PROSTATE GLAND

INRODUCTION

The Prostate is a conical Fibro-Musculo-Glandular organ surrounding the proximal part of male urethra.

- **Corresponds with paraurethral glands of female developmentally.**

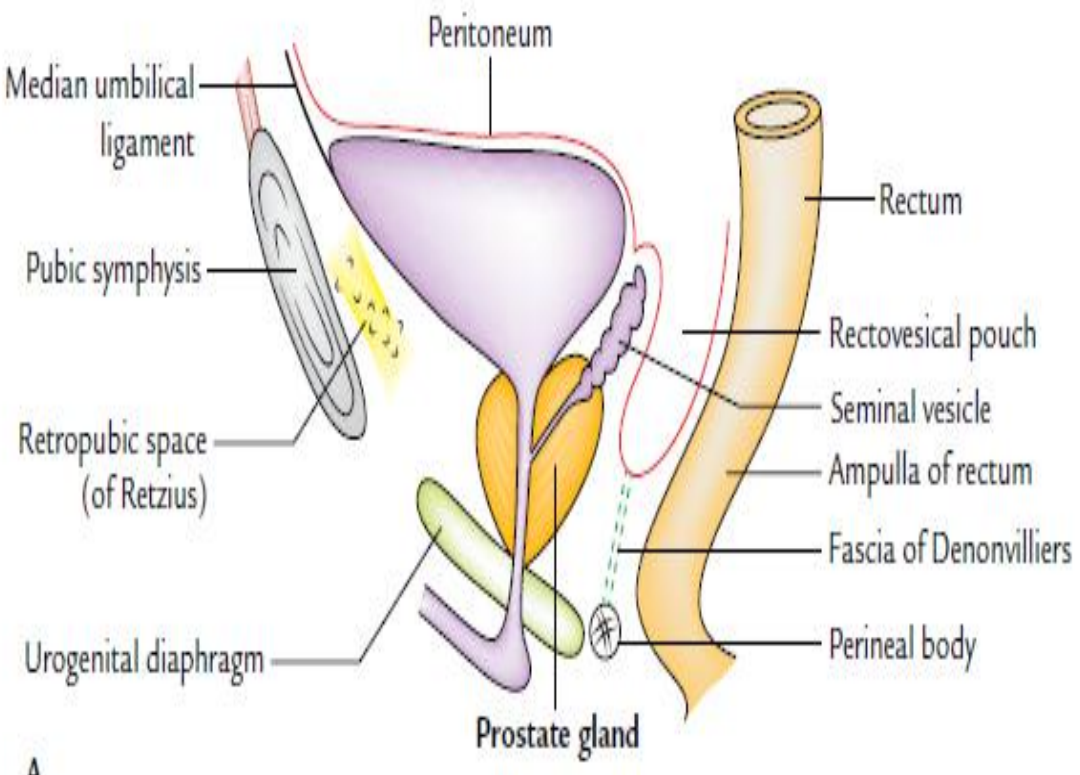
- **Secretion of Prostate forms considerable part of semen.**

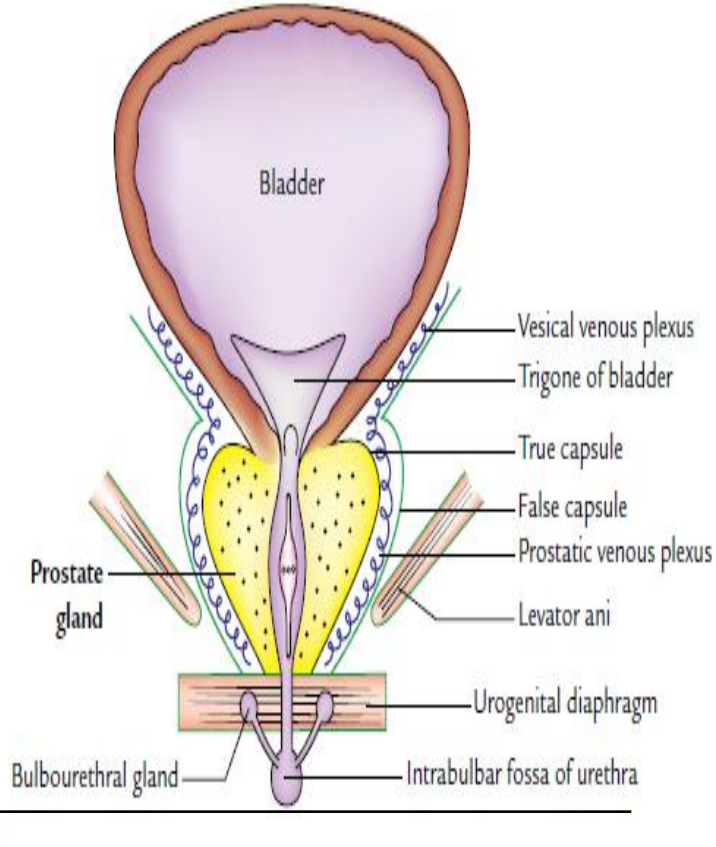
- **Is slightly acidic, contains acid phosphatase, fibrinolysin, prostaglandin and large amount of Zinc.**

- **Situation:**

Lesser pelvis below the neck of bladder, above urogenital diaphragm, behind the lower part of symphysis pubis, anterior to rectal ampulla and on each side embraced by levator ani muscle.

- **Measurements:**
- Chest nut in appearance.
- Transverse (at base): 4 cm.
- Vertical: 3 cm
- Anteroposterior: 2 cm.
- Weight : 8 gm.

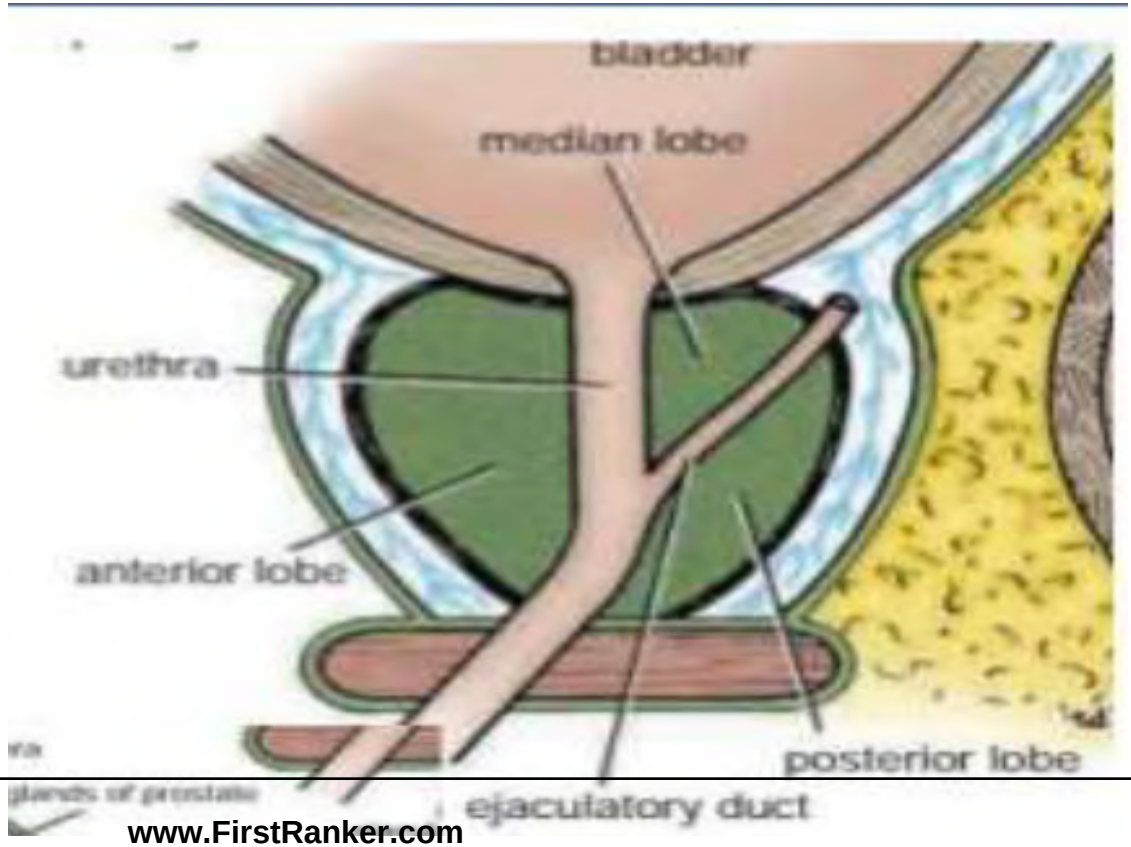




Presenting Parts of Prostate gland

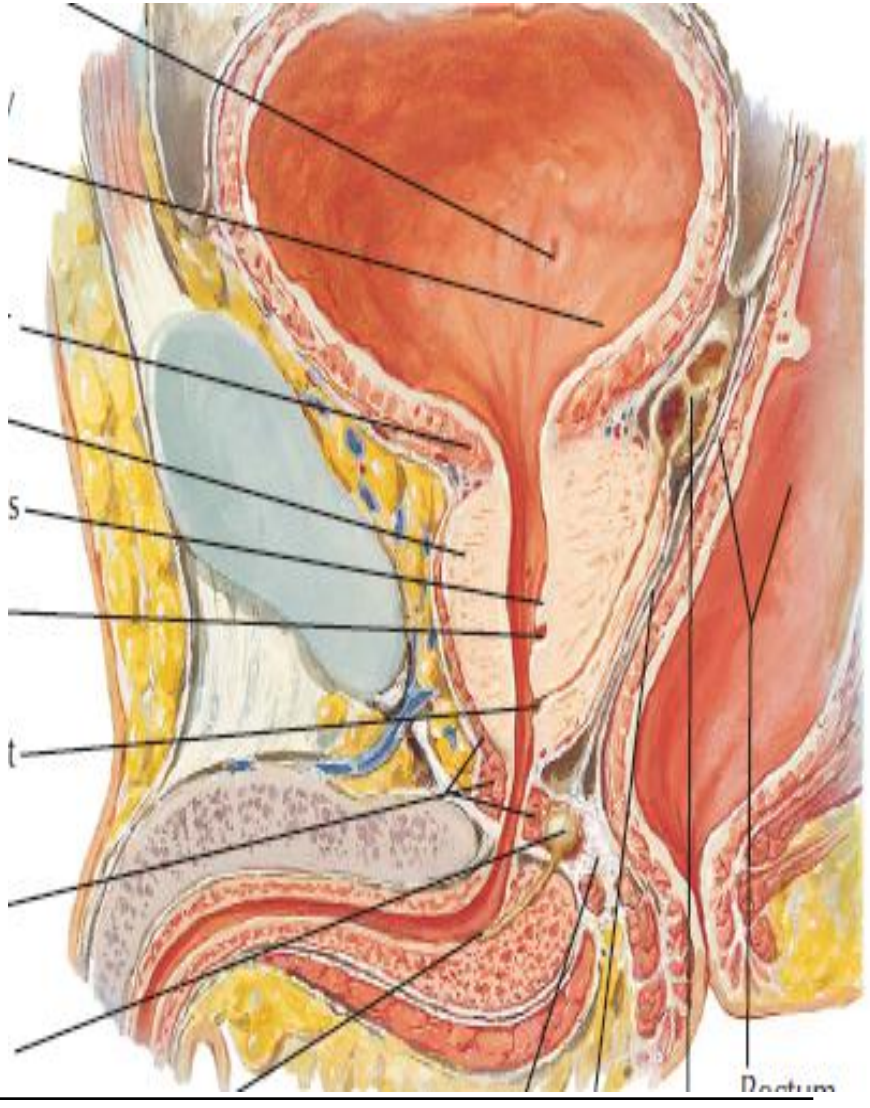
-Apex: Directed downwards, in contact with Superior fascia of urogenital diaphragm.

- Base : Directed upwards, surrounding the neck of the bladder, pierced by urethra in median plane at the junction of ant. 1/3rd and post. 2/3rd of the gland.



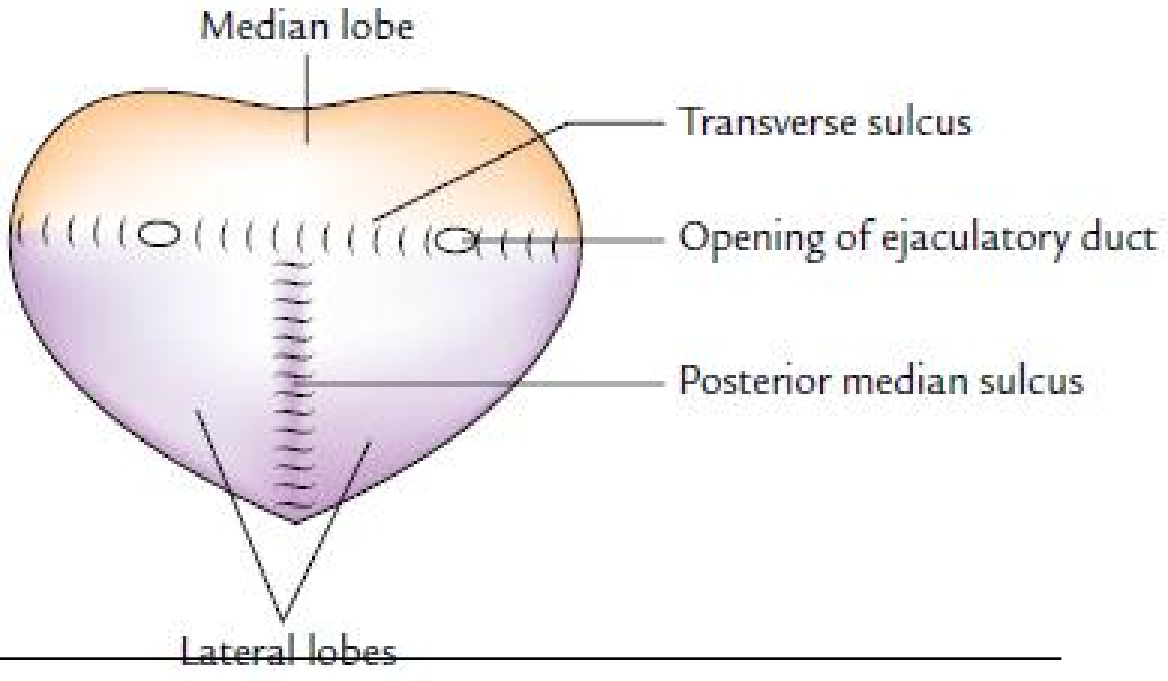
Presenting Parts of Prostate gland

- **Anterior surface** : narrow and convex and situated about 2cm behind lower part of symphysis pubis separated by retropubic fat, prostatic venous plexus and deep dorsal vein of penis.
- **Posterior surface**: broad, flat, related to the ampulla of rectum separated by rectovesical fascia.This surface is palpable by rectal examination about 4 cm above anus.



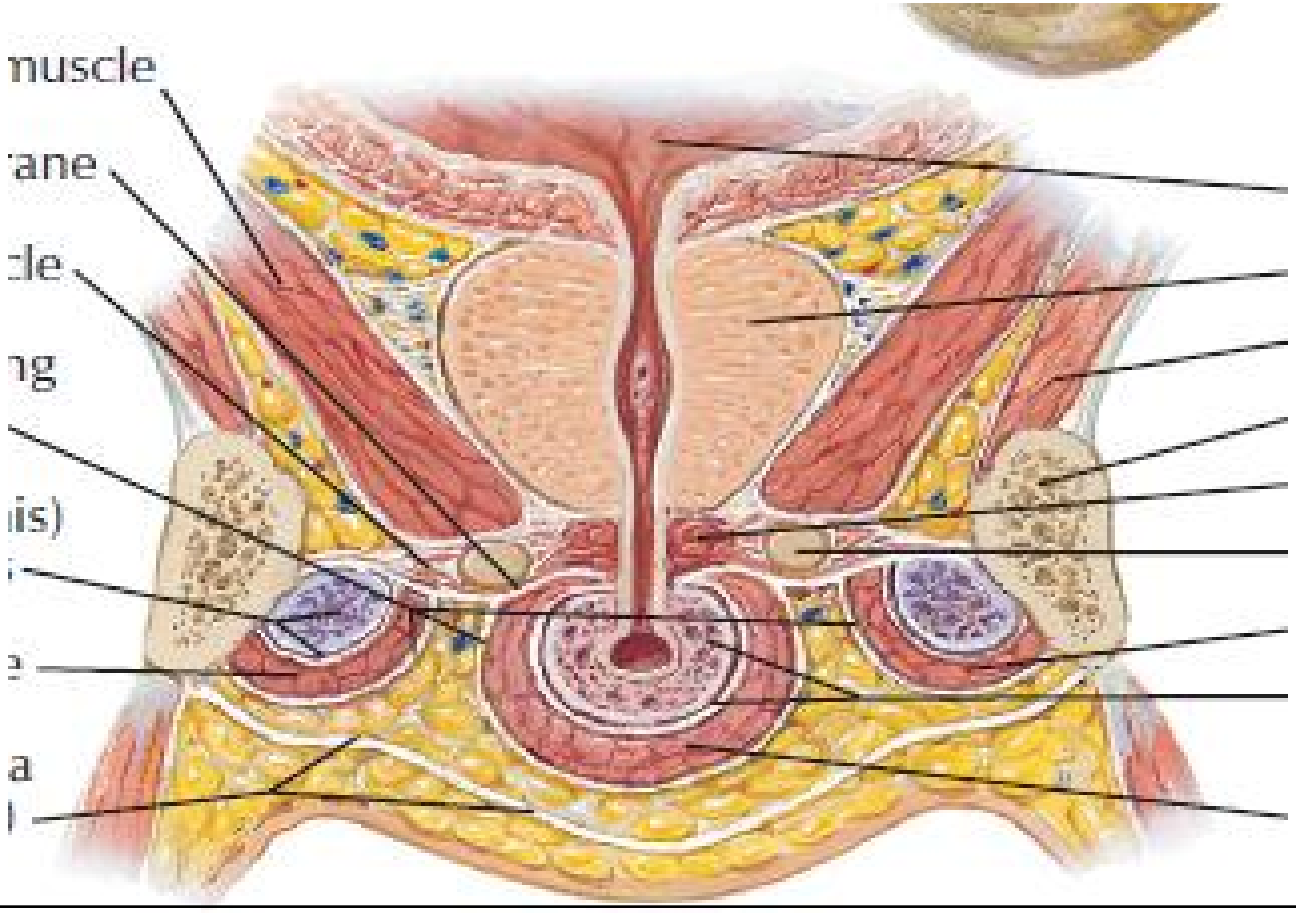
Presenting Parts of Prostate gland

- **Posteror surface** is subdivided by transverse groove into upper small and lower large areas. It is pierced by ejaculatory ducts on each side. The **upper area** forms **median lobe**; **lower area** is subdivided by a median sulcus into **two lateral lobes**.



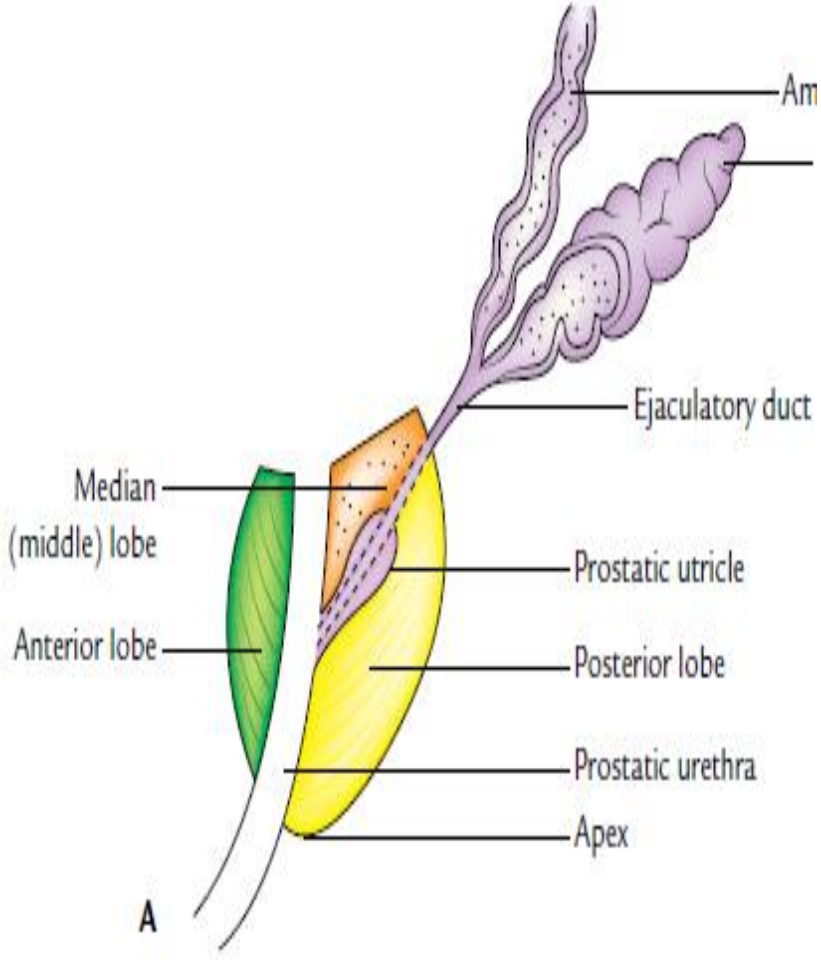
Presenting Parts of Prostate gland

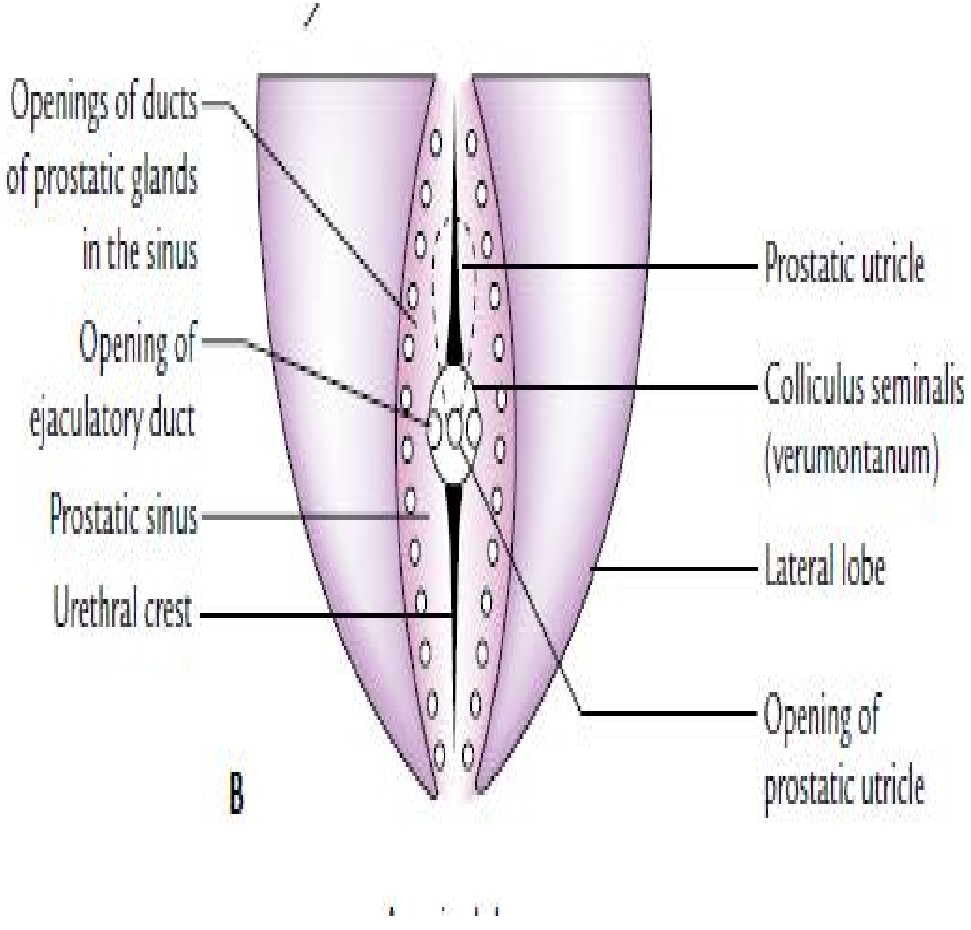
- Each of **two Infero-lateral surfaces**, related to the anterior fibres of levator ani which acts as levator prostate; anterior recess of the ischio-rectal fossa lies outside the levator ani.



LOBES OF PROSTATE GLAND

5 lobes: Median, Anterior, Posterior and two lateral.



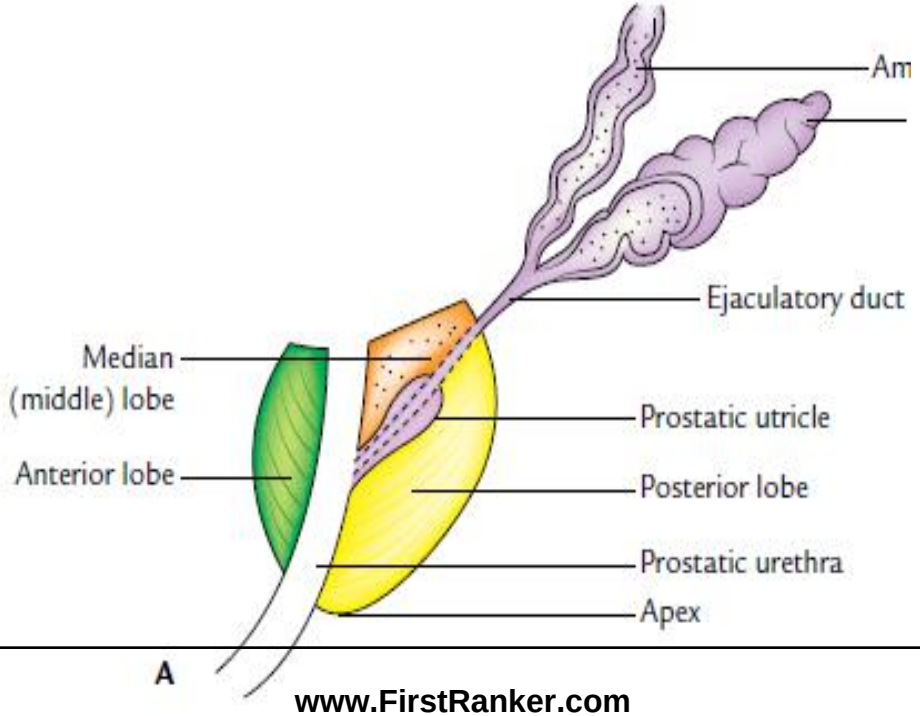


left view of a sagittal section Coronal section through posterior half of gland;

LOBES OF PROSTATE GLAND

The median lobe: is wedge shaped, apex directed below towards colliculus seminalis, base forms uvula vesicae at the apex of trigonum vesicae.

Bounded anteriorly by urethra, behind and on each side by the ejaculatory duct, behind and in the median plane by prostatic utricle. This lobe is predominantly fibro-muscular with mucus glands.

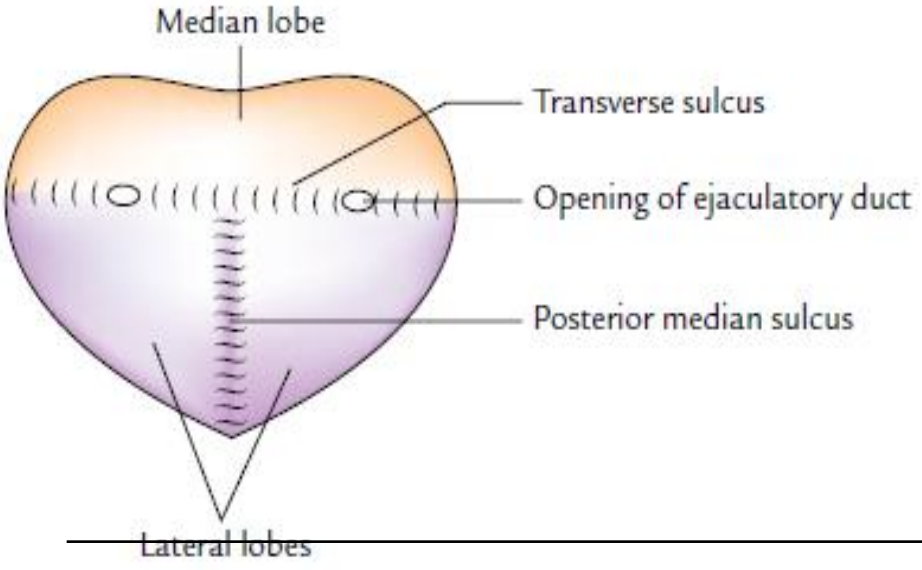


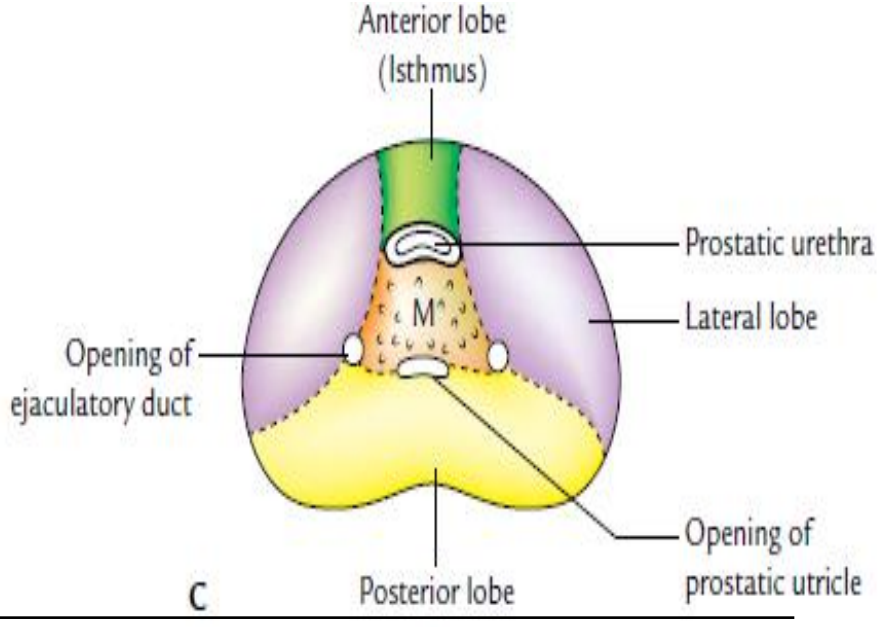
LOBES OF PROSTATE GLAND

The two lateral lobes are separated superficially by posterior median sulcus , but deep to the sulcus and behind urethra both the lobes are continuous.

This continuity is described as posterior lobe surgically.

Each lateral lobe covers sides of urethra and in front of urethra are connected by fibro-muscular isthmus,which is known as anterior lobe in foetal life containing glands.(may persist upto 6 years after birth)





FASCIAL RELATIONS

The prostate is related to the two capsules and one fascia behind

1. **True Capsule**

Formed by the condensation of the peripheral fibrous stroma of the gland

2. **False Capsule**

Formed by the visceral layer by the pelvic fascias.

(The prostatic venous plexus lies between these capsules)

Hence plane of enucleation of prostatic adenoma lies deep to both the capsules.

Surgical Capsule/pathological capsule

Formed by the non adenomatous tissue of the prostate which is pushed by the hypertrophied gland to the periphery

Fascia Behind the Prostate

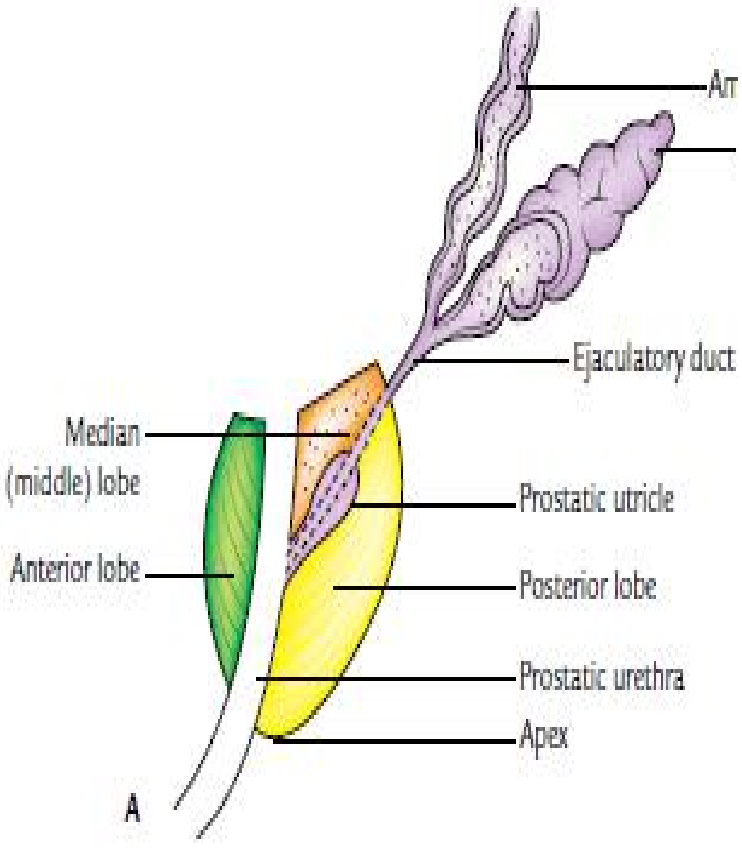
it is also known as rectovesical, prostatoperitonial,denonvillier's fascia

Structures traversing the Prostate gland

- **Prostatic urethra:** runs vertically downwards from base to slightly in front of apex, at the junction of ant. 1/3rd and post. 2/3rd of gland.

- **Pair of ejaculatory ducts**: each passes postero-lateral to median lobe, opens at the colliculus on each side of prostatic utricle.

- **Prostatic utricle**: is mucus cul –de-sac, about 6mm long, extends upwards, and backwards from colliculus behind the median lobe.



STRUCTURE OF PROSTATE GLAND

Consist of 1/4th fibrous, 1/4th muscular and 2/4th glandular tissue.

- **Fibrous tissue**: forms true capsule at the periphery,postero-median fibrous septum connects capsule with urethral crest.

- **Muscular tissue**: smooth muscle, continuous with detrusor muscle, arranged in outer and inner sheets, connected by radiating fibres. Spaces between these fibres occupied by follicles of the gland.

- There are transversely oriented arched striated muscle fibres within the prostate anterior to the urethra, blending with fibrous capsule postero-laterally and with postero-median septum

Glands of prostate are arranged in 3 layers:

- Inner mucous glands
- Intermediate submucous glands
- Outer main glands

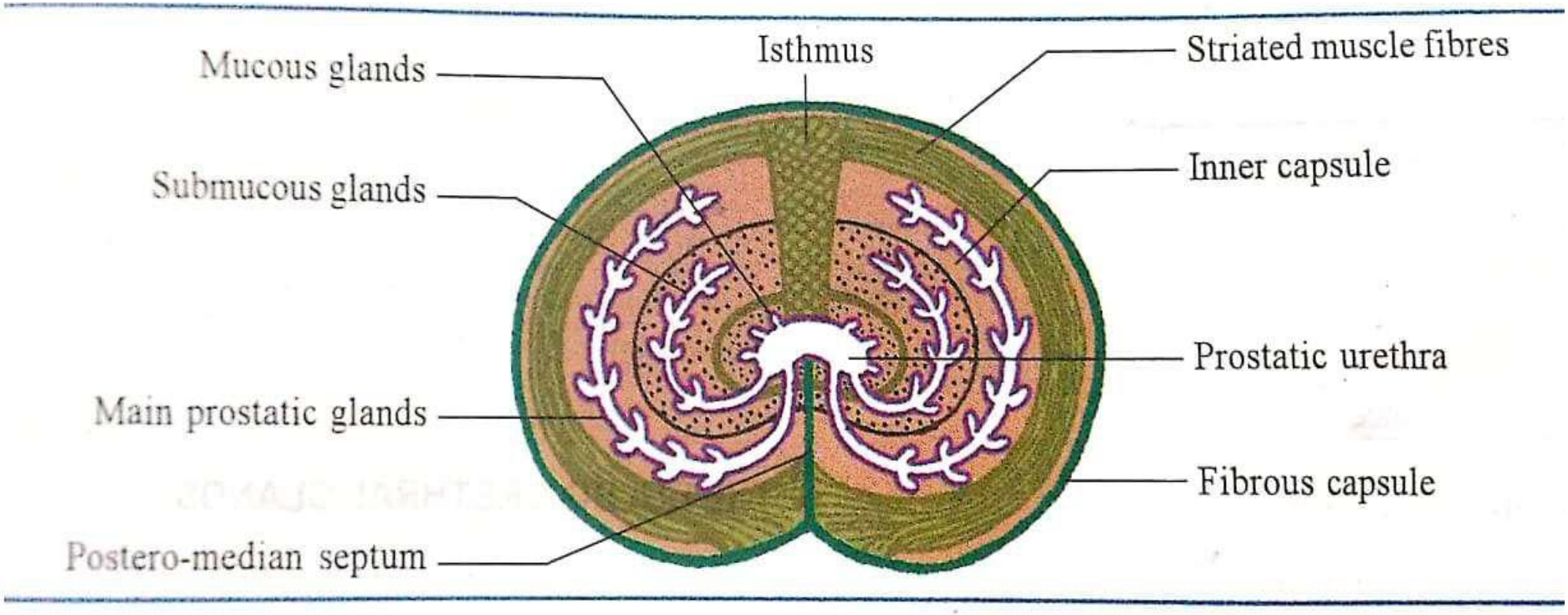


Fig. 4.12 : Structure of prostate (Transverse section).

BLOOD SUPPLY

Arterial supply :

1. Inferior vesical artery
2. Middle rectal artery
3. Internal pudendal arteries

Venous drainage:

Veins form prostatic plexus in between true and false capsules. Plexus receives deep dorsal vein of penis anteriorly and communicates above with the vesical venous plexus. Finally draining into internal iliac vein.

Few veins from prostate pass backwards through anterior sacral foramina , draining into internal vertebral venous plexus, known as paravertebral veins of Batson. (metastatic spread of cancer prostate to vertebrae)

Lymphatic drainage:

1. Internal iliac group of lymph nodes.
2. External iliac group of lymph nodes
3. Sacral group of lymph nodes.

Nerve supply:

1. Superior Hypogastric plexus conveys sympathetic nerves(L1,L2 preganglionic fibres)

2. Parasympathetic fibres derived from pelvic splanchnic nerves conveying preganglionic fibres from S2, S3, and S4.(secretomotor to gland)

AGE CHANGES IN PROSTATE GLAND

In newborn: consist basically of duct system in fibromuscular stroma. Before puberty grows slowly and rudimentary follicles bud out from sides of ducts.

At Puberty: shows sudden growth, doubles in size. Follicles shows infoldings. Above 45 years age mucous folds disappears and follicles contains corpora amylacea.

In old age: It may atrophy or show hypertrophy.

APPLIED ANATOMY

- **Prostatitis**
- **Benign hypertrophy of prostate.**
- **Prostatectomy:**

i) Suprapubic approach
ii) Transurethral resection of prostate (TURP)

- **Carcinoma of Prostate.**
- **Digital per rectal examination.**

URETHRA

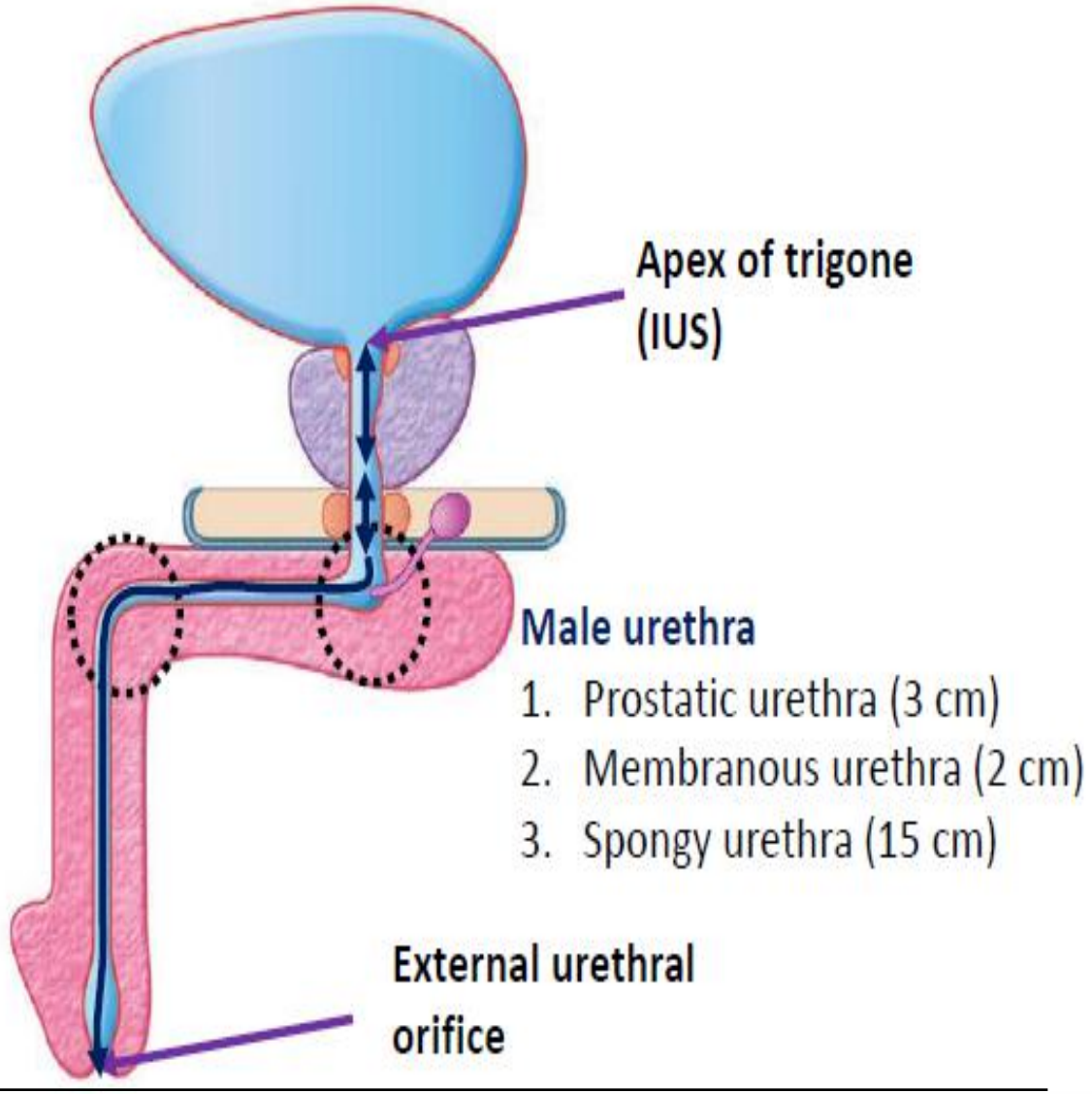
Male urethra

The male urethra is about 20.0 cm long and is divided into three parts-

– Prostatic,

– Membranous

– Spongy (penile).

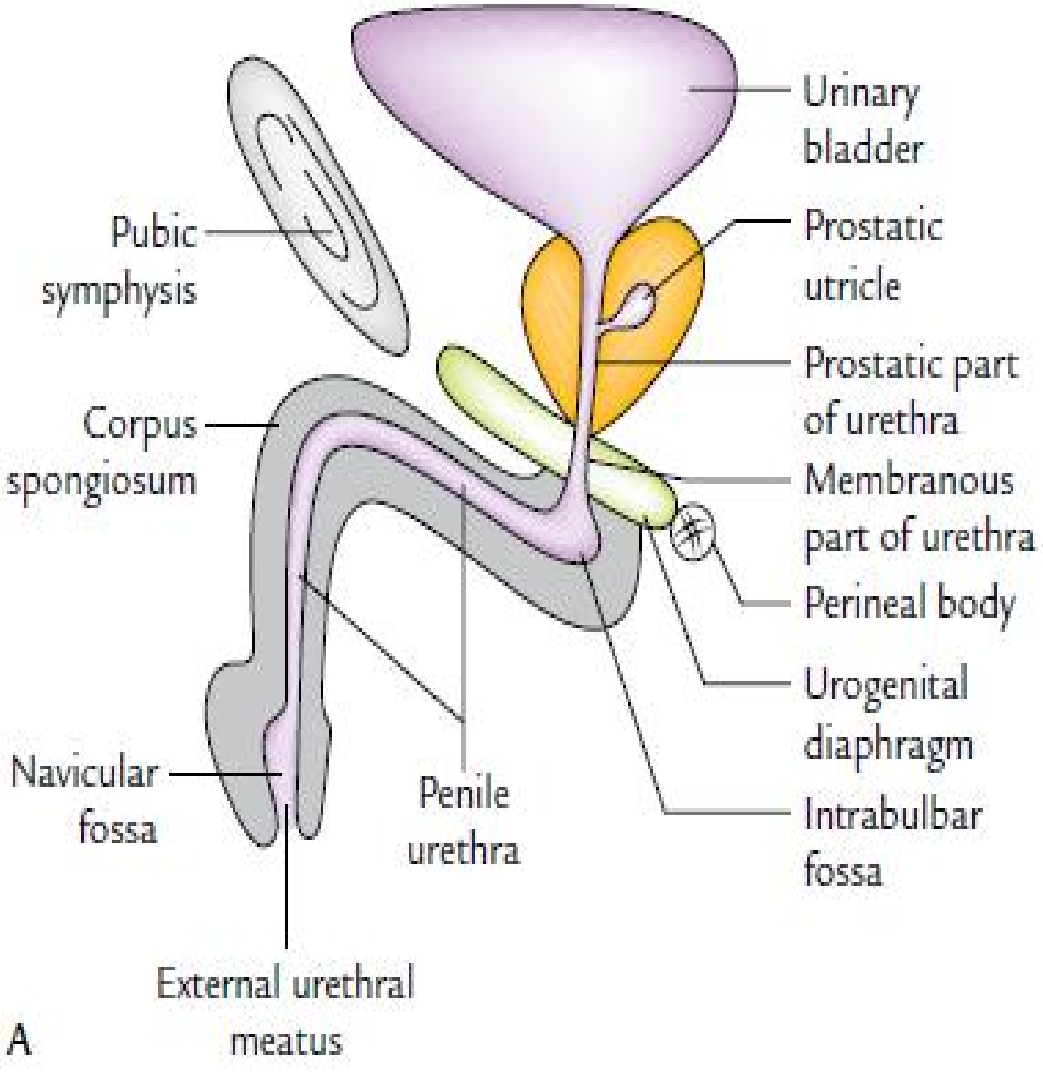


The anterior urethra

• It is about 16 cm long and surrounded by the corpus spongiosum. It is subdivided into:

• *The bulbar urethra which is more proximal,* surrounded by the Bulbospongiosus muscles and lie entirely within the perineum.

• *The penile urethra which is distal and* continues to the tip of the penis.



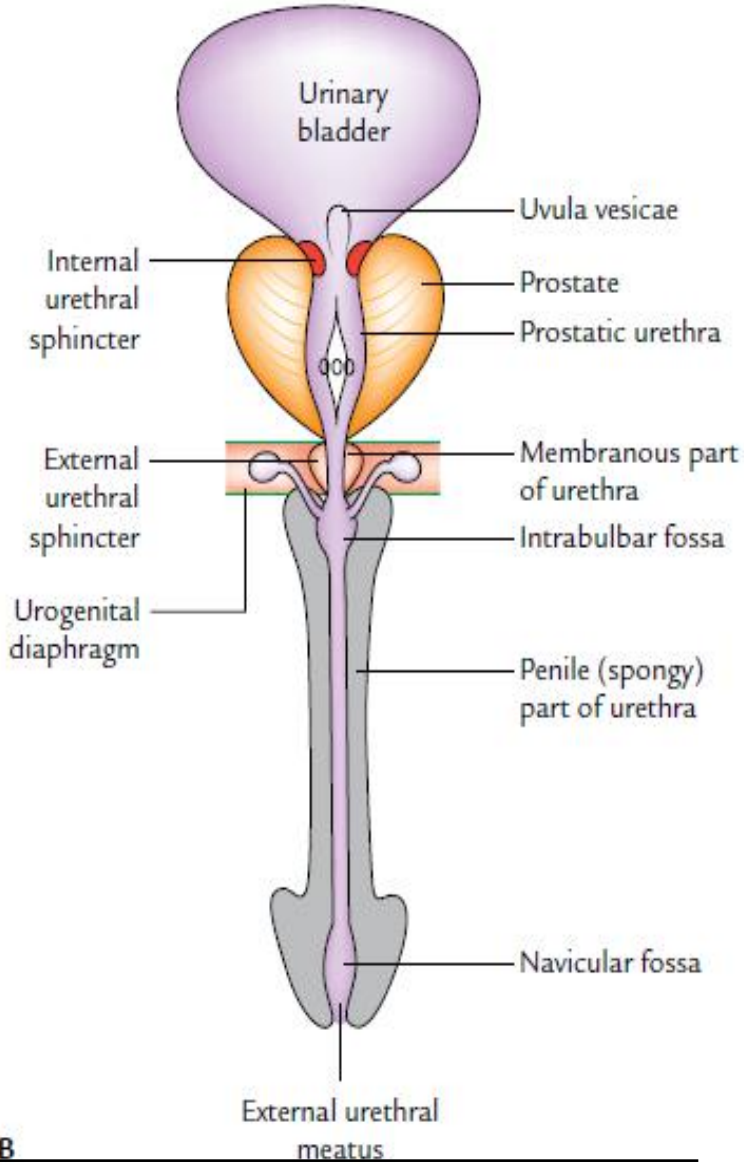
The posterior urethra

• It is about 4 cm long and lies in the pelvis
proximal to the corpus spongiosum. The
posterior urethra is divided into:

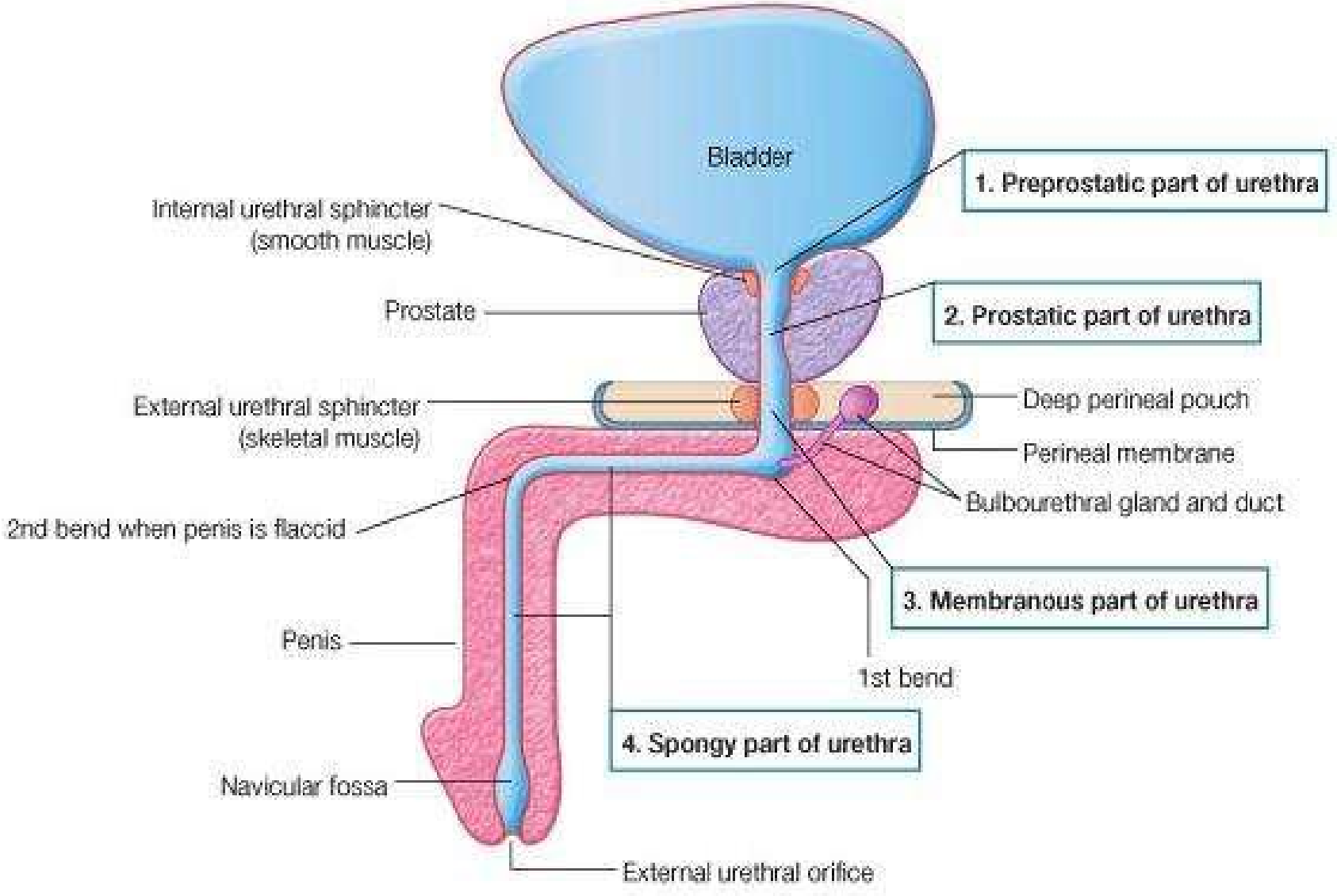
– *The pre-prostatic part of the urethra.*

– *The prostatic part is the widest and passes through* the prostate.

– *The membranous (sphincteric) part is the shortest* and narrowest part. In the deep perineal pouch, it
is surrounded by distal (external) urethral sphincter.



Parts of male urethra



Preprostatic urethra

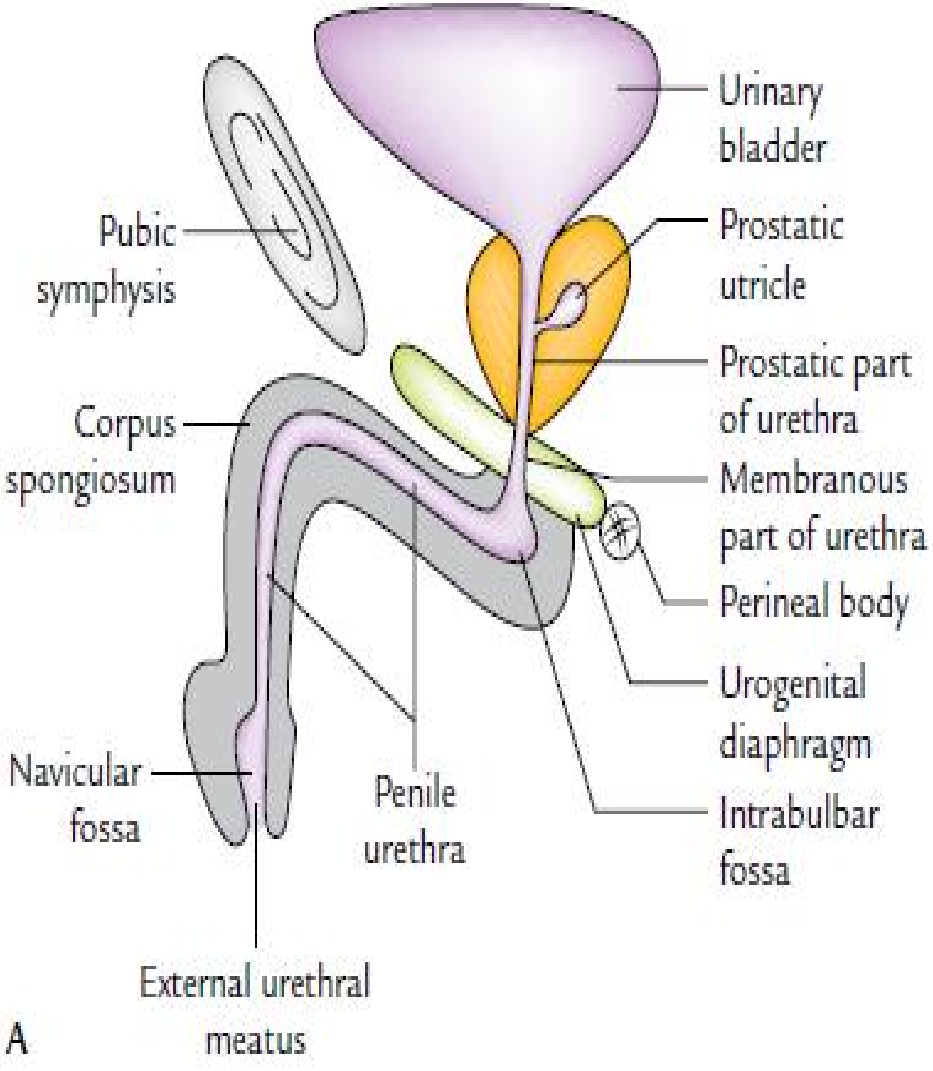
- approximately 1 cm in length.

- extends from the base of the bladder to the prostate.

- Small periurethral glands at this site may contribute to benign prostatic hyperplasia (BPH) and symptoms of outflow obstruction in older men.

Prostatic urethra

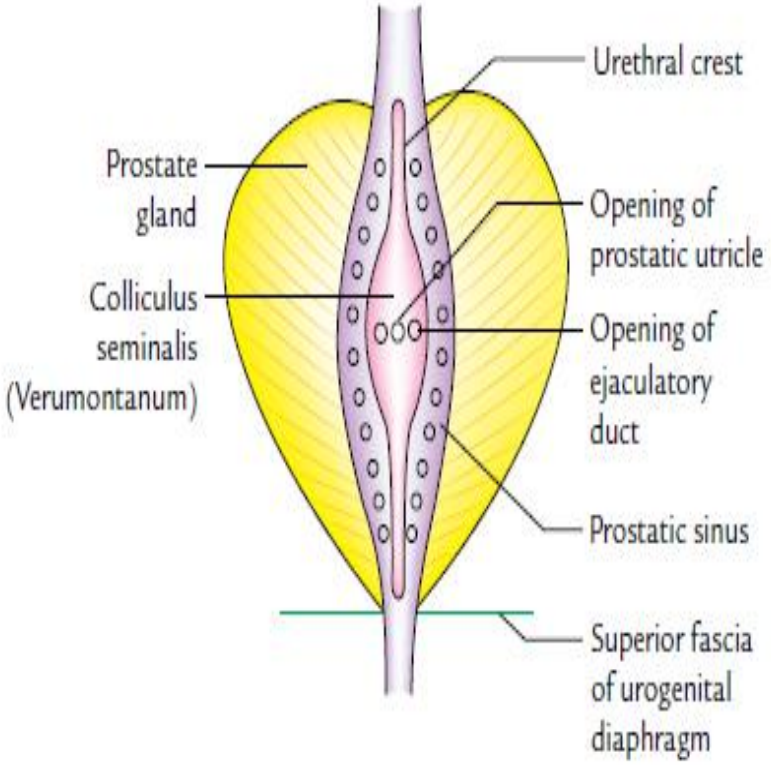
- is 3–4 cm in length
- passes through the substance of the prostate, closer to the anterior than the posterior surface of the gland.
- It is continuous above with the preprostatic part and emerges from the prostate slightly anterior to its apex.
- *- Length: 3.0 cm*



Prostatic urethra

- Features:

In its posterior prostatic urethra wall there is *urethral crest* with a round swelling **colli*culus seminalis*** *in the* middle.



- There are three openings on the colliculus seminalis:

- One median for prostatic utricle.

- Two lateral for the ejaculatory ducts.

- On either side of urethral crest, there is a shallow *depression-**prostatic sinus**for* prostatic glands ducts opening.

Membranous urethra

- lies in the deep perineal pouch.
- This is the narrowest segment of male urethra.

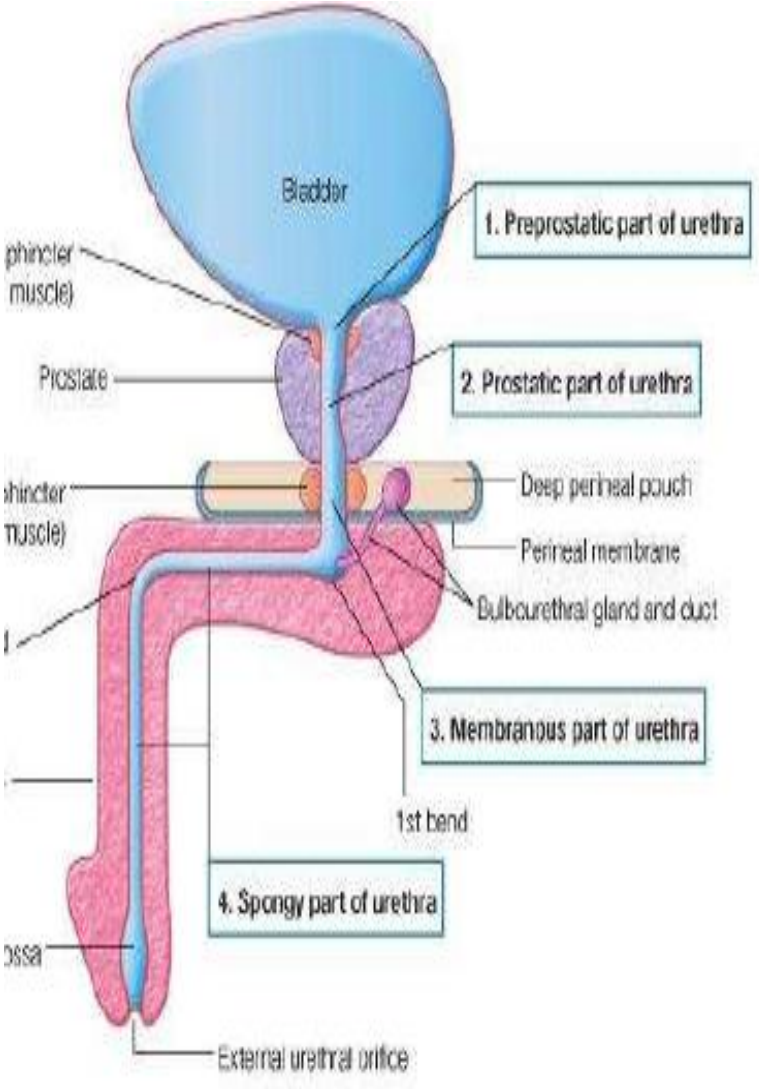
- It is having thickened circular muscles in its walls i.e. sphincter urethrae- that acts as a voluntary external sphincter.

- more susceptible to injury, during passage of instrument through urethra due to

I. Its narrowest part with delicate walls.

II. Its angulation with the spongy urethra.

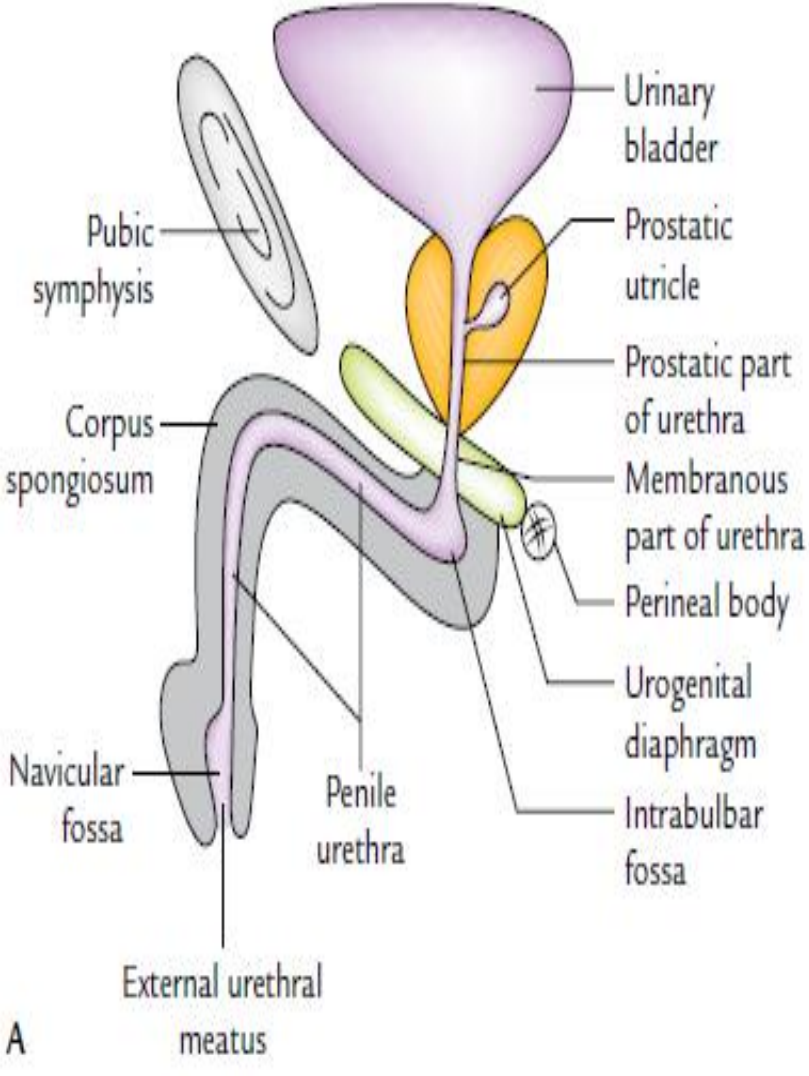
III. Length: 2.0 cm



Spongy (penile) urethra

- *The longest part of male urethra.*
- Length-I5 cm.
- It begins below the perineal membrane and ends at external urethral meatus.
- This part lies within the bulb of penis, corpus spongiosum and glans of penis.
- There are *two dilatations in this part:*

i. One intrabulbar fossa in the bulb of penis.
ii. One navicular fossa in the glans of penis.



Spongy (penile) urethra

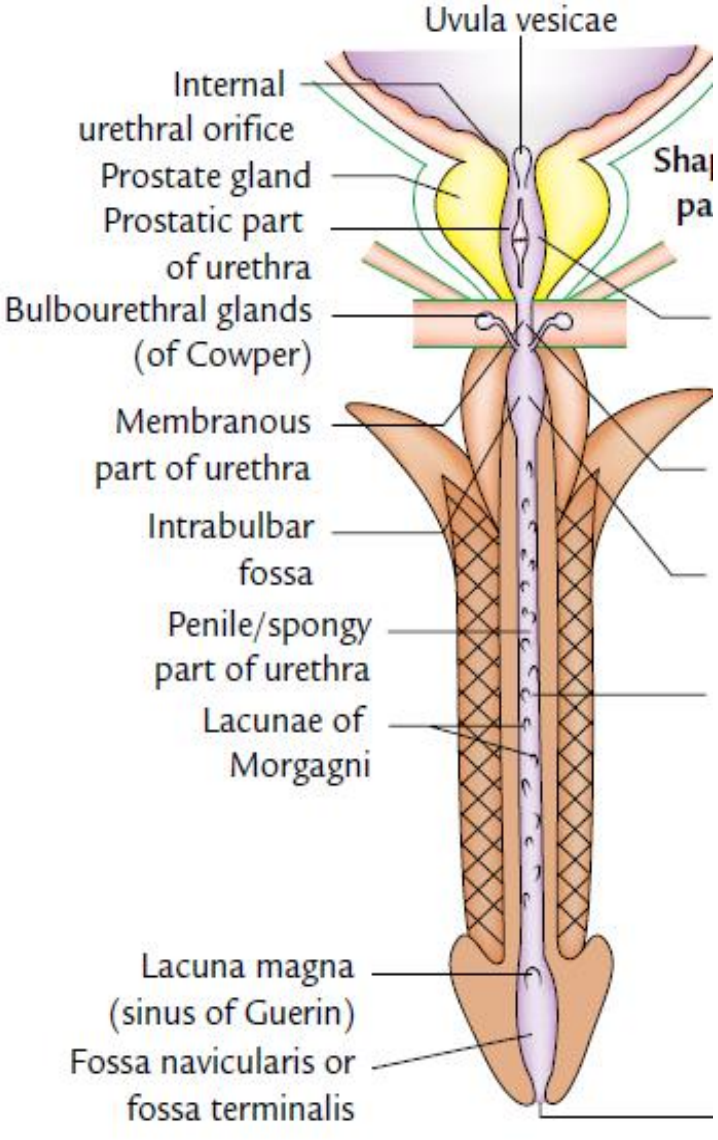
• The ducts of bulbo-urethral (Cowper's) gland open in this part just below urogenital diaphragm.

• The dorsal wall of spongy urethra has

- Openings of many mucus glands.
- Lacunae or pit-like recesses directed forwards. The ***lacuna magna*** *lies in the navicular fossa.*

• The spongy urethra ends at *external urethral meatus, that* is a sagittal slit, about 6 mm long at the tip of the glans.

• The external meatus is guarded by two lateral labia. It is the *narrowest point of male urethra. If an instrument can pass* through it, it can easily pass through rest of urethra.

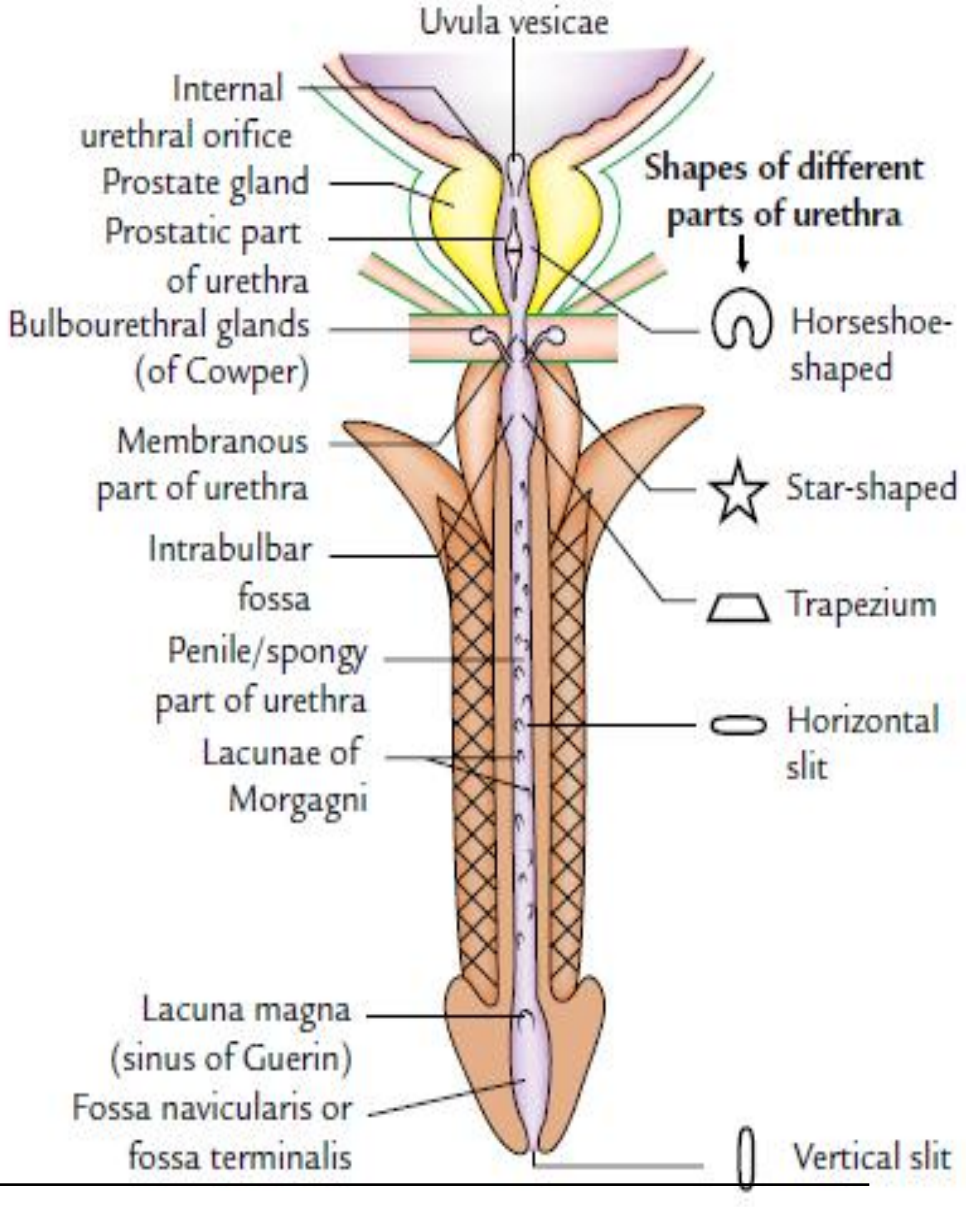


URETHRAL MUCOSA

1. ***Prostatic urethra*** *above the seminal colliculus is lined by* transitional epithelium and below it by stratified columnar epithelium.

2. ***Membranous urethra*** *is lined by stratified columnar* epithelium.

3. **Spongy urethra** up to navicular fossa is lined by stratified columnar epithelium. The navicular fossa and external urethral orifice are lined by stratified squamous epithelium.



ARTERIAL SUPPLY

• Urethral artery

– just below the perineal membrane it arises from
• the internal pudendal artery
• or common penile artery

– runs through the corpus spongiosum, to reach the glans penis.
– It supplies • the urethra and • erectile tissue around it.

In addition, the urethra is supplied by
• the dorsal penile artery
– via its circumflex branches on each side and
– retrogradely from the glans, by its terminal branches.

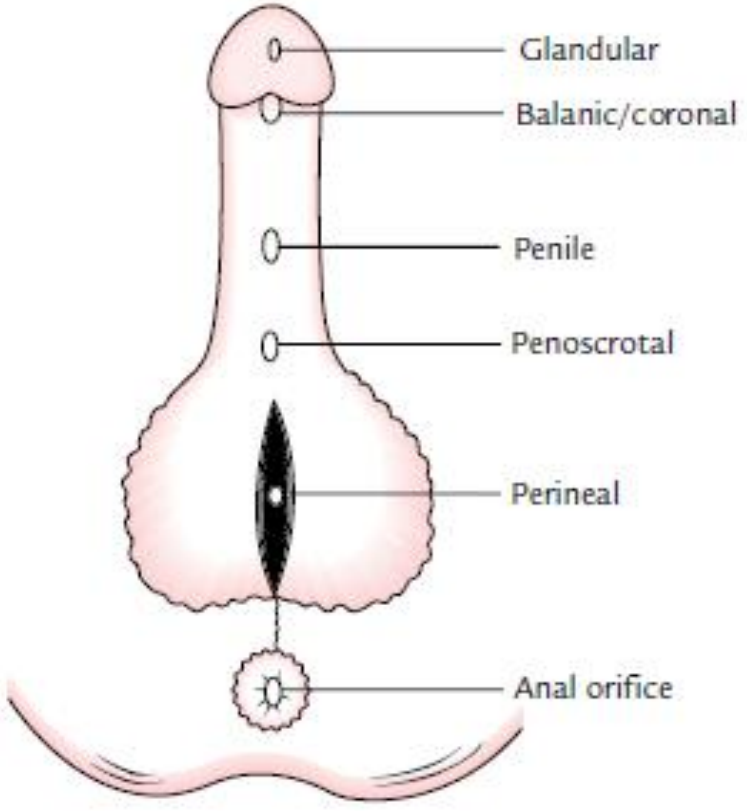
• The blood supply through the corpus spongiosum is so plentiful that the urethra can be divided without compromising its vascular supply.

APPLIED

1.Rupture of the urethra.

2. Catheteristion of urethra.

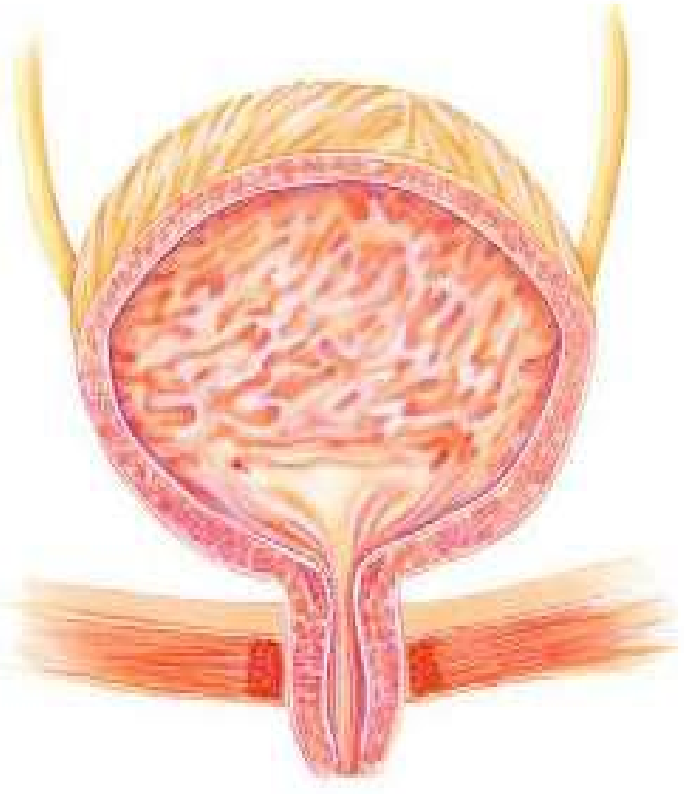
3.Hypospadias.



Female urethra

• *it is about 4.0 cm long and 6mm* diameter.

• It extends from the neck of bladder to the external urethral meatus.



• the external orifice is situated in front of the vaginal opening and about 2.5 cm behind the clitoris.

• It is homologous with upper part of Prostatic urethra of males.

• ***Location:*** *The female urethra is* embedded in anterior wall of vagina. Thus in cases of difficult child-birth, it is more likely to be lacerated.

Lumen of Urethra on cross section

- At the internal *orifice- crescentic with the* convexity directed in front

.

- At the *middle- transverse slit.*

- At the external *orifice- sagittal slit.*

Glands around the female urethra

- ***Urethral glands-***

– *These are tubular mucous glands*
– surround the entire urethra.

- ***Para-urethral glands-***

– *These correspond with the prostate gland of male*
– their ducts open close to the external urethral orifice.

- ***Greater vestibular glands-***

– compound racemose glands
– situated behind the bulb of the vestibule in the superficial perineal pouch
– ducts of the glands open in the vagina below the hymen.
– Corresponds to the bulbourethral glands of male

- ***Urethral lacunae-***

– *These are pit like mucous recesses which project from the entire* female urethra.

Applied

- **Infection of the female** urinary bladder is more common *due to the shortness of the urethra.*

- ***Stress incontinence*** *is associated with the funneling of the bladder* neck during normal standing usually observed in multiparous women with symtoms of sudden dribbling of urine during increases intra-abdominal pressure.