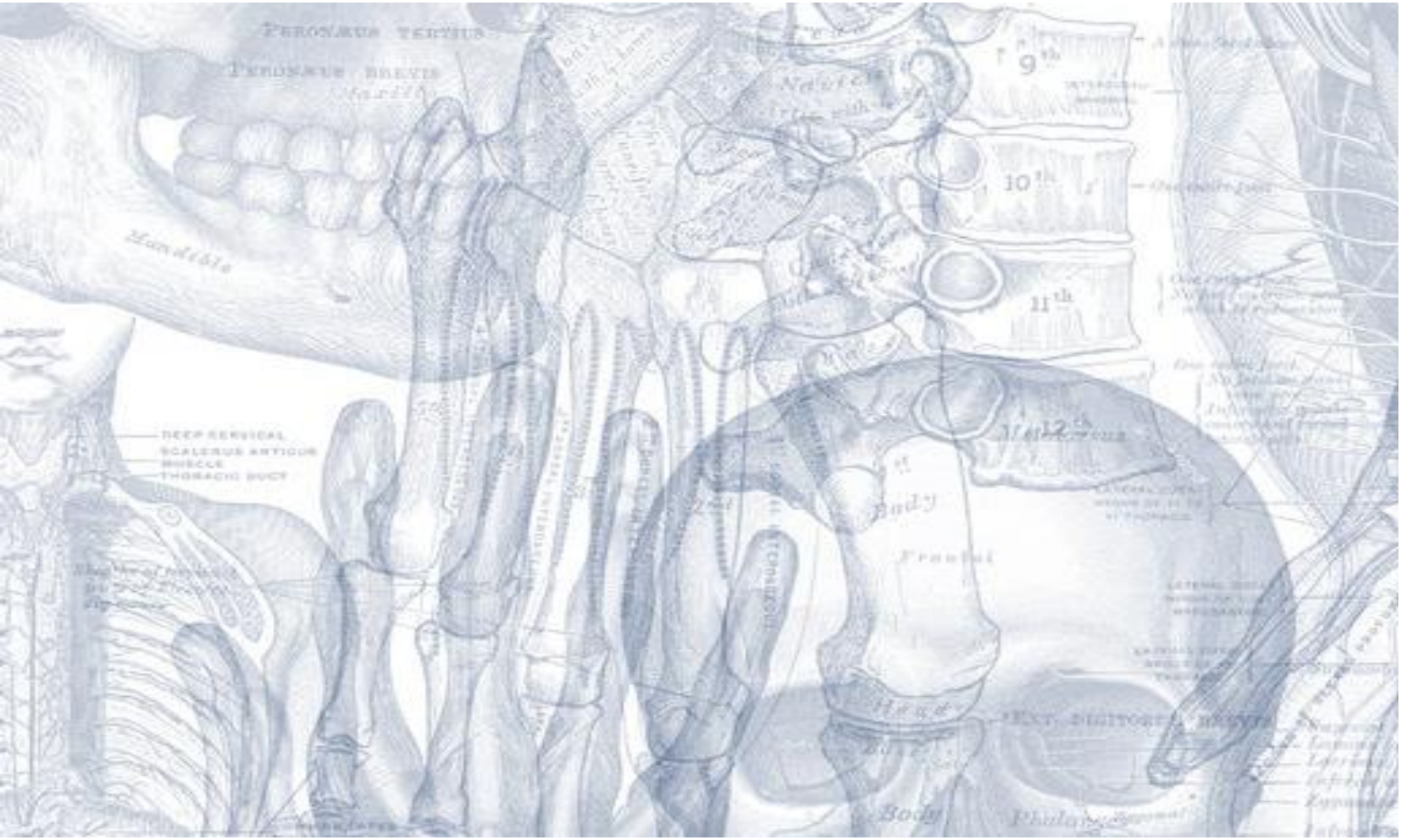
بِسْمِ اللَّهِ الرَّحْمَٰنِ الرَّحِيمِ



ANATOMY
TEAM 436

436
MEDICINE
KING SAUD UNIVERSITY

Revised by
شوق الأحمري & طراد الوكيل

Ureters, Urinary Bladder, Urethra

Please view our Editing File before studying this lecture to check for any changes.

Color Code

- Important
- Doctors Notes
- Notes/Extra explanation

Objectives

At the end of the lecture, students should be able to:

- ✓ Describe the course of ureter & identify the site of ureteric constrictions.
- ✓ Describe the important relations & identify certain areas (trigone, uvula vesicae) in the base of urinary bladder.
- ✓ List the blood supply, lymphatic drainage & nerve supply of urinary bladder
- ✓ Differentiate between male & female urethra regarding length, structure, course & function.

Ureter

DEFINITION: It is a muscular tube transporting urine from kidney to urinary bladder.

LENGTH: 25 – 30 cm

BEGINNING:

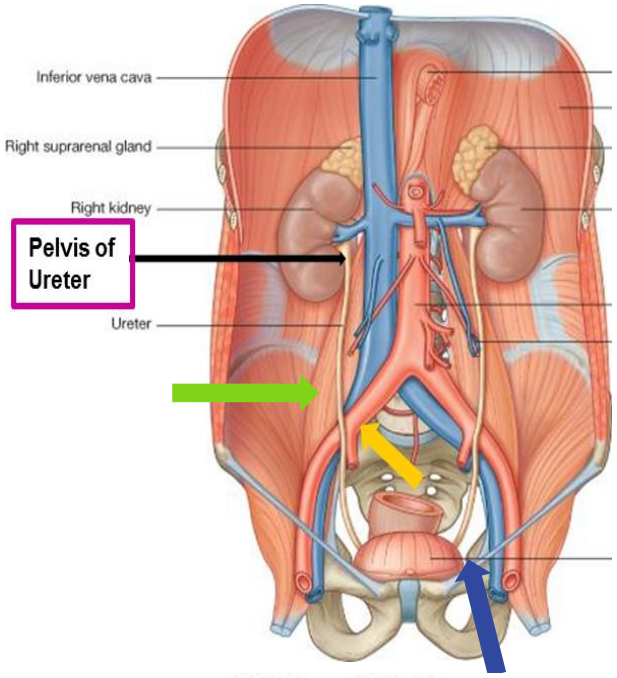
- It begins as a **continuation of renal pelvis** (or pelvis of ureter).

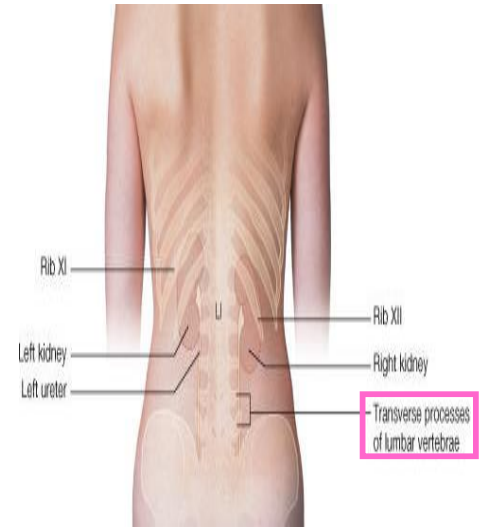
COURSE IN ABDOMEN: Important

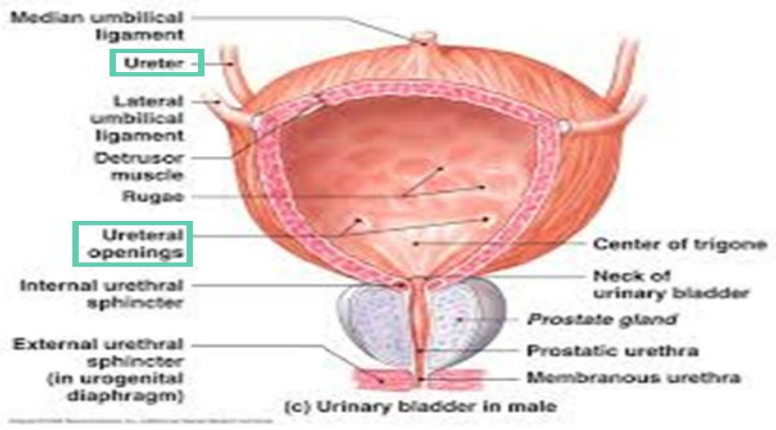
- It descends *anterior* to psoas major muscle (opposite the tips of lumbar transverse processes).
- It crosses *anterior* to the end (bifurcation) of common iliac artery to enter the **pelvis**.

COURSE IN PELVIS & TERMINATION:

- It runs *downward* & *backward* to the level of ischial spine.
- It curves *forward* to open in **upper** (superior) **lateral** angles of the **base** (posterior surface) of urinary bladder.
- It runs obliquely for ¾ inch in wall of bladder before opening (this part acts like a valve which prevents urine from going back).







Ureter

Sites of Constrictions (Obstruction-stone* Impaction): **Important!**

At **ureteropelvic**** junction

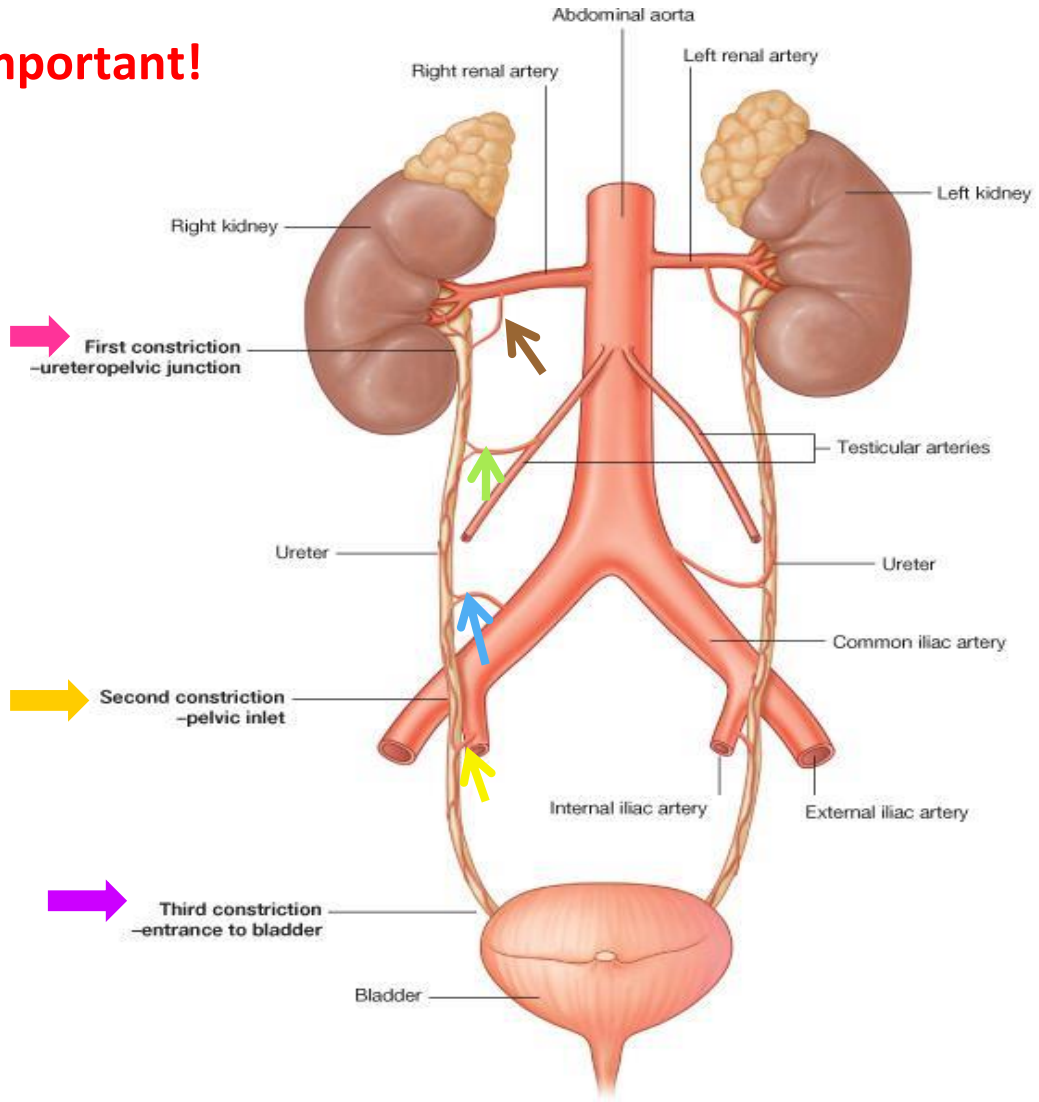
At **pelvic inlet**
(site of crossing of common iliac artery)

At site of **entrance to bladder**

* sites were stones most commonly get stuck and cause obstruction
** between renal pelvis and ureter

Arterial Supply:

- **Renal** artery
- **Gonadal** artery
- **Common iliac** artery
- **Internal iliac** artery

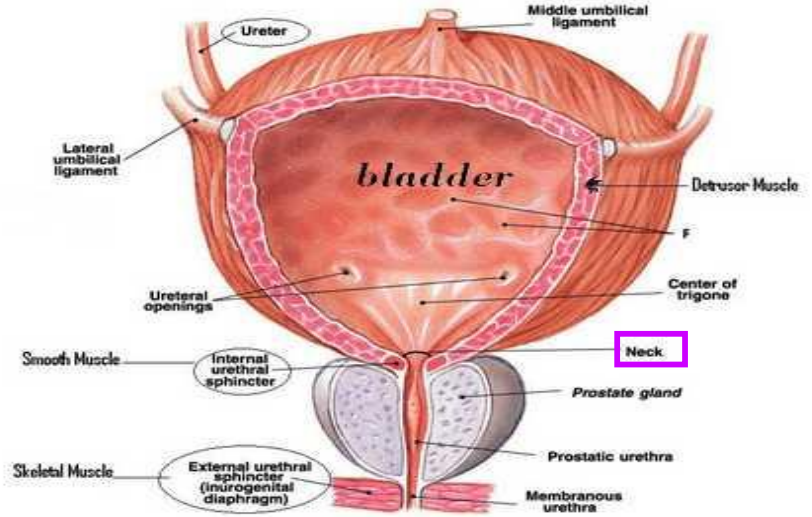


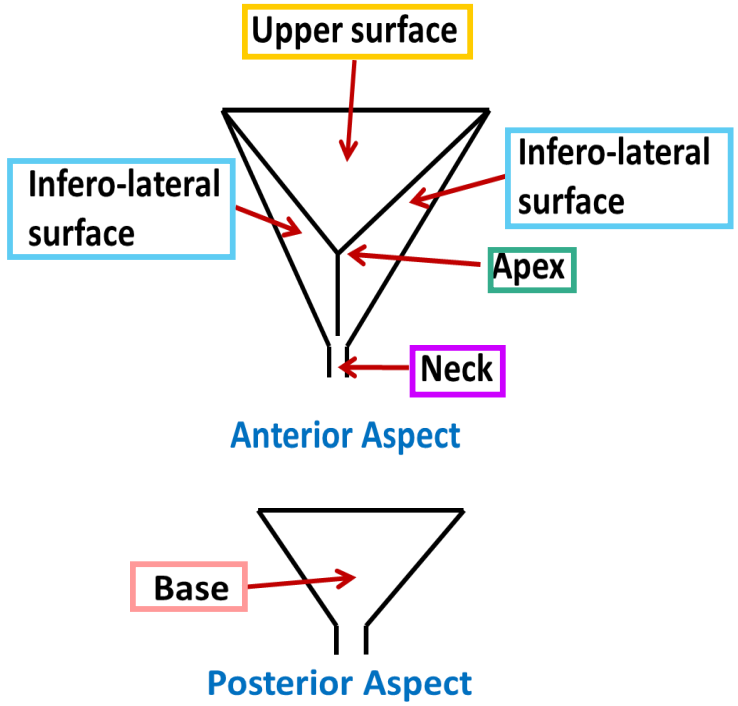
Urinary Bladder

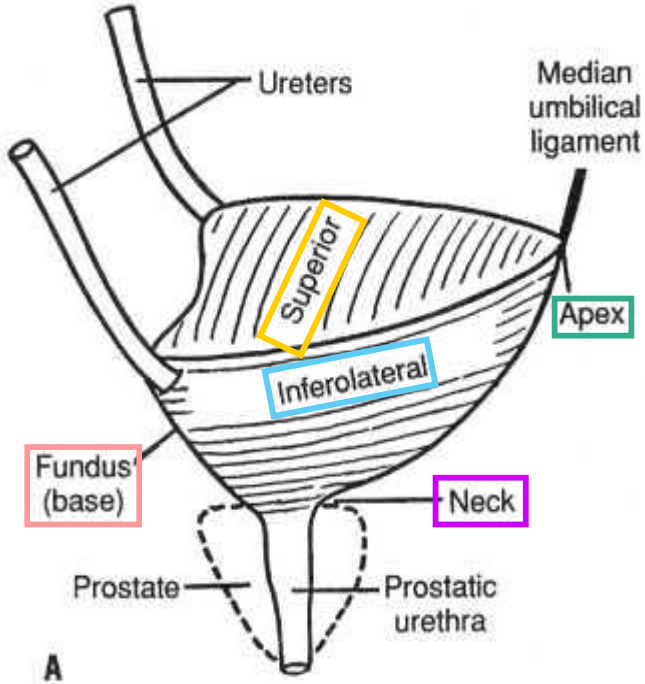
Shape

- It is **pelvic** organ.
- It has the shape of three-sided pyramid placed on one of its angle (NECK)*.
- It has:
  1. An **apex**: directed *anteriorly*
  2. A **base**: directed *posteriorly*
  3. A **superior surface**
  4. Two **infero-lateral surfaces**

*Since the bladder is shaped like a pyramid that means it has an apex, a base, 3 surfaces (1 superior and 2 infero-lateral), and 3 angles. The angle it is resting on or sitting on is called the neck which is continuous with the urethra.







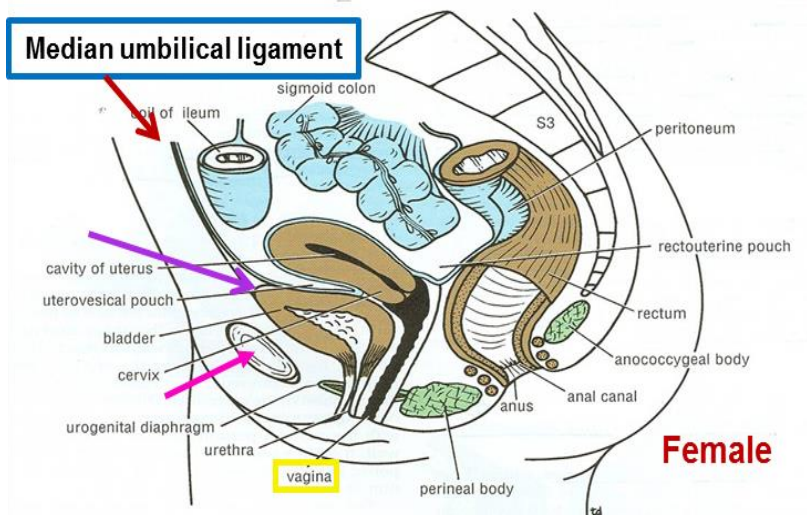
Extra

Urinary Bladder

1- Apex

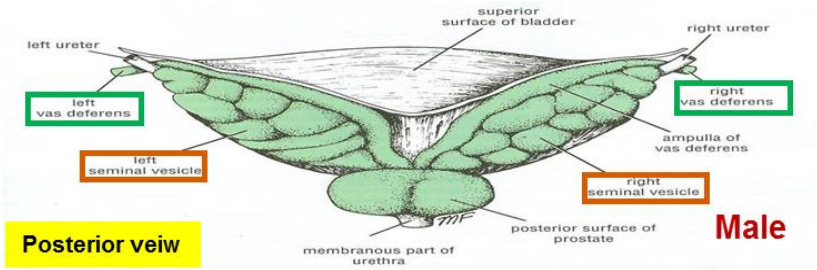
- The apex is directed *forward*.
- It is related to (lies behind) **upper border** of symphysis pubis (in both male and female).
- It is connected to umbilicus* by the median umbilical ligament (remnant of urachus in embryo).

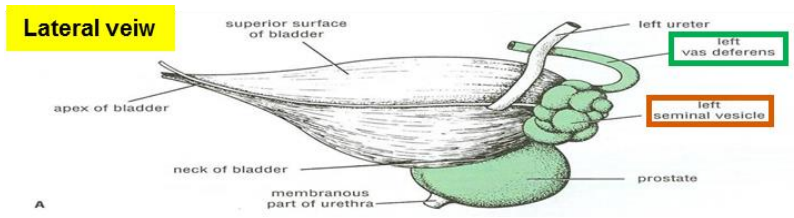
* سرة البطن

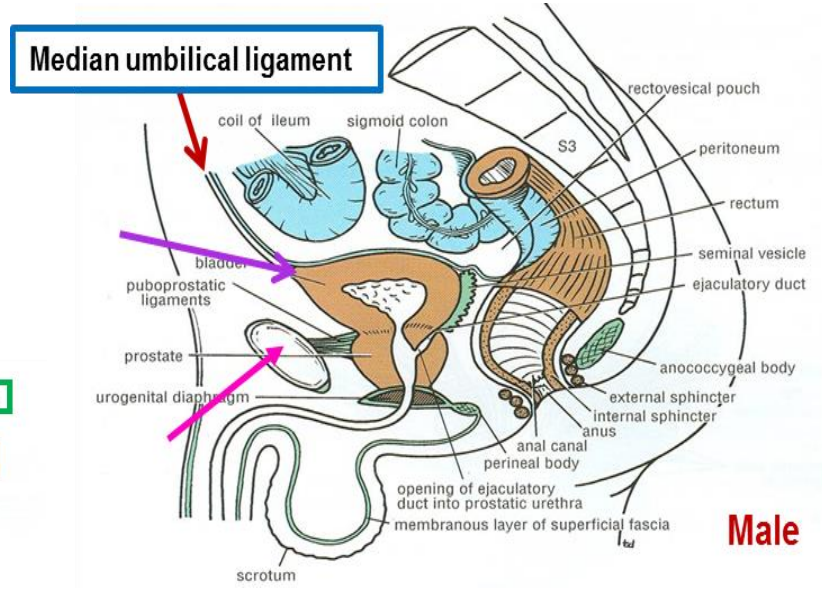


2- Base

- Is directed *backward.*
- IN MALE: Is related to vas deferens & seminal vesicle of both sides.
- IN FEMALE: Is related to vagina







Urinary Bladder

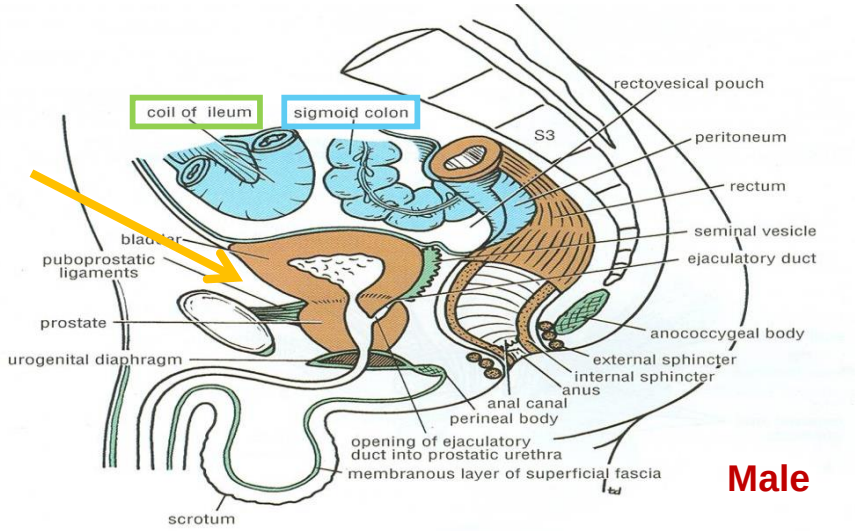
3- Superior Surface

IN MALE:

- Is related to coils of ileum & sigmoid colon.

IN FEMALE:

- Is related to the uterus.

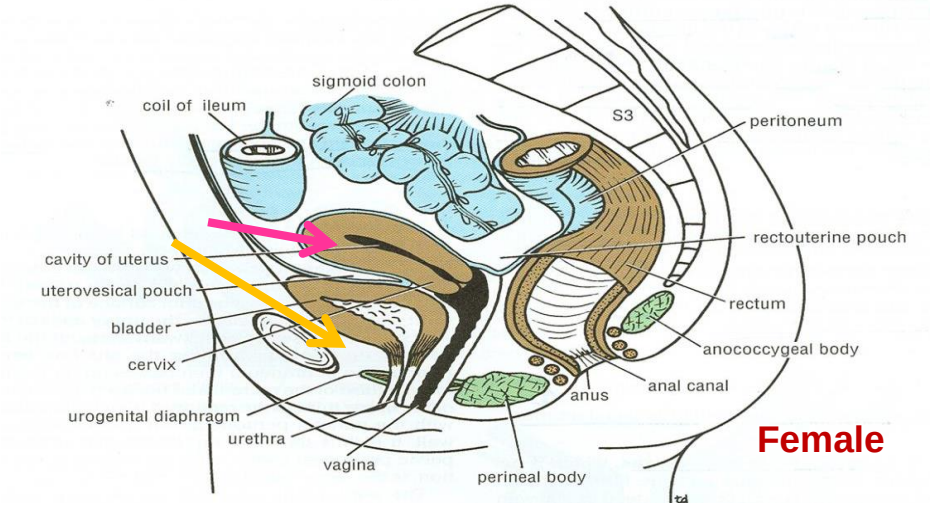


4- Infero-Lateral Surface

- Are related to retropubic fat separating them from pubic bones (in both male and female)

Retropubic fat

- Accommodates distention* of bladder when full.
- Continuous upward with **anterior abdominal wall**. Rupture of bladder → escape of urine to anterior abdominal wall



* انتفاخ

Urinary Bladder

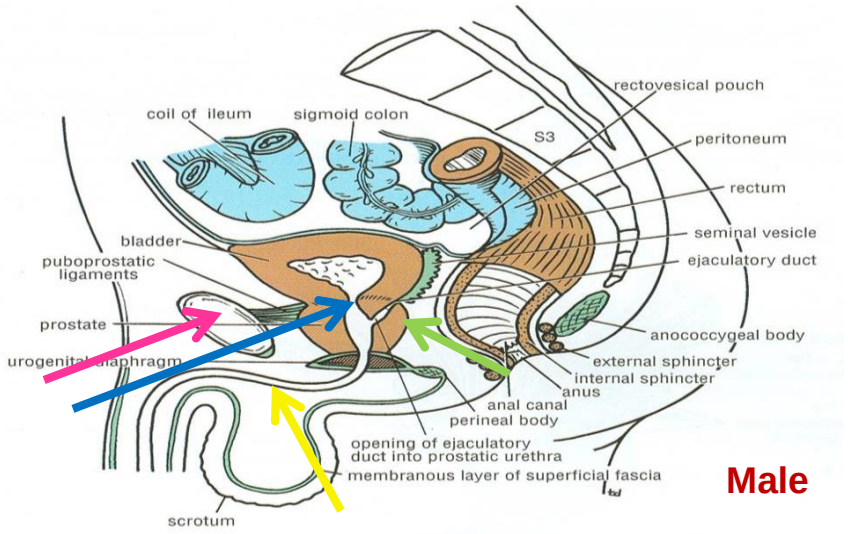
Neck

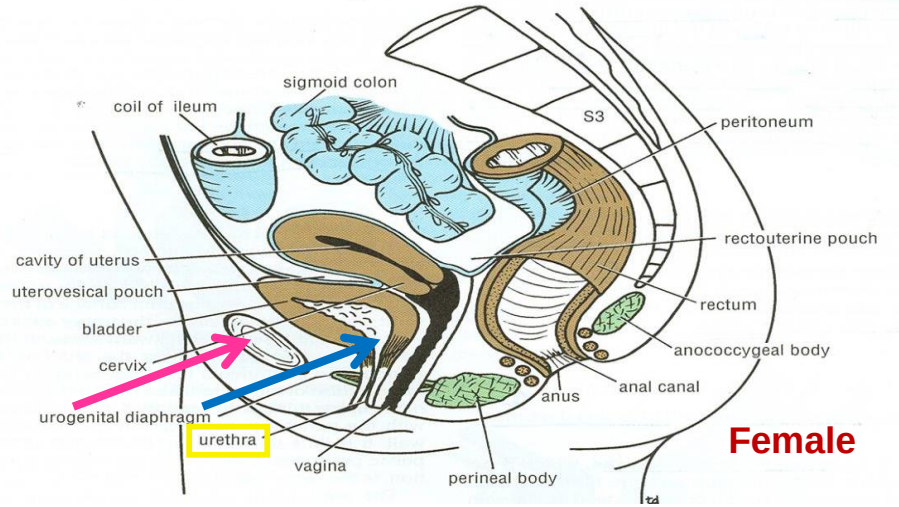
- The neck is the lowest & most fixed part of the urinary bladder.
- It is **continuous with urethra**.
- It is related to (lies behind) **lower border** of symphysis pubis* (in both male and female).

* unlike the apex which was related to the upper border of symphysis pubis

- IN MALE:

  It is related to upper surface of prostate gland (or we can say inferiorly, it rests on the base of prostate).

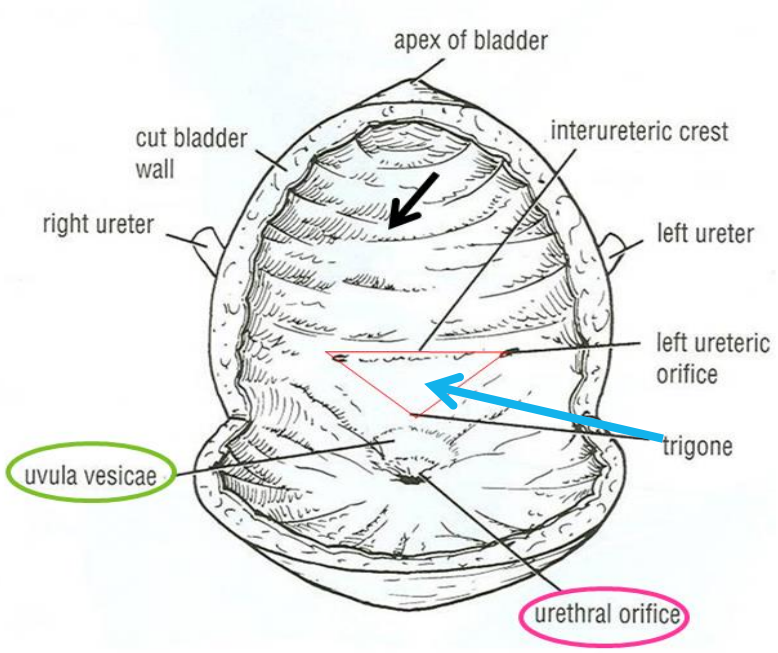


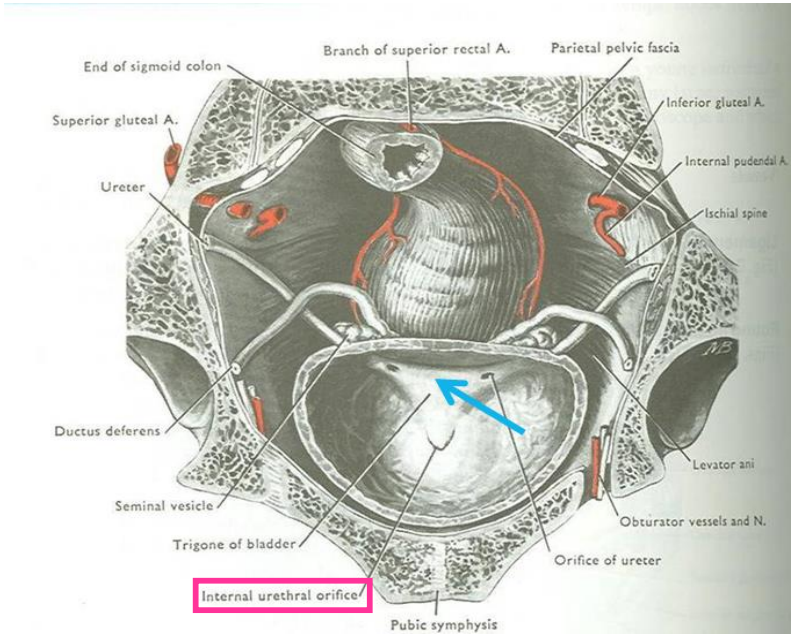


Urinary Bladder

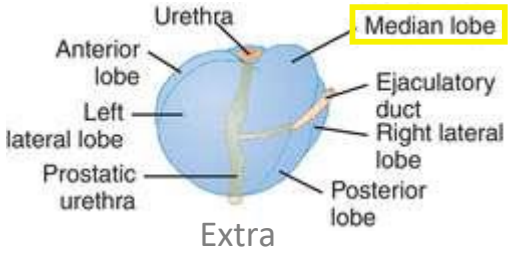
Interior

- The interior of the urinary bladder is contains a **mucous membrane** that is folded (except at trigon).
- There is an elevation behind the internal urethral orifice called **uvula vesicae**: it is produced by the median lobe of the prostate gland (so its only present in males)
- **Trigone**: a triangular area in **base** of bladder.
- Bounded by the **2 ureteric orifices** (from the ureter) and **internal urethral orifice** (going to the urethera).
- Its mucous membryane is **elastic** (not folded).
- It is present in both male and female.





Extra



When the prostate undergoes hyperplasia the median lobe grows anteriorly and blocks or constricts the internal urethral orifice which leads to urinary symptoms (like decreased urination).

Urinary Bladder

Capacity

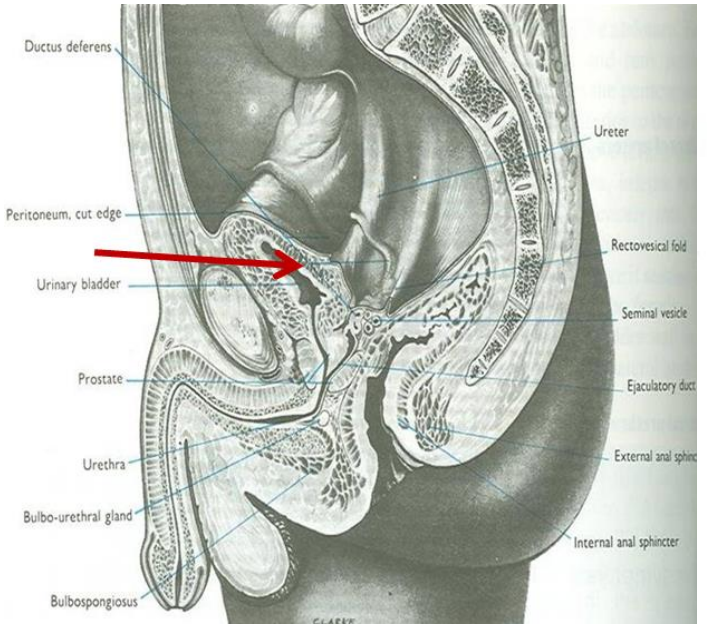
EMPTY

- Empty bladder is a **pelvic** organ.
- Accommodates from 300 – 500 ml of urine.

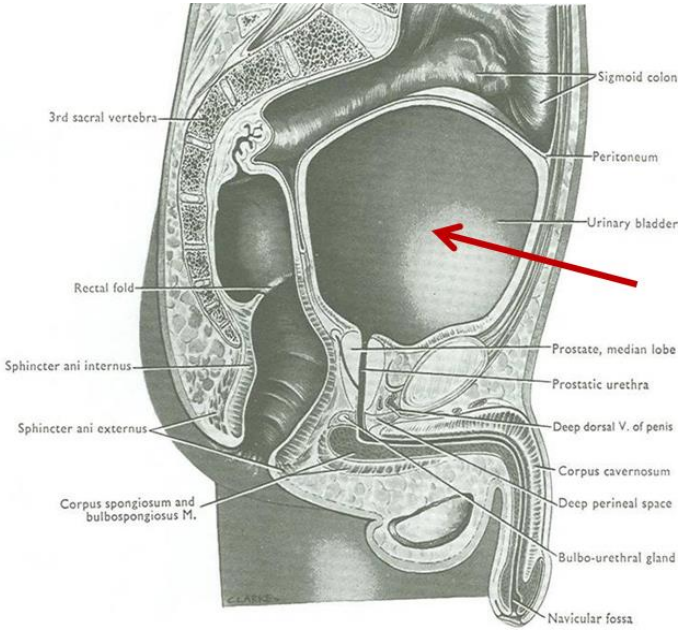
DISTENDED

- Is circular in shape,
- Bulges into **abdominal** cavity.

Empty

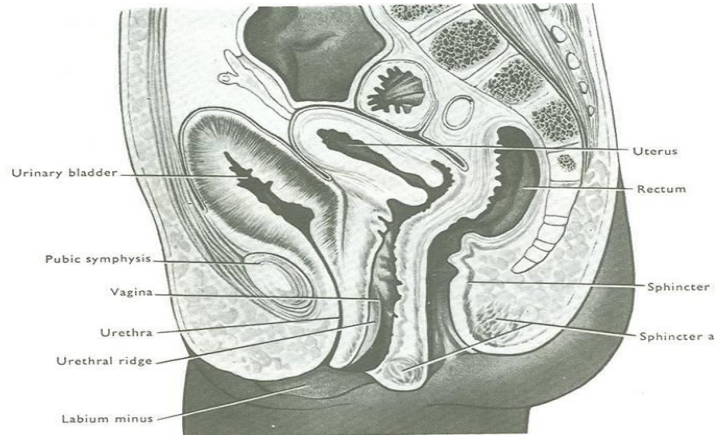


Distended



Position (only on the boys' slides)

- Is found in abdomen until age of 6 years.
- Begins to enter the enlarging pelvis from age of 6 years onward.
- Is found entirely in pelvis at puberty.



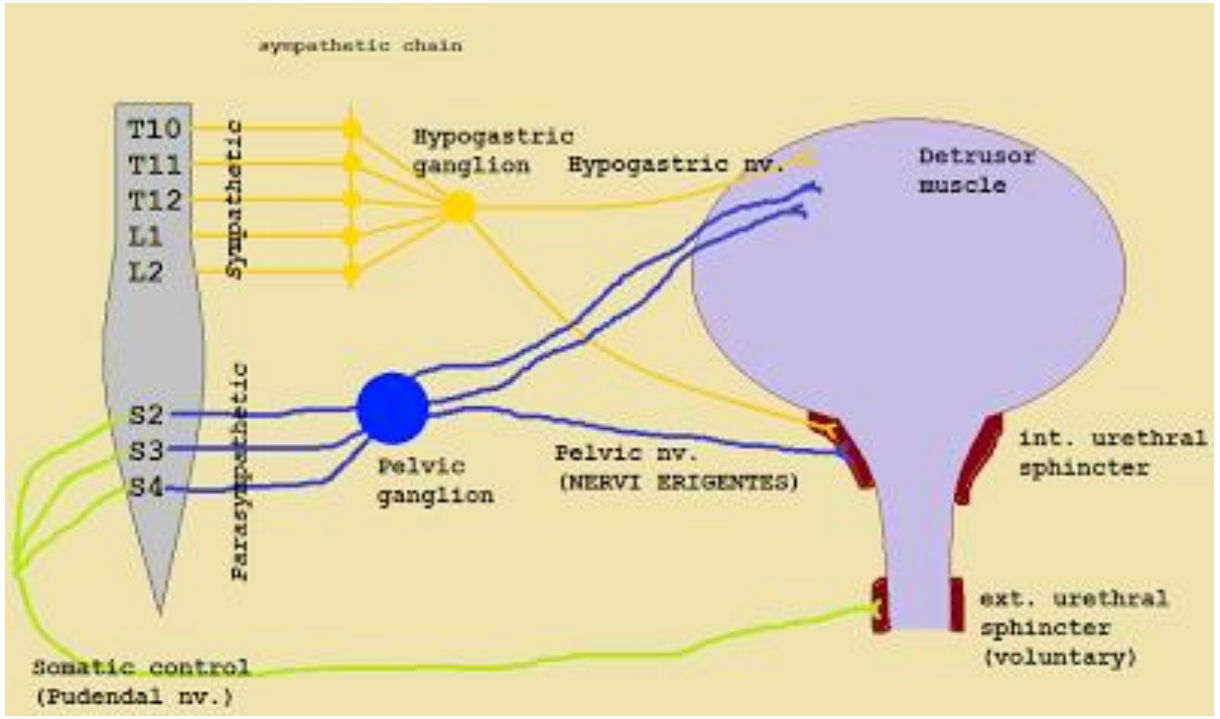
A median sagittal section of a newborn female child

Urinary Bladder

Supply

- ARTERIES: from **internal iliac** artery
- VEINS: into **internal iliac** vein
- LYMPH: into **internal iliac** lymph nodes
- NERVES: **Important!**

1) Parasympathetic: through pelvic **splanchnic nerves from S2, 3, 4.**
2) Sympathetic: from **L1,2** through **hypogastric nerves**.
3) Sensory: transmitting pain due to over distention of bladder (via general **visceral afferent fibres** from bladder to CNS).



Autonomic Regulation of the Bladder
urination involves coordination between the central, autonomic, and somatic (pudendal nerve) nervous systems.

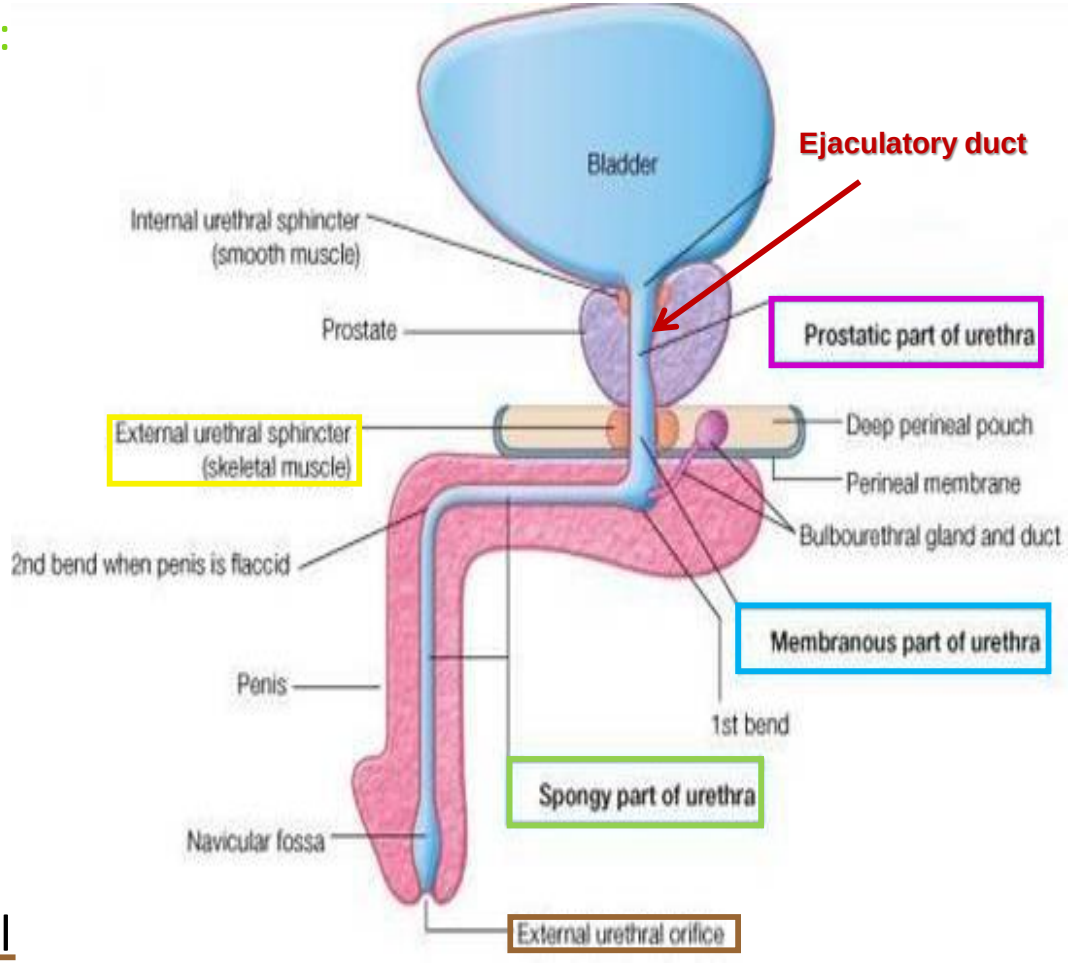
Urethra

Male

LENGTH: 20 CM.

Has 2 functions: urinary and genital and is divided into 3 parts:

1. PROSTATIC URETHRA (Length=3 cm):
   - **Widest** & most dilatable
   - Extends from **neck** of bladder inside prostate gland
   - Structures openings into prostatic urethra: Important
     - **Ejaculatory ducts**: containing sperms & secretion of seminal vesicles
     - **Ducts of prostate gland**
1. MEMBRANOUS URETHRA (Length=1 cm):
   - Surrounded by external urethral sphincter
1. PENILE (SPONGY) URETHRA (Length=16 cm):
   - Extends inside penis & opens externally through external urethral orifice (**narrowest** part of whole urethra)

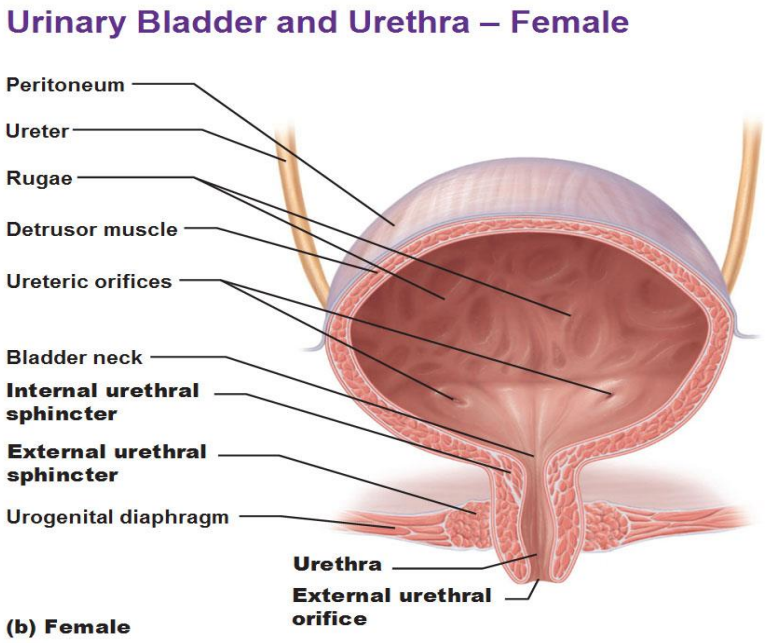


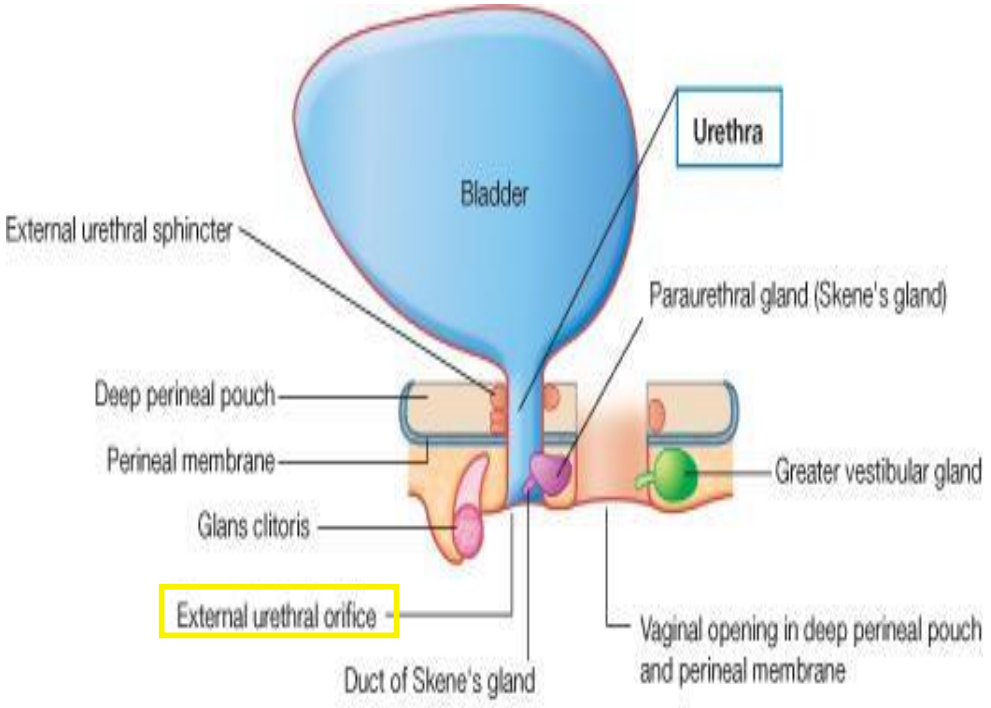
Urethra

Female

LENGTH: 4 CM

- Has only **urinary** function.
- Extends from **neck** of urinary bladder to open externally through the external urethral orifice (*anterior* to the vaginal opening).





Intravenous Urogram (IVU,IVP)

- A urogram (Post micturation): demonstrates a bladder stone. Or any obstruction in the urinary system.
- We use contrast media to determine the site of a stone in the urinary tract.

IVP: IntraVenous Pyelogram

Urogram: an imaging exam used to evaluate the urinary tract

Post micturition: after urination

In this image we can see that the left kidney was able to excrete the urine with the dye, while the right kidney was not able to due to an obstruction.

Summary

	Beginning	Course	Termination	Sites of constriction	Arterial supply
URETER	continuation of renal pelvis	descends anterior to: psoas major & ends at (bifurcation) of common iliac artery.	opens at upper lateral angle of base of urinary bladder	at uteropelvic junction, at pelvic inlet, at site of entrance of bladder	renal, gonadal, common & internal iliac arteries

	Function	Length	Course
MALE URETHRA	both urinary & genital	20 cm, divided into prostatic (3 cm), membranous (1 cm) & penile (16 cm)	Extends from neck of bladder to open externally through external urethral orifice (narrowest part of whole urethra)
FEMALE URETHRA	urinary only	4 cm	Extends from neck of bladder to external urethral orifice (anterior to vaginal opening)

	Apex	Base	Superior surface	Inferolate-ral surfaces	Neck	Trigone	Uvula vesicae	Supply	Nerves
URINARY BLADDER	related to symphysis pubis, continuous with median umbilical ligament	related to vas deferens & seminal vesicle (in male) & to vagina (in female)	related to coils of ileum & sigmoid colon (in male) & to uterus (in female)	related to retropubic fat	continuous with urethra, related to upper surface of prostate gland (in male)	lies in the base of bladder, bounded by ureteric orifices & internal urethral orifice, its mucous membrane is elastic	dilatation behind internal urethral orifice, produced by the median lobe of the prostate gland	internal iliac (artery, vein, lymph nodes)	parasympathetic (S2,3,4), sympathetic (L1,2)
	A slight projection into the cavity of the bladder just behind the urethral opening, marking the location of the middle lobe of the prostate gland.								

MCQs

1. The ureter is a continuation of:
A- the renal cortex
B- the renal medulla
C- the renal pelvis
D- the nephron
Answer: C

2. Which one of these arteries is NOT supplying the ureter:
A- external iliac artery
B- internal iliac artery
C- gonadal artery
D- common iliac artery
Answer: A

3. The apex of the bladder is directed:
A- anterior
B- posterior
C- lateral
D- internal
Answer: A

4. The base of the bladder in female is related to:
A- uterus
B- vagina
C- the colic of ileum
D- vas deferens & seminal vesicle
Answer: B

5. The uvula vesicae is found in :
A- female
B- male
C- both male and female
D- none of the above
Answer: B

6. The triangular area inside the urinary bladder is called:
A- uvula vesicae
B- the base
C- the apex
D- trigone
Answer: D

7. The Parasympathetic supply of the bladder originates from:
A- S1, S2, S3
B- L1, L2
C- S2, S3, S4
D- hypogastric nerves.
Answer: C

8. If there is rupture in the urinary bladder the urine will go to:
A- anterior of the abdominal wall
B- posterior of the abdominal wall
C- the neck
D- the liver
Answer: A

SAQs

1. What are the constriction areas in the ureter ?

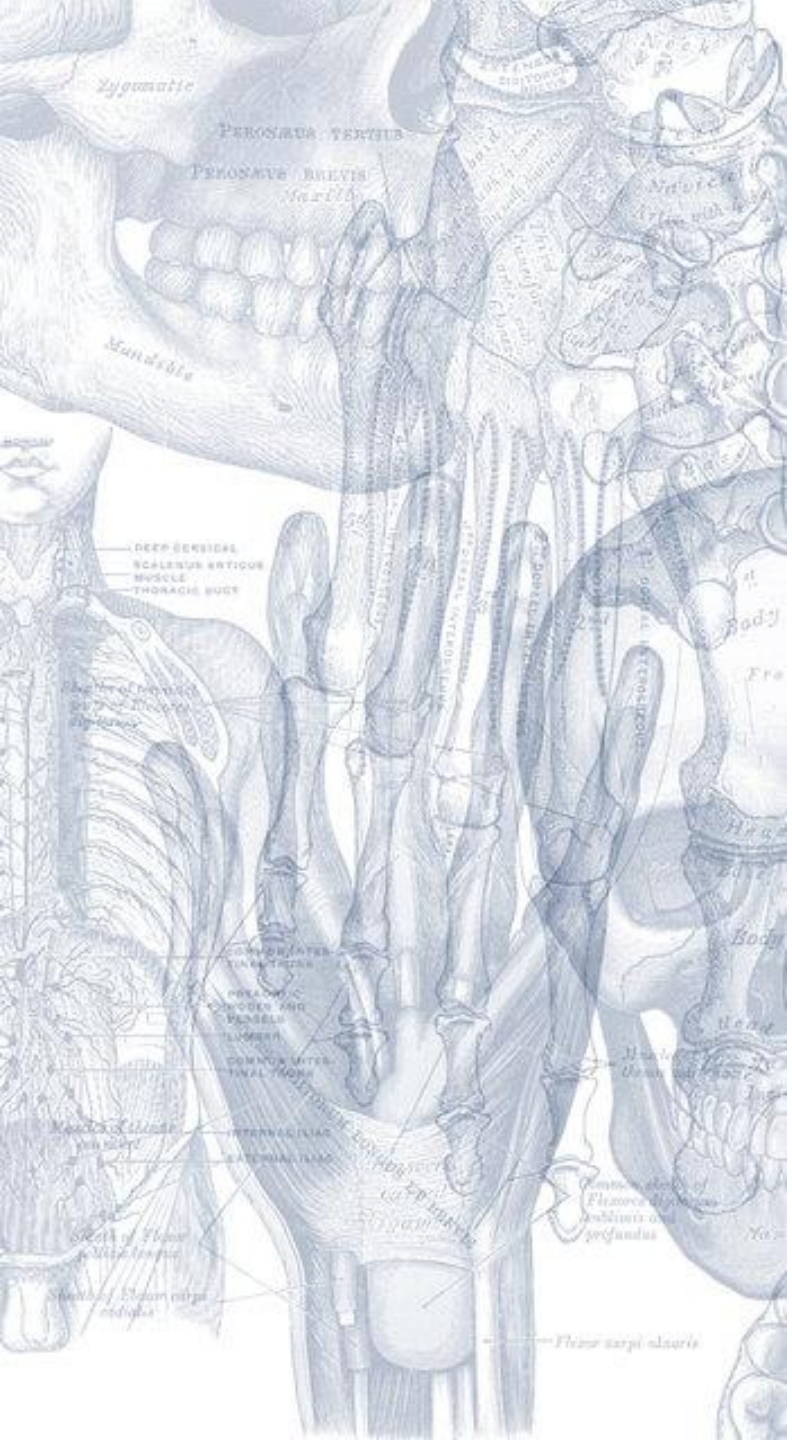
1. At ureteropelvic junction
2. At pelvic inlet
3. At site of entrance to bladder

2. What are the regions of the urethra in male ? And identify 2 structure opening in one of these regions?

The regions:
1- the prostatic region
2- the membranous region
3- the penile (spongy) region
The opening:
At the prostatic region there are 2 ducts:
1- ducts of prostatic gland
2- the ejaculatory duct

3. What are related to the superior surface of the bladder in male and female ?

male	female
coils of ileum & sigmoid colon	the uterus



Leaders:

Nawaf AlKhudairy

Jawaher Abanumy

Members:

Allulu Alsulayhim

Lama Alfawzan

Safa Al-Osaimi

Wejdan Alzaid

anatomyteam436@gmail.com

@anatomy436