

INTERNATIONAL SURGICAL  
ANATOMY TEACHING  
SERIES



# ISATS HANDOUT 2025/26

Lower limb

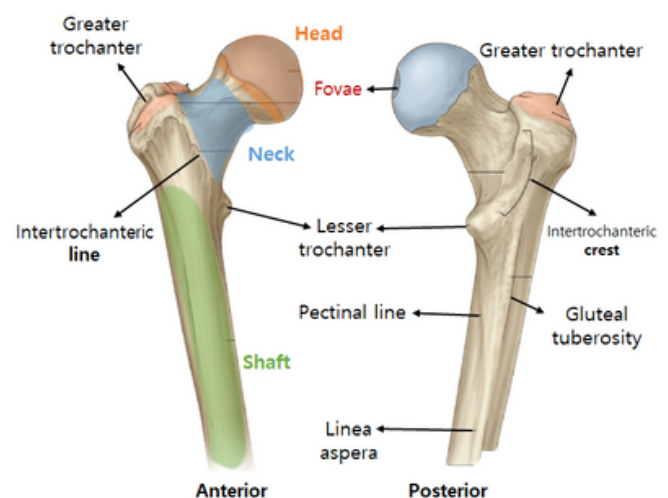
# LOWER LIMB ANATOMY

**Objectives:** To understand the bony anatomy, ligaments, muscle compartments and neurovascular supply of the lower limb, hip joint, knee joint and ankle joint.  
Further to apply this anatomical knowledge in performing a hip arthroplasty

## Bony Anatomy

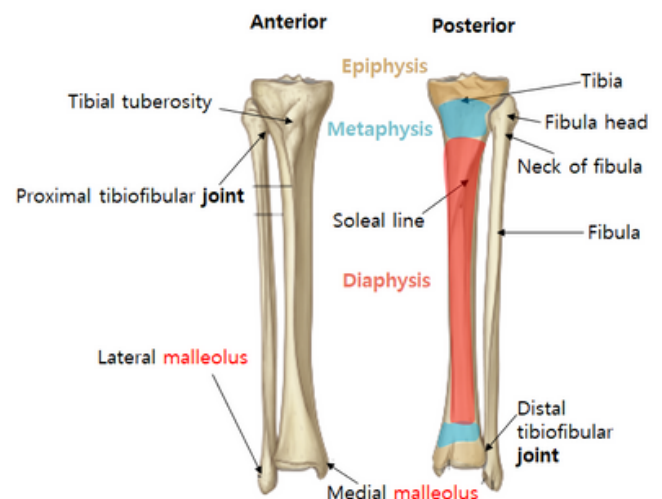
### Femur

- Commonest femur fractures are neck of femur fractures:
  - **Intracapsular fracture** – Occurs superomedial to intertrochanteric line
    - \*Surgical emergency as failure to treat can lead to **avascular necrosis** of femoral head
  - **Extracapsular fracture** – occurs inferolateral to intertrochanteric line



### Tibia & Fibula

- Tibia and fibula are both **long bones** located between the knee and ankle joint
- Tibial tuberosity – insertion point for muscles
- Proximal & Distal tibiofibular joints – synovial joint permitting limited gliding movement

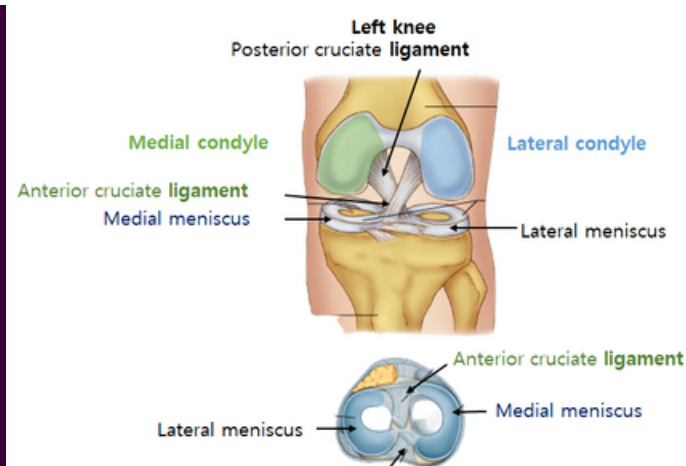


### Foot

- The foot is composed of 26 bones of various types, i.e. long bones (metatarsal), short bones (talus).
- The talus has retrograde blood supply, \* Surgical emergency if talus fracture occurs as can lead to **avascular necrosis**

## Knee joint

- Knee joint is a **synovial hinge joint**
- Knee joint is stabilised by 4 ligaments, 2 menisci
- **Knee locking** occurs when femur rotates medially with respect to tibia – permits knee extension with minimal muscular effort
- **O'Donoghue's unhappy triad**
  - Lateral to medial traumatic force on the knee joint
  - Classically damages ACL, MCL, Medial meniscus
  - Treatment involves ACL ligament reconstruction and meniscectomy



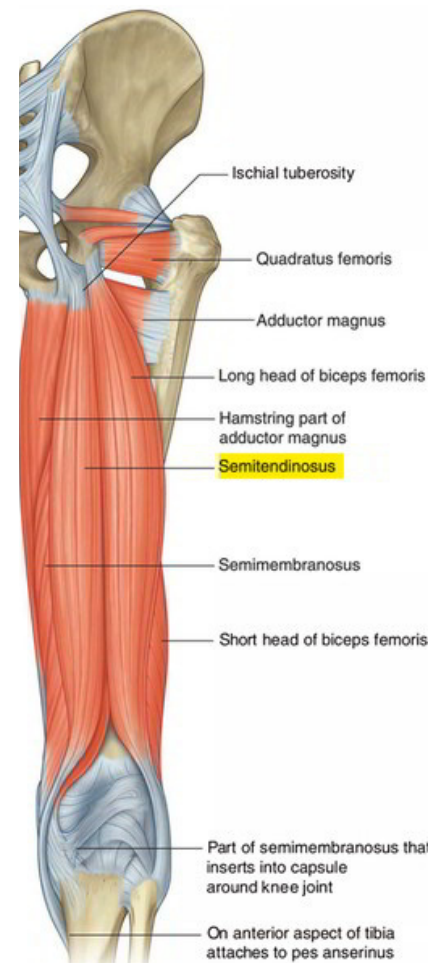
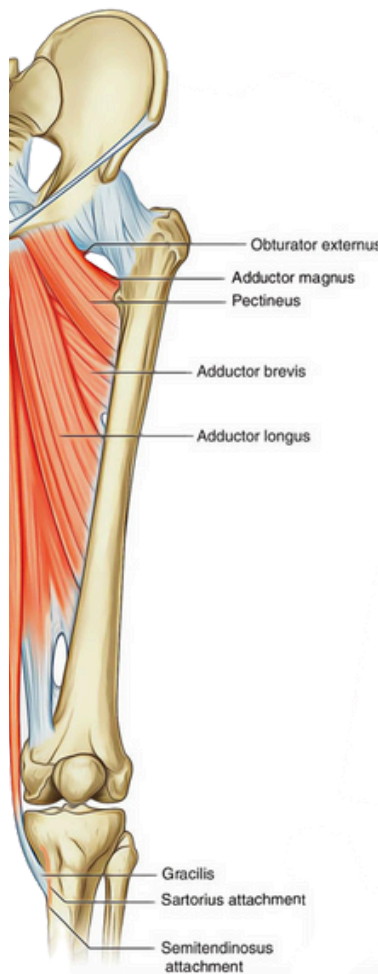
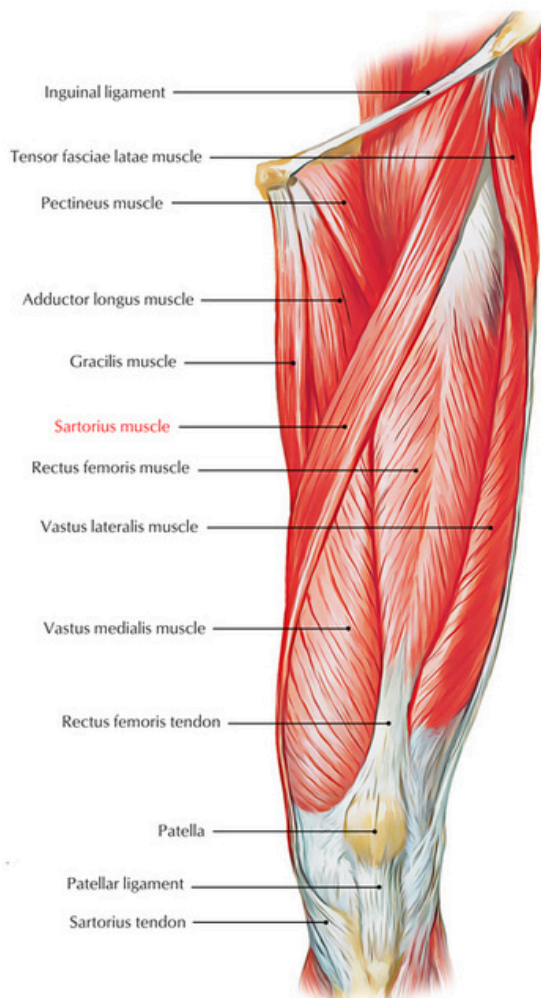
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## Muscular Anatomy

### Thigh:

| Muscle Compartment | Function            | Innervation     |
|--------------------|---------------------|-----------------|
| Anterior           | Hip flexion, Knee   | Femoral nerve   |
| Medial             | Adduction           | Obturator Nerve |
| Posterior          | Hip extension, Knee | Sciatic Nerve   |



Anterior Thigh

Medial Thigh

Posterior Thigh



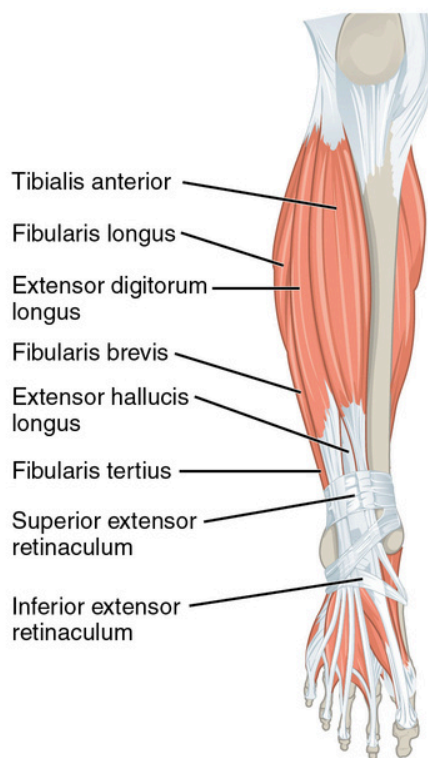
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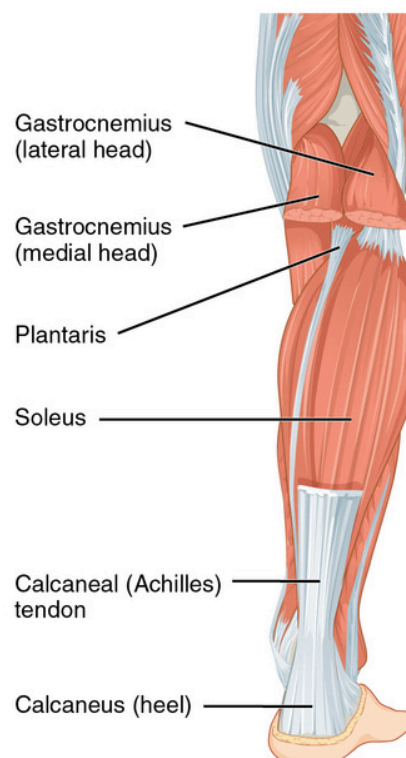
## Muscular Anatomy

**Leg:**

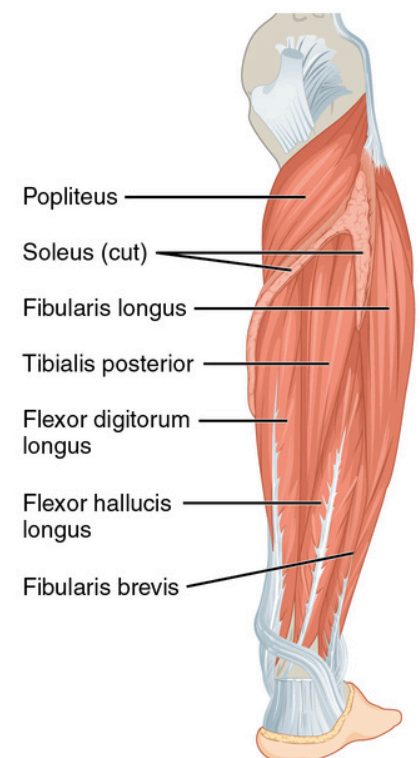
| Muscle Compartment | Function                  | Innervation          |
|--------------------|---------------------------|----------------------|
| Anterior           | Dorsiflexion, Toe         | Deep peroneal nerve  |
| Lateral            | Eversion                  | Superficial peroneal |
| Posterior          | Plantarflexion, eversion, | Tibial Nerve         |



Superficial muscles of the right lower leg (anterior view)



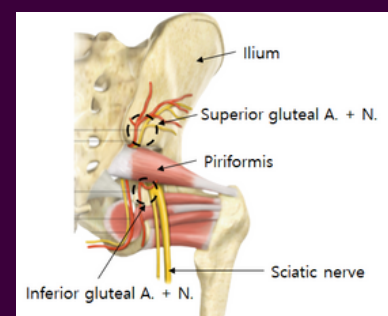
Superficial muscles of the right lower leg (posterior view)



Deep muscles of the right lower leg (posterior view)

## Gluteal Region

- Superficial and Deep group
- Gluteus maximus receives inferior gluteal neurovascular supply
- All the rest superior gluteal supply
- Sciatic nerve sits inferior to piriformis

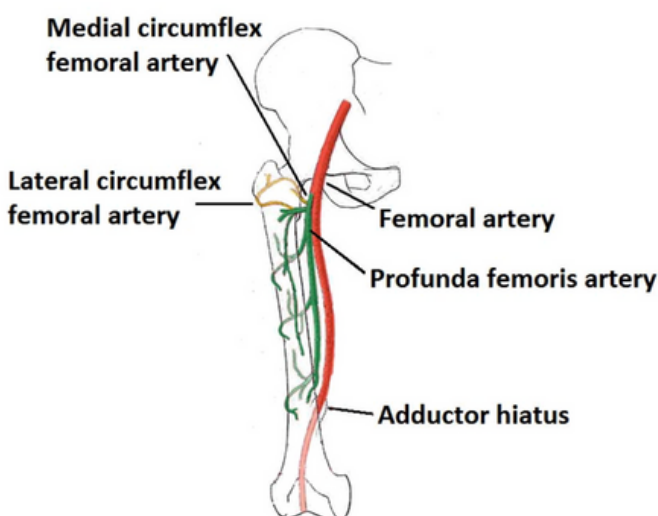


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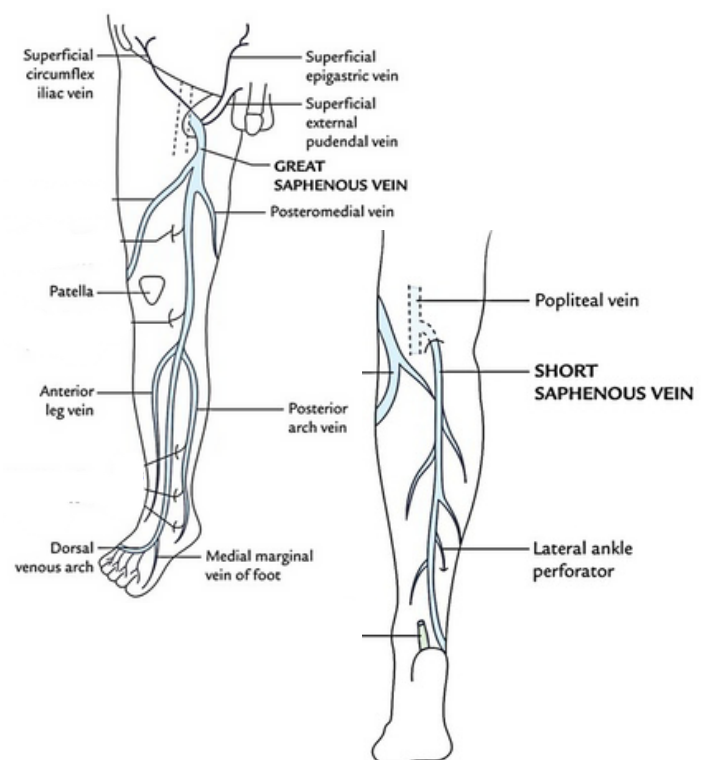
## Arterial supply

- **Supply to thigh & femur:**
  - External iliac artery → femoral artery (under inguinal ligament) → Profunda femoris → Medial + Lateral circumflex arteries
- **Supply to leg**
  - Femoral artery → passes through adductor hiatus → Popliteal artery → Anterior tibial artery + Tibioperoneal trunk → Peroneal artery + Posterior tibial artery → Medial + Lateral plantar artery



## Venous drainage

- Greater saphenous vein drains into femoral vein at **saphenofemoral junction**.
- **Lesser saphenous vein** drains into anterior and posterior tibial veins at popliteal fossa → popliteal vein at **saphenopopliteal junction** → femoral vein



## NERVE SUPPLY TO THE LOWER LIMB – SUMMARY

### THIGH

| Muscle compartment | Function                    | Innervation           |
|--------------------|-----------------------------|-----------------------|
| Anterior           | Hip flexion, knee extension | Femoral nerve L2-L4   |
| Medial             | Lower limb adduction        | Obturator nerve L2-L4 |
| Posterior          | Hip extension, knee flexion | Sciatic nerve L4-S3   |

### LEG

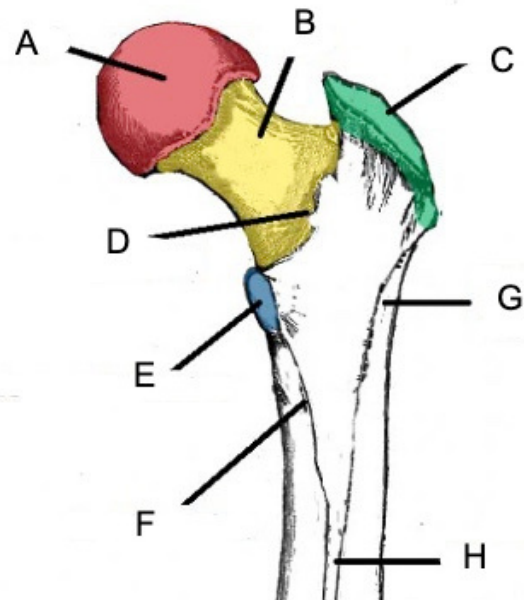
| Muscle compartment | Function                               | Innervation                      |
|--------------------|----------------------------------------|----------------------------------|
| Anterior           | Dorsiflexion, inversion, toe extension | Deep peroneal nerve L4-S1        |
| Lateral            | Eversion                               | Superficial peroneal nerve L4-S1 |
| Posterior (S+D)    | Plantarflexion, eversion, toe flexion  | Tibial nerve L4-S3               |

# LOWER LIMB ANATOMY

## *Test yourself*

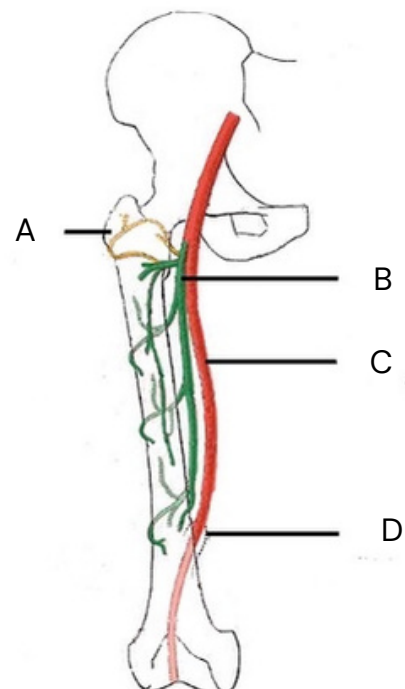
1) Label the structures of the femur:

- A)
- B)
- C)
- D)
- E)
- F)
- G)
- H)



2) Label the following arterial structures of the femur:

- A)
- B)
- C)
- D)



# LOWER LIMB ANATOMY

## Test yourself

### MCQ 1

**Which option most accurately describes the cause of footdrop?**

- A) Damage to superficial fibular nerve causing loss of plantarflexion
- B) Damage to common fibular nerve causing loss of dorsiflexion
- C) Damage to tibial nerve causing loss of dorsiflexion.
- D) Damage to deep fibular nerve causing loss of plantarflexion
- E) Damage to saphenous nerve causing loss of dorsiflexion

### MCQ 2

**A patient twists their ankle and develops swelling on the lateral side of the ankle. This type of ankle sprain most commonly injures which ligament?**

- A) Deltoid ligament
- B) Anterior talofibular ligament
- C) Tibionavicular ligament
- D) Posterior talofibular ligament
- E) Spring ligament

### MCQ 3

**What is the main function of the empty space in the femoral triangle?**

- A) Allow the femoral nerve to maintain mobility
- B) When intraabdominal pressure is high It has no significant function
- C) Allow herniation of abdominal contents
- D) Allow the femoral vein to distend when venous return is high
- E) Provide space for lymph nodes within the femoral canal

### MCQ 4

**An 82 year old female presents after a fall and is diagnosed with a displaced intracapsular fracture of the femoral neck. Which artery is most likely to be compromised?**

- A) Profunda femoris artery
- B) Medial femoral circumflex artery
- C) Artery to the ligament of the head of femur
- D) Inferior gluteal artery
- Lateral circumflex femoral artery
- E) Lateral circumflex femoral artery

### MCQ 5

**When considering the venous drainage of the lower limb, which vessel do the superior and inferior gluteal veins drain into?**

- A) Internal iliac
- B) External iliac
- C) Deep femoral
- D) Femoral
- E) Common femoral

### MCQ 6

**Which muscle of the quadriceps femoris crosses at both the hip joint and knee joint?**

- A) Iliopsoas
- B) Vastus lateralis
- C) Rectus femoris
- D) Vastus intermedius
- E) Vastus Medialis

# LOWER LIMB ANATOMY

## Test yourself

### OSCE Station – Case Based Discussion

*A 25-year-old man is brought to the emergency department after a motorcycle accident. He has an obvious deformity of his right leg and cannot weight bear. X-ray confirms a mid-shaft fracture of the tibia. He is afebrile and haemodynamically stable.*



- Q1. Why are tibial fractures more likely to present as open fractures?
- Q2. Which major arteries runs close to the tibia?
- Q3. Which nerve would you suspect to be damaged in a tibial fracture injury?
- Q4. How would you test this nerve to see if it has been damaged?
- Q5. What is the most serious early complication of a tibial shaft fracture?
- Q6. What is the main potential long-term complication associated with this injury?