



Development Of The Bladder And Urethra

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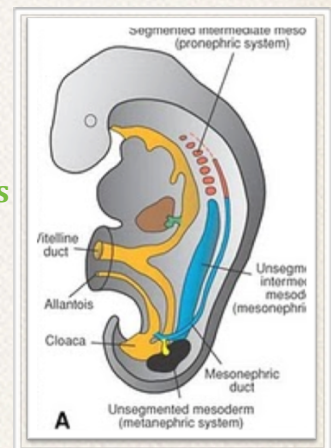
Renal block 2013 (**Second lecture**)

• Objectives:

- Describe cloaca and formation of urogenital sinus
- Discuss division of urogenital sinus into parts and name the derived adult organs
- Describe how the caudal parts of the mesonephric ducts and ureters are absorbed into the urogenital sinus and its significance.
- Discuss position/significance/fate of the urachus
- Describe various anomalies

Cloaca

- ❖ It is the *dilated* terminal part of the hindgut*.
- ❖ It receives the allantois and the mesonephric ducts (remains 2, one on each side).
- ❖ Its floor is enclosed by the cloacal membrane.
 - ***Reminder:** After the folding of the embryo, part of the yolk sac remains enclosed within the embryo to form the gut which differentiates into 3 parts:
 - 1) Foregut: (cranial)
 - 2) Midgut: (middle)
 - 3) Hindgut: (caudal)



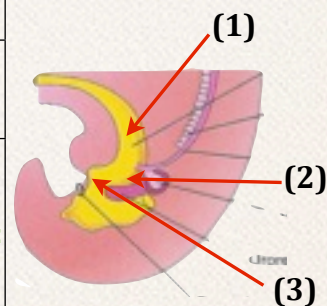
- ❖ A mesodermal *urorectal septum* divides the cloaca and the cloacal membrane into:
 - * **Ventral part (the primitive urogenital sinus*)**:
 - Communicates with the allantois (anteriorly) and the mesonephric ducts (laterally).
 - **Floor:** the urogenital membrane.
 - * gives urinary bladder and urethra.
 - * **Dorsal part (the anorectal canal) :**
 - **Forms:** the rectum and upper part of anal canal.
 - **Floor:** the anal membrane.
 - * will be taken in GIT block.

Primitive urogenital sinus

- ❖ Divided into three parts:

urogenital sinus

Cranial (Vesical part)(1)	Middle (Pelvic part)(2)	Caudal (Phallic part)(3)
Forms <i>most*</i> of the bladder and continuous with the allantois.	Forms main part of male urethra(except for the terminal part of the penile urethra) and entire female urethra.	Grows towards genital tubercle*. *gives genital system: males: penis. females: clitoris.



Bladder

- ❖ Develops *mainly** from the **vesical part** of the urogenital sinus.
*because the **trigone** is formed by the absorbed caudal part of the the **mesonephric duct**.
- ❖ The trigone is derived from the absorbed caudal end of the mesonephric ducts.
- ❖ The epithelium is **endodermal** in origin.
- ❖ The other layers are derived from the **splanchnic mesoderm**.

The allantois is at first continuous with the bladder



Undergoes fibrosis



Extend from the apex of the bladder to the umbilicus



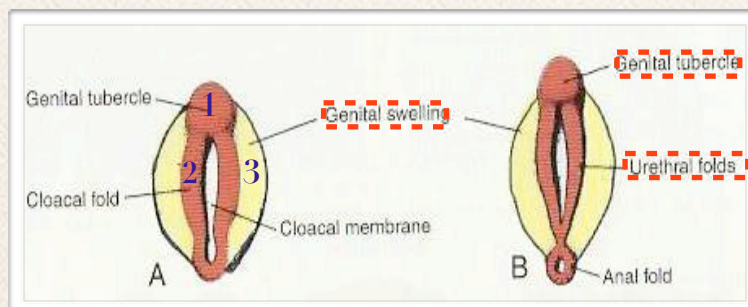
Forms the median umbilical ligament (In Adult)

- ❖ After absorption of the mesonephric ducts to form the trigones, the ureters open separately in the bladder. In infants and children the bladder is an abdominal organ.

- ❖ 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** after puberty.

Urethra

- ❖ **Indifferent (undifferentiated) stage:**
- ❖ The genital tubercle (mesenchymal elevation) develops at the cranial end of the cloacal membrane. [1]
- ❖ Two urethral folds, develop on either side of the urogenital membrane. [2]
- ❖ Laterally two labioscrotal (cloacal) folds develop on either side of the urethral folds. [3]



- ❖ **Later on:**
- ❖ The urethral folds in male fuse with each other to close the penile urethra.
- ❖ The urethral folds in female remain separate to form labia minora.

Female Urethra	Male Urethra
<ul style="list-style-type: none"> The entire female urethra is derived from endoderm of the pelvic part of the urogenital sinus. The external urethral orifice opens dorsal to the glans clitoris. 	<ul style="list-style-type: none"> The genital tubercle elongates forming the phallus, which is the precursor of the penis. Most of the male urethra prostatic, membranous and spongy parts is derived from endoderm of the pelvic part of urogenital sinus. The distal part of male 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

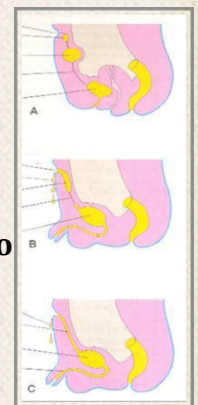
☉ **Exstrophy of the bladder (Ectopiae vesica):** exposure of the posterior wall of the bladder due to a defect in the anterior abdominal wall and anterior wall of the bladder.

☉ **Urachal anomalies:**

A) **Urachal cyst:** Persistence or remnant of epithelial lining (**didn't fibrose**) of urachus.

B) **Urachal sinus:** Discharge serous fluid from the umbilicus.

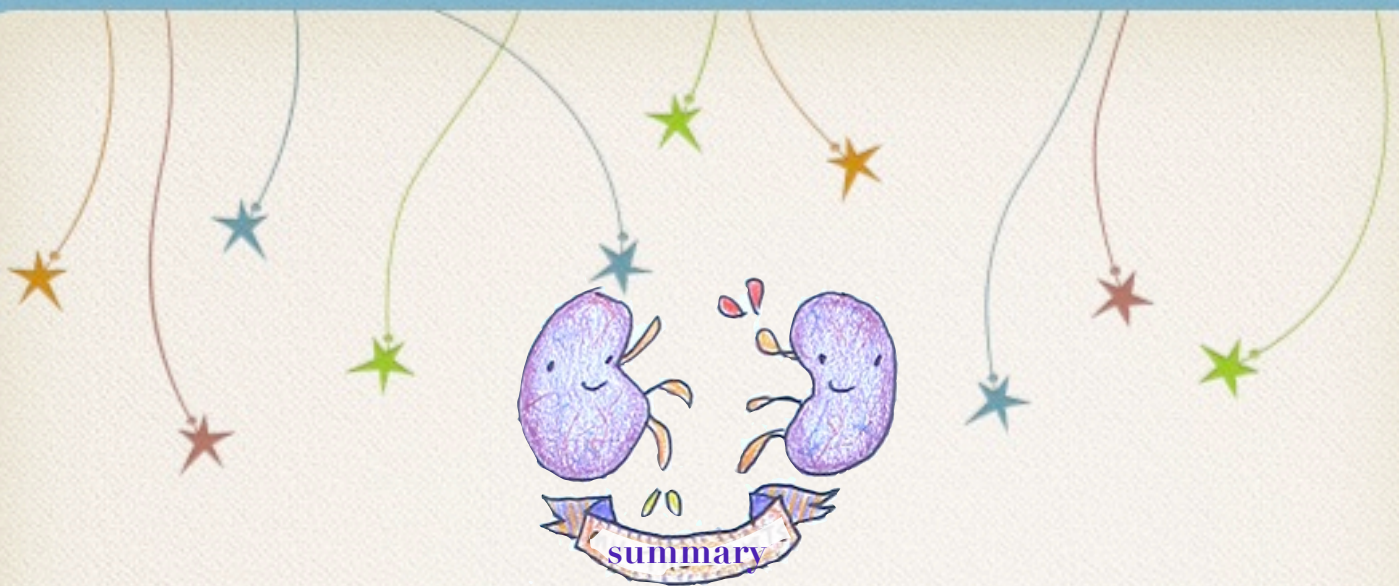
C) **Urachal fistula:** The entire urachus remains patent and allows urine to escape from the umbilicus.



☉ **Urethral anomalies:**

✧ **Thypospadias:** 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.

✧ **Epispadias:** is a rare abnormality, in which the urethral meatus is found on the dorsum of penis, it is most often associated with exstrophy of the bladder (most common in male).



Mesodermal urorectal septum divides the cloaca into:

- **Ventral part:** the primitive urogenital sinus.
- **Dorsal part:** the anorectal canal.

Bladder

- Derived from **cranial** (vesical) part of primitive urogenital sinus.
- Trigone is derived from **mesonephric ducts**.
- Other layers are derived from **splanchnic mesoderm**.

Urethra

• Male Urethra

- Derived from **Middle (Mainly)** and **Caudal** part of primitive urogenital sinus.
- Urethral folds **fuse** with each other to close the penile urethra
- The distal part of male urethra in glans penis is ectodermal in origin.

• Female Urethra

- Derived from **Middle** part of primitive urogenital sinus.
- Urethral folds remain **separate** to form labia minora.



Questions

1. The urinary bladder is mainly developed from :
 - 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 one of the following forms the entire female urethra ?
 - a. Genital tubercle.
 - b. Allantois.
 - c. Vesical part of the urogenital sinus.
 - d. Pelvic part of the urogenital sinus.

3. The trigone of the urinary bladder is developed from :
 - a. Paramesonephric ducts.
 - b. Mesonephric ducts.
 - c. Allantois.
 - d. Urogenital sinus.

4. The urethra in glans penis is developed from :
 - a. The vesical part of urogenital sinus.
 - b. The pelvic part of urogenital sinus.
 - c. The ectoderm.
 - d. The splanchnic mesoderm.

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Answers: A-D-B-C