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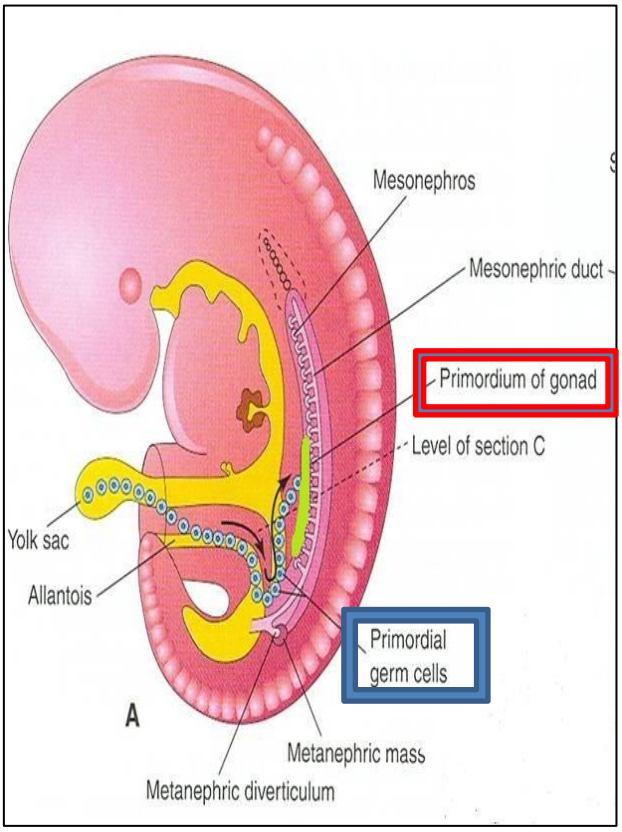
DEVELOPMENT OF GONADS

- **During 5th week:** gonadal development occurs.
- **Until 7th week:** gonads are similar in both sexes.
- **Gonads are derived from *3 sources:***

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



INDIFFERENT GONADS

- **Gonadal ridge:** a bulge on the medial side of mesonephros produced by:

1. *Proliferation of mesothelium* (cortex)
2. *Proliferation of mesenchyme* (medulla)

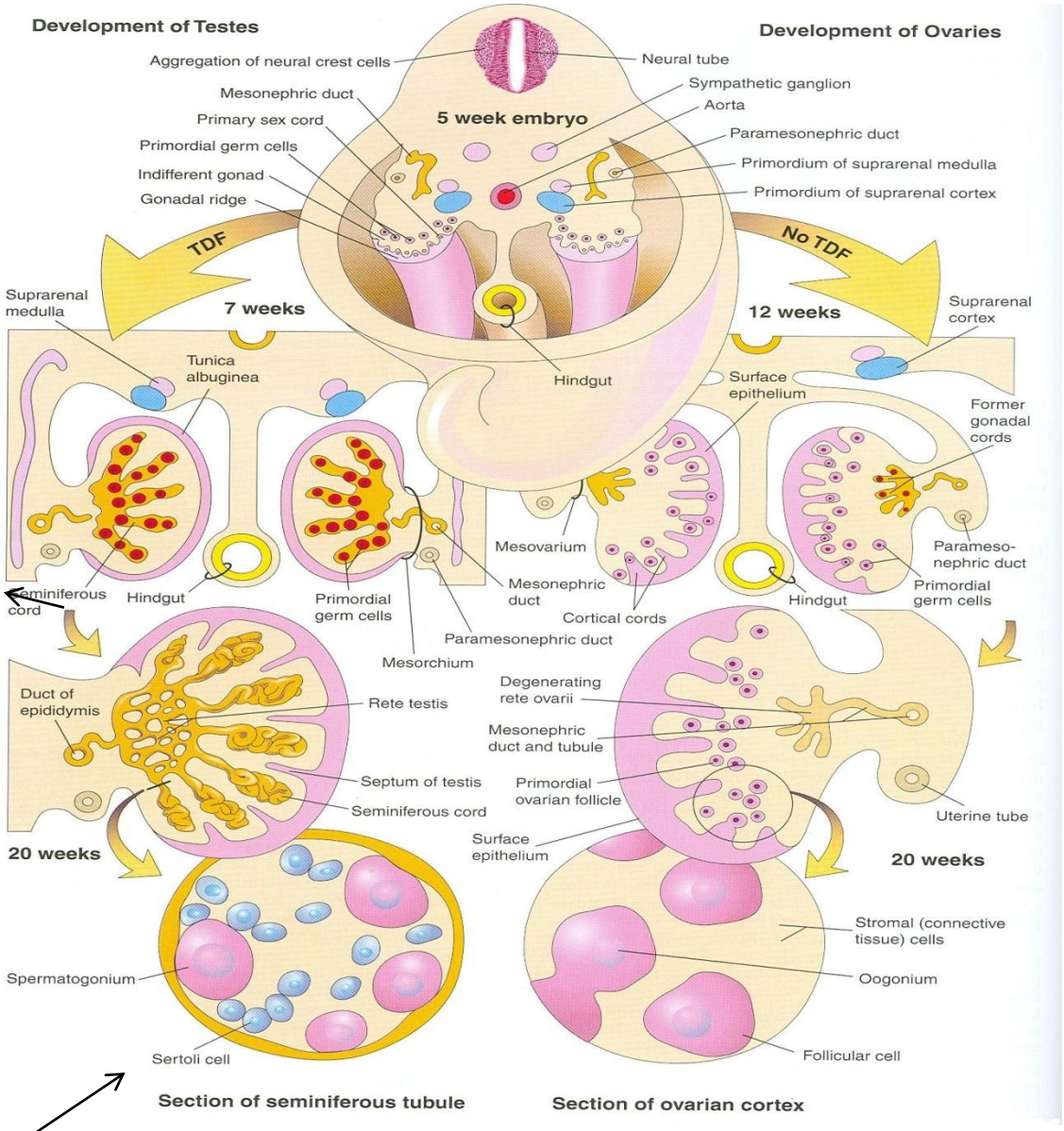
- **Gonadal (primary sex) cords:**

The proliferating mesothelial cells fuse and penetrate the underlying mesenchyme to form gonadal cords.

- **Primordial germ cells:**

endodermal cells of the yolk sac migrate along dorsal mesentery of hindgut to gonadal ridges & become incorporated into gonadal cords.

In Medulla



Germ cells →

Mesothelial cells ↗

DEVELOPMENT OF TESTIS

The Y chromosome has a testis-determining factor (TDS) that differentiates gonad into testis.

At 7th week:

- ☐ Regression of cortex & differentiation of medulla into testis.
- ☐ Gonadal cords condense & extend into medulla 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:** semineferous tubules
- ☐ Semineferous tubules remain solid until puberty. Its 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 semineferous cords gives rise to interstitial cells (of Leydig) secreting testosterone.

DEVELOPMENT OF MALE GENITAL DUCTS

Leydig's cells

↓

Testosterone (8th week)

↓

1) Masculine differentiation of mesonephric duct: epididymis, vas deferens, seminal glands, ejaculatory duct.
2) Masculine differentiation of external genitalia

Sertoli cells

↓

Müllerian inhibiting substance
(Anti- Müllerian hormone)
(7th week)

↓

Suppression of development of paramesonephric (Müllerian) duct

DEVELOPMENT OF MALE GENITAL GLANDS

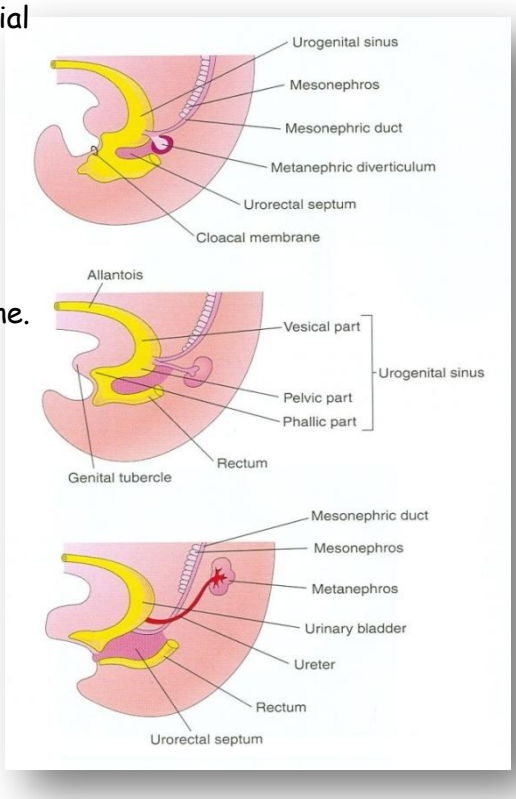
SEMINAL GLAND	PROSTATE GLAND	BULBOURETHRAL GLAND
mesodermal outgrowth from mesonephric duct	endodermal outgrowth from prostatic urethra	endodermal outgrowth from spongy urethra

*Stroma & smooth muscles in prostate and bulbourethral glands are derived from surrounding mesenchyme.

Genital tubercle: produced from mesenchyme at the cranial end of cloacal membrane. It elongates to form a primordial phallus

Urogenital folds: develop on each side of cloacal membrane.

Labioscrotal swellings: develop on each side of urogenital folds.



DEVELOPMENT OF MALE EXTERNAL GENITALIA

9th week

Begins•
(stimulated by testosterone)•

12th week

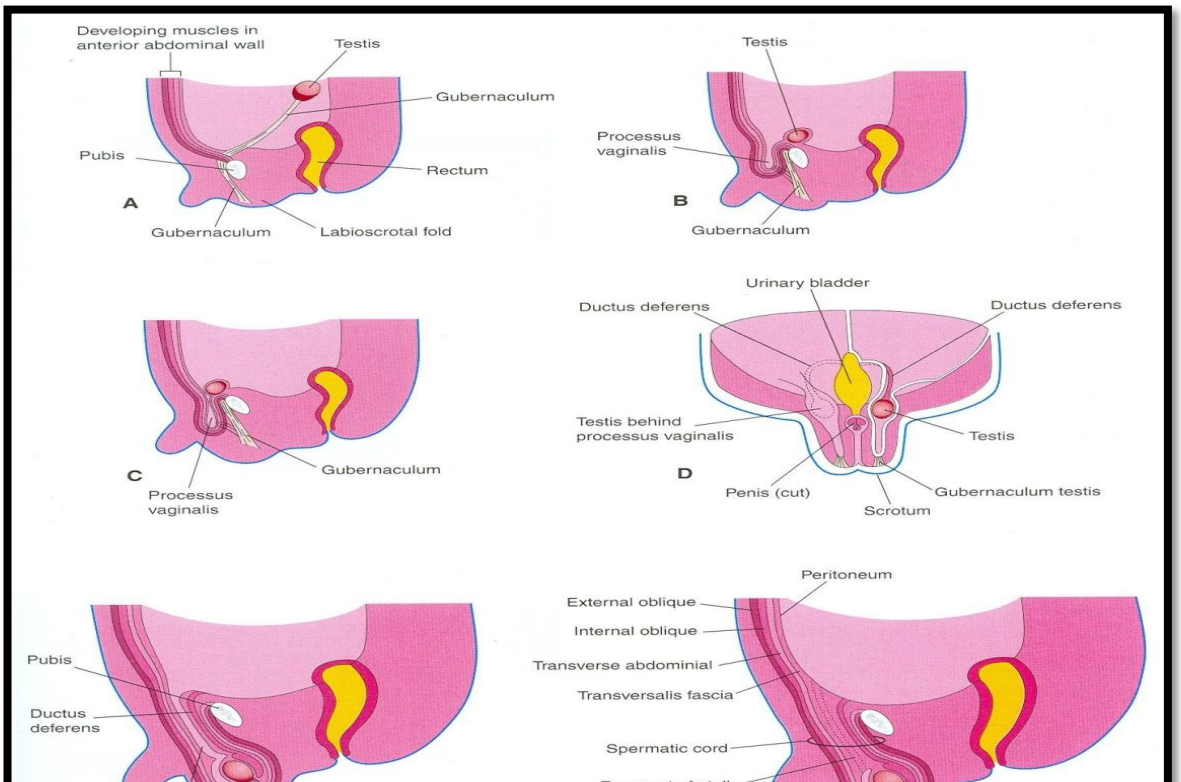
Complete differentiation •
The phallus enlarges to form the penis•
The urogenital folds fuse to form the spongy (penile) • urethra
The labioscrotal folds (swellings) fuse to form the scrotum•

DESCENT OF TESTIS

Gubernaculum: a mesenchymal band extending from inferior pole of gonad to labioscrotal fold

Inguinal canal: a pathway formed by gubernaculum through layers of anterior abdominal wall

Processus vaginalis: a peritoneal fold passing through inguinal canal before testis to facilitate its descent



INTERNAL DESCENT OF TESTIS

- **Definition:** Descent of testis from posterior abdominal wall to deep inguinal ring.
- **Time:** During 12th week
- **Cause:** a *relative movement* resulting from elongation of cranial part of abdomen away from its caudal part (future pelvic cavity).

EXTERNAL DESCENT OF TESTIS

- **Definition:** Descent of testis from deep inguinal ring, through inguinal canal, to scrotum
- **Time:** Begins in 7th month and *takes 2 to 3 days*
- **Causes:**

1. Controlled by androgens.
2. Guided by gubernaculum.
3. Facilitated by processus vaginalis.
4. Helped by increased intra-abdominal pressure resulting from growth of abdominal viscera.

EXTERNAL DESCENT OF TESTIS

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

EXTERNAL DESCENT OF TESTIS

Complete descent of testis is associated by:

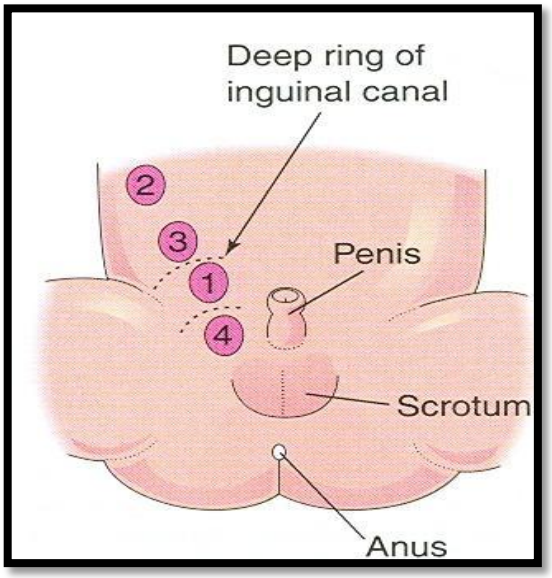
- Degeneration of gubernaculum.
- Obliteration of stalk of processus vaginalis.

- Persistence of part of processus vaginalis surrounding the testis in the scrotum to form "tunica vaginalis" .

CHRYPTORCHIDISM (UNDESCENDED TESTIS)

- **Incidence:** in up to 30% of premature & 3-4% of full term males
- **Cause:** deficiency of androgens.
- **Common sites:** look to figure
- **Complications:**

1. Sterility, if bilateral
2. Testicular cancer (20-44%)

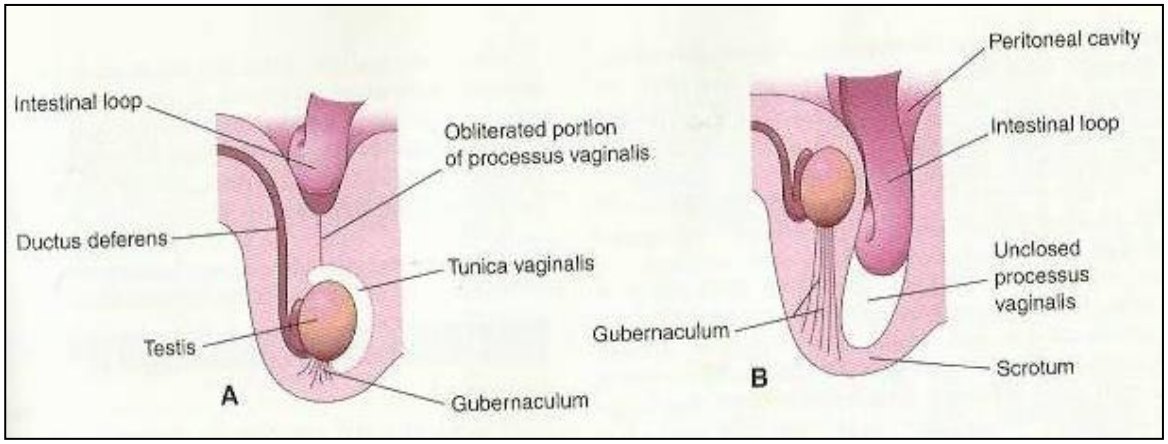


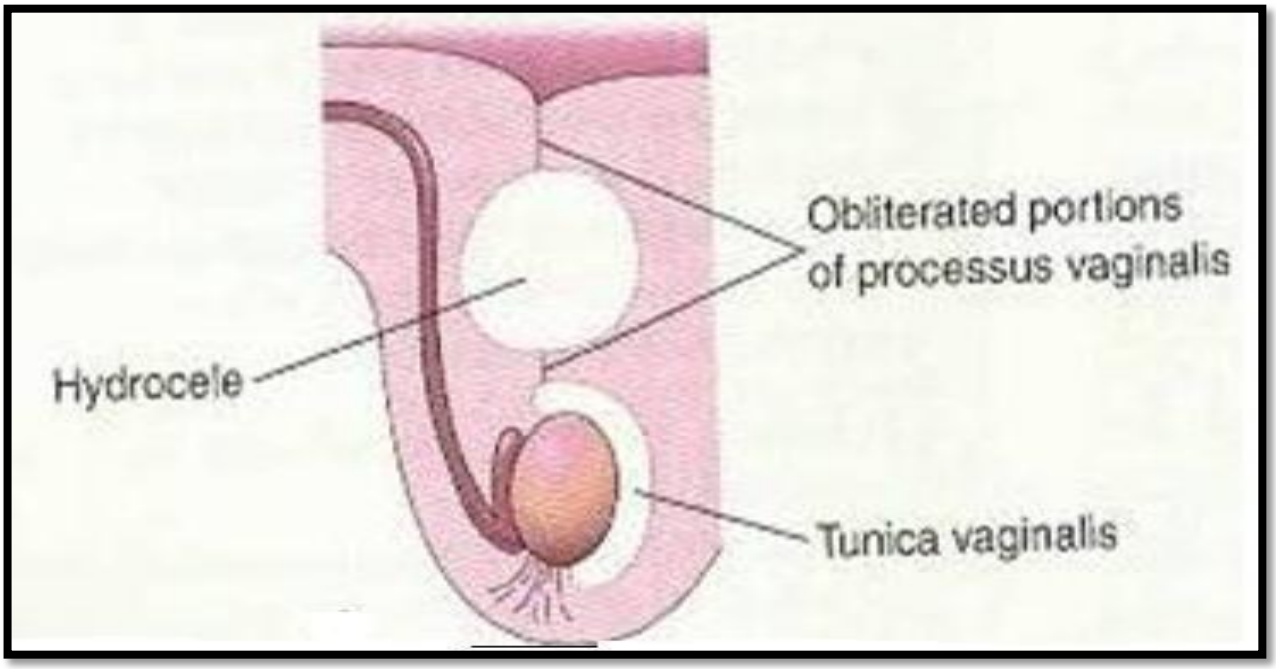
CONGENITAL INGUINAL HERNIA

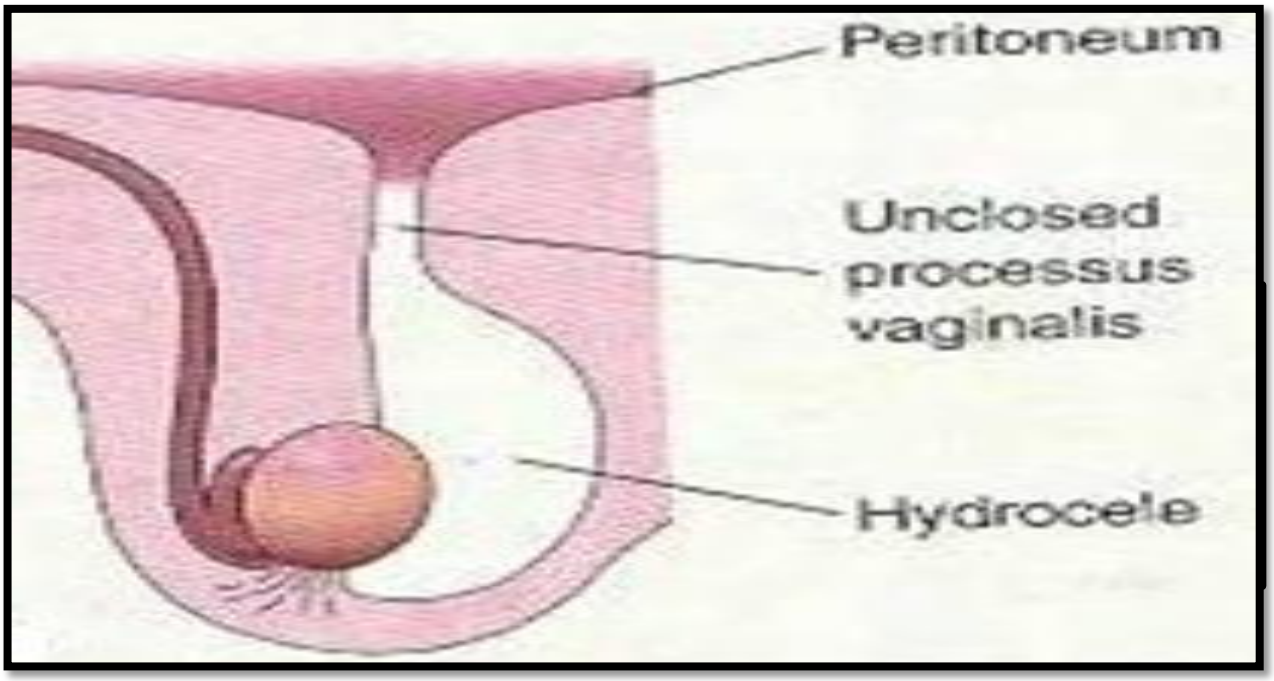
- **Definition:** Herniation of a loop of intestine through a non-obliterated processus vaginalis.

A: incomplete B: complete (in scrotum)

- **Cause:** The processus vaginalis does not obliterate & remains in open communication with the peritoneal cavity.




Obliterated portions
of processus vaginalis
Hydrocele
Tunica vaginalis


Peritoneum
Unclosed
processus
vaginalis
Hydrocele

Test your self

1. Which of the following is the characteristic feature of the testicular development ?

a. Rete testis.

b. Seminiferous cords.

c. Tunica albuginea.

d. Testis- determining factor (TDF).

Answer:C

2. Which structure gives rise the seminal gland ?

a. Genital tubercle.

HYDROCELE OF TESTIS

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

b. Mesonephric duct.

c. Paramesonephric duct.

d. Urogenital sinus.

Answer:B

3. Which one of the following contributes to congenital cyst formation in the stalk of processus vaginalis?

a. Cryptorcidism.

b. Congenital inguinal hernia.

c. Hydrocele of spermatic cord.

d. Hydrocele of testis.

Answer:C