



## Anatomy

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**\*\*In** this lecture we will talk about inguinal hernia and its types, Inguinal canal is a common land marks for surgeons and they must know its relation to make a decision about the site and the length of the incision they will make, so we have to memorize the anatomy of inguinal canal and its rings..

The inguinal canal (oblique structure) extend in a downward and medial direction, above and parallel to the lower half of the inguinal ligament (between pubic tubercle and anterior superior iliac spine)

### **1-It has 4 walls:**

a) **Anterior wall:** is formed along its entire length by the aponeurosis of the external oblique muscle (you know that the inguinal ligament is composed of reflexions from the external oblique aponeurosis).

b) **Posterior wall:** is formed by the transversalis fascia.

c) **Superior wall(roof):** formed by the arching fibers of the transversus abdominis and internal oblique muscles.

d) **Inferior wall (floor):** formed by the medial one- half of the inguinal ligament, at the medial part is the lacunar ligament.

### **2-it has 2 rings:**

a) **Deep (internal) inguinal ring:** it's the beginning of the inguinal canal and its point midway between anterior superior iliac spine and pubic symphysis, above the inguinal ligament and lateral to the inferior epigastric vessels, an opening of the transversalis fascia.

b) **Superficial (external) inguinal ring:** it's the end of the inguinal canal and it's above the pubic tubercle.

### **3- Contents:**

a) Spermatic cord in men.

b) Round ligament of the uterus down to the labia majora in women.

c) Genital branch of genitofemoral nerve ( innervation to the cremasteric muscle in men).

d) testicular artery in men.

e) cremasteric vessels in men.

f) Lymphatic.

g) The remaining of the processus vaginalis (we will talk about it in a while)

h) ilioinguinal nerve in both sexes, enter the canal through posterior wall.

## **Development**

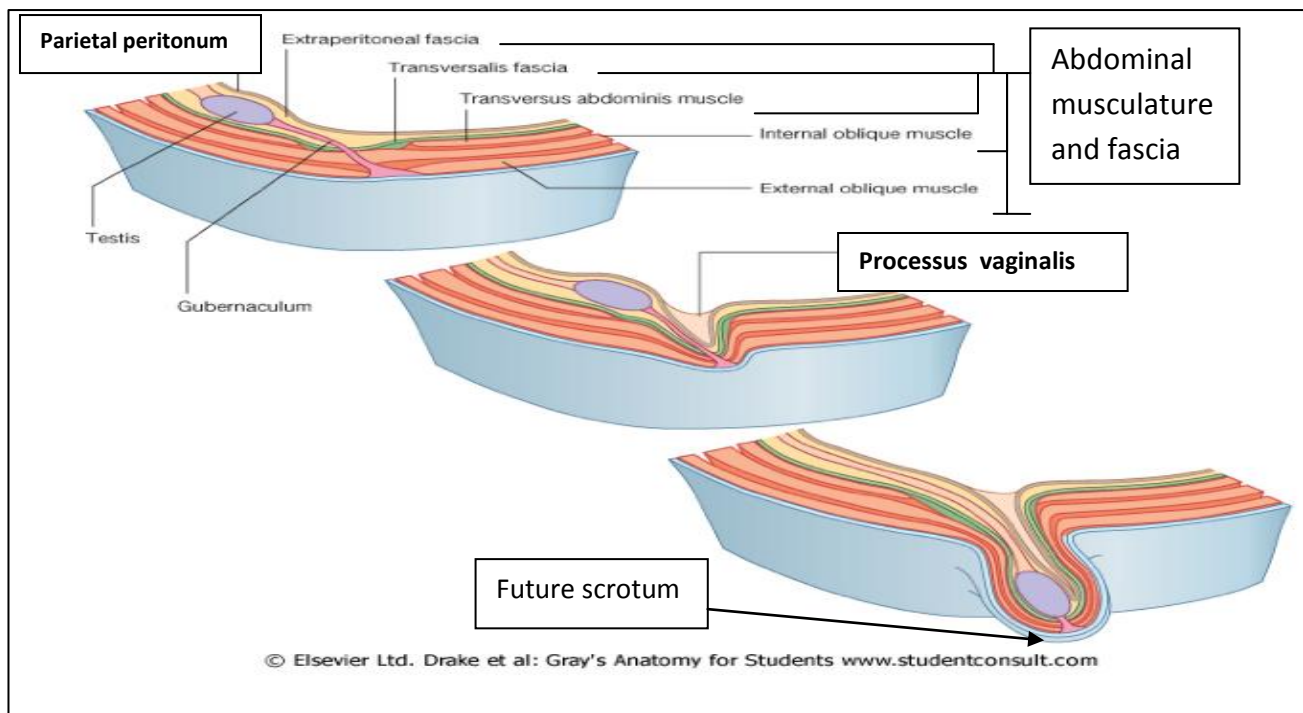
We will talk about it because it has some clinical using in this lecture, the inherent weakness in the anterior abdominal wall in the inguinal region that leading to hernia is caused by changes that occur during the development of the gonads.

In the embryonic period and before the descent of the ovaries and testes from their initial position high in the posterior abdominal wall, a peritoneal outpouching forms, then it becomes processus vaginalis which is an embryonic developmental outpouching of the parietal peritoneum, then this structure protruding through the layers of the anterior abdominal wall, as a result processus vaginalis transformed into a tubular structure with multiple coverings from the anterior abdominal wall and this is the basic structure of the inguinal canal.

The final event of this development is the descent of the testes and their vessels, ducts and nerves pass through the inguinal canal and surrounds by the same fascial layers of abdominal wall into the scrotum (and by this testicular descent the formation of the spermatic cord completed)

or of the ovaries into the pelvic cavity and become associated with the developing of the uterus.

The processus vaginalis is closed normally in both sexes may a small part of it remain there.



-the inguinal region is the area of junction between the anterior abdominal wall and the thigh, in this area the abdominal wall is weakened from changes that occur during development and a peritoneal sac or diverticulum with or without abdominal contents, can therefore protrude through it, creating inguinal hernia.

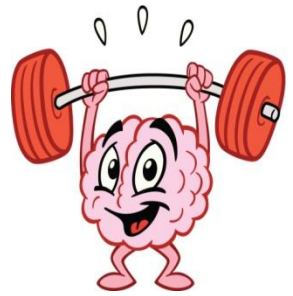
-keep in mind that the inguinal canal in the fetus and babies is not oblique but straight that the two openings opposite or facing each others.

-the fascia transversalis is not strong as external oblique aponeurosis.

-superficial inguinal ring supposed to be weak point and opposite to it complete fascia that support it which is a conjoint tendon (This wall or tendon is strong where it lies opposite the weakest part of the anterior wall (that is superficial inguinal ring), its form the medial part of posterior wall of inguinal canal, it's a common tendon of insertion of internal oblique and transversus and attached to the pubic crest and pectineal line).

-so if we have a patient with hernia we go through these layers:  
Skin, fat, scarpas fascia, external oblique aponeurosis.

-The doctor show a video for an operation he did on a patient with hernia, he asked the patient to cough so the intestine part that herniated be blown up, so he can tell that its inguinal hernia because its above and medially to the pubic tubercle.



-Then he asks a question will you face if we cut the spermatic cord?

Vas deference(it's hard, can be felt easily and passage for sperm),  
genital branch of genitofemoral nerve, testicular artery and veins,  
Testicular lymph vessels, Autonomic nerves, Processus vaginalis, Cremastic artery,  
Artery of the vas deference.

- What will happen if we cut ilioinguinal nerve?

This nerve is responsible for stimulation of the pain in the penis and upper part of scrotum so loss of sensation occur, and if we tie or suture it the patient will suffer from severe and continuous pain.

-**Cremasteric reflex**, This reflex is elicited by lightly stroking or poking the superior and medial part of the thigh, in normal state the ilioinguinal nerve normally stimulated then its activate the motor fiber of genital branch of genitofemoral that innervate the cremastic muscle cause contraction in this muscle and elevate the testes,when there is no such a response that's mean there is a defect..

-as we said before the testicle is formed in the posterior abdominal wall it get out from the deep ring taking with a part of the peritoneum (processus vaginalis) that continue with the spermatic cord and pass through the superficial ring, so if this processus vaginalis remain patent after birth it causes hernia.

-in the adult we have two types of hernia:

### **1-direct hernia:**

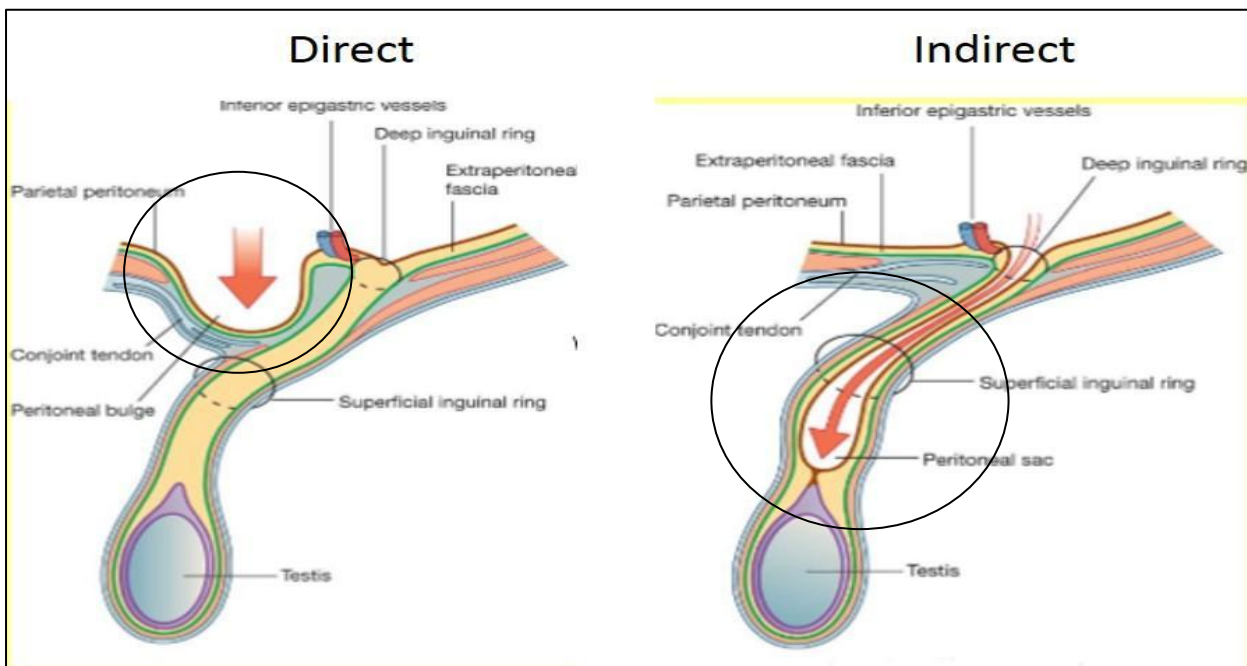
On the posterior wall (fascia transversalis ), on the medial end, so it common in old people where their structure become weakened, may exist through superficial inguinal ring, doesn't pass down the inguinal canal.

### **2-indirect hernia:**

Its more common than the direct hernia, the protruding peritoneum sac enter the inguinal canal by pass through the deep inguinal ring and exit through superficial ring in the aponeurosis of external oblique, common in young people, its often a

congenital condition (patent processus vaginalis ) that appear in babies, complication is higher in this type because it has tight narrow defect neck may lead to necrosis and accumulation of pus in this small area, it follow the course of spermatic cord and enter the scrotum and the hernia sac lies superior and medial to the pubic tubercle.

-you can't tell the type of hernia for sure its 50 to 50 ratio, through experience you can tell that, it's not that valuable to tell the type because there is no difference in the treatment of the two, just for recording reason.



\*\*the table below summarizes it all:

	Direct hernia	Indirect hernia
<b>Age</b>	Common in old	<b>Young</b>
<b>shape</b>	Hemispherical	<b>Oval</b>
<b>Reaches scrotum</b>	Never	<b>Can reach</b>

<b>Direction of descent</b>	Forwards	<b>Forwards, downwards And medially</b>
<b>Reduction</b>	Backward	<b>Upward Backward laterally</b>
<b>Relation to the inferior epigastric artery</b>	Medially	<b>Laterally</b>
<b>Deep ring test Reduction of hernia Put thumb over Deep ring ask the Patient to cough</b>	Hernia appear	<b>Hernia doesn't Appear</b>

**Note:** to write this sheet I refer to the book pages (292-300,413),slides from the previous year, so please refer to the slides.



**\*\* يقول الله تعالى في القرآن الكريم:**  
**{وَقُلْ رَبِّ زِدْنِي عِلْمًا} [طه: ١١٤]**