

DEVELOPMENT OF MALE GENITAL SYSTEMS

Objectives:

- List the causes of differentiation of genitalia into the male type
- Describe the origin of each part of the male internal & external genitalia
- List the causes & describe the events of descent of testis
- List the common anomalies of male genital system & describe the causes of each of them

Done by:

- **Team leaders:** Meaad Alnofaie - Fahad Alnahabi



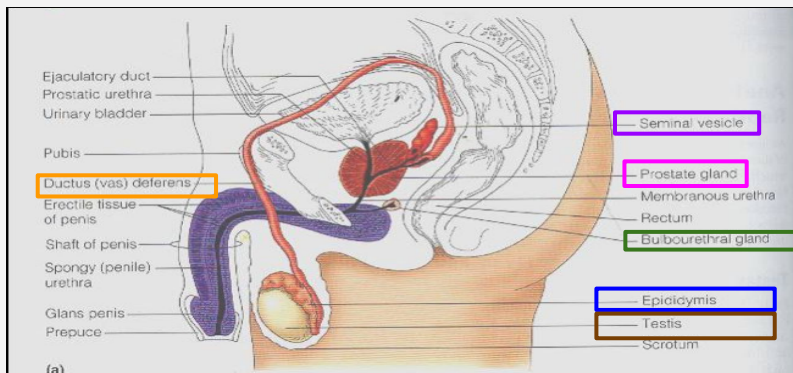
- Important
- Extra
- Notes



MALE GENITAL SYSTEM

It comprises the development of:

1. Gonad	2. Genital ducts	3. Genital glands
Testis	Epididymis	Seminal vesicle
	Vas deferens	Prostate
	Urethra	Bulbourethral gland



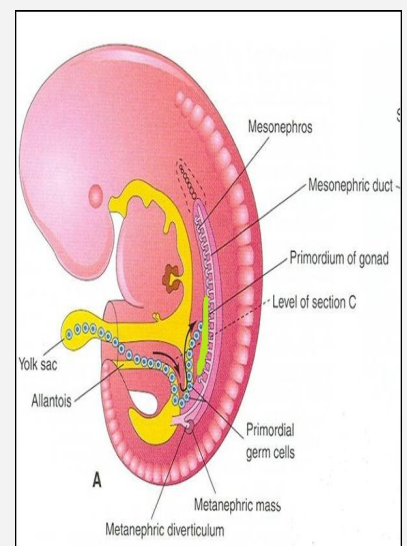
1. Development of gonads

◆ Development of gonads:

- During 5th week : gonadal development occurs
- Until 7th week: gonads are similar in both sexes

➤ Gonads are derived from 3 sources:

1. Mesothelium (epithelium lining the coelomic cavity)
2. Underlying mesenchyme (Mesoderm)
3. Primordial germ cells.



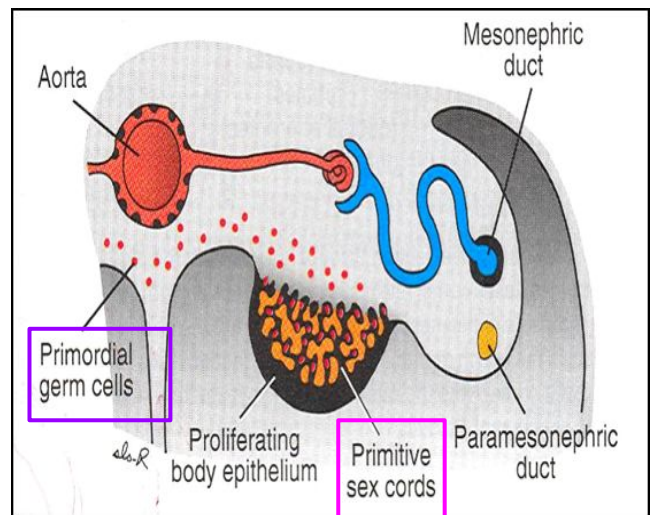
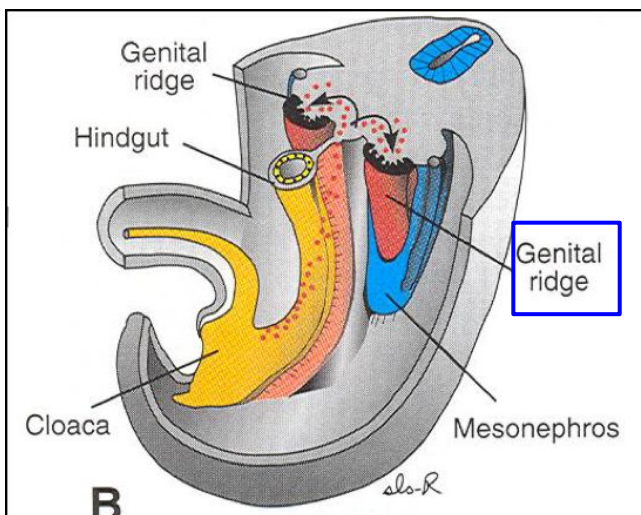


هذا الفيديو يشرح أهم نقاط المحاضرة .. وجداً جداً مفيد

INDIFFERENT GONADS

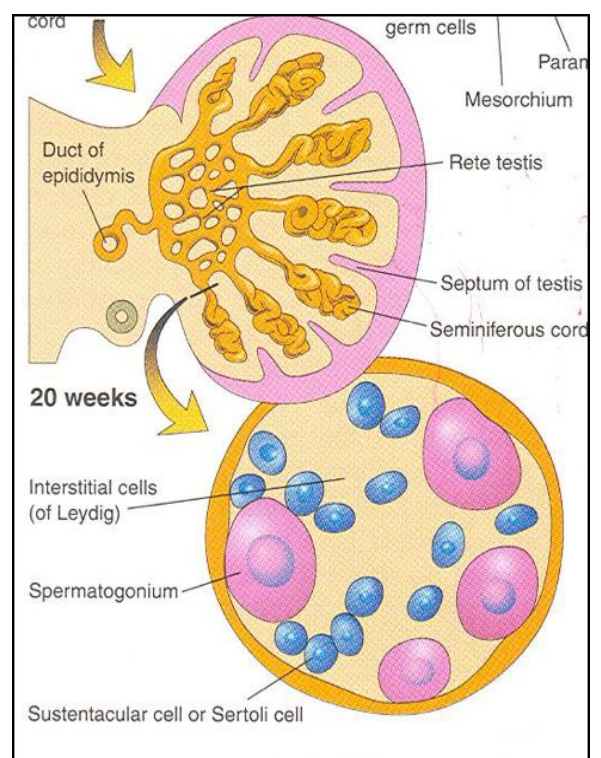
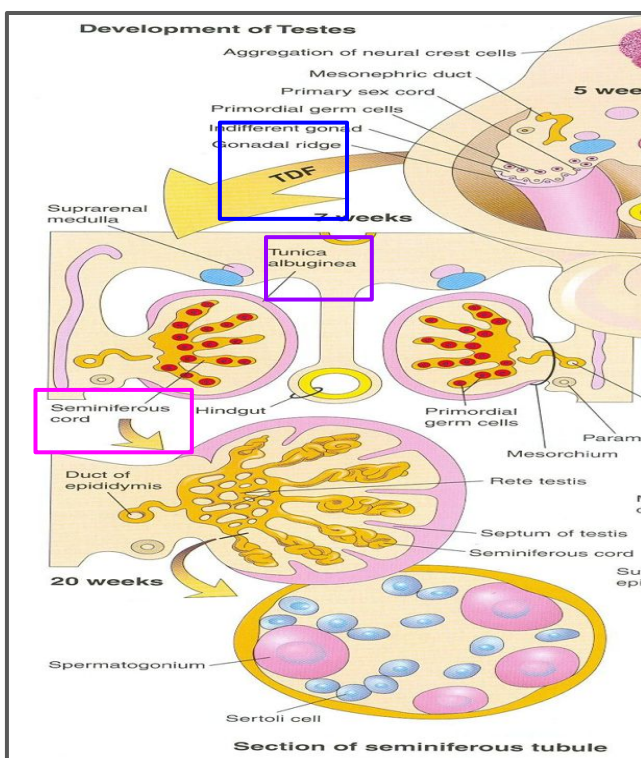
❖ Gonad Is derived from three sources :

<p>Gonadal ridge</p>	<p>A bulge on the medial side of mesonephros produced by:</p> <ol style="list-style-type: none"> 1. Proliferation of mesothelium (cortex) 2. Proliferation of mesenchyme (medulla) <p>because we here still in the indifferent stage, so both medulla and cortex mesenchyme proliferate, but if we reach the 7th week and start the differentiate stage, only (medulla) the Medulla will differentiate while the cortex regress.</p>
<p>Gonadal (primary sex) cords</p>	<p>The proliferating mesothelial cells fuse and penetrate the underlying mesenchyme to form primitive gonadal cords</p>
<p>Primordial germ cells</p>	<p>Endodermal cells of the yolk sac migrate along dorsal mesentery of hindgut to gonadal ridges and become incorporated into gonadal cords</p>



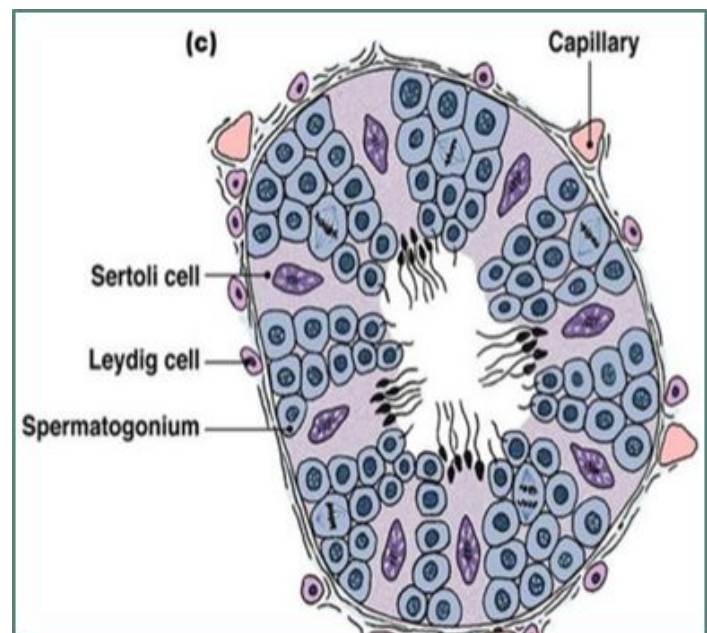
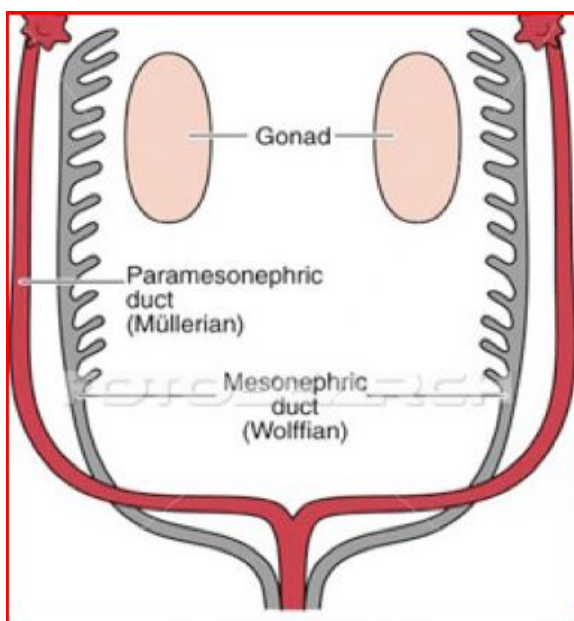
DEVELOPMENT OF TESTIS

- The Y chromosome has a **testis-determining factor (TDF)** that differentiates gonad into testis.
 - **At 7th week:**
 - Regression of cortex & differentiation of medulla into testis
 - Gonadal cords condense & extend into medulla (**Medullary cords**) to form **Seminiferous cords**
 - **The characteristic feature is** the development of a thick fibrous capsule (**tunica albuginea**) that separates the enlarging testis from mesonephros
 - **Seminiferous cords** develop into: **Seminiferous tubules**
 - Seminiferous tubules remain solid until puberty
- Seminiferous walls are composed of:
1. Sertoli cells: derived from surface epithelium of testis (mesothelial cells)
 2. Spermatogonia: derived from primordial germ cells
- By **eighth week**, mesenchyme surrounding seminiferous cords from outside gives rise to interstitial cells (of Leydig) secreting testosterone



2. DEVELOPMENT OF MALE GENITAL DUCTS

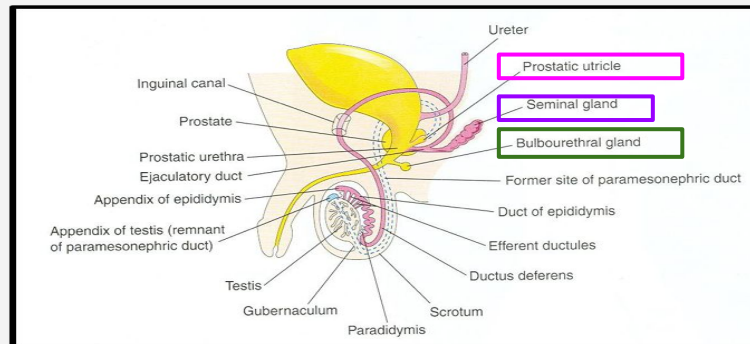
	Leydig's cells	Sertoli cells
Secretion	Secretes Testosterone	Secretes Müllerian inhibiting substance (Anti-Müllerian hormone)
Time	8th week	7th week
Action	<ul style="list-style-type: none"> ➤ Masculine male differentiation of mesonephric duct : <ol style="list-style-type: none"> 1. epididymis 2. vas deferens 3. ejaculatory duct 4. seminal glands ➤ Masculine differentiation of external genitalia 	<ul style="list-style-type: none"> ➤ Suppression of development of paramesonephric (mullerian) ducts in females



Development of Male Genital Glands

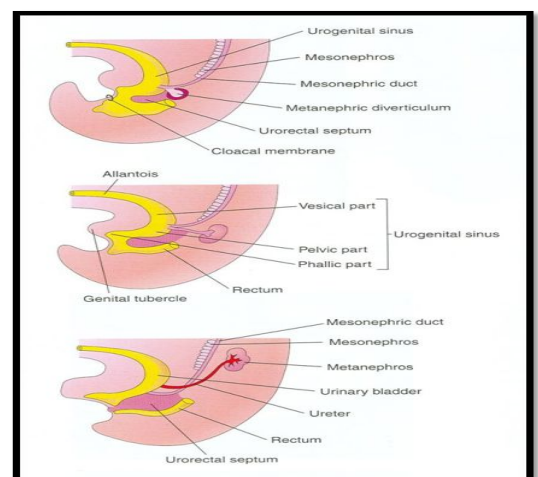
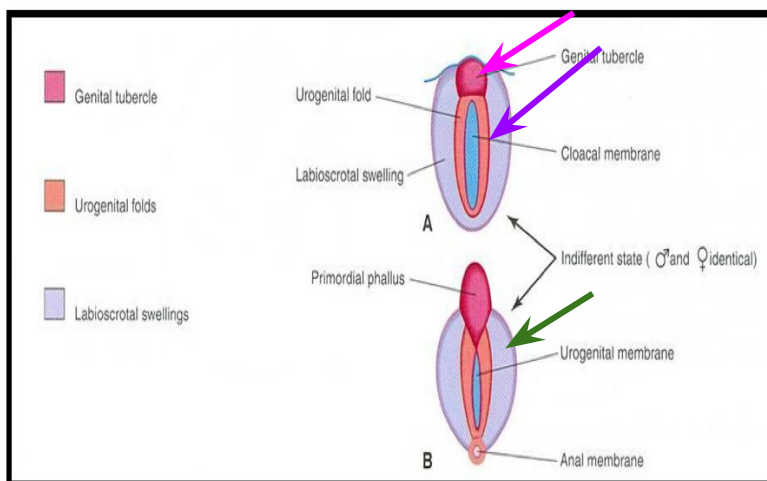
1. **SEMINAL GLAND:** mesodermal outgrowth from mesonephric duct
2. **PROSTATE GLAND:** endodermal outgrowth from prostatic urethra
3. **BULBOURETHRAL GLAND:** endodermal outgrowth from spongy urethra

➤ **Stroma & Smooth muscles** Of prostatic and bulbourethral glands are derived from surrounding mesenchyme



1. **Genital tubercle:** produced from mesenchyme at the cranial end above of cloacal membrane
It elongates to form a primordial phallus Which later will give the penis
2. **Urogenital folds:** develop on each side of cloacal later will convert to urogenital) membrane
3. **Labioscrotal swellings:** develop on each side of urogenital folds Which later will give the scrotum

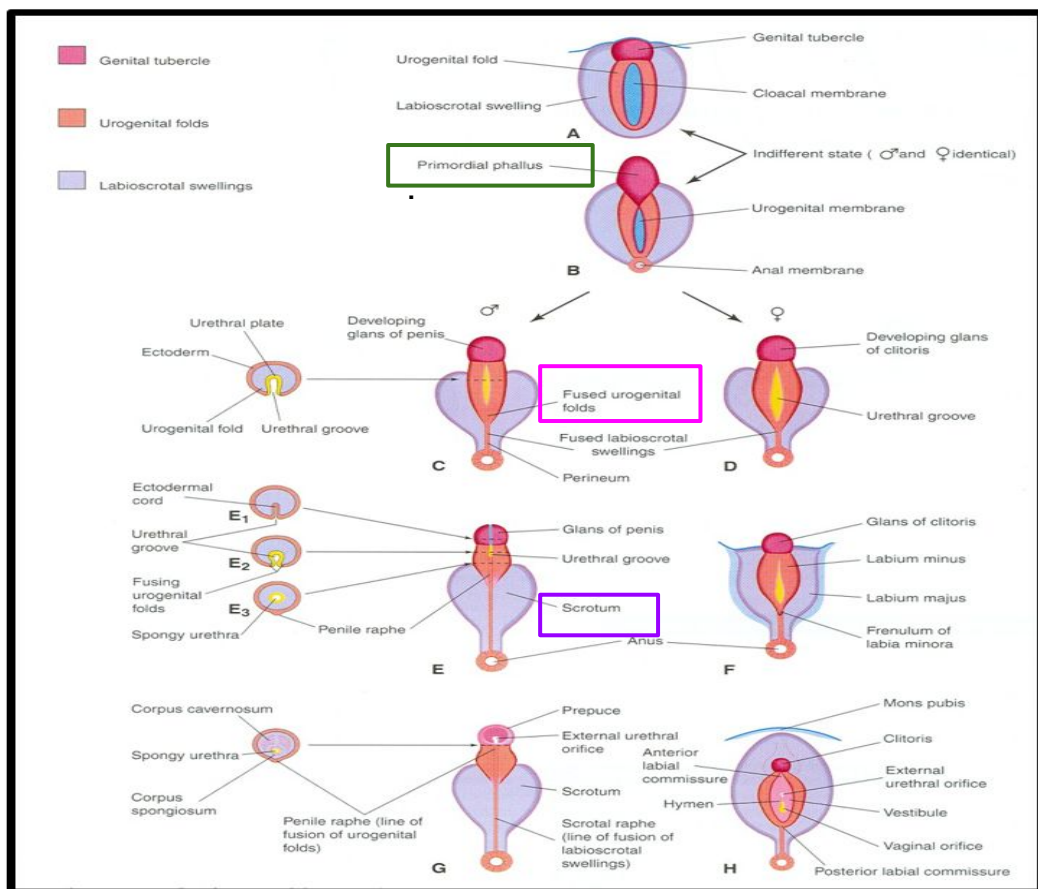
➤ **INDIFFERENT STAGE OF EXTERNAL GENITALIA (from 4th to 7th week)**



DEVELOPMENT OF MALE EXTERNAL GENITALIA



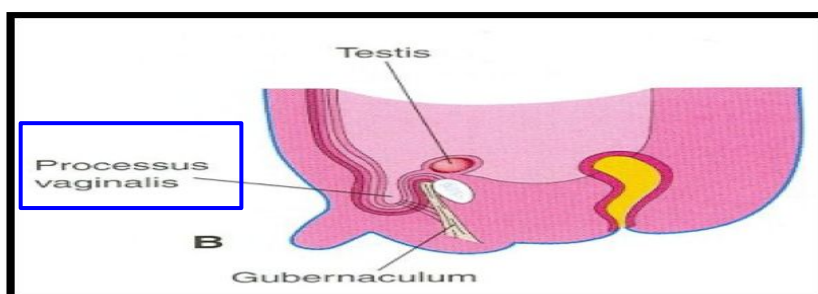
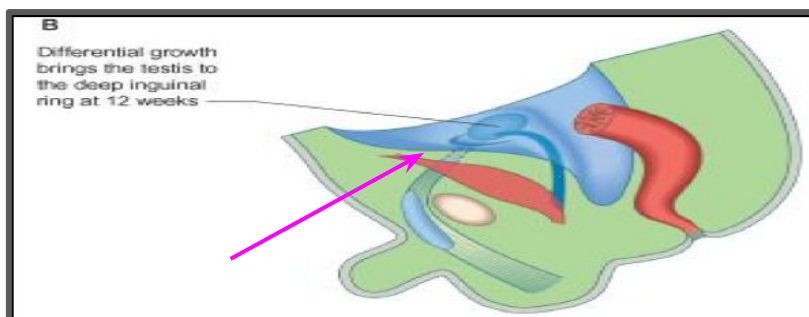
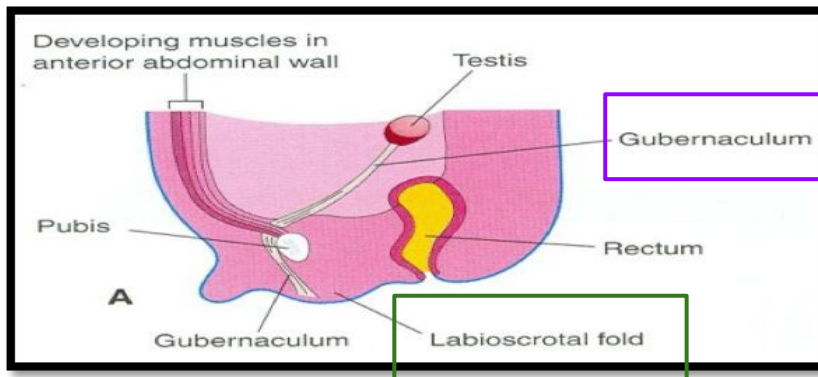
- Stimulated by testosterone
- Begins at **9th week**
- Complete differentiation at **12th week**:
 1. The **phallus** enlarges to form the **penis**
 2. The **urogenital folds** fuse to form the **spongy (penile) urethra** (yellow color in the middle)
 3. The **labioscrotal folds (swellings)** fuse to form the **scrotum**



DESCENT OF TESTIS

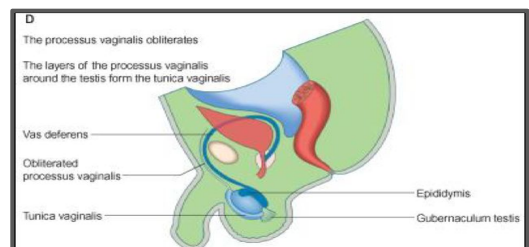
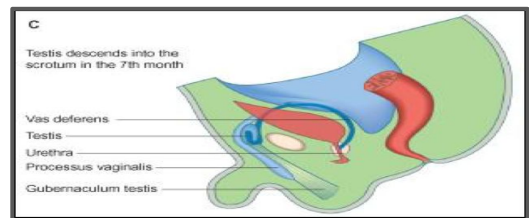
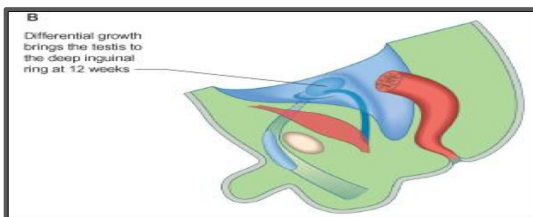
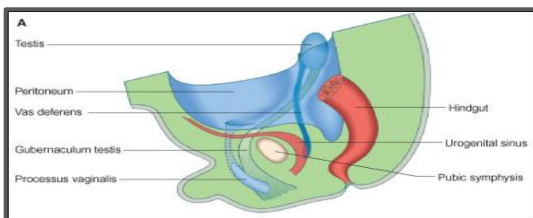
❖ DESCENT OF TESTIS

Gubernaculum	Inguinal canal	Processus vaginalis
A mesenchymal band extending from inferior pole of gonad to labioscrotal fold	A pathway formed by gubernaculum through layers of anterior abdominal wall.	A peritoneal fold passing through inguinal canal before testis, to facilitate its descent



INTERNAL & EXTERNAL DESCENT OF TESTIS

	INTERNAL DESCENT OF TESTIS	EXTERNAL DESCENT OF TESTIS
Definition	Descent of testis from posterior abdominal wall deep inguinal ring	Descent of testis from deep inguinal ring, through inguinal ring, to scrotum.
Time	During 12th week	Begins in the 7th month and it takes 2 to 3 days
Cause	relative movement resulting from elongation of cranial part of abdomen away from its caudal part (future pelvic cavity)	<ul style="list-style-type: none"> ➤ Controlled by androgens ➤ Guided by gubernaculum. ➤ Facilitated by processus vaginalis ➤ Helped by increased intra-abdominal pressure resulting from the growth of abdominal viscera.

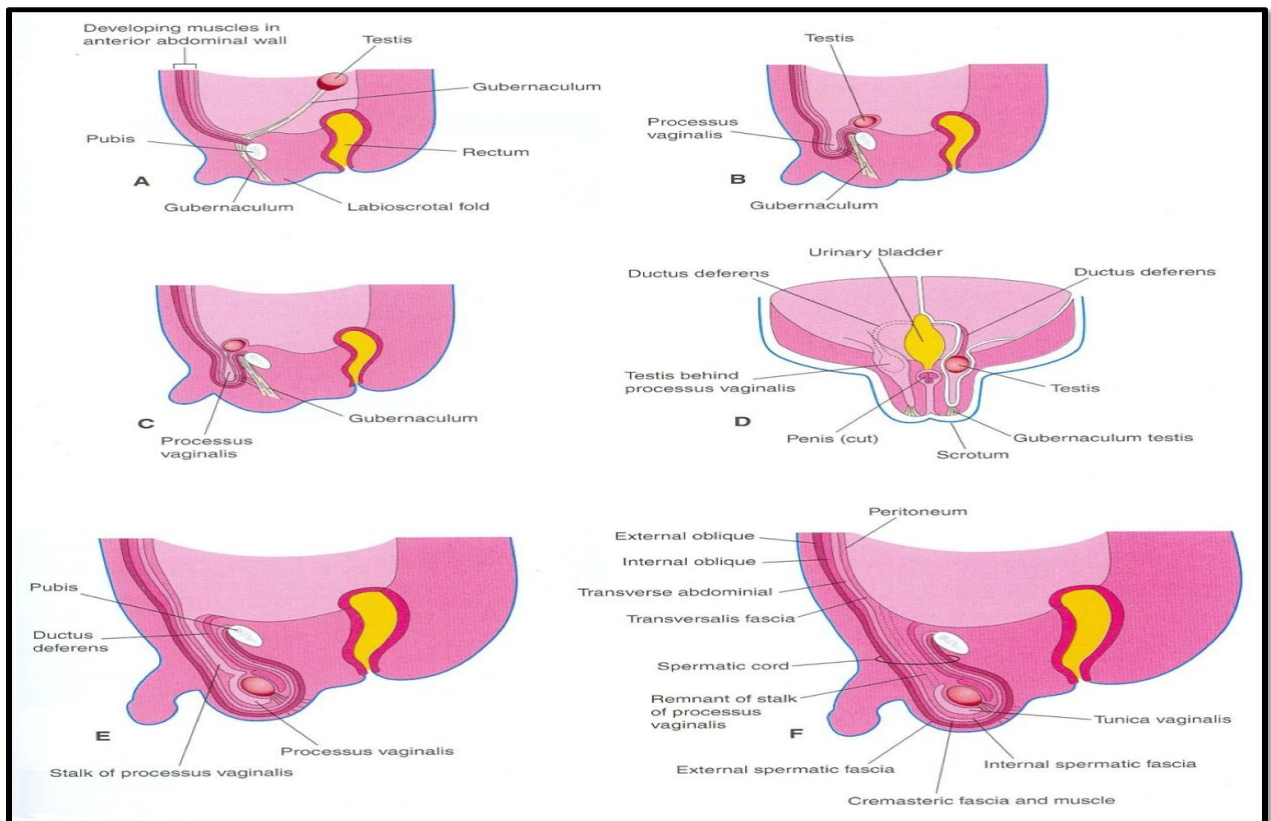


EXTERNAL DESCENT OF TESTIS

- More than 97% of full-term newborn males have both testes in scrotum
- **During first 3 months after birth**, most undescended testes descend into scrotum
- **No spontaneous descent occurs after the age of 1 year**

◆ Complete descent of testis is associated by:

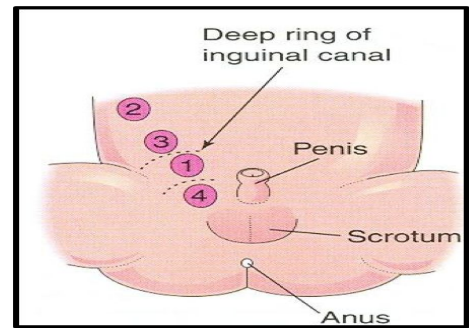
- Degeneration of gubernaculum
- Obliteration of stalk of processus vaginalis
- Persistence of part of processus vaginalis surrounding the testis in the scrotum to form tunica vaginalis



Congenital Anomalies

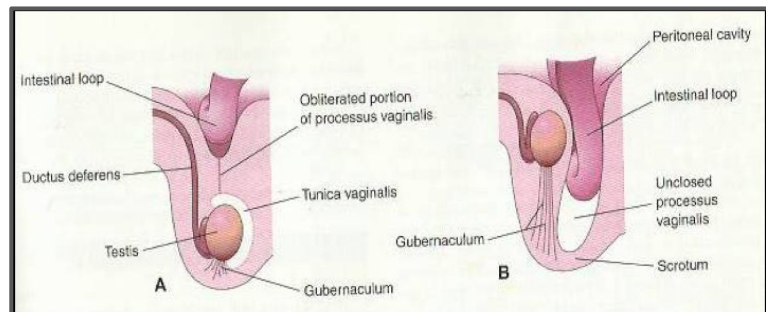
Cryptorchidism (undescended testis)

- Incidence: is up to 30% of premature & 3-4% of full term males
- **Cause:** deficiency of androgens
- **Common sites:** look to figure:
 1. Deep ring of inguinal canal
 2. Upper part of abdomen
 3. Lower part of abdomen
 4. Pelvis
- **Complications:**
 1. Sterility, **if bilateral**
 2. Testicular cancer (20-44%)



Congenital inguinal hernia

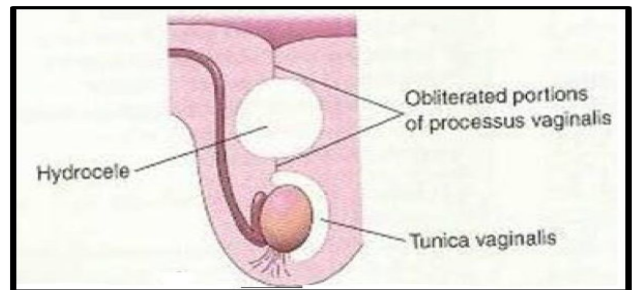
- **Definition:** Herniation of a loop of intestine through a non-obliterated processus vaginalis
- **incomplete** (Part of stalk open)
- **complete** (in scrotum) (All stalk open)
- **Cause:** The processus vaginalis does not obliterate & remains in open communication with the peritoneal cavity.



Congenital Anomalies

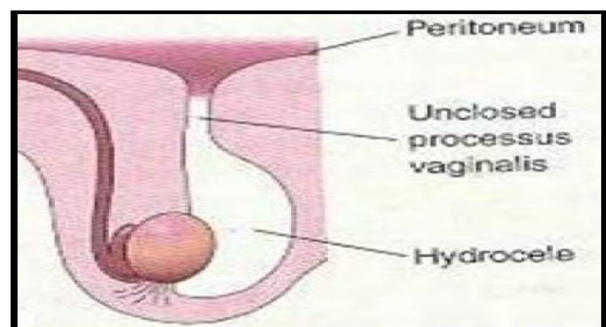
Hydrocele spermatic cord

- Accumulation of fluid in spermatic cord due to a non-obliterated portion of stalk of processus vaginalis



Hydrocele of testis

- Accumulation of fluid in tunica vaginalis (in scrotum) due to non-obliteration of the whole stalk of Processus vaginalis



Summary

DATE	EVENT
5th week	➤ development of gonads
7th week	<ul style="list-style-type: none"> ➤ Regression of cortex & differentiation of medulla into testis 7th week ➤ Sertoli cells secretes Anti-Müllerian hormone- ➤ gonads are similar in both sexes
8th week	➤ interstitial cells (of Leydig) secreting testosterone.
4th to 7th week	➤ INDIFFERENT STAGE OF EXTERNAL GENITALIA
9th week	➤ Begins of development of male external genitalia
12th week	<ul style="list-style-type: none"> ➤ Complete differentiation male external genitalia ➤ Internal descent of testis
7th month	➤ external descent of testis
First 3 months after birth	➤ most undescended testes descend into scrotum
After 1 year	➤ No spontaneous descent of testis occur penis
Penis	➤ Genital tubercle- > enlargement of phallus
Spongy (penile) urethra	➤ fusion of urogenital folds
Scrotum	➤ fusion of The labioscrotal folds

MCO's

1. The Y chromosome carries a gene on its short arm that codes for		2. What is the most common site of cryptorchidism ?				
A.	testosterone	A.	Superficial inguinal ring			
B.	MIF	B.	Deep inguinal ring			
C.	testes-determining factor (TDF)	C.	Peritoneal cavity			
D.	progesterone	D.	Pelvis			
3. which one of the following cells is responsible for masculine differentiation of external genitalia ?		4. is due to deficiency of androgens				
A.	Sertoli cells	A.	CAH			
B.	Primordial cells	B.	CRYPTORCHIDISM			
C.	leydig's cells	C.	HYDROCELE OF TESTIS			
D.	Mesothelium cells	D.	UNDESCENDED TESTIS			
5. are due to Failure of closure of processus vaginalis		6. In HYDROCELE OF SPERMATIC CORD Accumulation of fluid in..... and in HYDROCELE OF TESTIS Accumulation of fluid in.....				
A.	HYDROCELE OF SPERMATIC CORD	A.	tunica vaginalis , scrotum			
B.	HYDROCELE OF TESTIS	B.	scrotum . tunica vaginalis			
C.	CONGENITAL INGUINAL HERNIA	C.	spermatic cord . tunica vaginalis			
D.	all of them	D.	scrotum , spermatic cord			
Q	1	2	3	4	5	6
Answers	C	B	C	B,D	D	C