



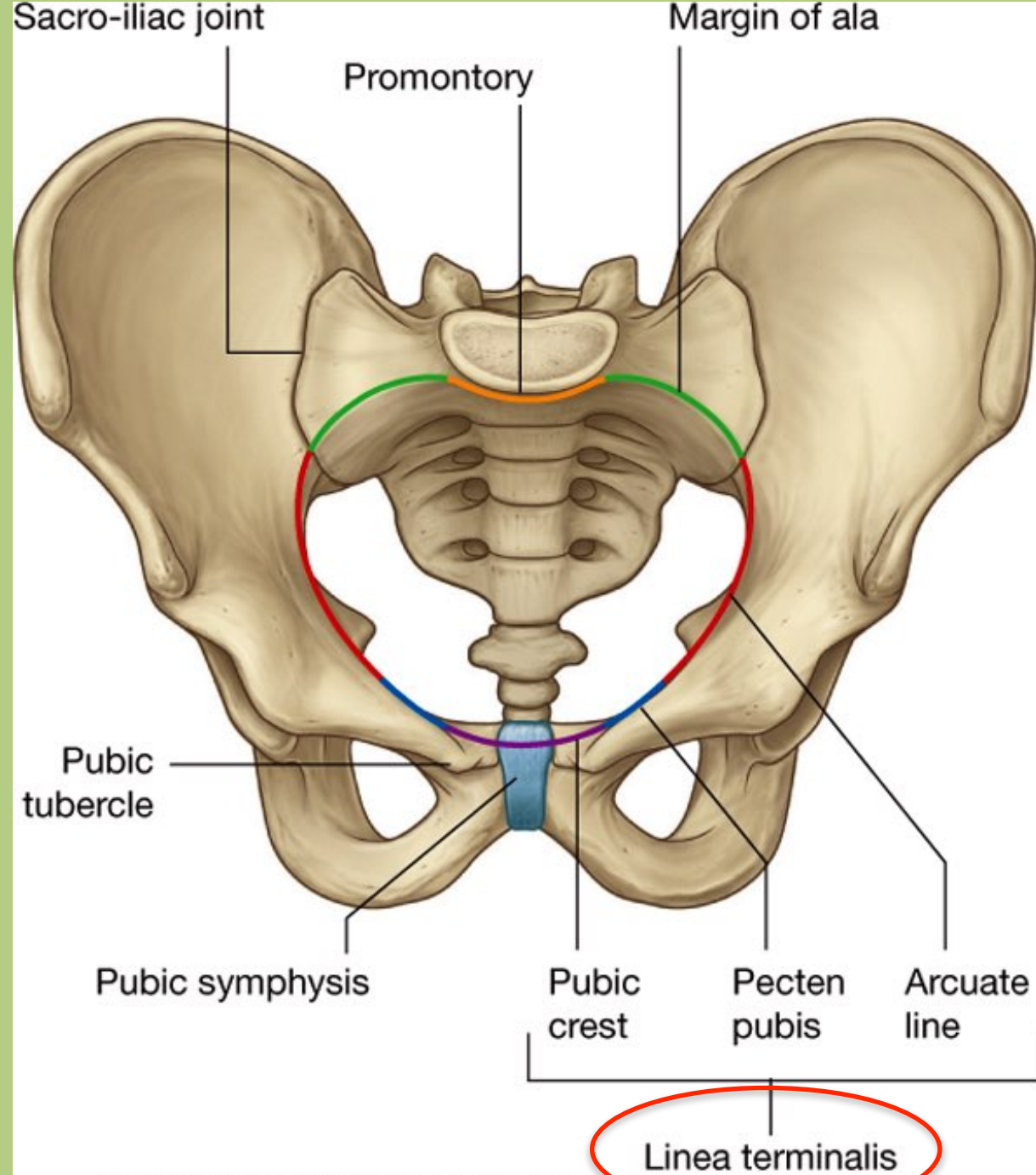
Abdominal muscles. Subinguinal  
hiatus, femoral and inguinal canals.  
Pelvic cavity and pelvic muscles

Sándor Katz M.D.,Ph.D.

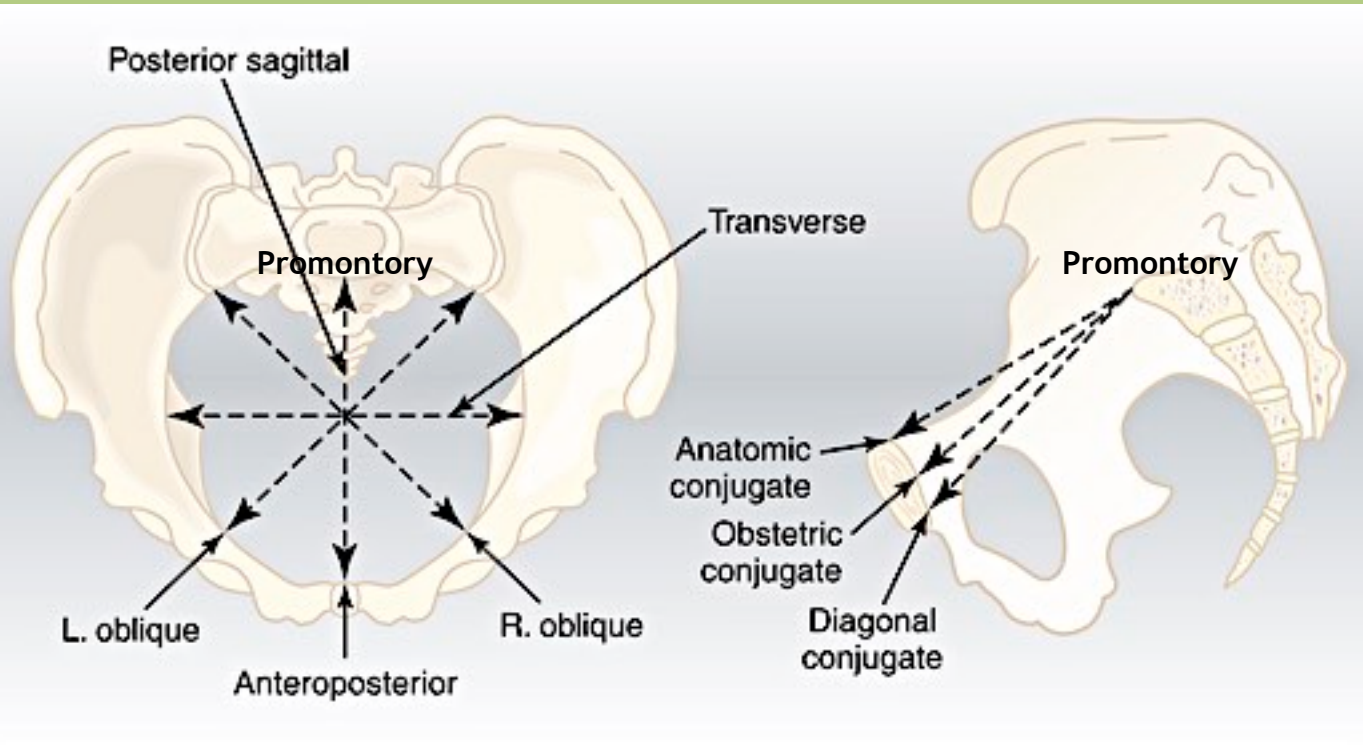


# Pelvic cavity:

- Greater pelvis
- Lesser pelvis



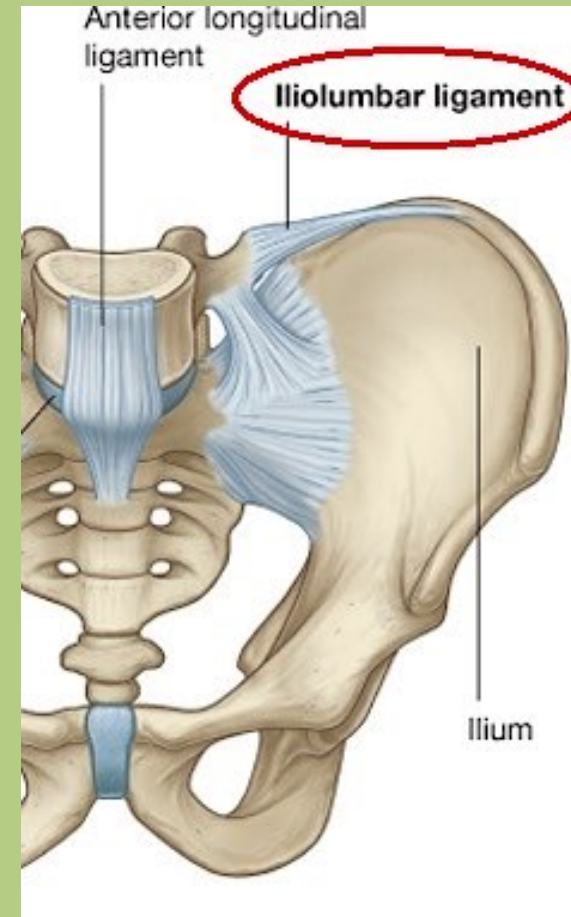
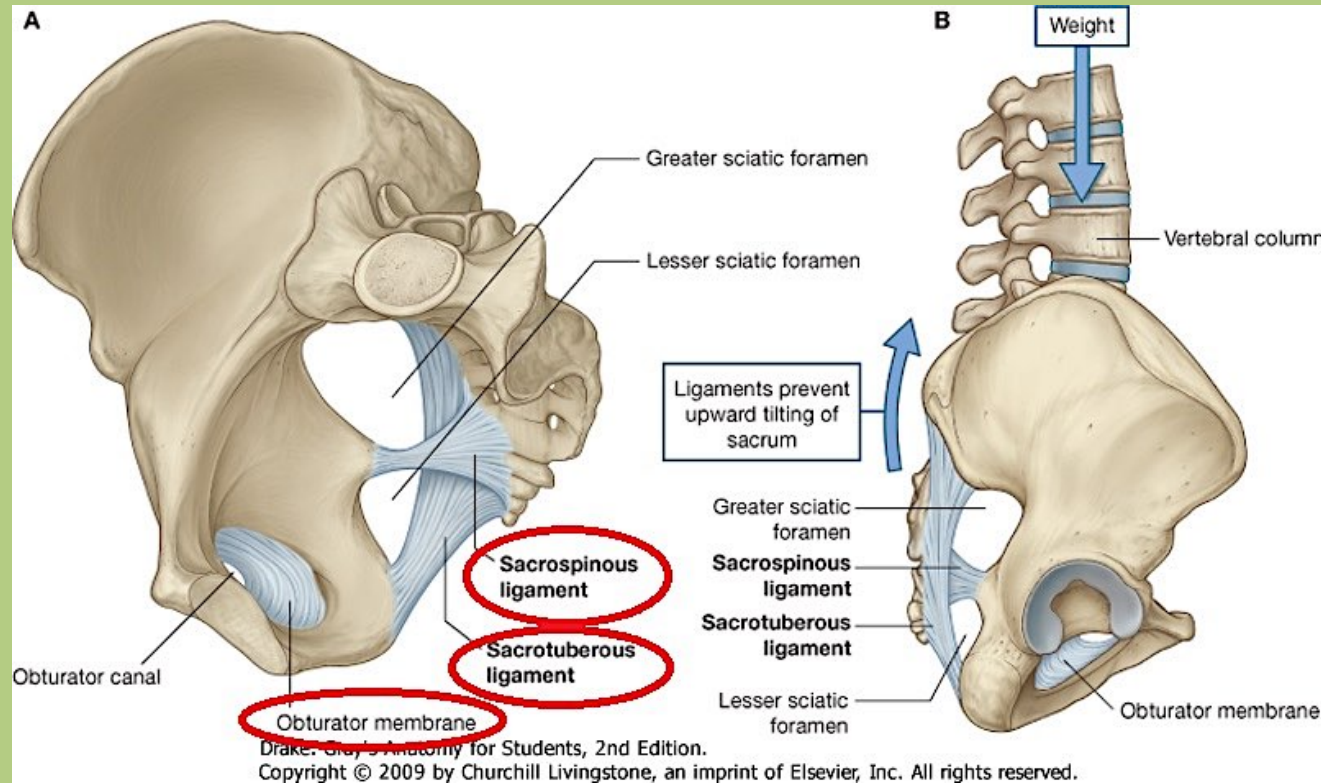
# Pelvic measurements in women



- Anatomic conjugate: 11 cm
- **Obstetric conjugate: 11 cm**
- Transverse diameter: 13 cm

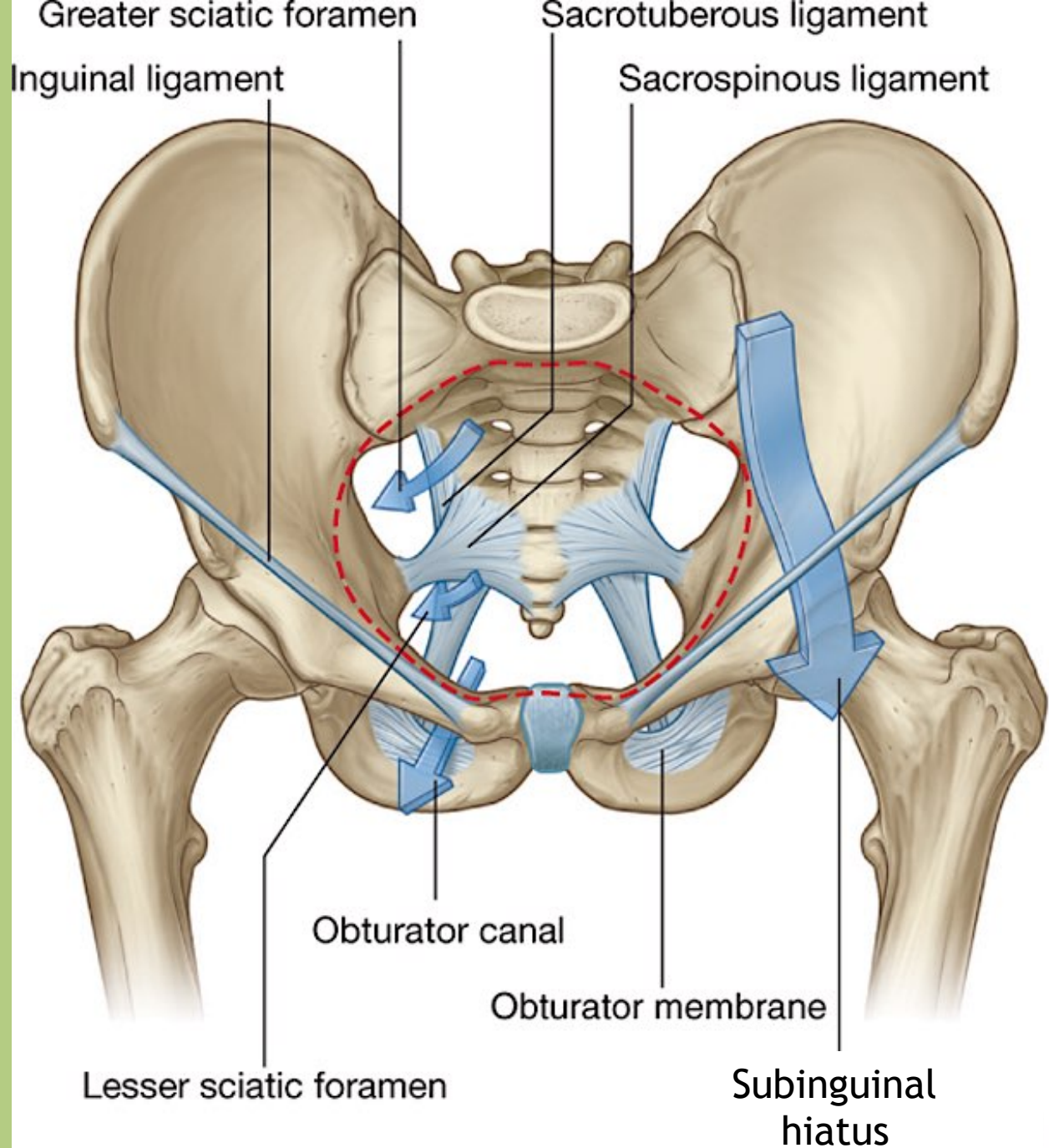
*The lesser pelvis functions as the birth canal*, the external and internal pelvic dimensions have special practical significance in obstetrics, determining whether the pelvic cavity is broad enough to allow for a vaginal delivery.

# Pelvic ligaments

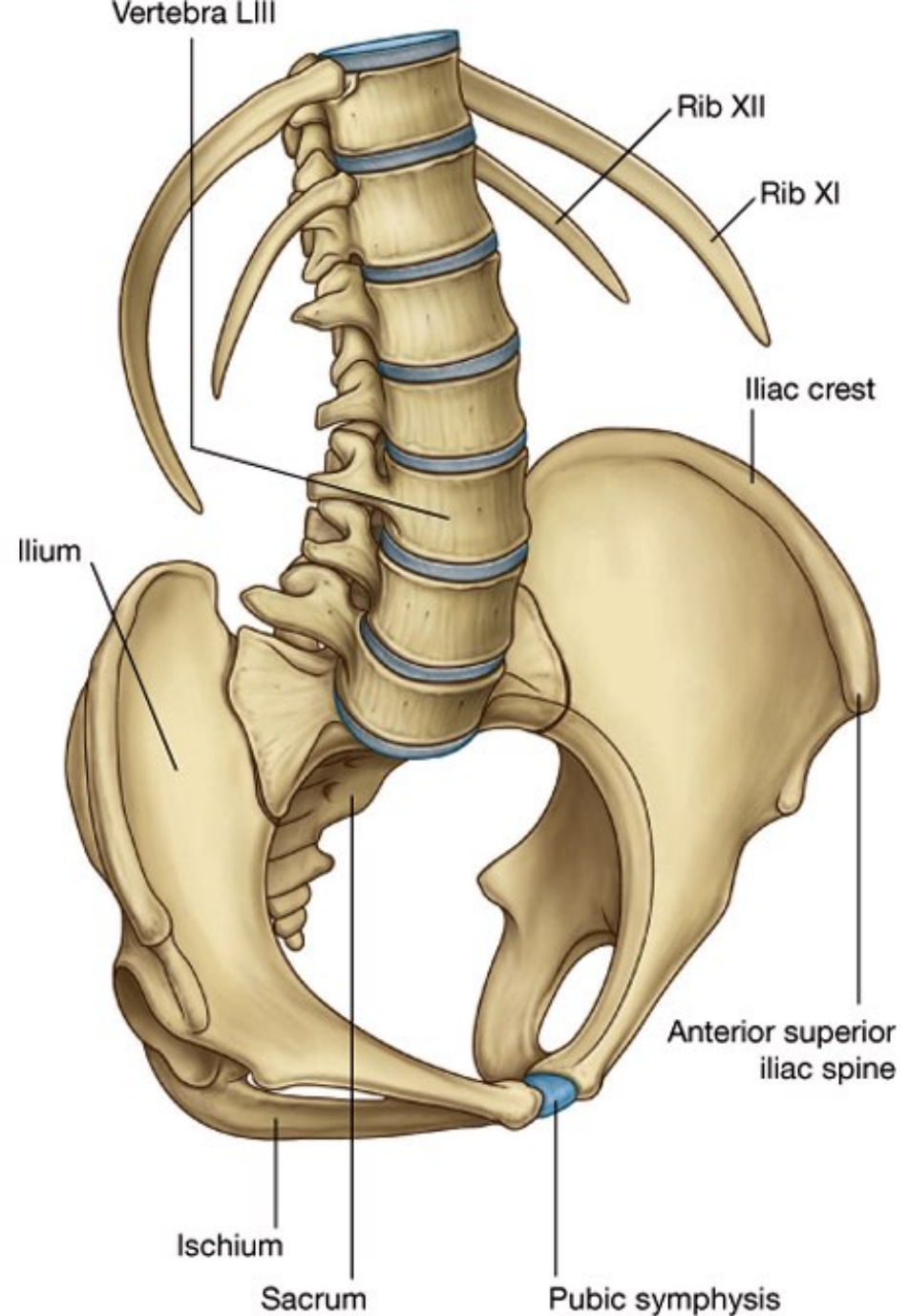




# Pelvis



# Bony components of the abdominal cavity

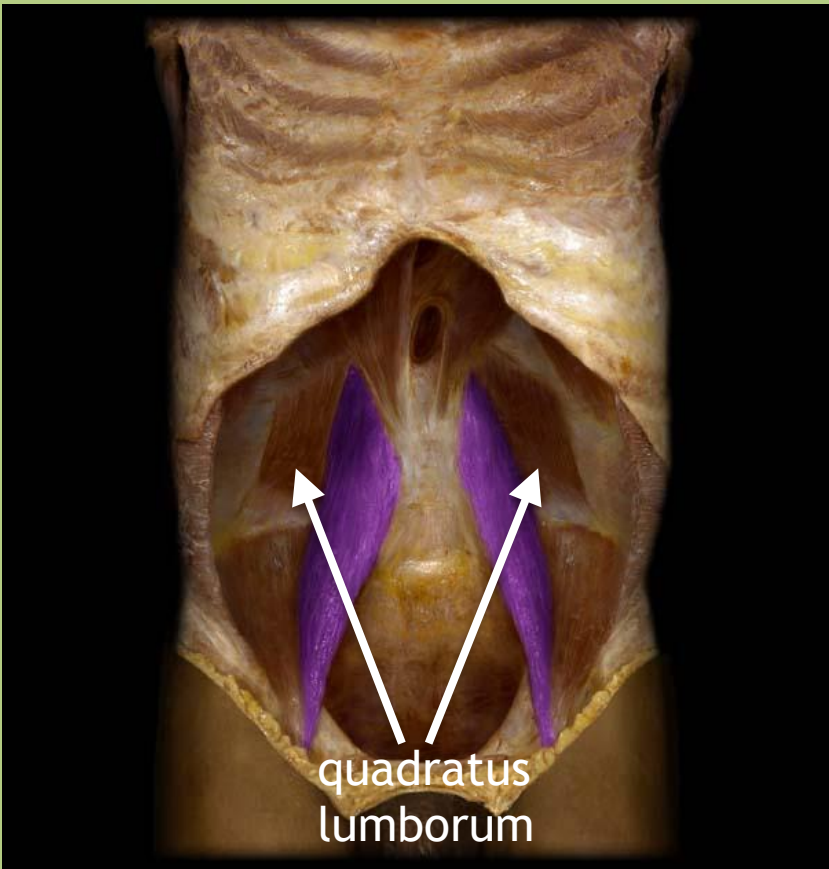


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# Posterior muscles: quadratus lumborum

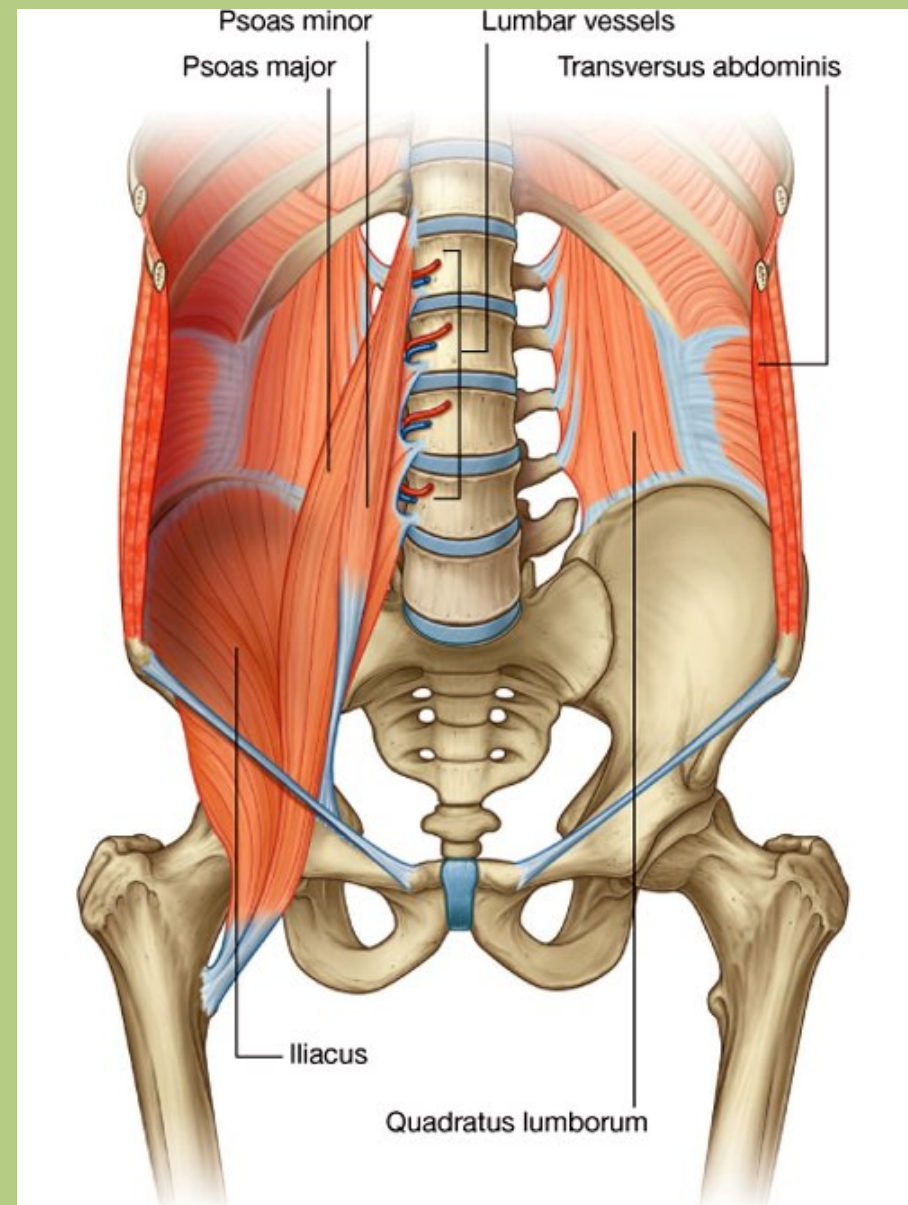


**Origin:** iliac crest

**Insertion:** 12th rib, costal processes of L1-4 vertebrae

**Action:** flexion of the trunk,  
active in expiration

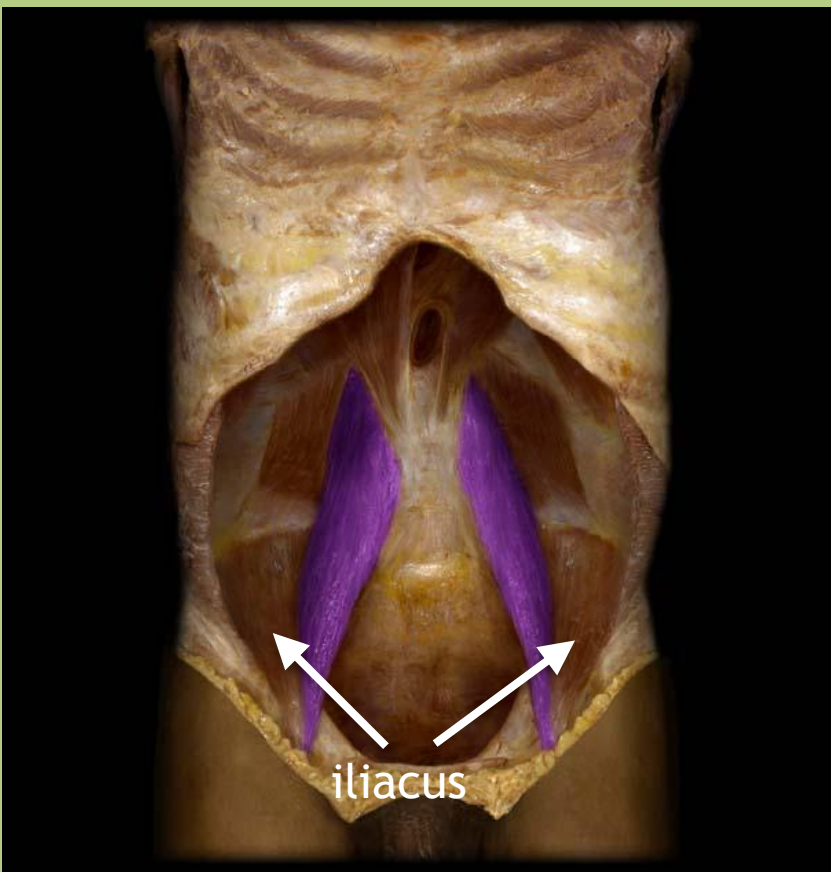
**Innervation:** subcostal nerve



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# Posterior muscles: iliopsoas (psoas major and iliacus)

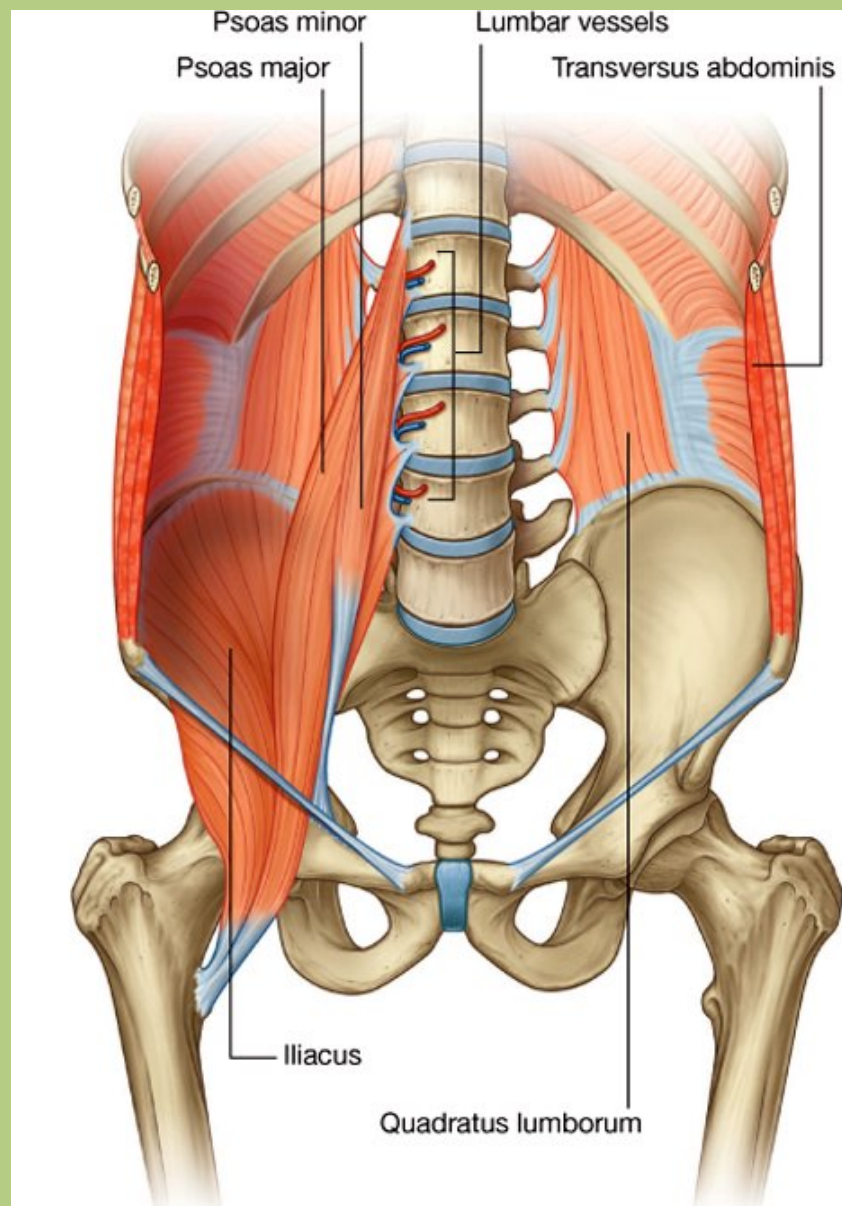


**Origin:** psoas major: vertebral bodies of the T12-L4 vertebrae and costal processes of the L1-5 vertebrae  
iliacus: iliac fossa

**Insertion:** lesser trochanter

**Action:** flexion and lateral rotation of the hip joint; lateral flexion of the lumbar spine

**Innervation:** spinal nerves and femoral nerve





# Anterolateral muscles: external oblique muscle

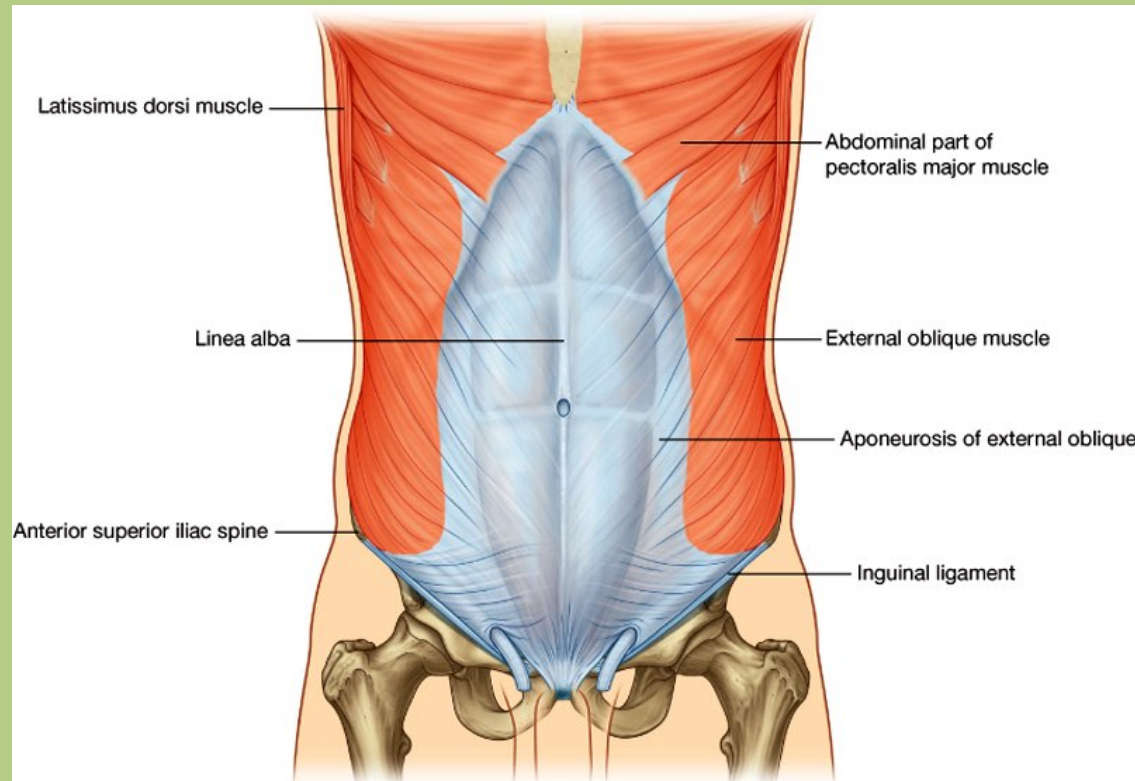


**Origin:** outer surface of the 5th to 12th ribs

**Insertion:** outer lip of the iliac crest, rectus sheath, linea alba

**Action:** flexion and rotation of the trunk, active in expiration

**Innervation:** intercostal nerves, subcostal nerve, iliohypogastric nerve



# Anterolateral muscles: internal oblique muscle

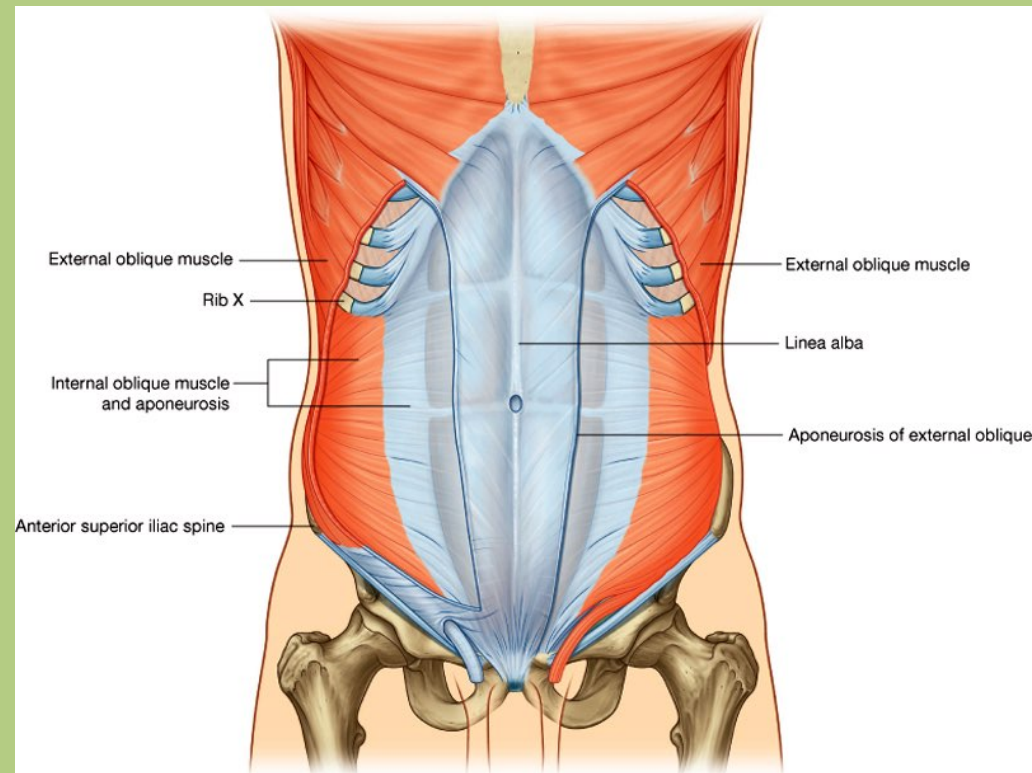


**Origin:** thoracolumbar fascia, intermediate line of the iliac crest, anterior superior iliac spine

**Insertion:** lower borders of the 10th to 12th ribs, rectus sheath, linea alba

**Action:** flexion and rotation of the trunk, active in expiration

**Innervation:** intercostal nerves, subcostal nerve, iliohypogastric nerve, ilioinguinal nerve





# Anterolateral muscles: transversus abdominis muscle

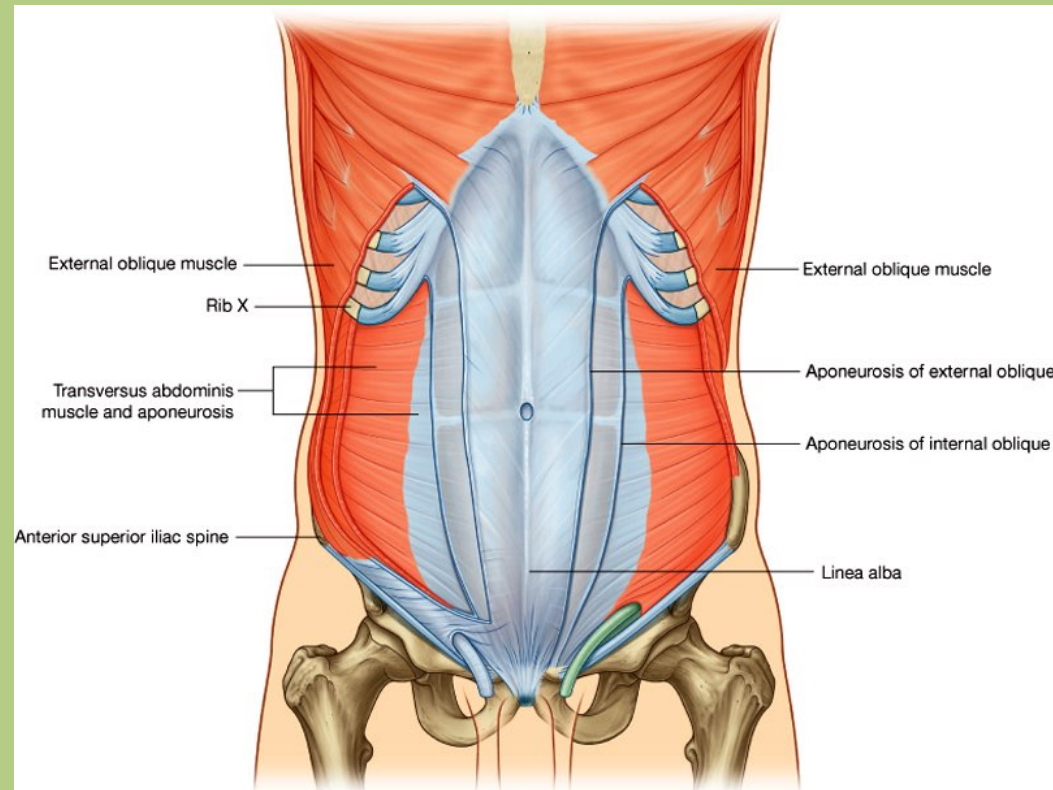


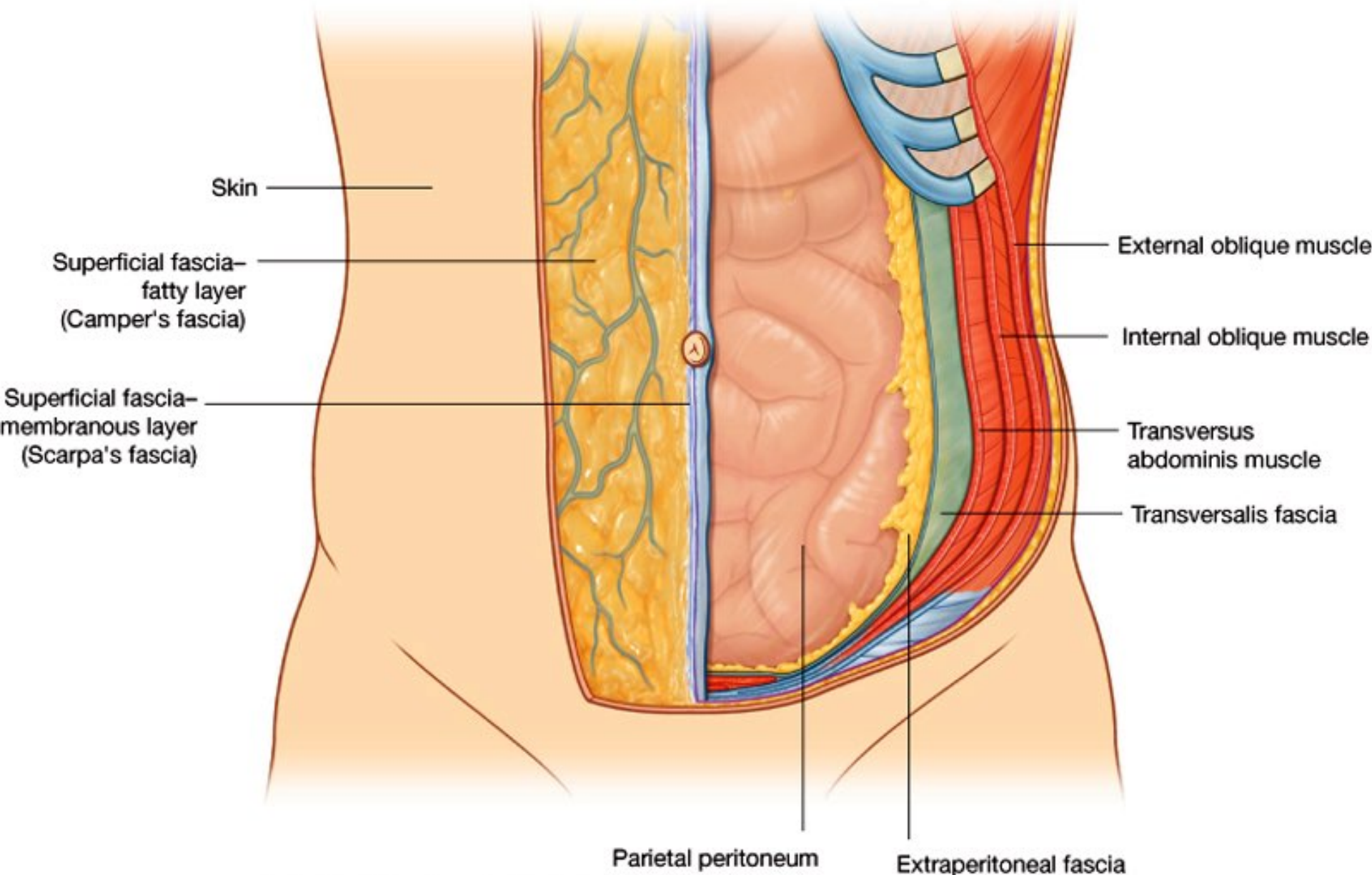
**Origin:** inner surfaces of the 7th to 12th costal cartilages, thoracolumbar fascia, inner lip of the iliac crest, anterior superior iliac spine, inguinal ligament

**Insertion:** rectus sheath, linea alba, pubic crest

**Action:** rotation of the trunk, active in expiration

**Innervation:** intercostal nerves, subcostal nerve, iliohypogastric nerve, ilioinguinal nerve





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# Anterior muscle: rectus abdominis muscle

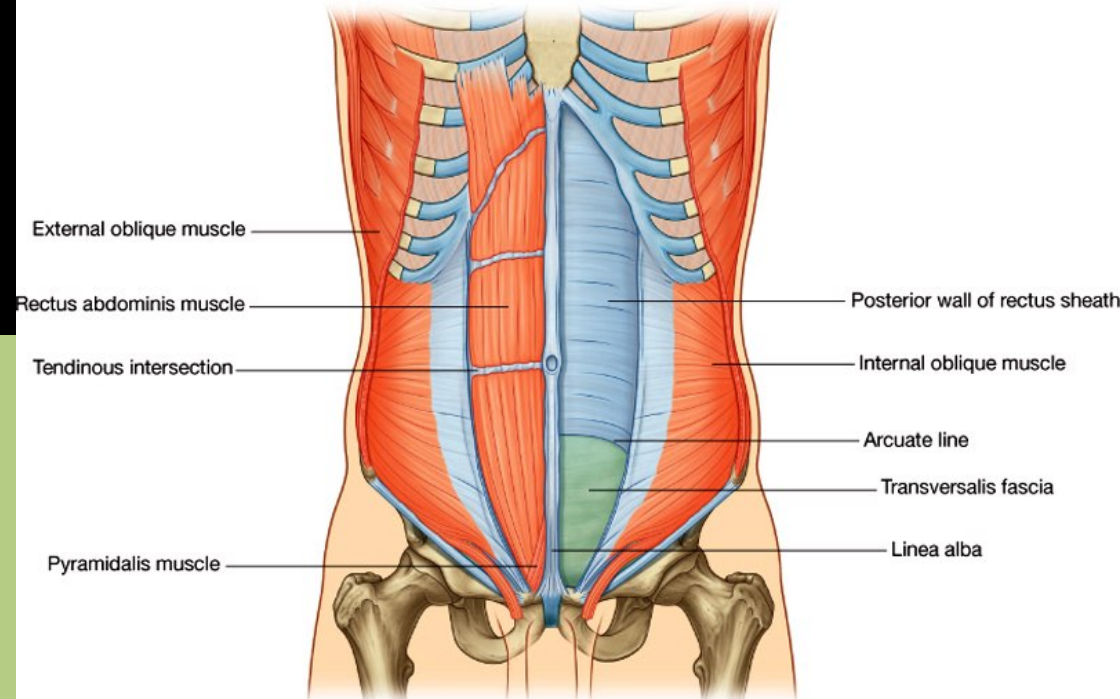


**Origin:** cartilages of the 5th to 7th ribs, xyphoid process

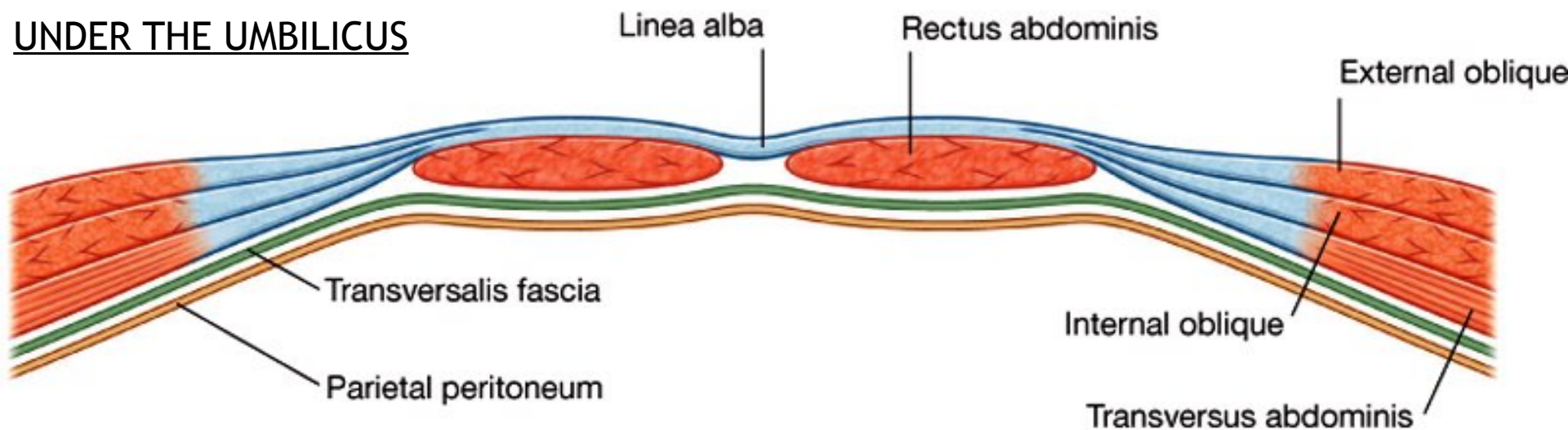
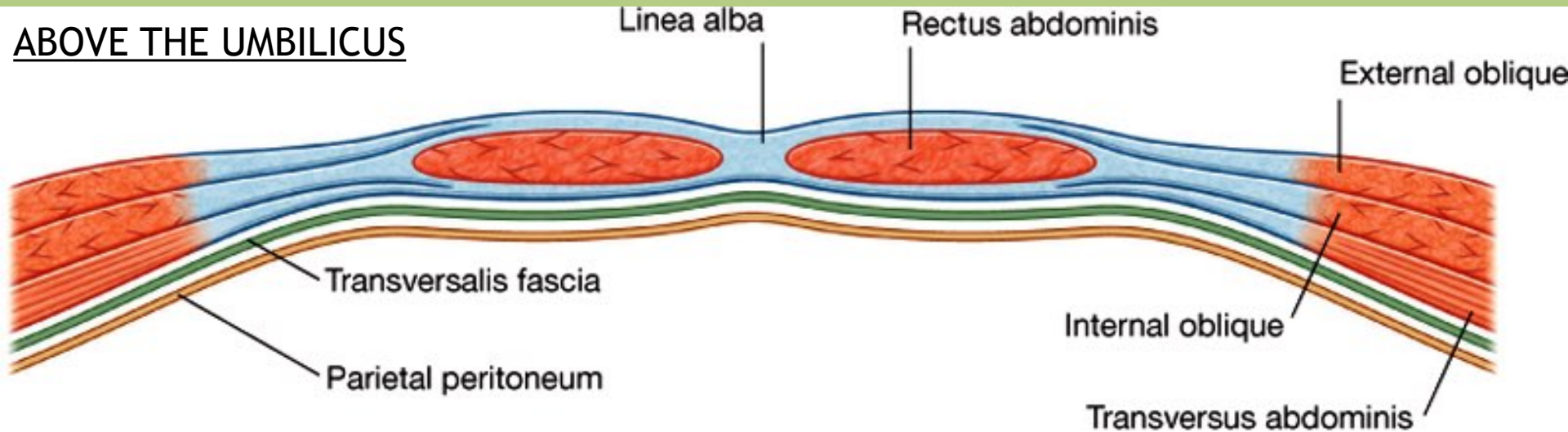
**Insertion:** between the pubic tubercle and symphysis

**Action:** flexion of the lumbar spine, active in expiration

**Innervation:** intercostal nerves, subcostal nerve



# Rectus sheath - cross sections

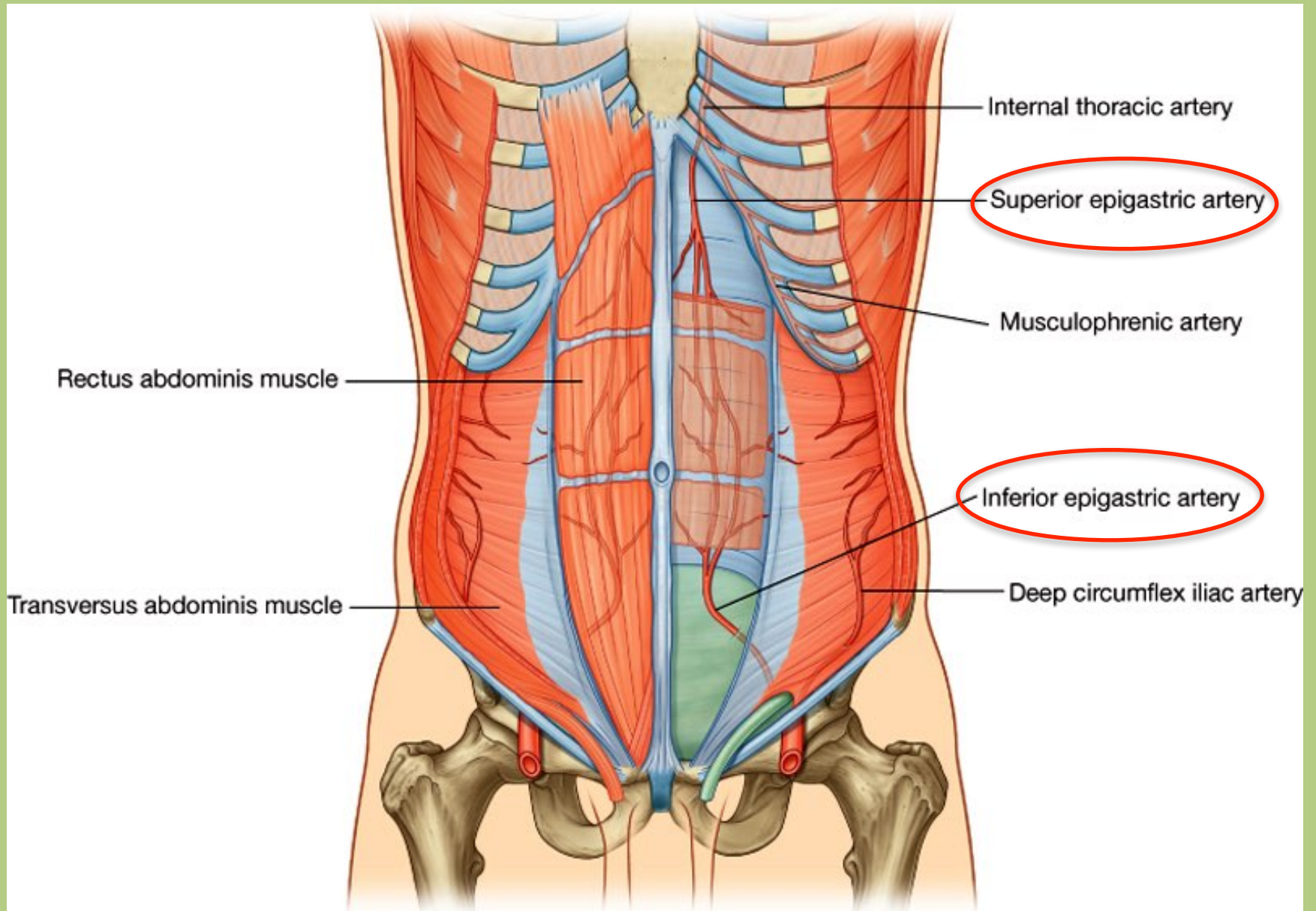


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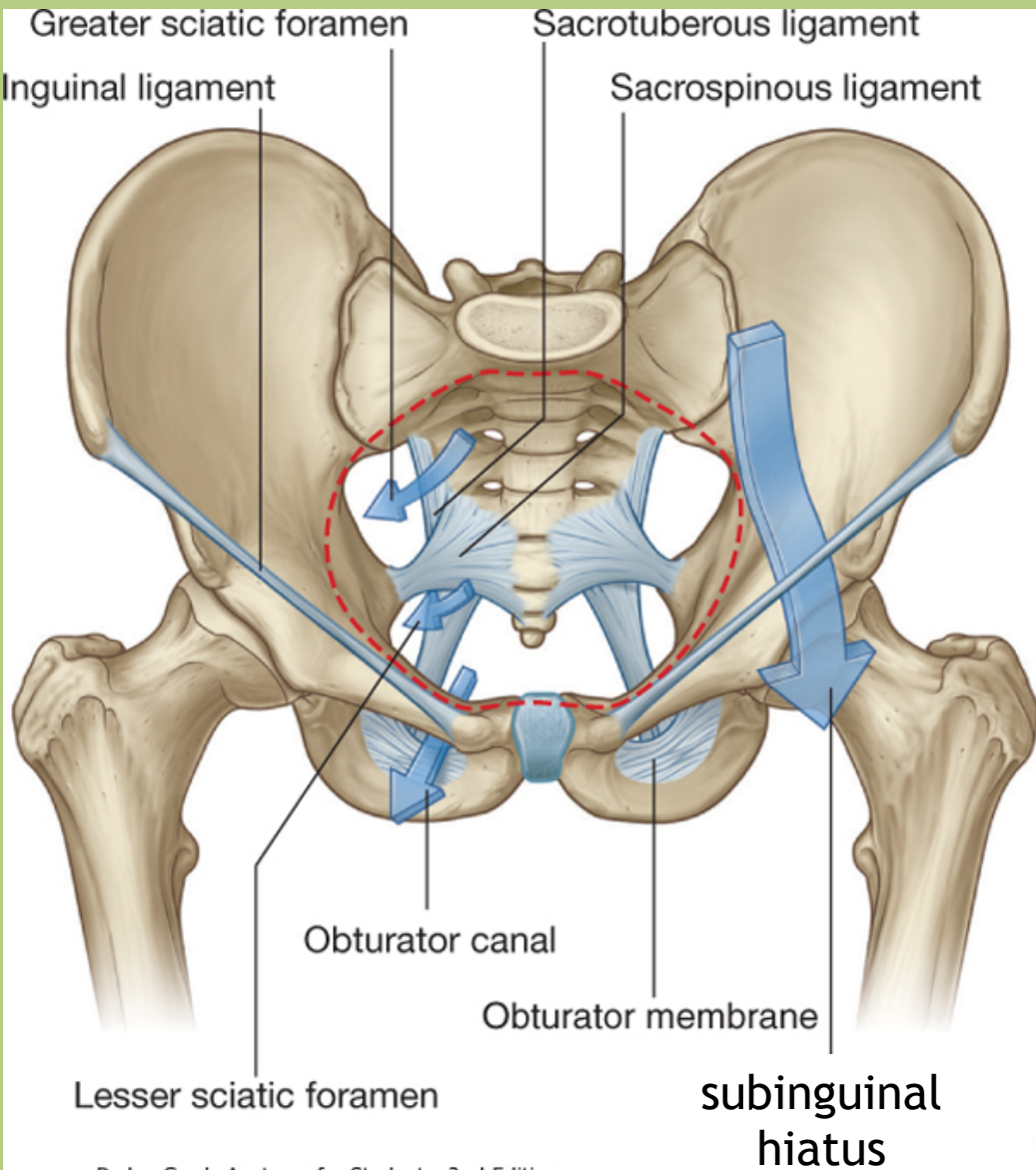
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# Blood supply of the rectus sheath



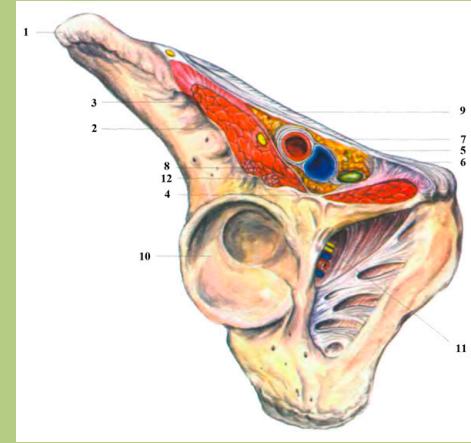
# Subinguinal hiatus - inguinal ligament







# Lacuna musculonervosa



- Iliopsoas muscle
- Femoral nerve
- Lateral femoral cutaneous nerve



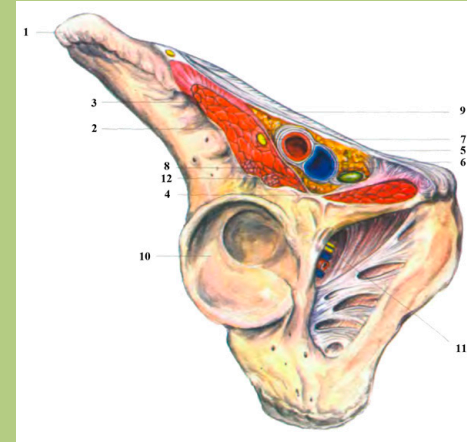
Psoas major muscles



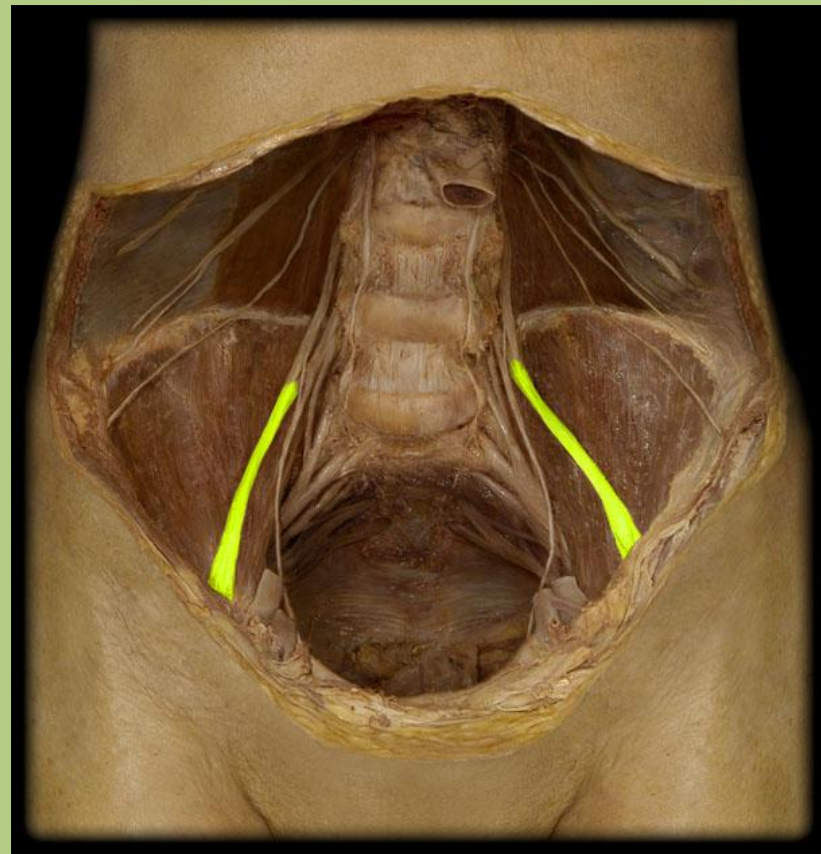
Iliacus muscles



# Lacuna musculonervosa



- Iliopsoas muscle
- Femoral nerve
- Lateral femoral cutaneous nerve

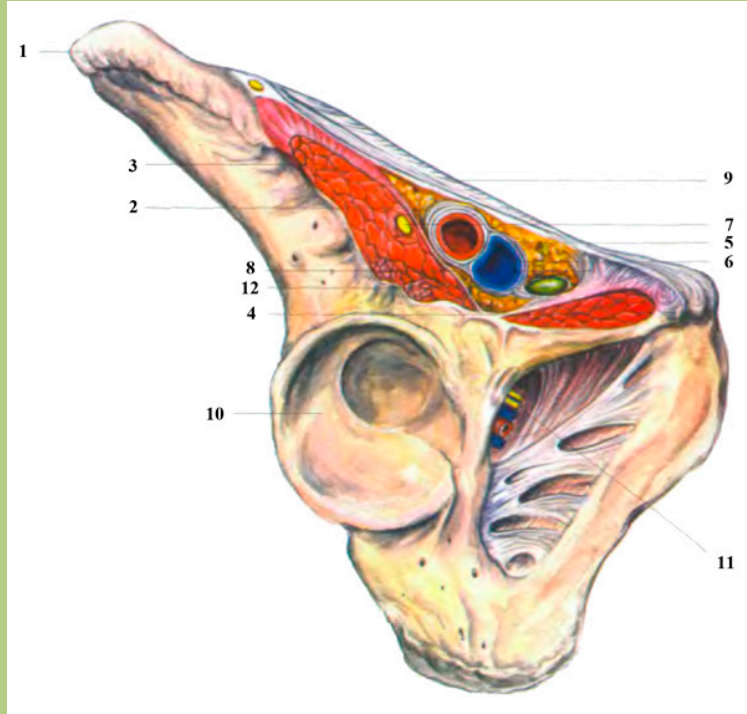


Femoral nerve

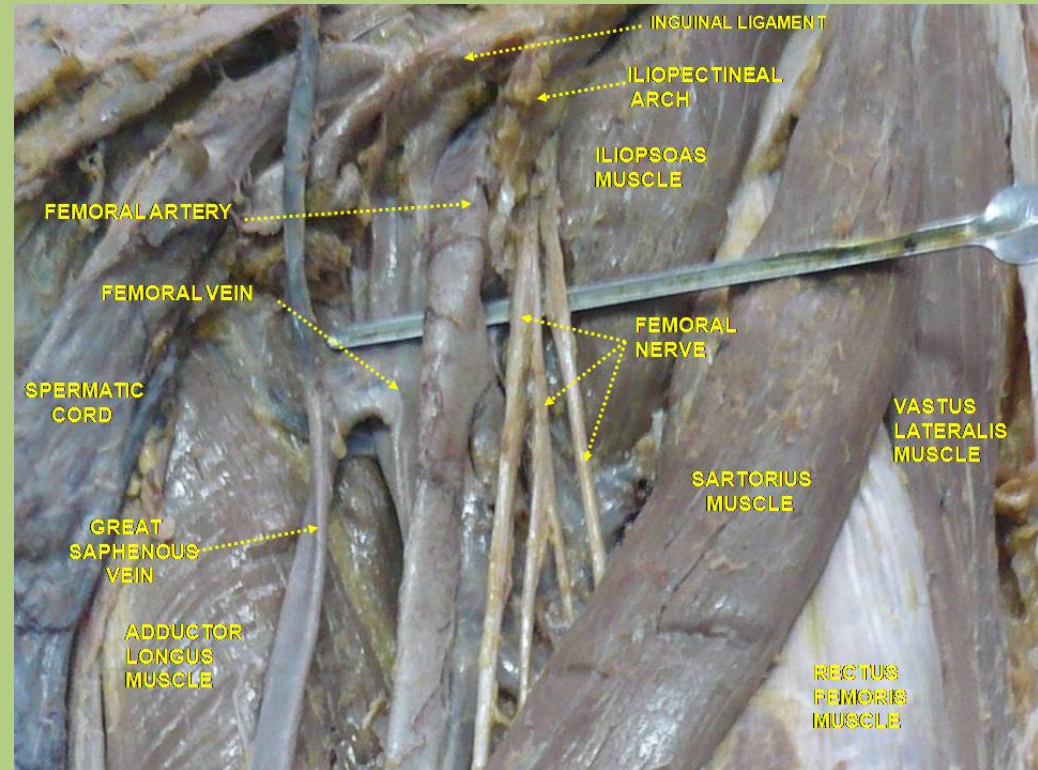


Lateral femoral cutaneous nerve - 4

# Lacuna musculonervosa - Lacuna vasorum

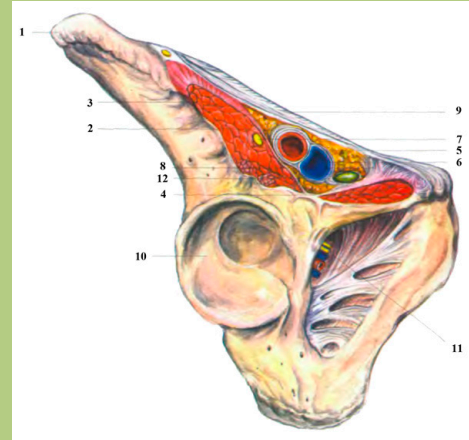


Iliopectineal arch

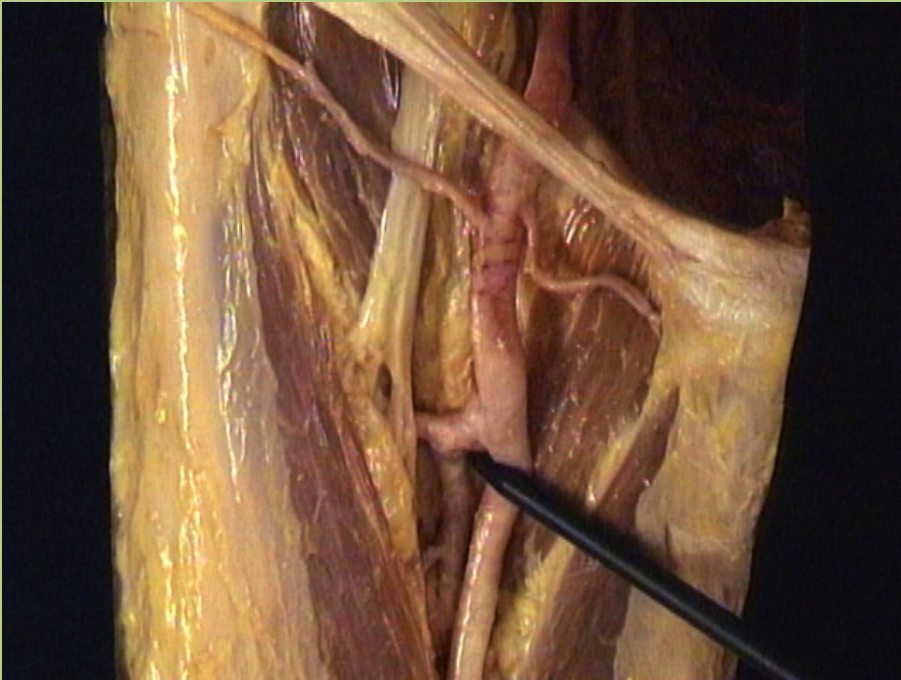




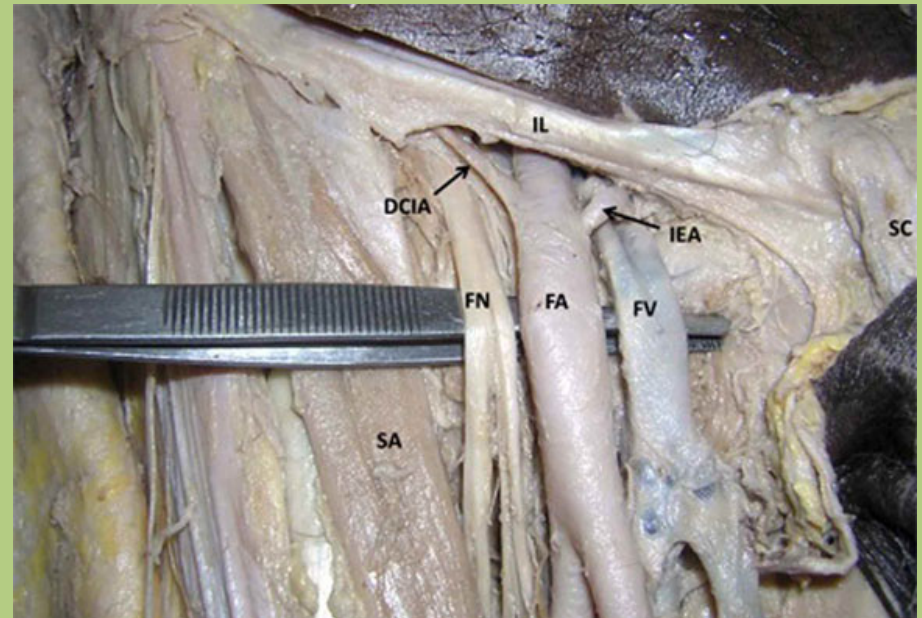
# Lacuna vasorum



- Femoral artery (laterally)
- Femoral vein (medially)
- Femoral branch of the genitofemoral nerve

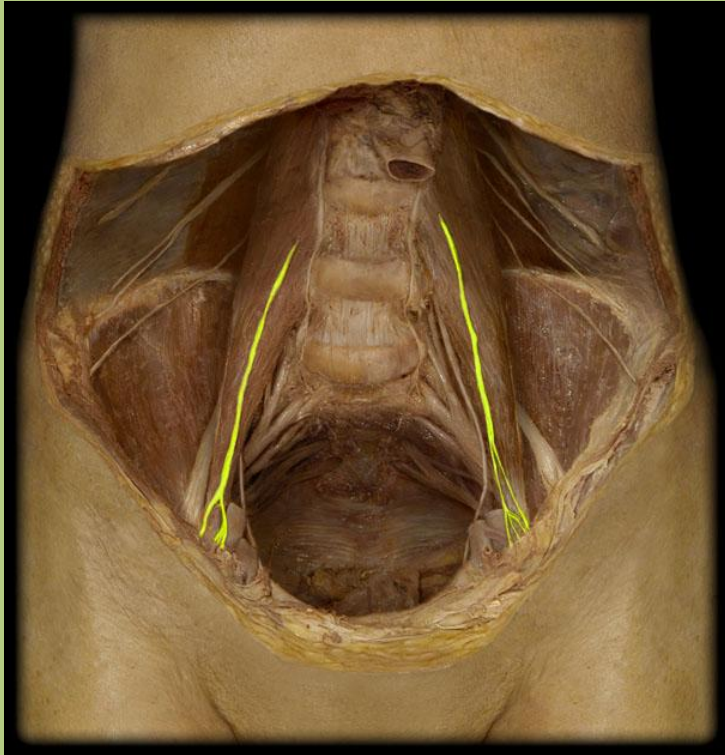
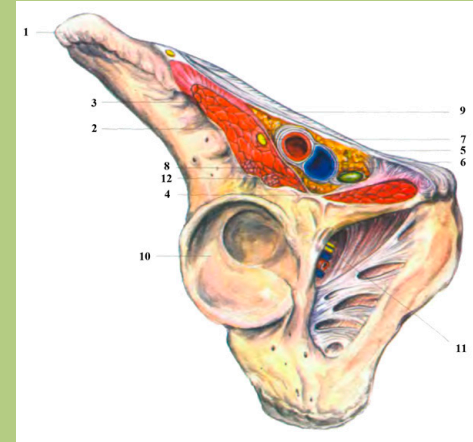


Femoral artery



Femoral vein

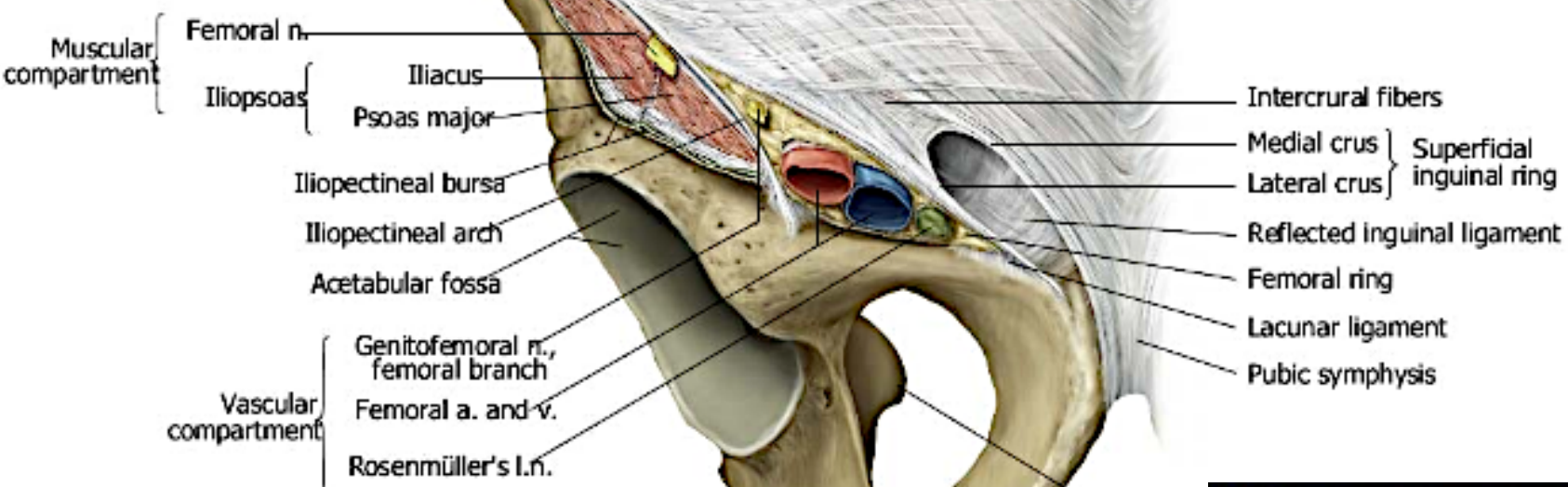
# Lacuna vasorum



- Femoral artery
- Femoral vein
- Femoral branch of the genitofemoral nerve



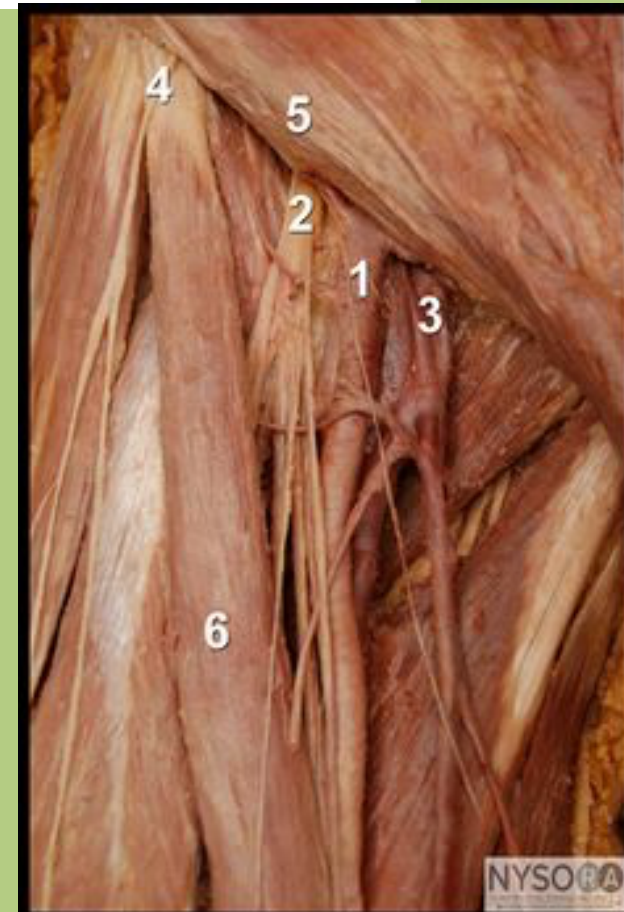




## Lacuna lymphatica = Lacuna herniosa

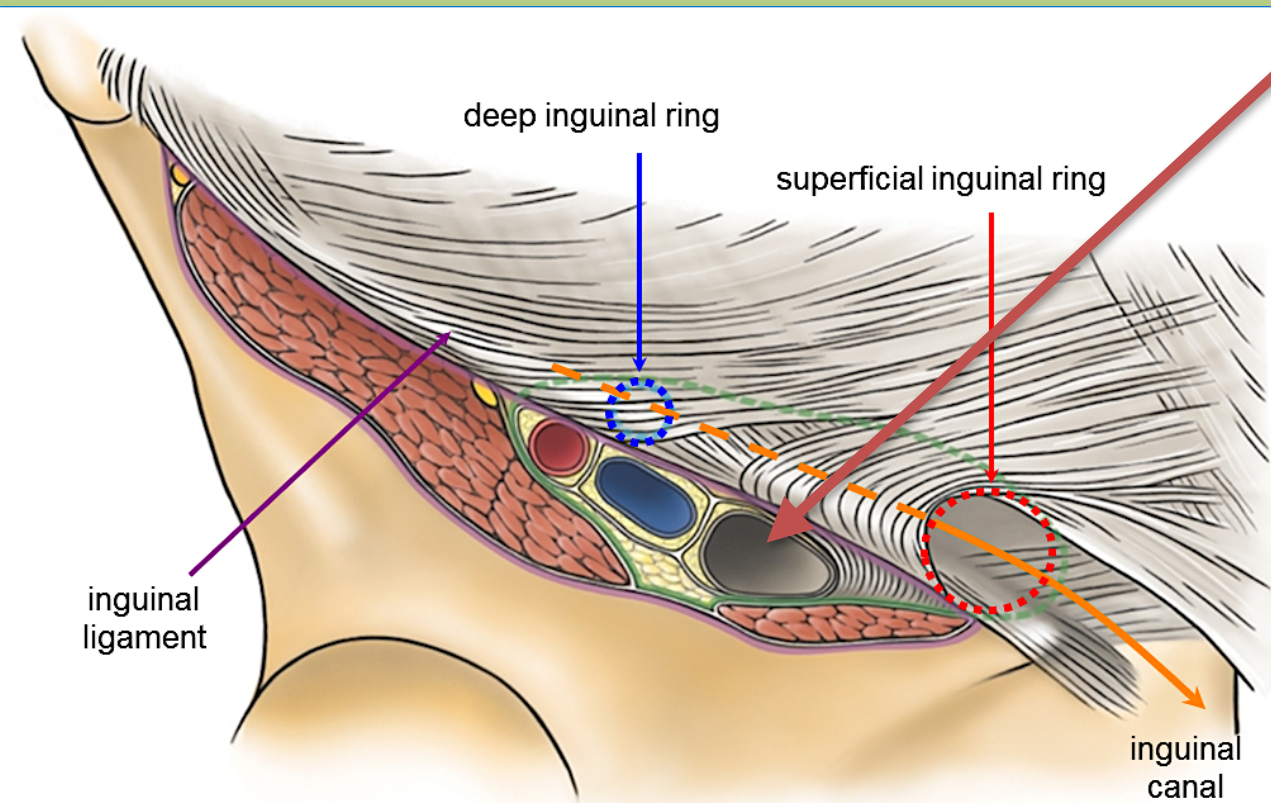
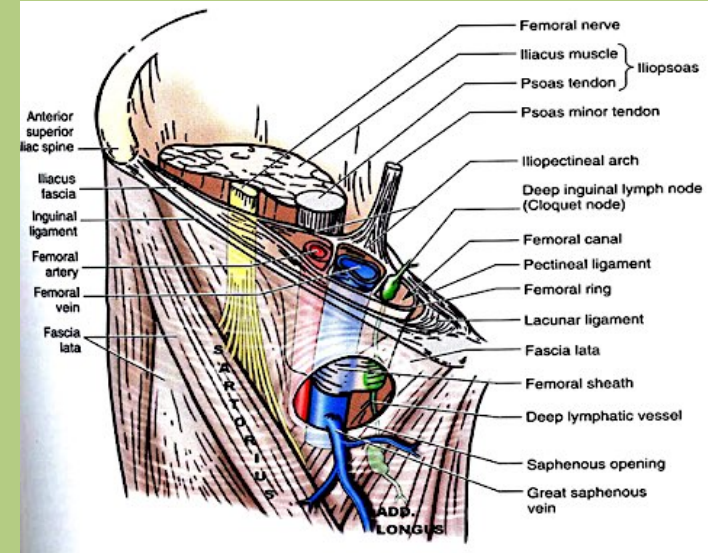
- Rosenmüller's lymph node

- 1: femoral artery
- 2: femoral nerve
- 3: femoral vein
- 4: lateral femoral cutaneous nerve
- 5: inguinal ligament
- 6: sartorius



# Femoral canal

A virtual space from the femoral ring to the saphenous hiatus.



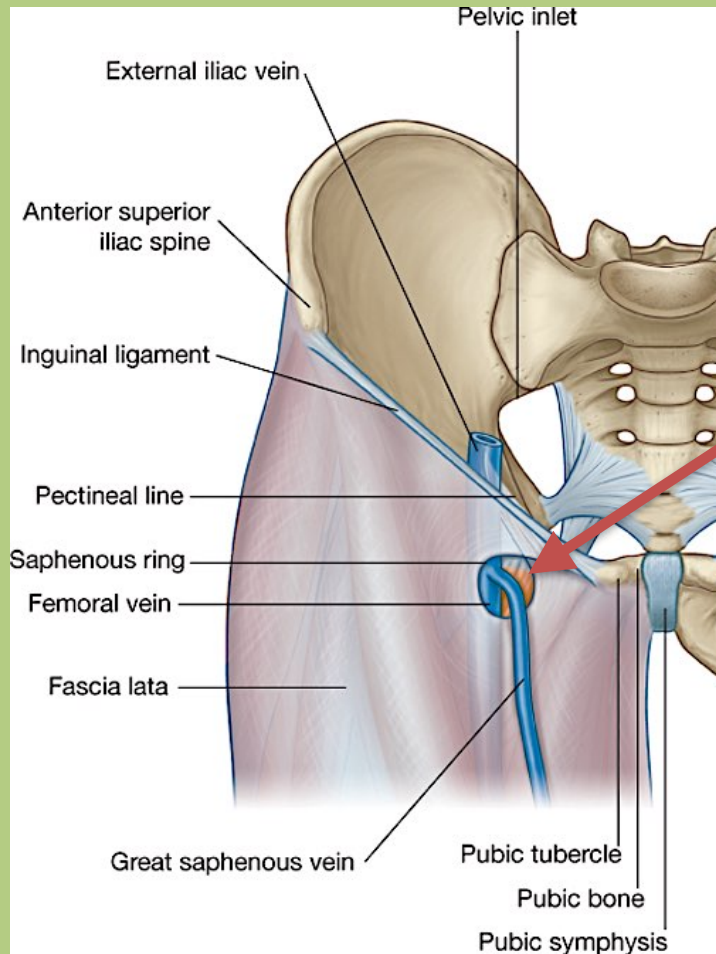
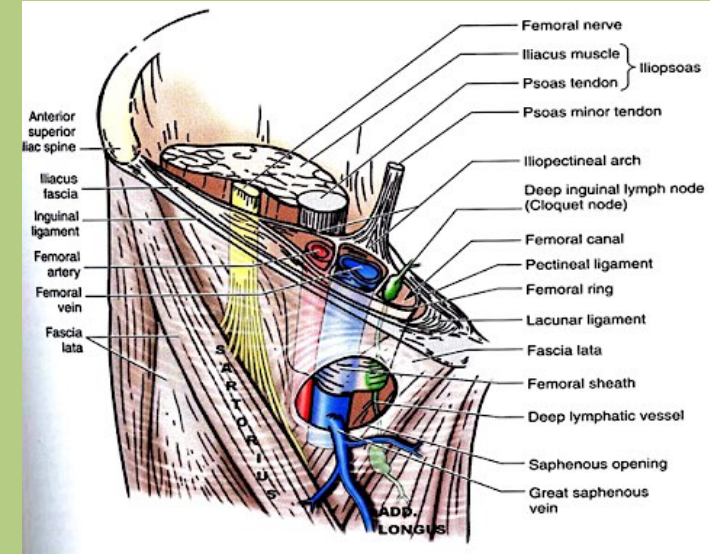
## Femoral ring:

- Lateral wall: femoral vein
- Medial wall: lacunar ligament
- Superior wall: inguinal ligament
- Inferior wall: pectineal fascia and superior ramus of the pubic bone



# Femoral canal

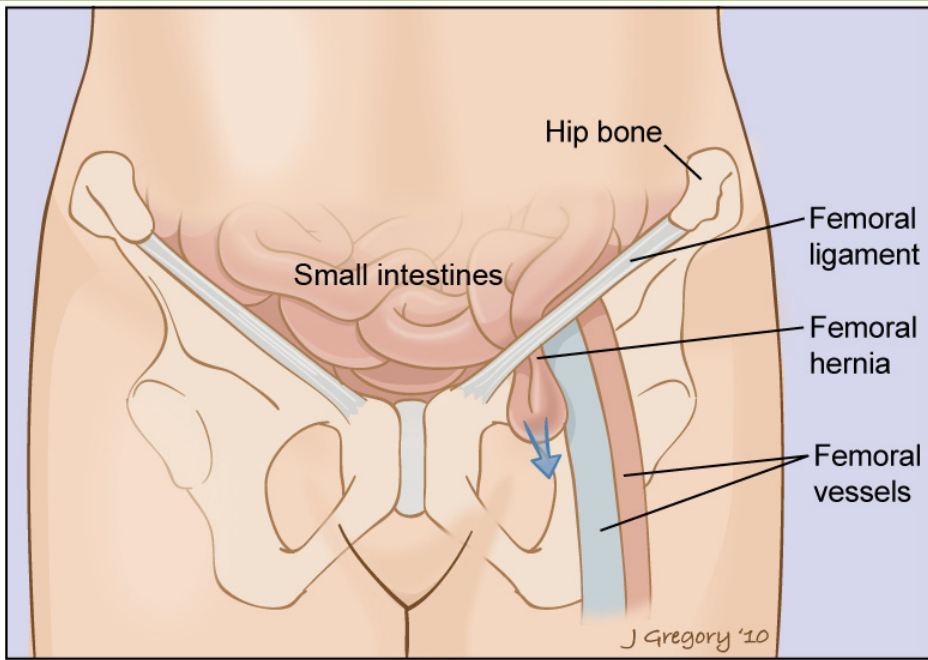
A virtual space from the femoral ring to the saphenous hiatus.



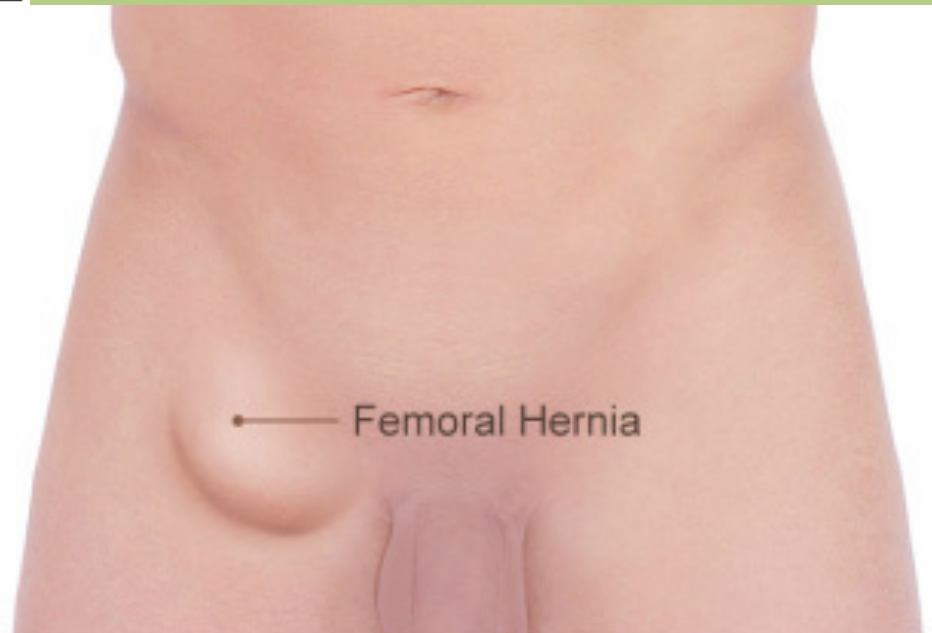
**Saphenous hiatus (closed by lamina cribrosa):**

- Great saphenous vein
- Lymph vessels

# Femoral herniation

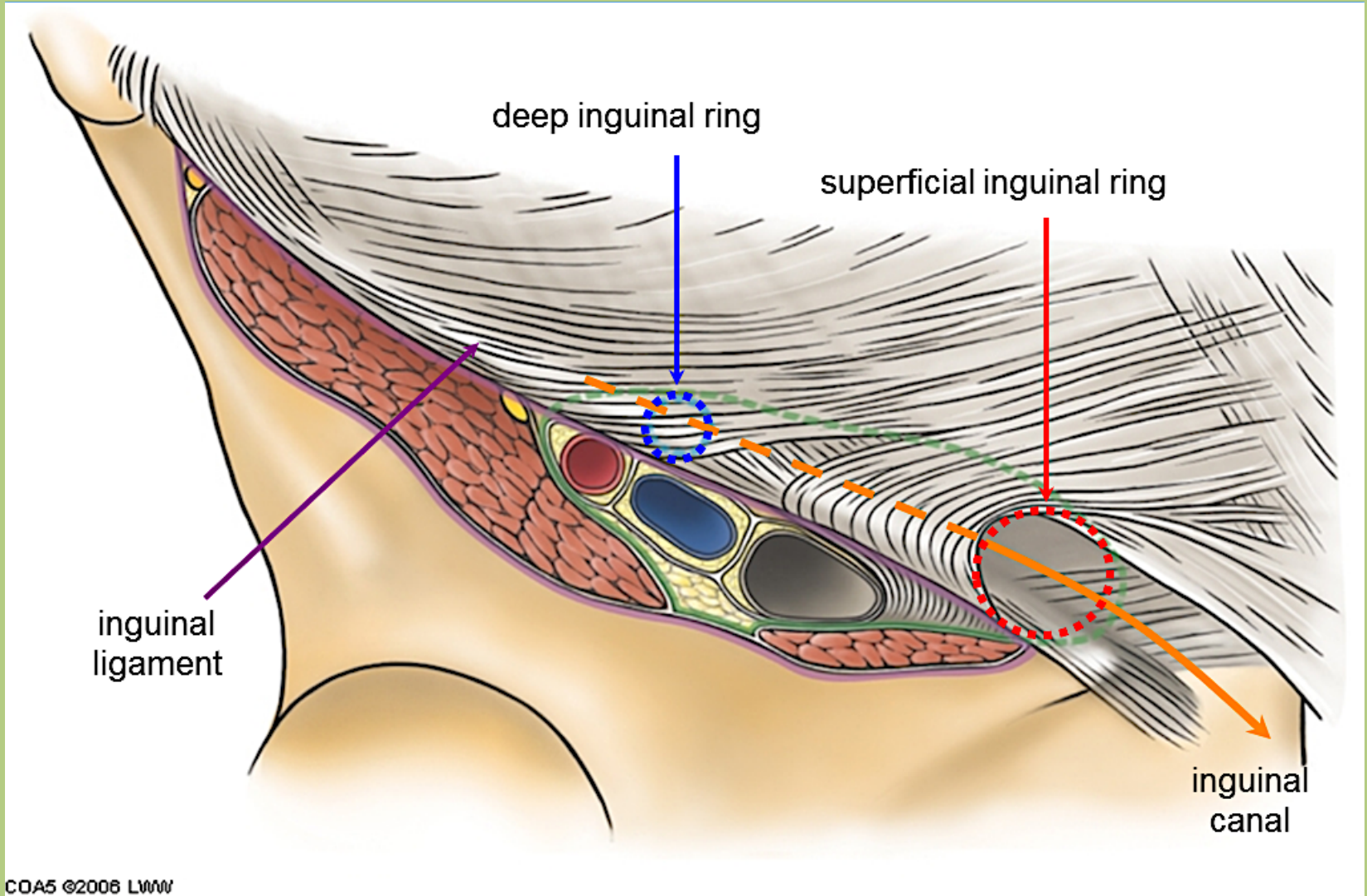


- Inferior to the inguinal ligament
- The sac may contain preperitoneal fat, omentum and small intestine
- Increased prevalence in females
- Always acquired

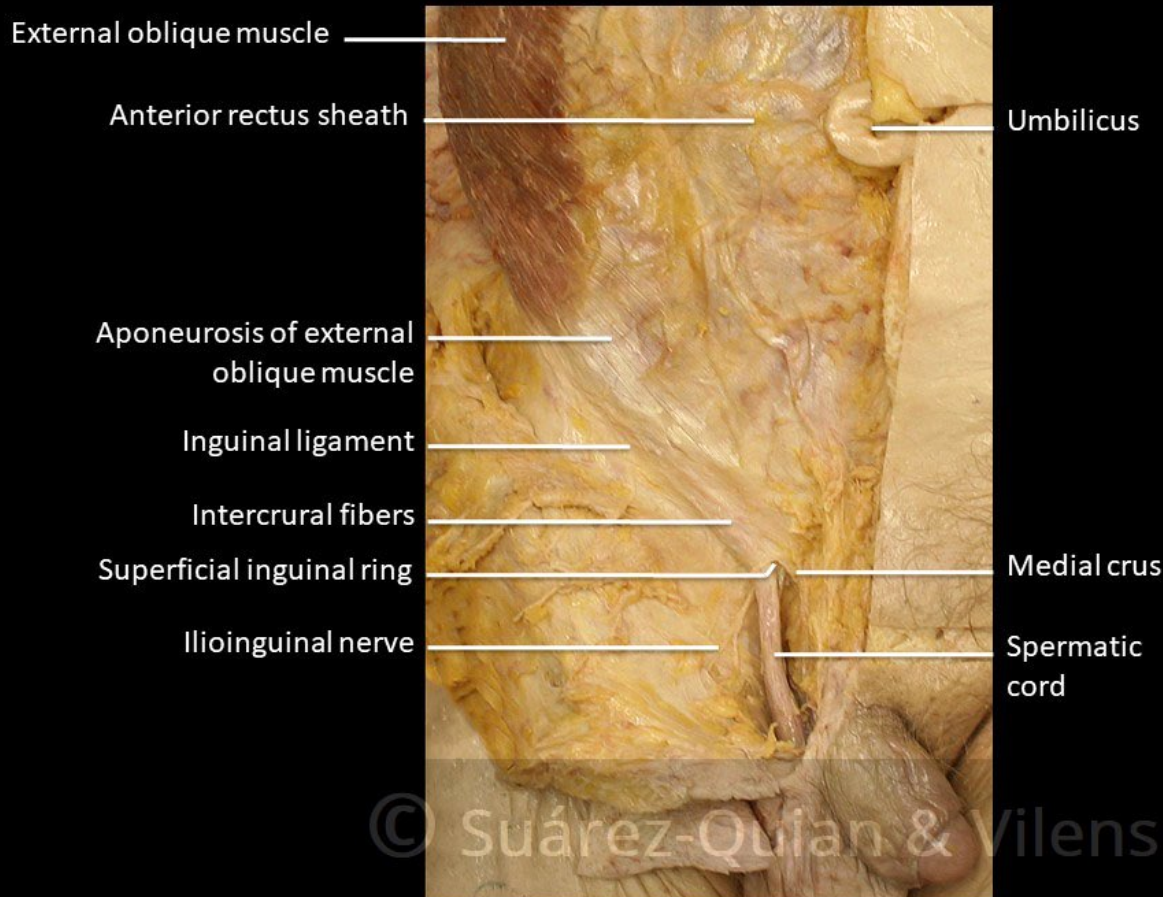
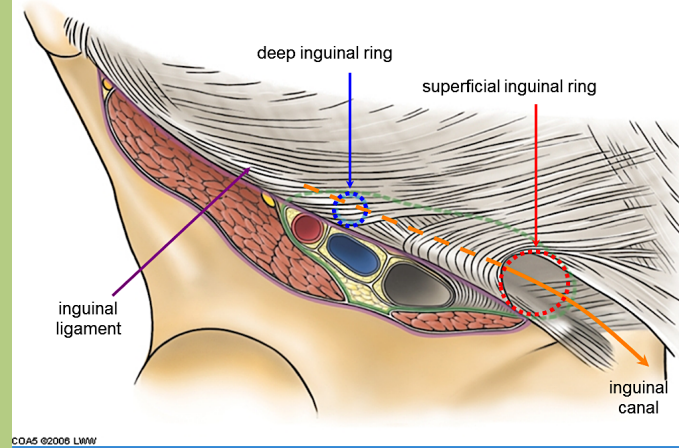




# Inguinal canal



# Inguinal canal

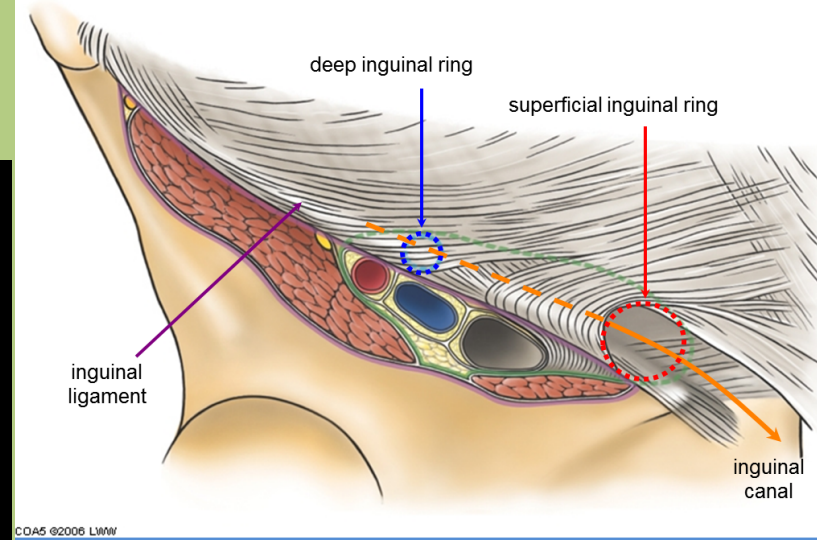
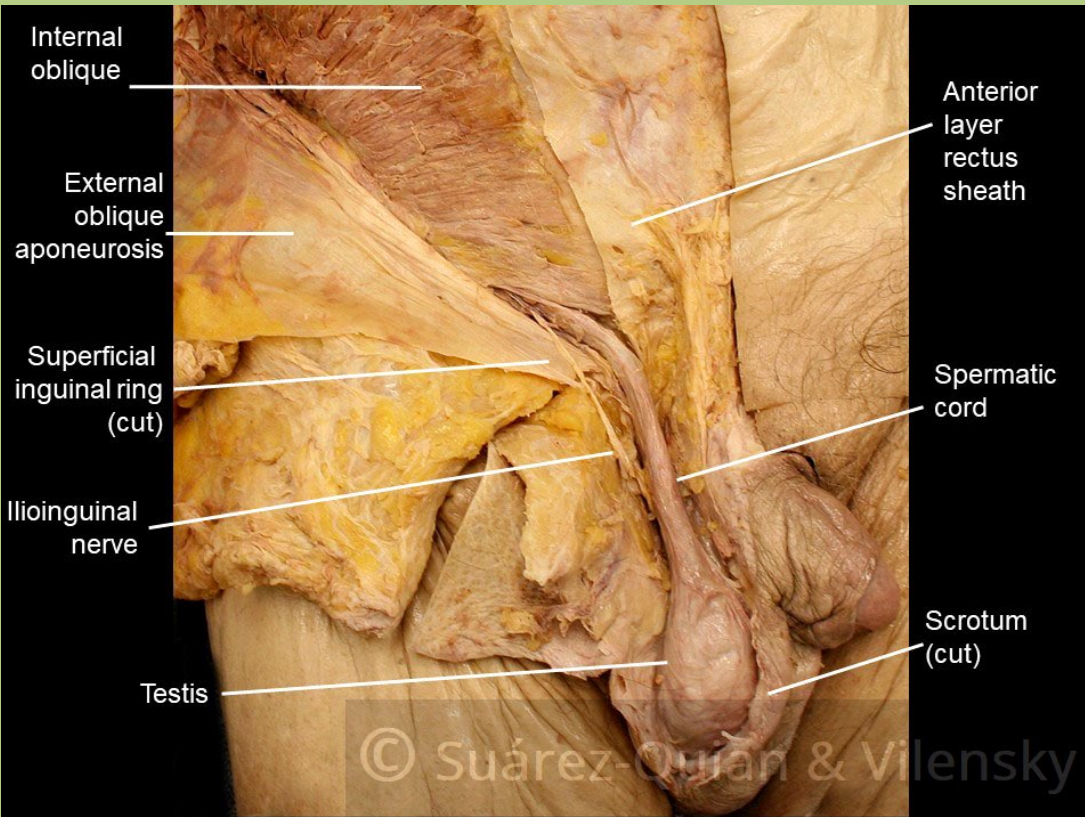


- **Floor:** inguinal ligament
- **Anterior wall:** external oblique aponeurosis

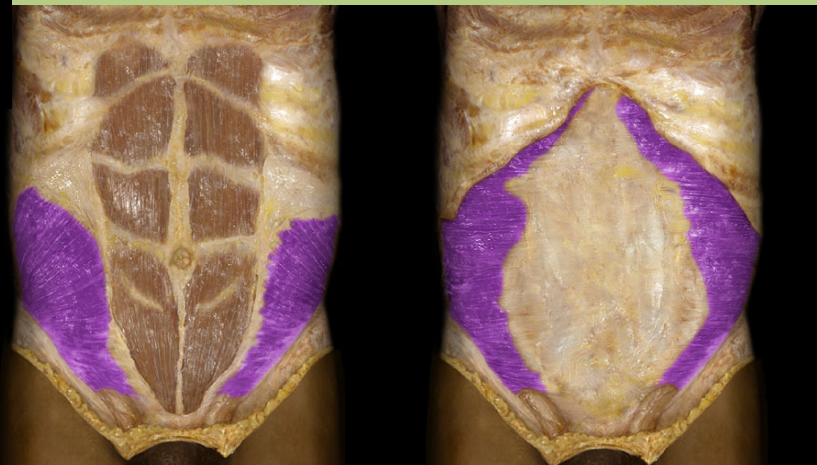




# Inguinal canal



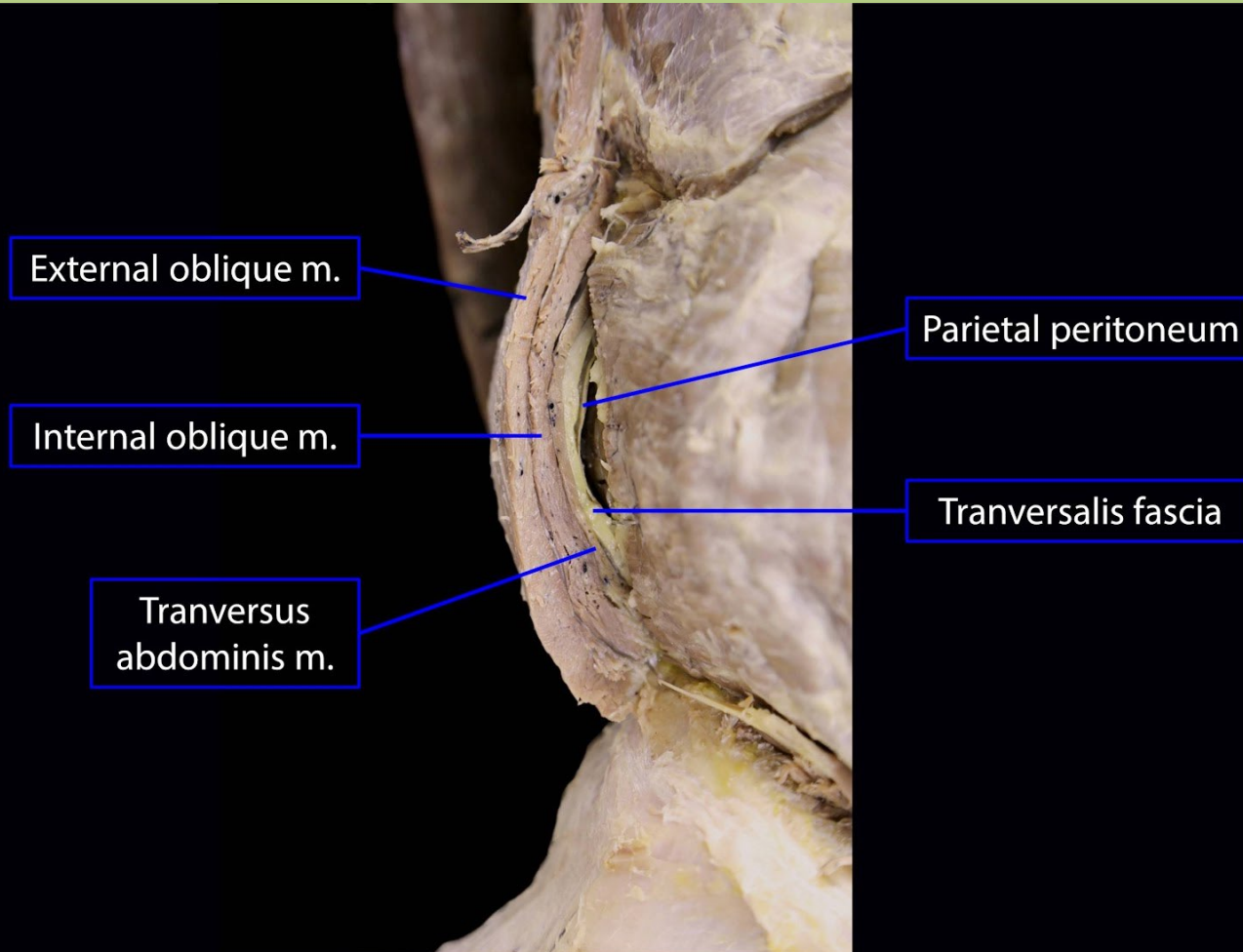
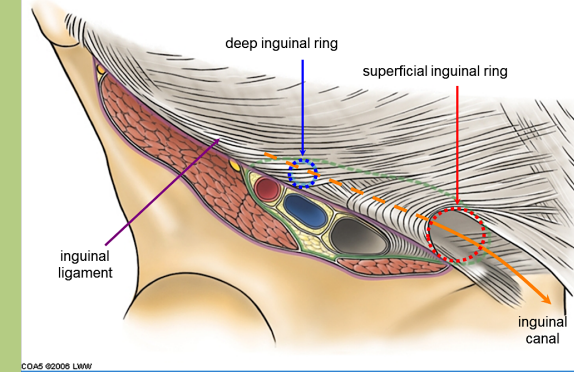
- **Roof:** Internal oblique and transversus abdominis muscle



Internal oblique

Transversus abdominis

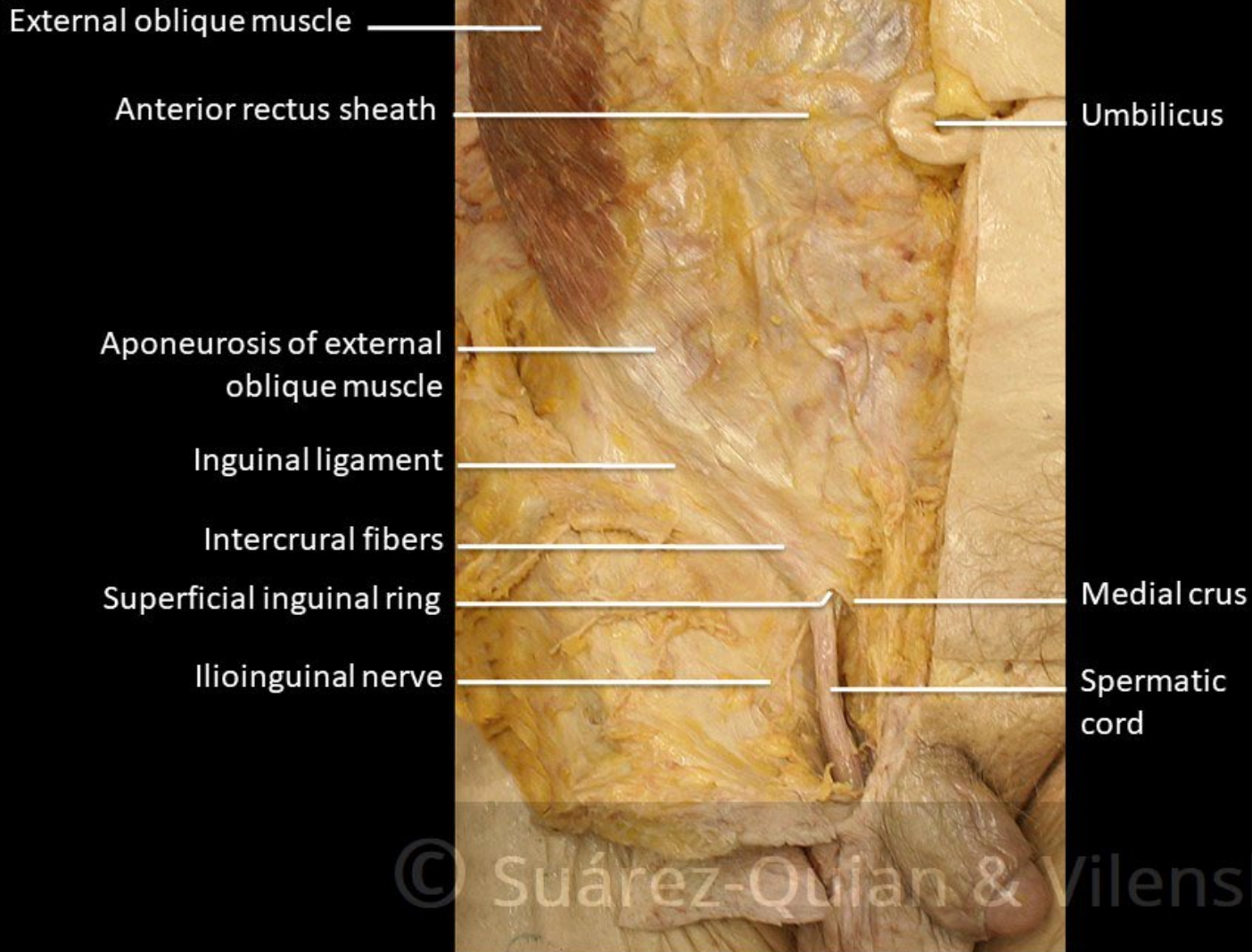
# Inguinal canal



- **Posterior wall:**  
Transversalis  
fascia and parietal  
peritoneum



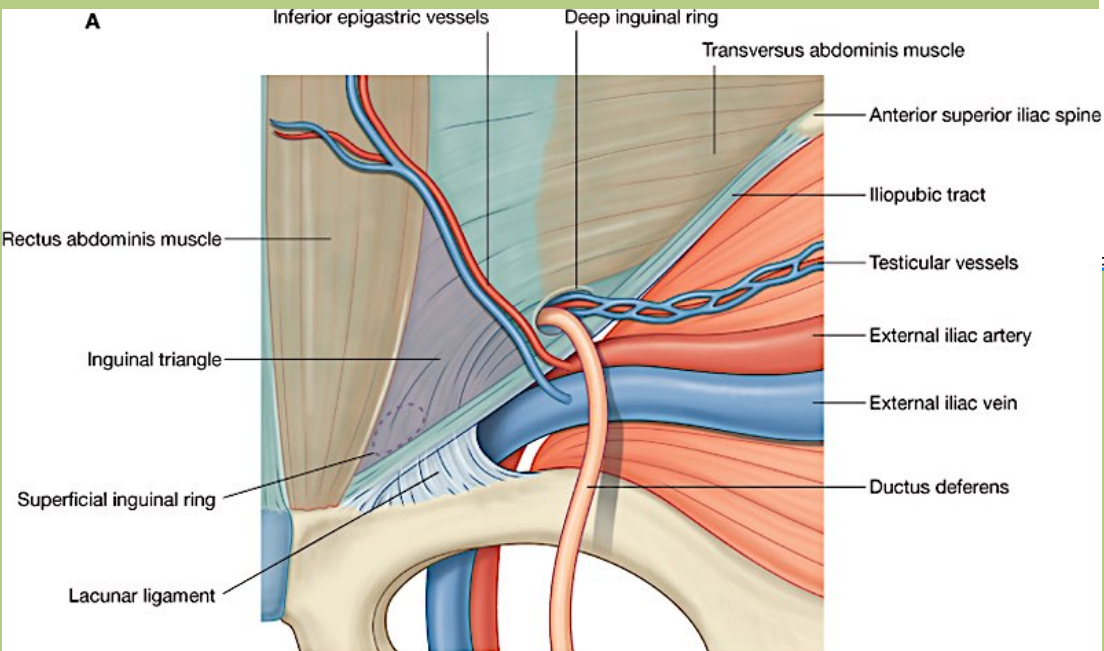
# Inguinal canal



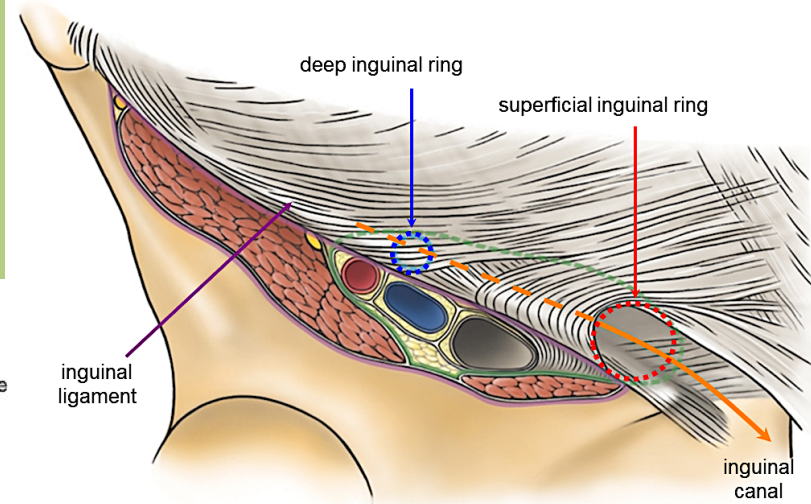
## Superficial inguinal ring:

- Opening in the external oblique aponeurosis
- Medial and lateral crura

# Inguinal canal



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## Deep inguinal ring:

- Formed by the transversalis fascia

## Contents:

- Spermatic cord in men and round ligament of the uterus in women
- Ilioungual nerve and genital branch of the genitofemoral nerve



# Inguinal herniation

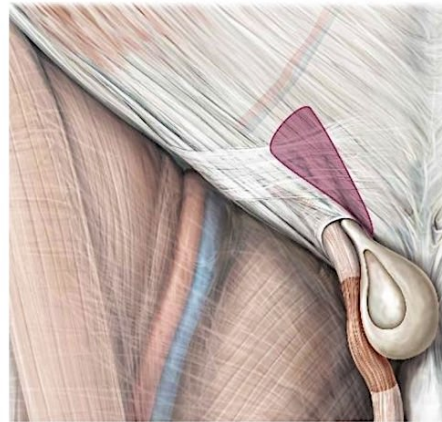
*Trigger factors: obesity, pregnancy and multiple surgical treatments*

## Direct inguinal hernia:

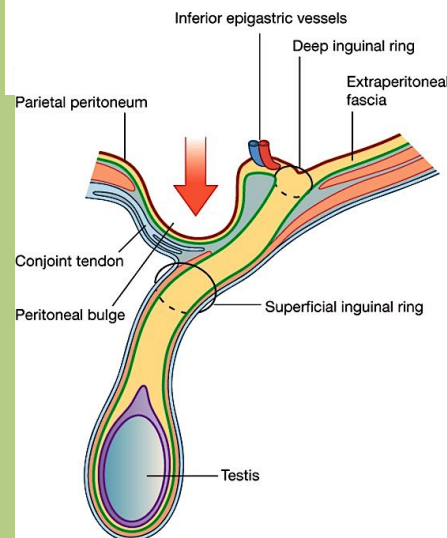
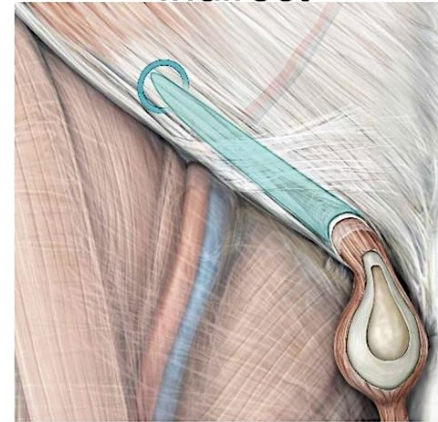
- The sac passes through the superficial inguinal ring
- Always acquired

## Clinical Correlations: Hernias

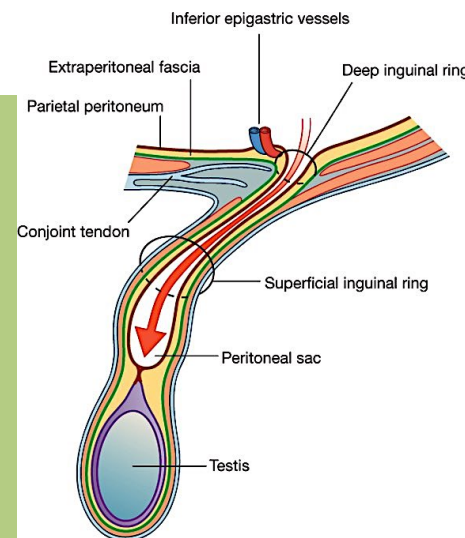
Direct



Indirect



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## Indirect inguinal hernia:

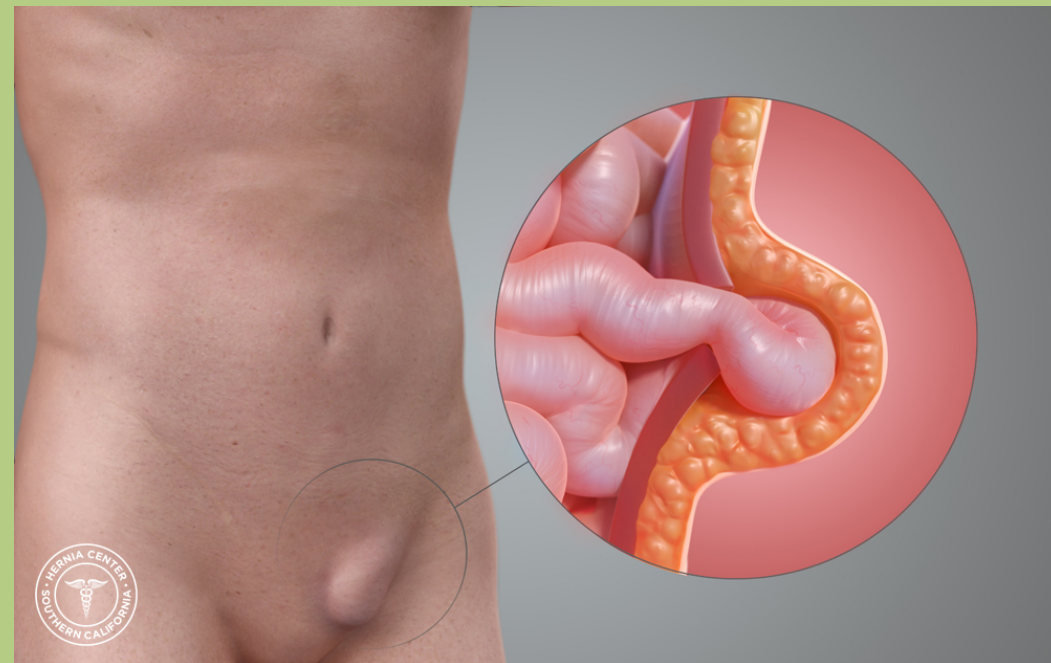
- The sac passes through the deep and superficial inguinal rings
- Congenital or acquired
- More dangerous

# Inguinal herniation



Indirect inguinal hernia

Direct inguinal hernia

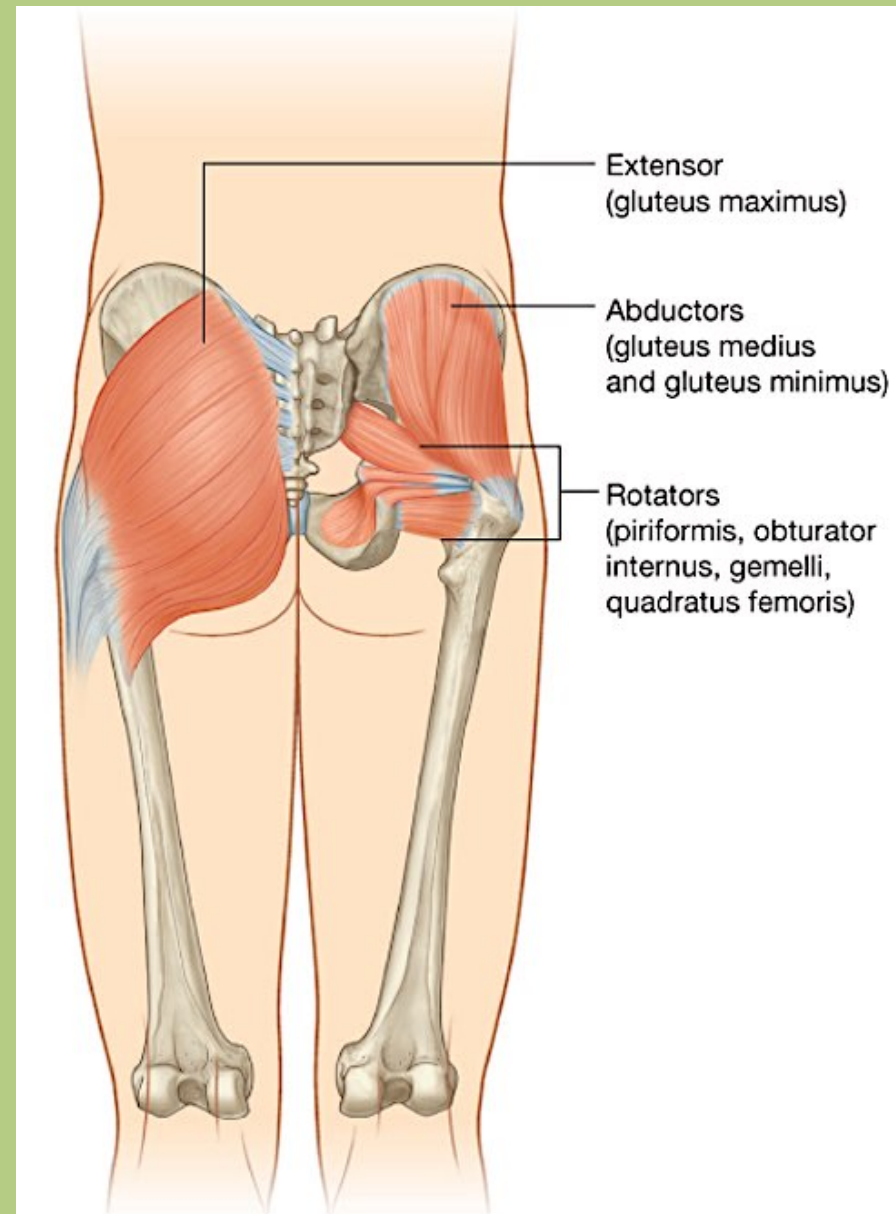




# Hip muscles

# Gluteus maximus

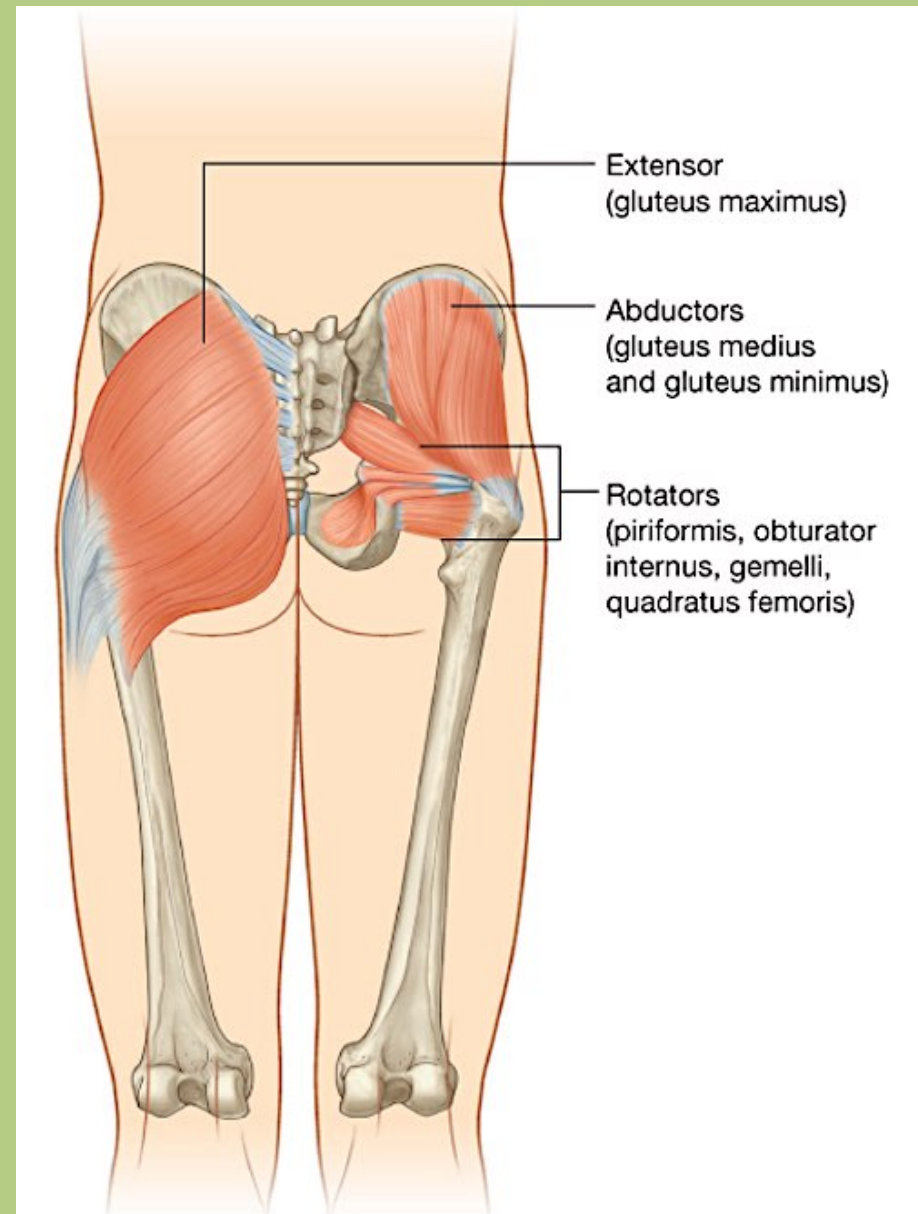
- **Origin:** dorsal to the posterior gluteal line of the ilium; sacrum and thoracolumbar fascia
- **Insertion:** gluteal tuberosity, iliotibial tract
- **Action:** Hip joint: abduction-adduction, *extension and lateral rotation*. Knee joint: stabilisation when the knee is extended.
- **Innervation:** inferior gluteal nerve





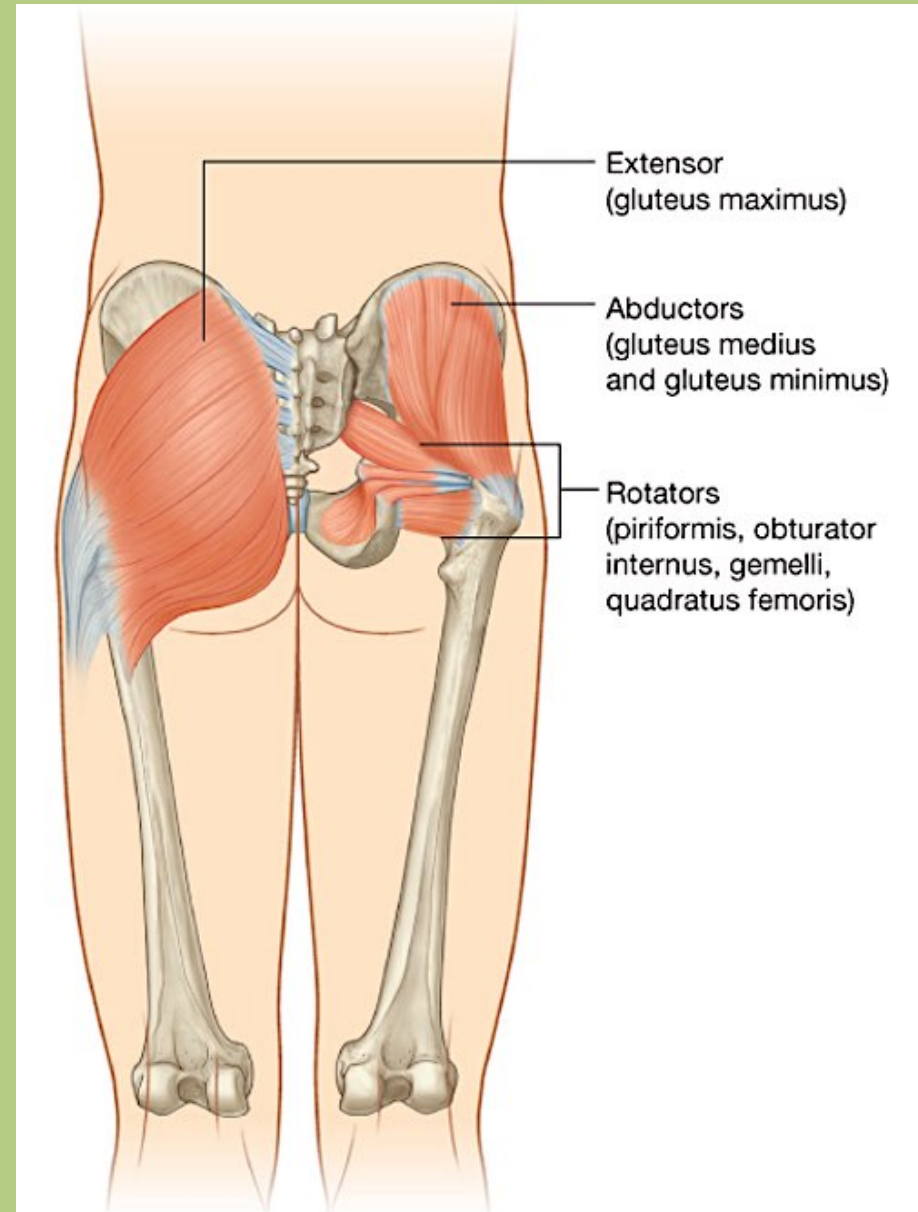
# Gluteus medius

- **Origin:** between the anterior and posterior gluteal lines of the ilium
- **Insertion:** greater trochanter
- **Action:** *abduction* and lateral and medial rotation.
- **Innervation:** superior gluteal nerve



# Gluteus minimus

- **Origin:** between the anterior and inferior gluteal lines of the ilium
- **Insertion:** greater trochanter
- **Action:** *abduction* and medial and lateral rotation
- **Innervation:** superior gluteal nerve



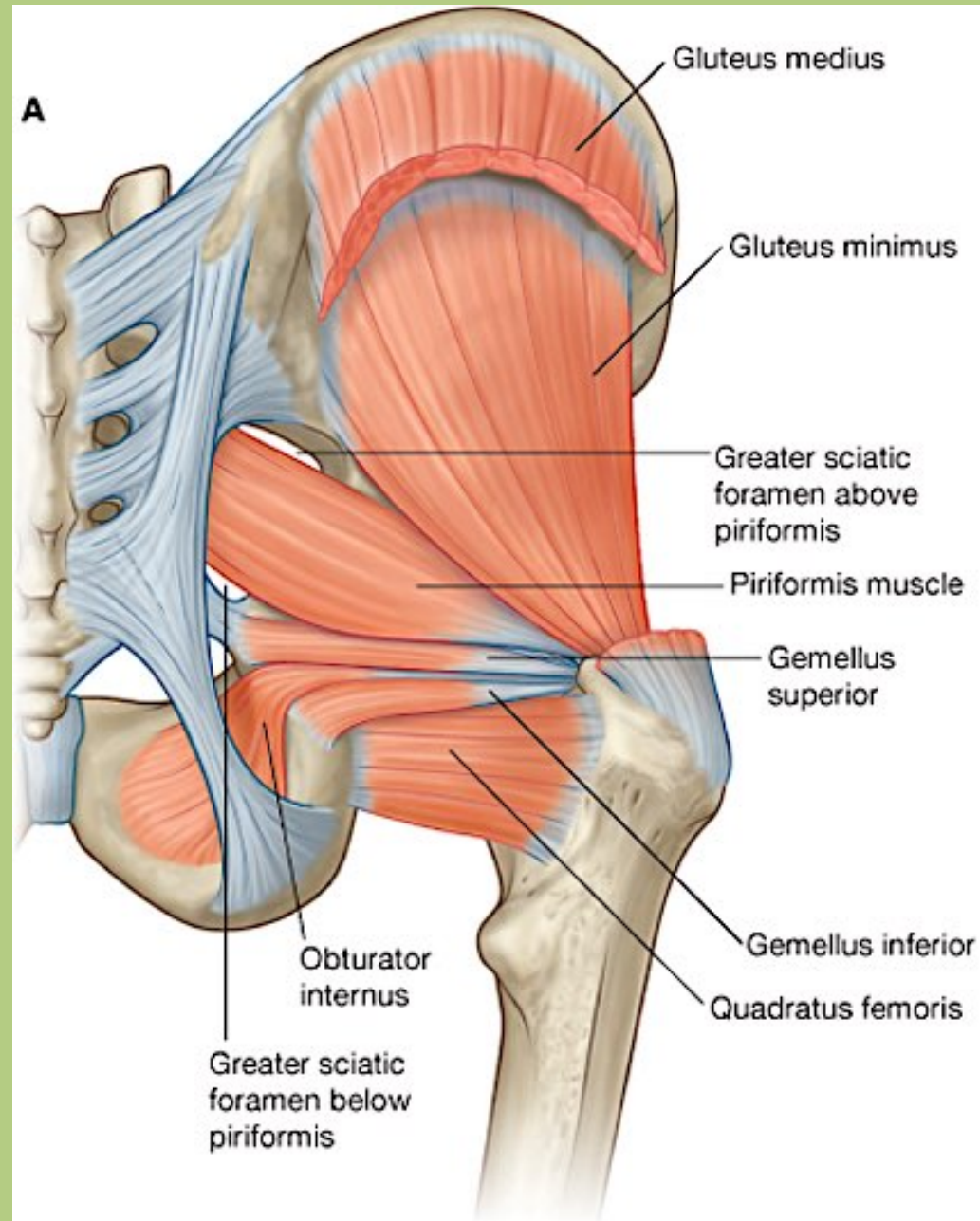


# Hip muscles



# Piriformis

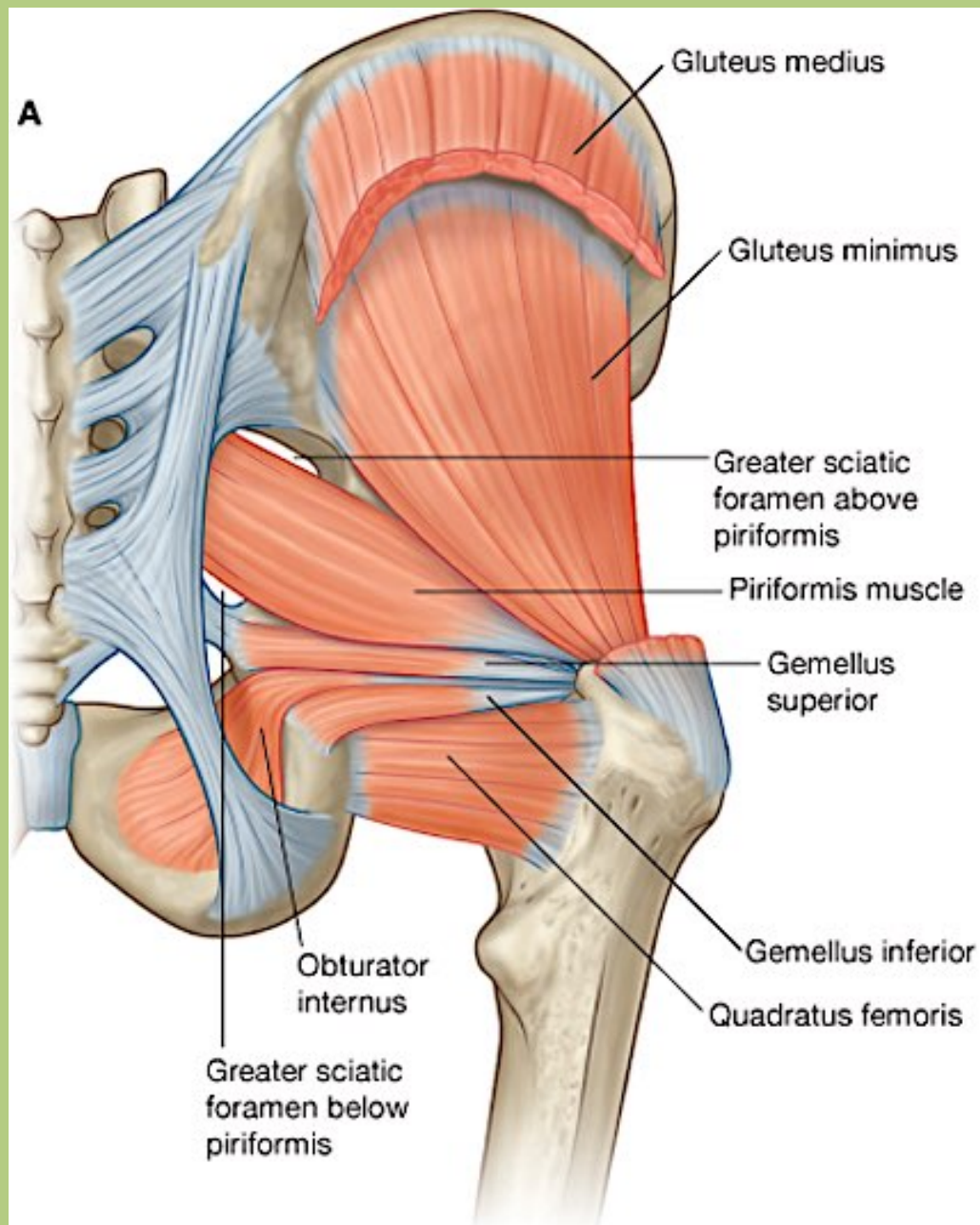
- **Origin:** 2nd-4th sacral pelvic foramina
- **Insertion:** tip of the greater trochanter
- **Action:** *abduction and lateral rotation*
- **Innervation:** sciatic nerve





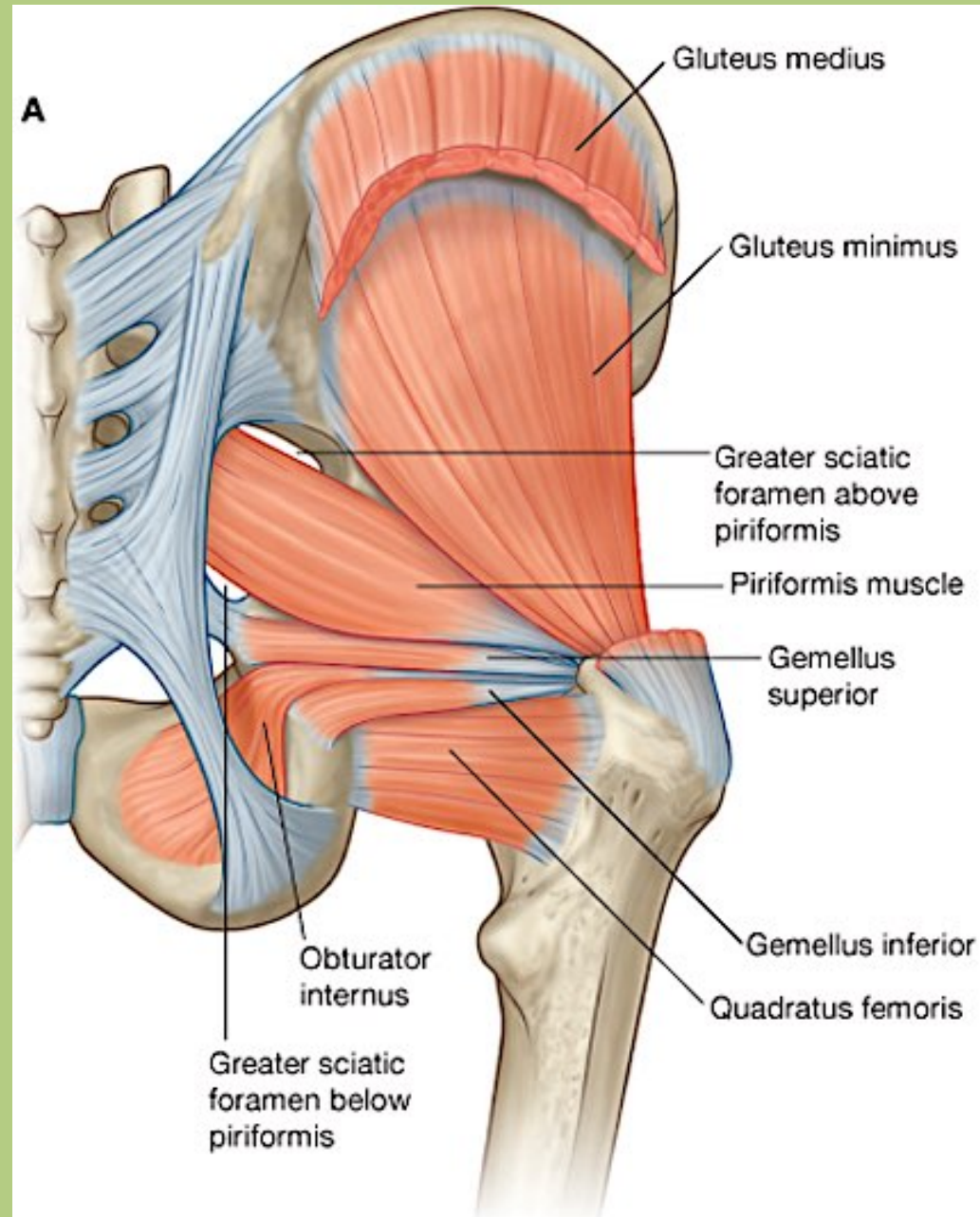
# Obturator internus

- **Origin:** inner surface of the obturator foramen and obturator membrane
- **Insertion:** trochanteric fossa
- **Action:** *adduction and lateral rotation.* (also active in abduction, depending on the position of the hip joint)
- **Innervation:** sacral plexus



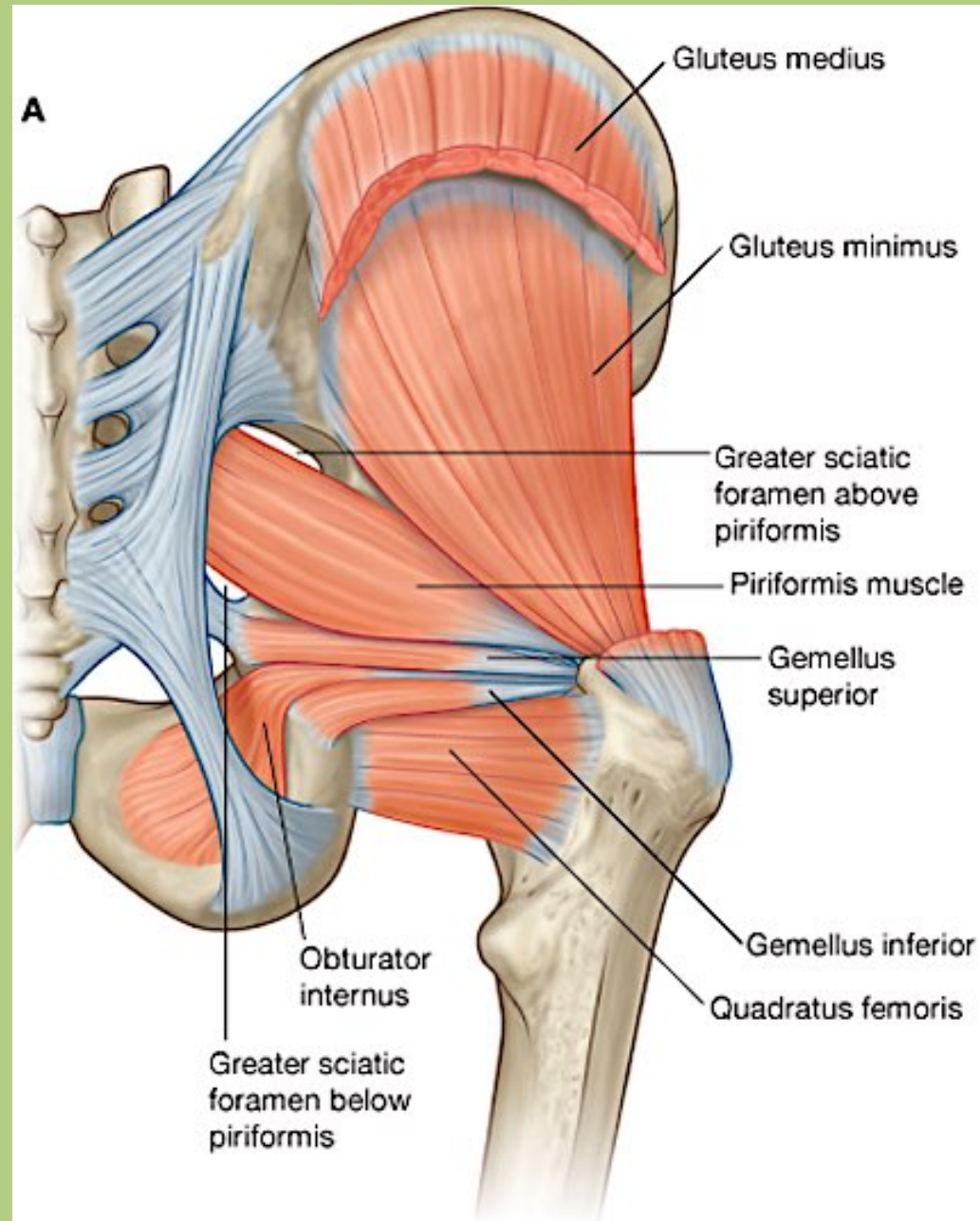
# Obturator externus

- **Origin:** outer surface of the obturator foramen and obturator membrane
- **Insertion:** trochanteric fossa
- **Action:** *adduction and lateral rotation*
- **Innervation:** lumbar plexus



# Gemellus superior

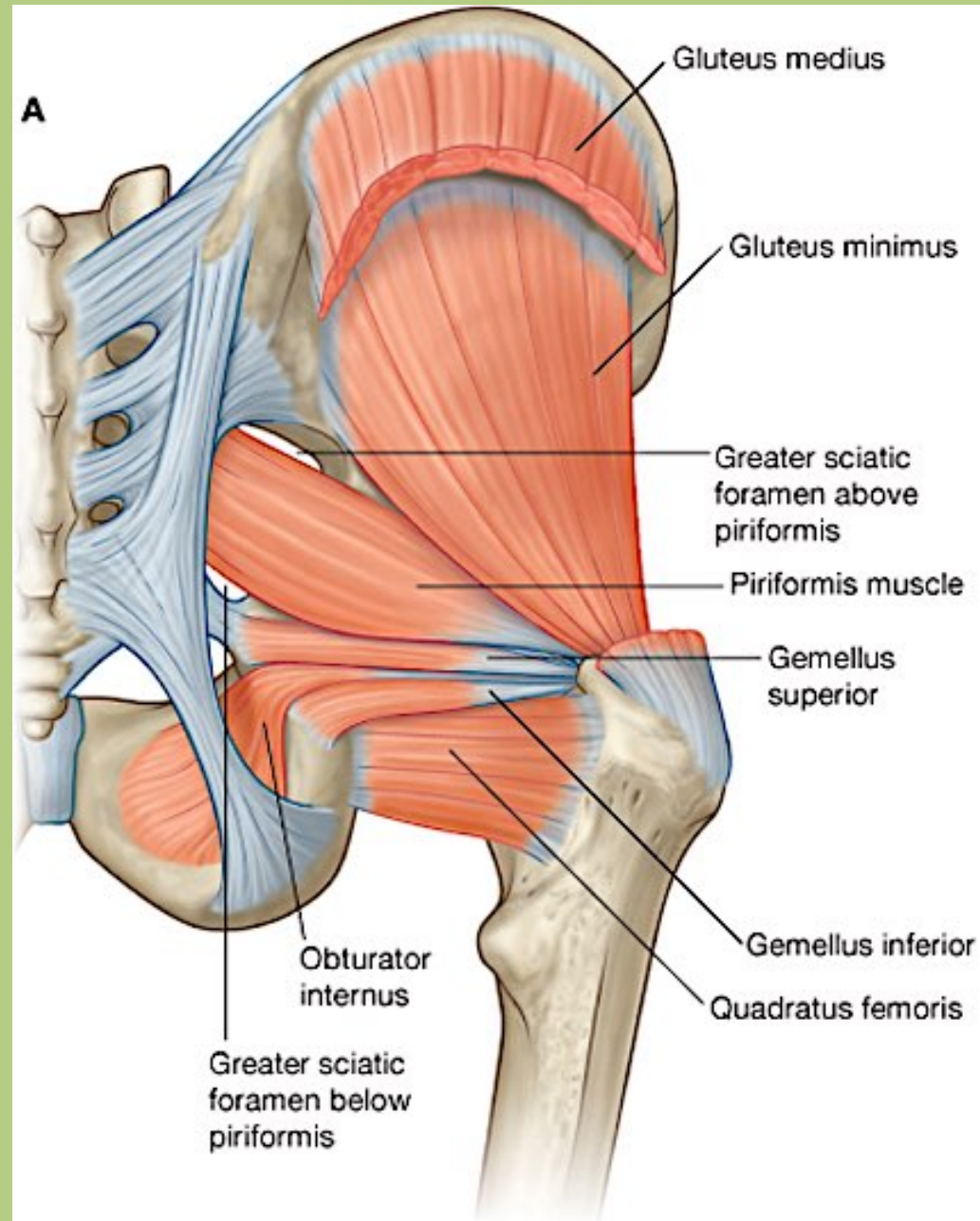
- **Origin:** ischial spine
- **Insertion:** trochanteric fossa
- **Action:** *adduction and lateral rotation*. (also active in abduction, depending on the position of the hip joint)
- **Innervation:** sacral plexus





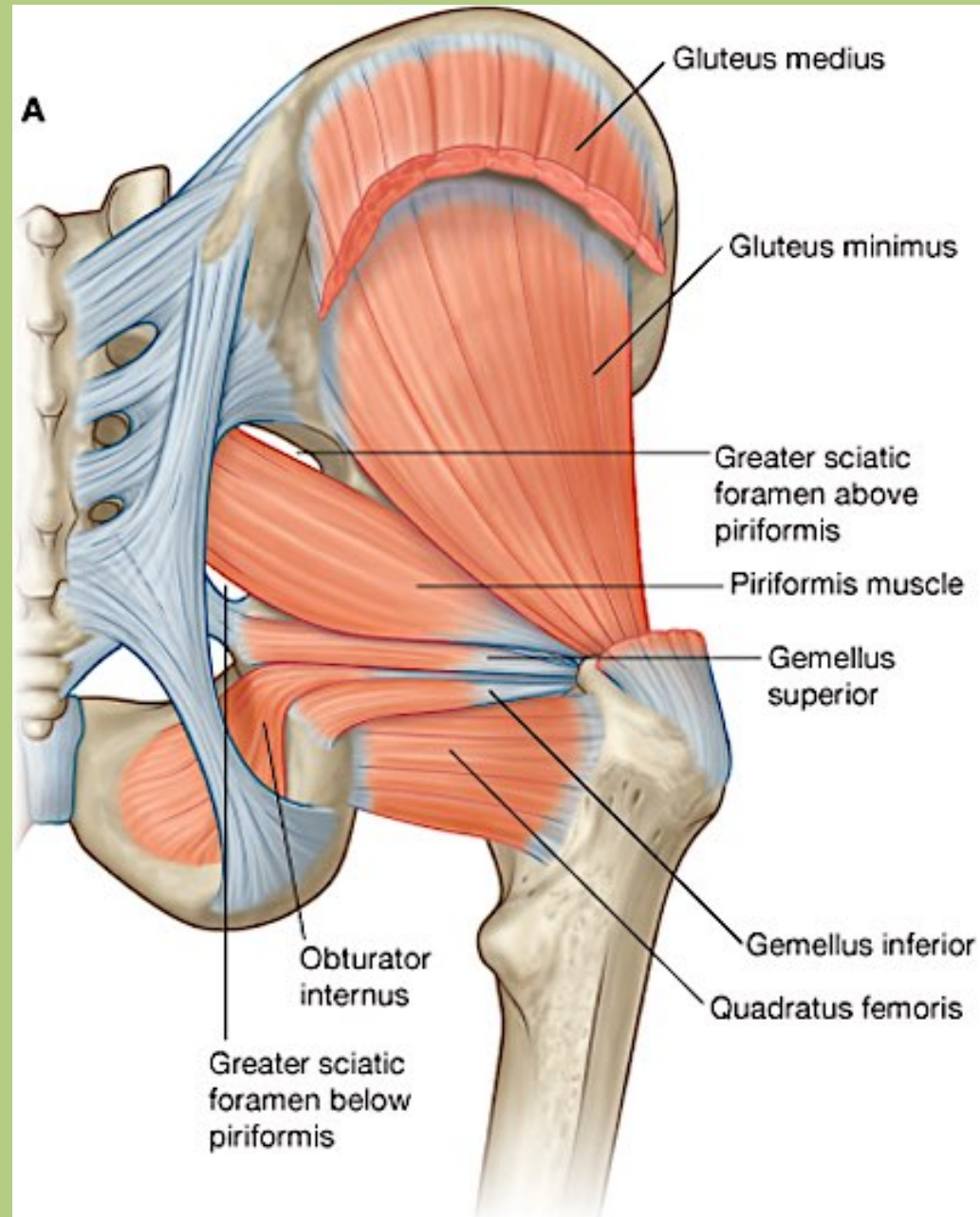
# Gemellus inferior

- **Origin:** ischial tuberosity
- **Insertion:** trochanteric fossa
- **Action:** *adduction and lateral rotation (also active in abduction, depending on the position of the hip joint)*
- **Innervation:** sacral plexus

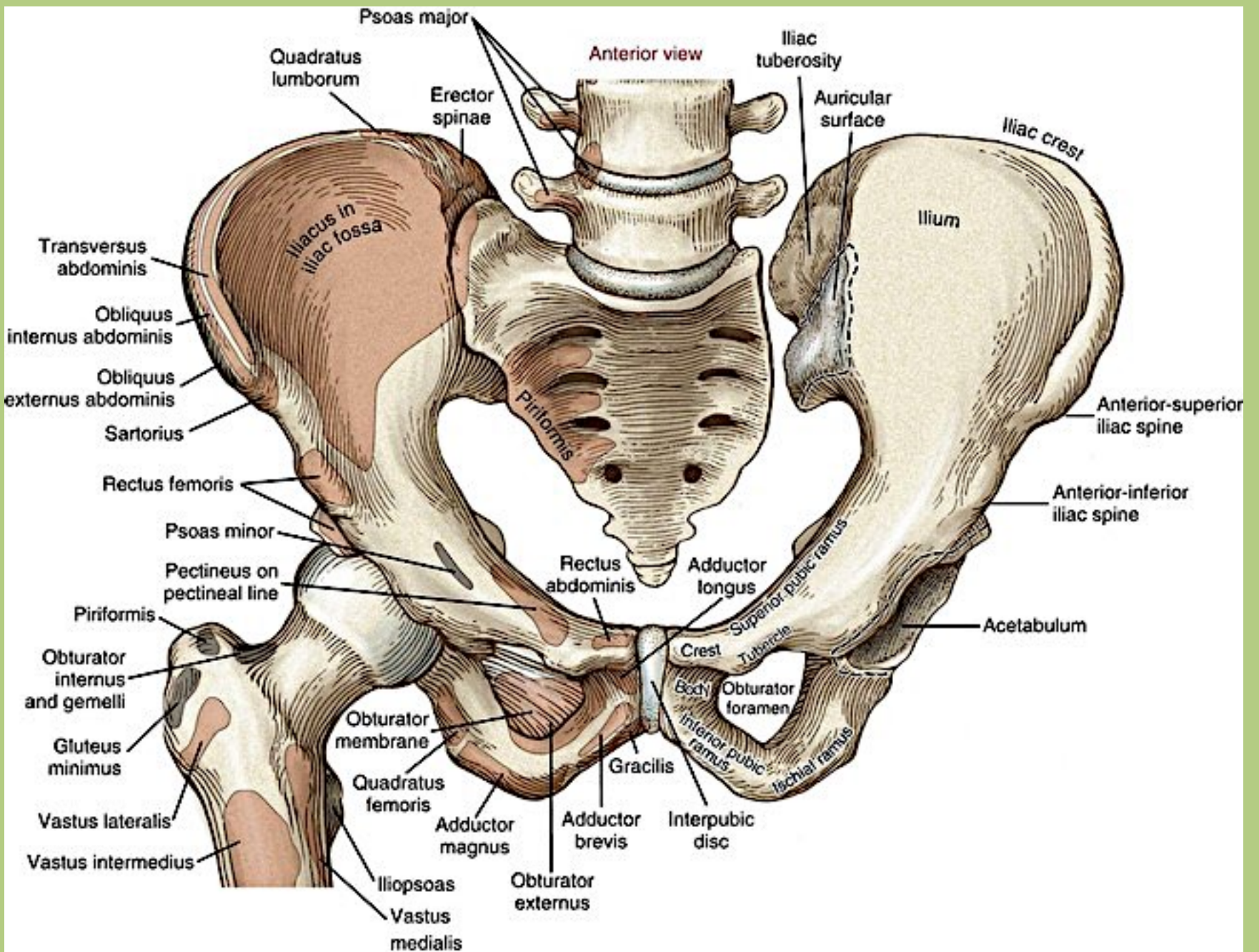


# Quadratus femoris

- **Origin:** ischial tuberosity
- **Insertion:** intertrochanteric crest
- **Action:** *adduction and lateral rotation*
- **Innervation:** sacral plexus





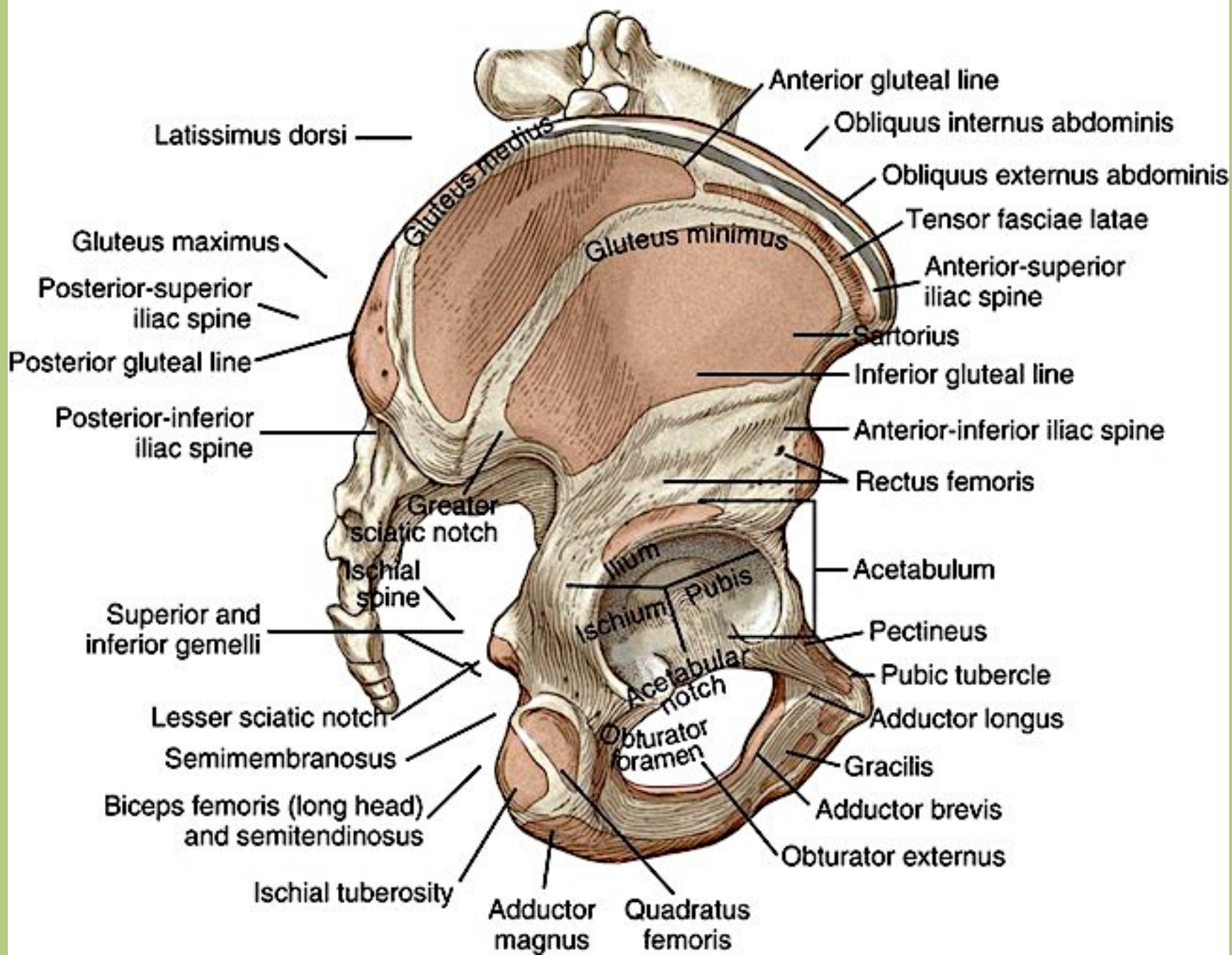


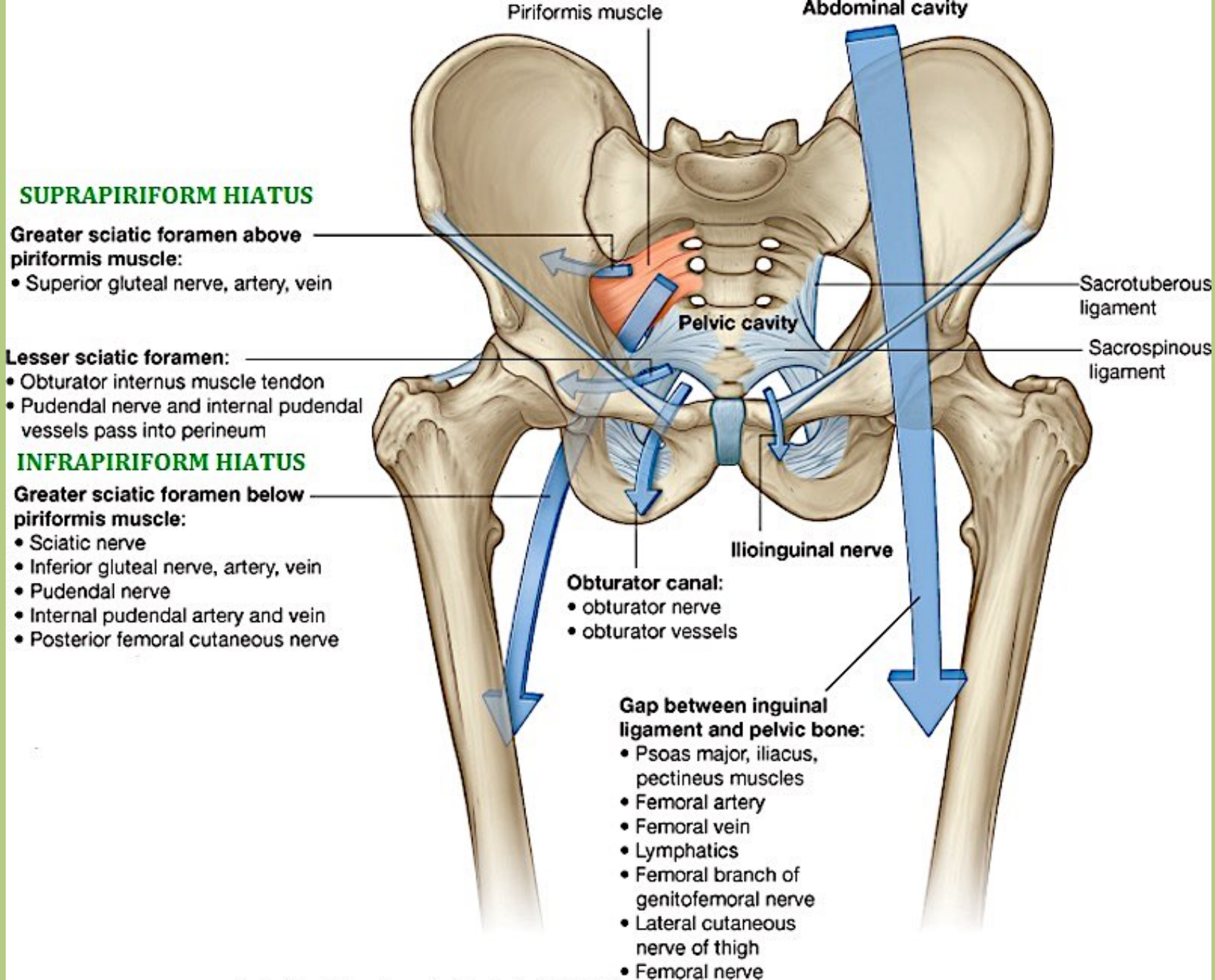






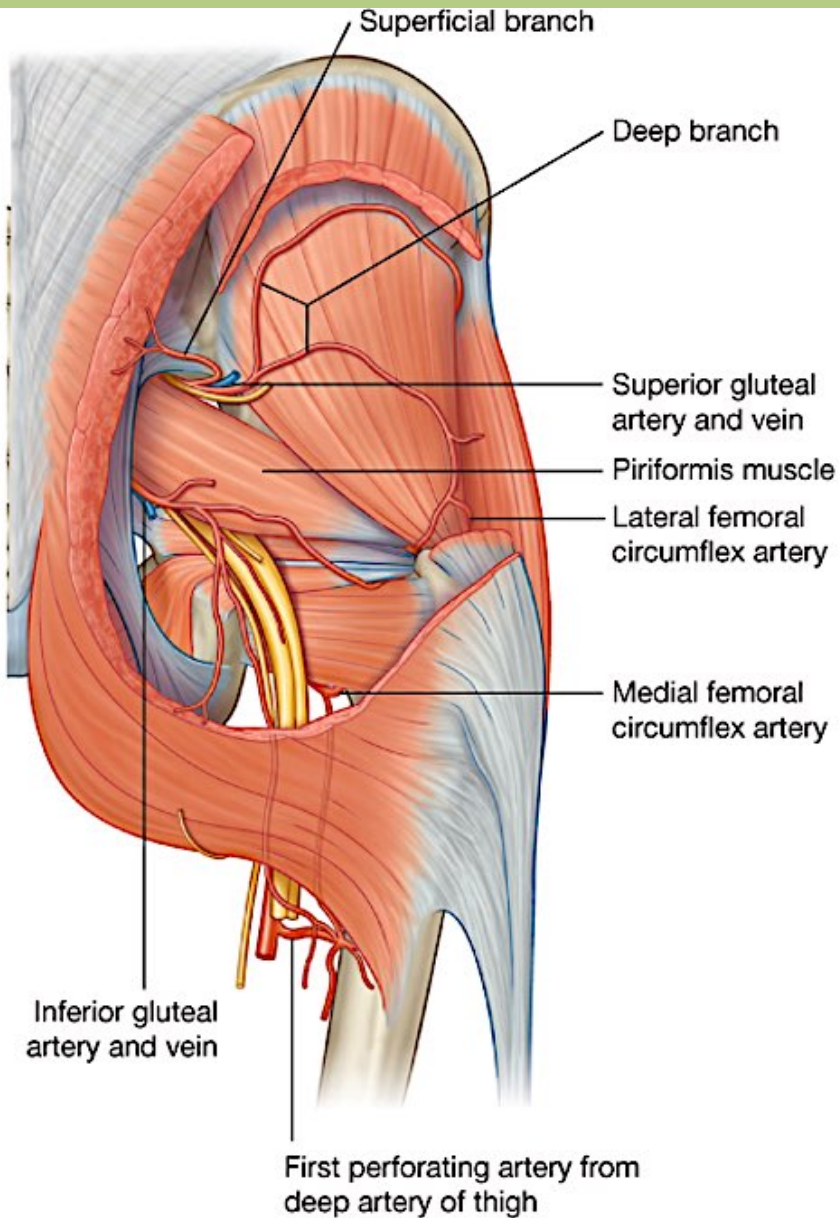
Lateral view



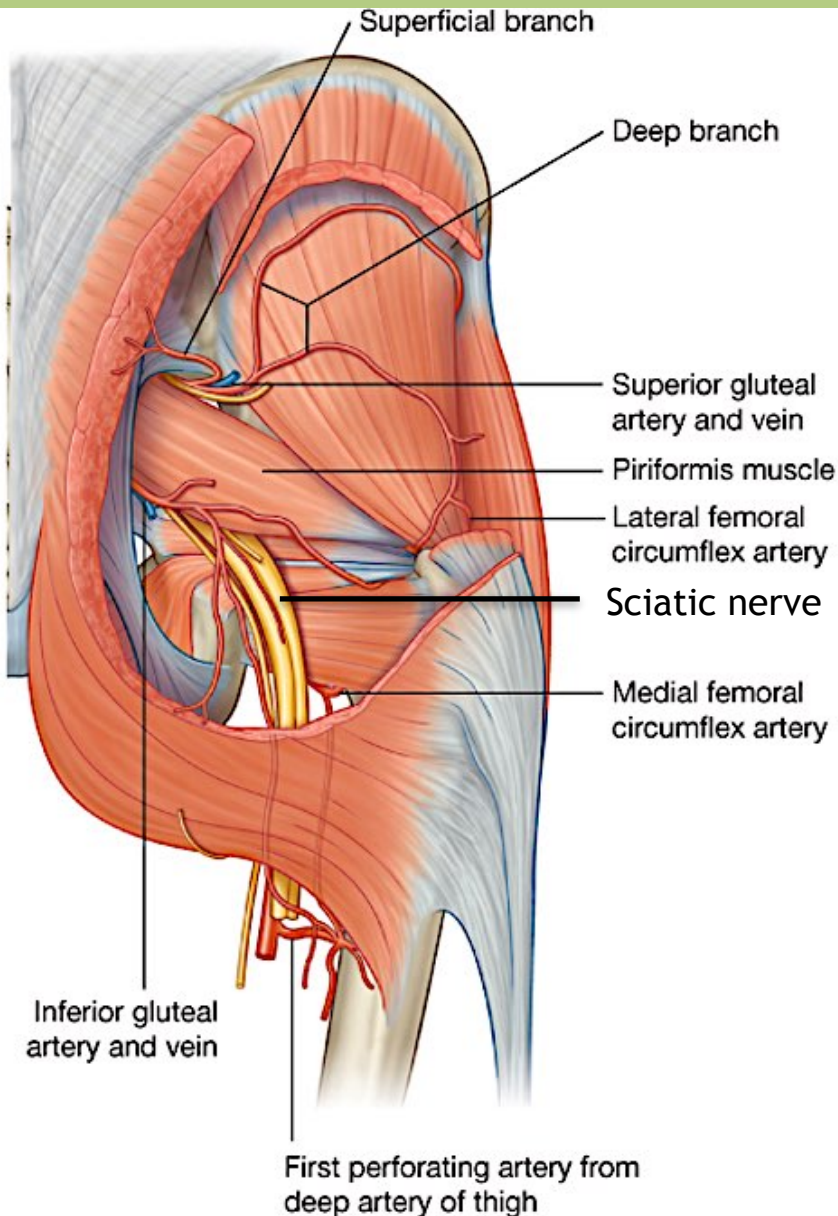




# Pelvis



# Piriformis syndrome



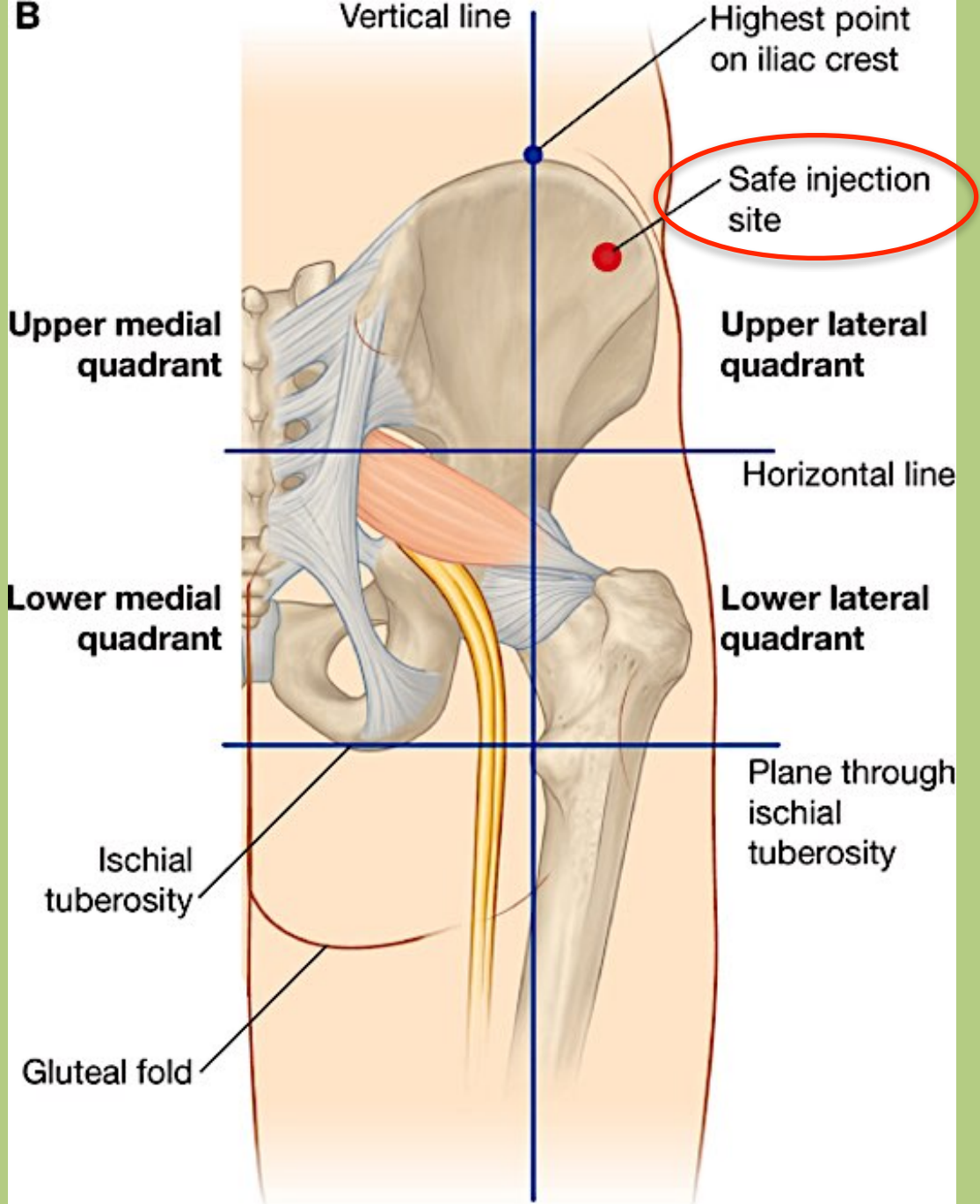
*Piriformis muscle compresses the sciatic nerve, causing pain and numbness in the buttocks. Pain can be severe and extend down the length of static nerve (called *sciatica*). Symptoms can be similar in other conditions, such as discus herniation.*

It is usually caused by sports or movement that repeatedly stresses the piriformis, such as running or lunging.

## ***Prevention:***

- avoid running or exercising on hills or uneven surfaces
- good posture
- stretching







Thank you for your attention.

References:

Drake: Gray's Anatomy for Students, 2nd ed.

Standing: Gray's Anatomy, 39th ed.

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