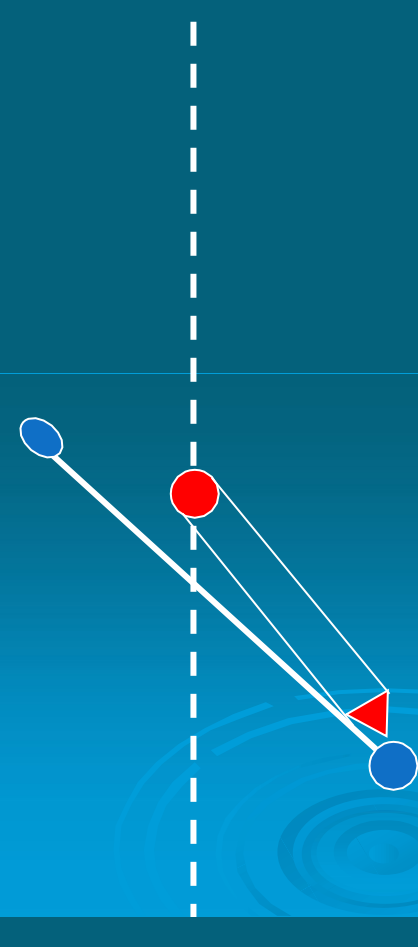
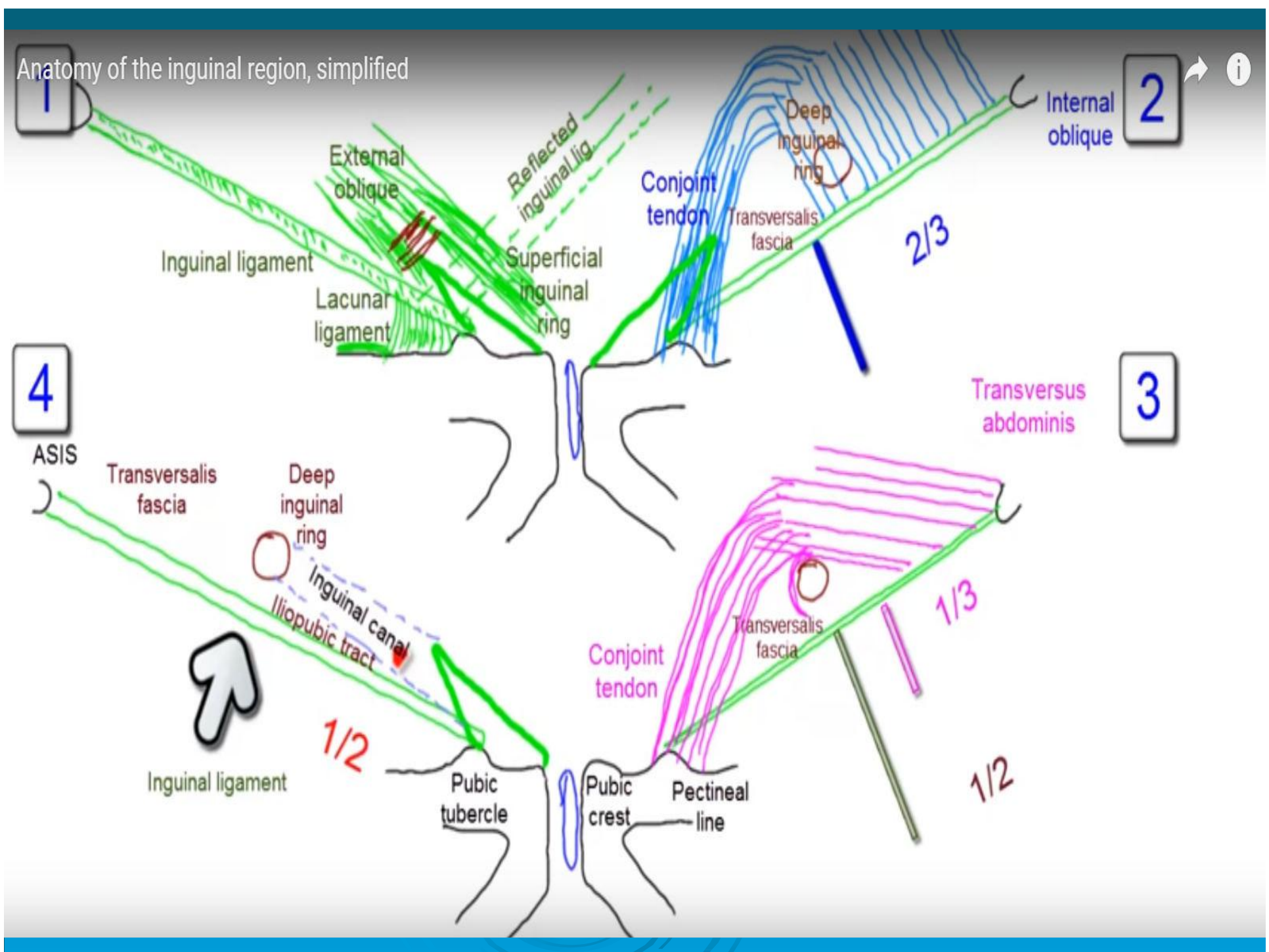
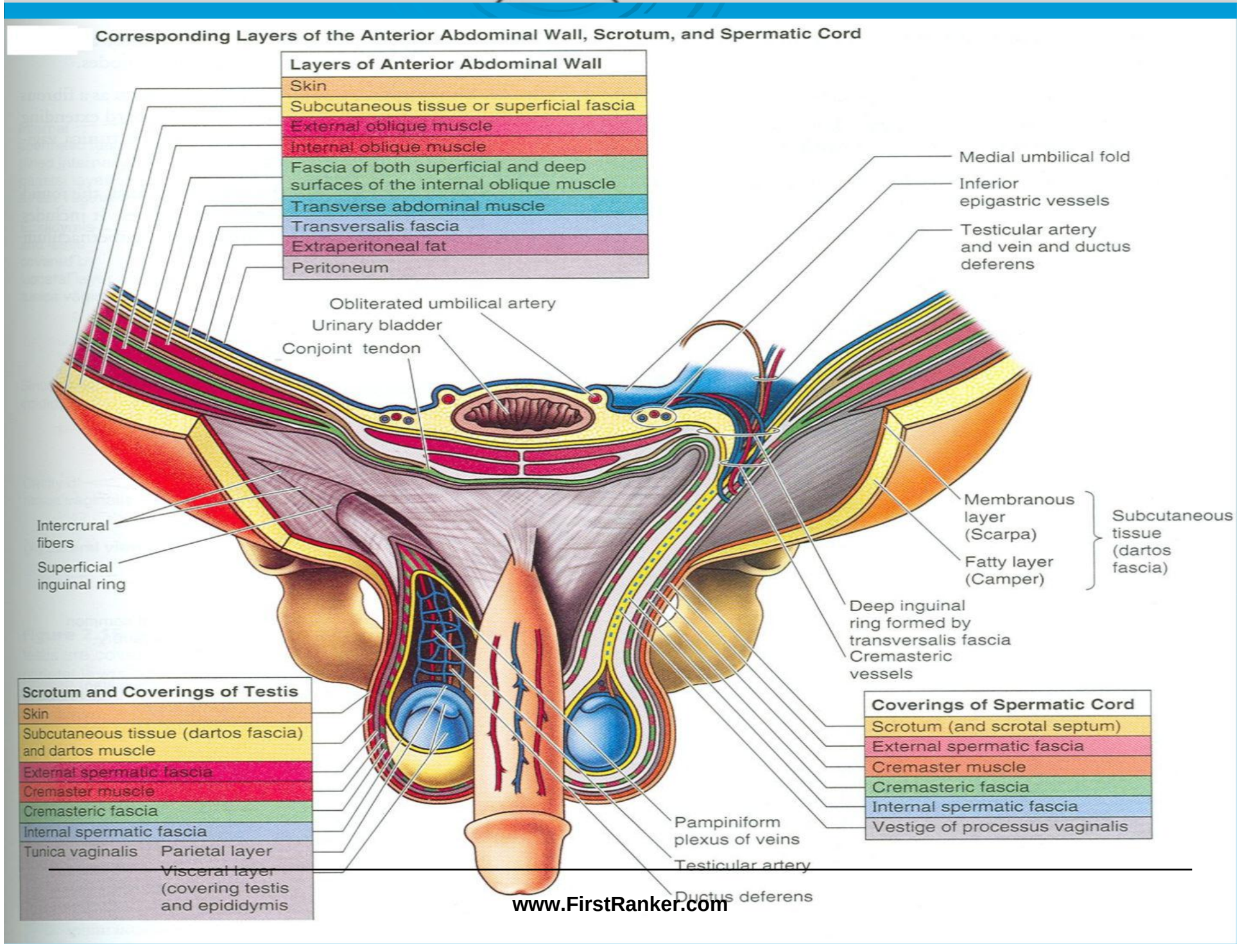
Inguinal canal
Surface anatomy



Inguinal Canal

- It is an oblique intermuscular passage through the lower part of the anterior abdominal wall
- Present in both sexes
- It allows structures to pass to and from the testis to the abdomen in males
- In females it permits the passage of the round ligament of the uterus from the uterus to the labium majus
- Transmits ilioinguinal nerve in both sexes



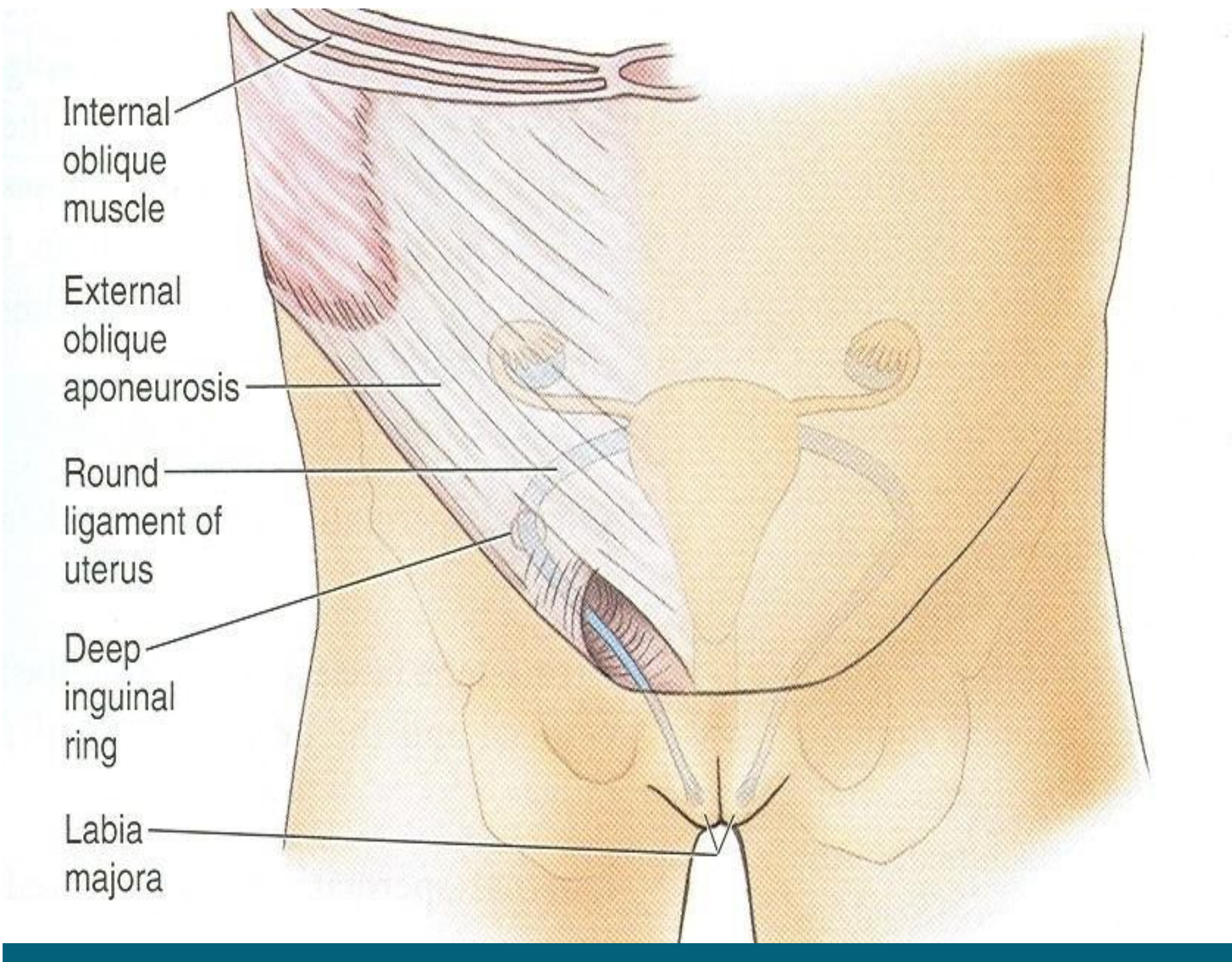


Inguinal Canal

- It is about 1 ½ inches or 4cm long in the adults
- Extends from the deep inguinal ring downward and medially to the superficial inguinal ring
- Lies parallel to and immediately above the inguinal ligament
- In the newborn child, the deep ring lies almost directly posterior to the superficial ring

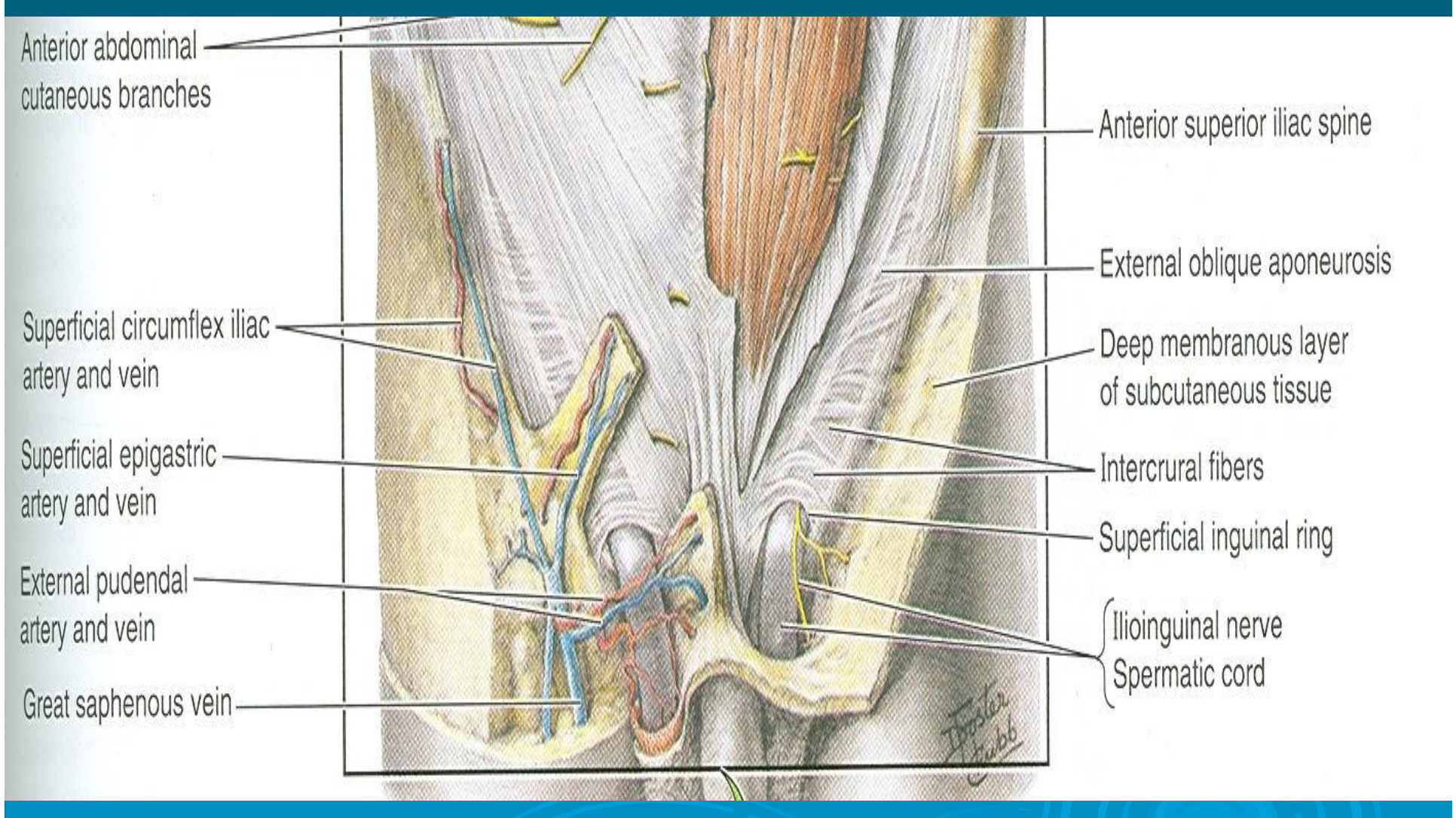
Deep Inguinal Ring

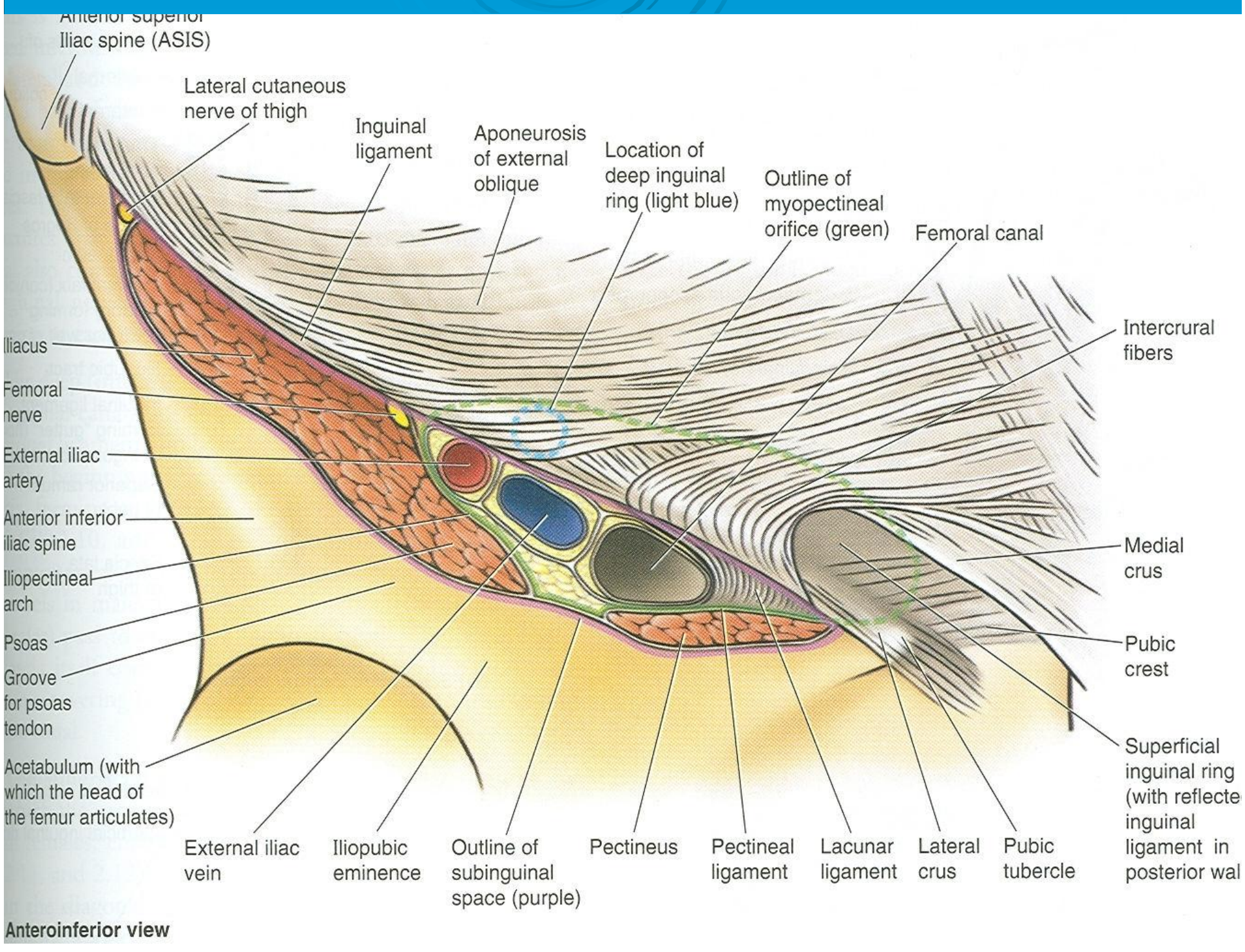
- Is an oval opening in the fascia transversalis
- Lies about ½ inch (1.3cm) above the inguinal ligament midway between the anterosuperior iliac spine and the symphysis pubis
- Margins of the ring give attachment to the internal spermatic fascia



Superficial Inguinal Ring

- Is triangular in shape
- Lies in the aponeurosis of the external oblique muscle
- Lies immediately above and medial to the pubic tubercle
- Its margins give attachment to the external spermatic fascia





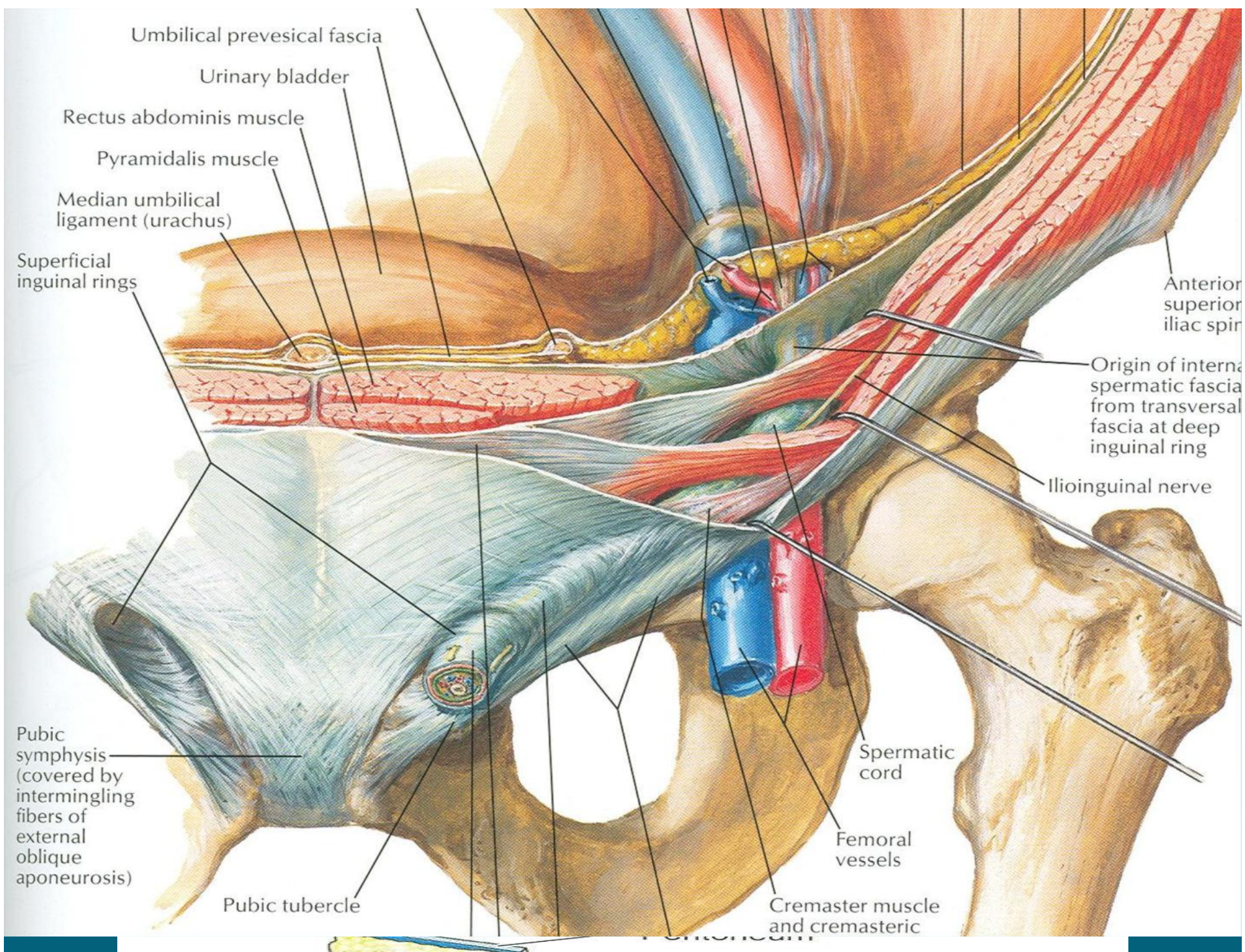
Anteroinferior view

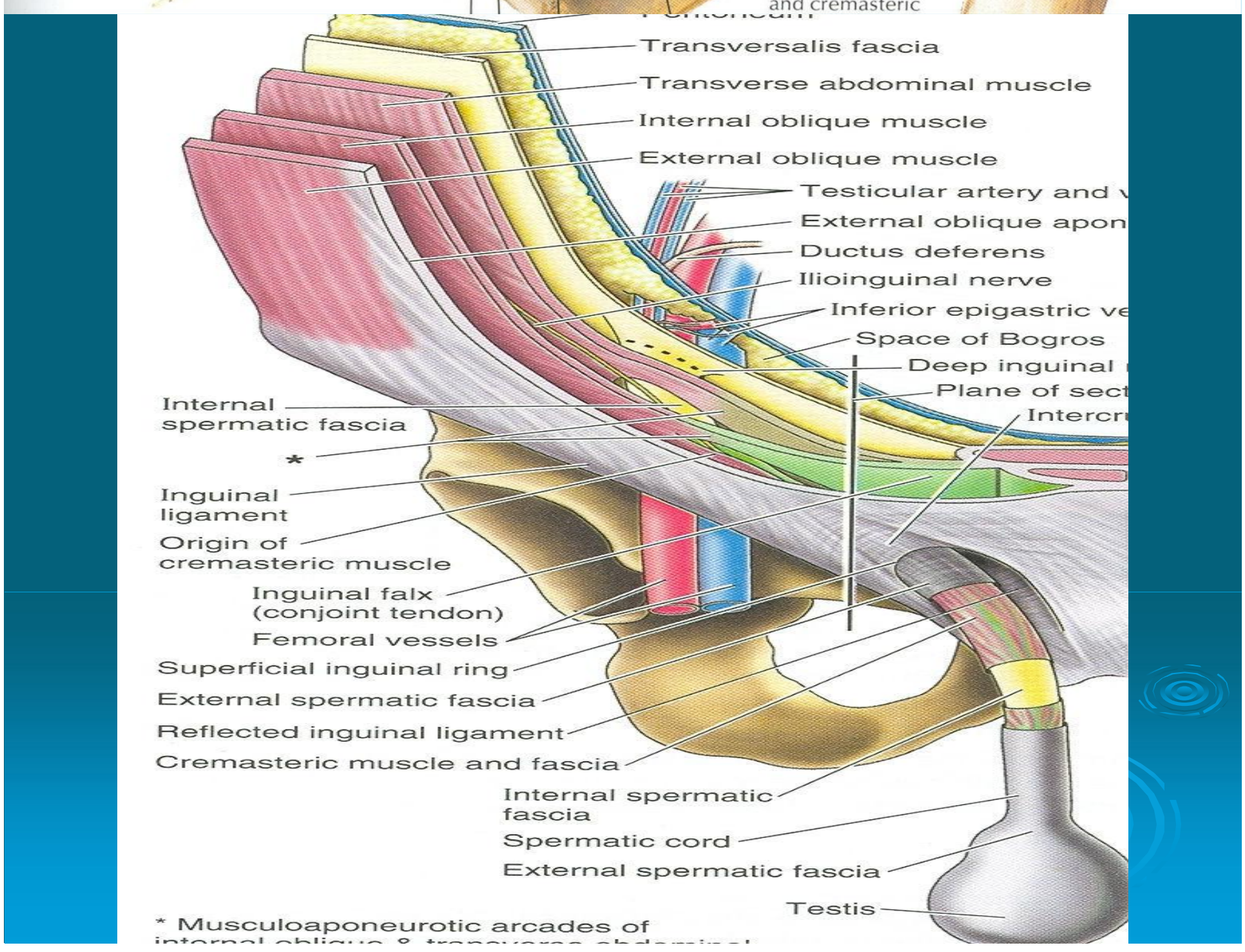
Anterior Wall of Inguinal Canal

- Is formed along its entire length by aponeurosis of the external oblique muscle
- It is reinforced in its lateral third by the origin of the internal oblique from the inguinal ligament
- This wall is strongest where it lies opposite the weakest part of posterior wall, that is deep inguinal ring

Posterior Wall of Inguinal Canal

- Is formed along its entire length by the fascia transversalis
- It is reinforced in its medial third by conjoint tendon, the common tendon of insertion of internal oblique and transversus, attached to the pubic crest and pectineal line
- This wall is strongest where it lies opposite the weakest part of the anterior wall, that is superficial inguinal ring





Inferior Wall of Inguinal Canal

- Is formed by the rolled-under inferior edge of the aponeurosis of the external oblique muscle called inguinal ligament and at its medial end, the lacunar ligament

Superior Wall of Inguinal Canal

- Is formed by the arching lowest fibers of the internal oblique and transversus abdominis muscles

Functions of Inguinal Canal

- It allows structures of spermatic cord to pass to and from the testis to the abdomen in male
- Permits the passage of round ligament of uterus from the uterus to the labium majus in female

Mechanics of Inguinal Canal

- Flap valve mechanish- oblique canal, deep & sup. Ing ring do not lie opposite to each other- increased intra abdo pressure – ant & post wall are approximated like a flap.
- Guarding of the inguinal rings- deep ing ring guarded ANTERIORLY by IOM, Sup. Ing ring guarded posteriorly – conjoint tendon & reflected part of ing lig.

Mechanics of Inguinal Canal

- Shutter Mechanism- IOM surrounds the canal in front, above & behind like a flexible mobile arch. When it contracts roof is pulled & approximated on the floor like a shutter
- slit- valve mechanism- contraction of EOM approximates the two crura of sup ing. Ring like a slit valve , the intercrural fibers also help.

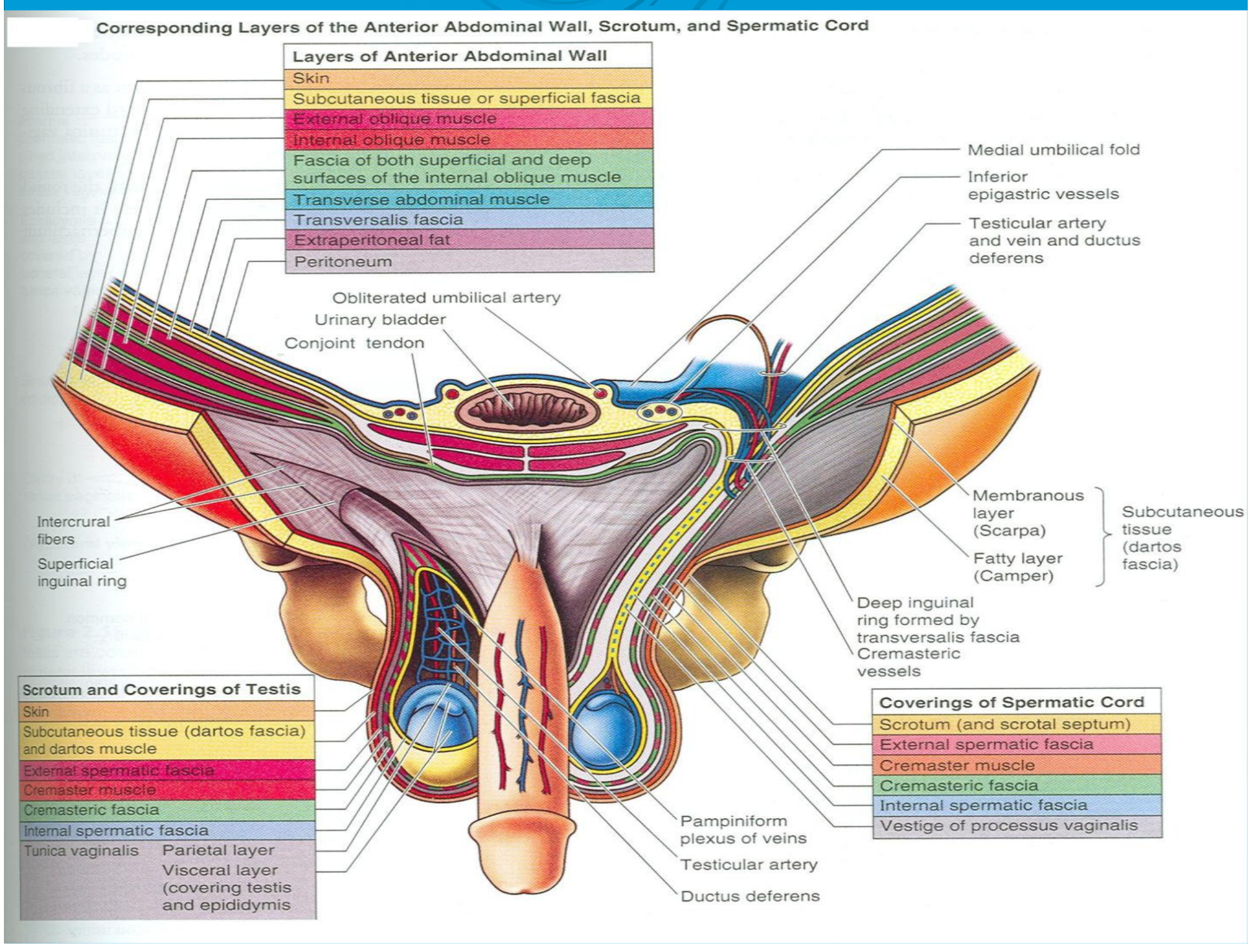
Mechanics of Inguinal Canal

- Ball valve Mechanism-

contraction of cremaster muscle pulls the testis up & sup. Ing. Ring is plugged by spermat. Cord.

Spermatic Cord

- It is a collection of structures that pass through the inguinal canal to and from the testis
- It is covered with three concentric layers of fascia derived from the layers of anterior abdominal wall
- It begins at the deep inguinal ring lateral to the inferior epigastric artery and ends at the testis



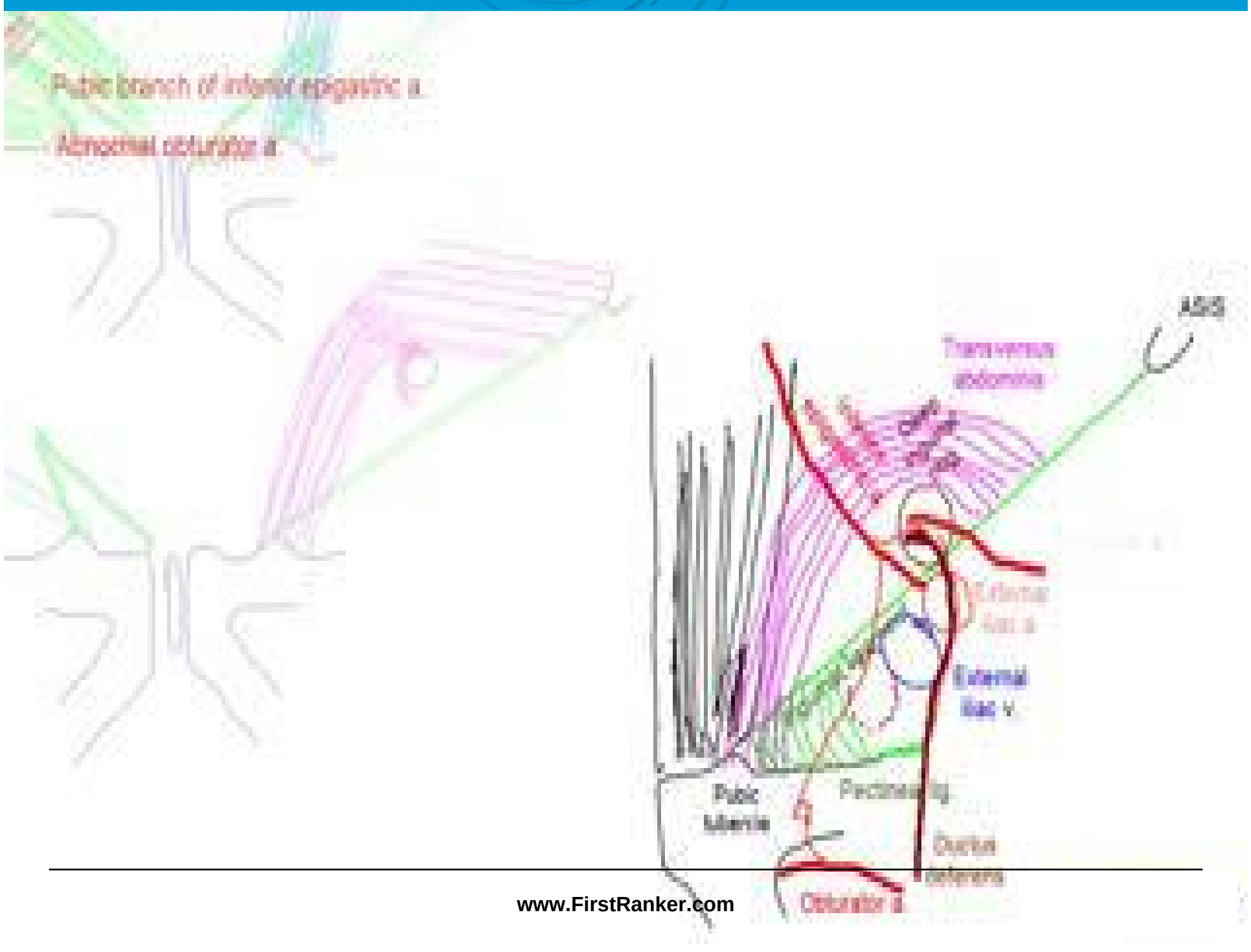
2.2.6 Inguinal area

Spermatic cord

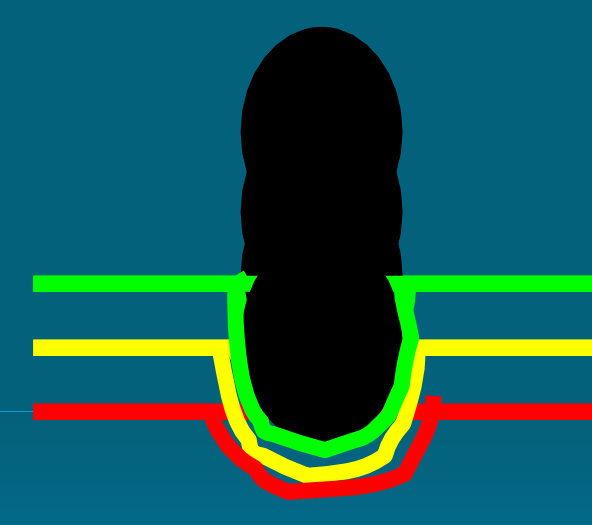
- **3 Fascia layers**
  - External spermatic fascia
  - Cremasteric fascia
  - Internal speratic fascia
- **3 Arteries**
  - Testicular artery
  - Cremasteric artery
  - Artery to ductus deferens

3 Nerves
- Genito-femoral nerve
- Ilio-inguinal nerve
- Sympathetic autonomic plexus

3 Other structures
- Lymphatic vessels
- Ductus deferens
- Pampiniform venous plexus



Spermatic cord



Vas Deferens

- It is a cord like structure
- Can be palpated between finger and thumb in the upper part of the scrotum
- It is a thick walled muscular duct that transport spermatozoa from the epididymis to the urethra

Testicular Artery

- It is a branch of abdominal aorta
- It is long and slender
- Descends on the posterior abdominal wall
- It traverses the inguinal canal and supplies the testis and the epididymis

Testicular Veins

- These are the extensive venous plexus, the pampiniform plexus
- Leaves the posterior border of the testis
- As the plexus ascends, it becomes reduced in size so that at about the level of deep inguinal ring, a single testicular vein is formed
- Drains into left renal vein on left side and inferior vena cava on right side

Covering of the Spermatic Cord

- The covering of the spermatic cord are three concentric layers of fascia derived from the layers of the anterior abdominal wall
- Each covering is acquired as the processus vaginalis descends into the scrotum through the layers of the abdominal wall

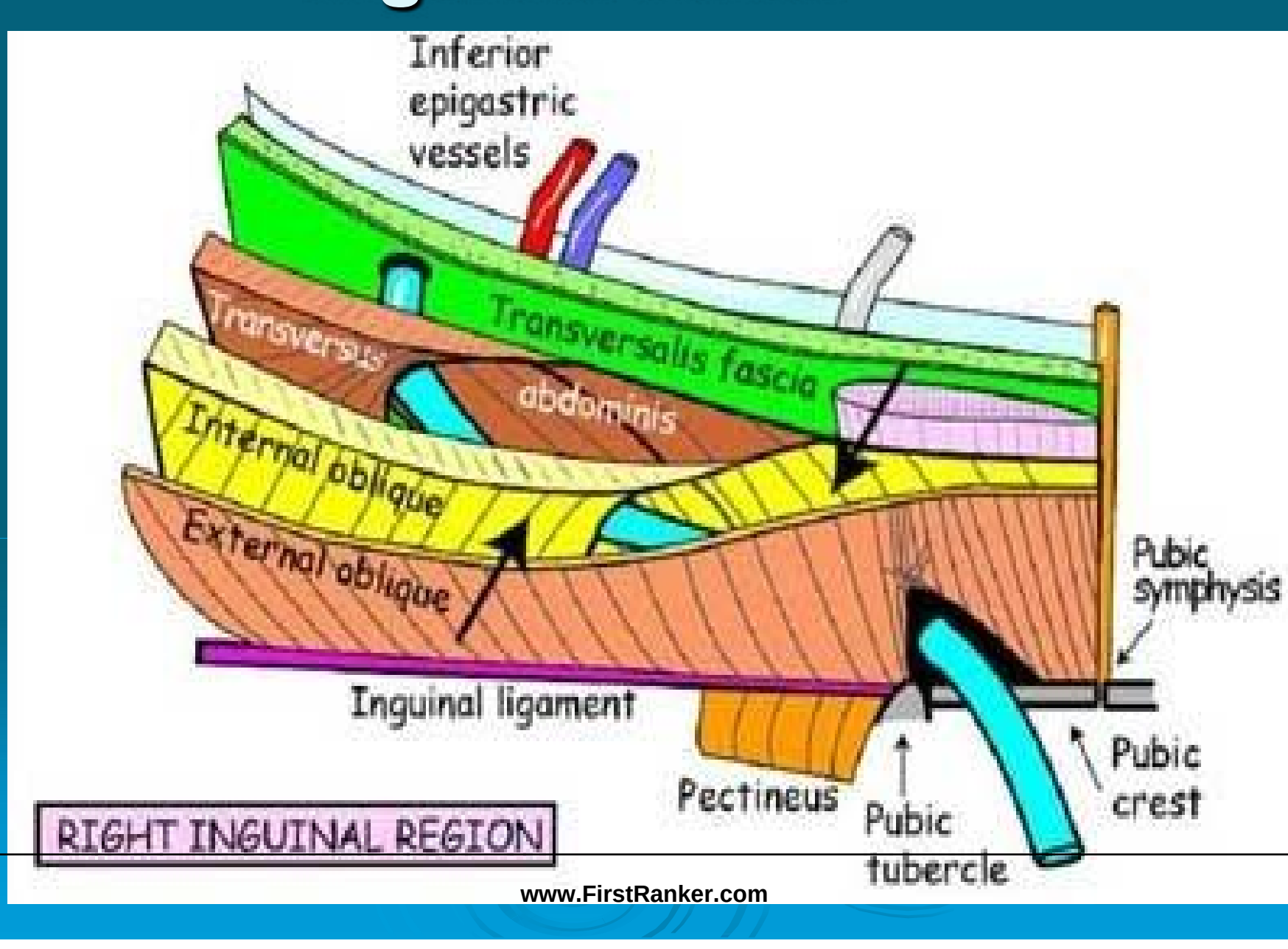
Covering of the Spermatic Cord

- External Spermatic fascia: Is derived from the external oblique aponeurosis and attached to the margins of the superficial inguinal ring
- Cremasteric Fascia: Is derived from the internal oblique muscle
- Internal Spermatic Fascia: Is derived from the fascia transversalis and attached to the margins of deep inguinal ring

Inguinal Hernia

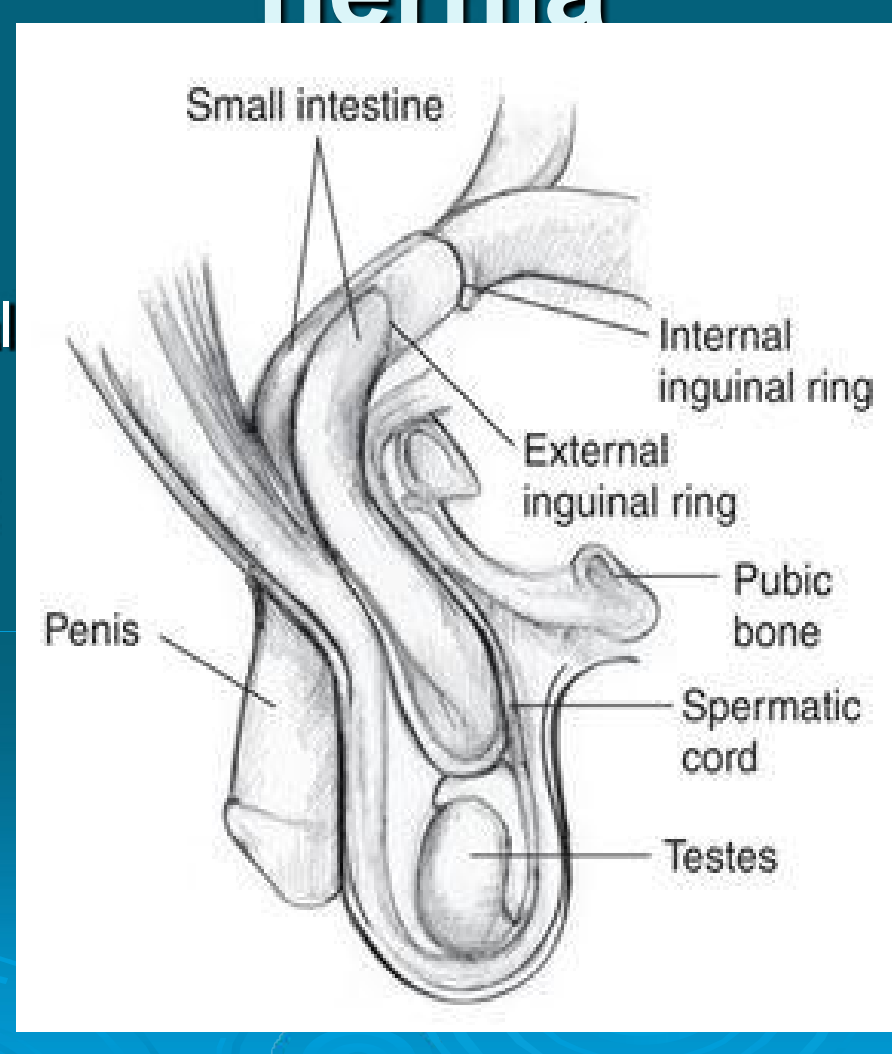
- A hernia is the protrusion of part of the abdominal contents beyond the normal confines of the abdominal wall
- Hernial coverings are formed from the layers of the abdominal wall through which the hernial sac passes

Inguinal canal



Inguinal hernia

- An **Inguinal hernia** is a protrusion of contents of abdominal-cavity through the Inguinal canal.
- Bulges through a weak area in the lower abdominal muscles.
- An inguinal hernia appears as a bulge on one or both sides of the groin. An inguinal hernia can occur any time from infancy to adulthood.
- Inguinal hernias tend to become larger with time.



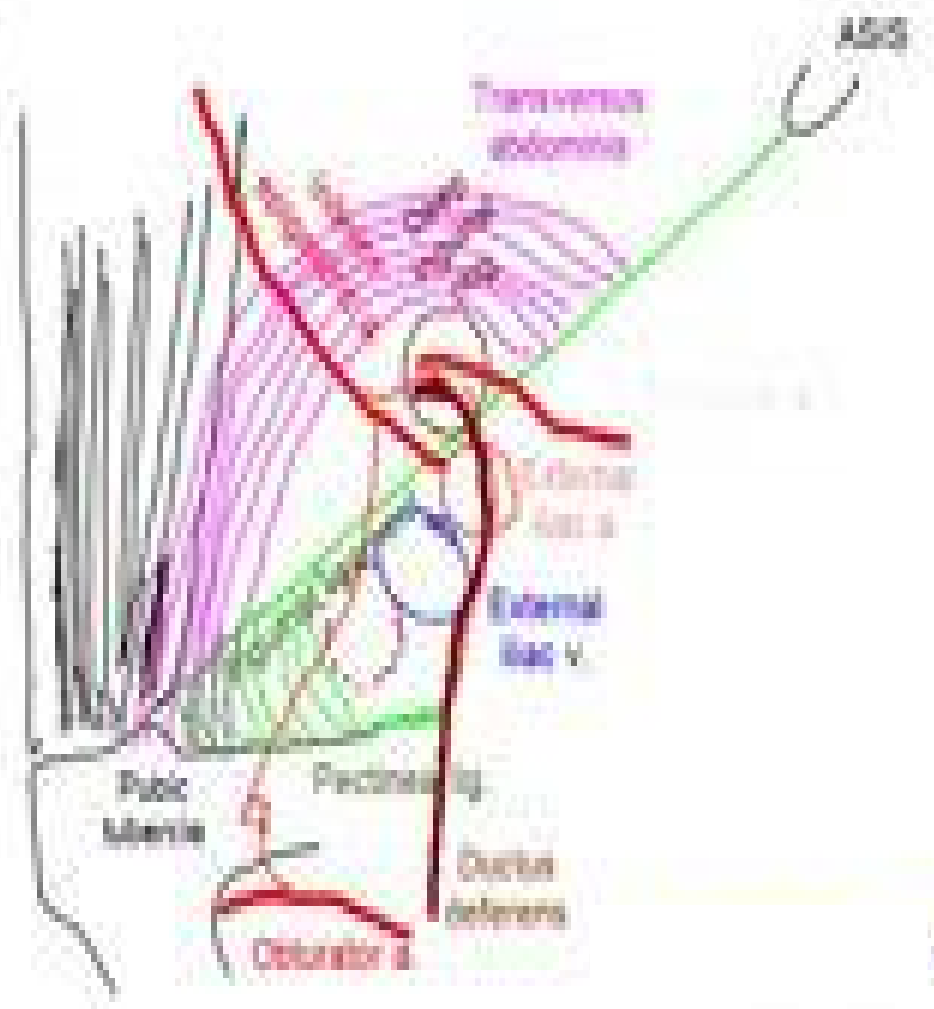
- More common in males
- In the case of the female, the opening of the superficial inguinal ring is smaller than that of the male.
- As a result, the possibility for hernias through the inguinal canal in males is much greater because they have a larger opening and therefore a much weaker wall for the intestines to protrude through.

Parts of hernia

- Consists of four parts: the sac, contents of the sac, covering of the sac and neck.
- Hernial coverings are formed from the layers of the abdominal wall through which the hernial sac passes.
- In Amyand's hernia, the content of the hernial sac is the vermiform appendix.
- In Littre's hernia, the content of the hernial sac contains a Meckel's Diverticulum.

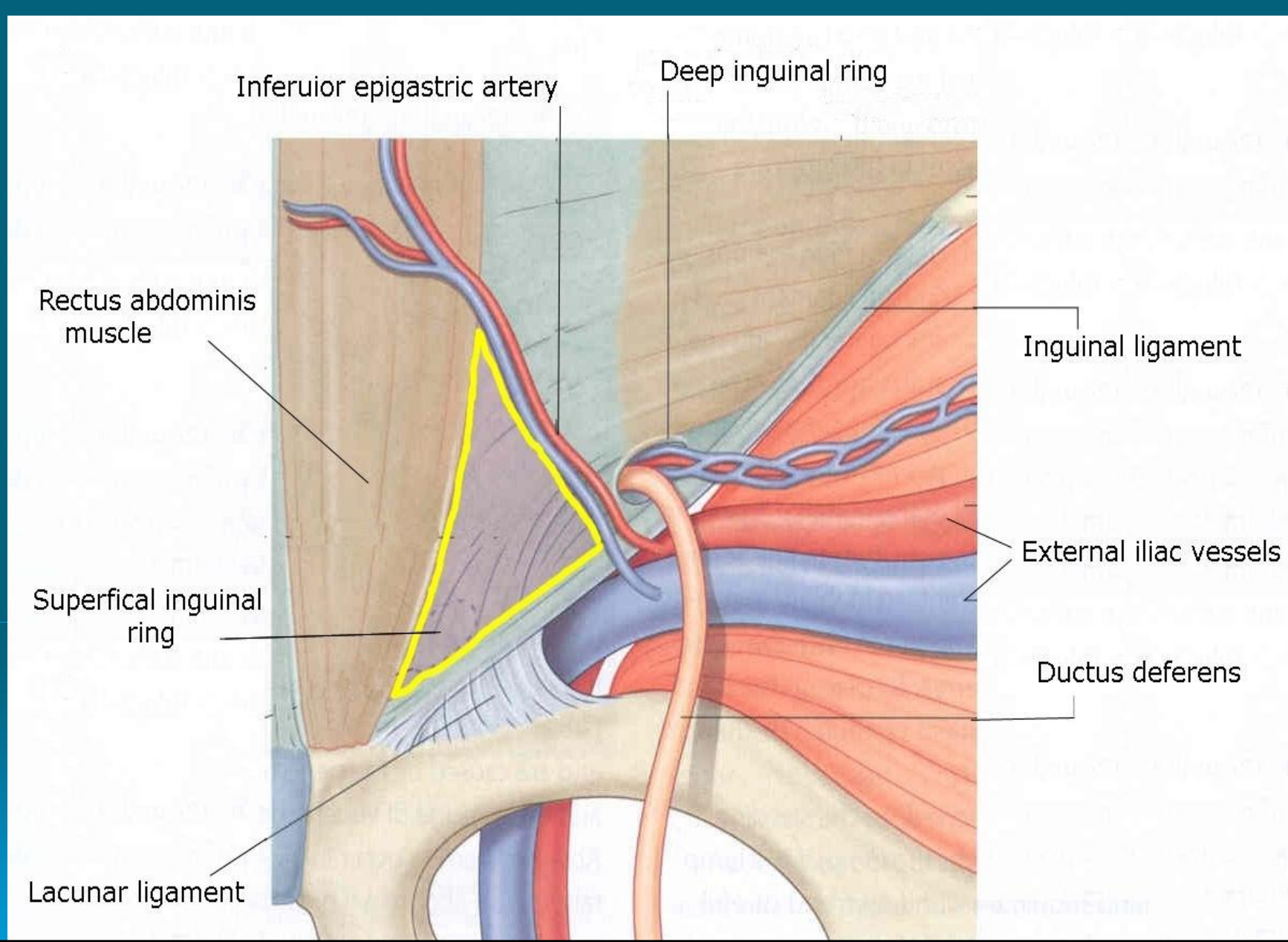
INGUINAL (HESSELBACH'S) TRIANGLE

- INGUINAL (HESSELBACH'S) TRIANGLE is an area of the anterior abdominal wall bounded by
- Inferior epigastric vessels,
- Inguinal ligament and
- Lateral border of the rectus abdominis.
- Direct inguinal hernias leave the abdomen through this triangle.



- **Boundaries**
- Medial border: Lateral margin of the rectus sheath, also called linea semilunaris
- Superolateral border: Inferior epigastric vessels
- Inferior border: Inguinal ligament, sometimes referred to as Poupart's ligament
- This can be remembered by the mnemonic RIP (as direct inguinal hernias rip directly through the abdominal wall).

Hesselbach's triangle



Two types of inguinal hernia

- DIRECT AND
- INDIRECT,
  - which are defined by their relationship to the inferior epigastric vessels.

- Direct inguinal hernias occur medial to the inferior epigastric vessels when abdominal contents herniate through a weak spot in the fascia of the posterior wall of the inguinal canal, which is formed by the transversalis fascia.
- Indirect inguinal hernias occur when abdominal contents protrude through the deep inguinal ring, lateral to the inferior epigastric vessels; this may be caused by failure of embryonic closure of the processus vaginalis.

- **Indirect inguinal hernia.**
  - Indirect inguinal hernias are congenital hernias.
- More common in males than females
- Indirect hernias are the most common type of inguinal hernia.
- More common on right side.
- The neck of the hernial sac lies at the deep inguinal ring
- Premature infants are especially at risk for indirect inguinal hernias because there is less time for processus vaginalis to obliterate.

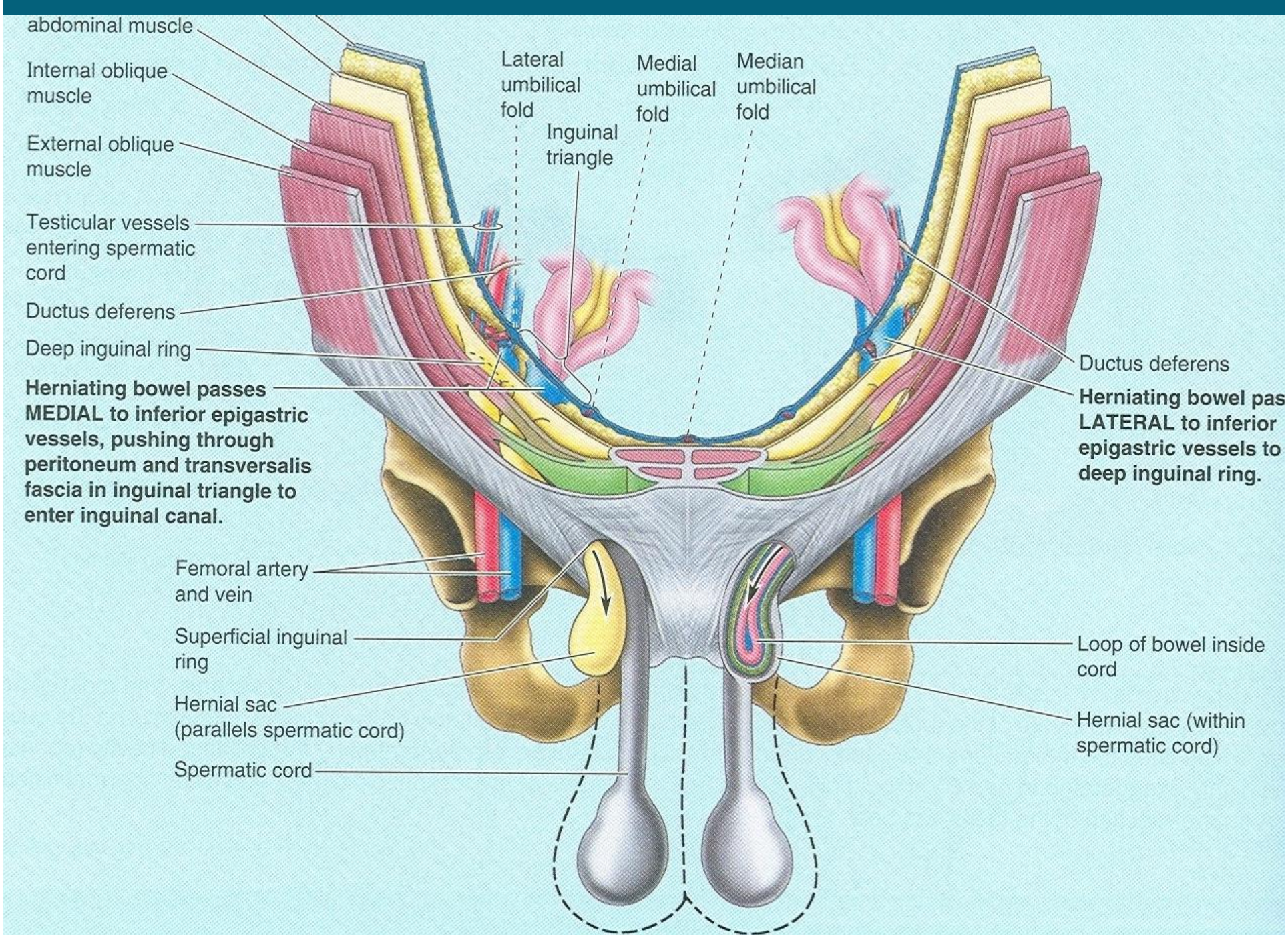
- In a male fetus, the spermatic cord and both testicles—starting from an intra-abdominal location—normally descend through the inguinal canal into the scrotum, the sac that holds the testicles
- Sometimes the entrance of the inguinal canal at the inguinal ring does not close as it should just after birth, leaving a weakness in the abdominal wall.
- Fat or part of the small intestine slides through the weakness into the inguinal canal, causing a hernia.
- In females, an indirect inguinal hernia is caused by the female organs or the small intestine sliding into the groin through a weakness in the abdominal wall.

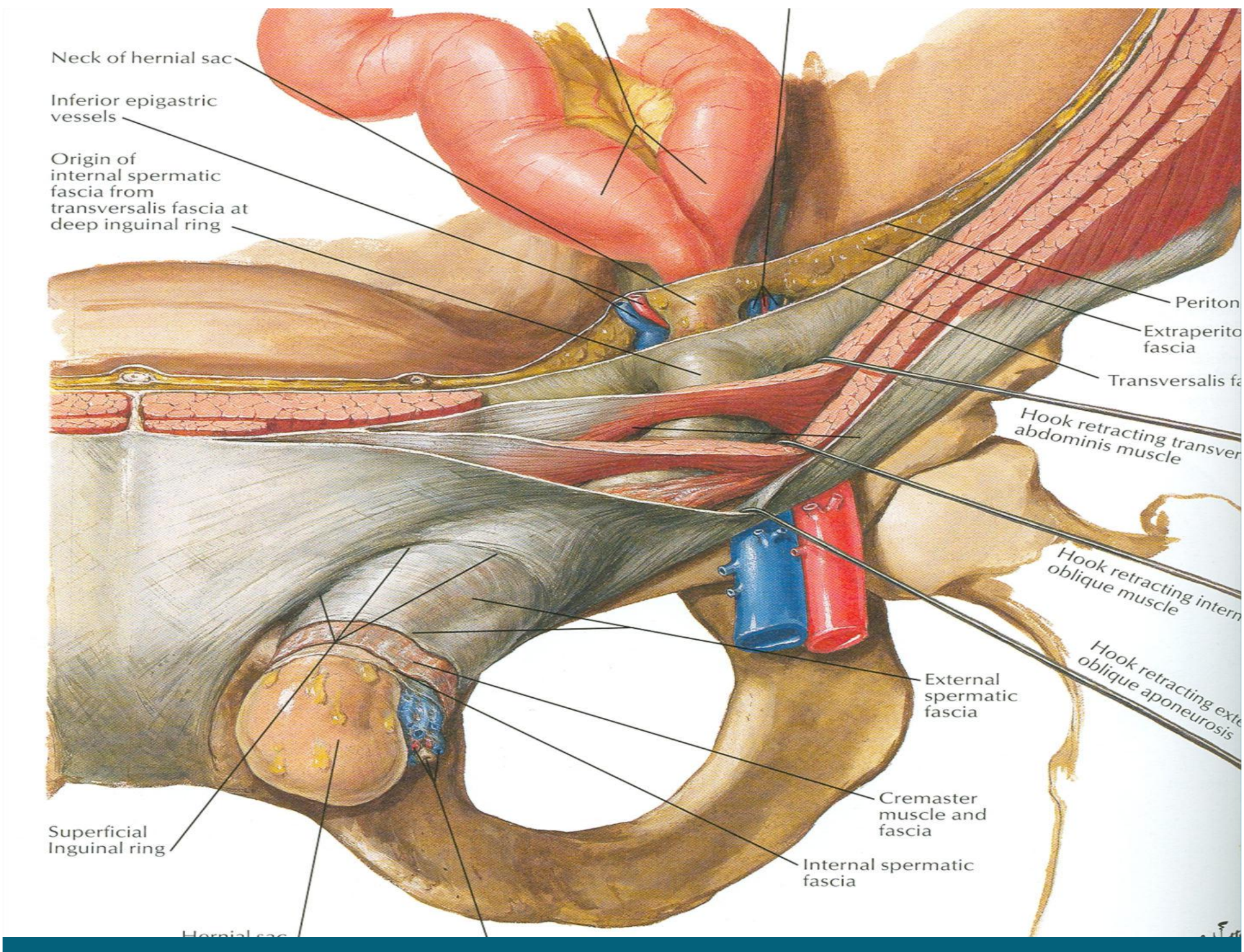
Direct inguinal hernias

- Caused by connective tissue degeneration of the abdominal muscles, which causes weakening of the muscles.
- Common in old men with weak abdominal muscles and rare in women
- The neck of the hernial sac is wide

- The hernia involves fat or the small intestine sliding through the weak muscles into the groin.
- A direct hernia develops gradually because of continuous stress on the muscles.

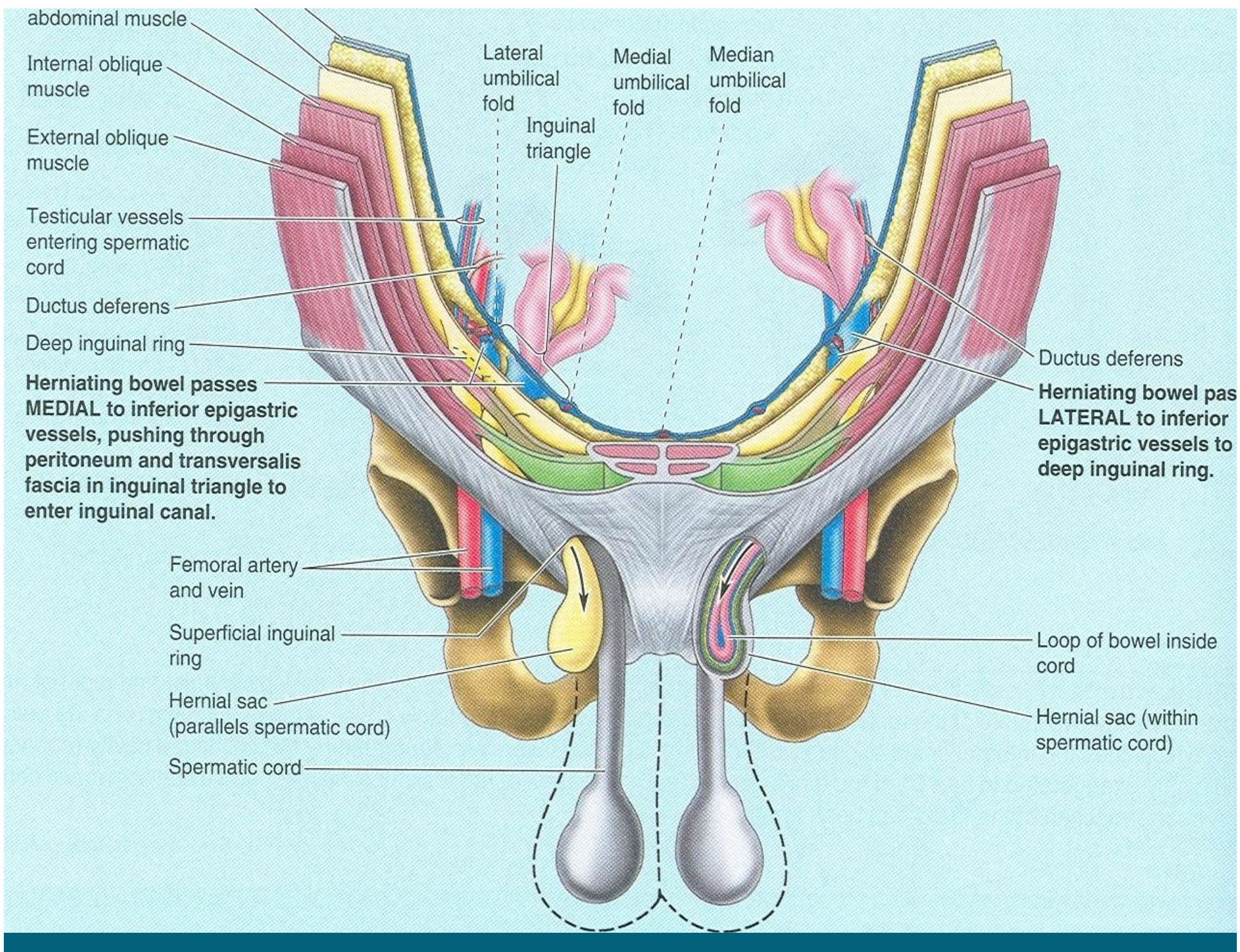
- One or more of the following factors can cause pressure on the abdominal muscles and may worsen the hernia:
  - sudden twists, pulls, or muscle strains
  - lifting heavy objects
  - straining on the toilet because of constipation
  - weight gain
  - chronic coughing





Indirect Inguinal Hernia

- It is the most common form of hernia
- Is believed to be congenital in origin
- The hernial sac is remains of processus vaginalis
- Enters the inguinal canal through the deep inguinal ring lateral to the inferior epigastric vessels
- It may extend part of the way along the canal or as far as the superficial inguinal ring



Indirect Inguinal Hernia

- If the processus vaginalis has undergone no obliteration, the hernia is complete and extends through the superficial inguinal ring down into the scrotum or labium majus
- Under these circumstances the neck of the hernial sac lies at the deep inguinal ring
- It is 20 times more common in young males than females
- Is more common on the right side

Direct Inguinal Hernia

- It composes about 15% of all inguinal hernias
- Common in old men with weak abdominal muscles and rare in women
- Hernial sac bulges forward through the posterior wall of the inguinal canal medial to the inferior epigastric artery
- The neck of the hernial sac is wide