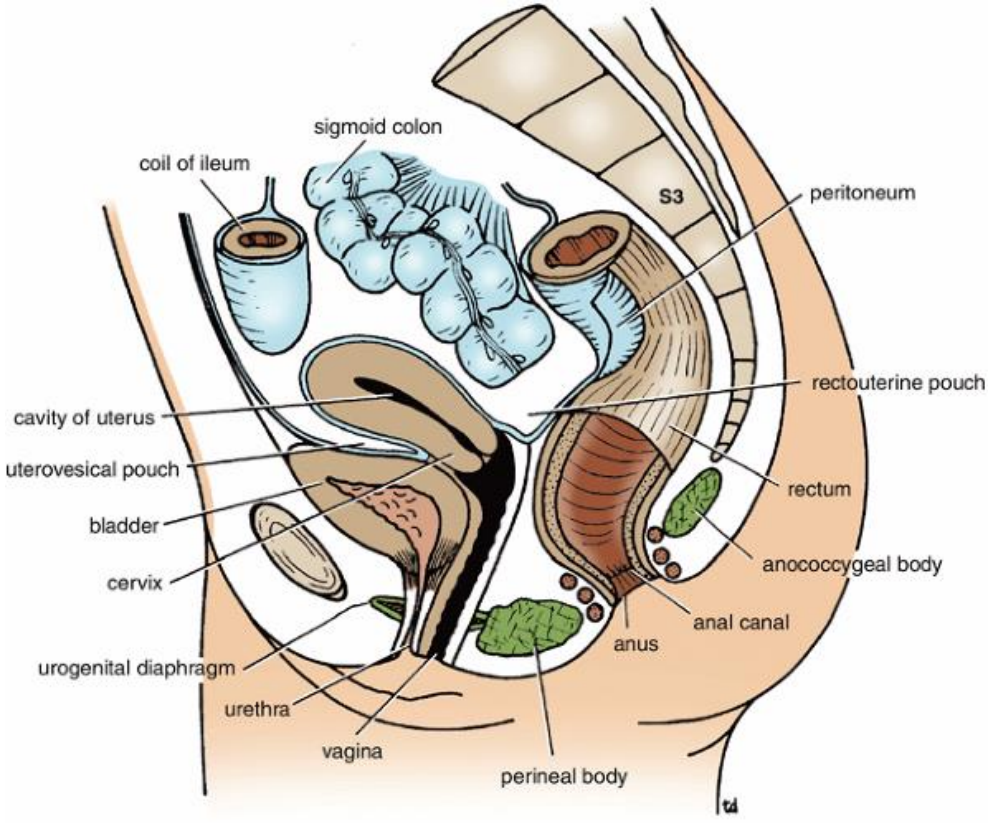
- Opens into the vestibule about 1 inch (2.5 Cm) below the clitoris
- Traverses the sphincter urethrae.

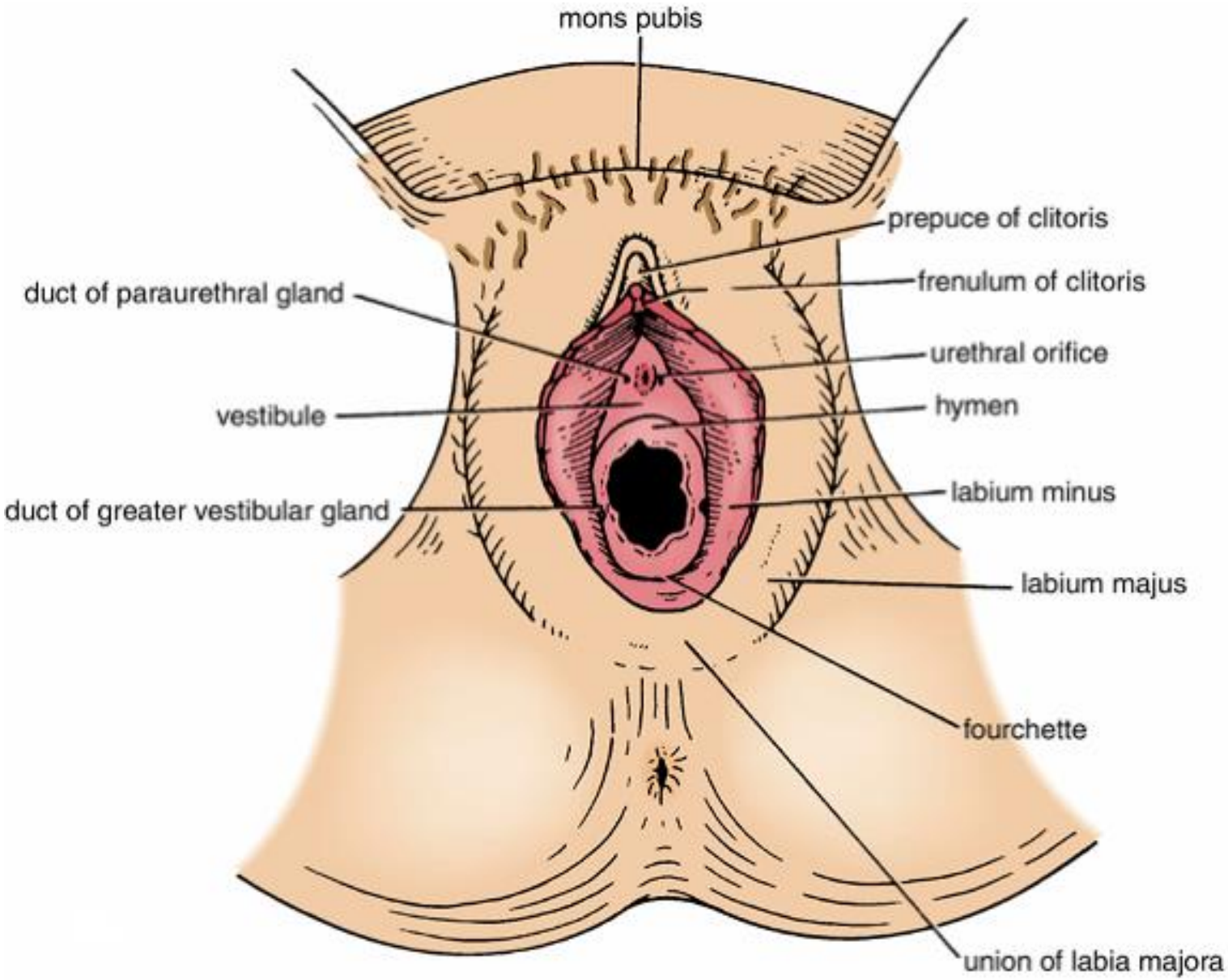
Lies: Immediately in front of the vagina.

Ducts of paraurethral glands:

- Open at sides of external urethral orifice

Can be dilated relatively easily.




mons pubis
prepuce of clitoris
frenulum of clitoris
duct of paraurethral gland
urethral orifice
vestibule
hymen
duct of greater vestibular gland
labium minus
labium majus
fourchette
union of labia majora

THANK YOU