Development of The Urinary Bladder And Urethra

Embryology
436

Revised by
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(إِنَّا خَلَقْنَا الإنسان
مِنْ نُطْفَةٍ أَمْشَاجٍ
نَبْتَلِيهِ فَجَعَلْنَاهُ
سَمِيعًا بَصِيرًا)
]الإنسان.[2 :

MEDICINE
KING SAUD UNIVERSITY

- Important
- Dr. notes
- Explanation

- We recommend you to study anatomy of the Bladder and urethra .

OBJECTIVE

1. Describe the cloaca and the formation of the urogenital sinus.
2. Discuss the division of the urogenital sinus into various pats and name the adult organs that are derived from each part.
3. Describe how the caudal parts of the mesonephric ducts are absorbed into the urogenital sinus and the significance of this embryonic events.
4. Discuss the position of the urachus and its significance and fate.
5. Describe the various anomalies concerned with the urinary bladder and urethra.

Introduction

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* Just More explanation for the whole idea:

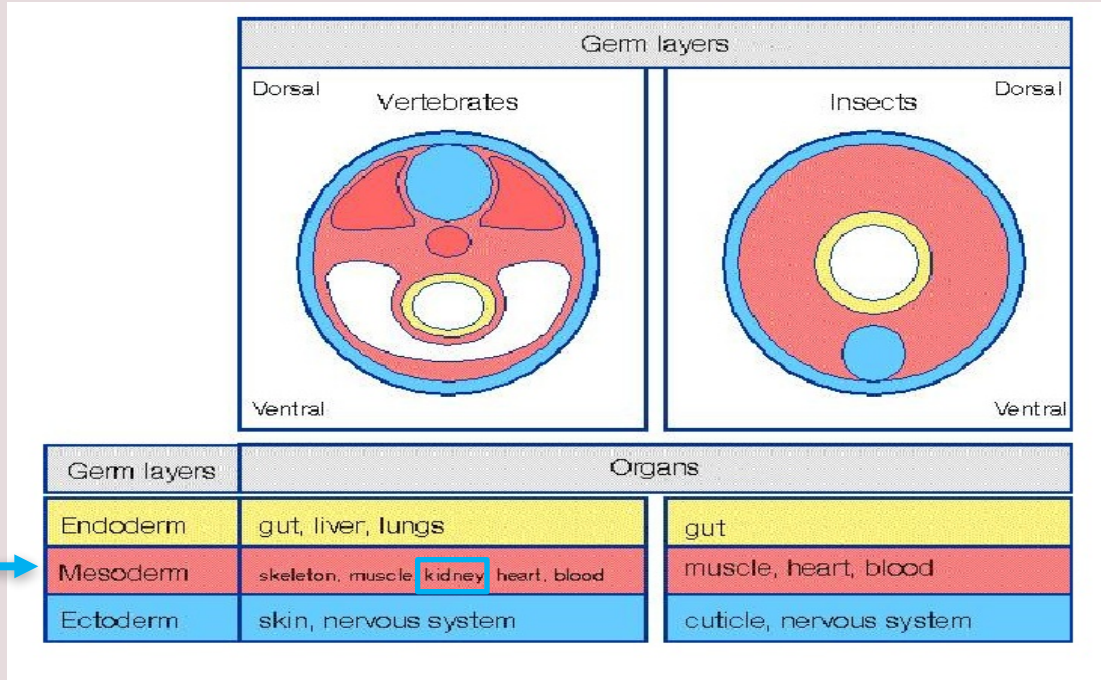
First the embryo was **2 layers** (endoderm , ectoderm), later it become **3 layers** (endoderm , mesoderm , ectoderm).

These layers folded together in growth space, than it give:(head fold , tall fold, two lateral fold.)

The Tall fold gives the "**hind gut**"

The last part of "hind gut" dilated and it's call **Cloaca**

Than the **Cloaca** divided by sptum into ventral part and dorsal part.



Cloaca

- It is the dilated terminal part of the hind gut.
- It receives 1- the allantois and 2- the mesonephric ducts.
- Its floor is closed by the cloacal membrane.

- A mesodermal urorectal septum divides the cloaca and cloacal membrane into: (2parts)

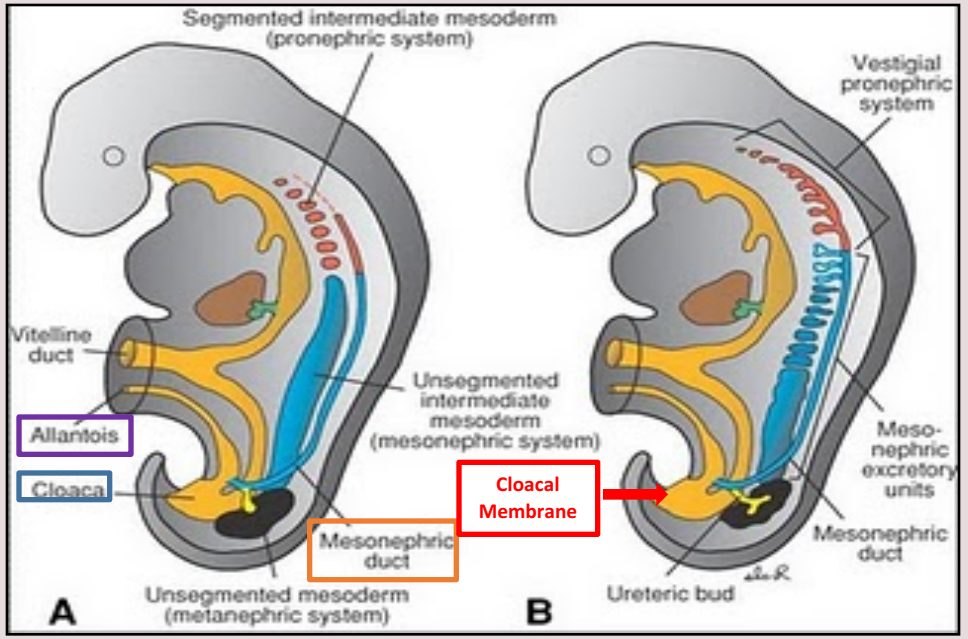
1- Ventral part: (from its name it will give part to urinary system and part to GIT)(this part that we need to know it in this lecture): **the primitive urogenital sinus** that communicates with the allantois"anterior" and the mesonephric ducts"two lateral".

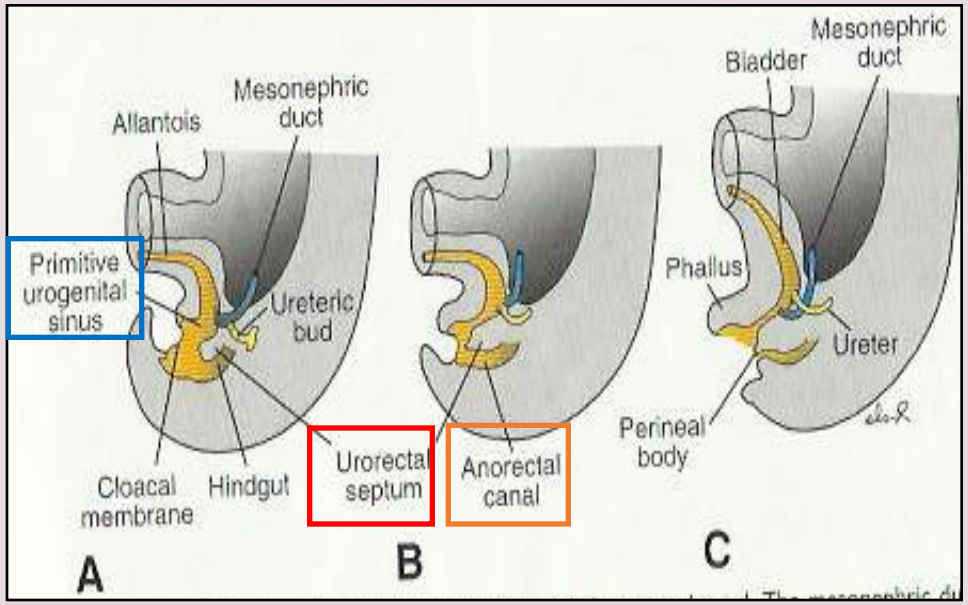
- Its floor is the urogenital membrane.

2- Dorsal:(at the end of GIT and will give "rectum". في هذه المحاضرة ما يهمنا هذا الجزء): **the anorectal canal** that forms the rectum and upper part of anal canal.

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

*the two parts(ventral and dorsal) will be separated completely from each other by **the mesodermal urorectal septum.** (بعد ما انفصلوا تماما كل واحد يصير له ممبرين خاص فيه)





Primitive Urogenital Sinus

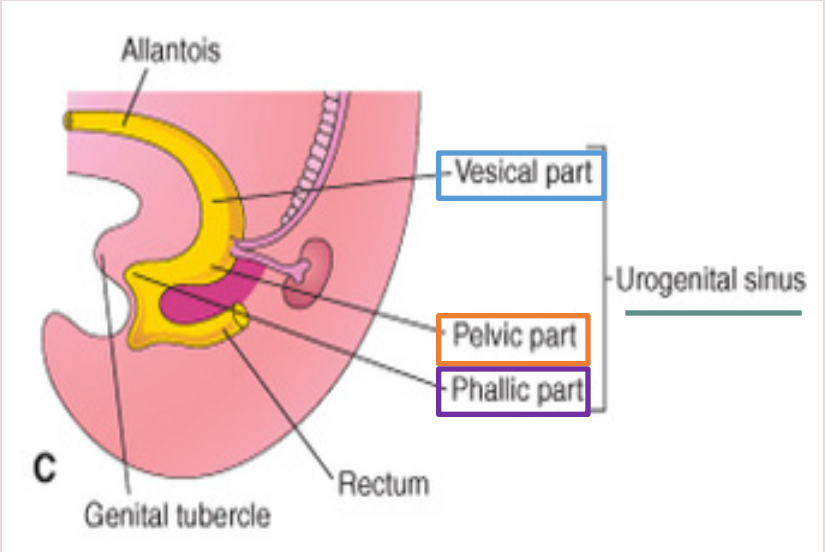
- this slide is very important ☺

- Primitive urogenital sinus: (Its divided into three parts):

1- A cranial (vesical*) part: forms most of the bladder (except the posterior surface or the trigone in both genders) and continuous with **the allantois**.

2- A middle (pelvic) part: forms main part of male urethra (there is a small part in the end of the penis is ectodermal in origin like the skin) and entire female urethra(forms all female urethra).

3- A caudal (phallic) part**: grows towards genital tubercle(shares in formation of male urethra).



*relating to the urinary bladder
**relating to penis

Urinary Bladder

- Bladder develops mainly from the vesical part (see the previous slide) of the urogenital sinus.

- The **trigone** is derived from the absorbed caudal ends (distal parts)of the **mesonephric ducts**.
  the end part of both 2 mesonephric ducts will be absorbed by urogenital sinus .(يندمجوا مع بعض)

- The **epithelium** of bladder is endodermal in origin. (the most inner layer originate from endoderm)

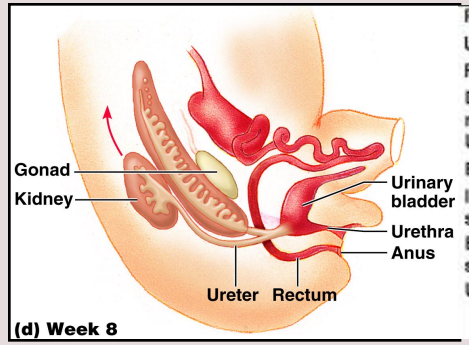
- The **other layers** of bladder are derived from the splanchinic mesoderm.

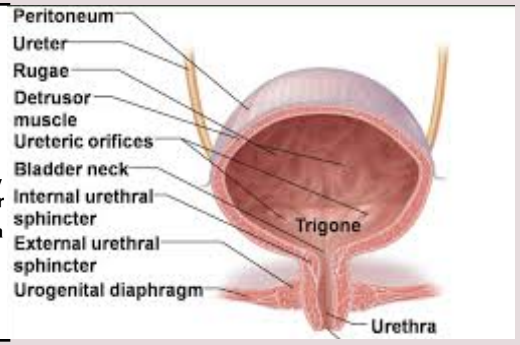
- **The allantois** is at first : 1- continues with the bladder, 2- then it becomes a thick fibrous cord urachus(الحبل السري) which extends from the apex (from proximal part of urachus) of the bladder to the umbilicus. (Allantois connect apex with umbilicus :اختصار)

- **At birth,it** is represented by the median umbilical ligament (from distal part of urachus).
  (median umbilical ligamentعند الولادة الديستال بارت اوف يوريكس يتحول الى)-

- **After absorption** of the mesonephric ducts to form the **trigone**, the ureters open separately in the bladder.

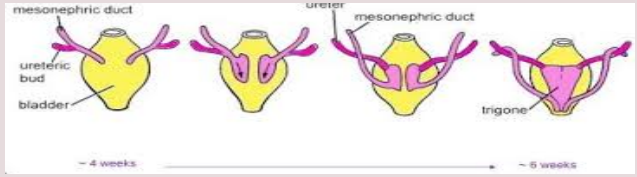
- **In infants and children**, the bladder is an abdominal organ, then it starts to enter the greater pelvis or false pelvis (between the 2 iliac bones) at about 6 years and becomes a pelvic (true pelvis) organ until **after puberty** at age 14 to 15.





الالانتويس انبوب سميك يربط السرة بقمة المثانة، في مرحلة معينة حيكون الحبل السري و بعد الولادة لما ينقطع حيبقى من جوا ما يُسمى median umbilical ligament.

Trigone " extra picture"



So the urinary bladder mainly developed from 1- the vesical part of urogenital sinus and 2-absorbed part of mesonephric duct

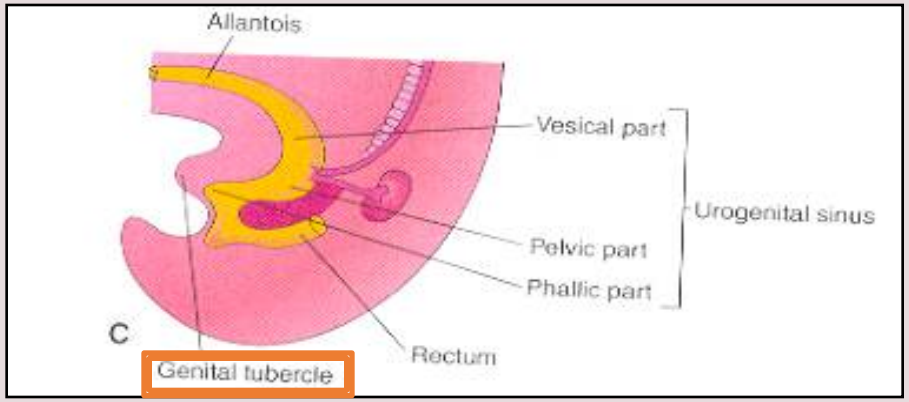
Urethra

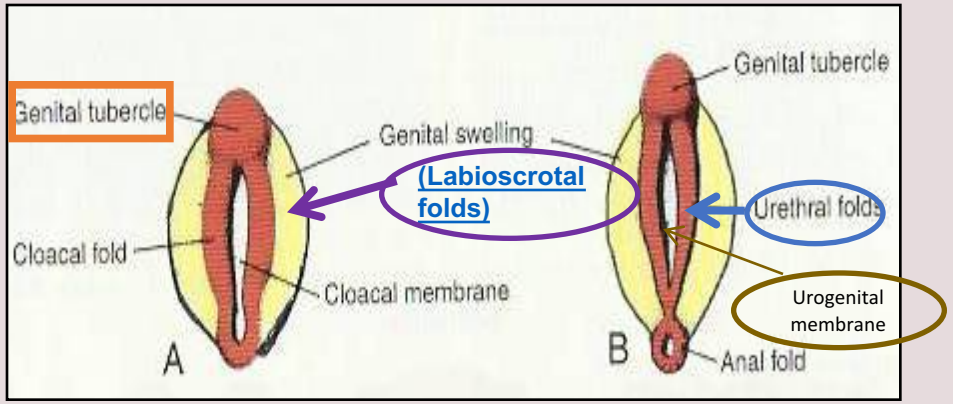
❖ **Indifferent stages:** (the urethra in this stage is the same for both genders) (في هذه المرحلة مانقدر نميز جنس الجنين).

- The genital tubercle (mesenchymal elevation) develops at the cranial end of the cloacal membrane.
  (هنا للحين اسمها كولوكال ممبرين عشان ما صار عندي انفصال تام)
- Two urethral folds, develop on either side of the urogenital membrane. (After separation)
  (عند الانفصال يتكون عندي يوروجينال ممبريين)
- Laterally two labioscortal folds develop on either sides of the urethral folds.

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

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





Extra: هذا النتوء من الامام مقسوم نصين طولية زي الصورة الثانية ، في البداية كان اسمه كولكال ممبرين بعد الانفصال الجزء العلوي حيصير يوروجينتال فولد على الاطراف و يوروجينتال ممبرين في المنتصف، في الانثى راح يضل الفولد زي ما هو و يكون الشفرين الصغيرين بينما في الذكر حيتحدوا الفولدين مع بعض و يكونوا الاحليل اللي راح يمتد على طول القضيب.

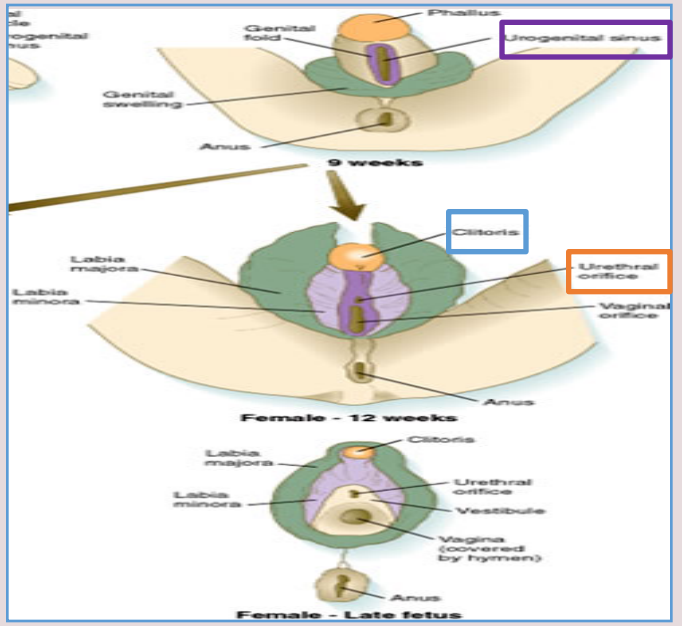
Female Urethra

-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.

The genital tubercle will form female clitoris which is ventricle in position to the external urethral orifice.

بالعربي: فتحة الاحليل الخارجية تكون خلف الكلايتوريس يعني دورسال لها



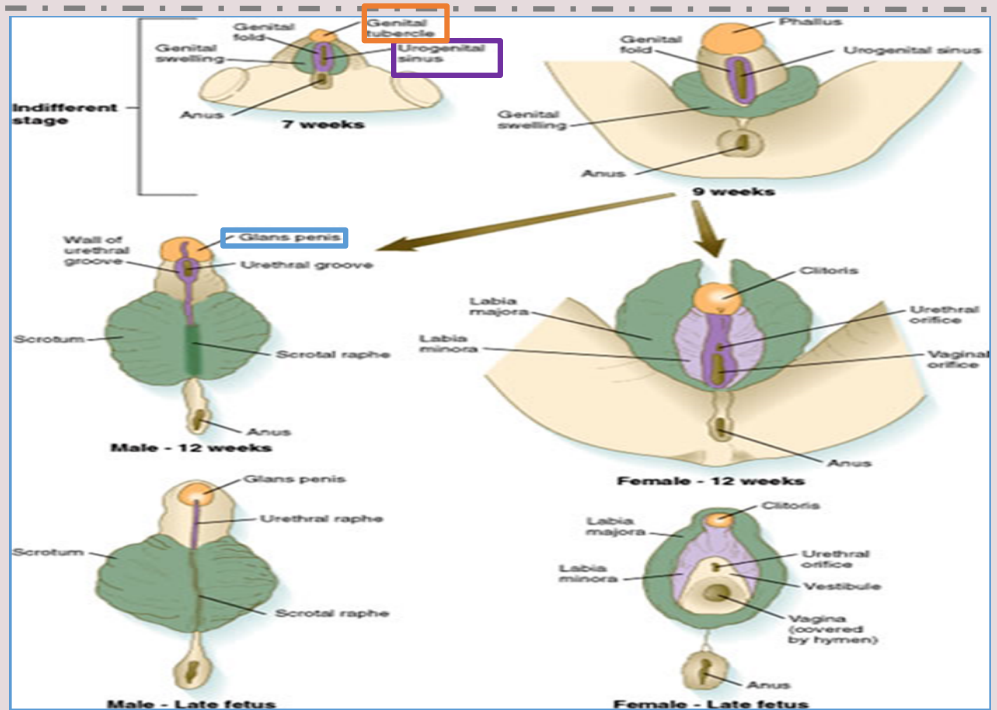
Male Urethra

- The genital tubercle elongates forming the **phallu**s, which the precursor of the penis. Remember it forms the female clitoris.

- Most of the male urethra (prostatic, membranous and spongy part) are derived from **endoderm of the pelvic (middle) part of the urogenital sinus.**

- 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.

- So the **terminal part** of male ureathra is ectoderm, while **the rest** of it are endoderm from pelvic and phallic part of urogenital sinus.



Anomalies

- This slide is very important ☺

- There are 3 anomalies : (1- extrophy of bladder 2- urachal anomalies 3- Urethral anomalies **)**. And they are in male only.

1. Extrophy of the bladder (ectopia vesicae):

- It is an **abnormal exposure** of the posterior wall of the bladder (trigone or base of bladder) due to a defect in the anterior abdominal wall and anterior wall of the bladder. very rare

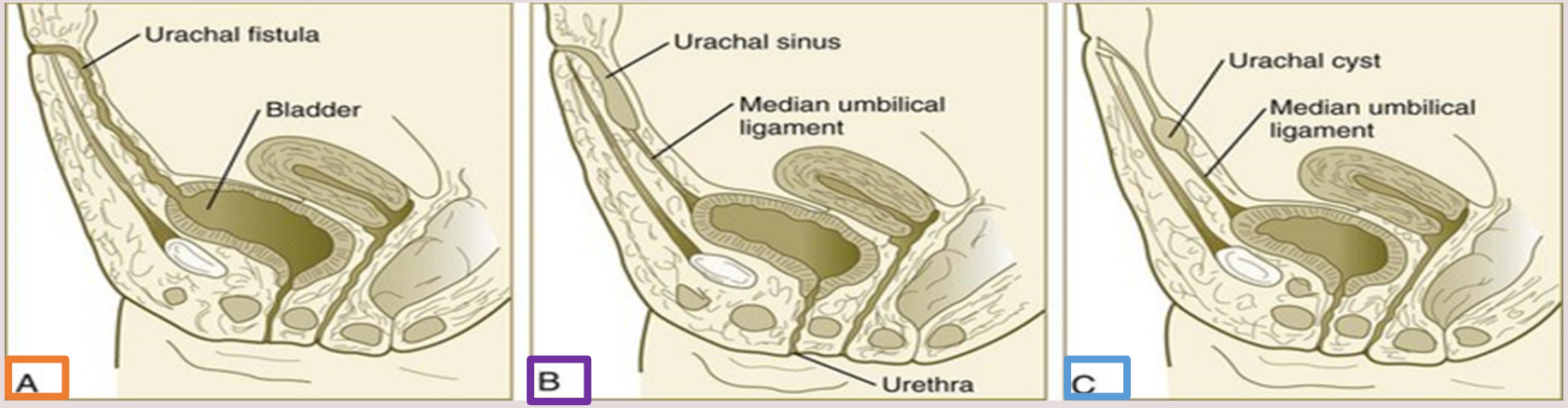
(يعني اقدر اشوف بعيني البوستيريور وول لانه ماتكونت عن الانتيريور وول للبلادر او للابدومن)

2. Urachal (remember! it is the cord extends from the urinary bladder to the umbilical and eventually form the medial umbilical ligament) **anomalies:**

A. Urachal fistula(no fibrosis): the entire urachus remains patent and allows urine to escape from the umbilicus. Open way between the urinary bladder and the umbilical which is supposed to be closed (after fibrosis). يتبولوا من سرتهم

B. Urachal sinus(fibrosis just in terminal part): discharge serous fluid from the umbilicus. فقط إفرازات بسيطة تخرج من السرة

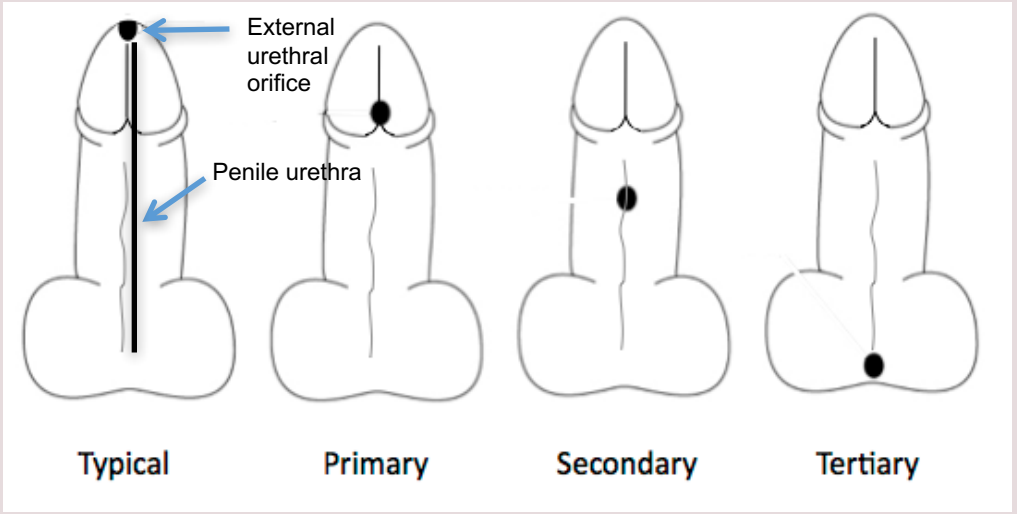
C. Urachal cyst (fibrosis just in the cranial and caudal part): persistence or remnant of epithelial lining of urachus. (Contain serous fluid in side cyst).



Video for extra explanation

Cont.. Anomalies

- This slide is very important ☺



3- Urethral anomalies:

In normal male the penile urethra must open in the external urethral orifice.

A. Hypospadius: it's the most common anomaly, with incomplete fusion of the urethral folds the complete fusion described in slide 7! , and abnormal opening of the urethra يعني جزء ما انقفل occur along the ventral (inferior) aspect of the penis.

B. Epispadius: is a rare anomaly , in which the urethral meatus is found in the dorsal **superior** surface of penis, it is most often associated with extrophy of the bladder.

يعني عادة ماتصير لحالها يكون معها اول انوملي تكلمنا عنها

- See You Our Doctors Next Year ♥..

SUMMARY

Urinary Bladder		
In infants and children the bladder is an **abdominal organ**. It starts to enter the **greater pelvis** at about 6 years and become **a pelvic organ** until after puberty		
Primitive urogenital sinus divided into **three part:**		
1- cranial (vesical part)	2- middle (pelvic part)	3- caudal (phallic part)
forms most of the bladder and continuous with the allantois	forms main part of male urethra and entire female urethra	grows towards genital tubercle.

Anomalies					
1- Exstrophy of the bladder (Ectopiae vesica)	2- Urachal anomalies:			3- Urethral Anomalies:	
(exposure of the posterior wall of the bladder due to a defect in the anterior abdominal wall and anterior wall of the bladder)	1- Urachal cyst	2- Urachal sinus	3- Urachal fistula	1- Hypospadius *common*	2- Epispadius *rare*
	(remnant of epithelium)	(discharging serous fluid from the umbilicus)	(entire urachus remains patent with urine escape from umbilicus). (discharging	(incomplete fusion of urethra)	(associated with exstrophy of the bladder)

MCQ's

1- The cloaca is the dilated terminal part of the hind gut, however witch of the following ducts does It receives.
A- Allantois duct. B- mesonephric duct. C- Both of them D- None of them

2- The Primitive urogenital sinus is divided into three parts, witch of the following is the correct order for them from up down.
A- vesical part, phallic part, pelvic part. B- vesical part, pelvic part , phallic part.
C- pelvic part, vesical part, phallic part. D- phallic part, vesical part, pelvic part.

3- Witch of the following forms most of the bladder and continuous with the allantois.
A- The vesical part of the primitive urogenital sinus. B- The pelvic part of the primitive urogenital sinus.
C- The phallic part of the primitive urogenital sinus. D- None of them

4- Witch of the following forms the female urethra?
A- The vesical part of the primitive urogenital sinus. B- The pelvic part of the primitive urogenital sinus.
C- The phallic part of the primitive urogenital sinus. D- None of them .

5- A mother of 7 weeks old child came to the pediatric clinic complaining of discharge serous fluid from the baby belly button, witch of the following is most likely be the cause.
A- Urachal cyst B- Urachal sinus C- Urachal fistula D- Epispadius

6- Hypospadius.Witch of the following best describe:

A- incomplete fusion ofthe urethral folds, and abnormal openings of the urethra occur along the ventral (inferior) aspect of the penis.

B- 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.

C- the entire urachus remains patent and allows urine to escape from the umbilicus.

1-C
2-B
3-A
4-B
5-B
6-A

ANY SUGGESTION OR ISSUE

Editing file

USEFUL VIDEOS

https://youtu.be/v3Tv86bITZ4?t=249

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