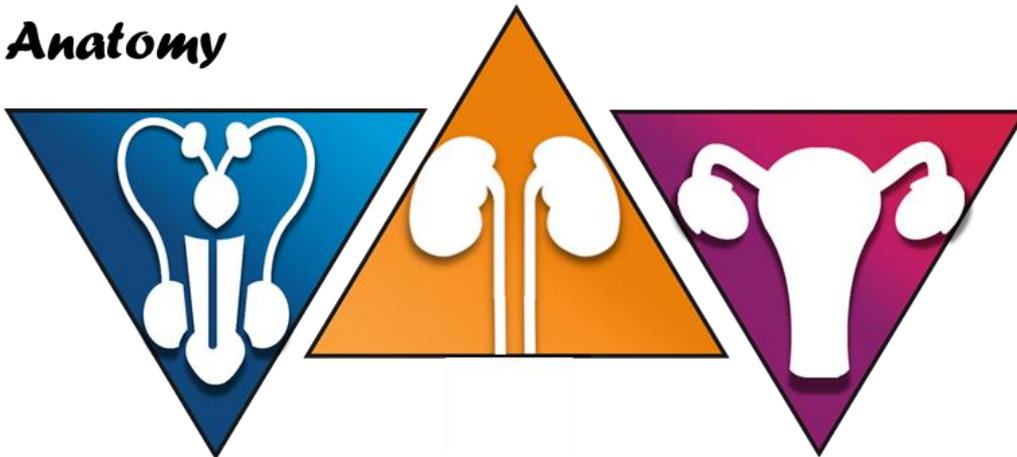




Urogenital system

Anatomy



Sheet



Slide

Number:

- 7

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**Any information in brackets is not mentioned by the doctor but it is mentioned in the slides.

**this is the last anatomy sheet included in the midterm and it is written from section 1 record and the lecture's video. I highly recommend you to watch the video it is very helpful you can find its link in the last page.

-Seminal vesicles

(It is a sacculated tube, about 5 cm long)

Site:

(It lies behind base of the bladder)

Relations:

Anteriorly: Base of the urinary bladder.

Posteriorly: Rectum.

Superiorly: vas deferens and rectovesical pouch which is located between the urinary bladder and the rectum.

Medially: ampulla of the vas.

Termination: inferiorly, it narrows into a small duct which joins the vas to form ejaculatory duct.

Blood supply: since it is located between the urinary bladder and the rectum it is supplied by **inferior vesical and middle rectal arteries**.

Remember: male urinary bladder is supplied by 2 arteries, Superior vesicle artery and Inferior vesicle artery.

Venous drainage: to vesical venous plexus.

Lymphatic drainage: internal and external iliac lymph nodes.

Nerve supply: Autonomic innervations mainly sympathetic from, **Prostatic Plexus** “which is continued from the lower part of the inferior hypogastric plexus.”

(Functions: the seminal vesicle produces an alkaline secretion rich in **fructose** and mucus, the secretion is added to the spermatozoa in ejaculation.)

Extra: Seminal vesicles release up to 60% of the fluid found in semen. The other 40% is produced by the **prostate** and bulbourethral glands.

Applied Anatomy:

The seminal vesicles when enlarged, could be felt on rectal examination:
Per Rectal examination.

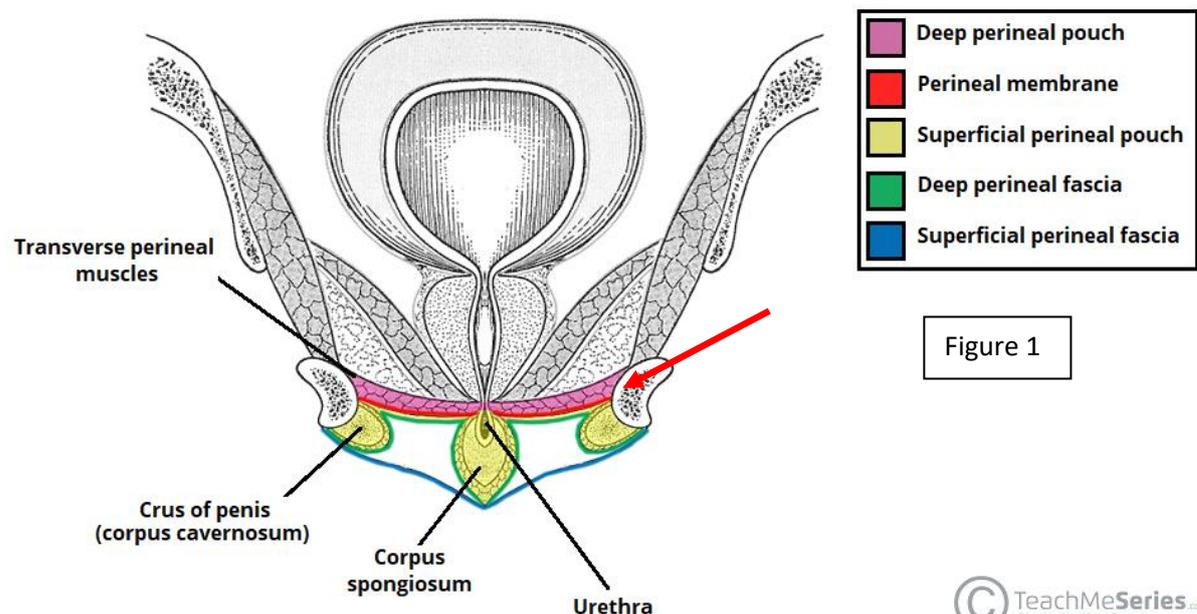
Abscess or **pus** in the seminal vesicle may rupture into the peritoneal cavity causing peritonitis (keep on mind that the rectovesical pouch lies superiorly to the seminal vesicle), drainage of the abscess is done through the rectum.

-Ejaculatory Ducts

Each is about 2 cm long, **formed by union of the ductus deferens and the duct of the seminal vesicle.**

The two ducts run antero-inferiorly between median and posterior lobes of the prostate along the sides of the prostatic utricle to **open on the seminal colliculus** of the prostatic urethra.

Note: perineal membrane is located between deep perineal pouch (above) and superficial perineal pouch(below). see –figure1-below.



-Bulbourethral Glands (Cowper's glands)

These small glands lie lateral to the membranous urethra **in the deep perineal pouch**

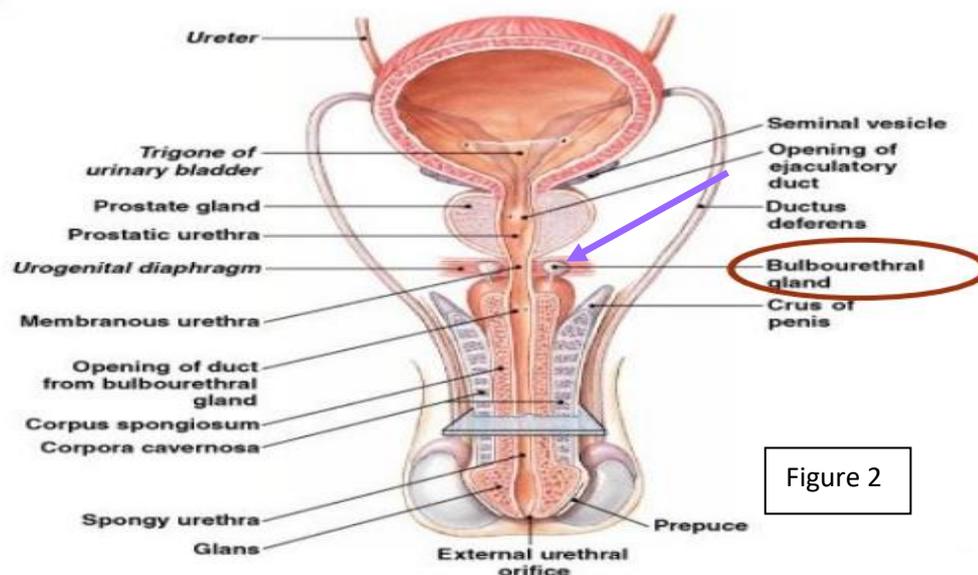
Each gives rise to a long duct (3 cm) which **pierces the perineal membrane to open on the floor of the penile(spongy) part of the urethra in the superficial perineal pouch.**

*Lies in the deep perineal pouch, opens in the superficial perineal pouch

(Blood supply: by artery of the bulb of the penis)

(It is **innervated by prostatic nerve plexus**)

Function: It secretes an alkaline mucous secretion known as pre-ejaculate.



-Prostate

It is an accessory gland of male reproductive system, which surrounds the prostatic urethra.

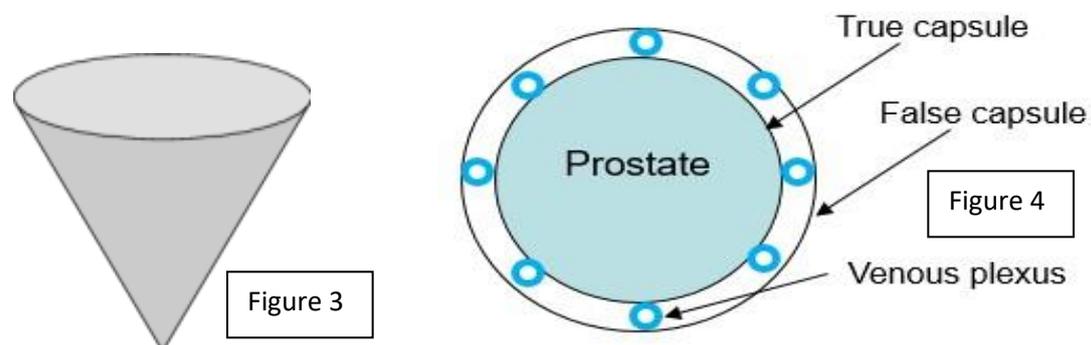
Site: it lies in the lower part of the lesser(true) pelvis behind the inferior border of the pubic symphysis in front of the rectum, **below neck of the bladder.**

Shape and Description: It simulates **an inverted cone which has a base (directed superiorly); an apex (directed inferiorly)**. see –figure3-below.

Prostatic capsules:

1. Inner true capsule: fibrous in structure
2. Outer false capsule (prostatic sheath): condensed visceral pelvic fascia.

Between the 2 capsules, lies the prostatic venous plexus. (figure 4)



It has four surfaces: anterior, posterior, and two inferolateral surfaces.

1- Base of the prostate: It is directed upwards, related to the **urinary bladder**. (separated from the bladder by a groove contains part of the prostatic venous plexus. It is pierced by the urethra)

2- Apex of the prostate: Is directed downwards It rests on the **perineal membrane** (roof of the deep perineal pouch).

(The urethra emerges from the prostate anterosuperior to the apex)

3-Anterior surface: It is convex and lies behind the lower part of the symphysis pubis. Its upper part is connected to the pubic bodies by **puboprostatic ligaments**.

4- Posterior surface: it is related to the **rectum and rectovesical fascia** (**Denonvilliers' fascia**).

*Fascia of DenonVillier's: It separates the prostate and urinary bladder from the rectum, it **prevents spread** of early stages of prostatic cancers **posteriorly** to the rectum.

(The prostate is easily palpated by a finger in the rectum. the rectovesical fascia is attached to the floor of rectovesical pouch(above) and to the perineal body(below).

*Near its upper border, the **posterior surface** is pierced by the **two ejaculatory ducts.**)

5- Right and left inferolateral surfaces: Are convex and related to levator prostatae parts of levator ani muscle.

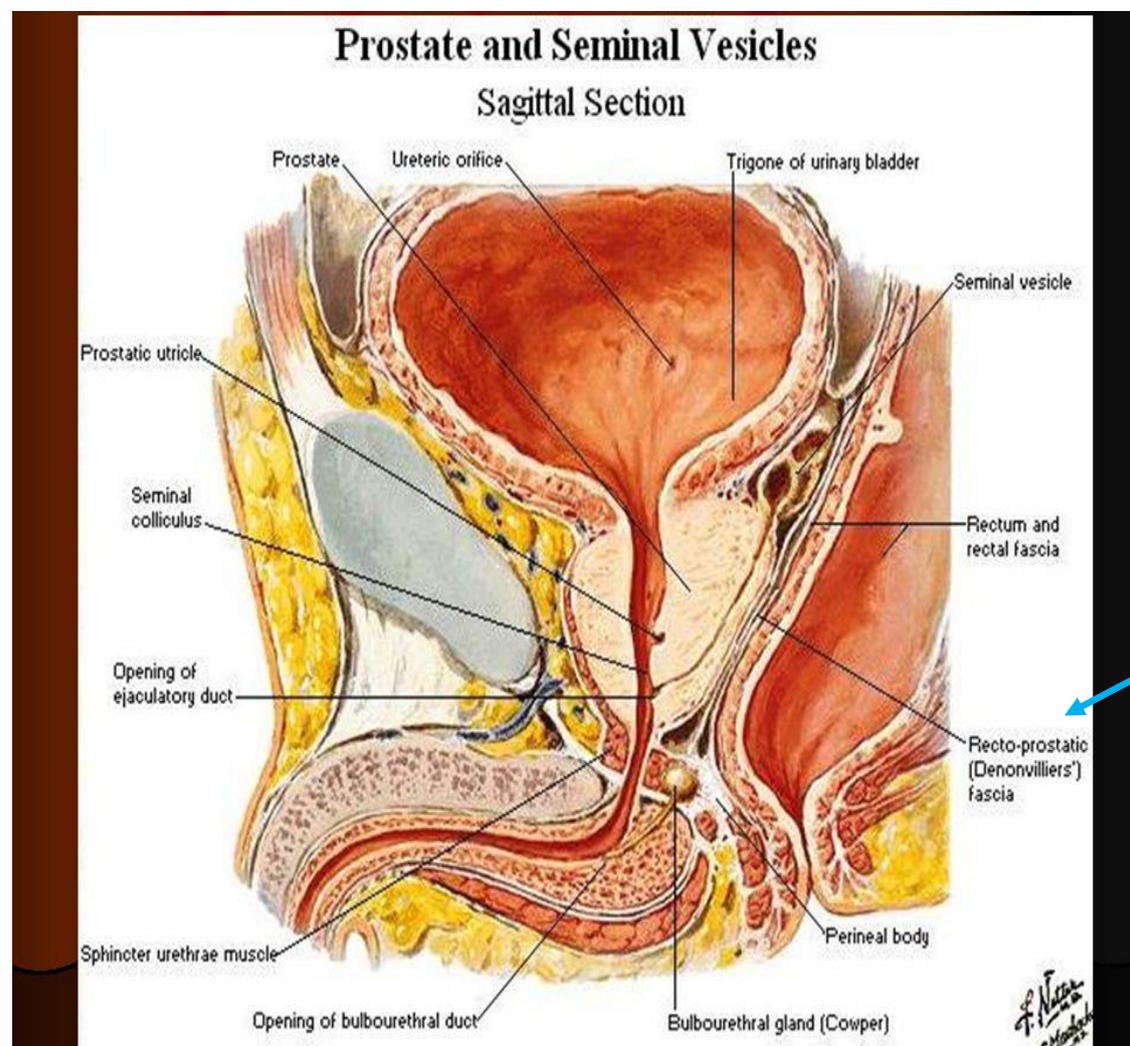
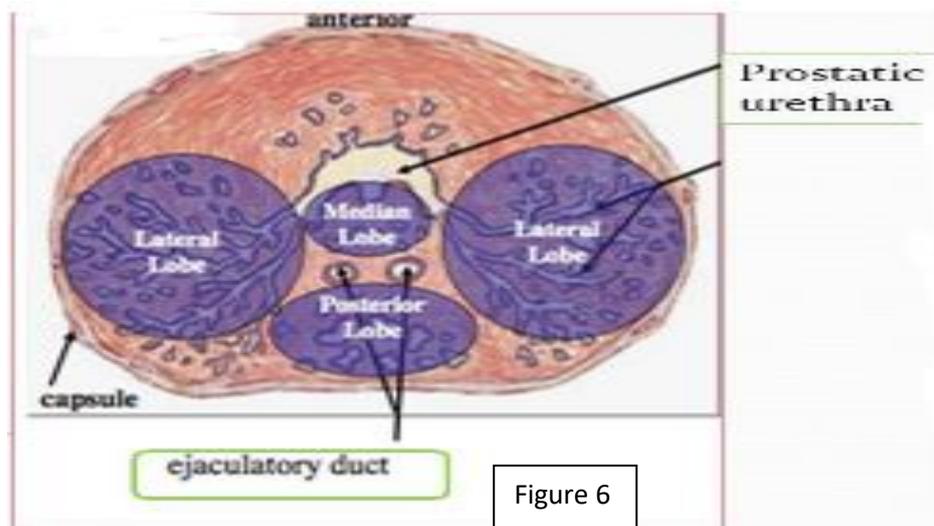


Figure 5.

Structures that traverse the prostate:

- 1) Prostatic urethra.
- 2) The two ejaculatory ducts descend anteroinferior to open in the prostatic urethra
- 3) The gland contains the utricle. (The utricle is a rudimentary embryological structure inside the prostate)

Lobes of the prostate: By means of the prostatic urethra and the two ejaculatory ducts, the prostate is divided into five lobes;



1) Anterior lobe (isthmus): lies in front of the prostatic urethra (It consists of fibromuscular tissue with little glandular tissue)

2) Right and left Lateral lobes: one on each side of the prostatic urethra. They are the most common sites for the senile enlargement of the prostate (**BPH: Benign Prostatic Hypertrophy**)

3) Posterior lobe: lies behind the prostatic urethra, but below the two ejaculatory ducts. It is the usual site for **cancer prostate**.

4) Median lobe: Lies between the upper part of prostatic urethra and the two ejaculatory ducts. **–it is located below the bladder trigone–**

After middle age, it produces uvula vesicae (if senile enlargement occurred at the median lobe it is going to push the trigone upwards) in the lower part of the bladder trigone compressing it so it may **obstruct***

the flow of urine at the internal urethral meatus causing weak urine stream also it causes incomplete emptying of the bladder resulting in **frequency** of micturition and sometimes **difficulty** in micturition.(this also happens in both cancerous and benign enlargement of the prostate)

*obstruction may lead to infection (prostatitis).

Prostatic urethra: we talked about it before but remember that it has urethral crest, seminal colliculus and prostatic sinuses.

Blood Supply of the Prostate:

inferior vesical and middle rectal arteries (same as seminal vesicles).

Nerve supply: autonomic innervations from inferior hypogastric plexus by prostatic nerve plexus.

Lymphatic Drainage: to internal, external iliac lymph nodes.

Venous drainage (important):

prostatic venous plexus which has the following features:

It is embedded between the two capsules of the prostate.

Superiorly, it is continuous with the vesical venous plexus.

Anteriorly: it receives the deep dorsal vein of penis.

Posteriorly: the plexus is drained to *the internal iliac veins* which in turn communicates with *the internal vertebral venous plexuses* by the *lateral sacral veins*.

These veins are **valveless** and responsible for **spread of cancer prostate to lumbar vertebrae** so the fastest spread of the prostatic cancer is **venous spread via the prostatic venous plexus to the bone that's why you see bone metastasis(invasion) in metastatic late stage prostatic cancer.**

Acid phosphatase and **Prostate-Specific Antigen (PSA)** are markedly **elevated in prostatic diseases** especially (but not only) carcinoma.

How prostatic resection procedure is performed?!

In the past there were pelvic procedures with high chance of nerve and blood vessels damage so many complications.

But nowadays it is **TURP**: Trans Urethral Resection of the Prostate, a safe procedure through urethra using resectoscope.

A clinical case

A 65 years old Male patient, complains from frequent micturition and weak urine stream.
Urine analysis :
Pus cells : 30-40 / HPF
Red blood cells : 10-20 /HPF
Pelvic X ray

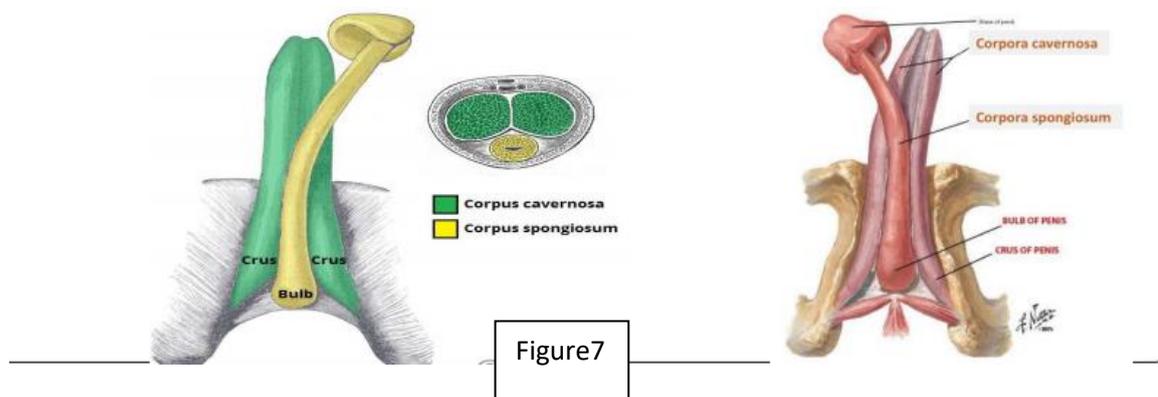
What is your provisional diagnosis?



It is most likely metastatic prostate cancer which metastasized to the hip bone also it causes urethral obstruction which leads to weak urine stream , frequent micturition and hematuria. (you can see that he has a prosthetic limb, may be because of bone metastasis)

-Penis

An external male genital organ.



The **body** of the penis is essentially composed of **three cylinders of erectile tissue (two corpora cavernosa and corpus spongiosum)** enclosed in a tubular sheath of fascia: Buck's **fascia**.

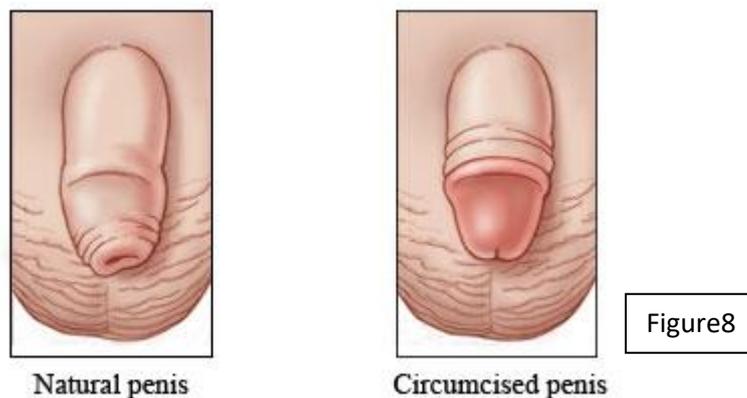
The **superficial penile fascia is devoid of fat (like the scrotum)** but rich in loose connective tissue to allow free movement of skin over the shaft of penis.

Dorsally there are two corpora cavernosa attached to the sides of pubic arch –ischiopubic remi (pubic arch) - creating two crura (singular is crus) of the penis , there is no urethra in corpora cavernosa .

It has **corpus spongiosum on the ventral surface which starts at the bulb of the penis and ends at the glans of penis –it is the part where the spongy "hence the name" urethra located .**

Intrabulbar fossa is found inside the bulb of the penis "hence its name"

There is excess skin covering the glans of the penis superiorly known as prepuce or foreskin –this is removed in circumcision-



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What to consider before doing circumcision?

- 1) **Test for haemophilia:** by testing **bleeding and coagulation time** –since it is commoner in males-
- 2) **Age:** the suitable age is **less than 7 days or more than 40 days** since between days 7-40 there is a **drop in the coagulation factors** which increases the chances of heavy bleeding.
- 3) **opening of urethra:** check for any **congenital anomalies** such as hypospadias (the urethral opening on the ventral surface) or epispadias (the urethral opening on the dorsal surface) **since these anomalies are corrected using the foreskin or prepuce.**

Additional information from the slides:

Penis has a root (or attached portion) and a shaft (or free portion).

The root is formed of 3 parts; two crura (right and left) and bulb of penis, all are present in the superficial perineal pouch of perineum.

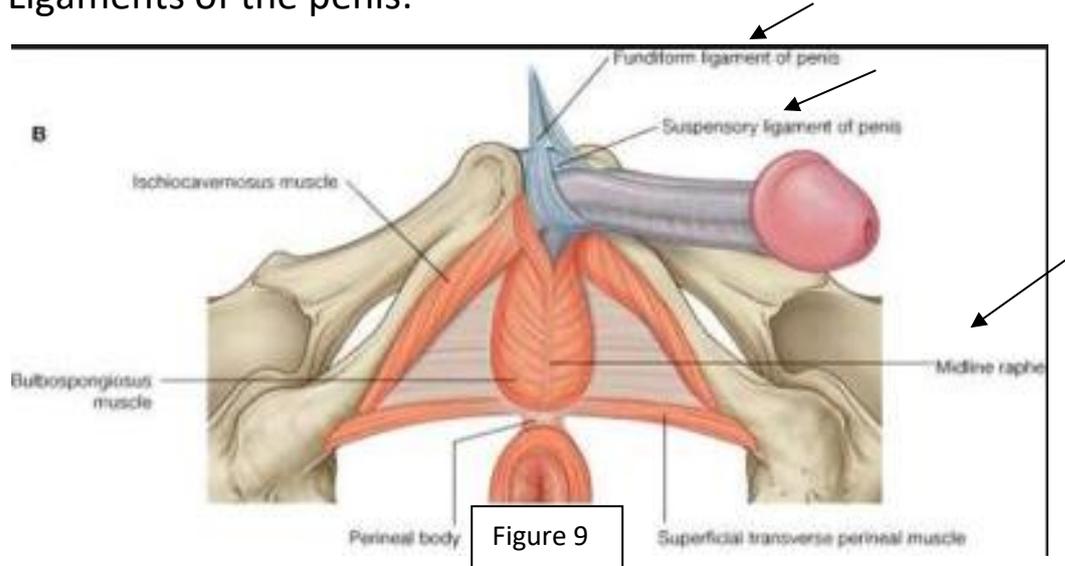
The shaft is formed of 3 columns of erectile tissue; two corpora cavernosa (right and left) and a median corpus spongiosum. The two corpora cavernosa:- They lie dorsally side by side in the shaft of penis.

Each is firmly surrounded by fibrous tissue called tunica albuginea which also sends a median septum between the two

The corpora cavernosa contain many irregular cavernous spaces which become filled by blood during erection.

B-The corpus spongiosum: It lies in the ventral surface of the two corpora cavernosa. It is also surrounded by a separate sheath of tunica albuginea. Followed distally, it forms glans penis which fits over the distal ends of the corpora cavernosa. The base of the glans penis is called the corona glandis. The corpus spongiosum is traversed by the penile part of the urethra. It also contains cavernous tissue capable of erection.

Ligaments of the penis:



A) **fundiform ligament**: arise from **linea alba**(lower part of it) surrounding the proximal part of the penis to insert into **midline raphe of scrotum** –it is like a sling around the penis -

B) **suspensory ligament** (deep to the fungiform ligament): extend from the **pubic bone** (symphysis pubis) then bends below with **the fascia of the penis**.

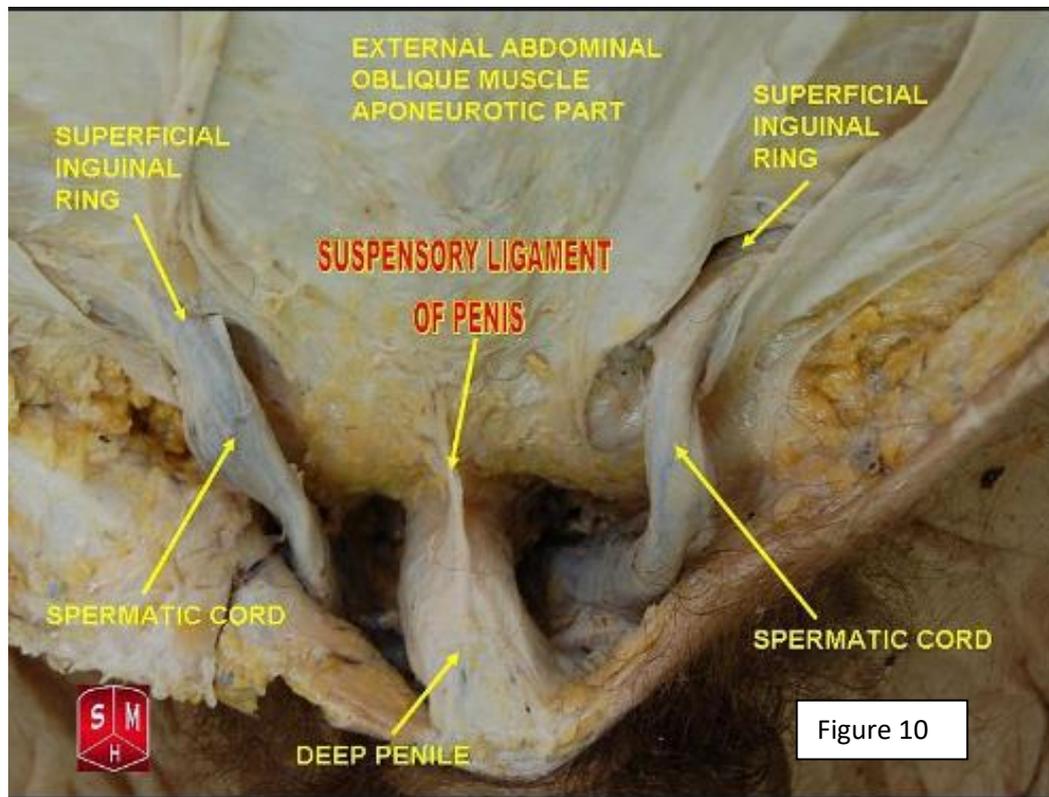


Figure 10

Blood supply:

all the three arteries that supply the penis **come from the Internal Pudendal Artery** (the artery of the perineum) **(and all are paired -right and left).**

1) Deep artery of the penis: to **corpora cavernosa** (since it is located deep) (with convoluted helicine arteries)

2) Dorsal artery of the penis: to **skin** (as well as fascia and glans)

3) Artery of the bulb: to **corpus spongiosum** (since it begins at the bulb of the penis) (and glans penis)

Venous drainage:

1. **Superficial dorsal vein** (superficial to the fascia penis); divides into right and left Each ends in the corresponding **superficial external pudendal vein.**

2. **Deep dorsal vein of the penis** (deep to fascia penis), passes below symphysis pubis to terminate in **prostatic venous plexus.**

Nerve supply:

-**Somatic** to the skin by **Dorsal nerve of the penis** (sensory), is a branch of **pudendal nerve**, runs lateral to the dorsal artery of the penis

-**autonomic** by Cavernous nerves arise **from the inferior hypogastric plexus**, **Parasympathetic** fibres (S2,3,4) produce vasodilatation & erection of **Penis**

Lymphatic drainage:

From the penis into **superficial inguinal lymph nodes** (with the scrotum).

(From glans penis, lymphatics drain directly to gland of Cloquet in the femoral canal.)

Questions given in the last of lecture

1)left testicular vein drains to:

- A) IVC
- B) left renal vein
- C) left Internal iliac vein
- D) left external iliac vein

2)bulbourethral gland is located in:

- A) superficial perineal pouch
- B) false pelvis
- C) Deep perineal pouch
- D) true pelvis

3)external oblique muscle in the anterior abdominal wall is replaced by which layer in the scrotum:

- A) cremasteric muscle and fascia
- B) skin
- C) external spermatic fascia
- D) colle's fascia

4) fascia of Denonvilleris is:

- A) posterior to prostate
- B) posterior to the rectum
- C) anterior to prostate
- D) anterior to the urinary bladder

Answers: 1(B),2(C),3(C).4(A)

Lecture's video link:

<https://www.youtube.com/watch?v=G1E-4tu4rZE>

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