

# DEVELOPMENT OF THE URINARY BLADDER AND URETHRA

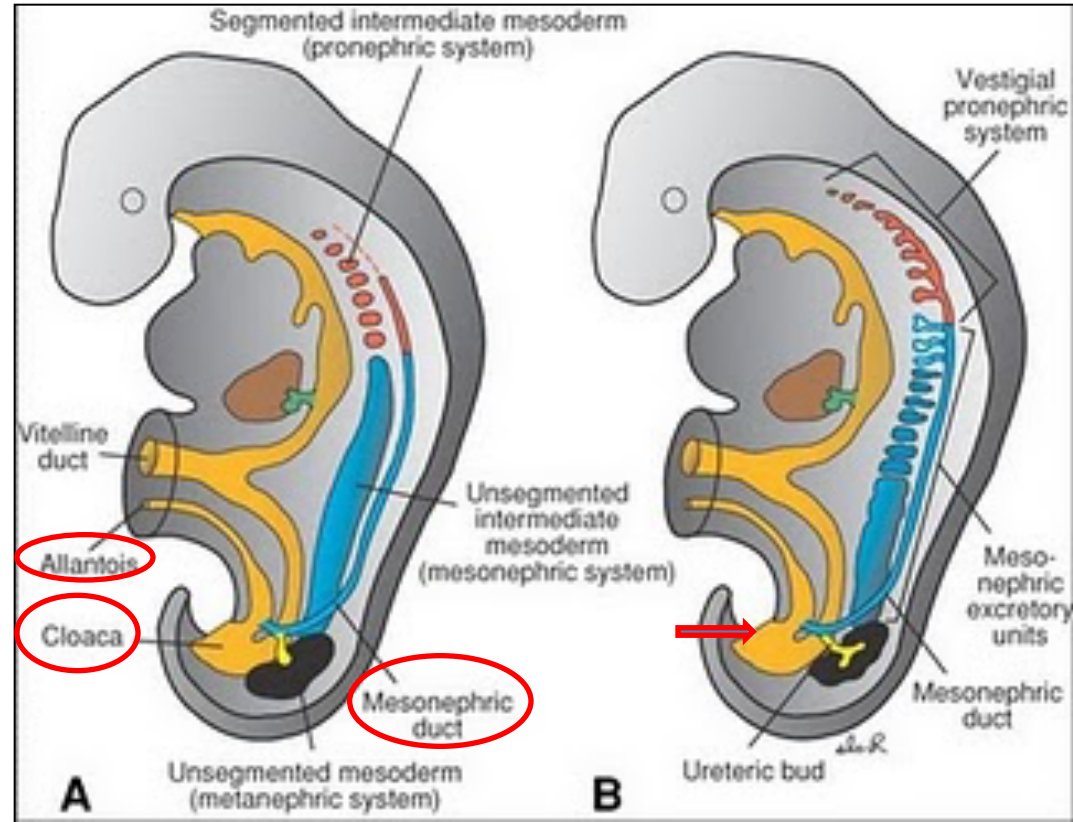
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Salama

# 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

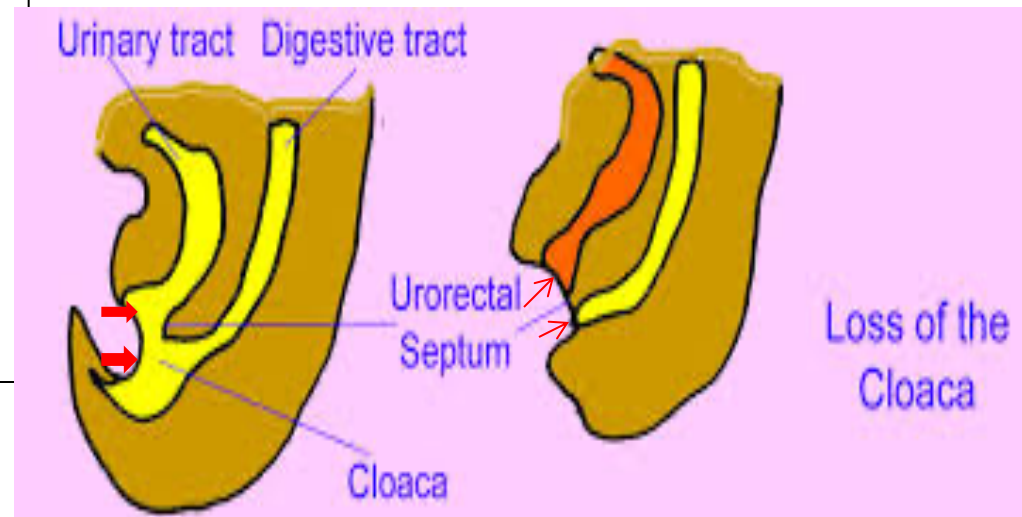
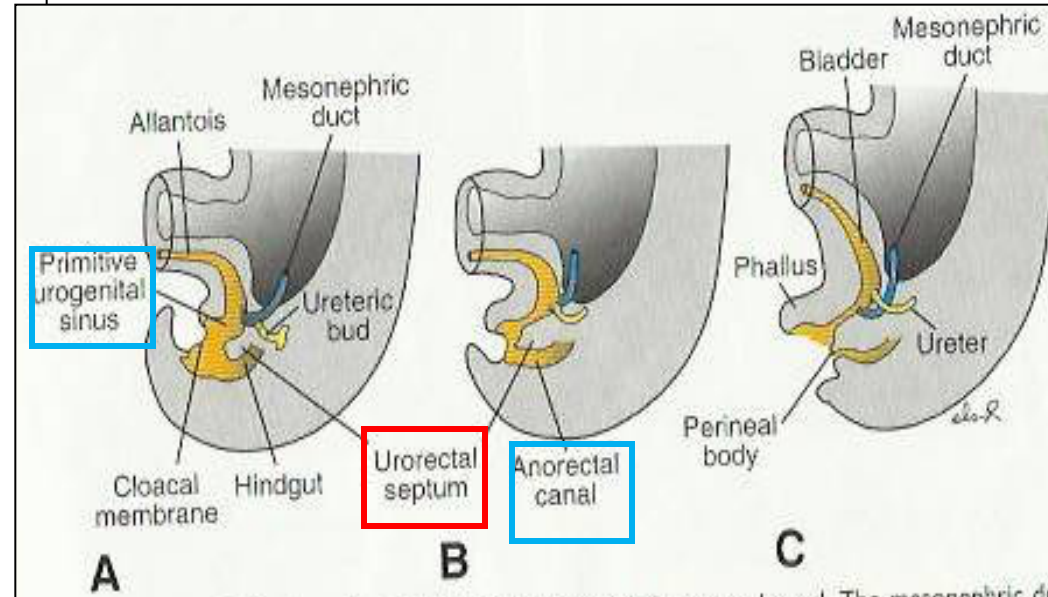
□ A **mesodermal urorectal septum** divides the **cloaca** and the **cloacal membrane** into :

✓ **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**.



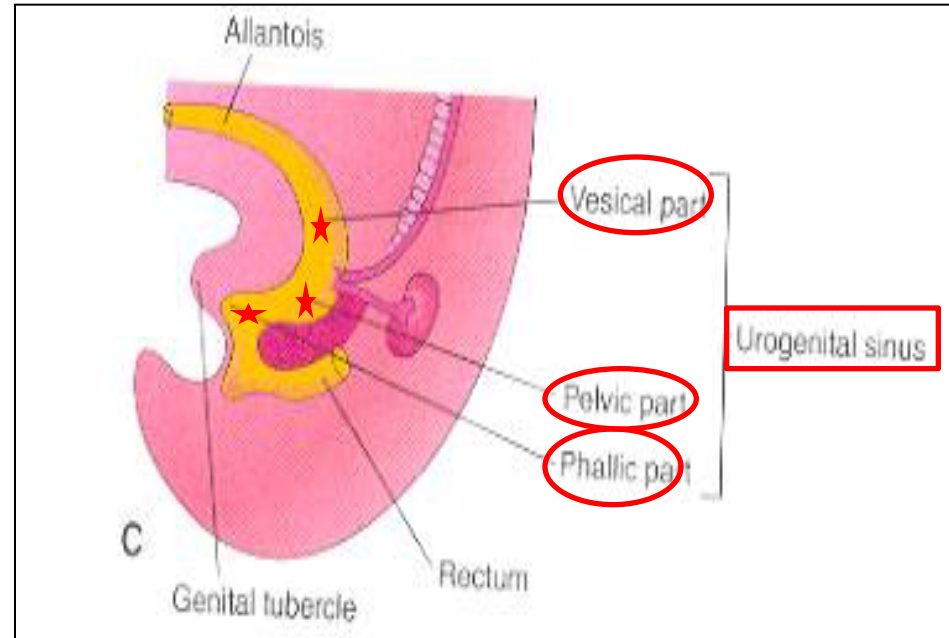
# Primitive urogenital sinus

□ Is divided into three parts;

▪ A **cranial; vesical part**; forms most of the bladder and continuous with the allantois.

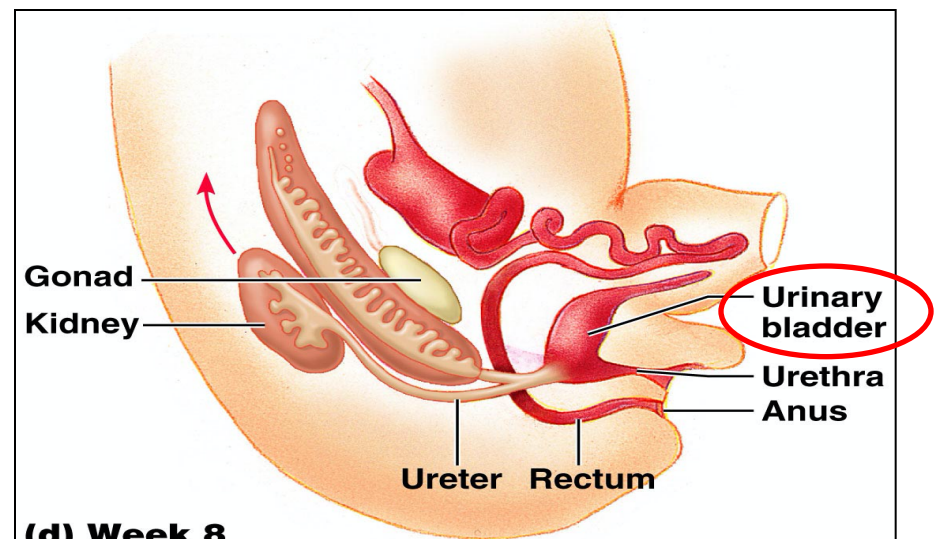
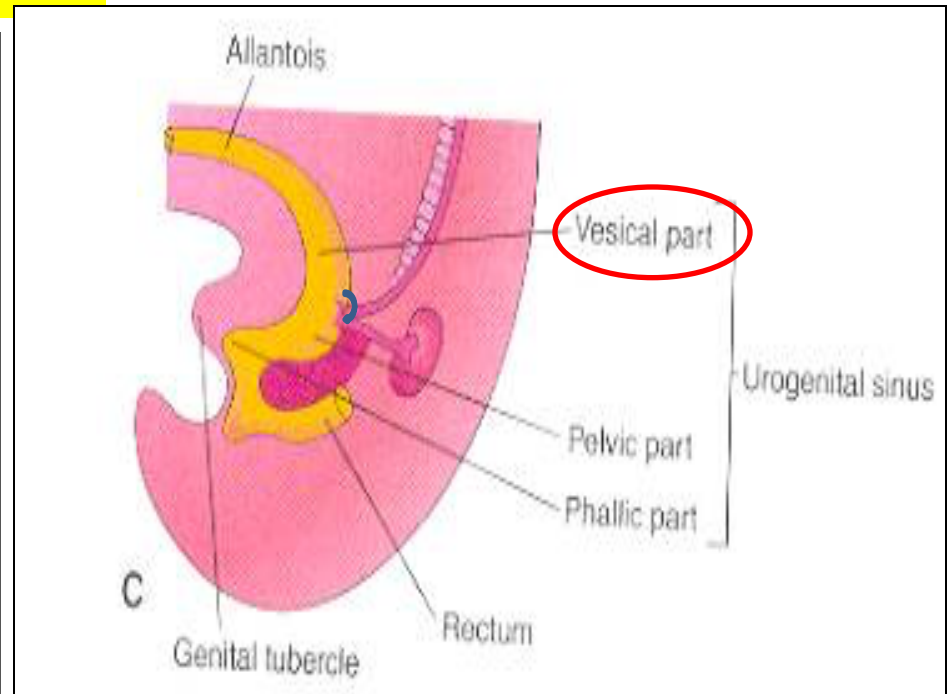
▪ A **middle; pelvic part**; forms main part of male urethra and entire female urethra.

▪ 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**.



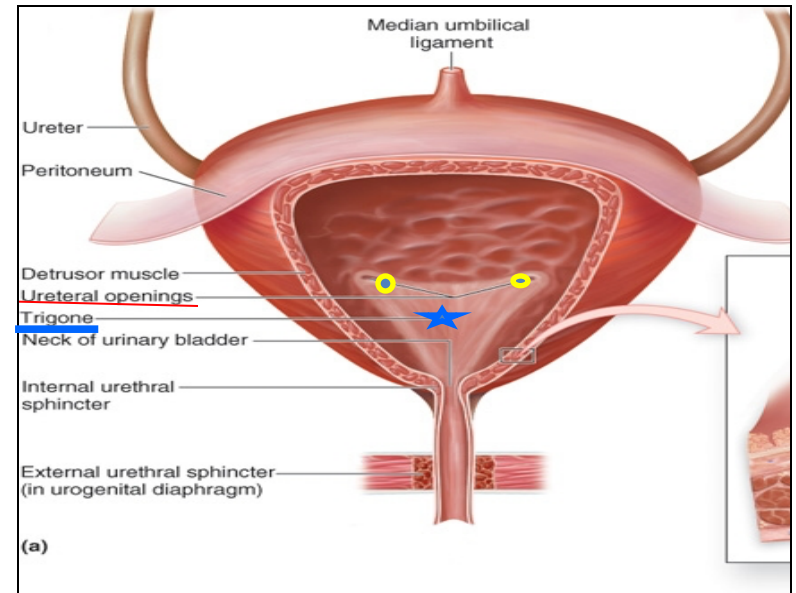
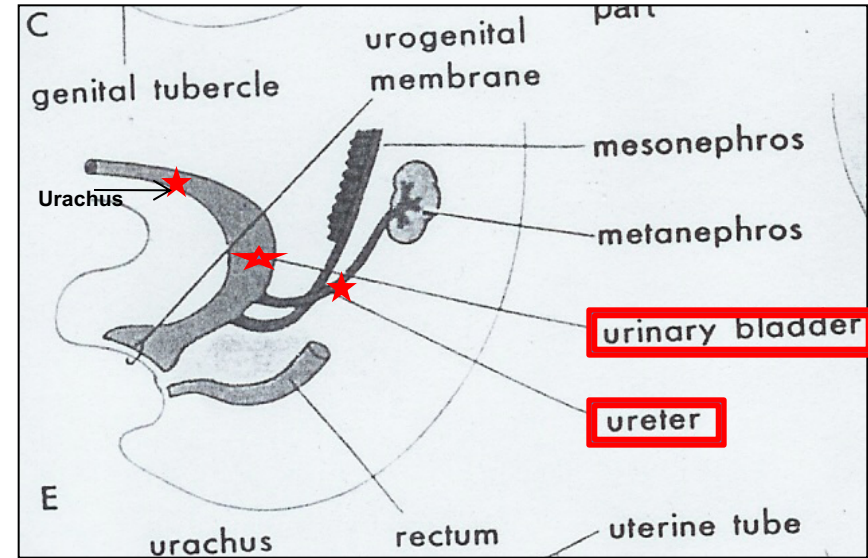
(d) Week 8

# 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,

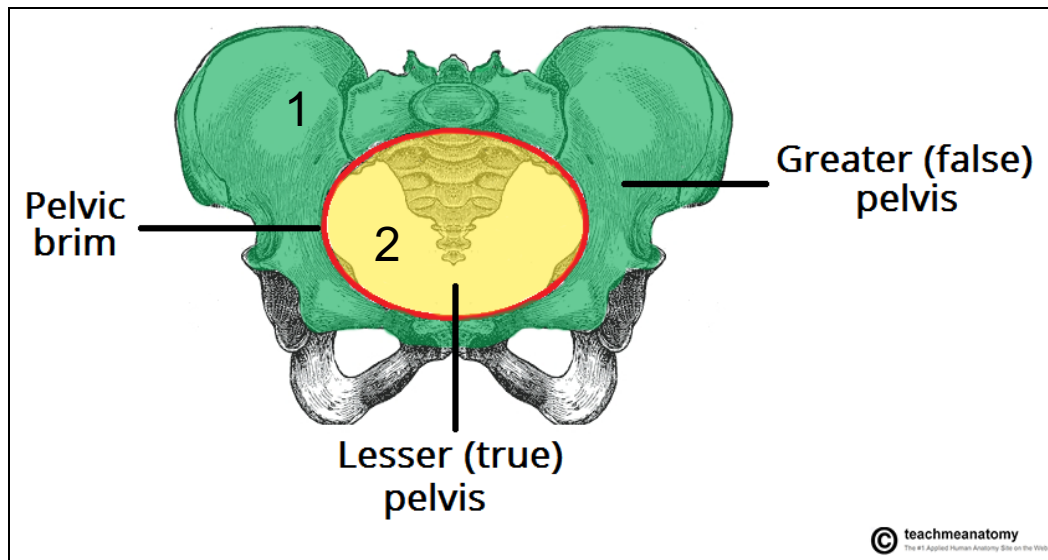
□ At birth, it is represented by the **median umbilical ligament**.

□ 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 ;

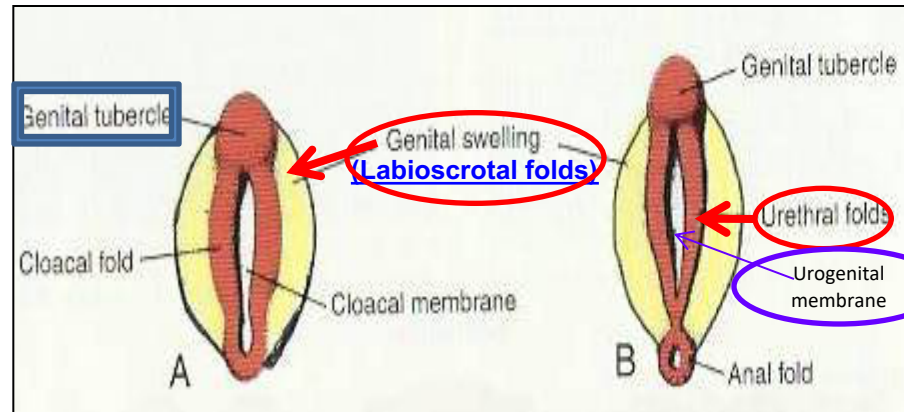
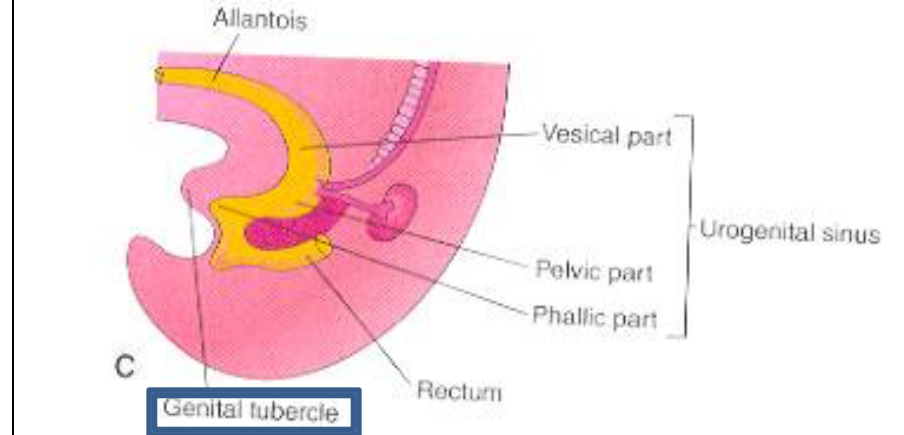
❑ The **genital tubercle** (mesenchymal elevation) develops at the cranial end of the cloacal membrane.

❑ **Two urethral folds**, develop on either side of the urogenital membrane; from the phallic part of urogenital sinus.

❑ Laterally **two labioscrotal folds** develop on either side of the urethral folds.

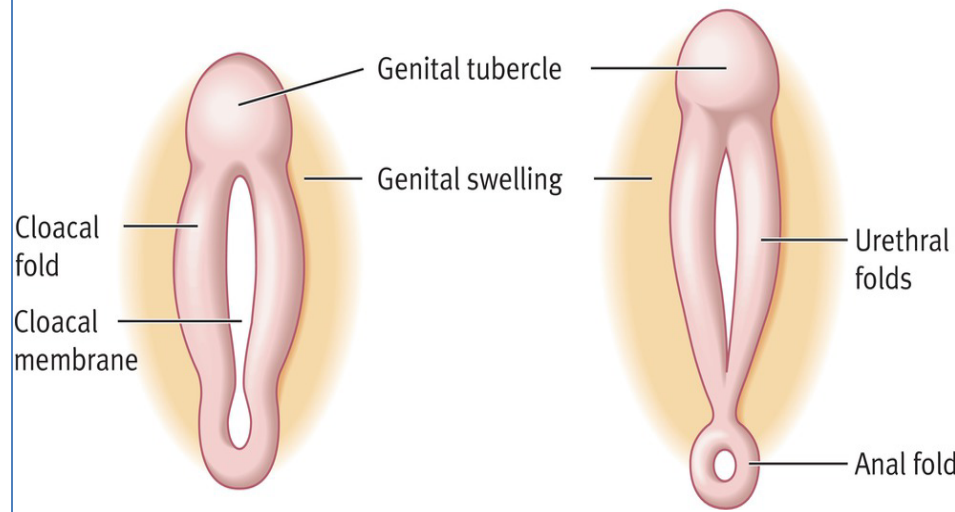
❑ **2 urethral folds in male** fuse with each other to close the **penile urethra**; so; **spongy urethra is formed by tubularization of the urethral folds**.

❑ **2 urethral folds in female** remain separate to form labia minora.



A At week 4

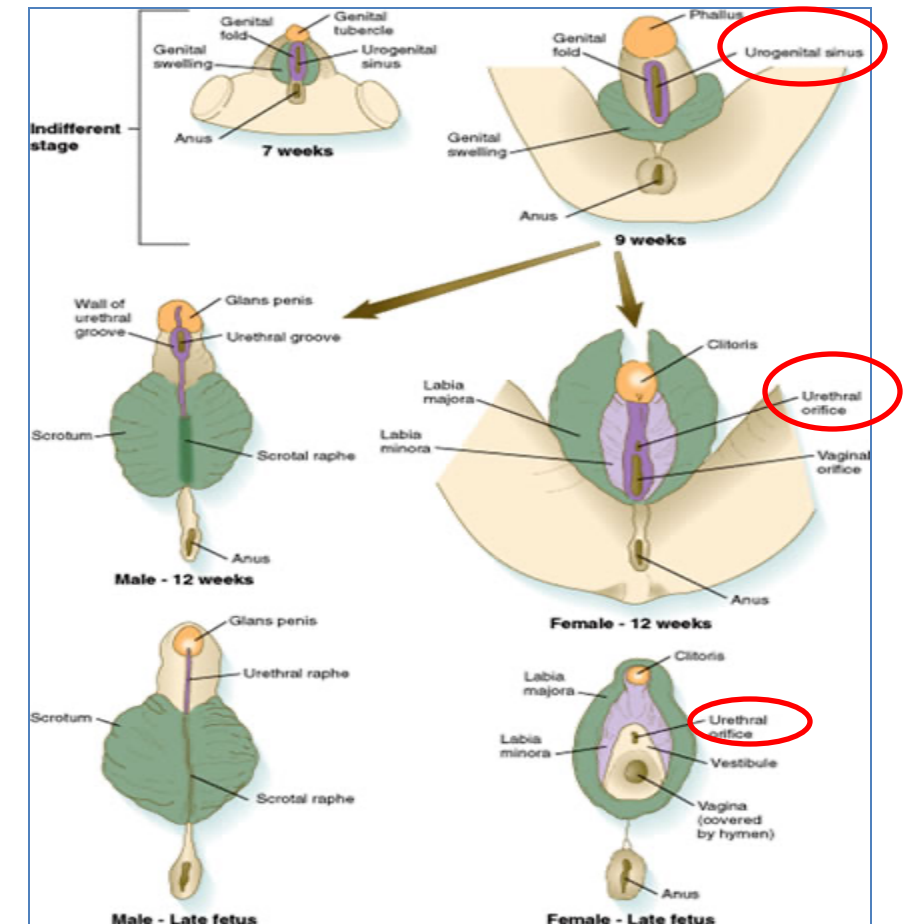
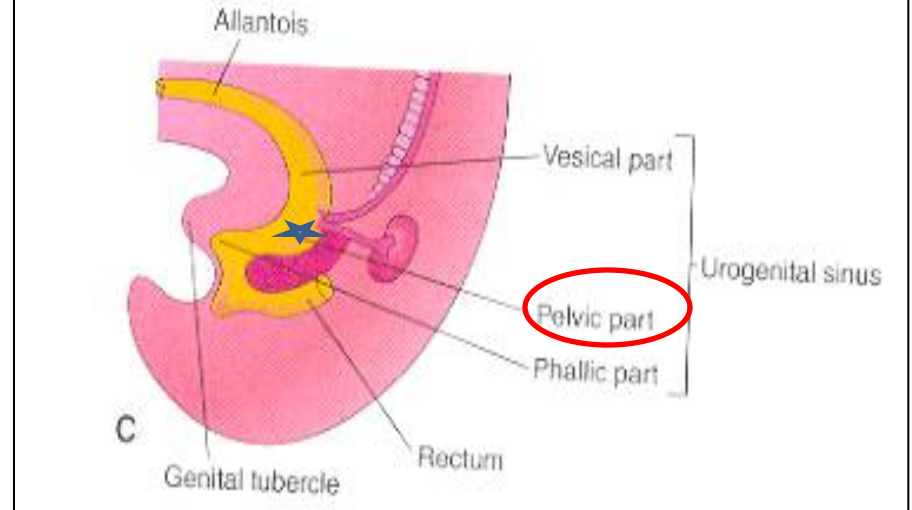
B At week 6



# 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**.



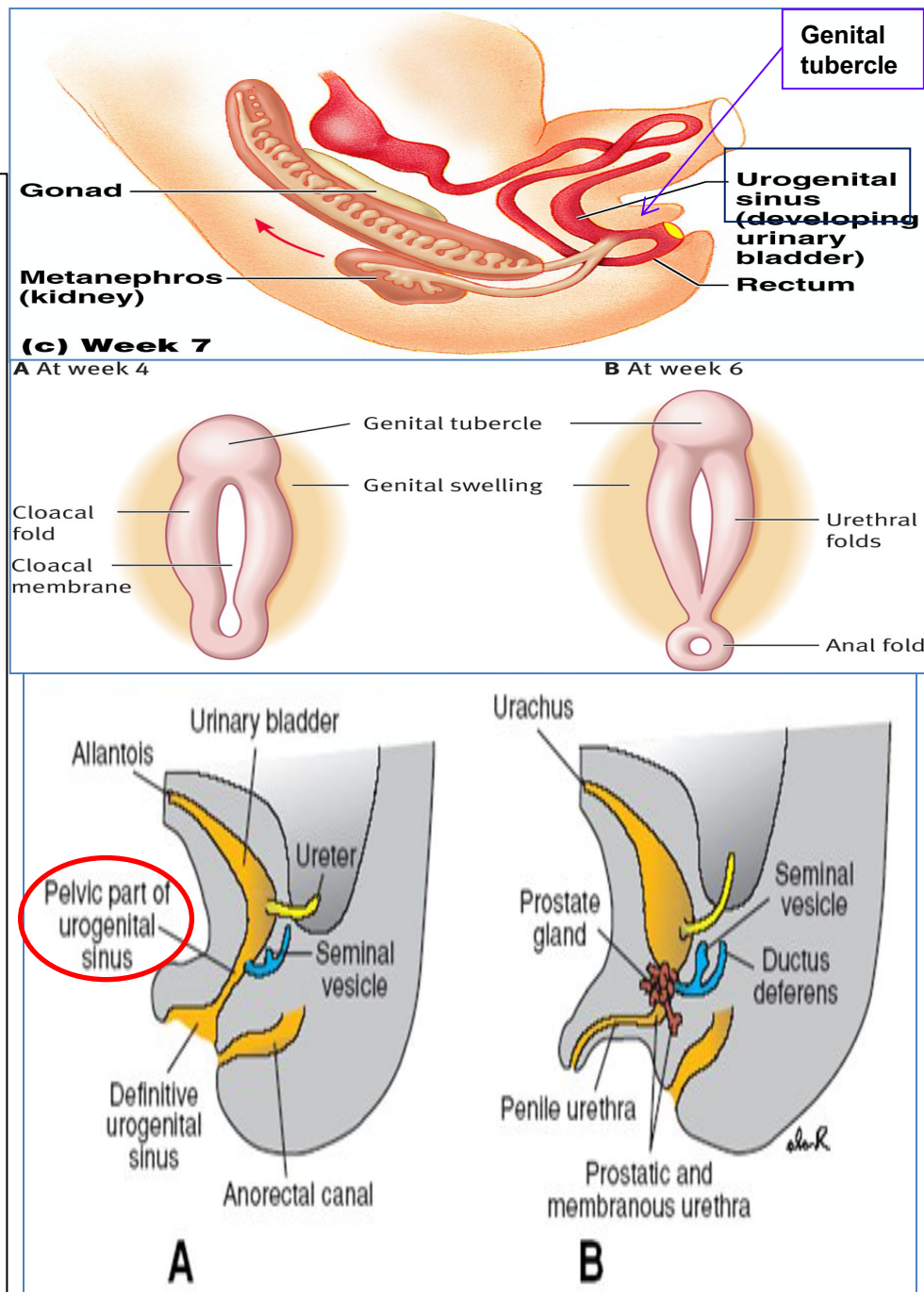
# Male Urethra

□ 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.

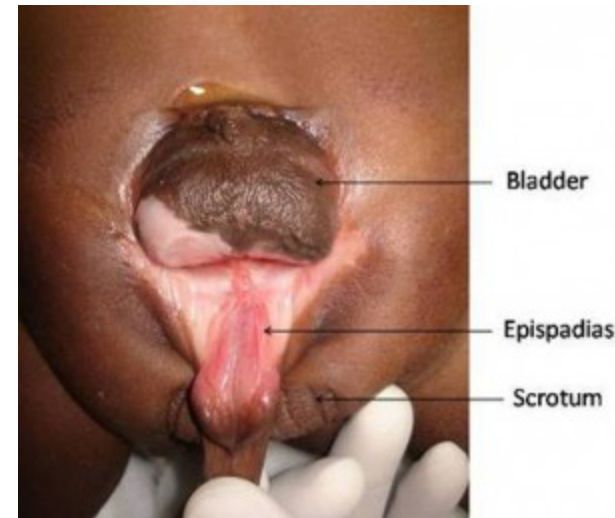
□ **2 urethral folds in male** fuse with each other to close the penile urethra.

□ 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.



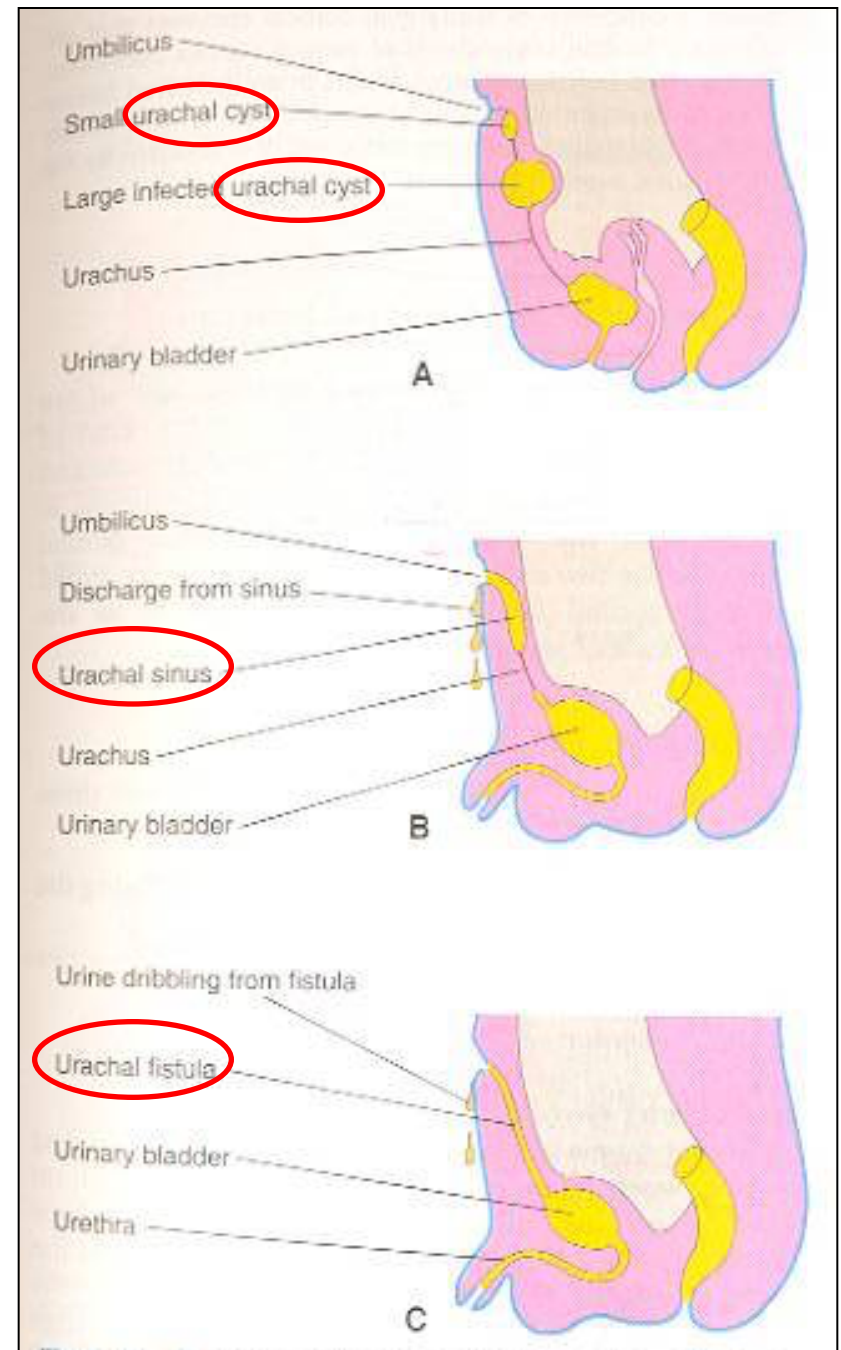
**Ectopia vesicae**

# Urachal anomalies

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

**B, Urachal sinus**, discharge serous fluid from the umbilicus.

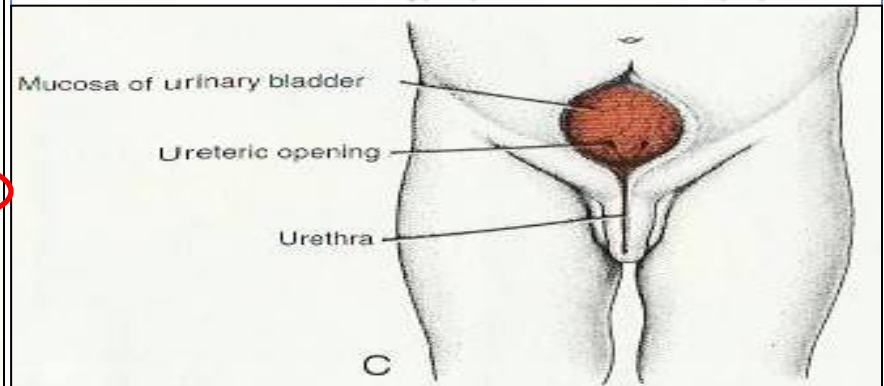
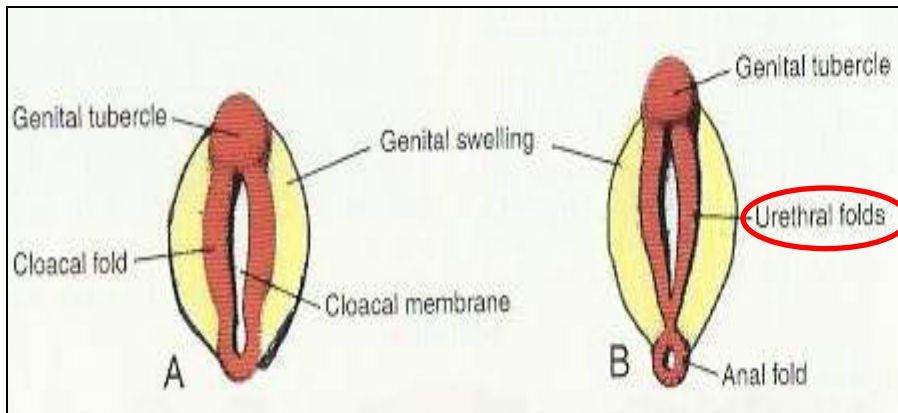
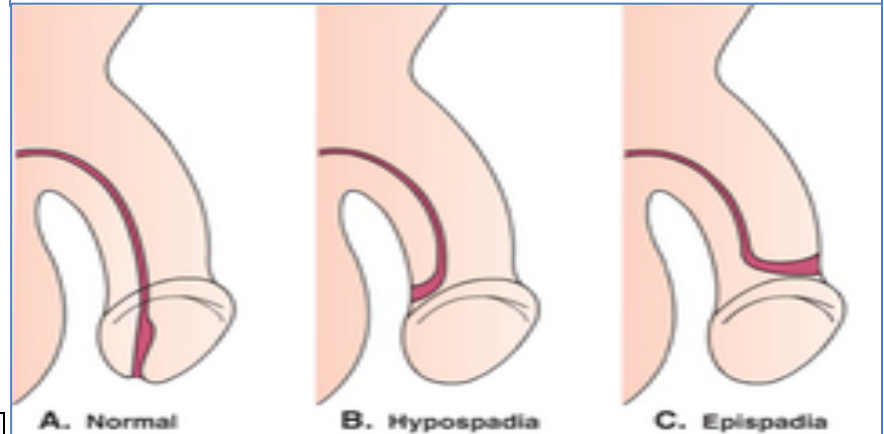
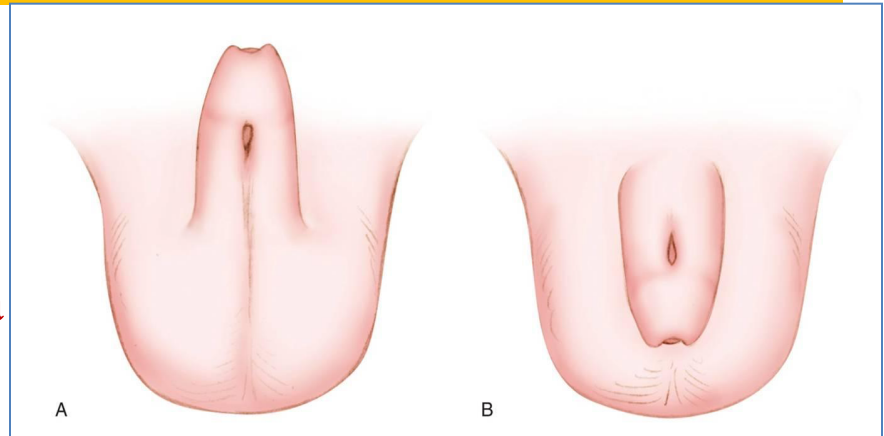
**C, Urachal fistula**, the entire urachus remains patent and allows urine to escape from the umbilicus.



# Urethral Anomalies

**1-Hypospadias** : 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-Epispadias** : 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 **epispadias**.
- 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 from which 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.