

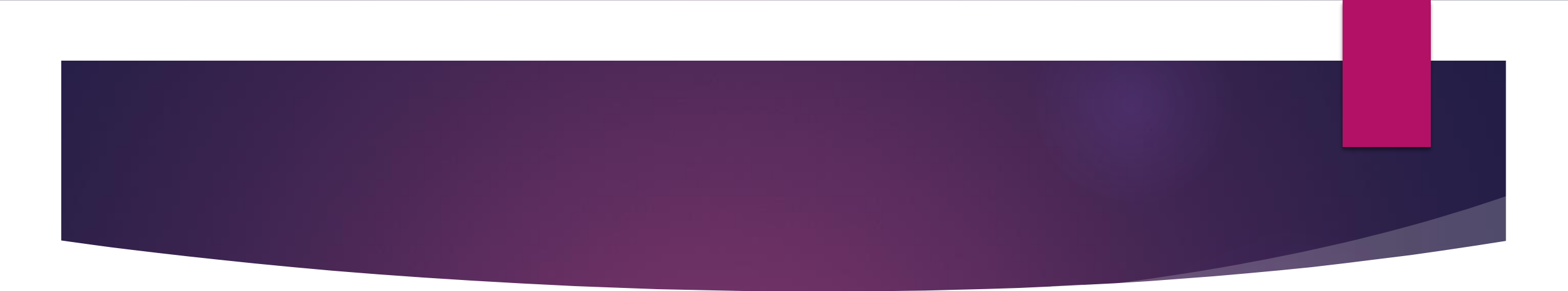


# GROSS ANATOMY OF URETHRA

BY DR. MAHVISH JAVED

# URETHRA

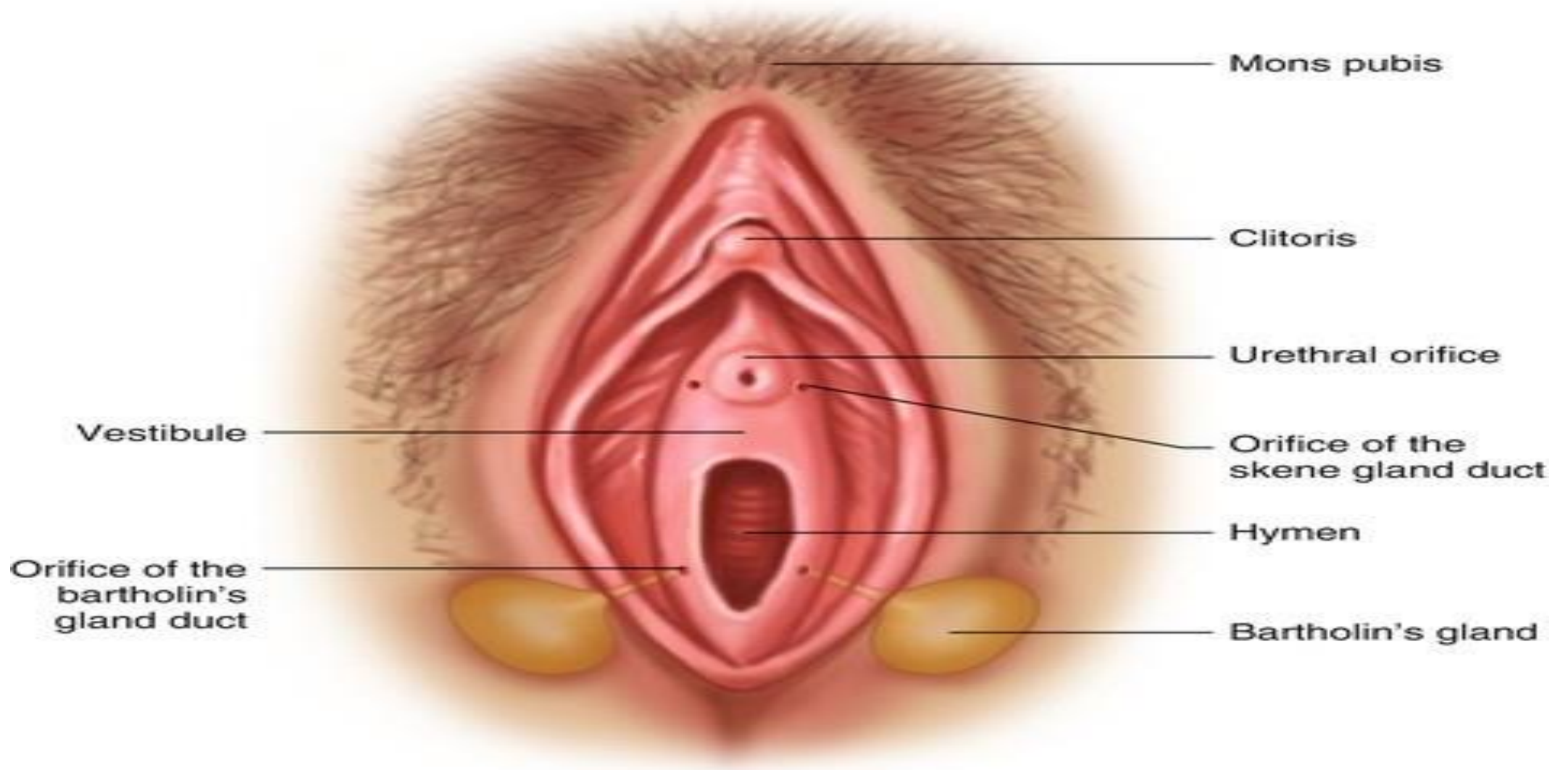
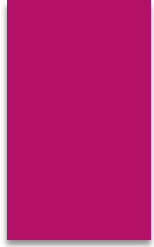
- ▶ In anatomy, the **urethra** is a tube that connects the urinary bladder to the urinary meatus for the removal of urine from the body. In males, the urethra travels through the penis and also carries semen. In human females, the urethra connects to the urinary meatus above the vagina.

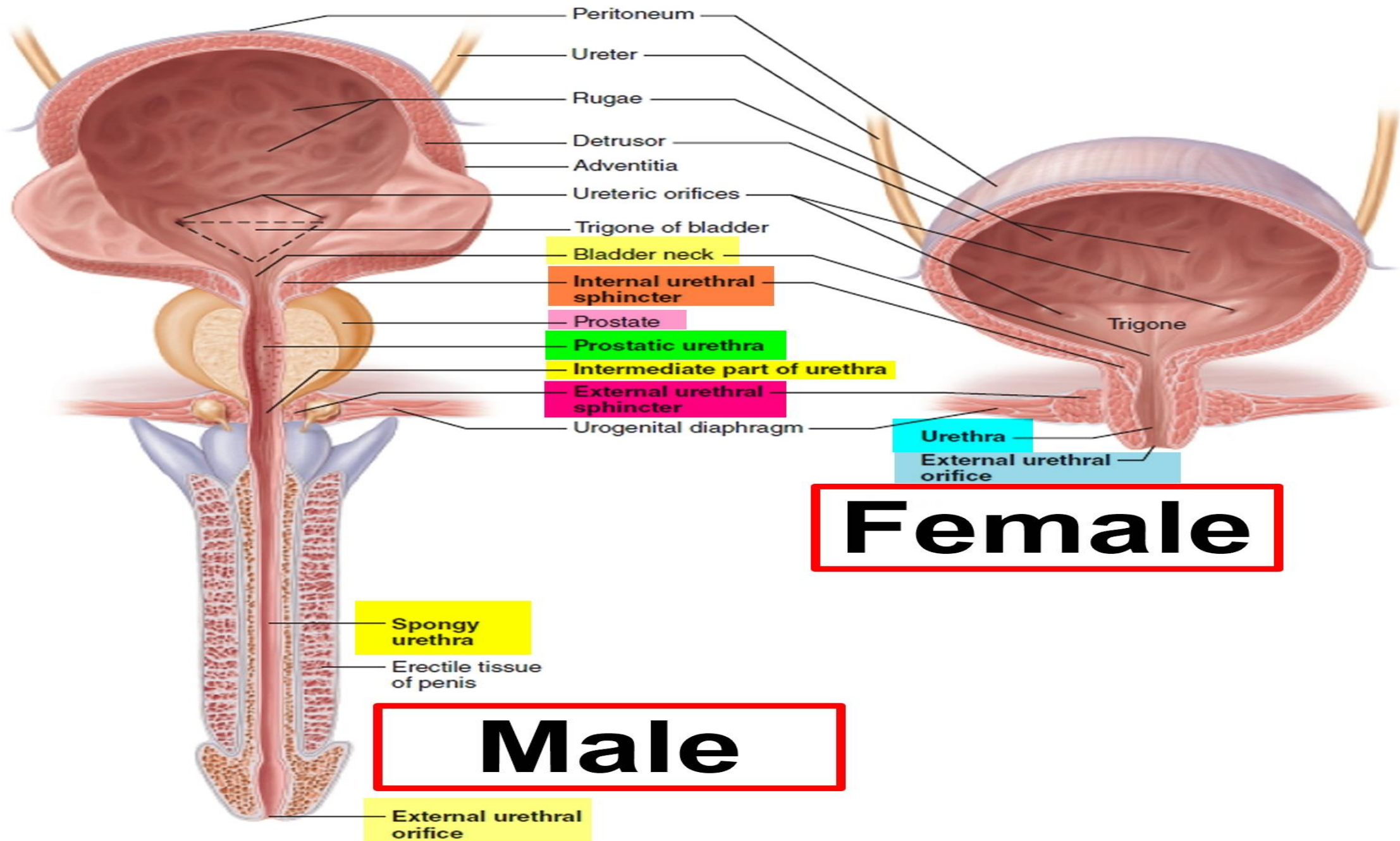
- 
- ▶ Females use their urethra only for urinating, but males use their urethra for both **urination** and ejaculation.
  - ▶ The external urethral sphincter is a striated muscle that allows voluntary control over urination.
  - ▶ The internal sphincter, formed by the involuntary smooth muscles lining the bladder neck and urethra, is innervated by the sympathetic division of the autonomic nervous system. The internal sphincter is present both in males and females.

# ANATOMY FEMALE

- ▶ In female, the urethra is about 1.9 inches (4.8 cm) to 2 inches (5.1 cm) long and exits the body between the clitoris and the vagina, extending from the internal to the external urethral orifice. The meatus is located below the clitoris. It is placed behind the symphysis pubis, embedded in the anterior wall of the vagina, and its direction is obliquely downward and forward; it is slightly curved with the concavity directed forward. The proximal 2/3rds is lined by transitional epithelium cells while distal 1/3rd is lined by stratified squamous epithelium cells.







**Female**

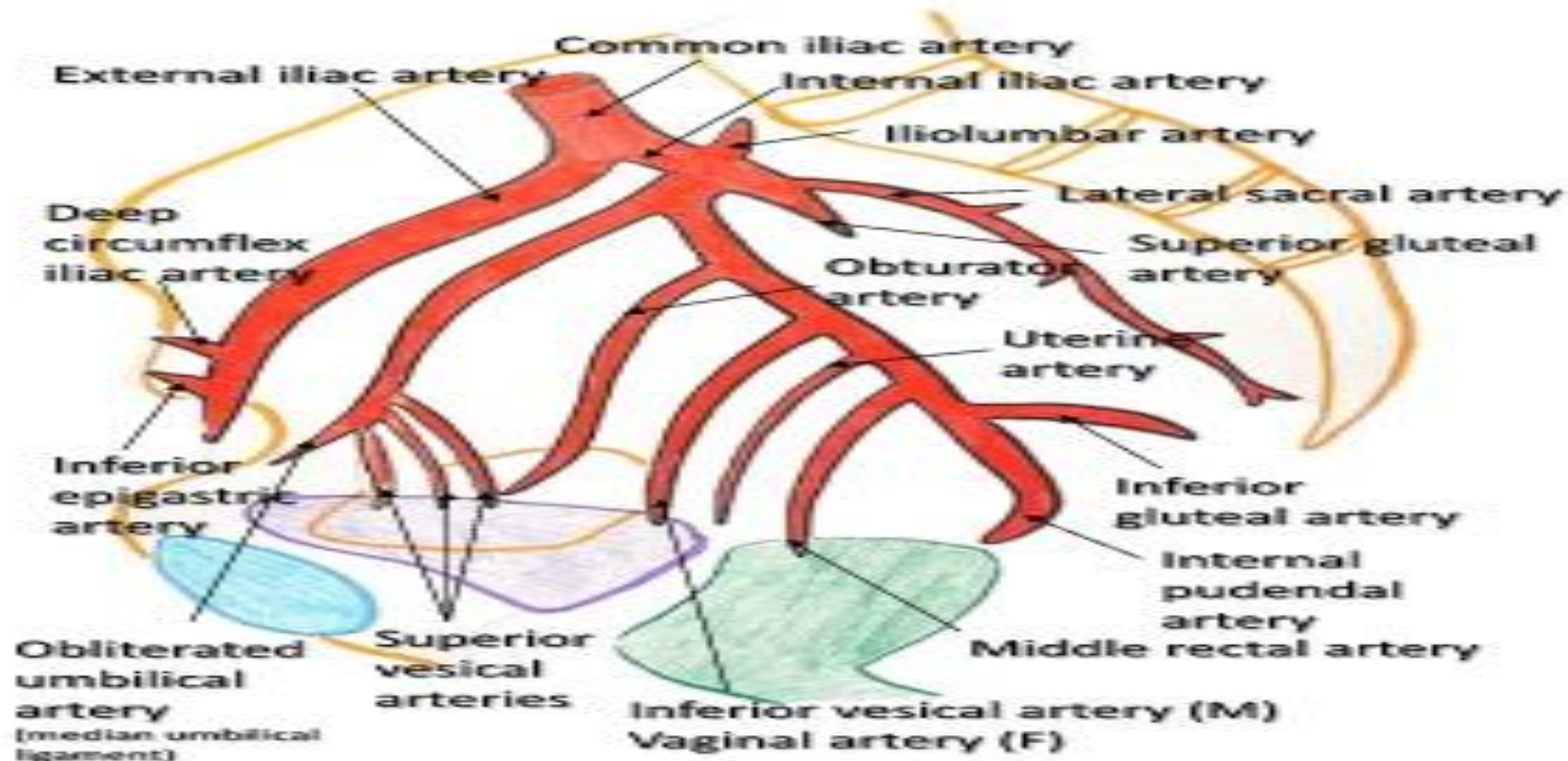
**Male**

# Neurovascular Supply

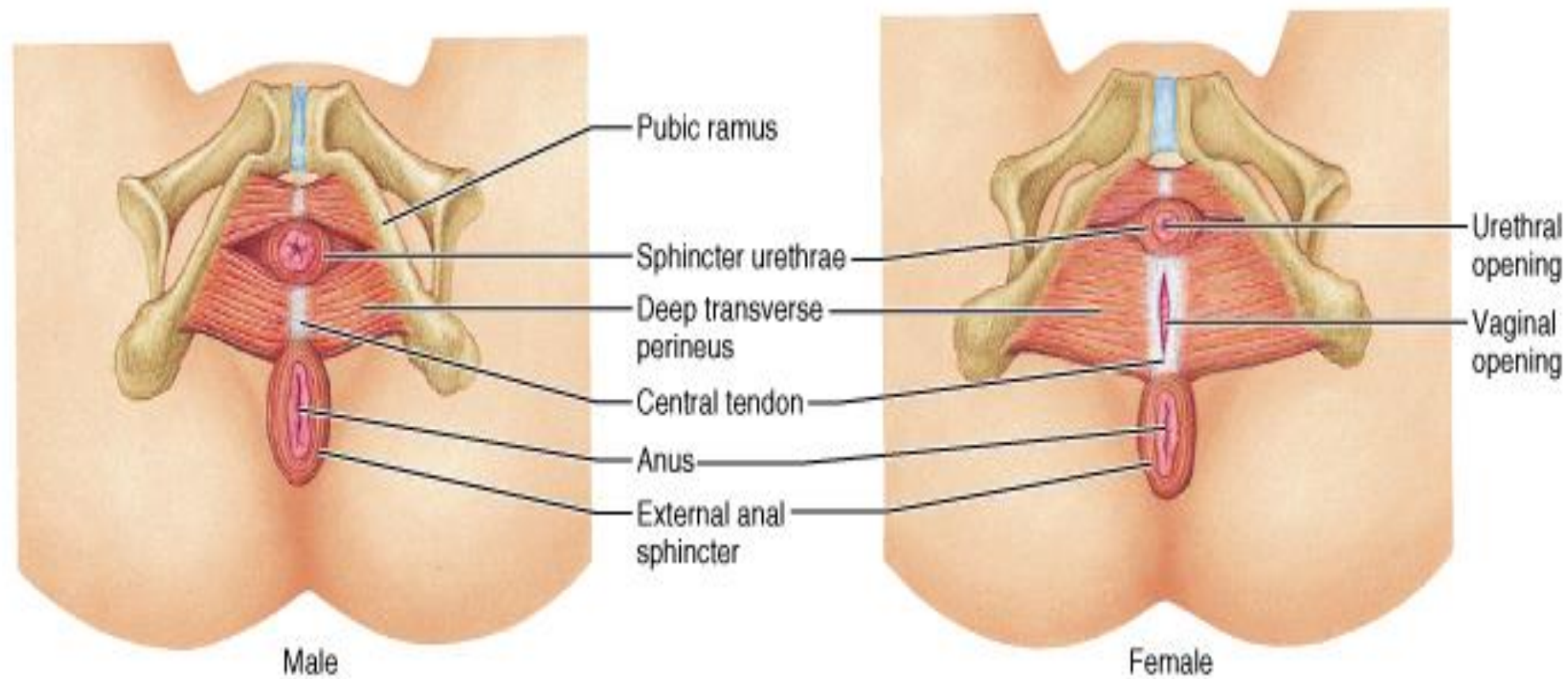
- ▶ The arterial supply to the female urethra is given by the **internal pudendal arteries**, the vaginal arteries and inferior vesical branches of the vaginal arteries. Venous drainage is given by veins of the same names.
- ▶ The nerve supply to the female urethra arises from the vesical plexus and the **pudendal nerve**. Visceral afferents from the urethra run in the pelvic splanchnic nerves.



## Anatomy



**internal iliac Artery** has anterior and posterior divisions and supplies blood to the pelvic viscera and the gluteal muscles. If sacrificed in surgery it may result in buttock claudication, or rarely bowel ischemia. Vascular surgeons would strive to preserve at least one of the 2 arteries.

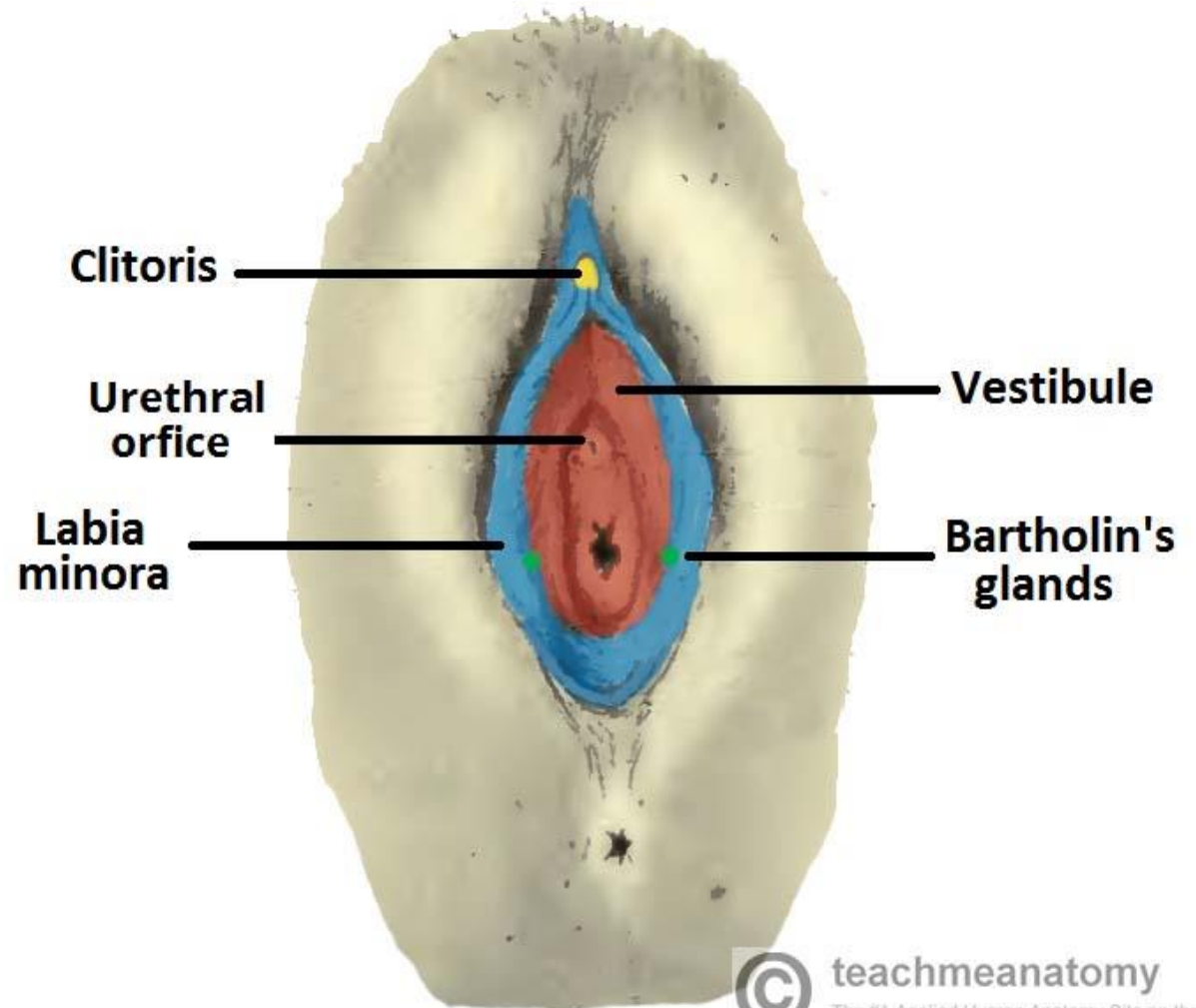


(b)

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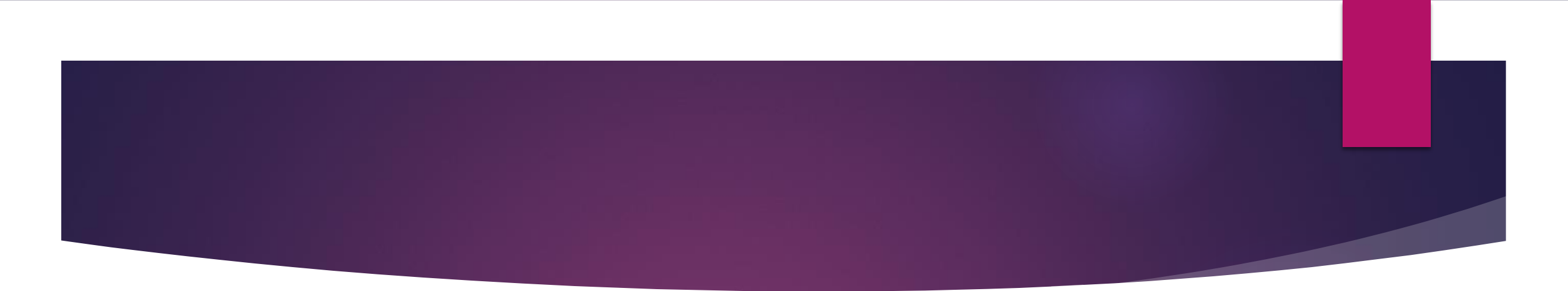
## Lymphatic Drainage

Lymphatic drainage of the proximal urethra is to the **internal iliac** nodes, while the distal urethra drains to the superficial inguinal lymph nodes.



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- 
- } MALE URETHRA IS A FIBROMUSCULAR CANAL EXTENDING FROM BLADDER NECK TO EXTERNAL URINARY MEATUS
  - } ITS LENGTH IS APPROXIMATELY 20 CM





} COURSE:

BEGINS AT THE NECK OF THE BLADDER ,RUNS  
DOWNWARDS AND SLIGHTLY FORWARDS TO END  
AT THE POSTERIOR LAYER OF TRIANGULAR  
LIGAMENT(UROGENITAL DIAPHRAGM).



**} IT IS BROADLY DIVIDED INTO THREE PARTS**

**Pre prostatic**

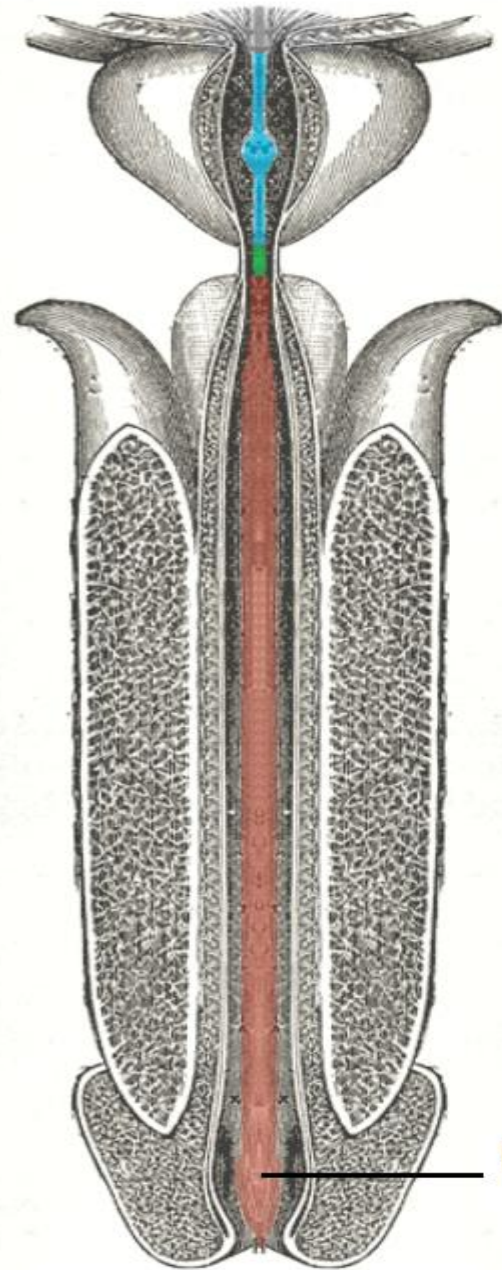
**} PROSTATIC**




**} MEMBRANOUS**

**} SPONGY OR PENILE**

**} PROSTATIC AND MEMBRANOUS TOGETHER FORM  
POSTERIOR URETHRA**

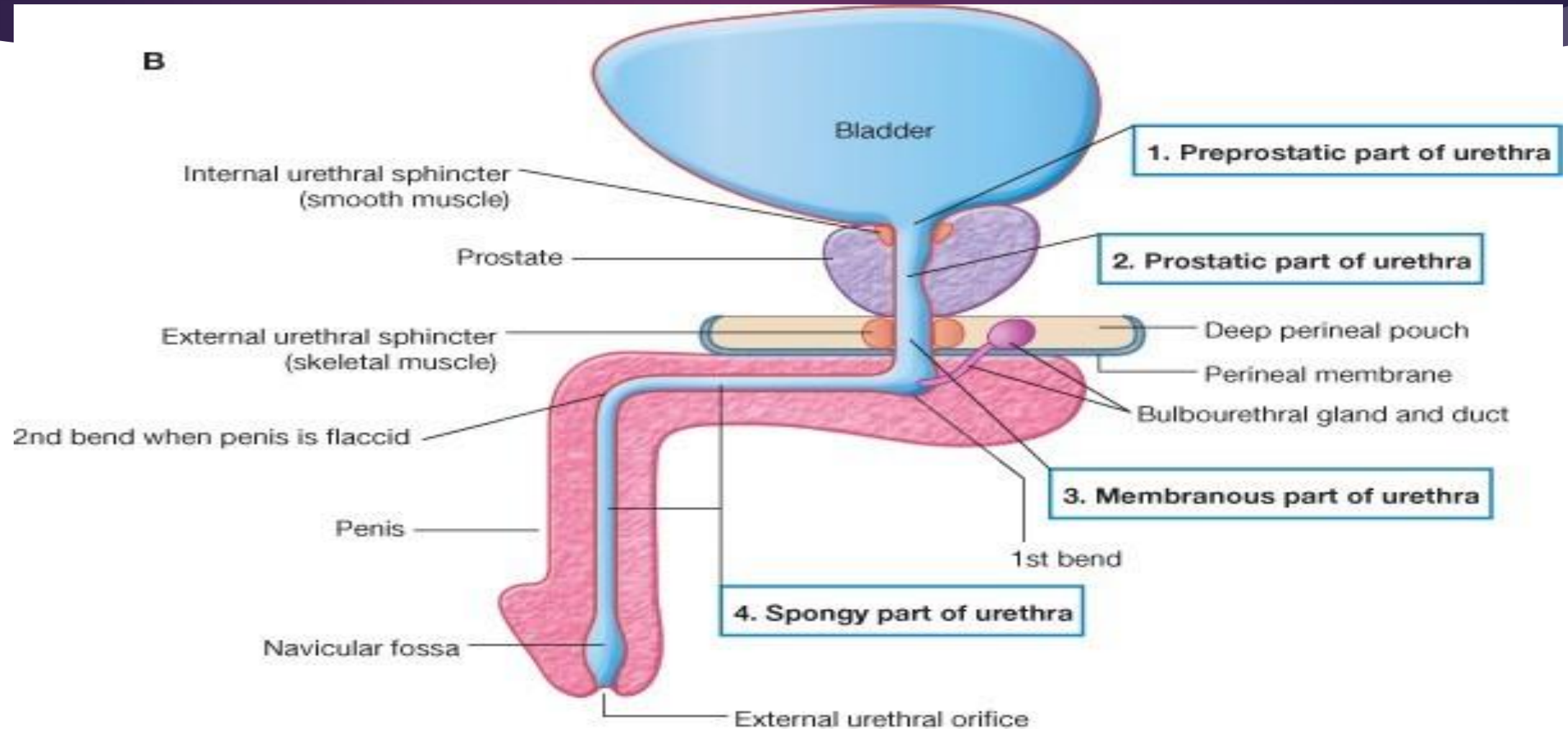
**} SPONGY PORTION FORMS ANTERIOR URETHRA**



-  Prostatic
-  Membranous
-  Penile (bulbous)

Navicular  
fossa

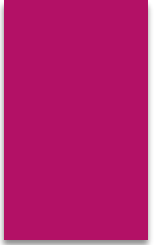
# Male Urethra





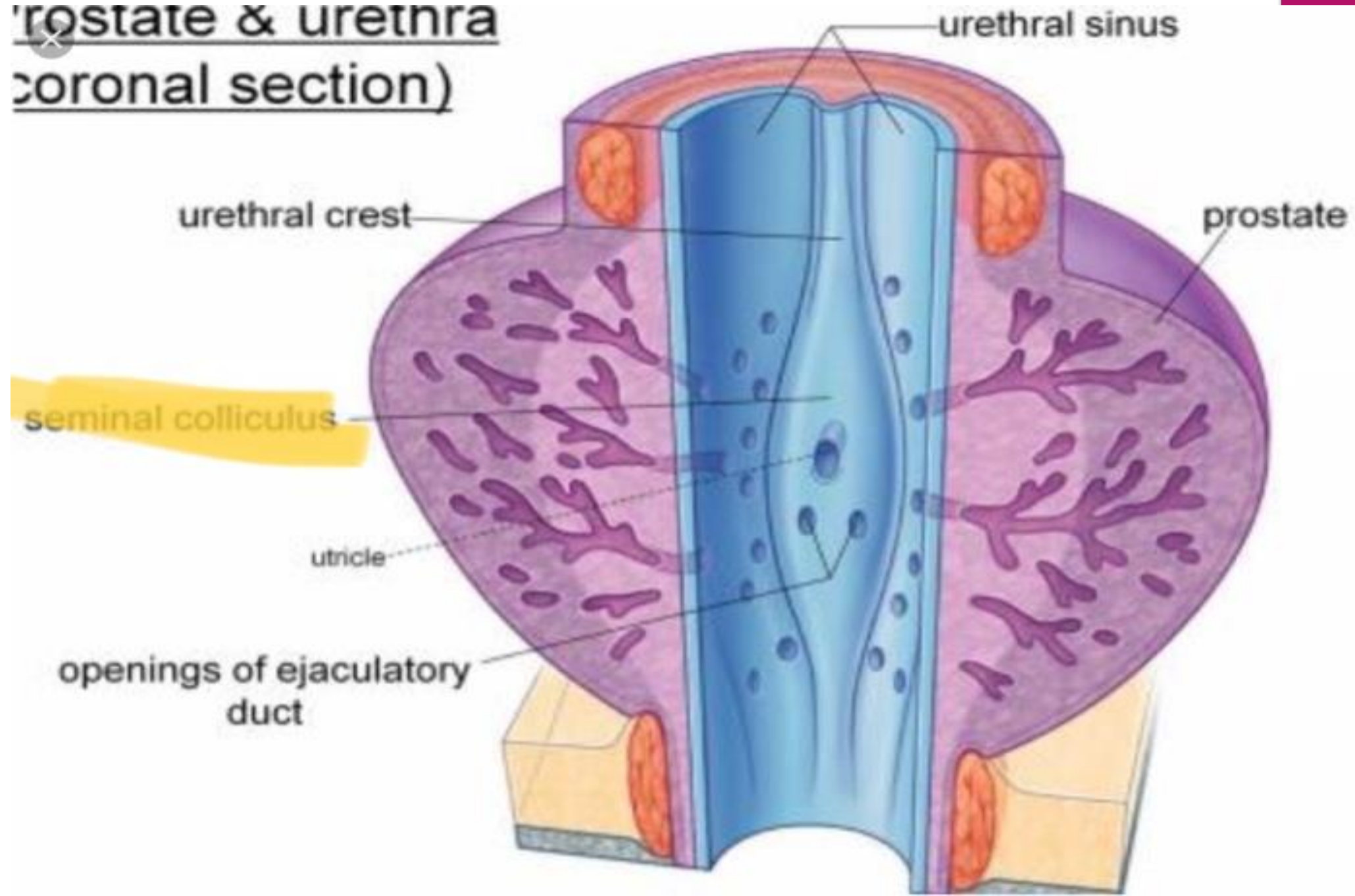
# PROSTATIC URETHRA

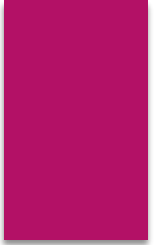
- } parsprostatica
- } 3 CM IS LENGTH
- } LINED BY TRANSITIONAL EPITHELIUM
- } IT IS THE WIDEST AND MOST DILATABLE PART OF MALE URETHRA



} Upon the posterior wall or floor is a narrow longitudinal ridge, **the urethral crest (*verumontanum*)**, formed by an elevation of the mucous membrane and its subjacent tissue. it is 15- 17 mm in length & 3mm in height

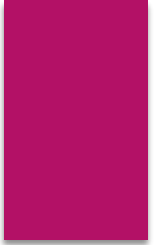
Prostate & urethra  
(coronal section)



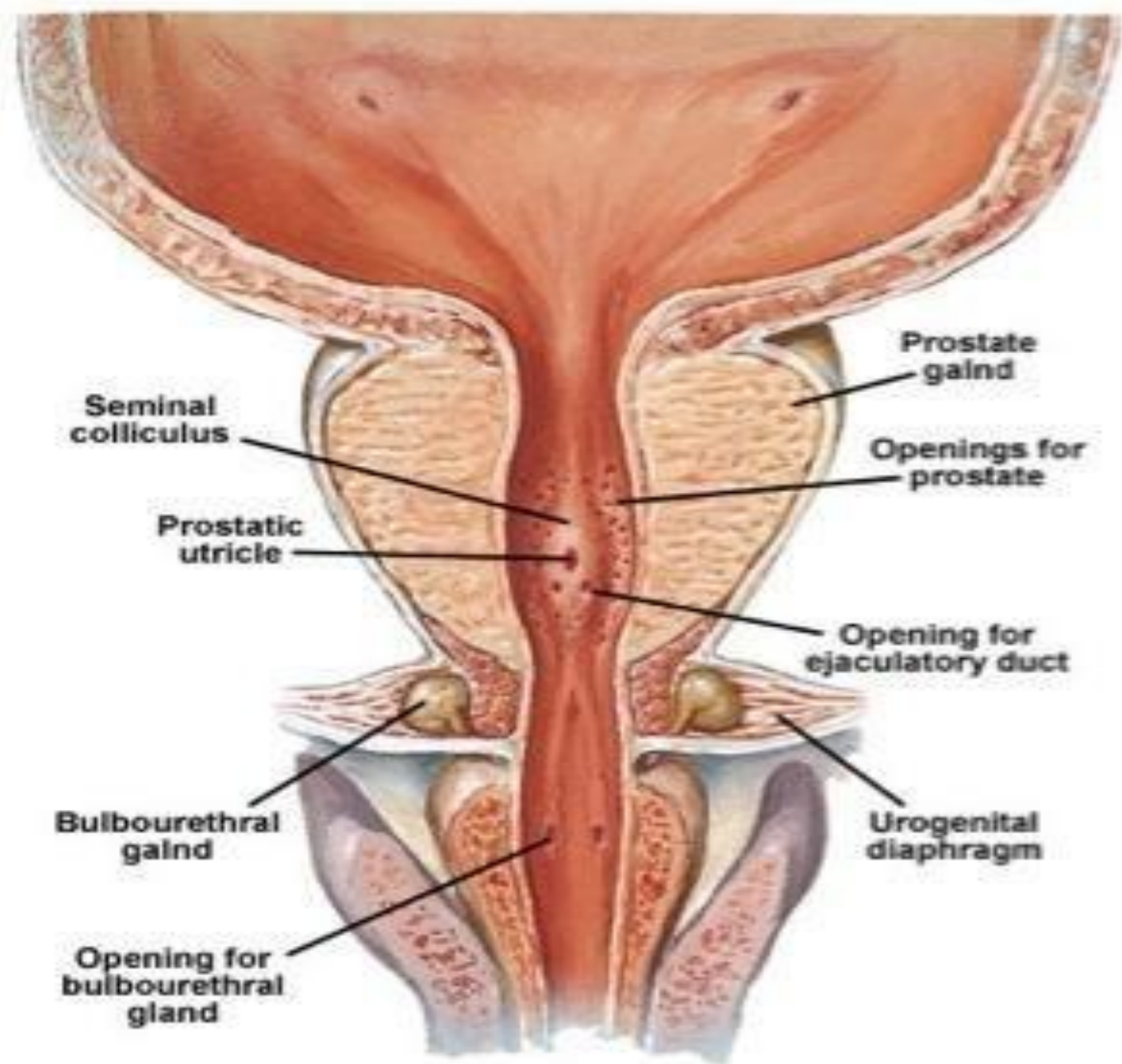


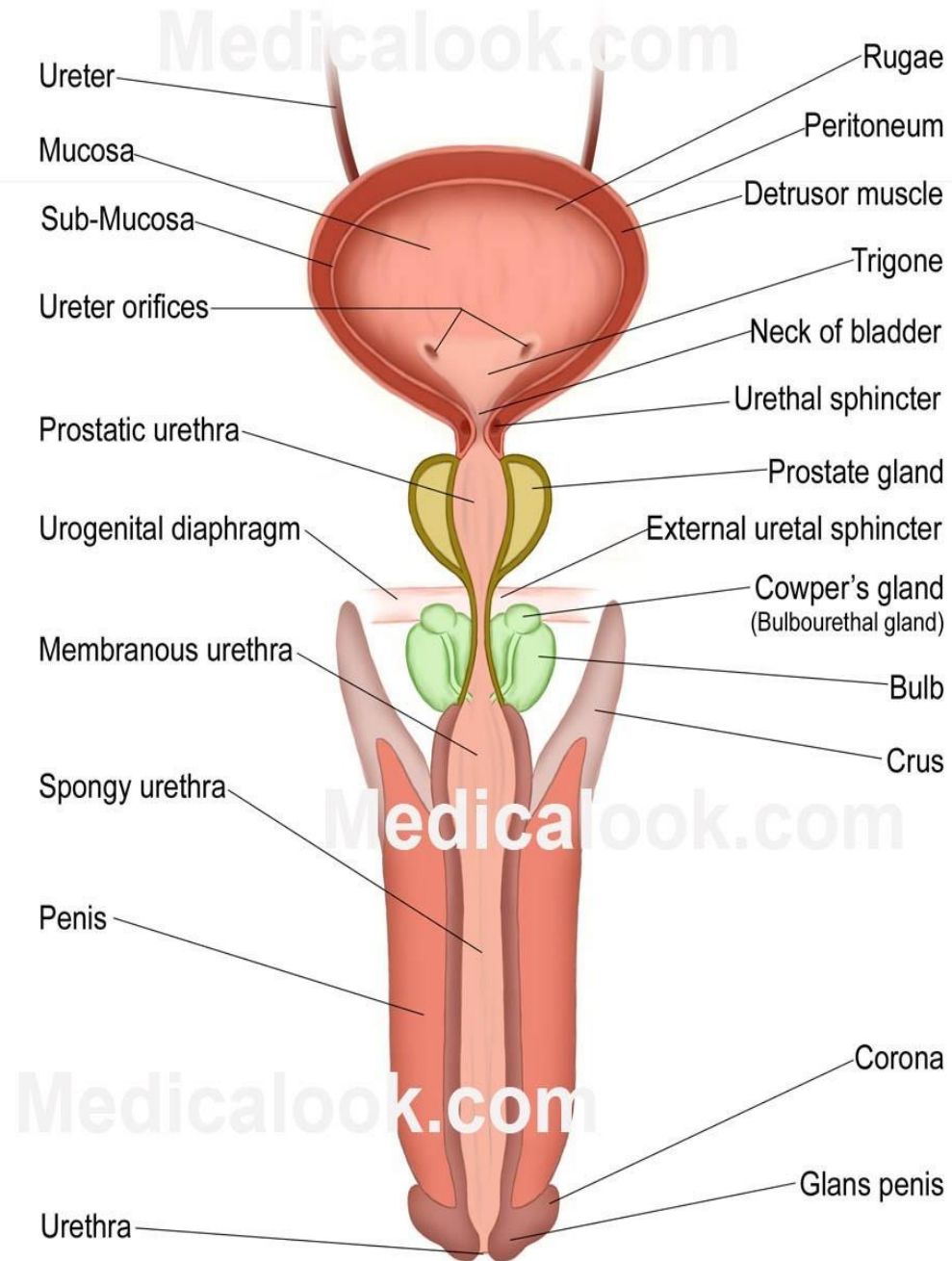
} On either side of the crest is a slightly depressed fossa, **the prostatic sinus**, the floor of which is perforated by numerous apertures, the orifices of the prostatic ducts from the lateral lobes of the prostate; the ducts of the middle lobe open behind the crest.

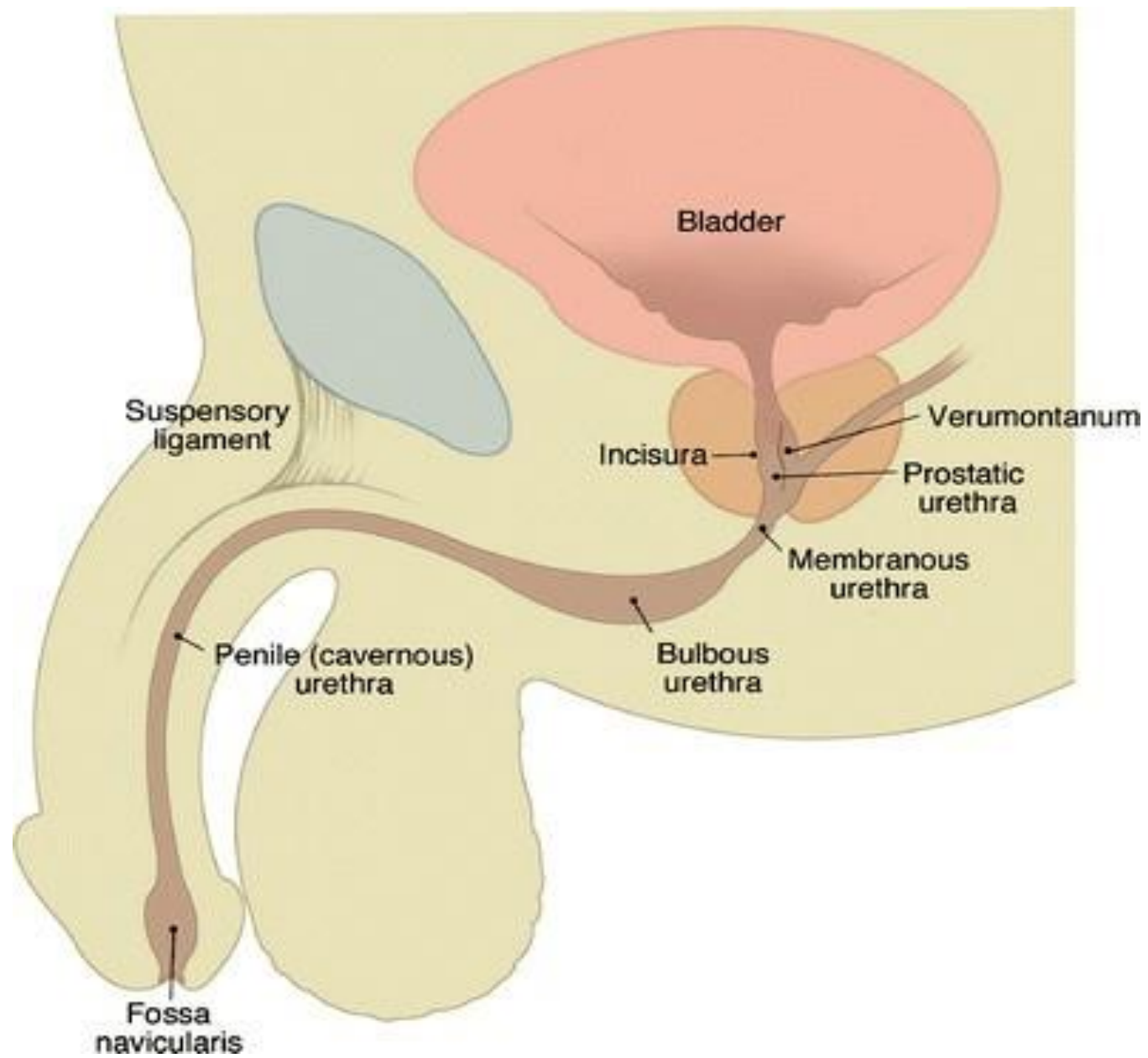




} The **prostatic utricle** (*sinus pocularis*) is also called as the uterus masculinus, as it is developed from the united lower ends of the atrophied Müllerian ducts, and therefore homologous with the uterus and vagina in the female





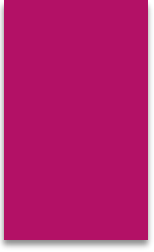


# MEMBRANOUS URETHRA

} (*pars membranacea*)

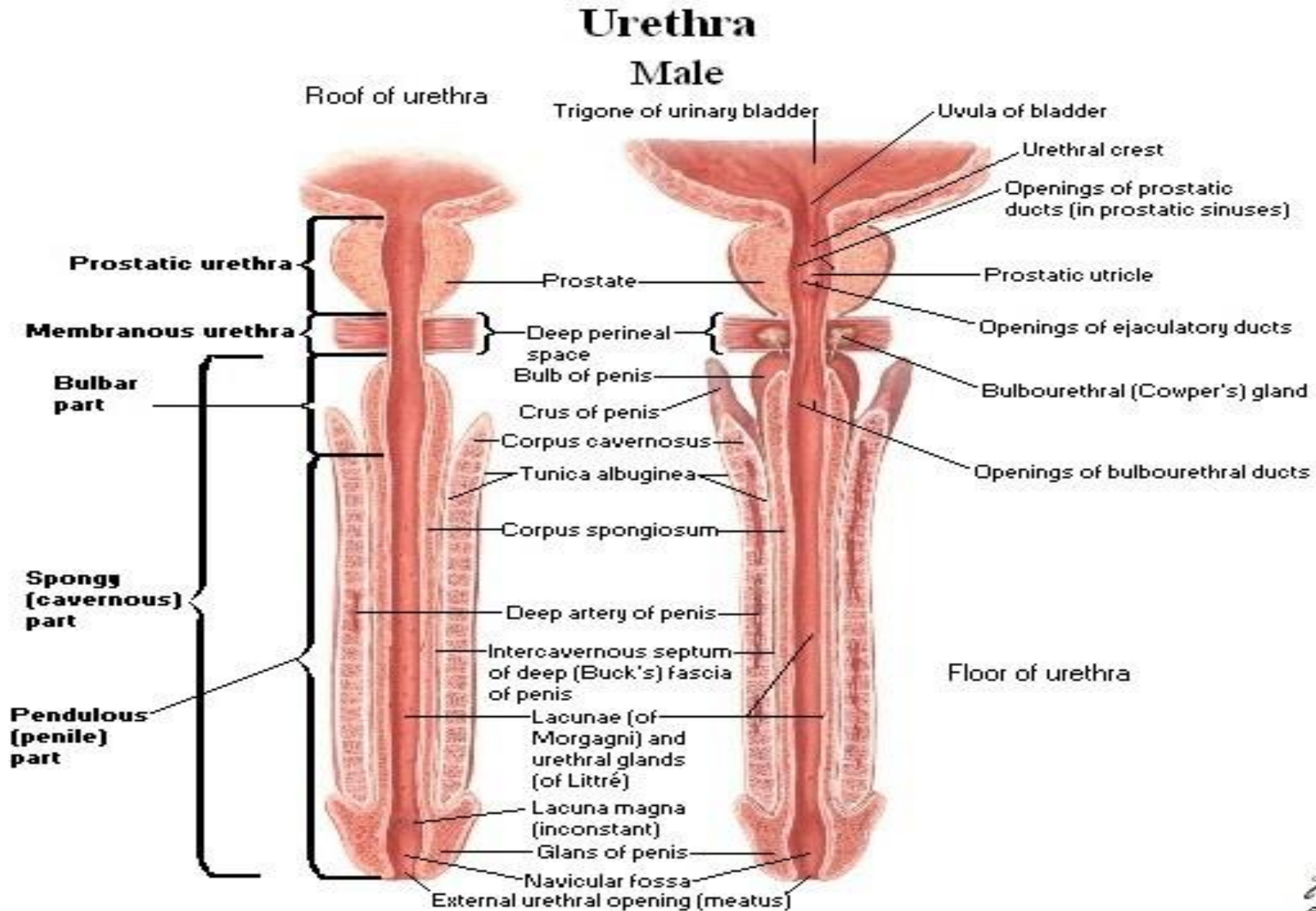
- ▶ } 1.5 – 2 CM IN LENGTH
- ▶ } LINED BY PSEUDO STRATIFIED COLUMNAR EPITHELIUM
- ▶ } IS THE SHORTEST, LEAST DILATABLE, AND, WITH THE EXCEPTION OF THE EXTERNAL ORIFICE, THE NARROWEST PART OF THE CANAL

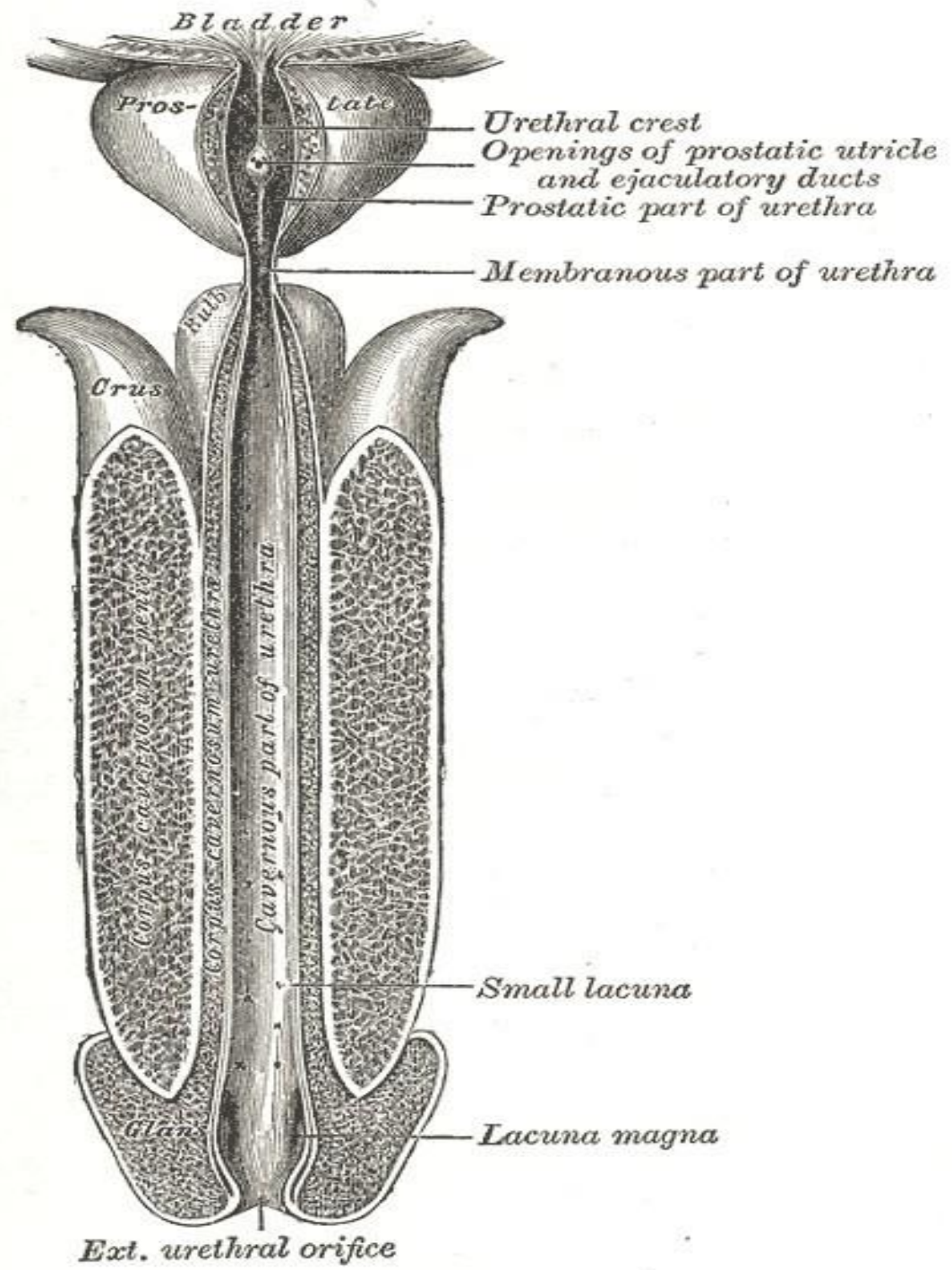


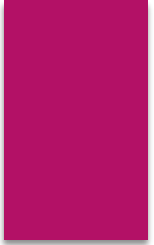


} **COURSE:** It extends downward and forward, with a slight anterior concavity, between the apex of the prostate and the bulb of the urethra, perforating the urogenital diaphragm about 2.5 cm. below and behind the pubic symphysis.

# Male Urethra





- 
- } the membranous urethra is completely surrounded by the fibers of the Sphincter urethrae. In front of it the deep dorsal vein of the penis enters the pelvis between the transverse ligament of the pelvis and the arcuate pubic ligament
  - } The **glands of Cowper** (bulbo urethral glands) lie on either side of its posterior surface

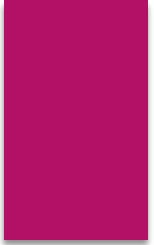
# SPONGY URETHRA

} *PARS CAVERNOSA; PENILE URETHRA*

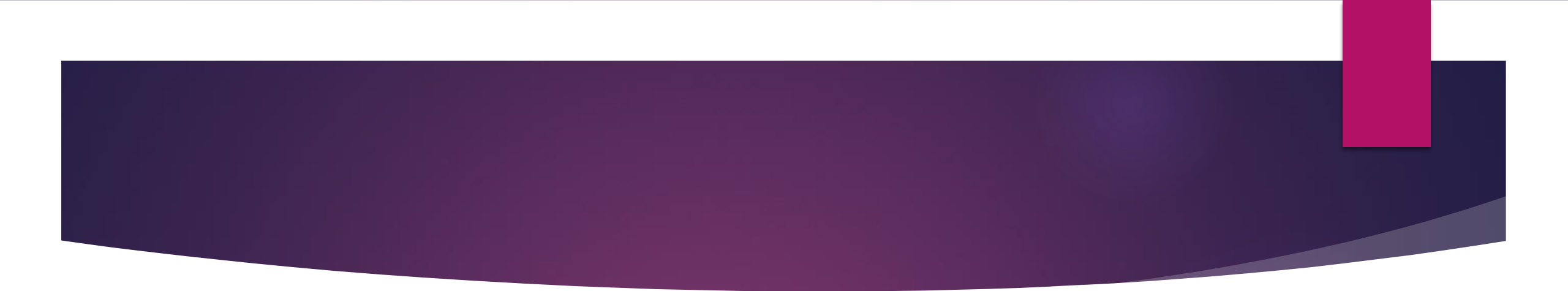
} 15 CM IN LENGTH

} LINED BY PSEUDO STRATIFIED COLUMNAR EPITHELIUM EXCEPT FOR TERMINAL 12MM , THE FOSSA NAVICULARIS , WHICH IS LINED BY STRATIFIED SQUAMOUS EPITHELIUM





} **COURSE:** extends from the termination of the membranous portion to the external urethral orifice. Commencing below the inferior fascia of the urogenital diaphragm it passes forward and upward to the front of the symphysis pubis; and then, in the flaccid condition of the penis, it bends downward and forward.



it is dilated behind, within the bulb, and again anteriorly within the glans penis, where it forms the fossa navicularis urethrae.

**The external urethral orifice (*orificium urethrae externum; meatus urinarius*) is the most contracted part of the urethra; it is a vertical slit, about 6 mm. long.**

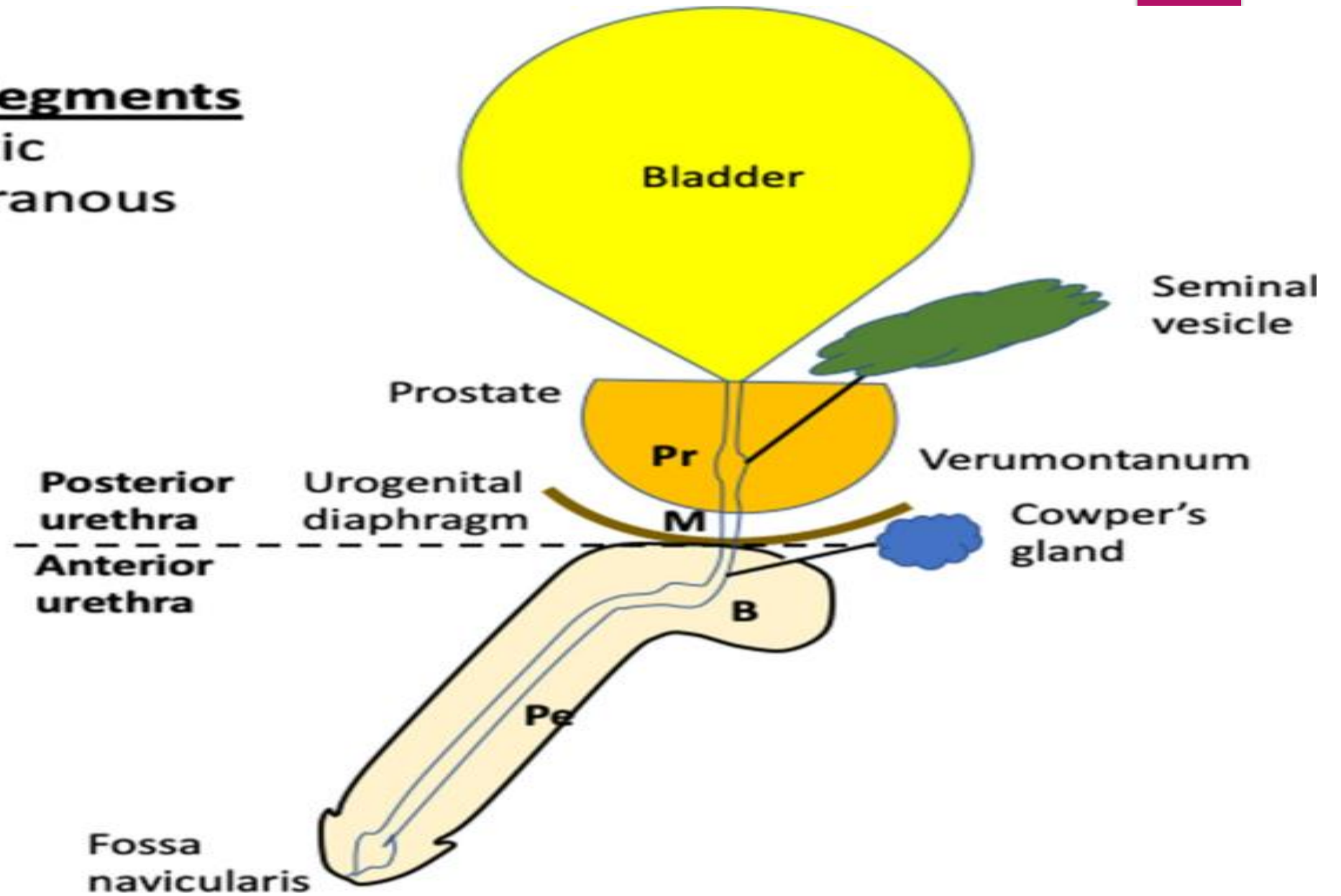
## Urethral Segments

Pr: Prostatic

M: Membranous

B: Bulbar

Pe: Penile





According to the latest classification, the male urethra can be divided anatomically into **three parts** (proximal to distal):

▶ **Prostatic urethra:**

- ▶ Begins as a continuation of the bladder neck and passes through the prostate gland.
- ▶ Receives the ejaculatory ducts (containing spermatozoa from the testes and seminal fluid from the seminal vesicle glands) and the prostatic ducts (containing alkaline fluid)
- ▶ The widest and most dilatable portion of the urethra.

▶ **Membranous urethra:**


- ▶ Passes through the pelvic floor and the deep perineal pouch.
- ▶ Surrounded by the external urethral sphincter – which provides voluntary control of micturition.
- ▶ The narrowest and least dilatable portion of the urethra.

▶ **Penile (bulbous) urethra:**

- ▶ Passes through the bulb and corpus spongiosum of the penis, ending at the external urethral orifice (the meatus).
- ▶ Receives the bulbourethral glands proximally.
- ▶ In the glans (head) of the penis, the urethra dilates to form the navicular fossa.

Region	Description	Epithelium
<u>pre-prostatic urethra</u>	This is the intramural part of the urethra and varies between 0.5 and 1.5 cm in length depending on the fullness of the bladder.	<u>Transitional</u>
<u>prostatic urethra</u>	Crosses through the <u>prostate gland</u> . There are several openings: (1) the <u>ejaculatory duct</u> receives <u>sperm</u> from the <u>vas deferens</u> and ejaculate fluid from the <u>seminal vesicle</u> , (2) several <u>prostatic ducts</u> where fluid from the <u>prostate</u> enters and contributes to the ejaculate, (3) the <u>prostatic utricle</u> , which is merely an indentation. These openings are collectively called the verumontanum.	<u>Transitional</u>
<u>membranous urethra</u>	A small (1 or 2 cm) portion passing through the <u>external urethral sphincter</u> . This is the narrowest part of the urethra. It is located in the <u>deep perineal pouch</u> . The <u>bulbourethral glands</u> (Cowper's gland) are found posterior to this region but open in the <u>spongy urethra</u> .	<u>Pseudostratified columnar</u>
<u>spongy urethra (or penile urethra)</u>	Runs along the length of the penis on its ventral (underneath) surface. It is about 15–16 cm in length, and travels through the <u>corpus spongiosum</u> . The ducts from the <u>urethral gland</u> (gland of Littre) enter here. The openings of the <u>bulbourethral glands</u> are also found here. <sup>[8]</sup> Some textbooks will subdivide the spongy urethra into two parts, the bulbous and pendulous urethra. The urethral lumen runs effectively parallel to the penis, except at the narrowest point, the external urethral meatus, where it is vertical. This produces a spiral stream of urine and has the effect of cleaning the external urethral meatus. The lack of an equivalent mechanism in the female urethra partly explains why urinary tract infections occur so much more frequently in females.	<u>Pseudostratified columnar – proximally, Stratified squamous – distally</u>





# What are three important differences between the female urethra and the male urethra?

## Male urethra

---

It is divided into three regions.

---

It opens out at the tip of the penis by urinogenital aperture.

---

It carries urine as well as semen to the exterior.

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## Female urethra

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It is not divided into regions.

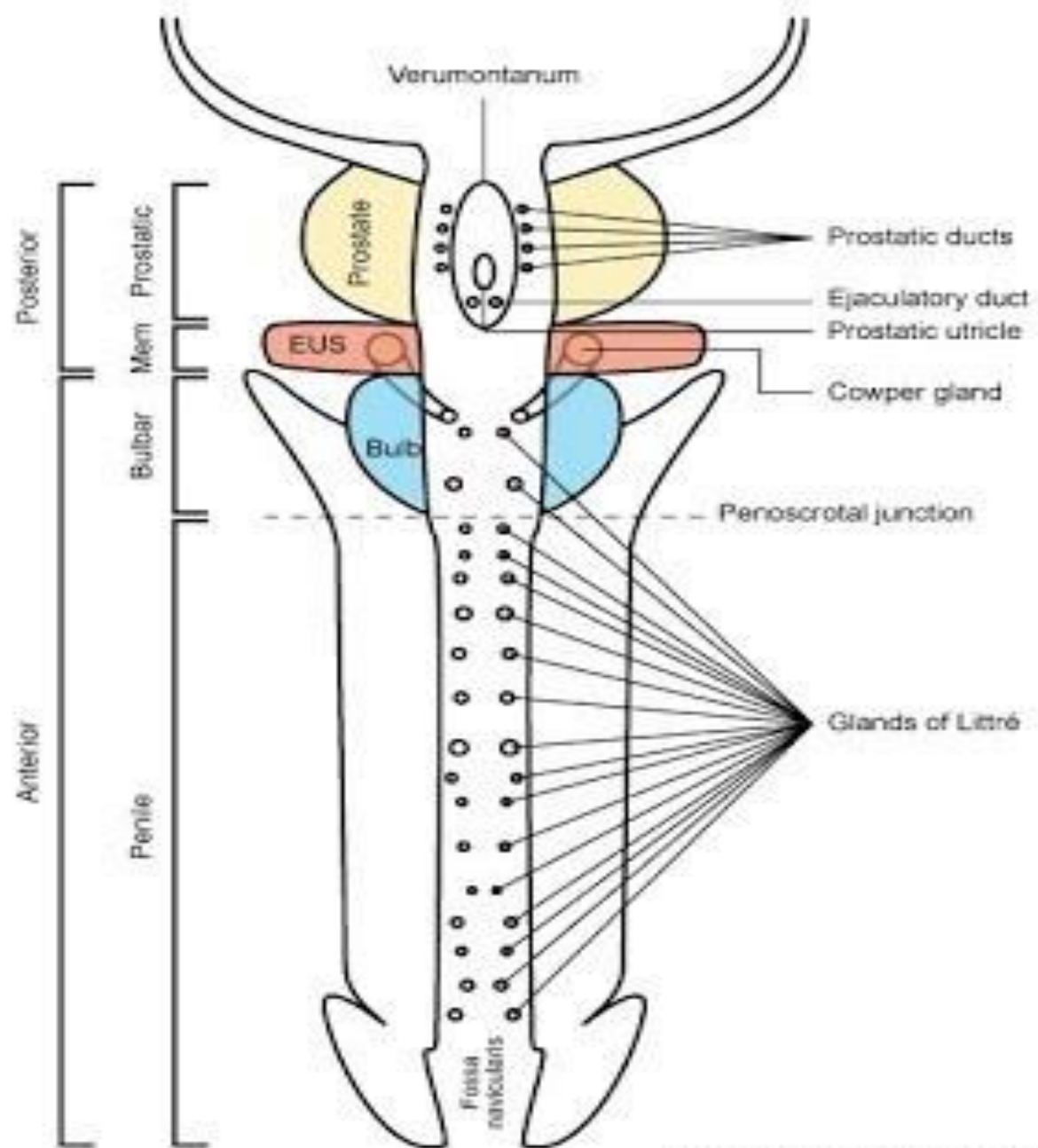
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It opens by urinary aperture in front of the vaginal aperture.

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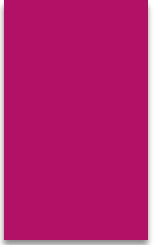
It carries only urine to the exterior.

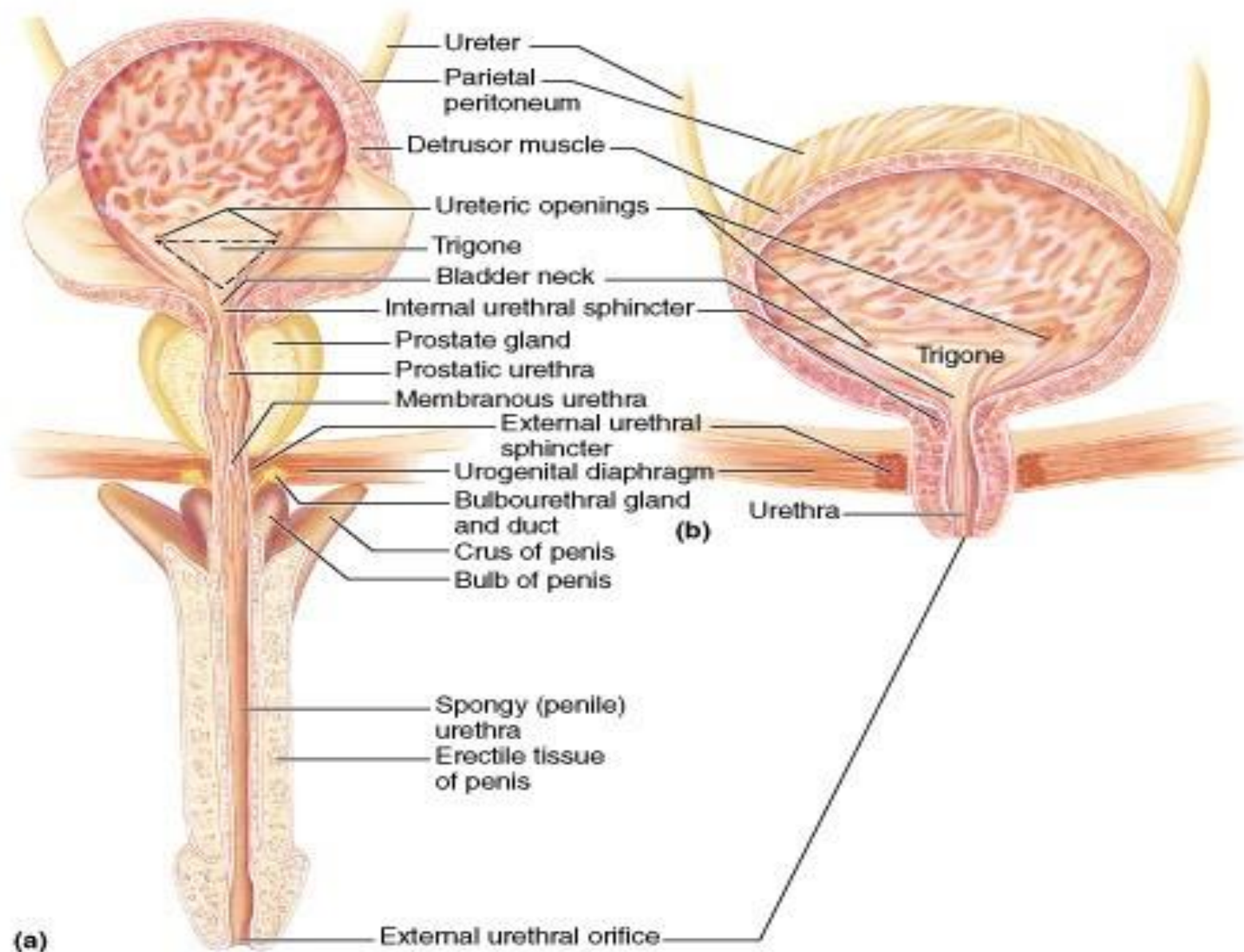
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# SPHINCTERS OF URETHRA

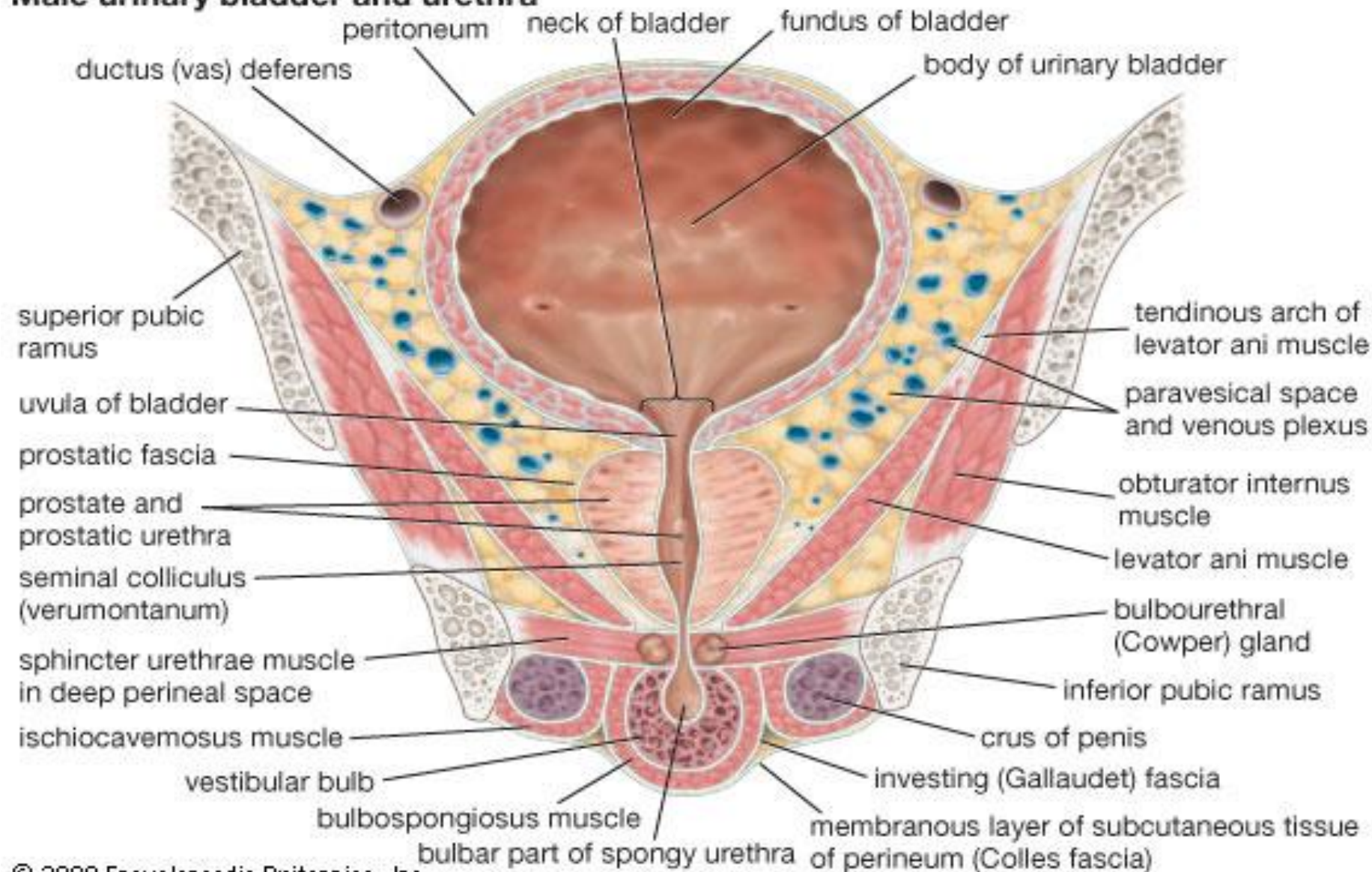
- } INTERNAL URETHRAL SPCHINTER:**
- } Also known as sphincter vesicae**
- } Involuntary in nature**
- } Supplied by sympathetic nerves from lower thoracic and upper lumbar segments**
- } It controls the neck of bladder and prostatic urethra above openings of ejaculatory ducts**

- 
- } EXTERNAL URETHRAL SPHINCTER:**
  - } Also known as SPHINCTER URETHRAE**
  - } Voluntary in nature**
  - } Supplied by perineal branch of pudendal nerve(S2 S3 S4)**
  - } It controls membranous urethra and is responsible for the voluntary holding of urine**





## Male urinary bladder and urethra



# Neurovascular Supply

The arterial supply to the male urethra is via several arteries:

- ▶ **Prostatic urethra** – supplied by the inferior vesical artery (branch of the internal iliac artery which also supplies the lower part of the bladder).
- ▶ **Membranous urethra** – supplied by the bulbourethral artery (branch of the internal pudendal artery)
- ▶ **Penile urethra** – supplied directly by branches of the internal pudendal artery.
- ▶ The nerve supply to the male urethra is derived from the **prostatic plexus**, which contains a mixture of sympathetic, parasympathetic and visceral afferent fibres.

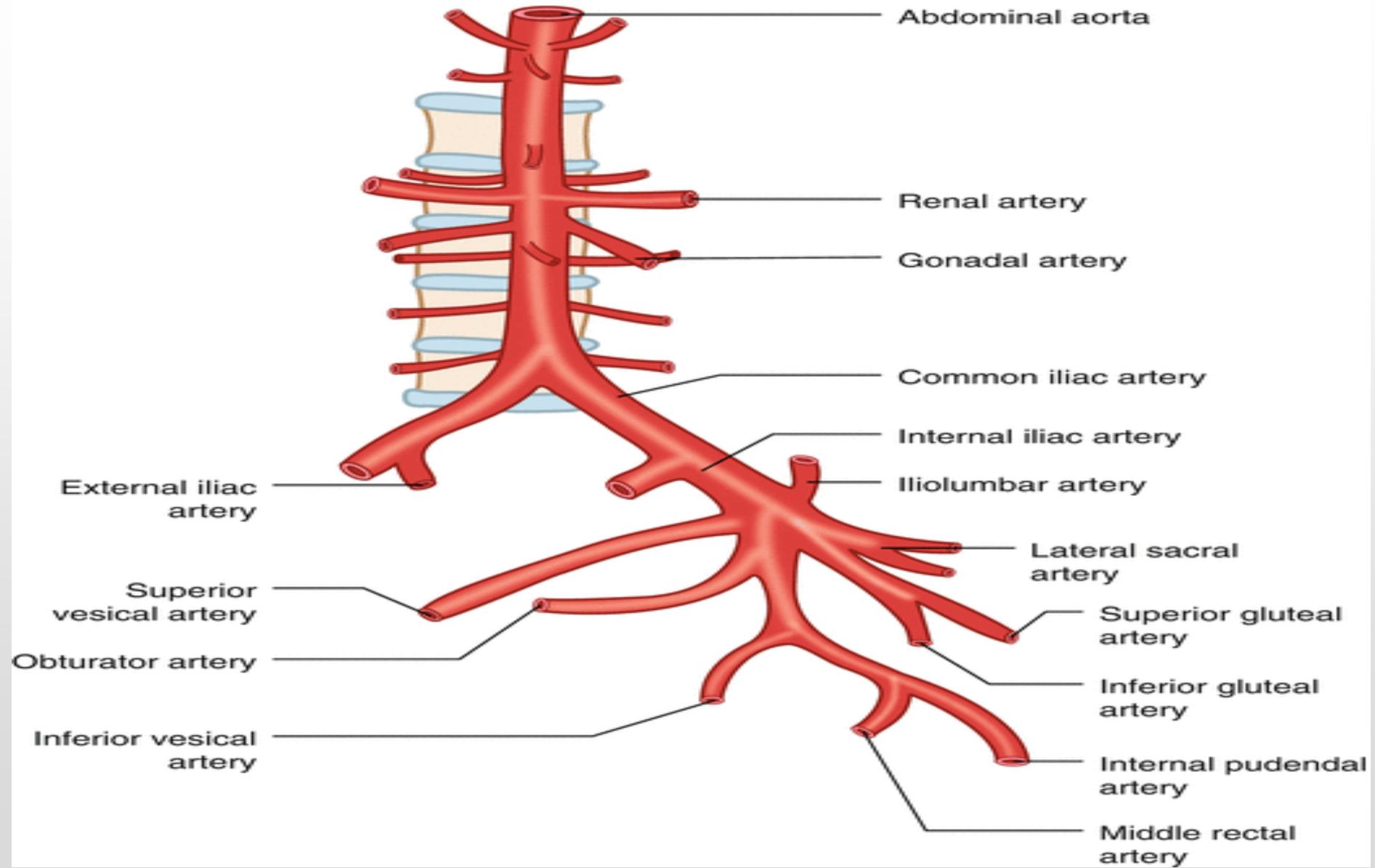
# VESSELS AND LYMPHATICS

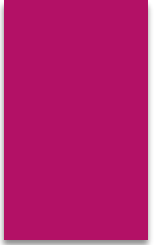
The prostatic urethra is supplied by the inferior vesical artery.

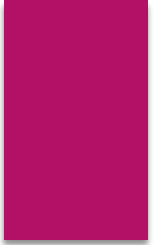
**The bulbourethral artery supplies the membranous and bulbar urethra**

**penile urethra is supplied by the deep penile artery, a branch of the internal pudendal artery.**

**In general, venous drainage mirrors the arterial supply**



- 
- } Lymphatics from prostatic and membranous parts pass mostly to the internal iliac nodes and partly to the external iliac nodes
  - } Lymphatics from spongy part pass mostly to deep inguinal nodes but some may end in superficial inguinal and external iliac

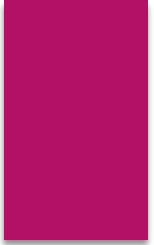
- 
- } **URETHRITIS**:inflammation of urethra
  - } Presents with
  - } Discharge
  - } Discomfort during micturition and burning micturition
  - } Confirmatory test is finding of increased number of polymorphonuclear leucocytes in the urethral smear or in sediment of first voided urine



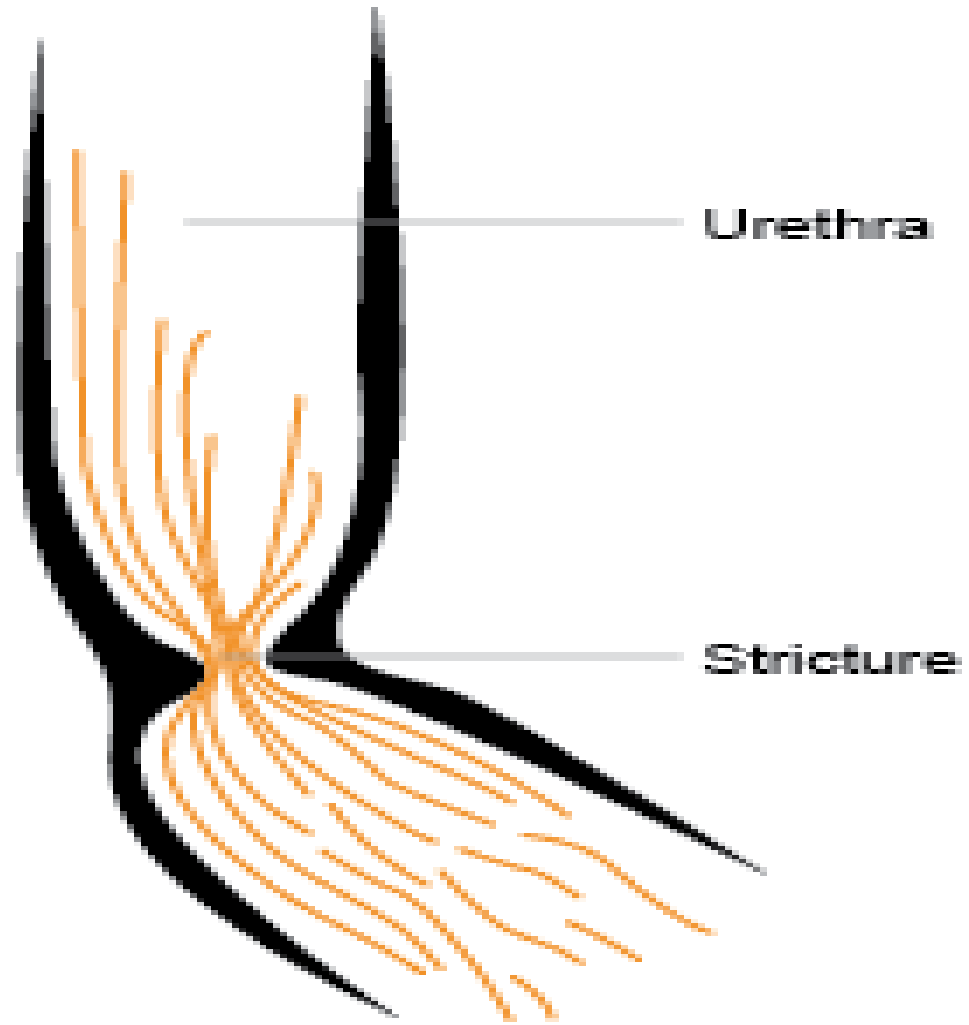
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- } CAUSES: BROADLY
  - } GONOCOCCAL
  - } NON-GONOCOCCAL

## What is Urethral Stricture ?

- ✓ A urethral stricture is a scar in or around the urethra, which can block the flow of urine, and is a result of inflammation, injury or infection.

- 
- } **STICTURE OF URETHRA:** urethral stricture is a narrowing of the urethra caused by injury or disease such as urinary tract infections
  - } can occur as complication of gonococcal and non gonococcal urethritis

## Urethral Stricture



## How is Urethral Stricture Treated?

- ✓ Treatment options for urethral stricture disease are varied and selection depends upon the length, location and degree of scar tissue associated with the stricture.
- ✓ The main treatment options include enlarging the stricture by gradual stretching (dilation).

## What are the symptoms of Urethral Stricture ?

- ✓ painful urination.
- ✓ slow urine stream.
- ✓ decreased urine output.
- ✓ spraying of the urine stream.
- ✓ blood in the urine.
- ✓ abdominal pain.
- ✓ urethral discharge.
- ✓ urinary tract infections in men.
- ✓ infertility in men.



Thank you  
for your attention

