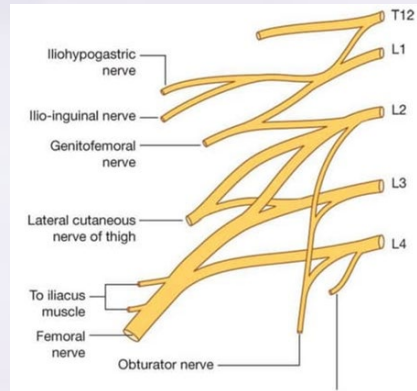
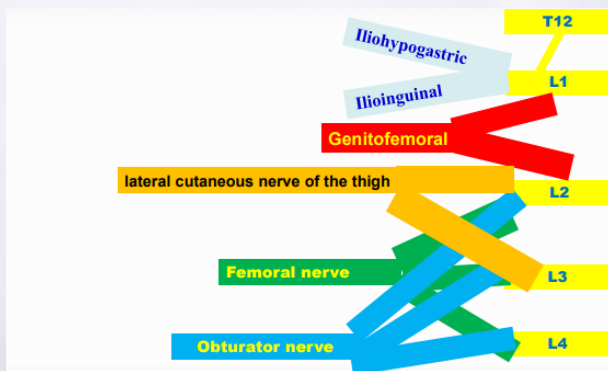


# Nerves Of The Lower Limb

## Lumbar Plexus

- Arises from ventral ramus of **L1 - L4**
- Lies within the psoas major muscle
- It receives a **contribution** from **T12** (subcostal) nerve

### ❖ Formation of lumbar plexus:



### ❖ Branches of Lumbar Plexus: (Interested In Getting Lunch On Friday)

**I**nterested-----iliohypogastric **L1**

**I**n-----ilioinguinal **L1**

**G**etting-----Genitofemoral **L1+L2**

**L**unch-----lateral cutaneous nerve of the the thigh **L2+L3**

**O**n-----Obturator **L2+L3+L4**

**F**riday-----Femoral **L2+L3+L4**

### ❖ Relation to Psoas Major Muscle:

#### **Lateral**

Iliohypogastric

Ilioinguinal

Lateral cutaneous nerve

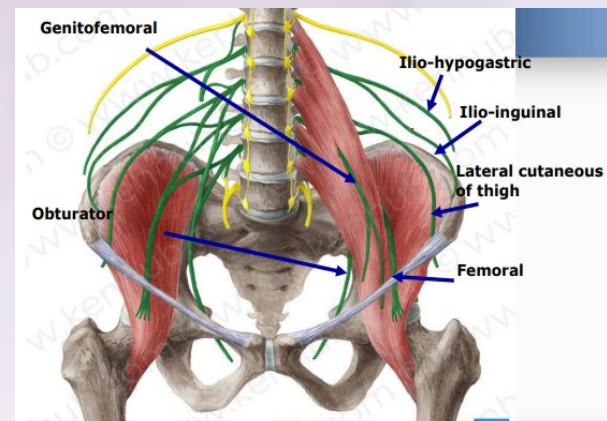
Femoral

#### **Medial**

Obturator

#### **Anterior**

Genitofemoral



# Sacral Plexus

–Lies caudal to the lumbar plexus

– Formed by the lumbosacral trunk (L4-L5) and ventral rami of S1-S4

–Located on the anterior surface of piriformis muscle

–The lumbosacral trunk is a thick nerve formed by the union of lower part of anterior primary ramus of L4 with the anterior primary ramus of L5

## ❖ Branches of Sacral Plexus

1-Sciatic L4,L5,S1,2,3,S4

2-Superior gluteal Nerve L4, L5 and S1

3-Inferior gluteal nerve L5 and S1 and S2

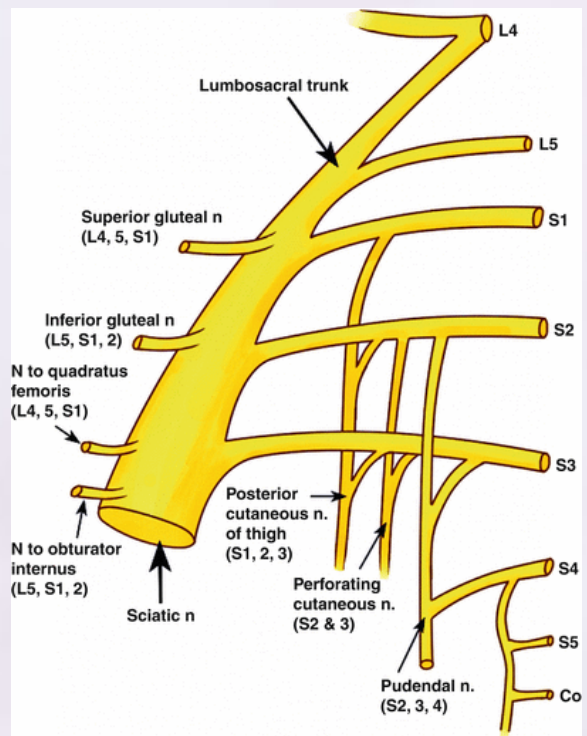
4-Posterior cutaneous nerve of thigh S1,S2 and S3

5-Nerves to the piriformis

6-Nerve to the quadratus femoris

7-Nerve to obturator internus

8- Pudendal Nerve



## Thigh

- 1- Skin
- 2- Superficial fascia
- 3- Deep fascia
- 4- Muscles
- 5- Nerves
- 6- Vessels

# Superficial fascia

→ It contains **cutaneous nerves** and **lymph nodes**

## ❖ Cutaneous nerve supply (SENSORY)

Anterior (A on the picture)

1-Ilioinguinal Nerve (upper anteromedial thigh and partially the external genitalia)

2-The femoral branch of genitofemoral Nerve

3. The lateral cutaneous nerve of the thigh (lateral 1/3)

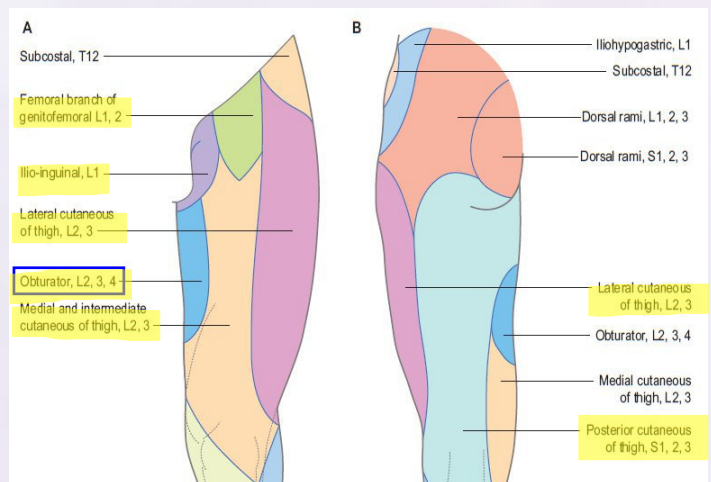
\*4. Intermediate cutaneous N. of the thigh (Intermediate 1/3)

\*5. The medial cutaneous N. (Medial 1/3)

(\* are branches of femoral nerve)

Posterior (B on the picture)

Posterior cutaneous nerve of the thigh



## ❖ Superficial Inguinal Lymph Nodes

It is T shaped, it has medial and lateral:

horizontal group → **below the inguinal ligament**

vertical group → **along the upper part of the great saphenous vein.**

### Afferent:

\*Lateral

→ Superficial parts of the buttock.

→ Back below the iliac crest.

\*Medial

→ Infraumbilical part of the anterior abdominal wall.

→ The perineum, external genitalia, and lower part of anal canal.

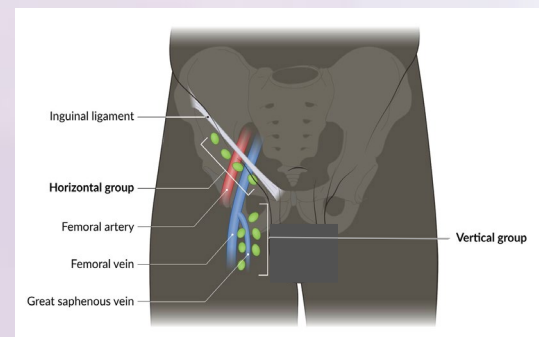
ALL The lower limb

Drain → inguinal lymph node

**EXCEPT**

**lateral side of foot and leg**

Drain to → popliteal lymph nodes



### Efferent:

Deep inguinal lymph nodes.

## Deep Fascia Fascia lata

→ Fascia lata is a **strong fibrous sheet** that surrounds the whole of the thigh like tight trousers.

### ❖ The Saphenous Opening:

→ It is an **oval opening** in the **supero medial** part of the **fascia lata**

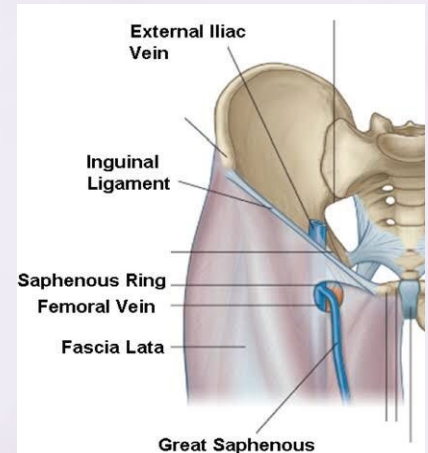
→ It is **covered** by the **cribriform fascia**

### ❖ Structures pass through cribriform fascia

\*Great **saphenous vein**

\*The **3 superficial branches** of the **femoral artery**

\***Efferent lymphatics** from the **superficial inguinal lymph nodes**.



### ❖ Iliotibial tract:

● The **deep fascia** of the thigh is **thickened laterally** to form iliotibial tract

● Attachment:

↑ Above: **iliac tubercle**

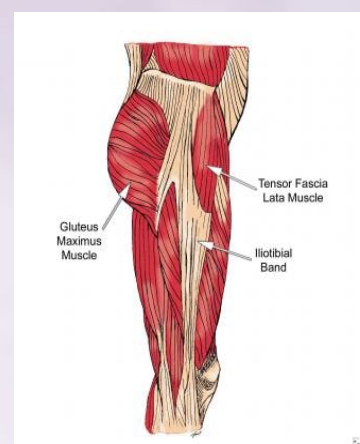
↓ Below: the **lateral condyle** of the **tibia**.

● It **receives** the **insertion** of the **tensor fasciae latae** and **gluteus maximus** muscles

● Function:

-Help in **knee extension**

-**Steadies femur** on the **tibia**

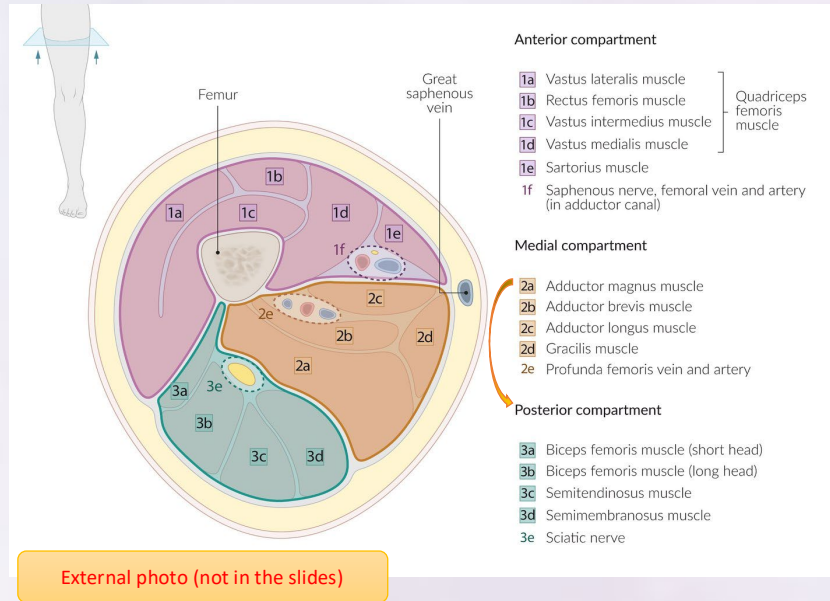
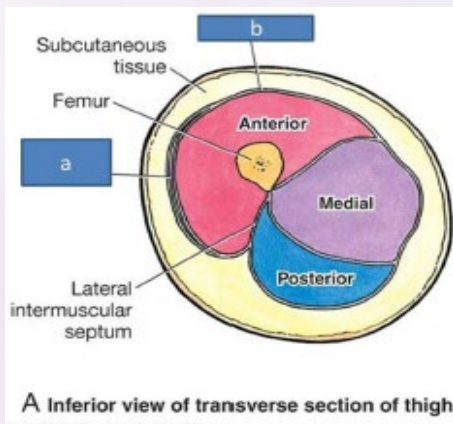




# Thigh compartments

The thigh is divided into 3 compartments, anterior, medial and posterior by 3 fascial septa

pass from the inner aspect of the deep fascia of the thigh →  
linea aspera of the femur.

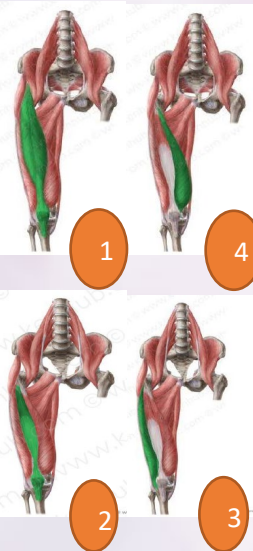
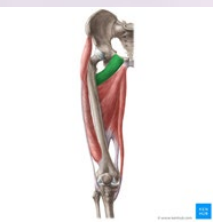


## ❖ Overview:

	ANTERIOR COMPARTMENT	MEDIAL COMPARTMENT	POSTERIOR COMPARTMENT
<b>MUSCLES</b>	Quadriceps + Iliopsoas + Sartorius	Adductors + Gracilis	Hamstrings
<b>MOVEMENT (Mainly)</b>	Flexion of thigh Extension of leg	Adduction of thigh	Extension of thigh Flexion of leg
<b>Motor NERVE Supply</b>	Femoral n. (Lumbar plexus)	Obturator N. (Lumbar plexus)	Sciatic n. (Sacral plexus)

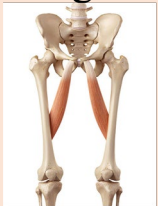
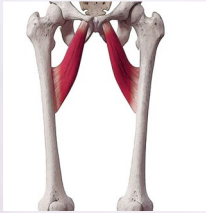

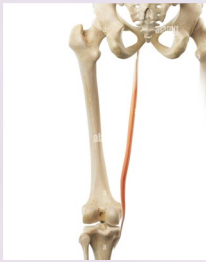
**\*\*Psoas sign** In case of appendicitis, flexion of the hip is painful.

## Muscles of the ANTERIOR COMPARTMENT “Thigh”

Muscle	Origin	Insertion	Nerve Supply	Action
<b>Iliopsoas</b> → composed of 2 muscles Iliacus & Psoas Major 	-Iliacus: iliac fossa  -Psoas Major: Transverse processes, bodies, and intervertebral discs of <u>T12-L5</u> vertebrae	lesser trochanter of femur	All are innervated by the <b>FEMORAL NERVE</b> Except <b>Psoas Major</b> by <b>L1,L2,L3</b>	*Flexes the thigh  *Psoas major → Flexes trunk on thigh; if thigh is fixed.
<b>Quadriceps Femoris</b> → four heads with different origin and same insertion 	1. <b>Rectus femoris</b> *Straight head: Anterior inferior iliac spine *Reflected head: Above the acetabulum.  2. <b>Vastus intermedius</b> Anterior and lateral surface of femur  3. <b>Vastus lateralis</b>  4. <b>Vastus medialis</b> : Upper end and shaft of femur	patella and tibia tuberosity via the patellar ligament		*Extends knee.  *(Rectus femoris) → flexes thigh.
<b>Sartorius</b> 	anterior superior iliac spine	Upper medial surface of shaft of tibia (SGS)		<u>Tailor position</u> *Flexes, abduct, laterally rotate the thigh  *Flexes, and medially rotates the knee
<b>Pectineus</b> 	Superior pubic ramus	Linea aspera		*Flexes and adducts thigh

# Muscles of the MEDIAL COMPARTMENT “Thigh”

## ADDUCTORS

Muscle	Origin	Insertion	Nerve Supply	Action
<b>Adductor Longus</b> 	body of pubis	Linea aspera	Obturator Nerve	Adducts Thigh
<b>Adductor Brevis</b> 	inferior pubic ramus			
<b>Adductor Magnus (pubic head)</b> 	Pubic Arch			
<b>Gracilis</b> 				

# Medial Compartment of the thigh

## ❖ Obturator Nerve

→ It is a **mixed** nerve.

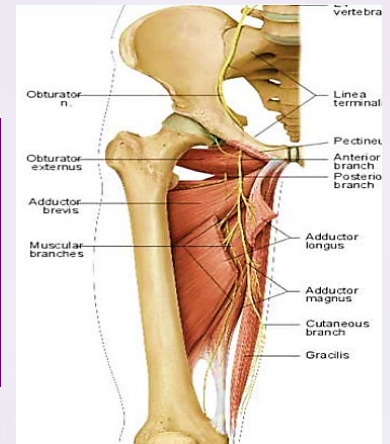
\***Origin:** Arises from **L2+L3 +L4**.

\***Course:** It descends **medial to psoas major** and leaves the **pelvis** through the **obturator canal**.

\***Termination:** It ends by dividing into **anterior** and **posterior** divisions.

\***Branches:**

Muscular	Sensory
1. Adductor longus 2. Adductor brevis 3. Adductor Magnus 4. Gracilis 5. Obturator externus	It supplies skin on the medial side of the thigh



## ❖ Femoral Triangle (Boundaries & Contents)

→ located in the **front** of **upper 1/3** of the **thigh**.

### 1- Boundaries

**Medial:** Adductor Longus

**Lateral:** Sartorius

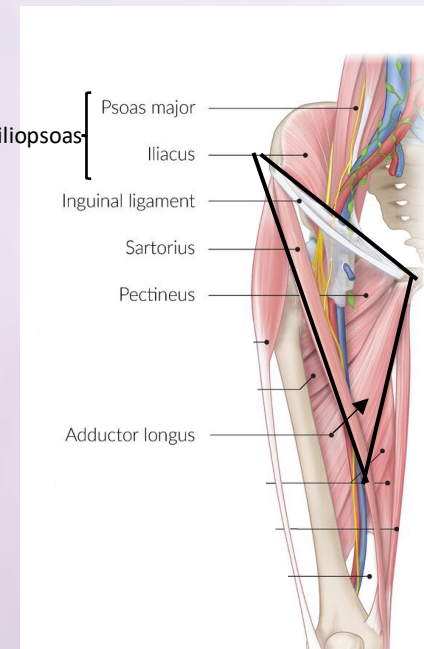
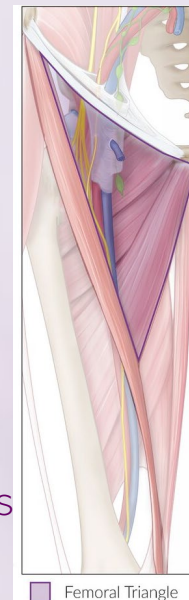
**Base:** Inguinal Ligament

**Floor:** it is made from lateral to medial:

Iliopsoas muscle → Pectineus muscle → Adductor longus

**Apex:** meeting of medial and lateral borders

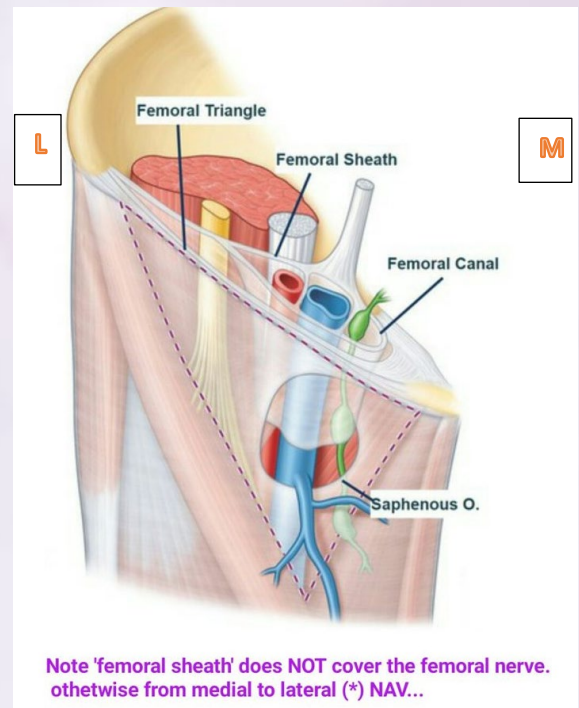
**Roof:** Skin, Superficial and Deep Fascia containing the Saphenous opening (see page 4)





## 2- Contents

- 1- The femoral sheath.
  - 2- The **femoral artery** and its branches.
  - 3- The **femoral vein** and its tributaries.
  - 4- Terminal part of the femoral nerve and its branches.
  - 5- Femoral branch of genitofemoral nerve.
  - 6- Lateral cutaneous nerve of the thigh.
  - 7- **Deep inguinal lymph nodes.**
- N→A→V→L



### ❖ Femoral sheath

→ It is a sheath of fascia **surrounds upper 1/3 of femoral vessels**

\*It has **3** compartments:

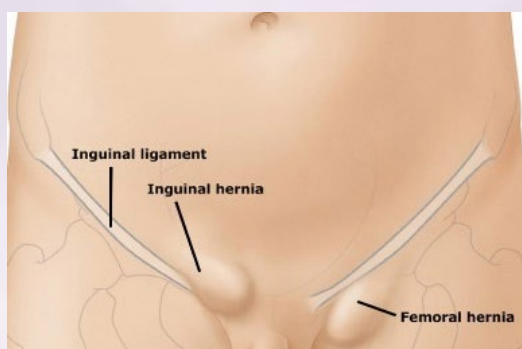
- 1- **Lateral compartment** → **Femoral artery** + **Femoral branch of the genitofemoral nerve**
- 2- **Intermediate compartment** → **Femoral vein**
- 3- **Medial compartment** → **Femoral canal**

### ❖ Femoral canal

→ Opens in the **abdominal cavity** **by femoral ring**

\***Advantage:** Allows **distension** of the **femoral vein** which occurs with the **increased venous return** during **muscular exercise.**

\***Disadvantage:** Gives **passage** for **femoral hernia.**



The Femoral Ring is **wider** in **females** than male so

**femoral hernia** is **common** → **females**

## ❖ The Femoral Artery

→Beginning: in the **midinguinal point** as a **continuation** of the **external iliac artery**.

→End: At the **opening** in **adductor magnus** by *becoming the popliteal artery*.

→Course & relations: It runs in the **femoral triangle** & **adductor canal**.

→Branches:

1-Superficial branches:

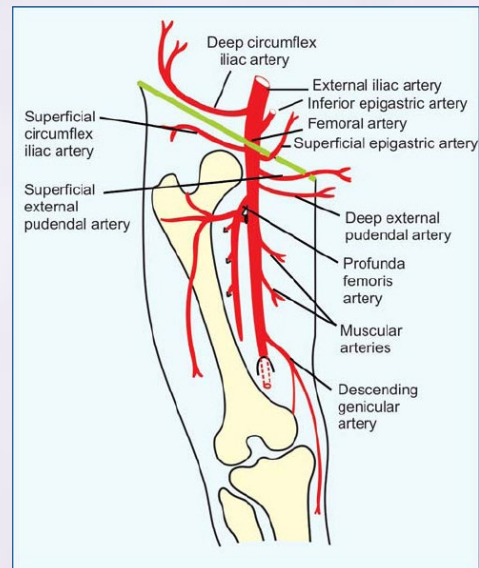
-Superficial epigastric.

-Superficial circumflex iliac

-Superficial external pudendal

2- Deep external pudendal artery

3- Profunda femoris  
(deep artery of thigh)



4- Descending genicular artery

## ❖ Profunda femoris (Branch femoral artery)

Branches:

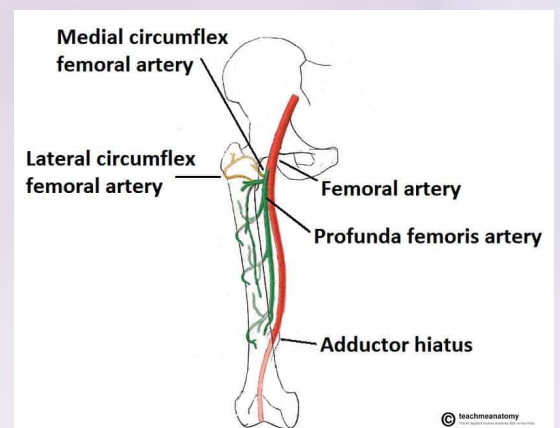
1- **Medial** circumflex femoral, it gives acetabular branch to head of the femur

2- **Lateral** circumflex femoral

3-**Perforating** arteries for the **back** of thigh

→They are **4** perforator arteries

→They perforate insertion of **adductor Magnus** muscle



## ❖ Clinical Anatomy fractures of femur neck:

→ The **blood supply** to the **neck of the femur** is **RETROGRADE**.

passing from **distal** → **proximal** along the femoral **neck** → femoral **head**.

This is through the **medial circumflex femoral artery**, which lies directly on the **intra capsular femoral neck**.

→ So intra-capsular fractures of femur neck **disrupt** the **blood supply** to the femoral **head** so femoral head will undergo **avascular necrosis** (even if the hip is fixed).

→ Patients with a displaced intra-capsular fracture therefore **require joint replacement**, rather than fixation.

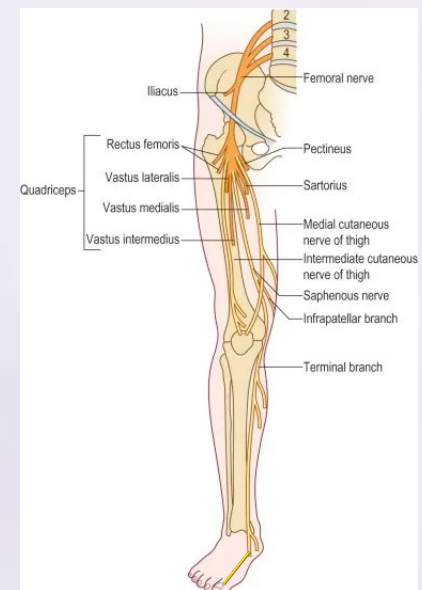
## ❖ The Femoral Nerve

→ It is a **mixed** nerve

\***Origin:** Arises from **L2, L3, L4**.

\***Course and Relations:**

- It passes **lateral** to **psoas major**
- It **enters** the **thigh** behind the **midpoint** of the **inguinal ligament**.
- It Passes **outside** the **femoral sheath** **lateral** to **femoral artery**.



\***Termination:**

**Saphenous Nerve:** It is terminal cutaneous branch supplies skin of medial side of the leg and medial side of the dorsum of the foot as far as the ball of the big toe.

\***Branches:**

Muscular	Sensory
1. Iliacus	1-Intermediate cutaneous N. of the thigh.
2.Pectineus	2. Medial cutaneous N. of the thigh
3.Sartorius	3- Saphenous nerve:
4. Four heads of quadriceps	It descends with the great saphenous Vein, in medial side of the leg and medial side of the dorsum of the foot down to the (ball of big toe).

## ❖ Nerve Injury (Femoral Nerve):

→ **Motor loss:**

Paralysis of **Quadriceps Femoris** muscle with **loss** of **knee extension**

→ **Sensory loss:**

Loss of sensation on the anterior and medial sides of the thigh,

the medial side of the leg

medial side of the dorsum of the foot as far as the ball of the big toe.

## ❖ Adductor (Subsartorial) canal:

→ **Location:** It occupies the **medial** side of the **middle 1/3** of the **thigh**.

**\*Boundaries:**

1. Anterolaterally: vastus medialis muscle.
2. Anteromedially: sartorius muscle.
3. Posteriorly: adductor **longus** above and adductor **magnus** below.

**\*Beginning:**

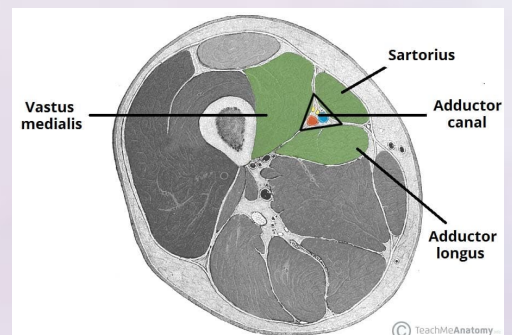
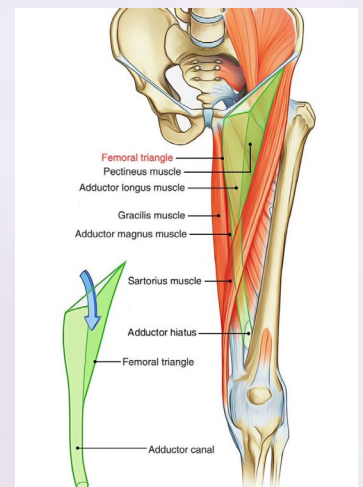
At the Apex of the femoral triangle.

**\*Termination:**

At opening of adductor magnus Where it become continuous with popliteal fossa

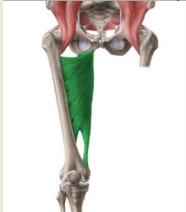



**\*Contents:**

1. **Femoral Artery**
2. **Femoral Vein**
3. **Saphenous Nerve**
4. **Nerve to vastus medialis**



# Muscles of the POSTERIOR COMPARTMENT “Thigh”

## Hamstring Muscles

Muscle	Origin	Insertion	Nerve Supply
Adductor Magnus (Ischial head) 	Ischial tuberosity	Adductor tubercle of femur	Tibial branch of Sciatic nerve
Semitendinosus 		upper part of medial surface of the tibia (SGS)	
Semimembranosus 		Back of medial condyle of the tibia	
Biceps femoris *(long head) 		linea aspera and lateral supracondylar line.	
Biceps femoris *(Short head)			

Action:

All are  
**Extends the hip**

(**EXCEPT short head of Biceps**)

and

**Flex the knee**

\*Lateral

muscle

rotates →

knee

laterally

\*Medial

muscle

rotates →

knee

medially



## ❖ Popliteal fossa

→ **Location:** Posterior to the knee joint.

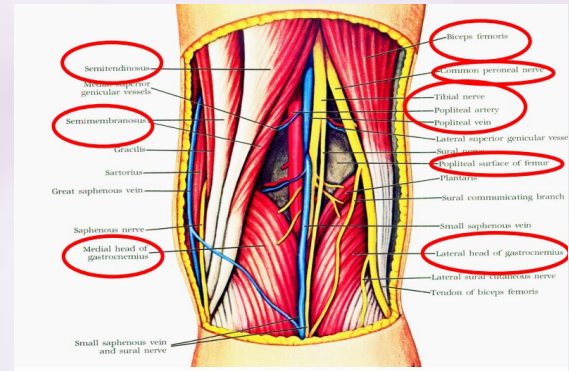
→ **Boundaries:**

1. **Above and lateral:** biceps femoris.

1. **Above and medial:** semitendinosus and semimembranosus.

2. **Below and lateral:** lateral head of gastrocnemius and plantaris.

3. **Below and medial:** medial head of gastrocnemius.



→ **Roof:** • Skin • Deep fascia

→ **Floor:**

• Popliteal surface of the femur.

• Capsule of the knee joint.

• Popliteus muscle

→ **Contents:**

1- **Popliteal artery** (Most deep)

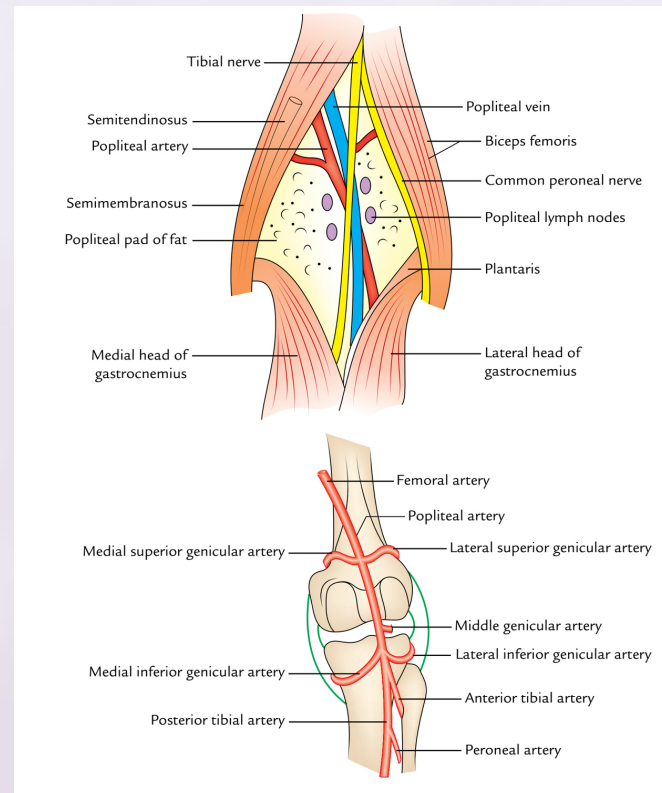
2- **Popliteal vein**

3- **The common peroneal nerve** (lateral popliteal nerve)

4- **Tibial nerve** (medial popliteal nerve)

5- **The posterior cutaneous nerve of the thigh**

6- **The small saphenous vein**



## ❖ Popliteal Artery

→ **Beginning:** at opening in **adductor magnus** as a continuation of **femoral artery**.

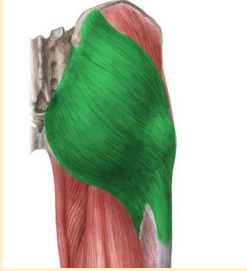
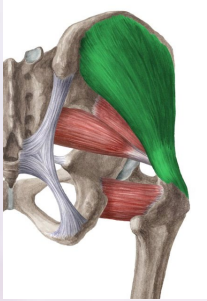
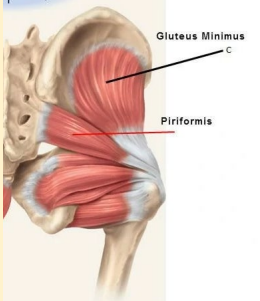

→ **Termination:** at the lower border of **popliteus muscle** by dividing into **anterior** & **posterior tibial arteries**.

→ **Branches:**

\* **5 Genicular** branches to the **knee joint** (2 superior, 2 inferior & middle).

\* **Muscular** branches to **muscles** of the **back** of the **leg**.

## Muscles of the Gluteal Region

Muscle	Origin	Insertion	Nerve Supply	Action
<b>Gluteus maximus</b> 	Outer surface of Ilium, sacrum and coccyx & sacrotuberous ligament	Gluteal tuberosity of femur iliotibial tract	Inferior gluteal nerve	*Extends and lateral rotation of thigh.  *Extends the knee (through iliotibial tract)
<b>Gluteus medius</b> 	Outer surface of Ilium	Greater trochanter of femur	Superior gluteal nerve	*Abduction  *Prevent tilting of the pelvis when the opposite limb is raised
<b>Gluteus minimus</b> 				
<b>Tensor fascia latae</b> 	Iliac crest	iliotibial tract		

## ❖ Cutaneous nerve supply of (Gluteal region)

### 1-Upper Medial quadrant is supplied by the:

Cutaneous branches from dorsal rami of upper 3 lumbar nerves (L1, L2, L3) and upper 3 sacral nerves (S1, S2, S3).

### 2-Upper Lateral quadrant is supplied by the:

Lateral cutaneous branch of subcostal nerve (T12)

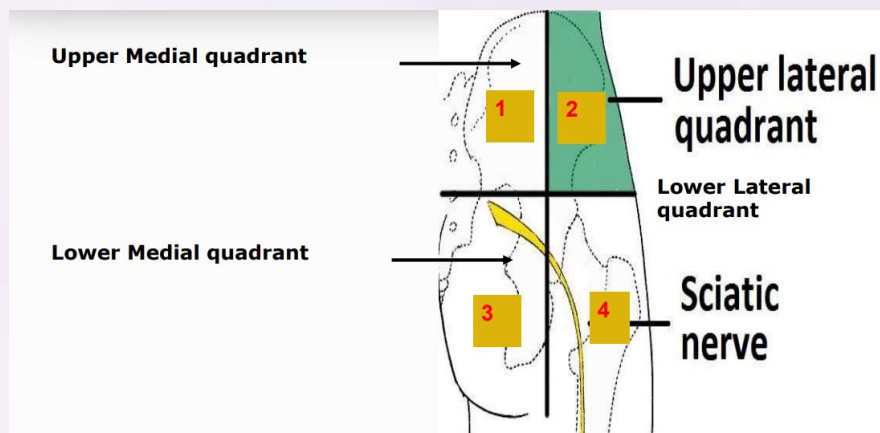
Lateral cutaneous branch of iliohypogastric nerve (L1).

### 3-Lower Medial quadrant is supplied by the:

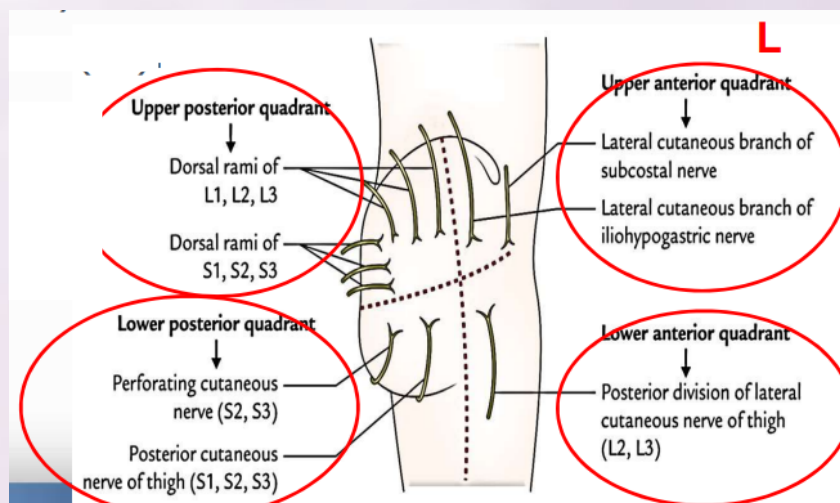
Posterior cutaneous nerves of the thigh (S1, S2, S3)

### 4-Lower Lateral quadrant is supplied by the:

Lateral cutaneous nerves of the thigh (L2, L3).



Gluteal Region Division



## ❖ Clinical Anatomy (Gluteal Region & Superior Gluteal Nerve)

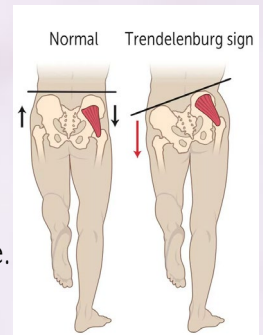
### Injury of superior gluteal nerve:

- ❖ Unilateral injury of superior gluteal nerve →

Unilateral Paralysis → of **Gluteal medius & minimus**,

the patient exhibits → **lurching gait** with a **positive Trendelenburg's sign**.

On standing on the affected side → **Pelvis** will **tilt towards** the **unsupported** side.



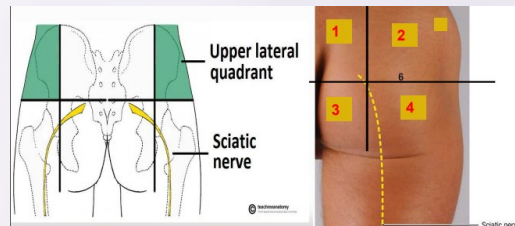
- ❖ Bilateral injury of superior gluteal nerve →

Bilateral Paralysis → **Gluteal medius & minimus**,

the patient exhibits → **waddling gait** → **Trunk** is **flexed** from **side to side** with each step during walking.

On standing on the diseased side the sound side sags.

→ Most suitable quadrangle for IM (intramuscular) injection is → **Upper Lateral Quadrant**.



## ❖ Lateral rotators of the thigh & their Nerve Supply

1-**Piriformis**: → **S1, S2**

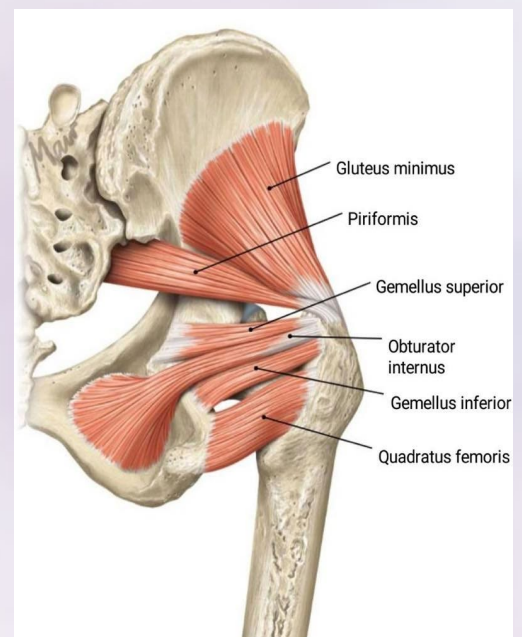
2-**Obturator internus**: → **Nerve to obturator internus**

3-**Superior gemillus**: → **Nerve to obturator internus**

4-**Quadratus femoris**: → **Nerve to quadratus femoris**.

5-**Inferior gemillus**: → **Nerve to quadratus femoris**.

6-**Obturator externus**: → **Obturator nerve**





## ❖ Greater and lesser sciatic foramens:

- **Sacrospinous ligament**

Between ischial spine and back of sacrum & Coccyx

- **Sacrotuberous ligament**

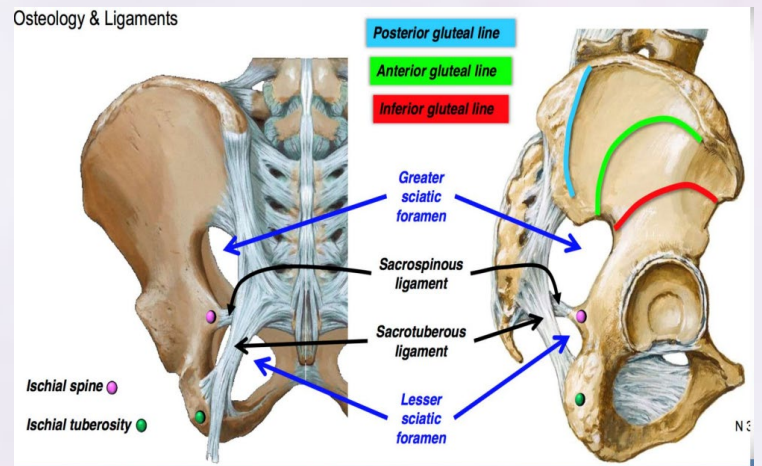
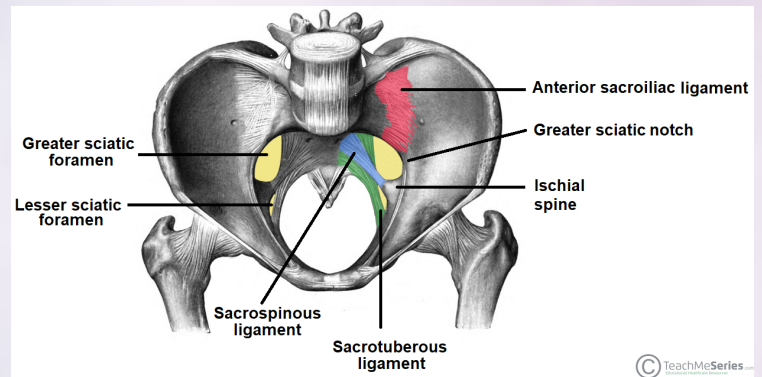
Between ischial tuberosity and back of sacrum & Coccyx

- **Greater sciatic foramen**

Between greater sciatic notch, sacrospinous and sacrotuberous ligaments.

- **Lesser sciatic foramen**

Between lesser sciatic notch, sacrospinous and sacrotuberous ligaments.



## ❖ Structures Passing in Greater and Lesser Sciatic Foramen

### Greater sciatic foramen

(7 nerves+3 vessels+1 muscle)

→ **Above Piriformis:**

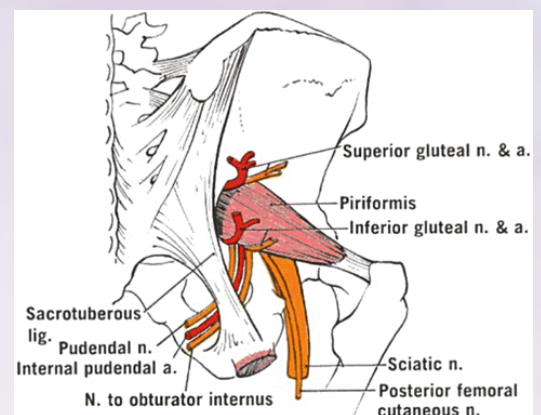
Superior gluteal nerve and vessels

→ **Below Piriformis:**

- Sciatic nerve
- Posterior cutaneous nerve of the thigh
- Inferior Gluteal nerve and vessels
- Nerve to Quadratus femoris
- Pudendal nerve
- Internal pudendal vessels
- Nerve to Obturator Internus

### Lesser Sciatic foramen

- Tendon of Obturator Internus Muscle
- Pudendal nerve
- Internal pudendal vessels
- Nerve to obturator internus





## ❖ Sciatic Nerve

### →Origin:

From **sacral plexus** \* L4+L5+S1+S2+S3 \*

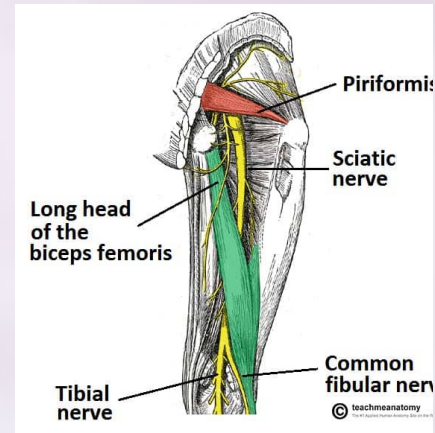
### →Course:

-It leaves the **Pelvis** through the **Greater sciatic foramen** below **piriformis**.

-It descends in the **gluteal region** and **back of the thigh**.

### →Termination:

It ends at the **popliteal fossa** by dividing into **tibial** and **common fibular** nerves.



## ❖ Sciatica

### →Causes:

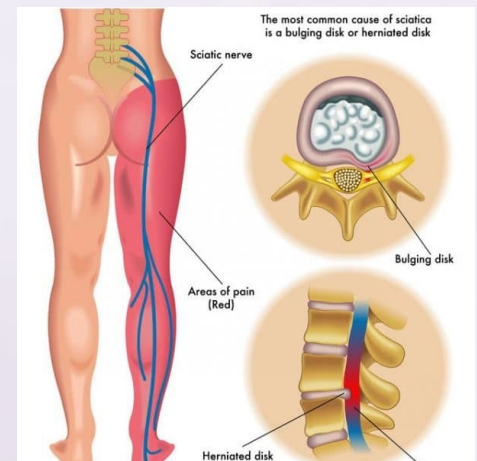
**Prolapse** of an **intervertebral disc** with **pressure** of one or more roots of **lower lumbar or sacral nerves**.

### →Manifestation:

Pain along the sensory distribution of the sciatic nerve as

\* posterior aspect of the thigh, \* posterior and lateral sides of the leg.

\* lateral part of the foot.



## ❖ Sciatic nerve Injury

### →Causes:

1. Penetrating wounds
2. Fractures of the pelvis
3. Dislocations of the hip joint
4. Wrong intramuscular injections.

### →Manifestation:

#### Motor:

- 1-**Weak flexion** of the **knee**
- 2-**Foot drop**

#### Sensory:

loss of sensation **below the knee**, **except** for a narrow area down the **medial side** of the **leg** and the **medial border** of the **foot**.

## ❖ Check List:

Sacral & Lumbar plexus.

Thigh

Medial compartment:

1. Muscles
2. Obturator nerve
3. Femoral triangle
4. Saphenous Opening
5. Femoral Sheath
6. Femoral Canal
7. Femoral Artery
8. Profunda Femoris
9. Femoral Nerve
10. Adductor (Subsartorial) canal

Anterior Compartment:

1. Muscles

Posterior Compartment:

1. Muscles
2. Popliteal fossa

Gluteal Region:

1. Iliotibial tract
2. Muscles
3. Lateral rotators of the thigh
4. Greater and lesser sciatic foramina
5. Structures Passing in Greater and Lesser Sciatic Foramen
6. Sciatic Nerve

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BEST Wishes 😊