

# **Gluteal Region-I**

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**Intramuscular (IM) gluteal injections**  
are a commonly used method of administering medication within  
clinical medicine.



# **Learning Objectives**

**By the end of this teaching session on Gluteal region – I all the MBBS 1<sup>st</sup> year students must be able to:**

- Enumerate the boundaries of gluteal region
- Enumerate the foramina of gluteal region
- Describe the cutaneous innervation of gluteal region
- Enumerate the structures in the gluteal region (bones, ligaments, muscles, vessels , nerves)
- Describe the origin, insertion, nerve supply & actions of gluteal muscles
- Name the key muscle of gluteal region
- Describe the origin, insertion, nerve supply & actions of short muscles of the gluteal region
- Discuss applied anatomy of muscles of gluteal region

# Gluteal region

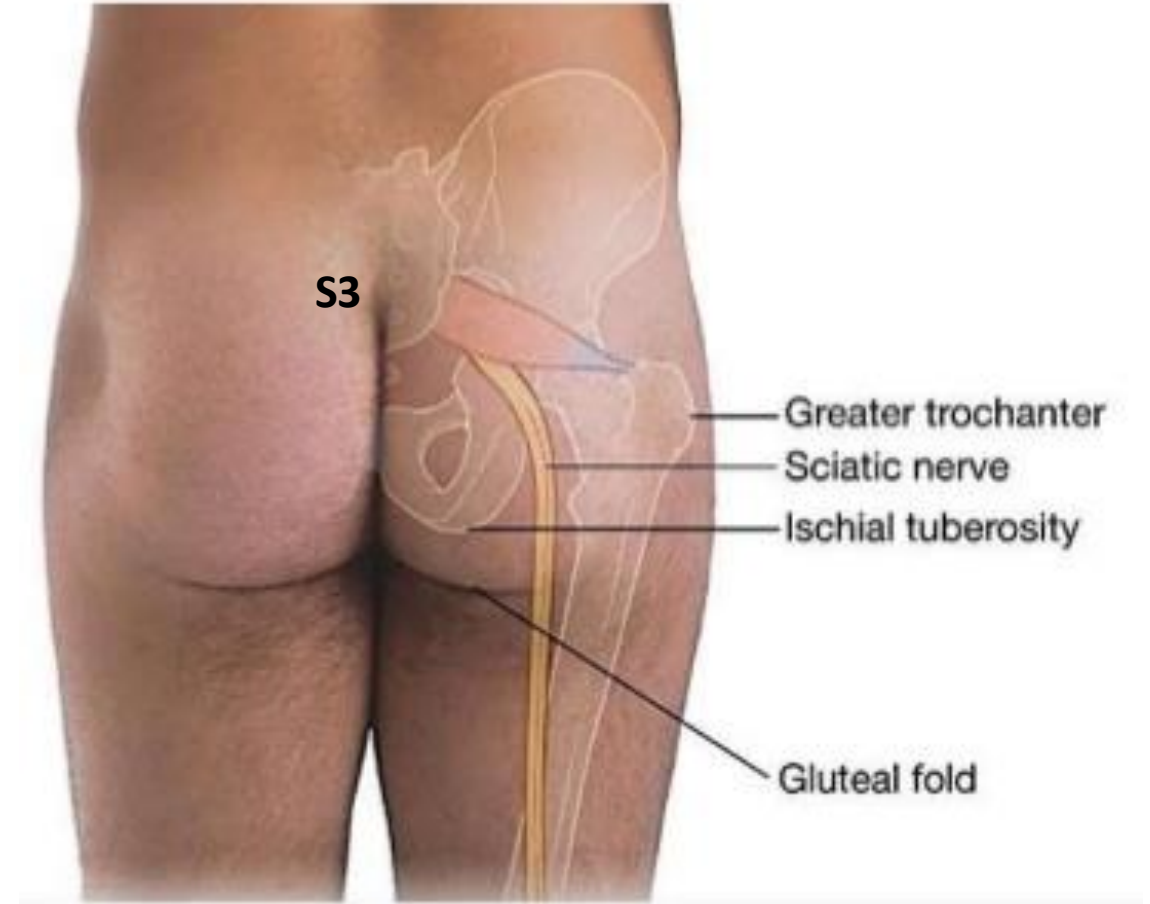
## BOUNDARIES:

**Superior:** Iliac crest

**Inferior :** Gluteal fold (lower limit of rounded buttock)

**Lateral :** Line joining ASIS to front of greater trochanter

**Medial :** natal cleft between buttocks



# Structures in the Gluteal region

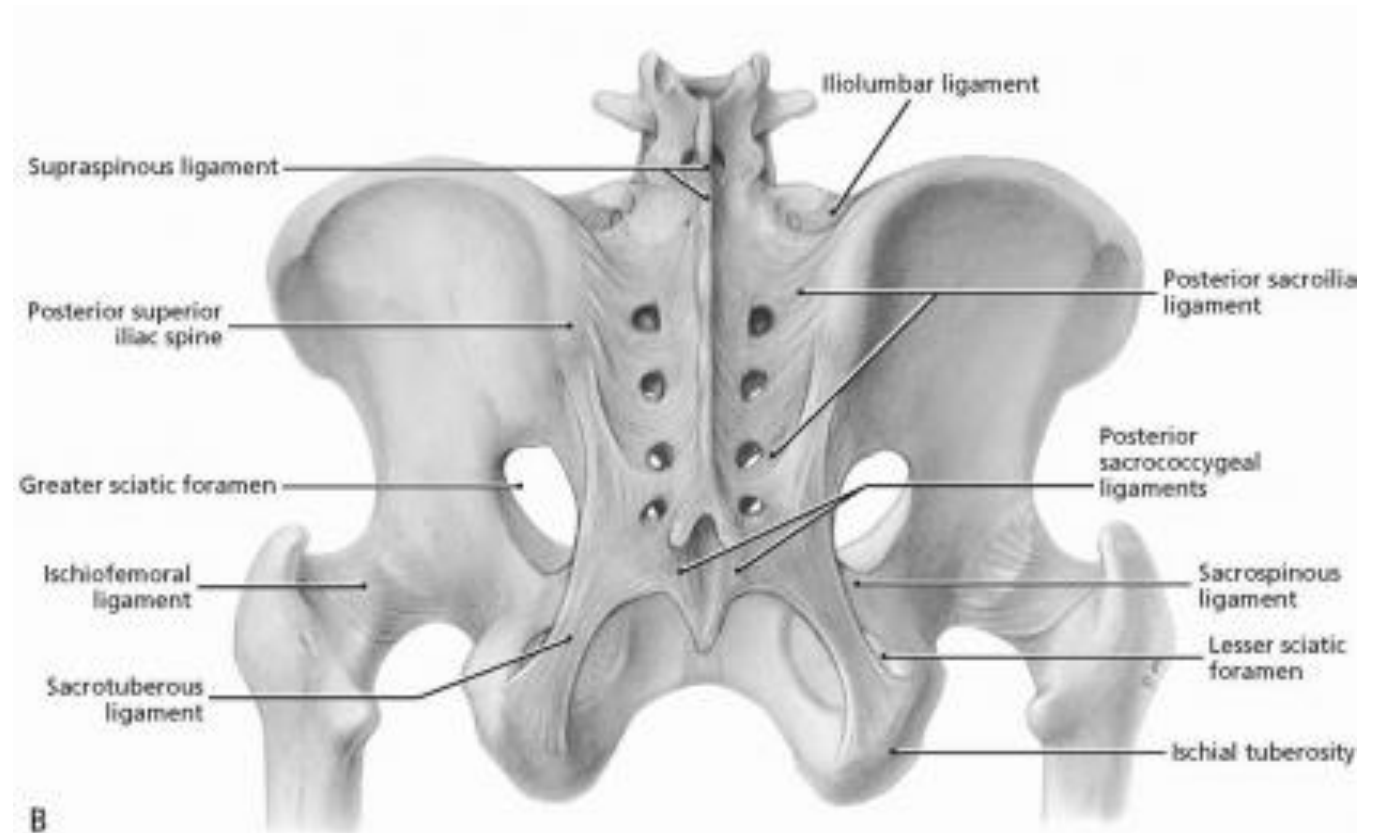
- Bones & joints
- Ligaments
- Muscles
- Vessels
- Nerves
- Bursae

**Thickest muscle-**  
**Gluteus maximus**

**Thickest nerve**  
**Sciatic nerve**

# Bones & Joints of the gluteal region

- Dorsal surface of sacrum
- Coccyx
- Gluteal surface of Ilium
- Ischium (ischial tuberosity)
- Upper end of femur
- Posterior aspect of hip joint
- Sacrococcygeal & sacroiliac joint



# Skeletal background features- Gluteal lines on hip bone

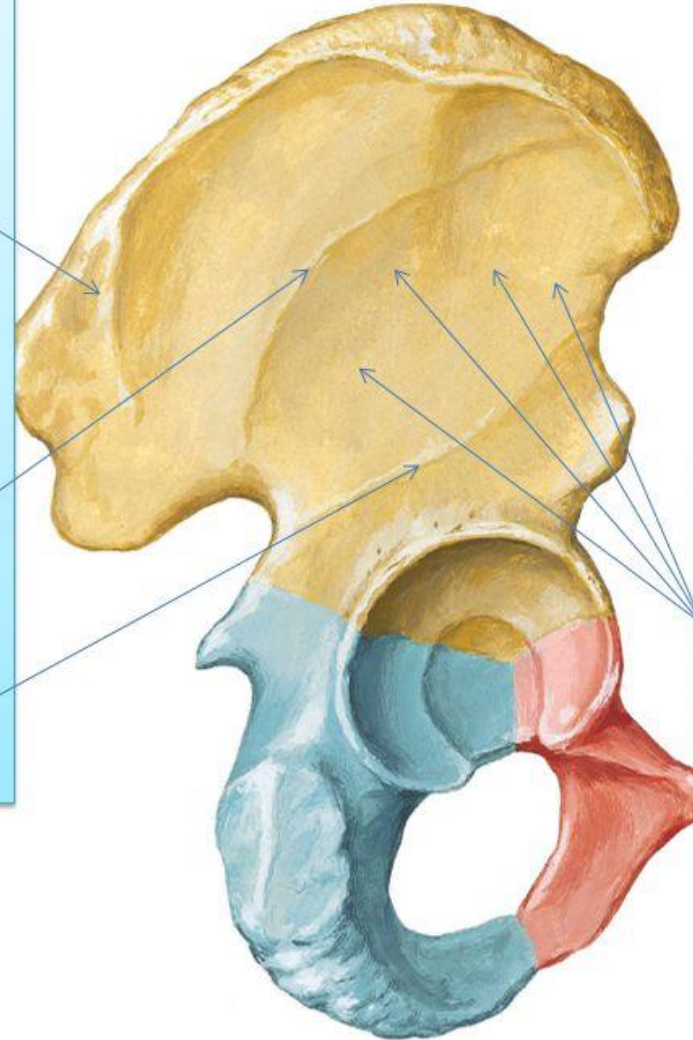
The gluteal surface is divided into 4 parts by three lines:

1- Posterior gluteal line

2- Middle gluteal line  
Or anterior

3- Inferior gluteal line

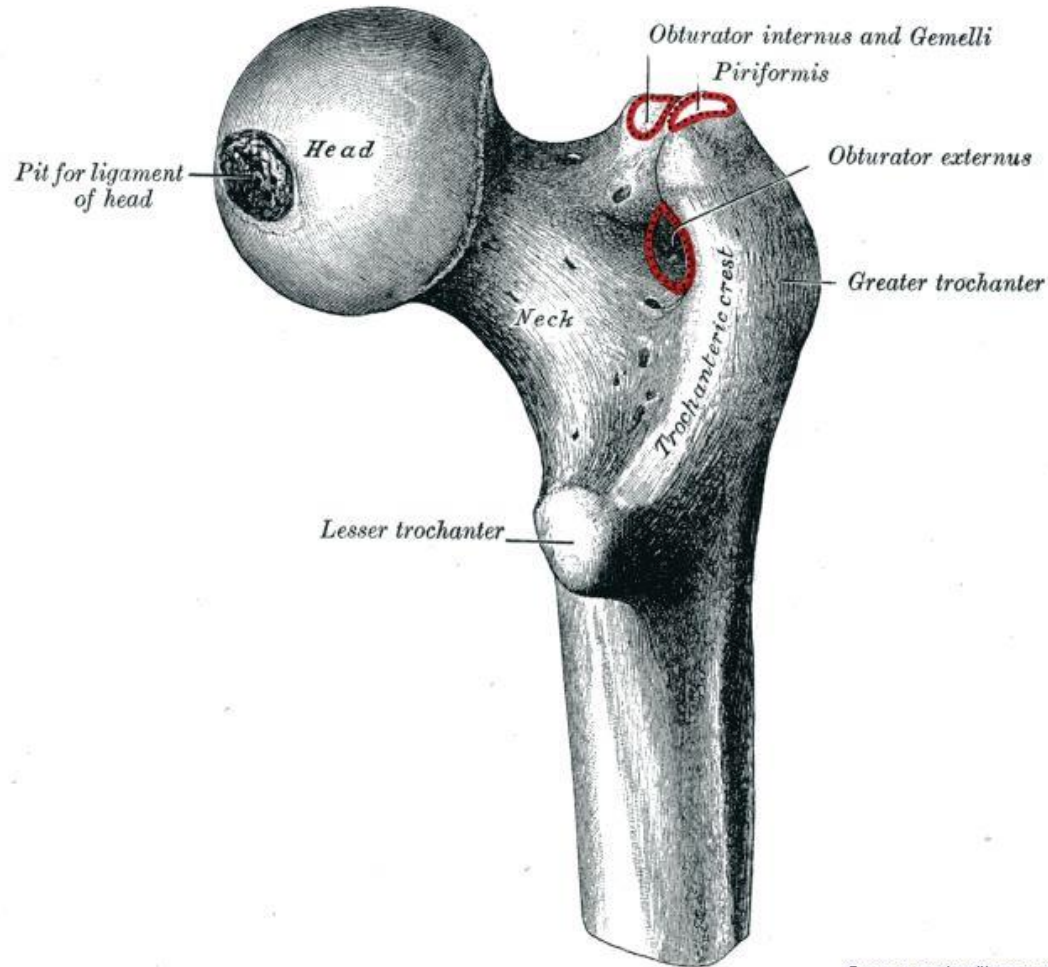
Hip (Coxal) Bone  
Lateral View



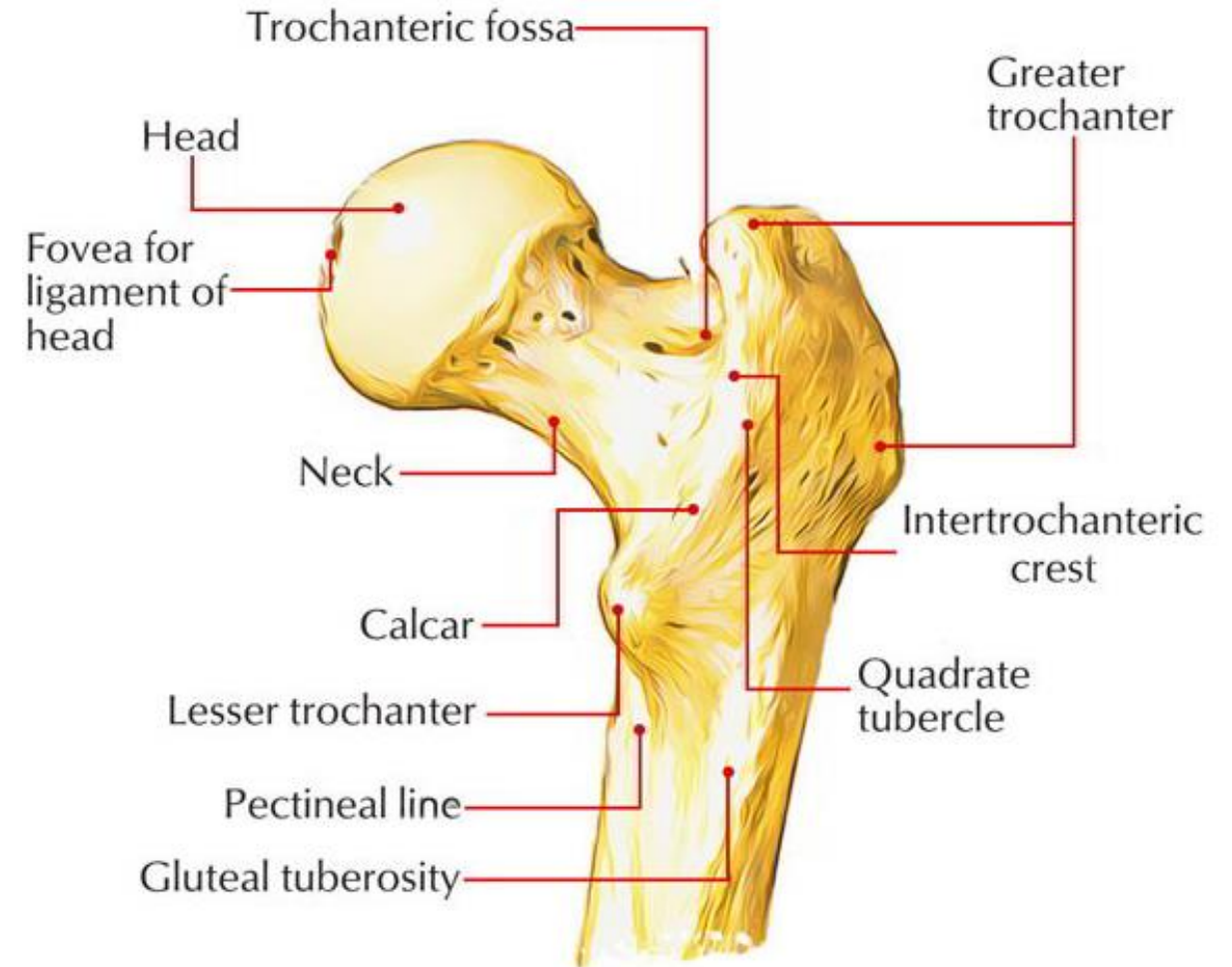


# Skeletal background features- Features on posterior surface of upper end of femur

FIG. 455.—The upper part of the right femur. Viewed from behind.



## Posterior view

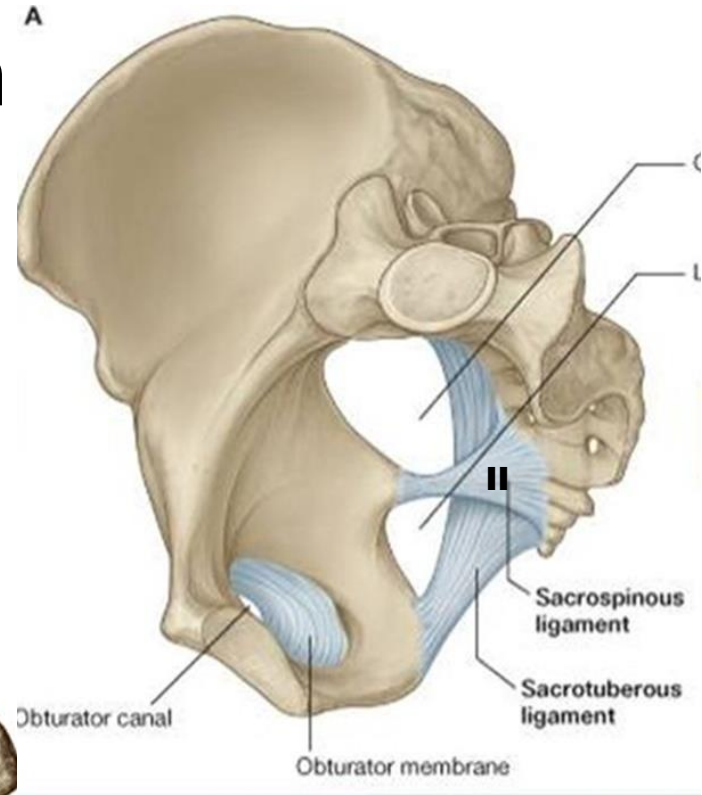
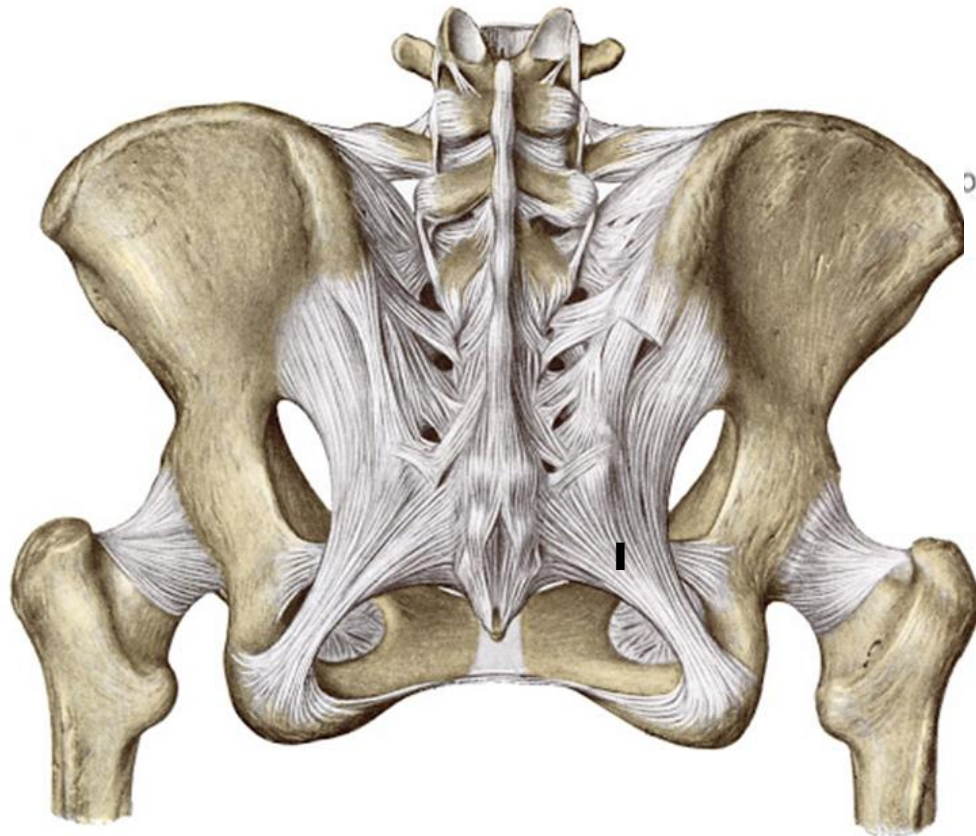


# Ligaments of Gluteal region

2 important ligaments:

I. Sacrotuberous ligament

II. Sacrospinous ligament





# Sacrospinous ligament

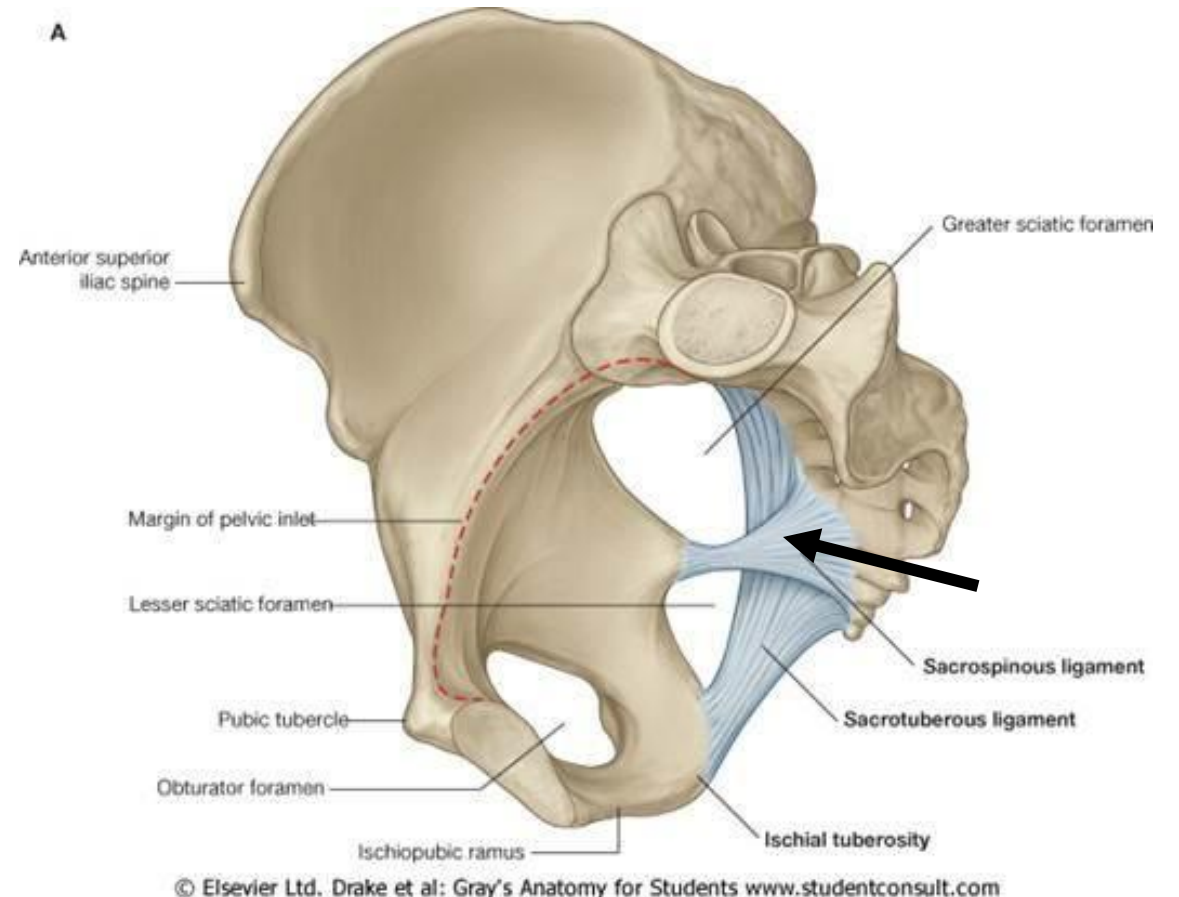
- short, thick, triangular
- Deep to sacrotuberous ligament

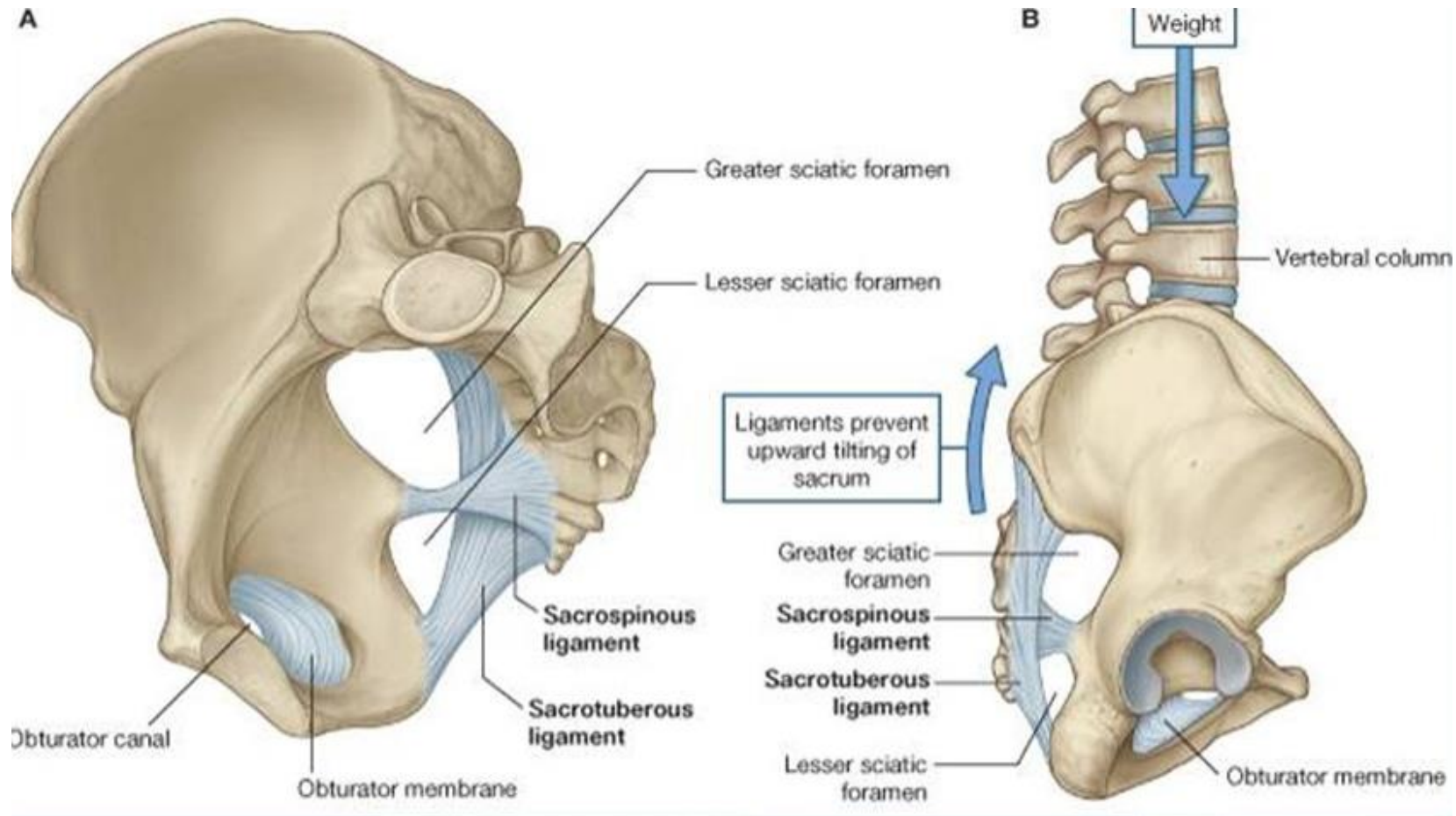
## ATTACHMENT:

ischial spine laterally

Sacrococcygeal junction  
medially

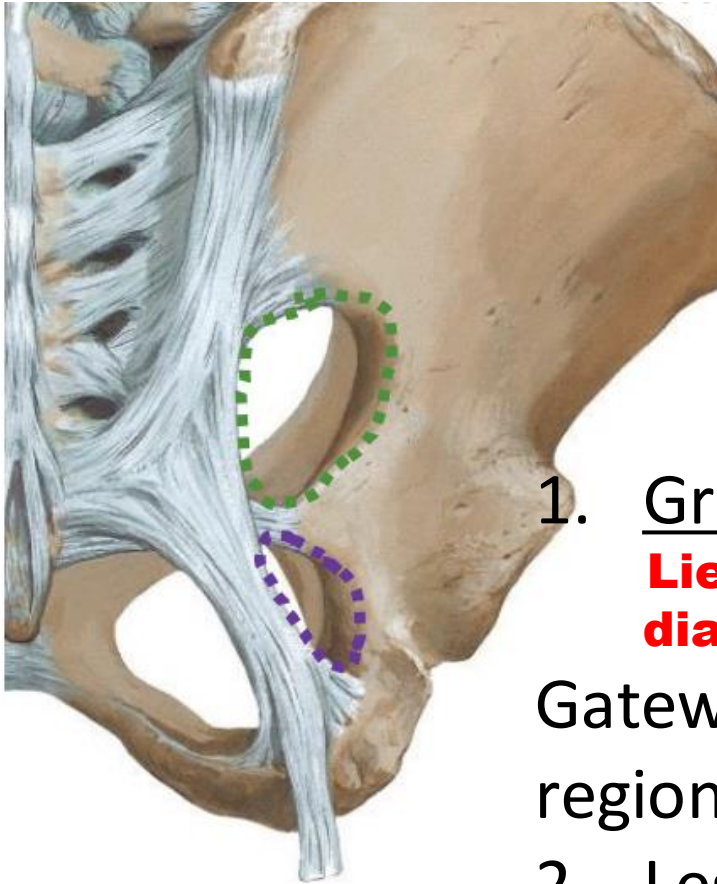
**Subdivides B shaped foramen into  
Greater & lesser sciatic foramina**





**FUNCTION:** These ligaments stabilize the sacrum & prevent its anterior rotation at sacroiliac joint by the weight of vertebral column

# 2 notches are converted into 2 foramina



Foramina serve as gateways

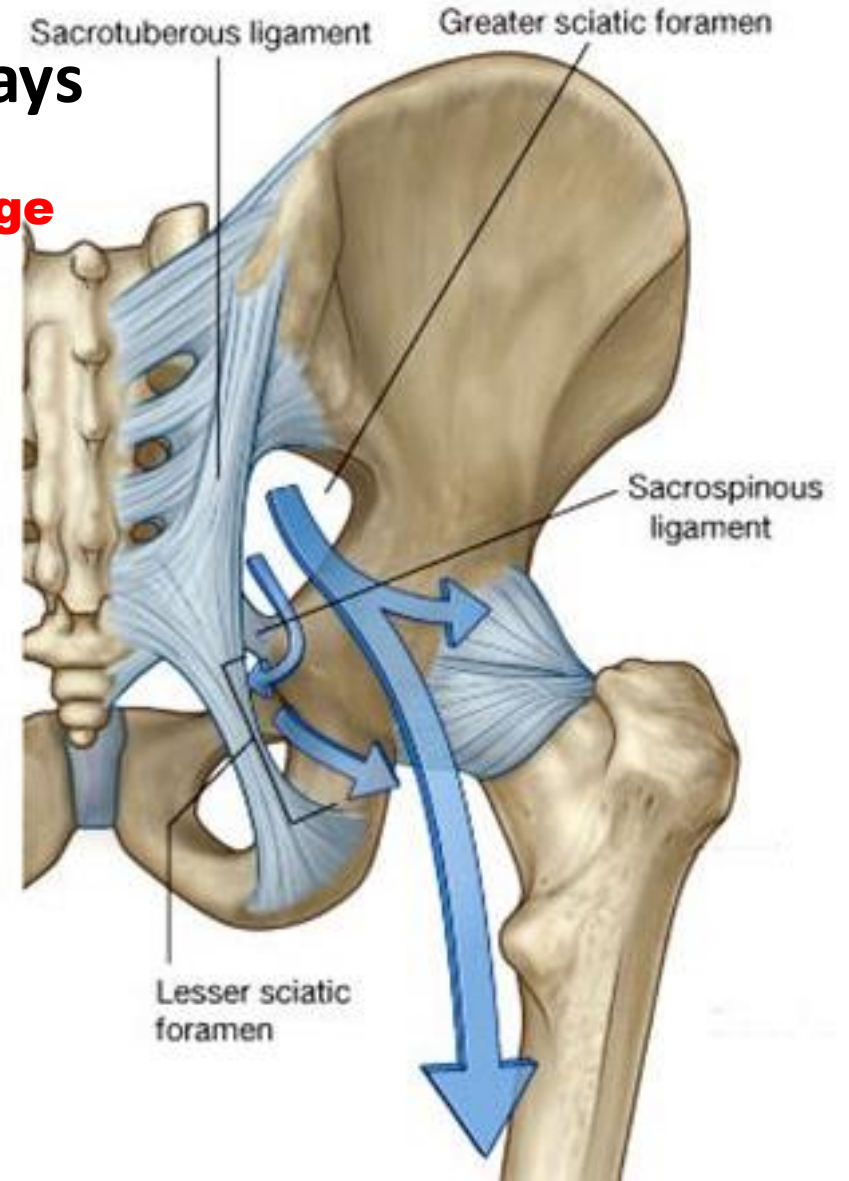
**sacrospinous ligament lies edge to edge with levator ani**

1. Greater Sciatic Foramen:  
**Lies above ischial spine & pelvic diaphragm**

Gateway from pelvis to gluteal region

2. Lesser Sciatic Foramen:  
**Lies below ischial spine & pelvic diaphragm**

Gateway from gluteal region to perineum



# Cutaneous Innervation

Region of gluteal skin is divided into 4 quadrants

- **Upper medial quadrant-**

- posterior rami of L1, L2, L3 & S1, S2, S3

- **Upper lateral quadrant-**

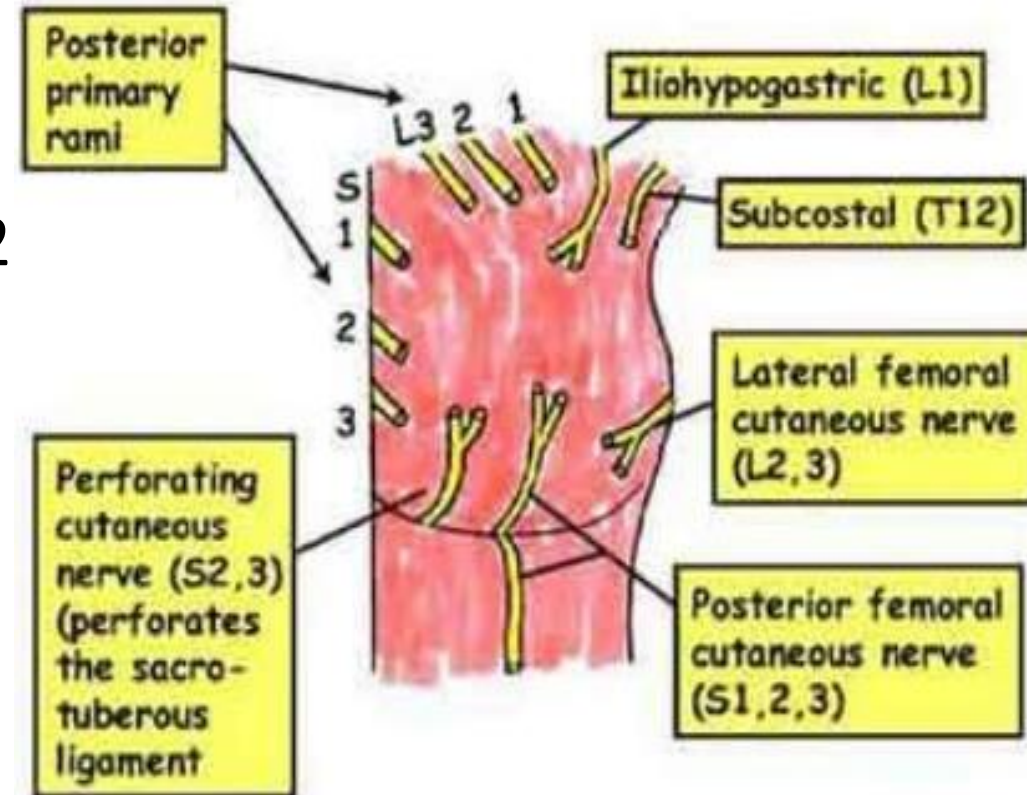
- Lateral branches of iliohypogastric (L1) & T12

- **Lower lateral quadrant-**

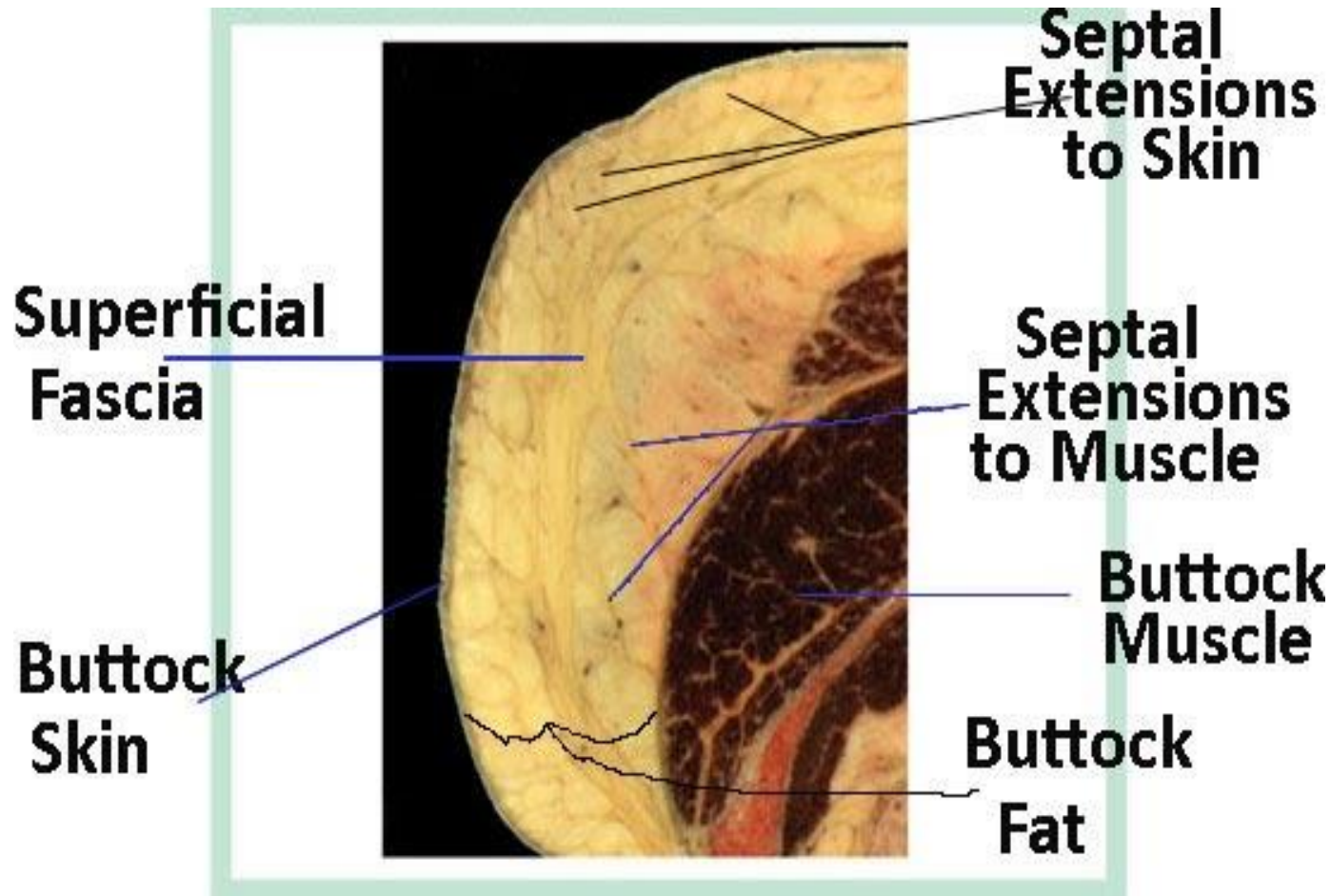
- Branches from lateral cutaneous nerve of thigh (L2, L3)

- **Lower medial quadrant-**

- Branches from posterior cutaneous nerve of thigh (S1, S2, S3)
- Branches from perforating cutaneous nerve (S2,S3)



# Superficial Fascia



- Dense

- Heavily laden with fat

- Forms a tough cushion over gluteal tuberosity



# Deep Fascia

- **The deep fascia** is continuous below with the deep fascia of the thigh.

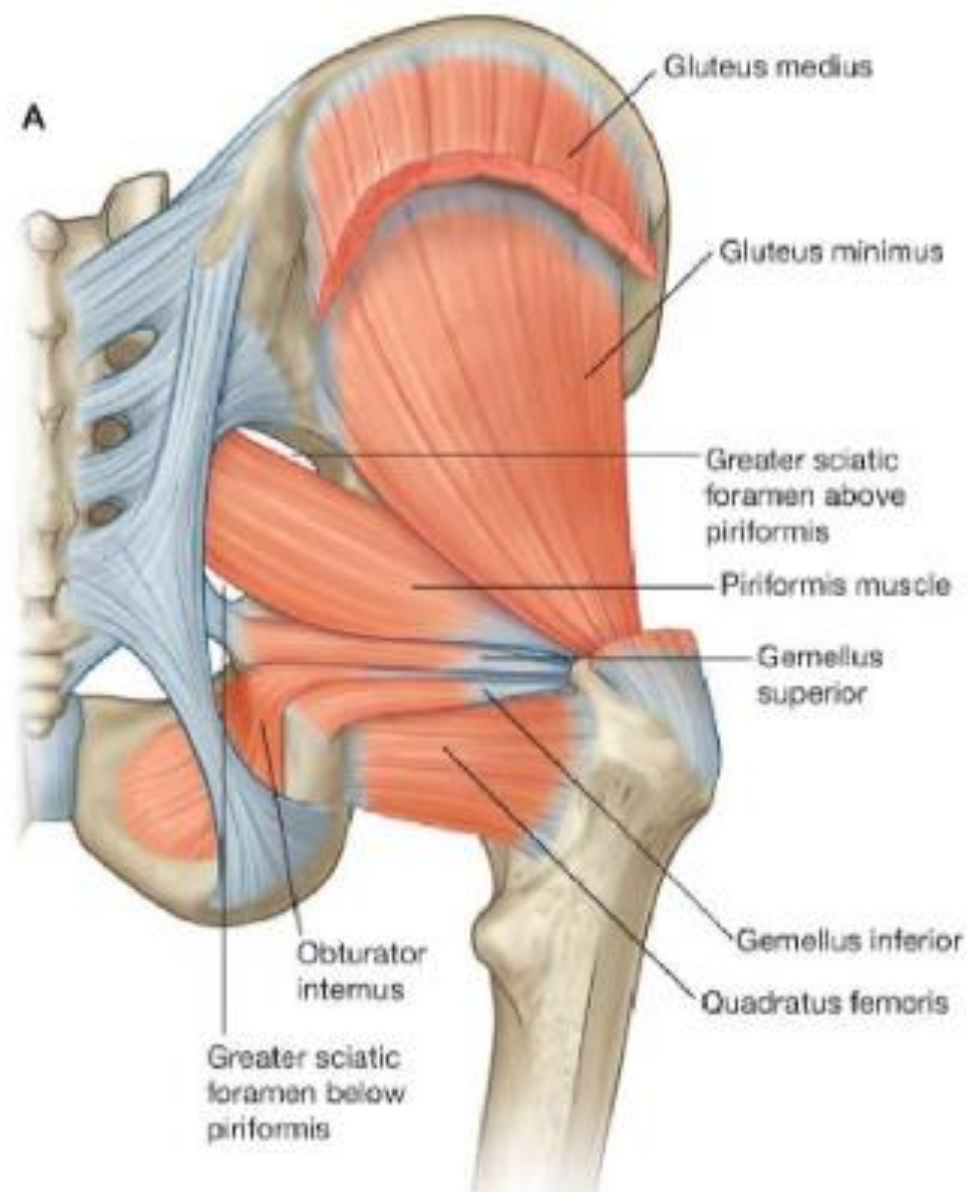
In the gluteal region, it splits to enclose the gluteus maximus muscle.

Above the gluteus maximus, it continues as a single layer that covers the outer surface of the gluteus medius and is attached to the iliac crest.

**Thick over gluteus medius, elsewhere it is thin over the gluteus maximus muscle**

# Muscles in the Gluteal region

1. Gluteus maximus.
2. Gluteus medius.
3. Gluteus minimus.
4. Tensor fasciae latae.
5. Piriformis.
6. Superior gemellus.
7. Inferior gemellus.
8. Obturator internus.
9. Quadratus femoris.
10. Obturator externus



# Gluteus Maximus

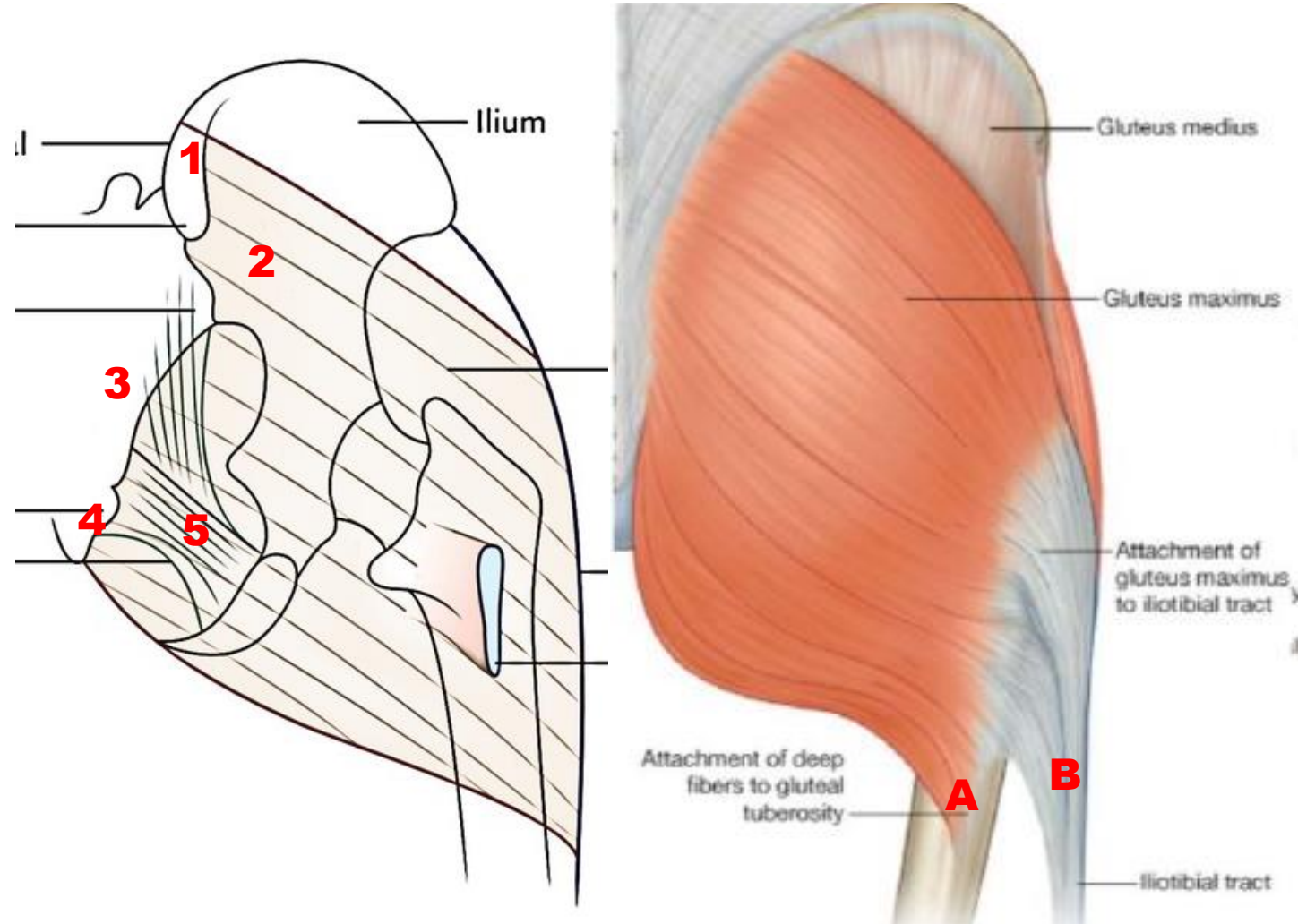
## ORIGIN:

1. Outer slope of dorsal segment of ilium
2. Gluteal surface behind posterior gluteal line
3. Dorsal surface of sacrum
4. Side of coccyx
5. Sacrotuberous ligament

**Fibres pass downwards & forwards then suddenly become aponeurotic**

## INSERTION:

- A. Deep 1/4<sup>th</sup> – Gluteal tuberosity
- B. Superficial 3/4<sup>th</sup> – Iliotibial tract



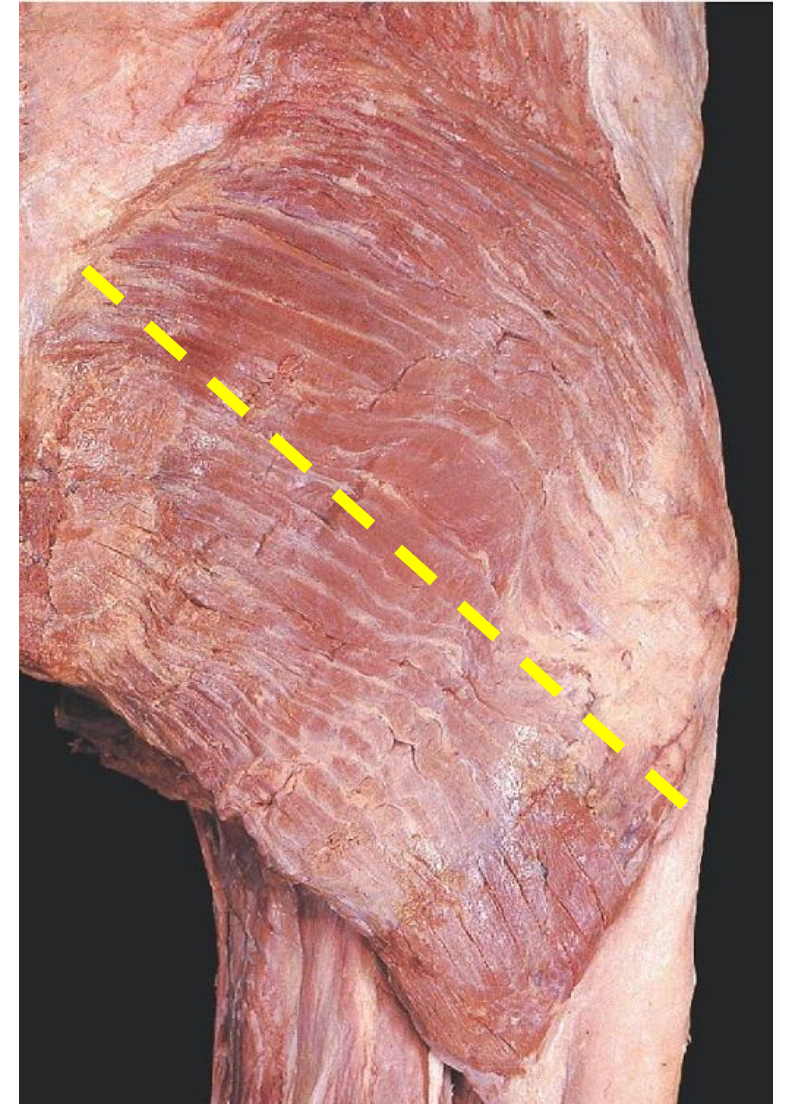
## Gluteus Maximus contd.....

### NERVE SUPPLY:

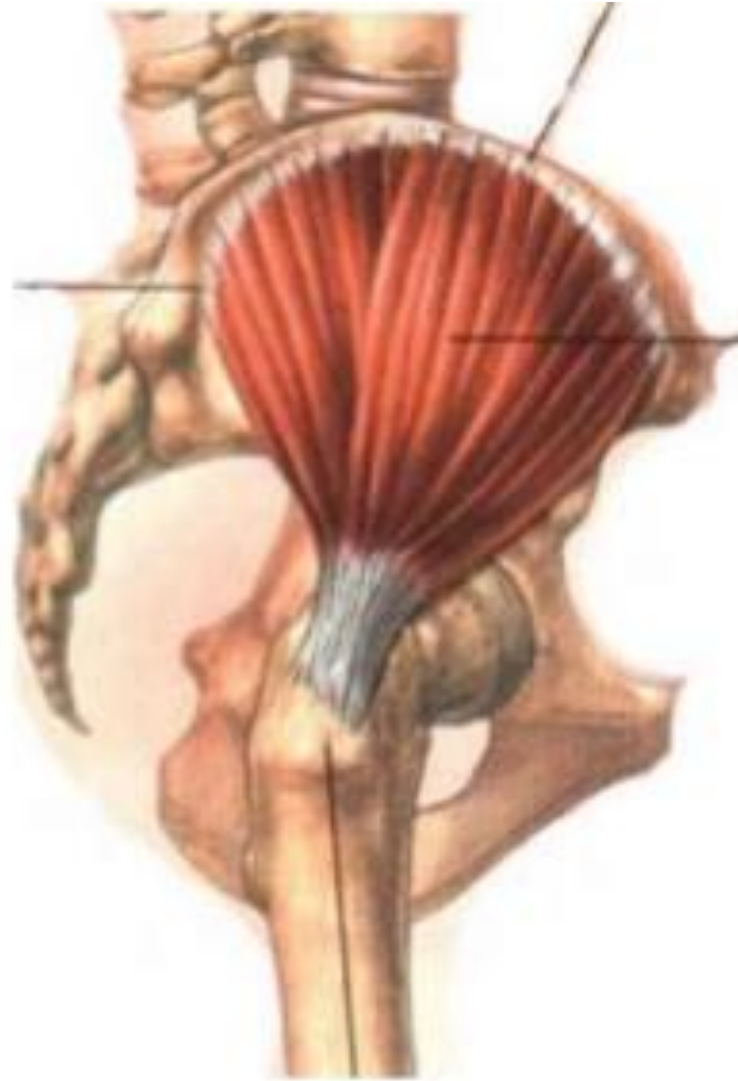
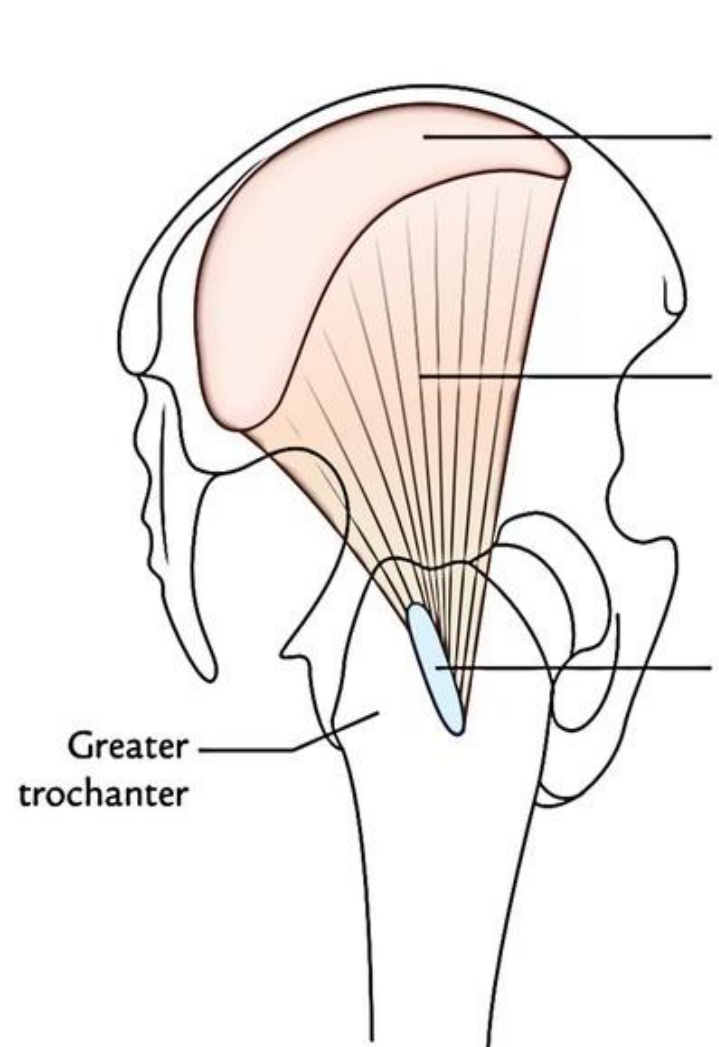
Inferior gluteal nerve (L5,S1, S2)

### ACTIONS:

- Powerful extensor of hip joint- principally when strength is required eg. Lifting heavy weights from floor, rising from sitting position, running, climbing stairs)- **during normal walking extension -by hamstring muscles**
- Lateral rotation of thigh
- Abduction of thigh Upper fibres only
- Acts with tensor fasciae latae - stabilizes pelvis on thigh
- Acts with tensor fasciae latae to extend knee through iliotibial tract



# Gluteus Medius



## ORIGIN:

Gluteal surface of ilium between anterior & posterior gluteal lines

## INSERTION:

Into an oblique ridge on the lateral surface of greater trochanter

**(ridge - downwards and forwards)**

# Gluteus Minimus



## **ORIGIN:**

Gluteal surface of ilium between anterior & inferior gluteal lines

## **INSERTION:**

Into an oblique ridge on the anterior surface of greater trochanter

# **Gluteus Medius & Minimus contd.....**

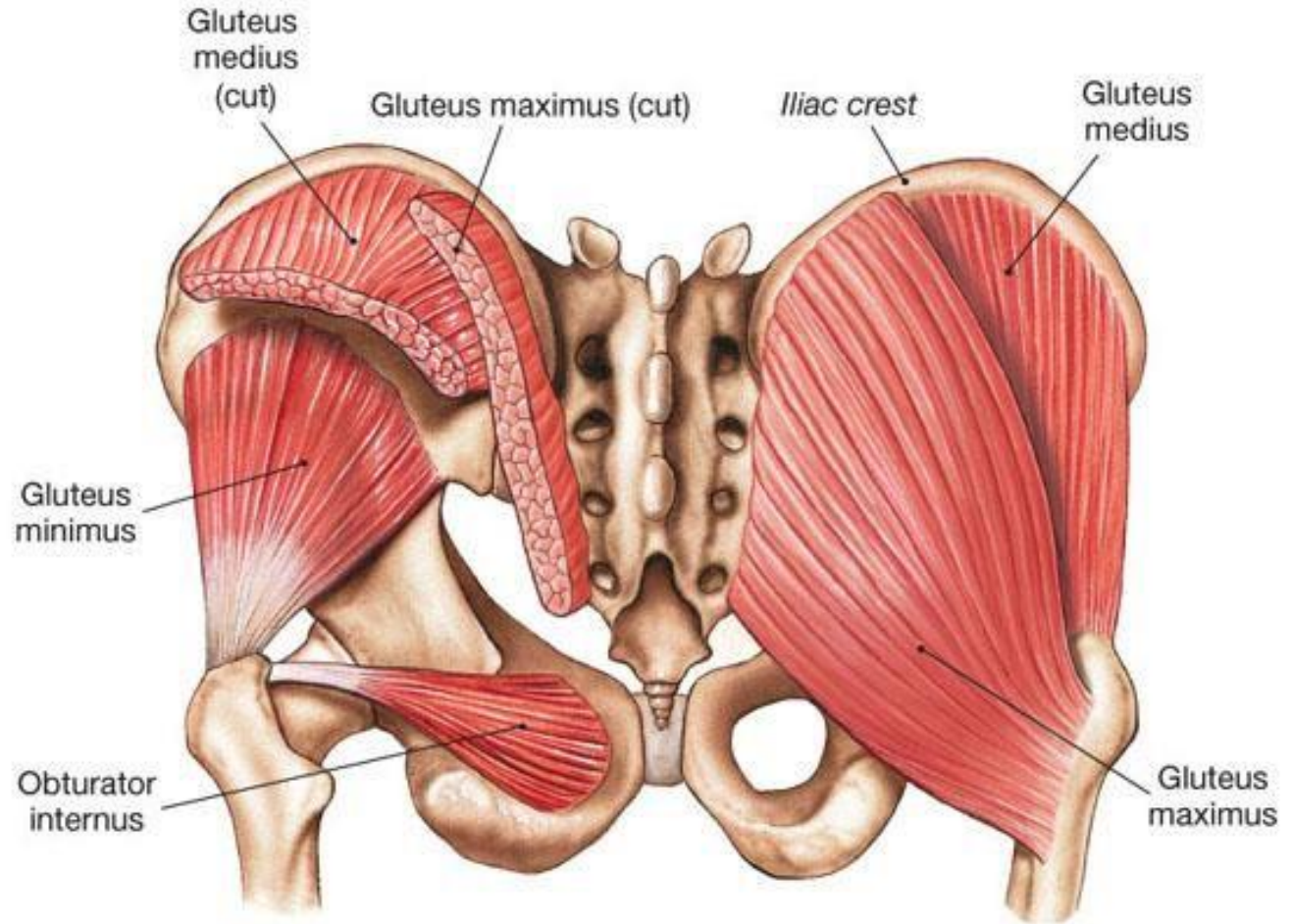
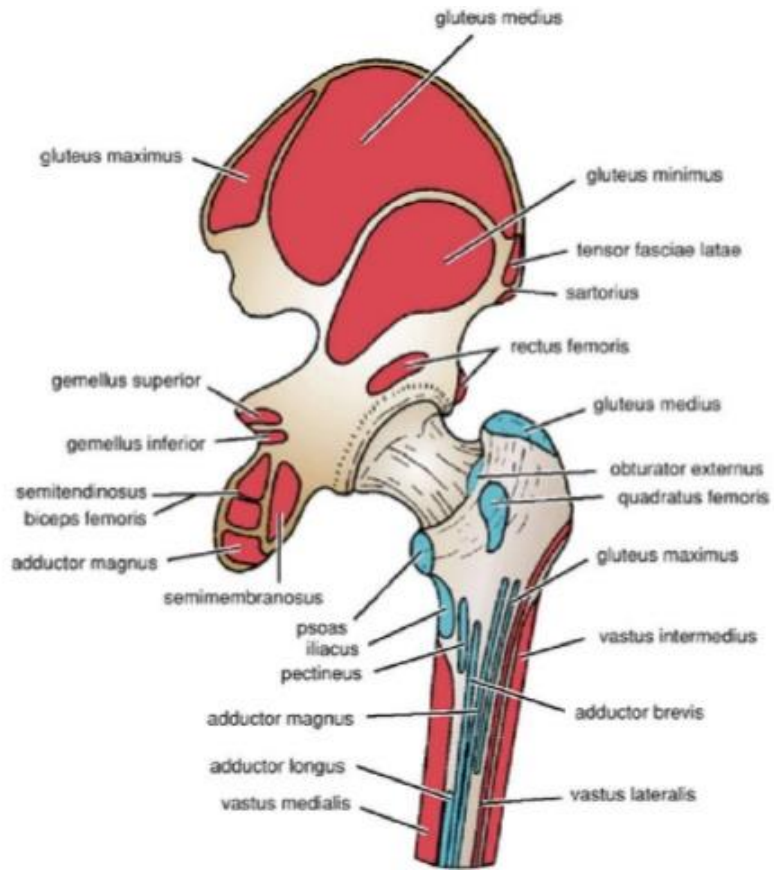
## **NERVE SUPPLY:**

Superior Gluteal nerve (L4, L5, S1)

## **ACTIONS:**

- Abduction at hip joint- Powerful abductors of thigh
- Medial rotation – by anterior fibres
- Maintain balance of the body when one foot is off the ground, prevent opposite side of pelvis from dropping under effect of gravity.

# Arrangement of the 3 Gluteus muscles



(c) Gluteal and lateral rotators, posterior view



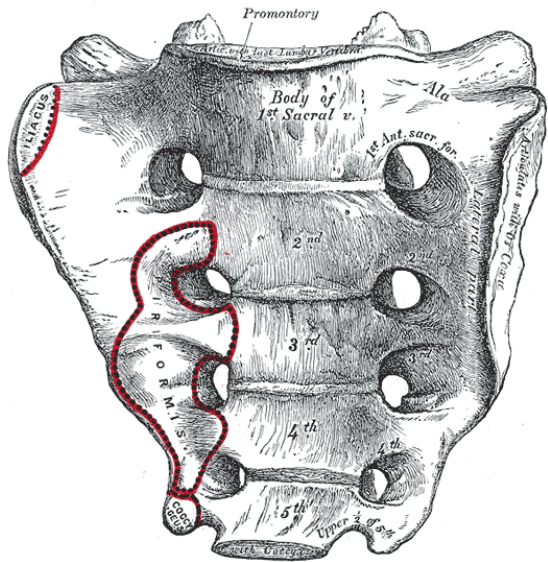
# **Other muscles- Small muscles on the back of the hip joint**

- Piriformis
- Gemellus superior
- Gemellus inferior
- Obturator internus
- Obturator externus
- Quadratus Femoris



**Key muscle of the Gluteal region**

**Piriformis**



# Piriformis

Below and parallel to posterior border of gluteus medius

## ORIGIN:

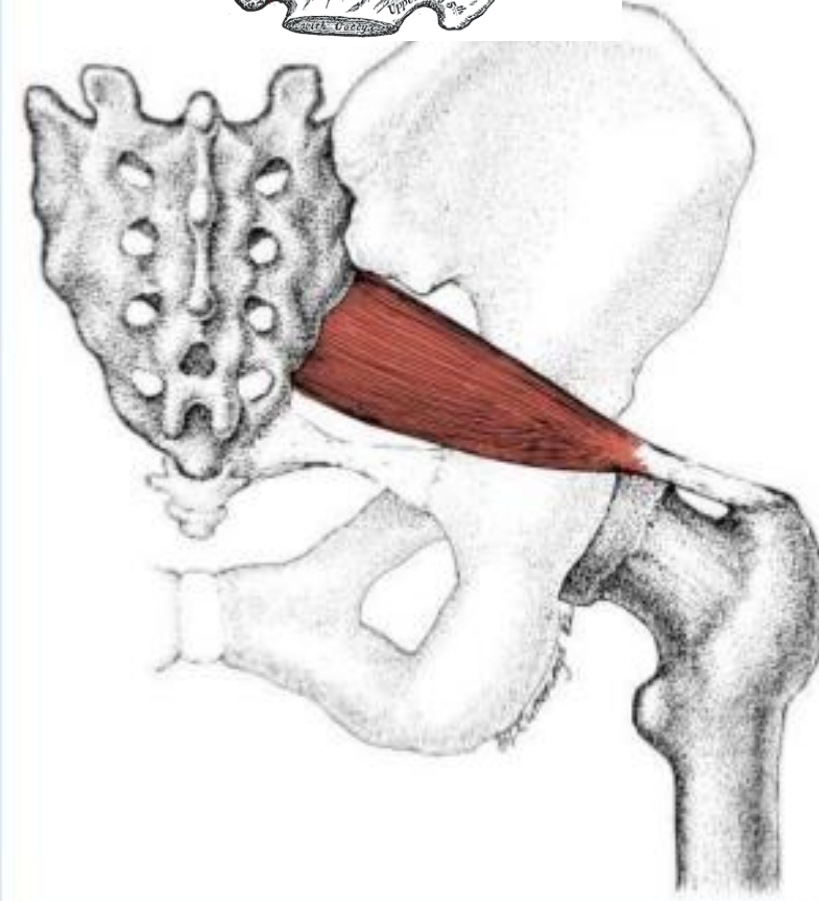
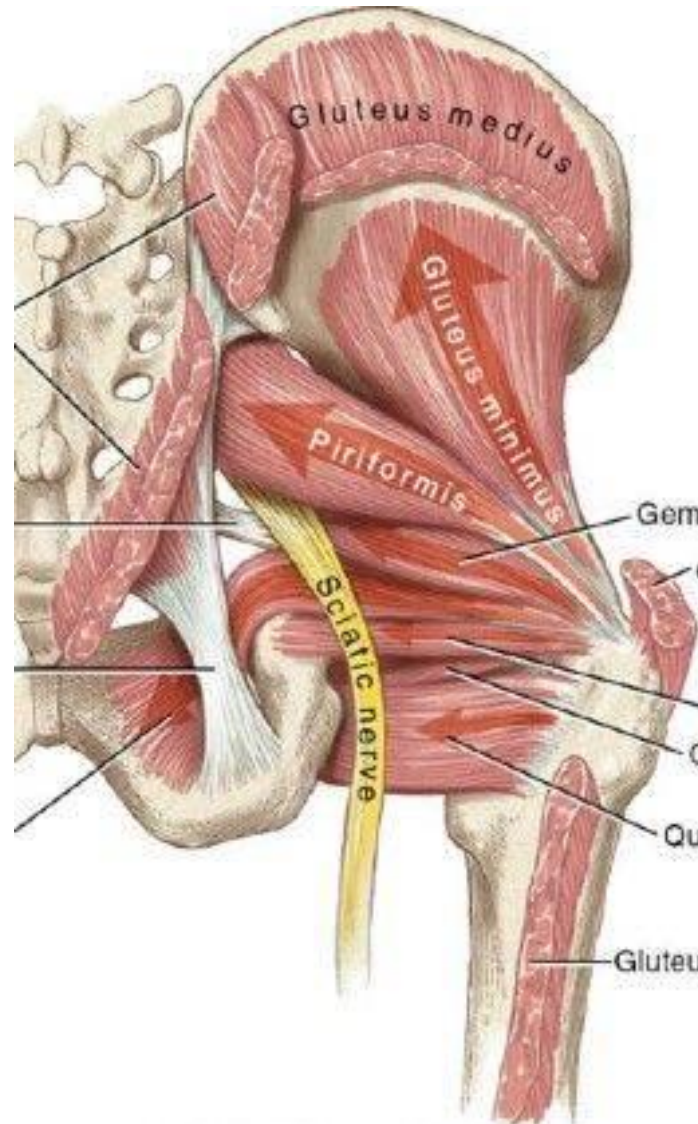
**Arises within pelvis**

By 3 digitations from pelvic surface of middle three pieces of sacrum

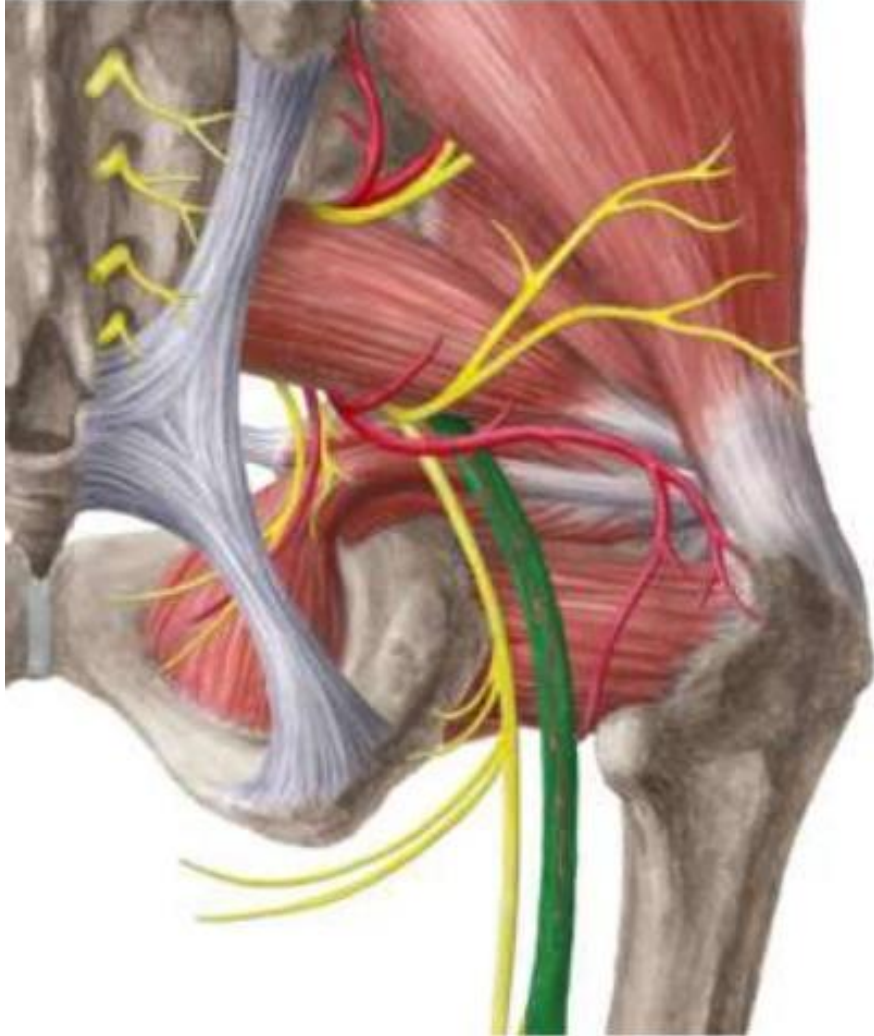
**Leaves the pelvis through Greater Sciatic notch**

## INSERTION:

Apex of greater trochanter by rounded tendon



## **Piriformis – is key muscle – why ?**



- Once piriformis is identified in the gluteal region
- Other structure that pass above and below the muscle can be identified

# Obturator Externus

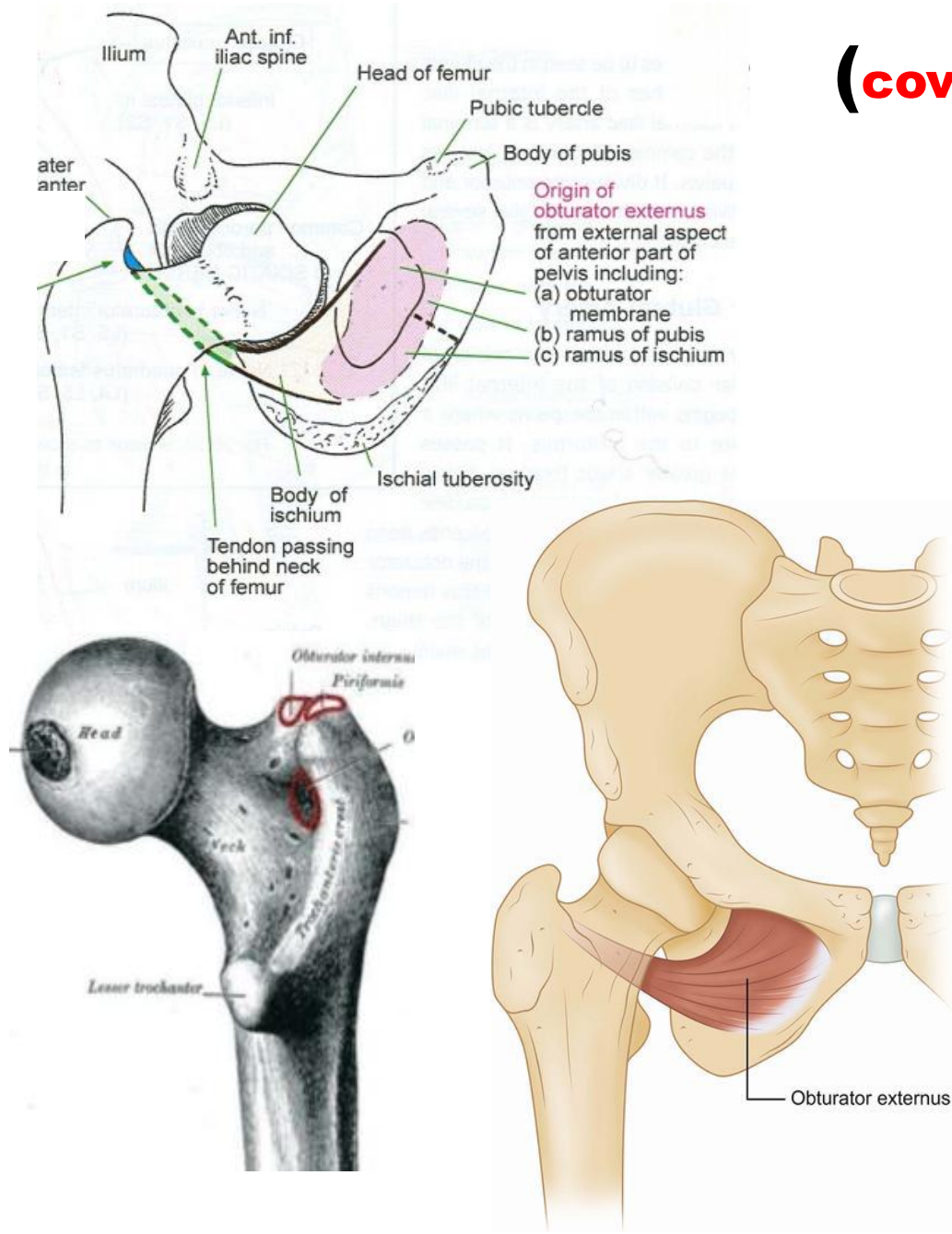
(covers outer surface of anterior wall of pelvis)

## ORIGIN:

- Outer surface of Obturator membrane
- Adjacent bony margin of obturator foramen

## INSERTION:

Tendon runs upwards laterally behind neck of femur, reaches gluteal region  
Inserted in trochanteric fossa on medial surface of greater trochanter



# Obturator Internus

(belly lies in pelvis & tendon in gluteal region)

## ORIGIN:

- Pelvic surface of Obturator membrane
- Pelvic surface of body of ischium, ishiopubic rami, Obturator fascia

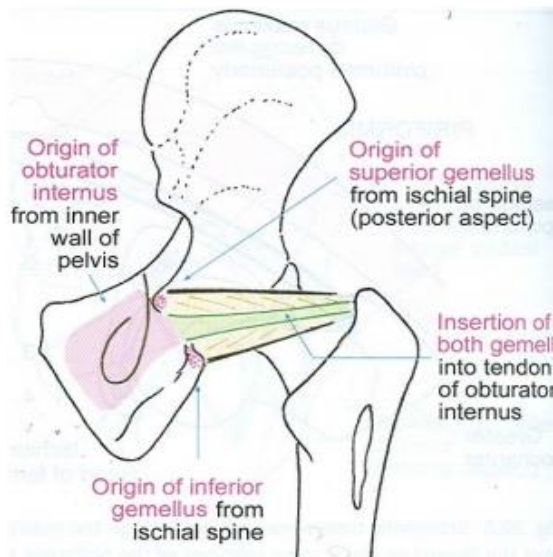
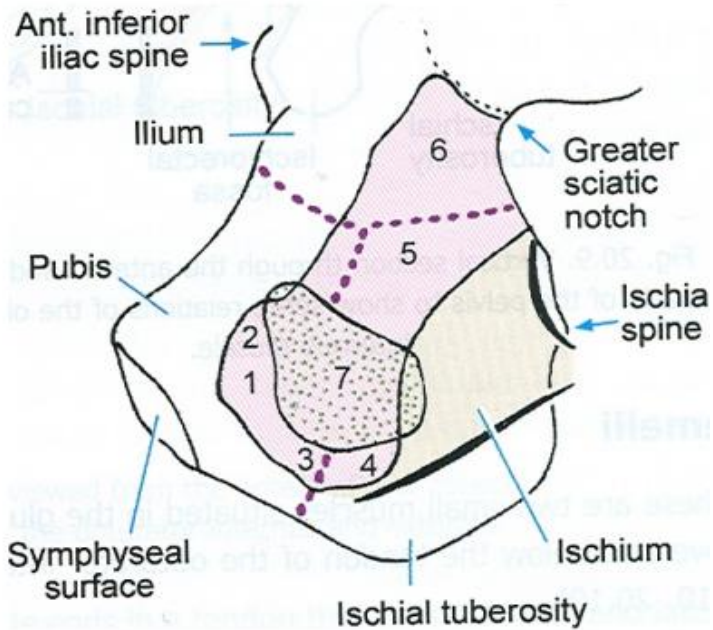
**It lies in the lateral wall of both pelvis & perineum**

## INSERTION:

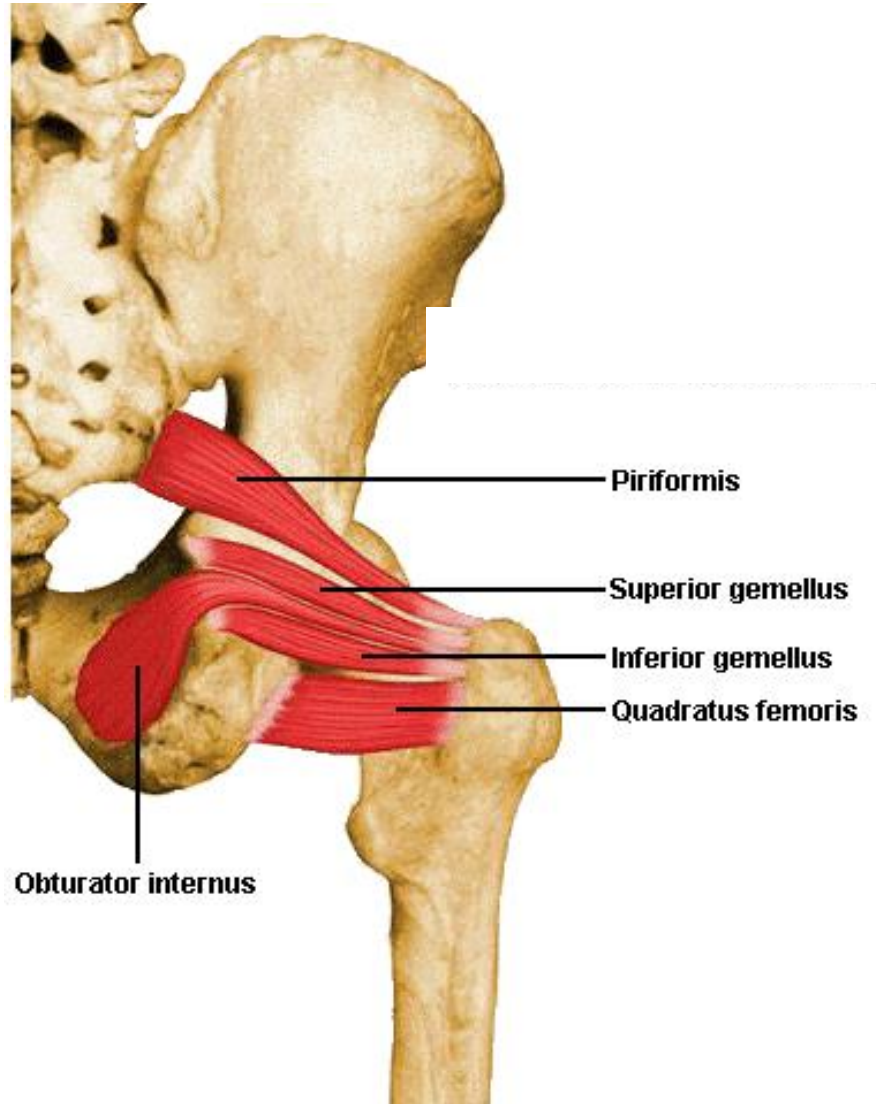
Tendon leaves pelvis through lesser sciatic foramen

**Turns 90° around lesser sciatic notch, upwards laterally behind neck of femur, reaches gluteal region**

Inserted on medial surface of greater trochanter



# Superior Gemellus



## ORIGIN:

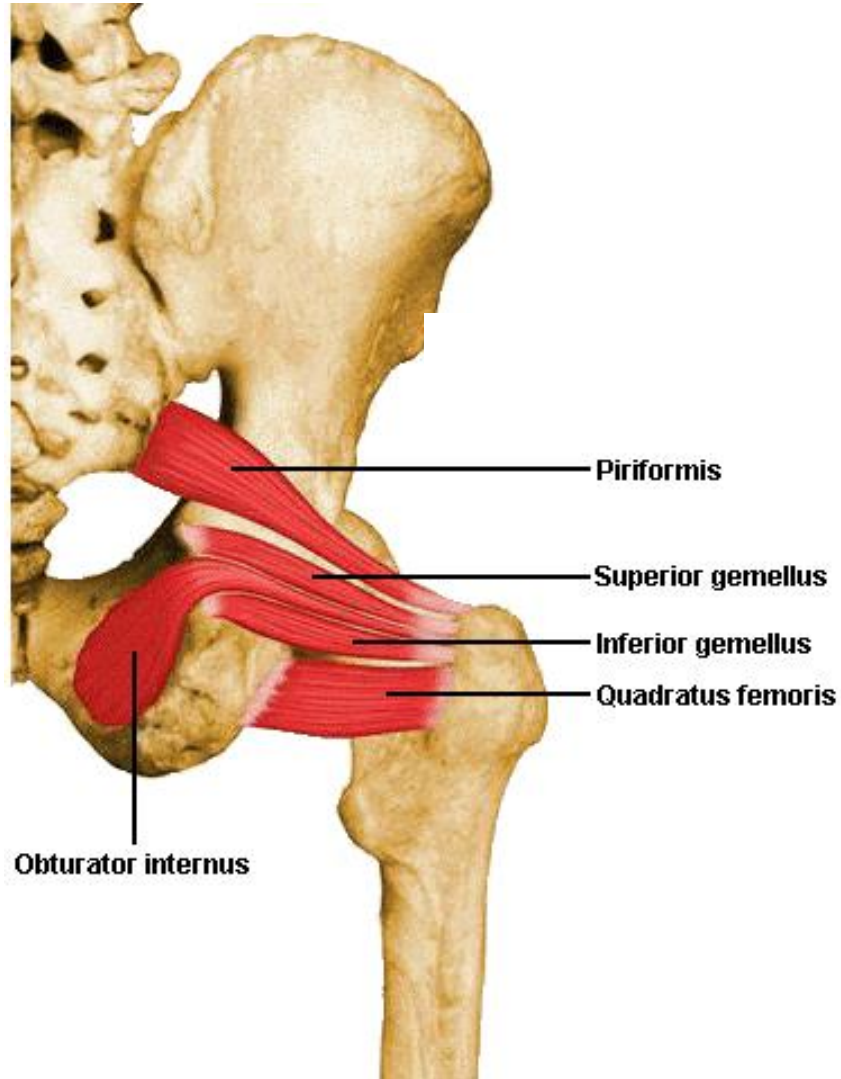
Upper part of Sciatic notch

## INSERTION:

Blends with tendon of obturator internus

Inserted into medial surface of greater trochanter

# Inferior Gemellus



## ORIGIN:

Lower margin of lesser sciatic notch

## INSERTION:

Blends with tendon of obturator internus  
Inserted into medial surface of greater trochanter



# Quadratus Femoris



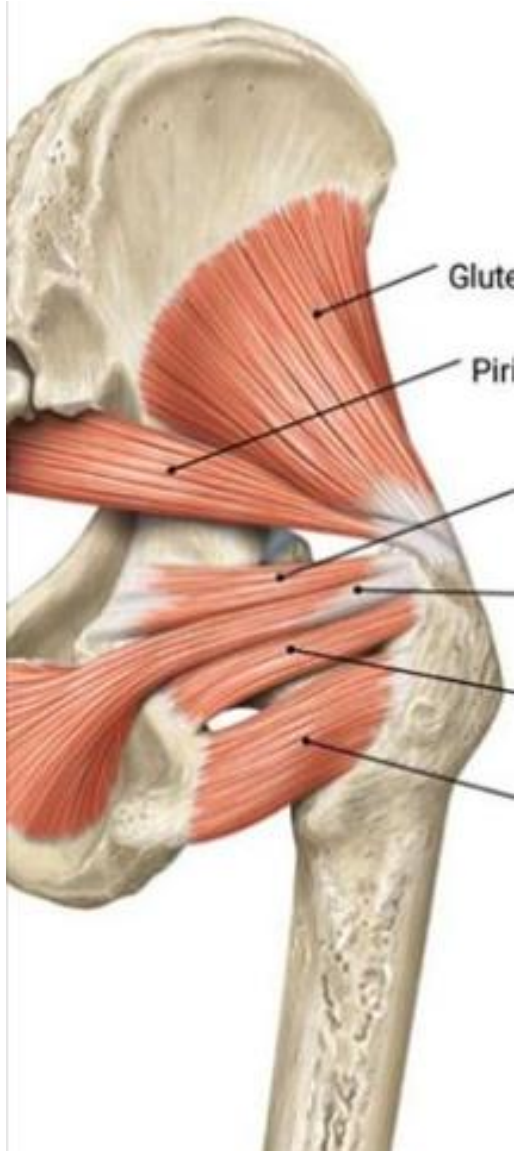
## ORIGIN:

Outer border/ lateral margin of ischial tuberosity

## INSERTION:

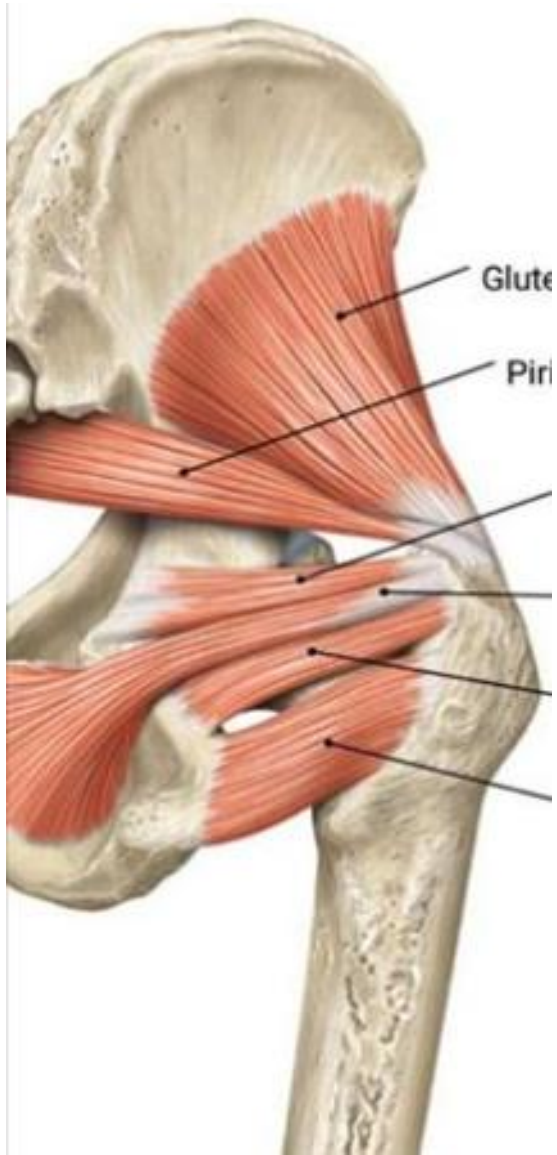
Quadratus tubercle and area below it

# Nerve Supply Actions



- Piriformis- Ventral rami S1, S2 (in pelvis)
- Obturator externus – Posterior division of obturator nerve
- Obturator Internus – Nerve to obturator internus ( L5, S1, S2)
- Gemellus superior- Nerve to obturator internus (L5, S1, S2)
- Gemellus Inferior - Nerve to quadratus femoris ( L4, L5, S1)
- Quadratus femoris - Nerve to quadratus femoris ( L4, L5, S1)

## Actions of short muscles



- Act as ligaments of variable length & tension which help to maintain the head of femur in the acetabulum
- Lateral rotators of thigh at hip joint (especially quadratus femoris)

# **Applied Anatomy**

- **Testing the 3 Gluteal muscles**
- **Weakness/paralysis of Gluteus maximus**
- **Normal abductor mechanism at hip**
- **Trendelenburg's Sign/test**
- **Abnormal gait due to U/L or B/L paralysis of Gluteus medius & Minimus**

# Testing Gluteus Maximus



- Position of Patient: Supine
- Action being tested: Extension against resistance

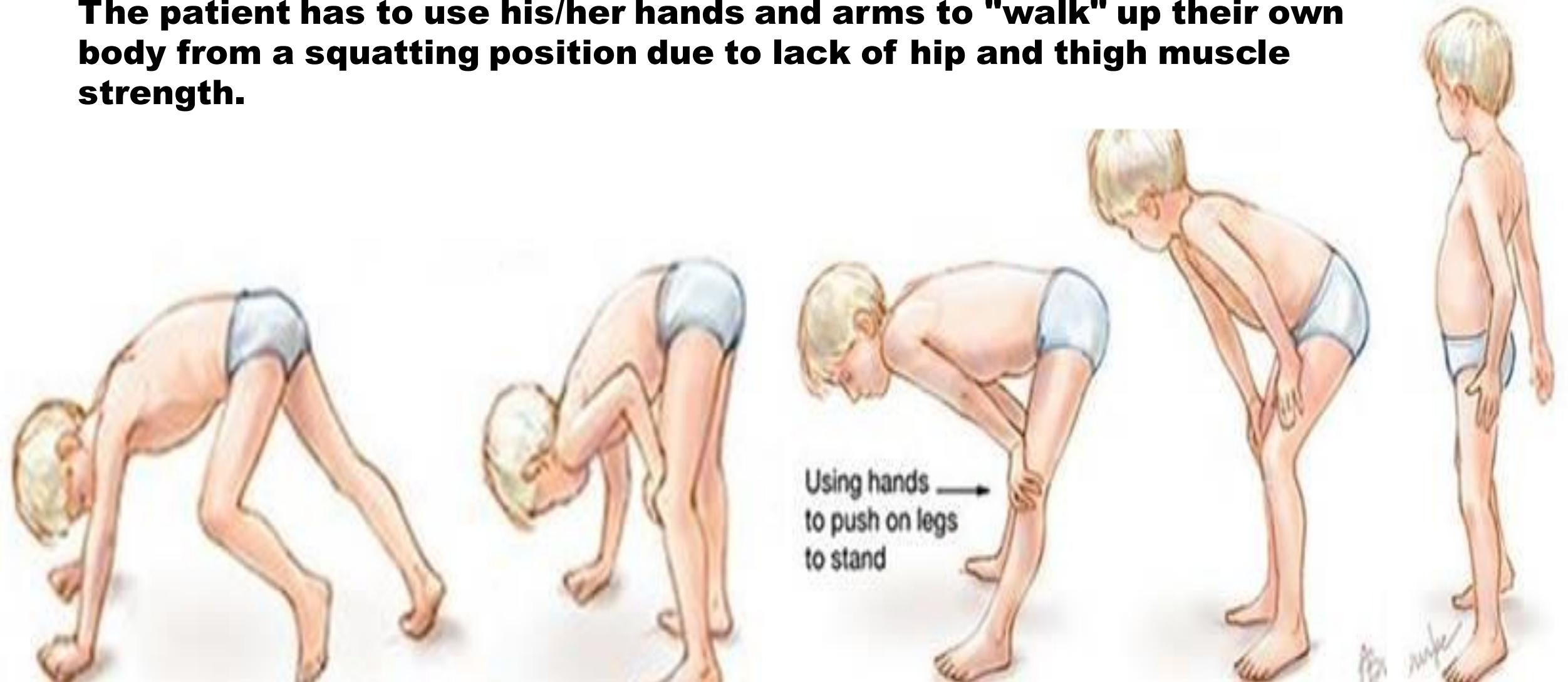
# Testing Gluteus medius, Minimus, & Tensor fasciae Latae



- Position of patient: Supine position with knee extended
- Action being tested: Abduction against resistance

# Gluteus maximus paralysis

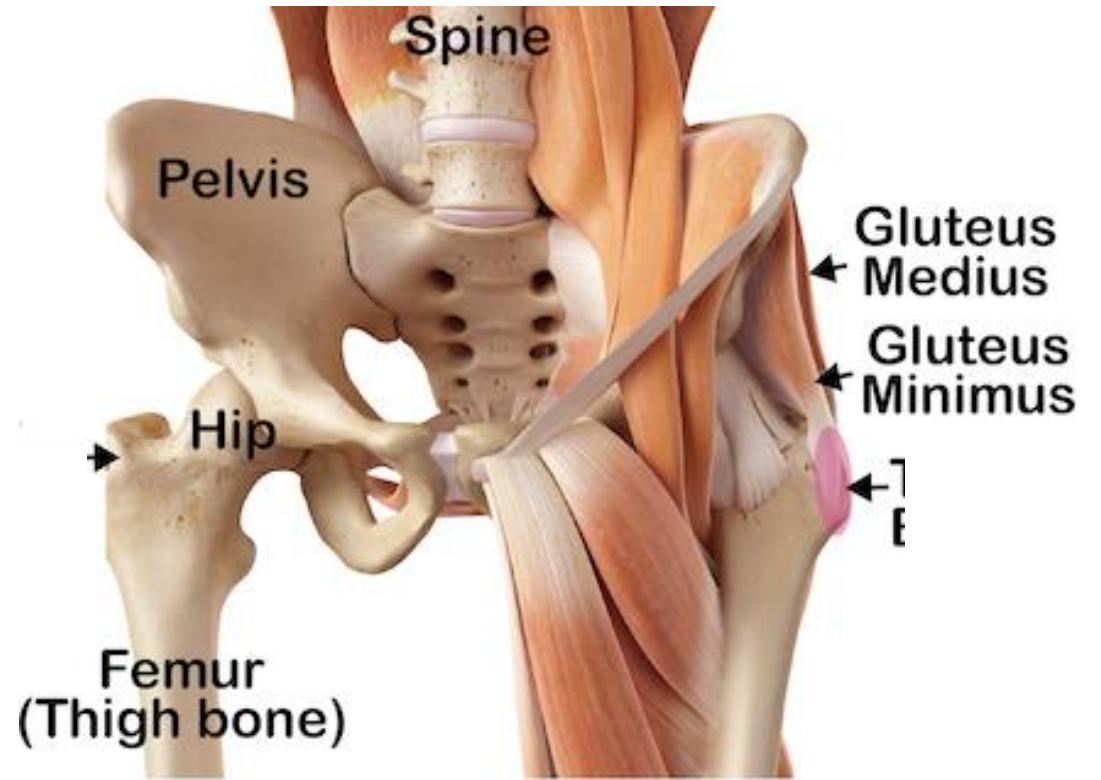
**The patient has to use his/her hands and arms to "walk" up their own body from a squatting position due to lack of hip and thigh muscle strength.**



# Normal gait depends on – proper abductor mechanism at both hips

## Comprises of:

1. Normal/ Intact gluteus medius & minimus
2. Normal relationship of head of femur with acetabulum – forming the fulcrum
3. Normal neck of femur – for weight transmission





# Gluteus Medius & Minimus (testing)



**Trendelenberg Test**





# Trendelenburg Sign



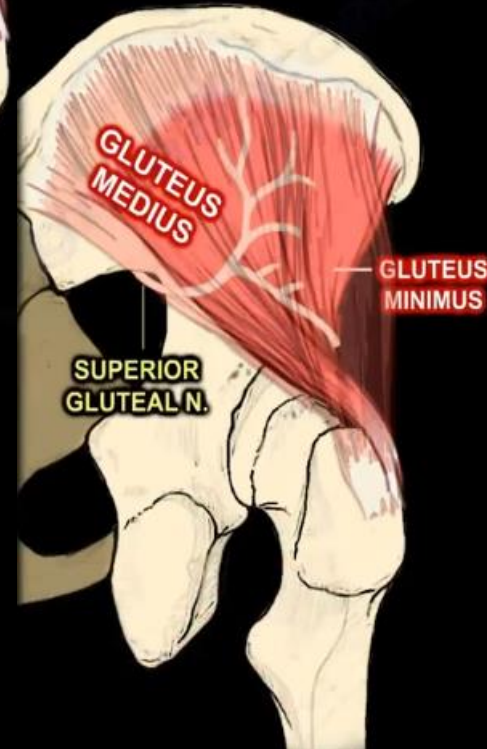
**Positive in defects of Abductor mechanism:**

- 1. Paralysis of Gluteus medius & minimus**
- 2. Dislocation of the hip**
- 3. Ununited fracture of neck of femur**

The trendelenburg sign occurs due to disruption of the hip abductor muscles.



There are two main muscles for hip abduction, the gluteus medius and gluteus minimus.



The function of the gluteus medius and gluteus minimus muscles is hip abduction and this function can become compromised due to injury of the superior gluteal nerve.

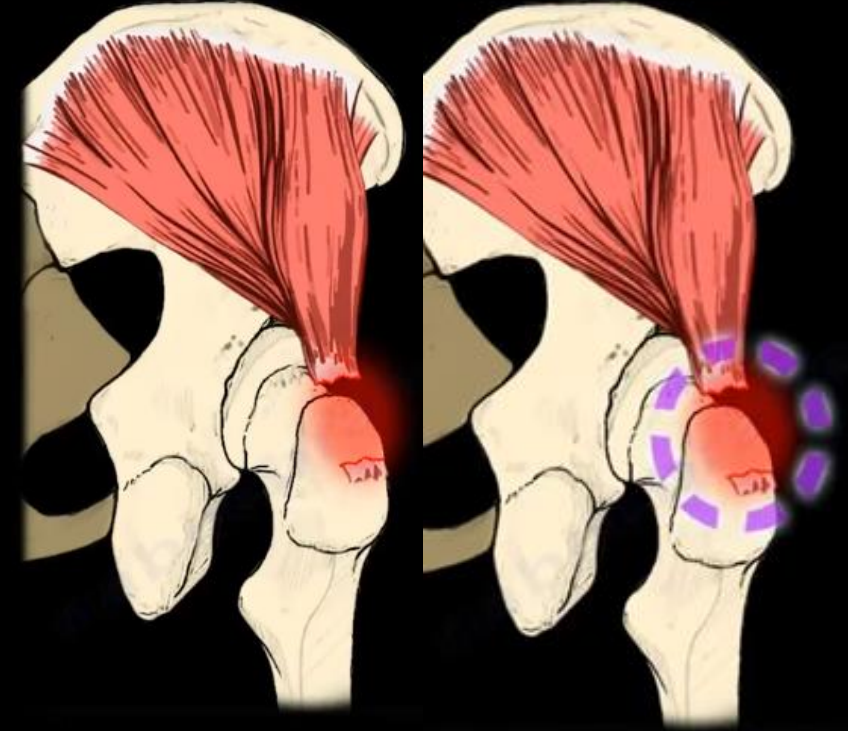
Both muscles are innervated by the superior gluteal nerve.



**function can become compromised due to injury of the superior gluteal nerve.**



**Involvement of the abductor muscles can also occur from injury of the L5 nerve root or due to avulsion of these muscles.**



**Avulsion of the tendon of the gluteus medius and gluteus minimus can occur at its insertion into the greater trochanter of the femur.**



**When you stand on both legs, each leg will carry half of the body weight.**



**When you have single leg stance, that supporting leg takes the entire load.**



**The function of the abductor muscles is to keep the pelvis level during single stance (when the patient is standing on one leg).**

LEFT



RIGHT



In this example, let us assume that the **RIGHT** side hip abductor muscles are tested.

When checking the integrity of the right side hip abductor muscles, stand behind the patient and ask the patient to stand on one leg.



**NORMAL**  
**ABDUCTOR**  
**MUSCLE**  
**FUNCTION**

**SUPPORTING**  
**LEG**

If the hip abductors connected to the supporting leg (leg touching the ground) are **intact**, the pelvis will remain level and the trunk will not lean.

## POSITIVE TRENDELENBURG SIGN

LEAN TOWARDS  
AFFECTED SIDE

If the abductor muscles of the supporting leg are injured, then the patient will show the Trendelenburg sign.

CONTRALATERAL  
HEMI-PELVIS DROP

AFFECTED  
SIDE

ABDUCTOR  
INJURY CAUSES  
TILT OF PELVIS  
AWAY FROM  
AFFECTED  
SIDE

As the patient stands on the side of the affected hip abductors, the pelvis on the normal side will tilt or escape downwards, and the trunk will lean towards the affected side.



## Trendelenburg Gait

Trendelenburg gait is an abnormal gait that is usually found in people with weak abductor muscles of the hip which are supplied by the superior gluteal nerve.



**ABNORMAL**

## LURCHING GAIT

In U/L paralysis of hip abductors person bends on paralysed/affected side to clear the opposite foot off the ground –

## WADDLING GAIT

In B/L paralysis of hip abductors person bends alternately on both sides to clear the opposite foot off the ground – walks like a DUCK



Thank You