DEVELOPMENT OF THE URINARY BLADDER AND URETHRA

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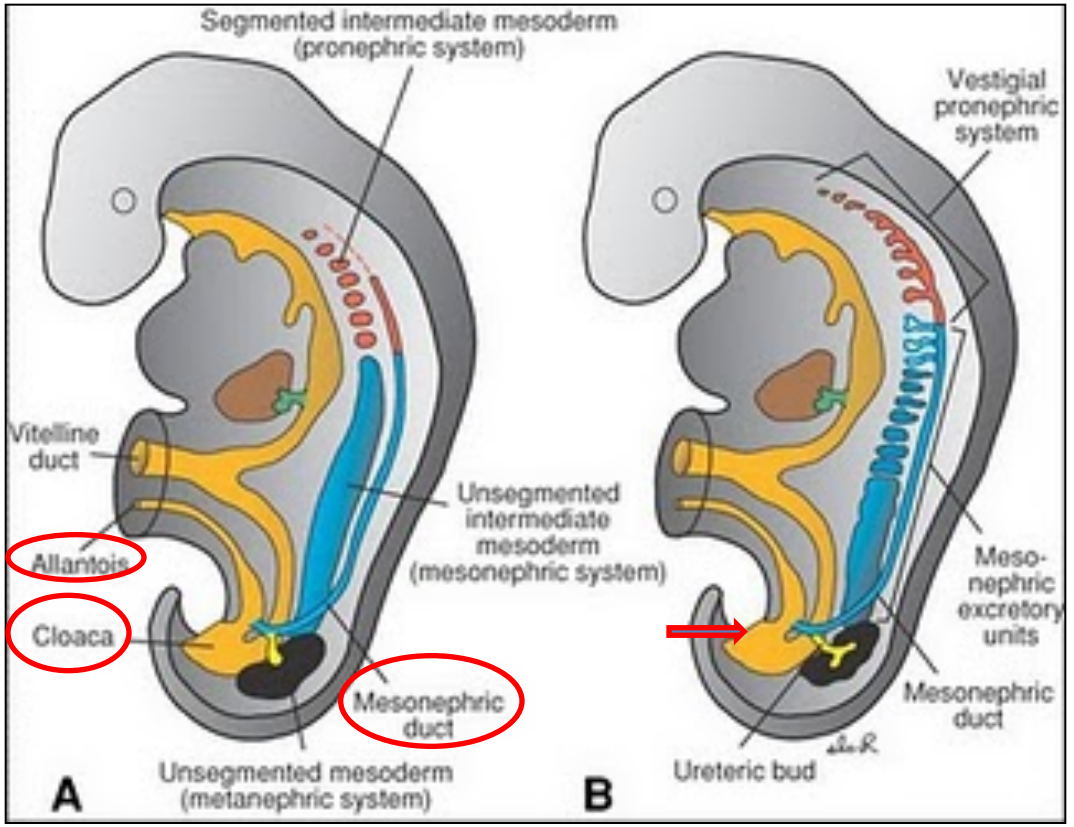
Objectives

- **At the end of the lecture the student is able to;**
- **Describe the cloaca and the formation of the urogenital sinus.**
- **Discuss the division of the urogenital sinus into various parts and name the adult organs that are derived from each part.**
- **Describe how the caudal parts of the mesonephric ducts are absorbed into the urogenital sinus and the significance of this embryonic event.**
- **Discuss the position of the urachus and its significance and fate.**
- **Describe the various anomalies concerned with the urinary bladder and urethra.**

Cloaca

- The cloaca is the **dilated terminal part** of the **hind gut.**
- **It is endodermal – lined cavity; developed from endoderm.**
  - **It receives** the **allantois** and the **mesonephric ducts.**
  - **Its floor** is closed by the **cloacal membrane.**



Cloaca

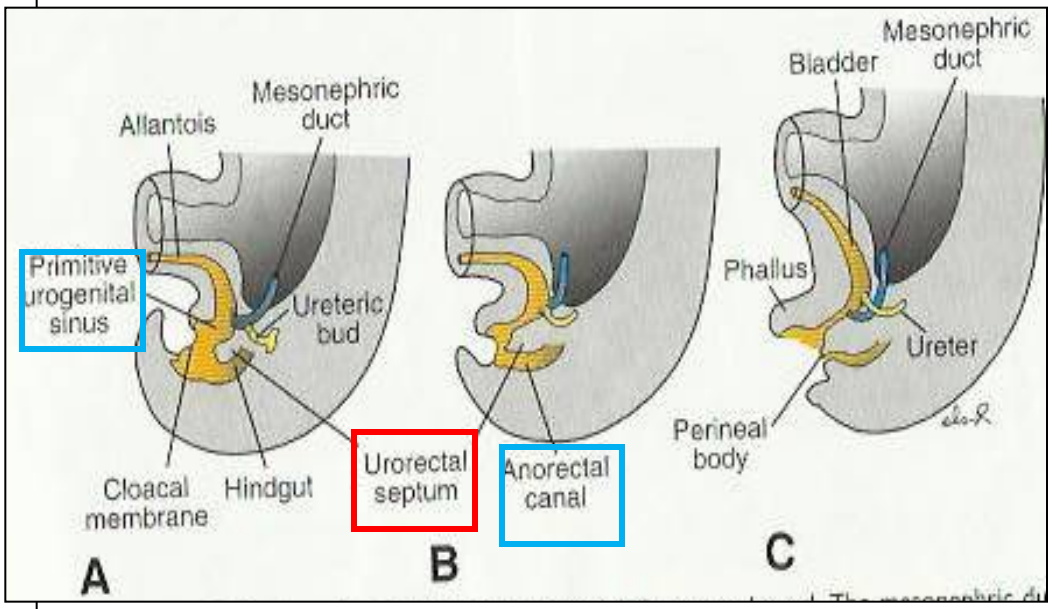
- A **mesodermal urorectal septum** divides the **cloaca** and the **cloacal membrane** into :

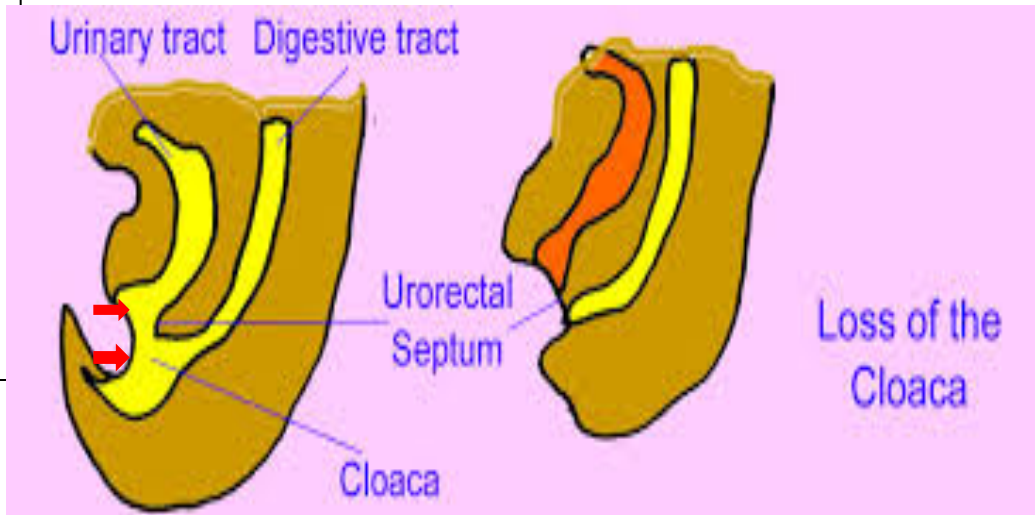
✓**Ventral part;** the **primitive urogenital sinus** that communicates with the allantois and the mesonephric ducts.

- **Its floor** is the **urogenital membrane.**

✓**Dorsal part;** the **anorectal canal** that forms the **rectum** and **upper part of anal canal.**

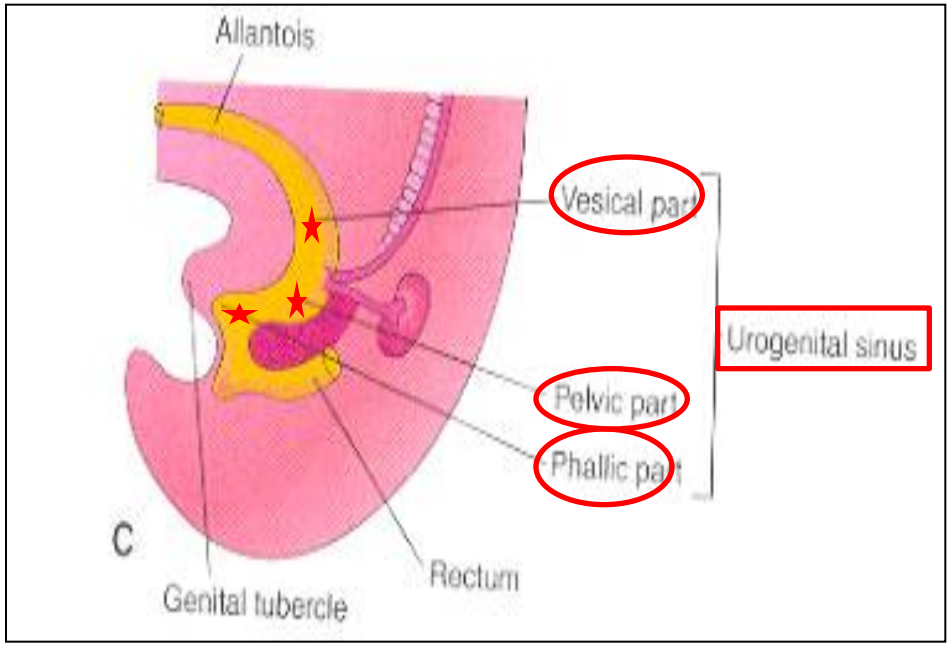
- **Its floor** is the **anal membrane.**





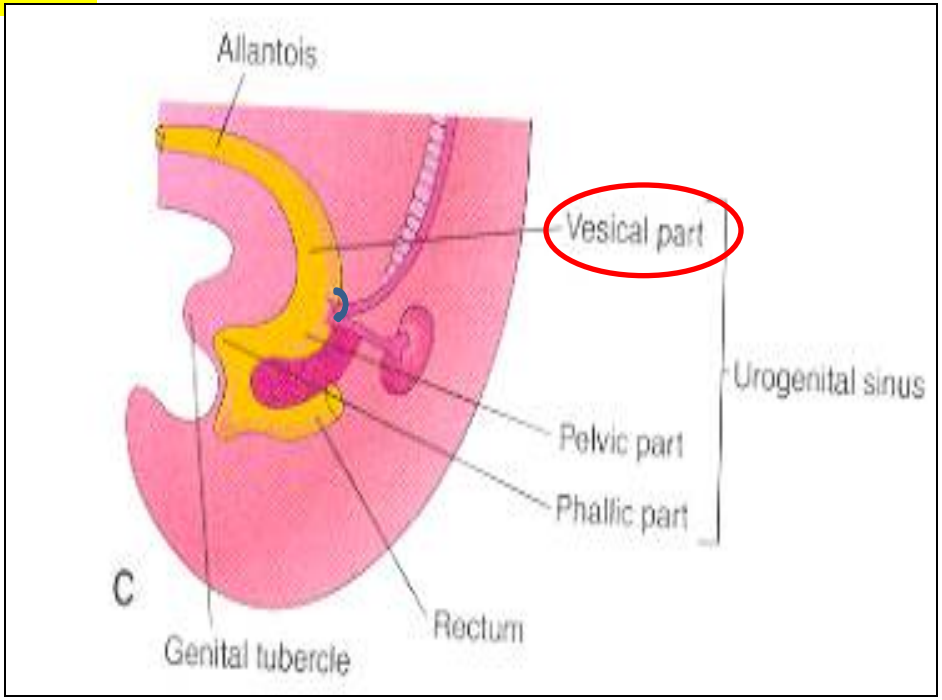
Primitive urogenital sinus

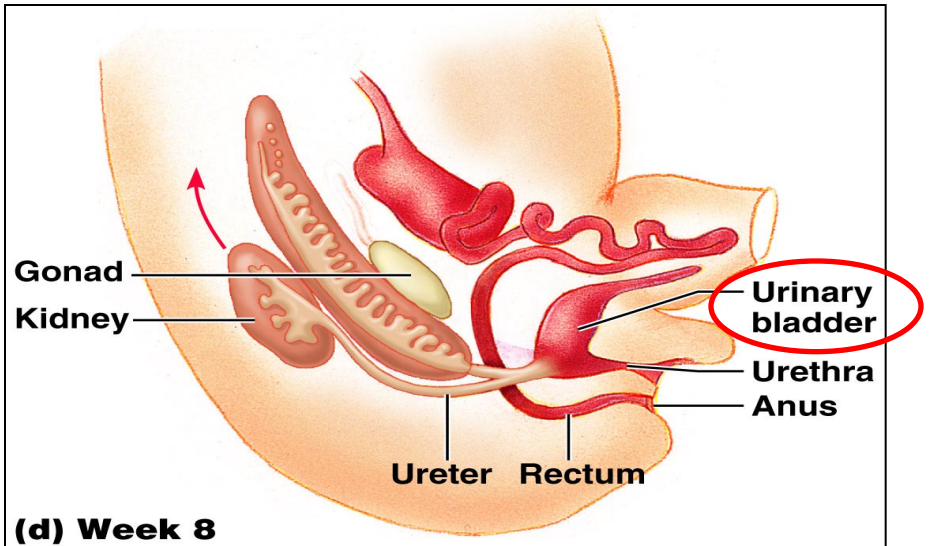
- Is divided into **three parts;**
  - A **cranial; vesical part;** forms **most of the bladder** and continuous with the allantois.
  - A **middle; pelvic part;** forms main part of male urethra and entire female urethra.
  - A **caudal; phallic part** grows towards genital tubercle.



Urinary bladder

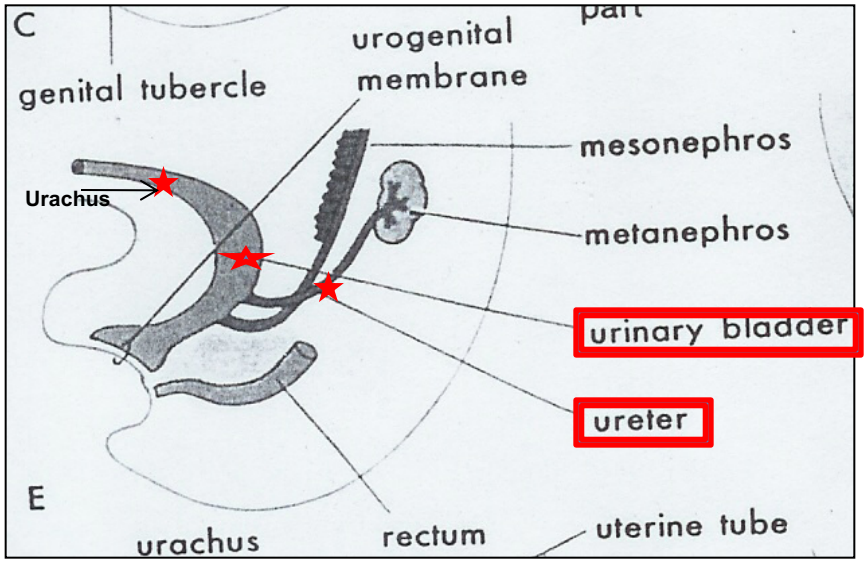
- It develops **mainly** from the **vesical part of the urogenital sinus.**
- The **trigone** is derived from the **absorbed caudal ends** of the **mesonephric ducts.**
- **The epithelium** is **endodermal** in origin.
- **The other layers** are derived from the **splanchnic mesoderm.**

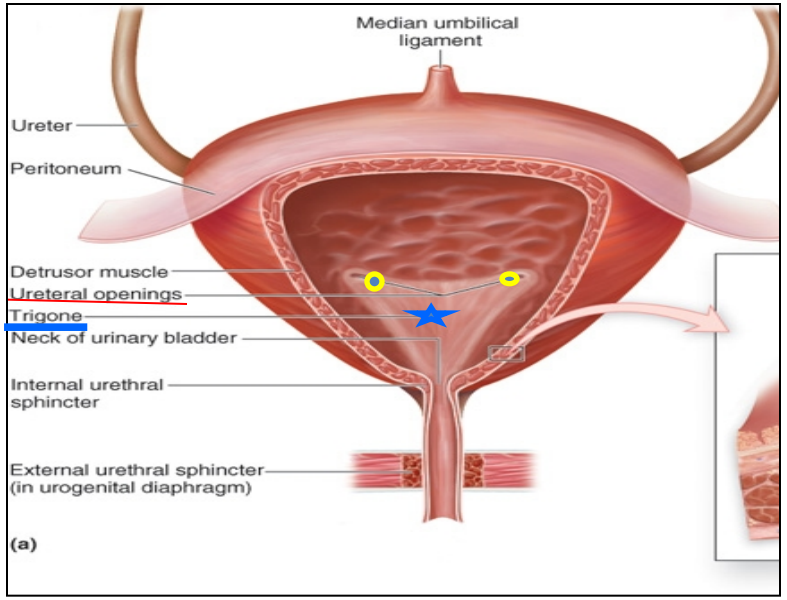




Urinary bladder & Urachus

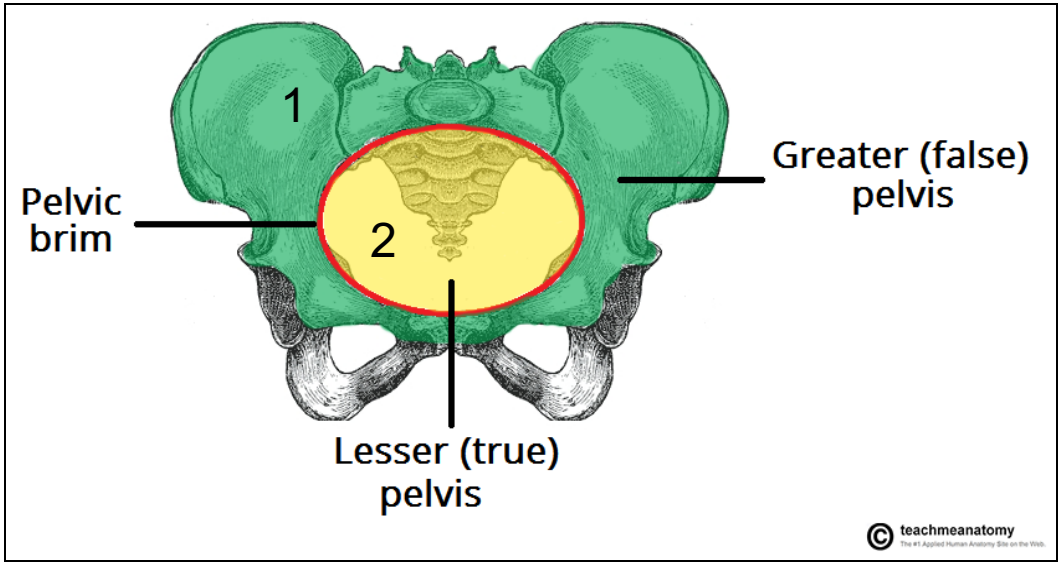
- **The allantois** is at first continues with the bladder , then it becomes a **thick fibrous cord urachus** which extends from apex of the bladder to the umbilicus,
- **At birth** , it is represented by the **median umblical ligament.**
- After absorption of the **mesonephric ducts** to form the **trigone,** the **ureters** open separately in the bladder.





Urinary bladder

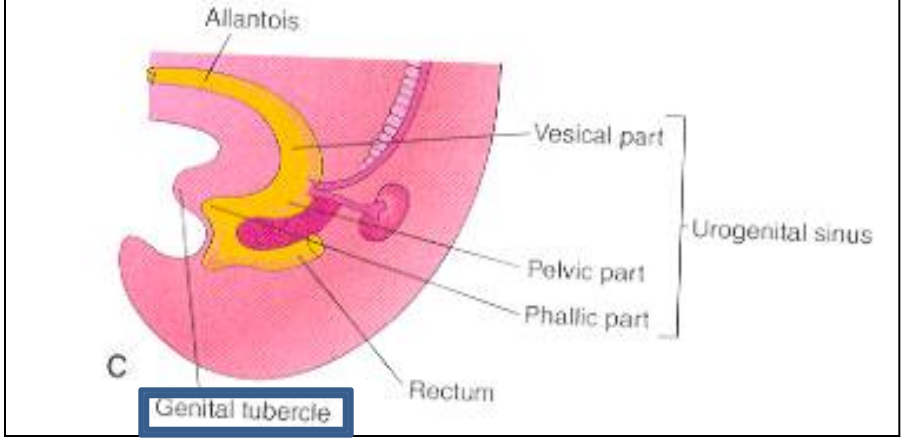
- **In infants and children** the bladder is an **abdominal organ** ,
- **It starts** to enter the **greater pelvis** **at about 6 years** and becomes a **pelvic organ** until **after puberty.**

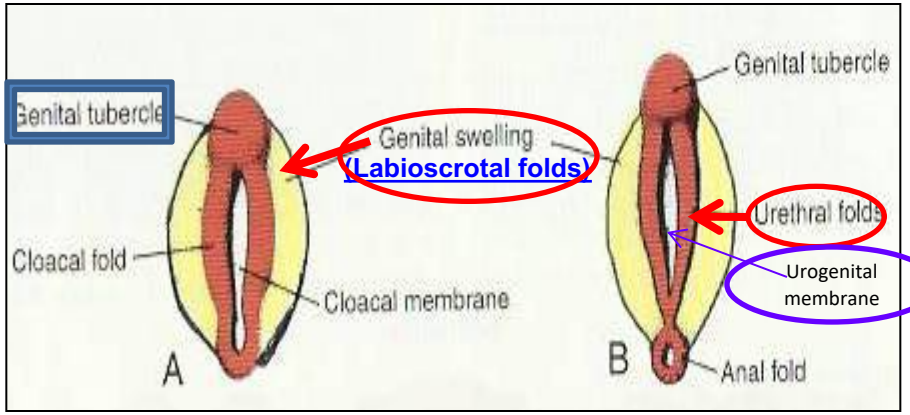


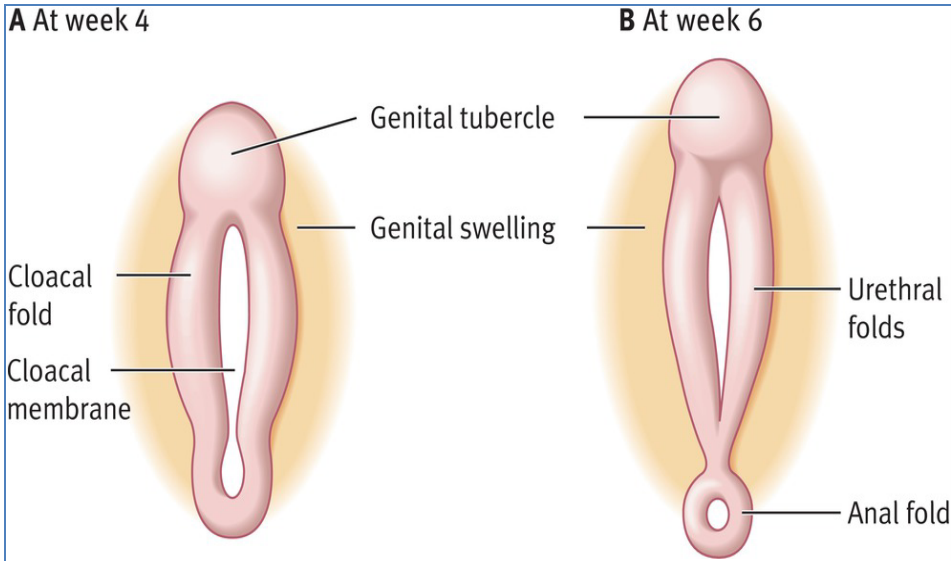
Urethra

Indifferent stage ;

- The **genital tubercle** (mesenchymal elevation) develops at the cranial end of the cloacal membrane.
- **Two urethral folds**, develop on either side of the urogenital membrane.
- Laterally **two labioscrotal folds** develop on either side of the urethral folds.
- **2 urethral folds in male** fuse with each other to close the **penile urethra;** **so; spongy urethra is formed by tubularization of the urethral folds.**
- **2 urethral folds in female** remain separate to form labia minora.

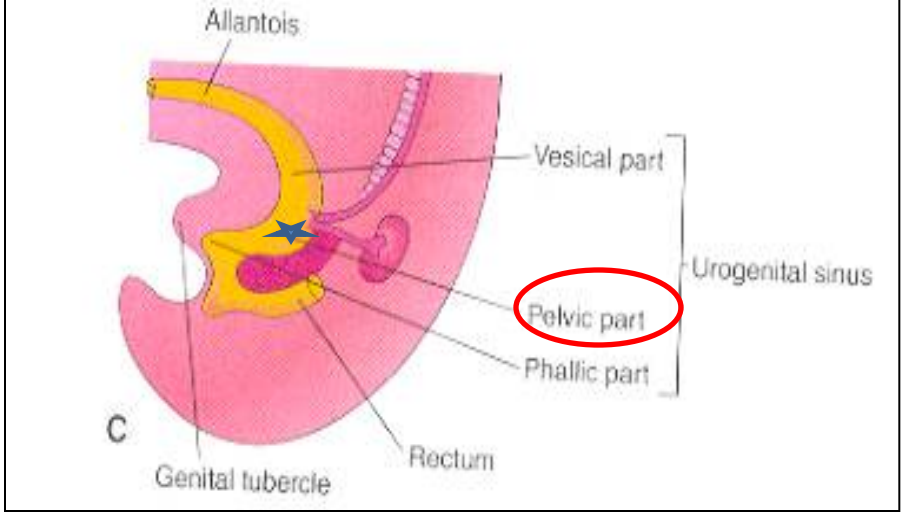


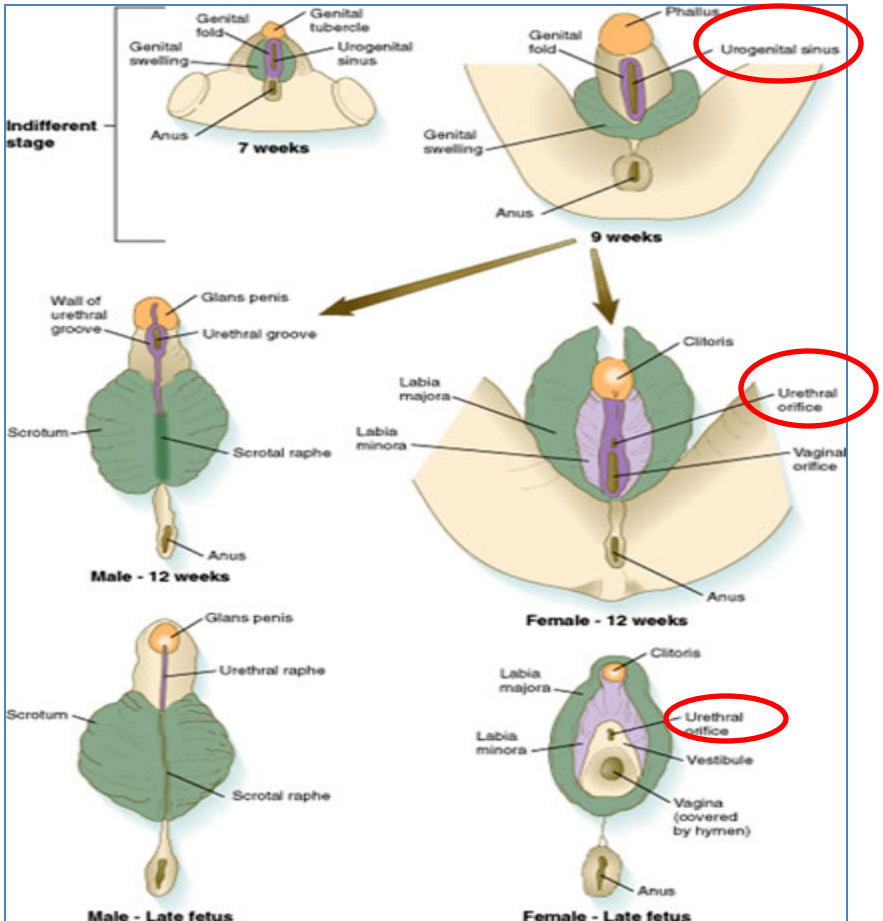




Female Urethra

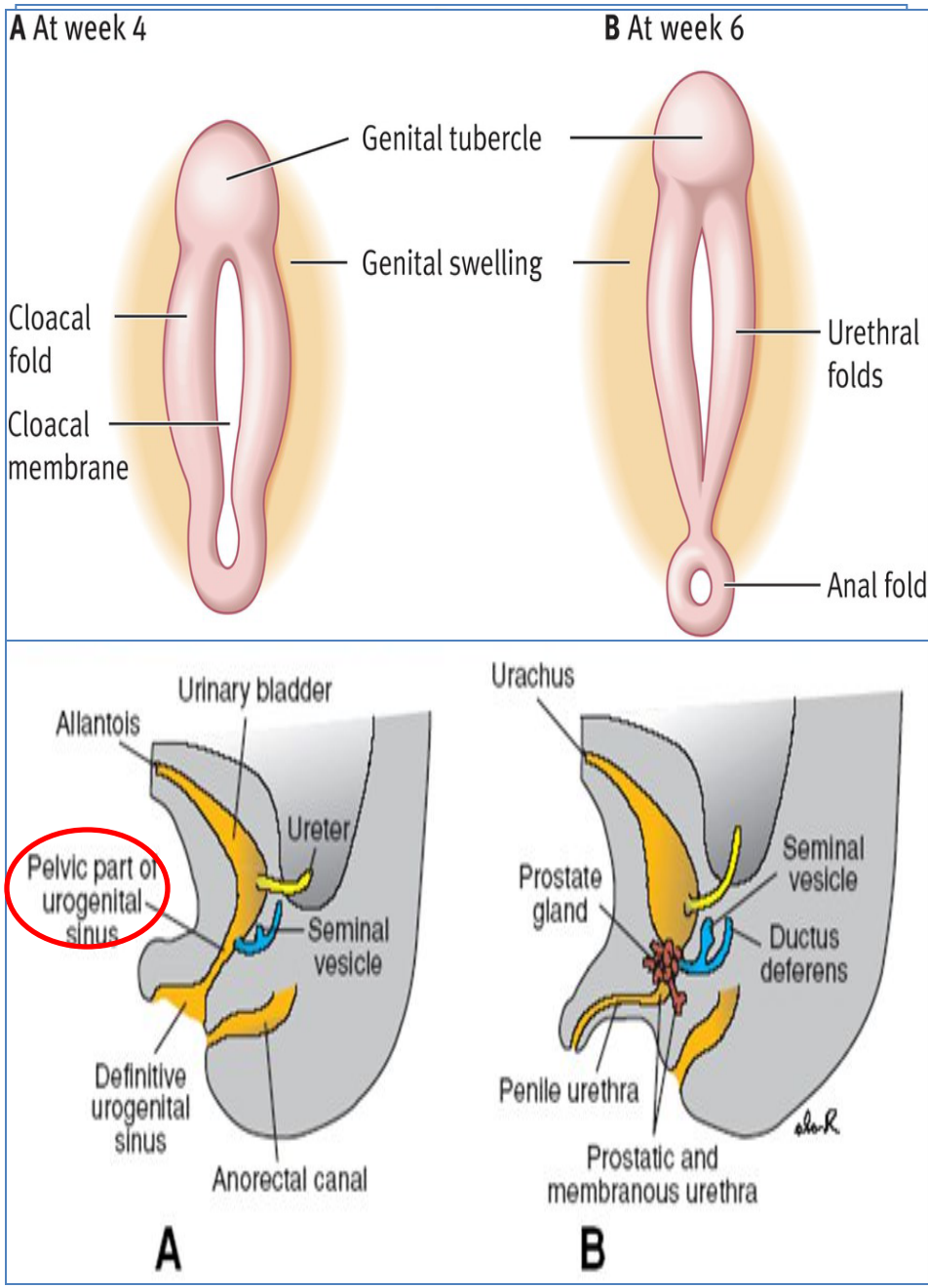
- The entire female urethra is derived from endoderm of the pelvic (middle) part of the urogenital sinus.
- The external urethral orifice opens dorsal to the glans clitoris.





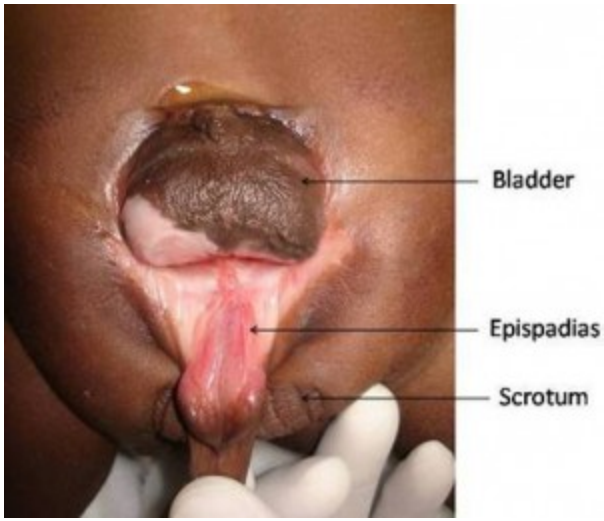
Male Urethra

- **The genital tubercle elongates forming the phallus, which is the precursor of the penis.**
- **Most of the male urethra : (prostatic, membranous) is derived from endoderm of the pelvic middle part of urogenital sinus.**
- **2 urethral folds in male fuse with each other to close the penile urethra.**
- **The distal part of male penile urethra in glans penis starts as ectodermal solid cord that grows towards the root of penis to meet the spongy urethra , later it canalizes.**



Anomalies

- **Urachal Anomalies.**
- **Urethral Anomalies.**
- **Extrophy of the bladder (Ectopia vesicae); exposure of the posterior wall of the bladder due to a defect in the anterior abdominal wall and anterior wall of the bladder.**



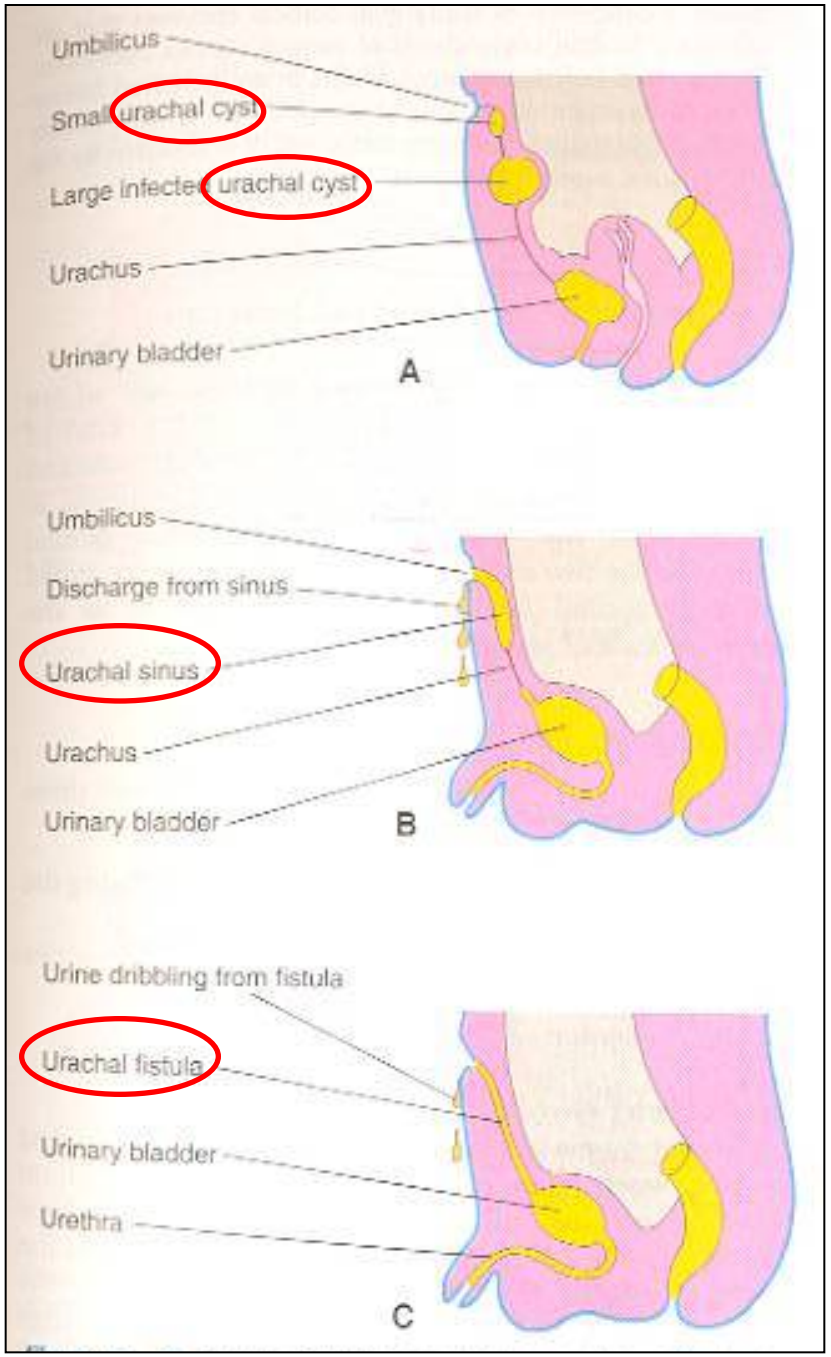
Ectopia vesicae

Urachal anomalies

A, Urachal cyst persistence or remnant of epithelial lining of urachus.

B, Urachal sinus, discharge serous fluid from the umblicus.

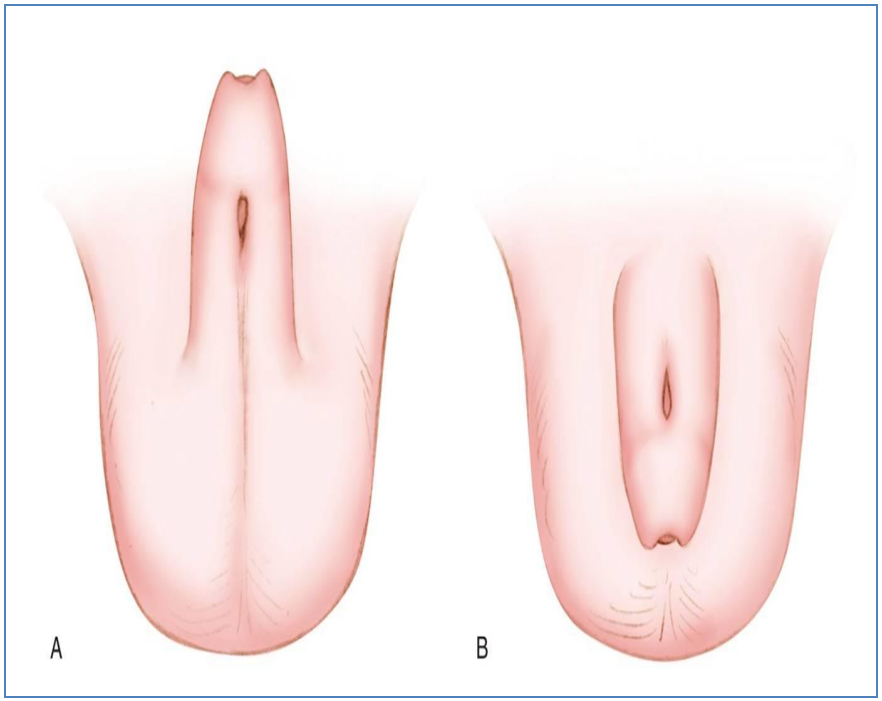
C, Urachal fistula, the entire urachus remains patent and allows urine to escape from the umbilicus.

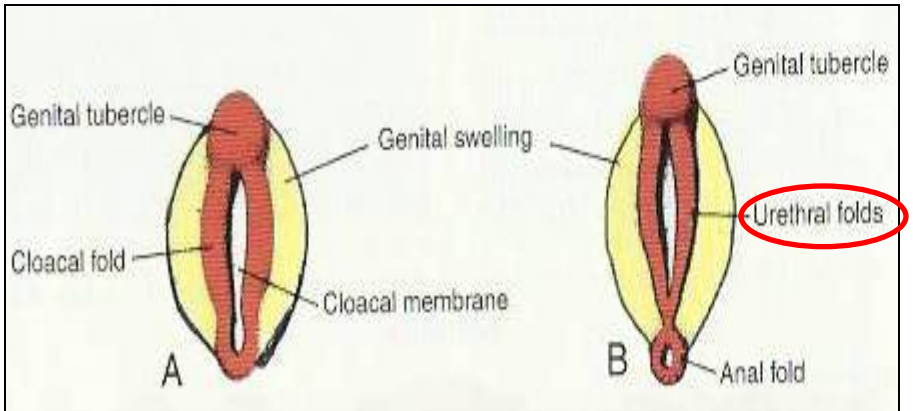


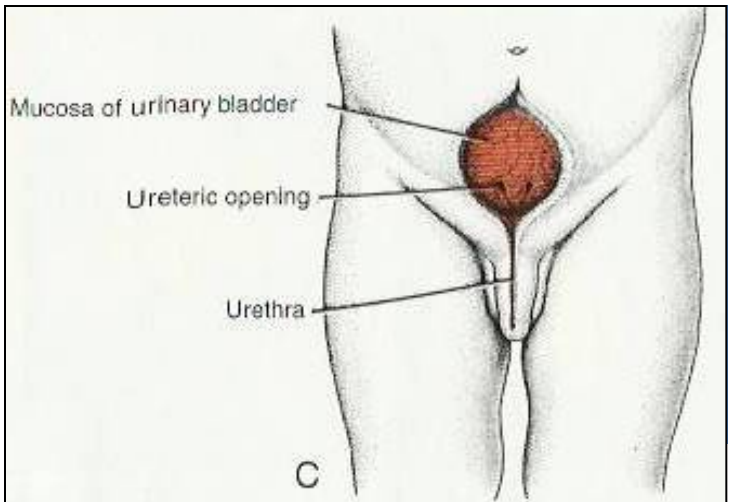
Urethral Anomalies

1-Hypospadius : is the most common anomaly, with **incomplete fusion of the urethral folds**, and **abnormal openings of the urethra** occur along the ventral (inferior) aspect of the penis.

2-Epispadius : is a rare abnormality, in which the **urethral meatus** is found on the **dorsum of penis**, it is most often associated with **extrophy of the bladder.**







Thank you

N.B

- **Bladder exstrophy is a congenital abnormality that occurs when the skin over the lower abdominal wall does not form properly. The bladder is open and exposed on the outside of the abdomen; it is associated with epispadius.**
- **In epispadias, the urethral meatus** is found on the **dorsum of penis.**

1. The urinary bladder is mainly developed from which one of the following ?

a. Vesical part of the urogenital sinus.
b. Pelvic part of the urogenital sinus.
c. Pallic part of the urogenital sinus.
d. Allantois.

2. Which part of urogenital sinus forms the entire female urethra ?

a. Caudal part.
b. Vesical part
c. Pelvic part
d. All parts.

4. The trigone of the urinary bladder is developed from one of the following?

a. Paramesonephric ducts.
b. Mesonephric ducts.
c. Allantois.
d. Urogenital sinus.

5. The urethra in glans penis is developed fromwhich one of the following ?

a. The vesical part of urogenital sinus.
b. The pelvic part of urogenital sinus.
c. The ectoderm.
d. The splanchnic mesoderm.