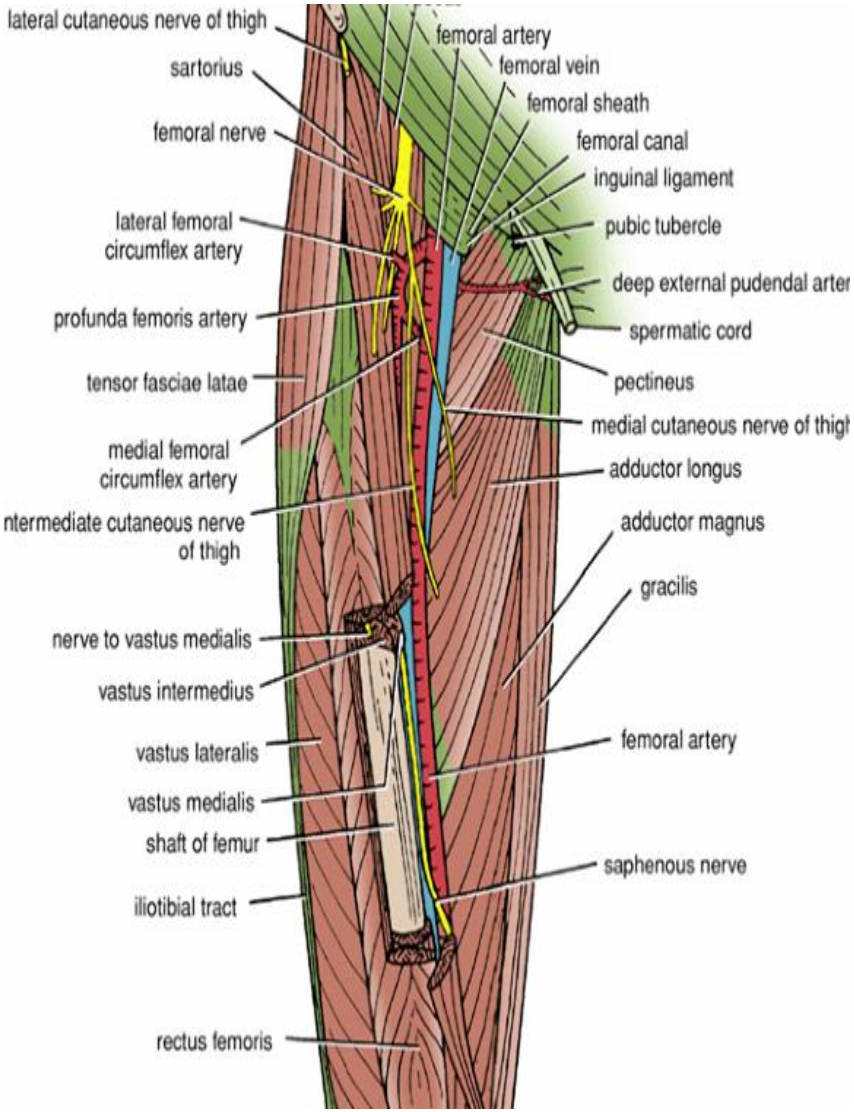
Where should you palpate the pulse of different arteries in the lower limb?

The femoral artery

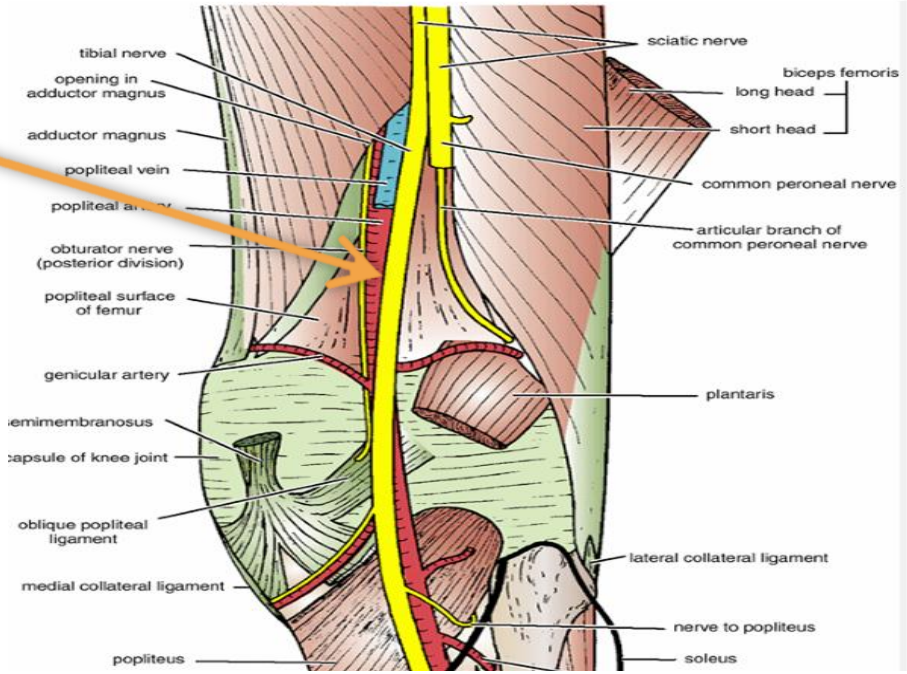
In the femoral triangle, its pulse is easily felt just inferior to the inguinal ligament midway between the pubic symphysis and the anterior superior iliac spine.



Femoral pulse

The popliteal artery

The popliteal artery pulse is difficult to find, but usually can be detected on deep palpation just medial to the midline of the popliteal fossa.

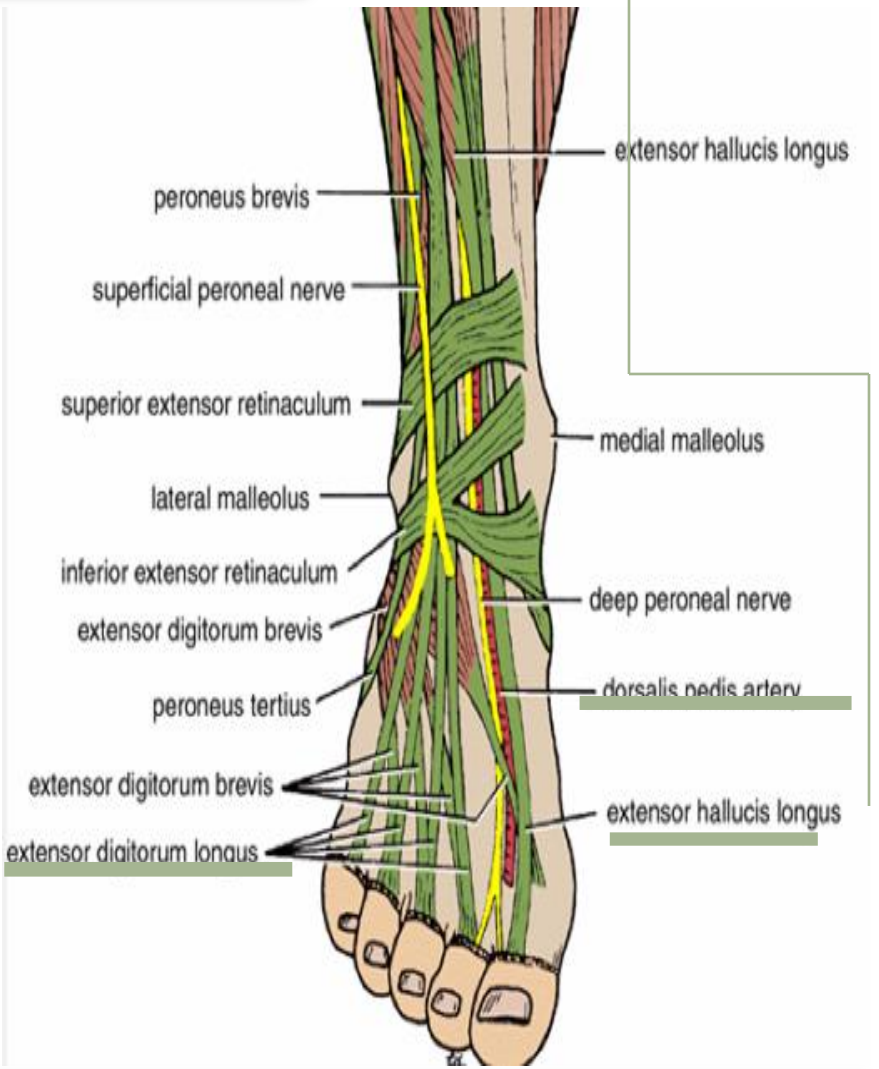


Popliteal pulse

The dorsalis pedis artery

Passes onto the dorsal aspect of the foot and anteriorly over the tarsal bones where it lies **between and is parallel** to the tendon of **extensor hallucis longus** and the tendon of **extensor digitorum longus** to the second toe.

Dorsalis pedis pulse

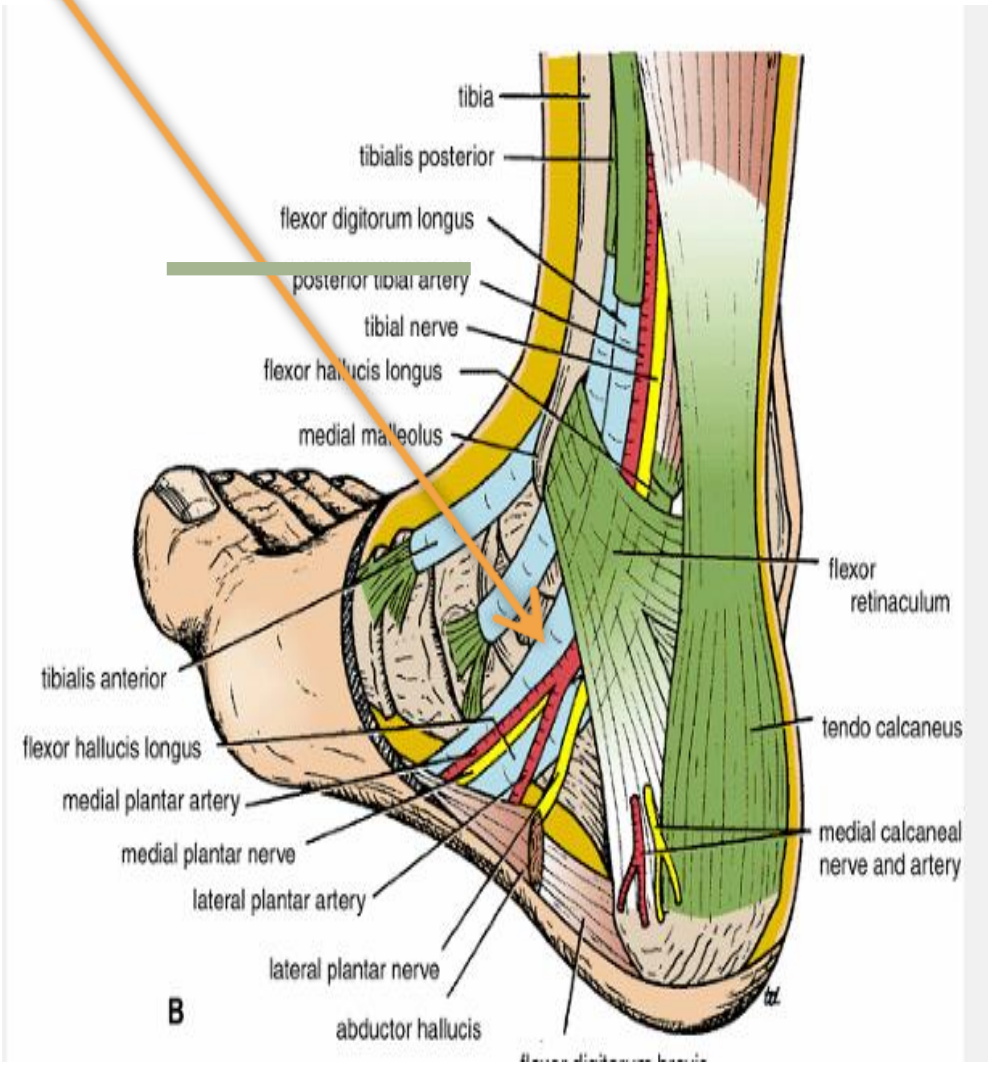


The artery may be absent in around 15% of people

The posterior tibial artery

Is palpable just posteroinferior to the **medial malleolus** between the heel and medial malleolus.

Posterior tibial pulse



NERVE INJURIES

OF

LOWER LIMBS

Femoral Nerve Injury

The femoral nerve can be injured in:

Stab or gunshot wounds

a complete damage of the nerve is rare.

Clinical manifestations:

If The nerve is completely injured

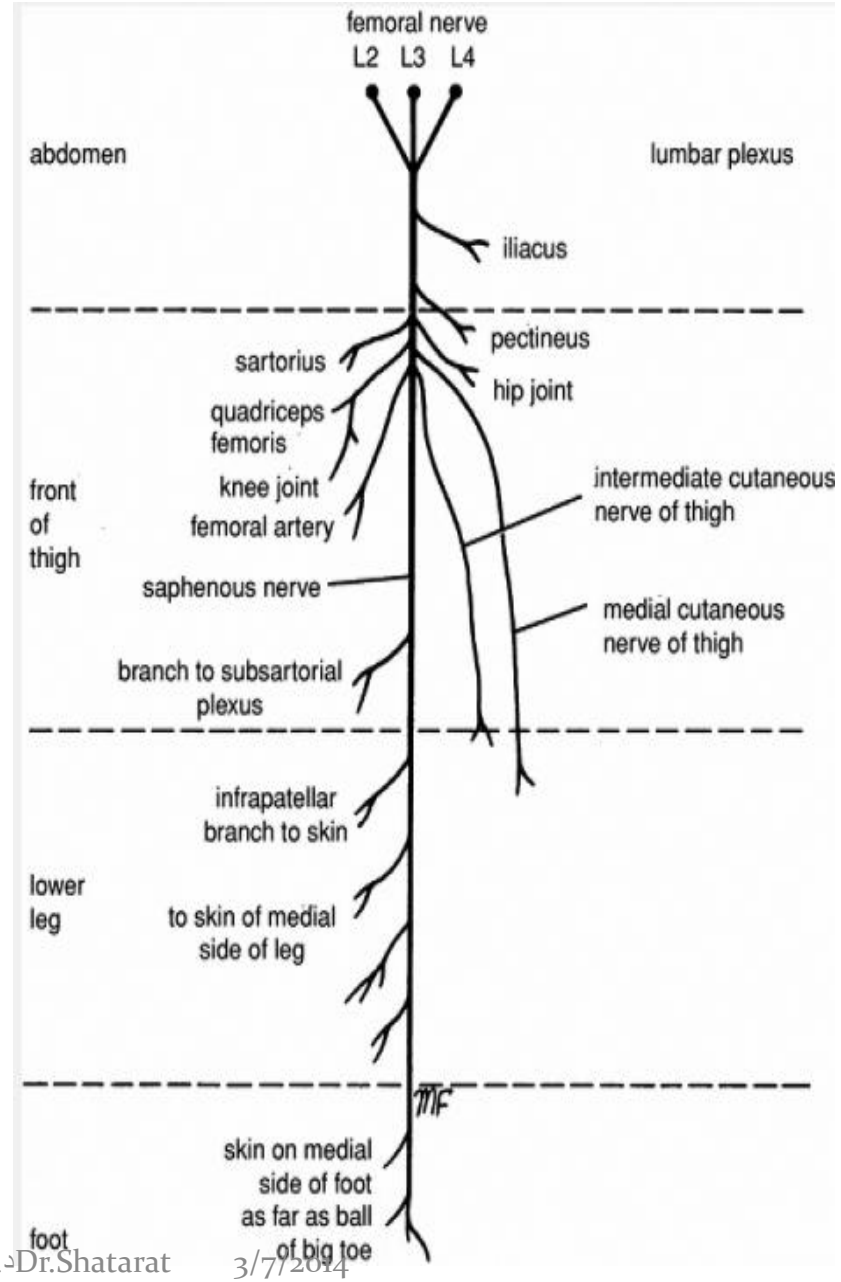
Motor: The *quadriceps femoris muscle is paralyzed*, and the *knee cannot be extended.*

Sensory: Skin sensation is lost over

1-The anterior and medial sides of the thigh,

2-Over the medial side of the lower part of the leg

3- The medial border of the foot as far as the ball of the big toe; this area is normally supplied by the saphenous nerve



Sciatic Nerve Injury

The nerve is sometimes injured by:

1- penetrating wounds

2-fractures of the pelvis

3-dislocations of the hip joint. (posterior)

4-badly placed intramuscular injections in the gluteal region. (common).

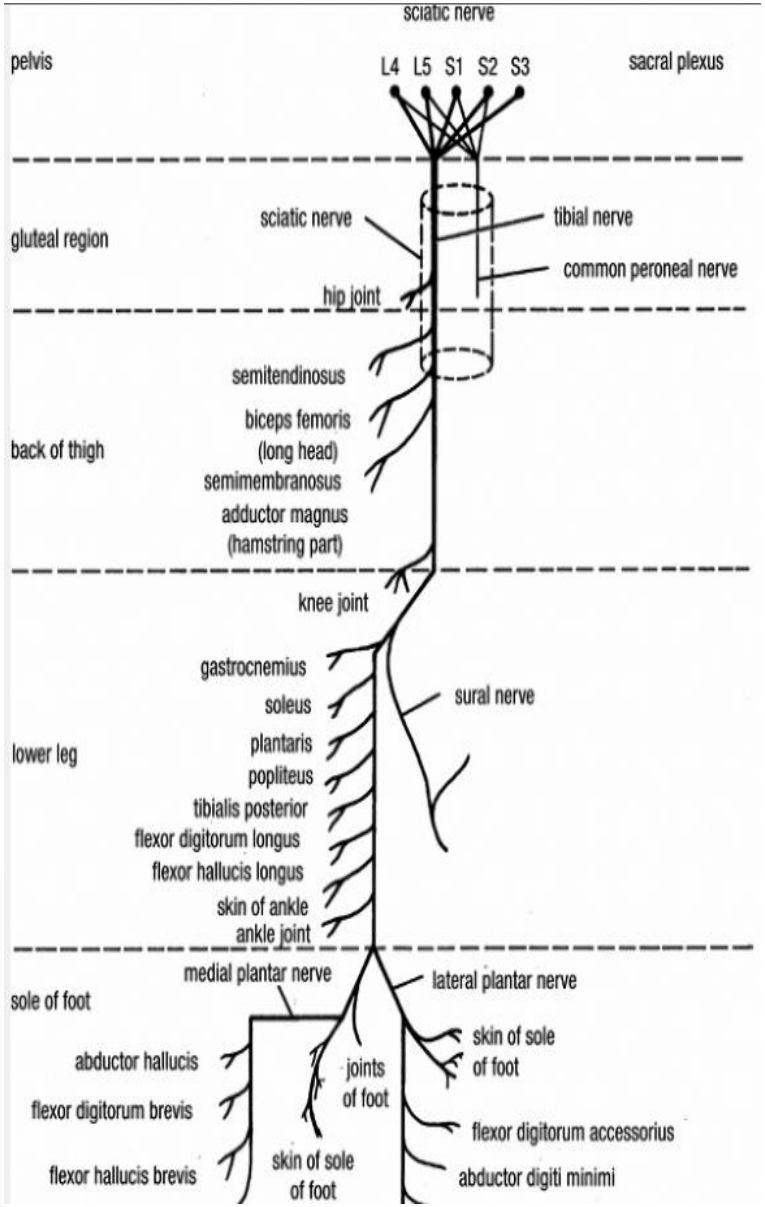
The following clinical features are present:

Motor: 1-The hamstring muscles are paralyzed, but weak flexion of the knee is possible because of the action **of the sartorius** (femoral nerve) and ***gracilis (obturator nerve)***

2-All the muscles below the knee are paralyzed, the foot assume the plantar-flexed position, or

Foot drop

Sensory: Sensation is lost below the knee, except for a narrow area down the medial side of the lower part ***of the leg and along the medial border of the foot as far as the ball of the big*** toewhich is supplied by the saphenous nerve (femoral nerve).



common peroneal nerve is in an exposed position as it leaves the popliteal fossa and winds around the neck of the fibula to enter the peroneus longus muscle

Injury to common peroneal nerve

Paralysis of extensor muscles (supplied by deep peroneal nerve) this means **loss of dorsiflexion of the foot**

Paralysis of peronei muscles (supplied by the superficial peroneal nerve) this means **loss of Eversion of the foot**

The antagonistic muscles (planter flexors and invertors) will take over
this leads to

Foot drop and inversion

Equino varus

Tibial Nerve Injury

Because of its deep and protected position, it is rarely injured.

Complete damage results in the following clinical features:

Motor: All the muscles in the back of the leg and the sole of the foot are paralyzed. The opposing muscles dorsiflex the foot at the ankle joint and evert the foot at the subtalar and transverse tarsal joints, an attitude referred to as

Calcaneovalgus

Sensory: Sensation is lost on the sole of the foot; later, trophic ulcers develop.

Read only

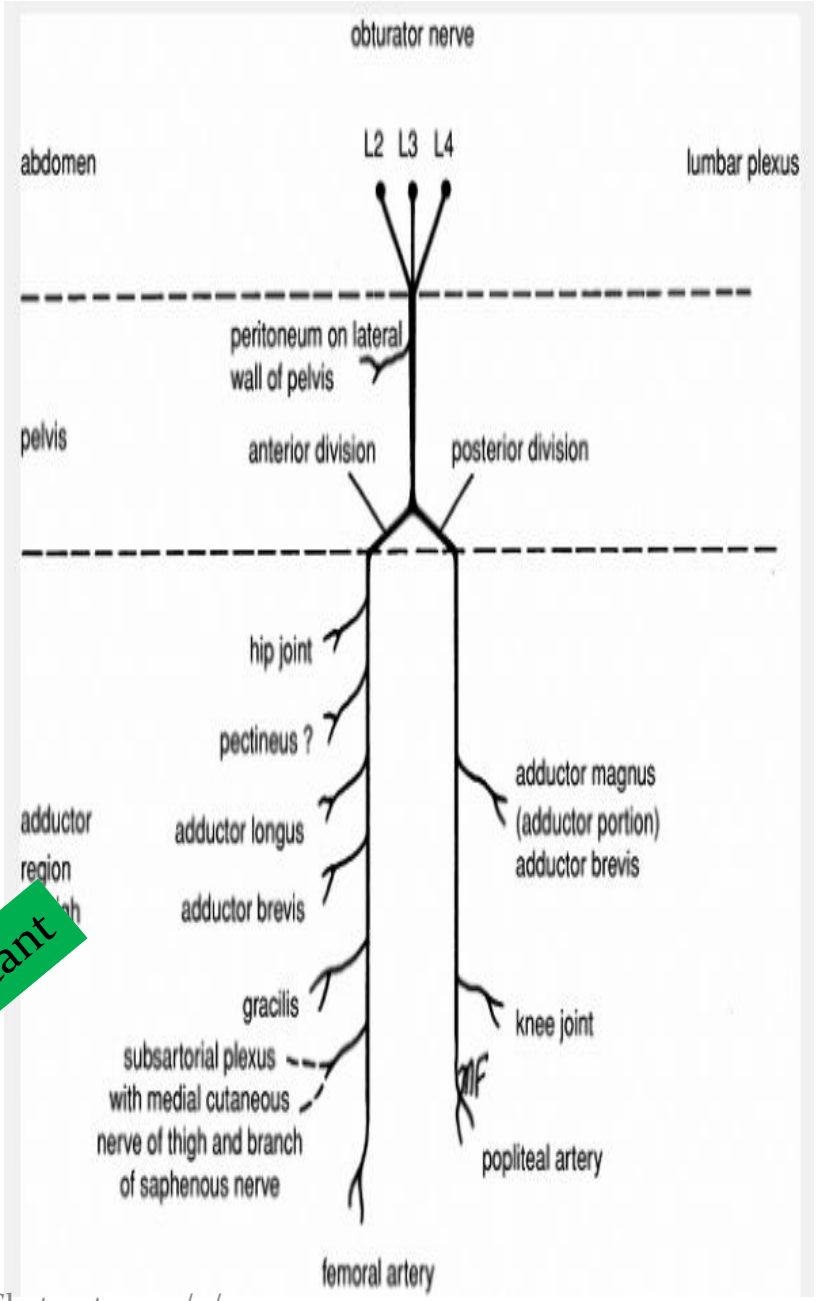
Obturator Nerve Injury

Read only

It is rarely injured in :
penetrating wounds,
in anterior dislocations of the hip joint,
or in abdominal herniae through the obturator foramen.
It may be pressed on by the fetal head during parturition.
The following clinical features occur:
Motor: *All the adductor muscles are paralyzed except the hamstring part of the adductor magnus, which is supplied by the sciatic nerve.*

Sensory: The cutaneous **sensory loss is minimal** on the medial aspect of the thigh.

important



Veins of the Lower Limb

The veins of the lower limb can be divided into three groups:

1-superficial, 2- deep , 3-perforating.

- The superficial veins consist of **the great and small saphenous veins,** which are situated beneath the skin in the superficial fascia.

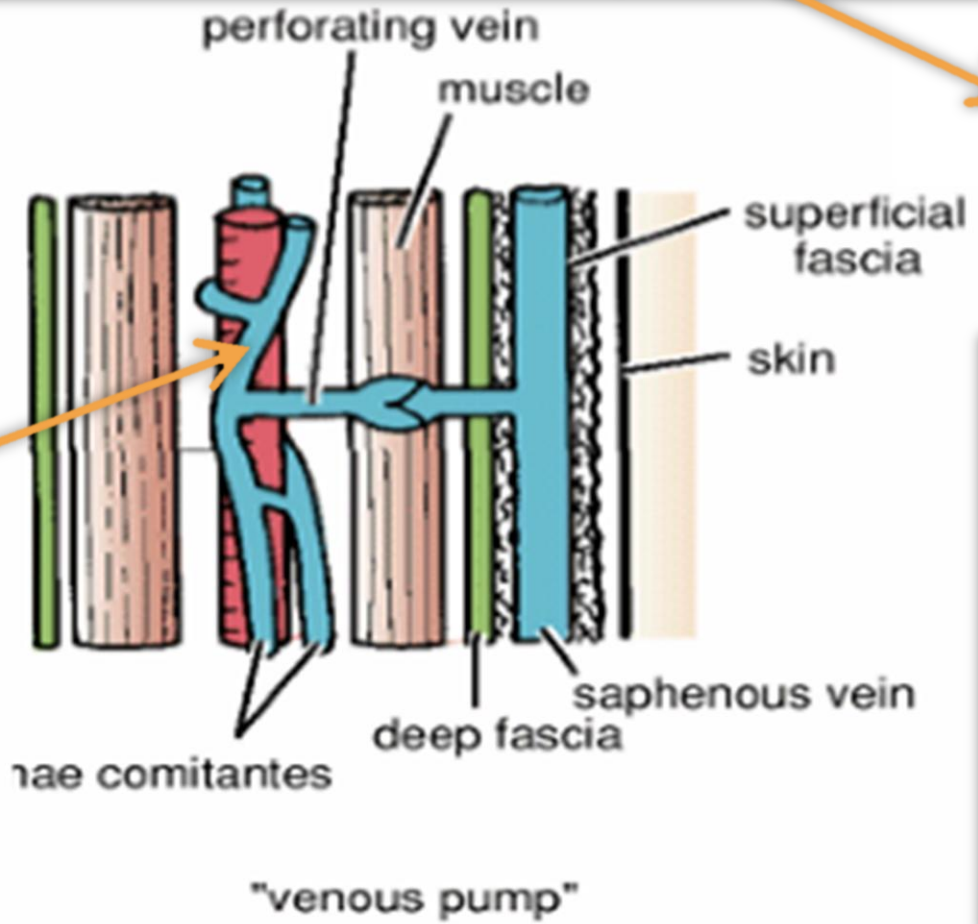
- The deep veins are the **venae comitantes to the anterior and posterior tibial arteries, the popliteal vein, and the femoral veins and their tributaries**.

- The perforating veins are communicating vessels that run **between the superficial and deep veins.** Many of these veins are found particularly in the region of the ankle and the medial side of the lower part of the leg. They ***possess valves that are arranged to prevent the flow of blood from the deep to the superficial veins.***

The valves in the perforating veins prevent the high-pressure venous blood from being forced outward into the low-pressure superficial veins.

High pressure

Low pressure



venae comitantes are subjected to intermittent pressure at rest and during exercise

The superficial saphenous veins lie within the superficial fascia and are not subject to compression forces

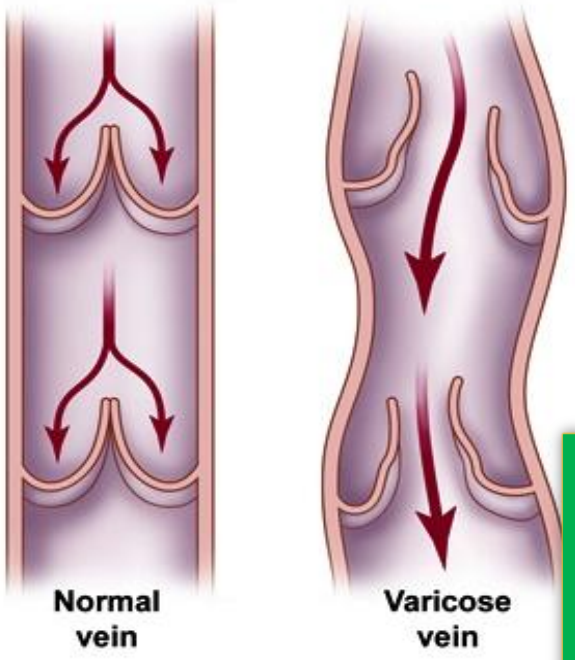
Varicose Veins

A varicosed vein is one that has a larger diameter than normal and is elongated and tortuous.

This condition commonly occurs in the superficial veins of the lower limb

CAUSES

hereditary weakness of the vein walls and incompetent valves; elevated intra-abdominal pressure as a result of multiple pregnancies or abdominal tumors;



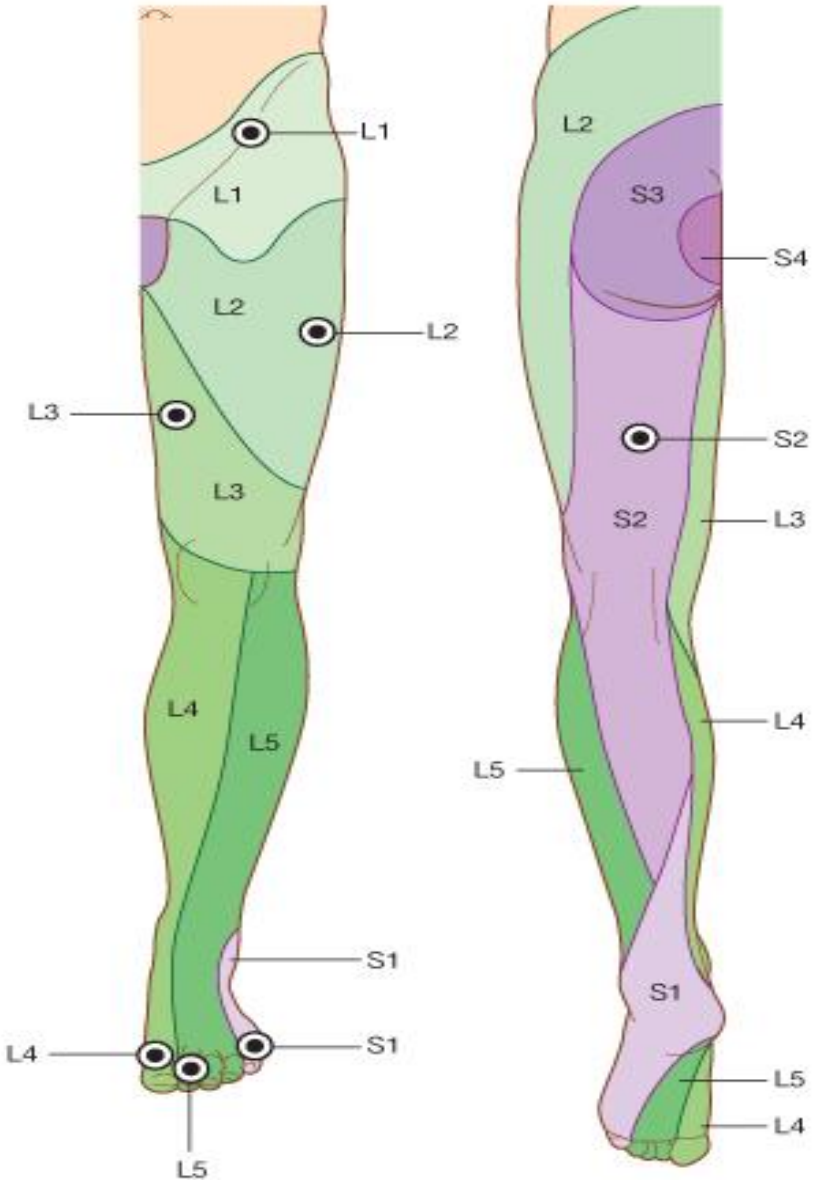
incompetence of a valve in a perforating vein.`

Dermatomes in the lower limb

Regions that can be tested for sensation and are reasonably autonomous (have minimal overlap) are:

over

1-The inguinal ligament-L1
2-Lateral side of the thigh-L2;
3-Lower medial side of the thigh-L3
4-Meidal side of the great toe (digit 1)-L4
5-Meidal side of digit 2-L5
6-Little toe (digit 5)-S1
7-Back of the thigh-S2
8-Skin over the gluteal fold-S3



Segmental Innervation to Muscles of Lower Limb

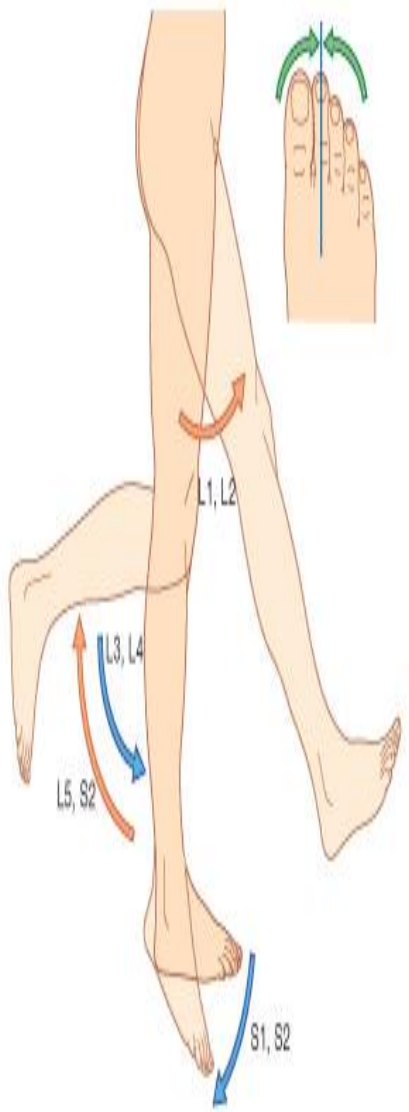
The **segmental innervation** to the muscles of the lower limb has a **proximal–distal gradient**, i.e., the more proximal muscles are innervated by the higher segments and the more distal muscles are innervated by the lower segments.

- The muscles that cross the **anterior side of the hip** are innervated by **L2 and L3.**
- The muscles that cross the **anterior side of the knee** are innervated by **L3 and L4.**
- The muscles that cross the **anterior side of the ankle** are innervated by **L4 and L5.**
- The muscles that cross the **posterior side of the hip** are innervated by **L4 and L5** (dorsi flexion).
- The muscles that cross the **posterior side of the knee** are innervated by **L5 and S1.**
- The muscles that cross the **posterior side of the ankle** are innervated by **S1 and S2** (plantar flexion).

In an unconscious patient, both somatic sensory and somatic motor functions of spinal cord levels can be tested using tendon reflexes:

1- a 'tap' on the patellar ligament at the knee ***tests Patellar tendon reflex (knee jerk)*** **<u>L3, and 4</u>** (extension of the knee joint on tapping the patellar tendon)

2-Achilles tendon reflex (ankle jerk) **<u>S1 and S2</u>** (plantar flexion of the ankle joint on tapping the Achilles tendon)



In fractures of the upper third of the shaft of the femur

The proximal fragment is

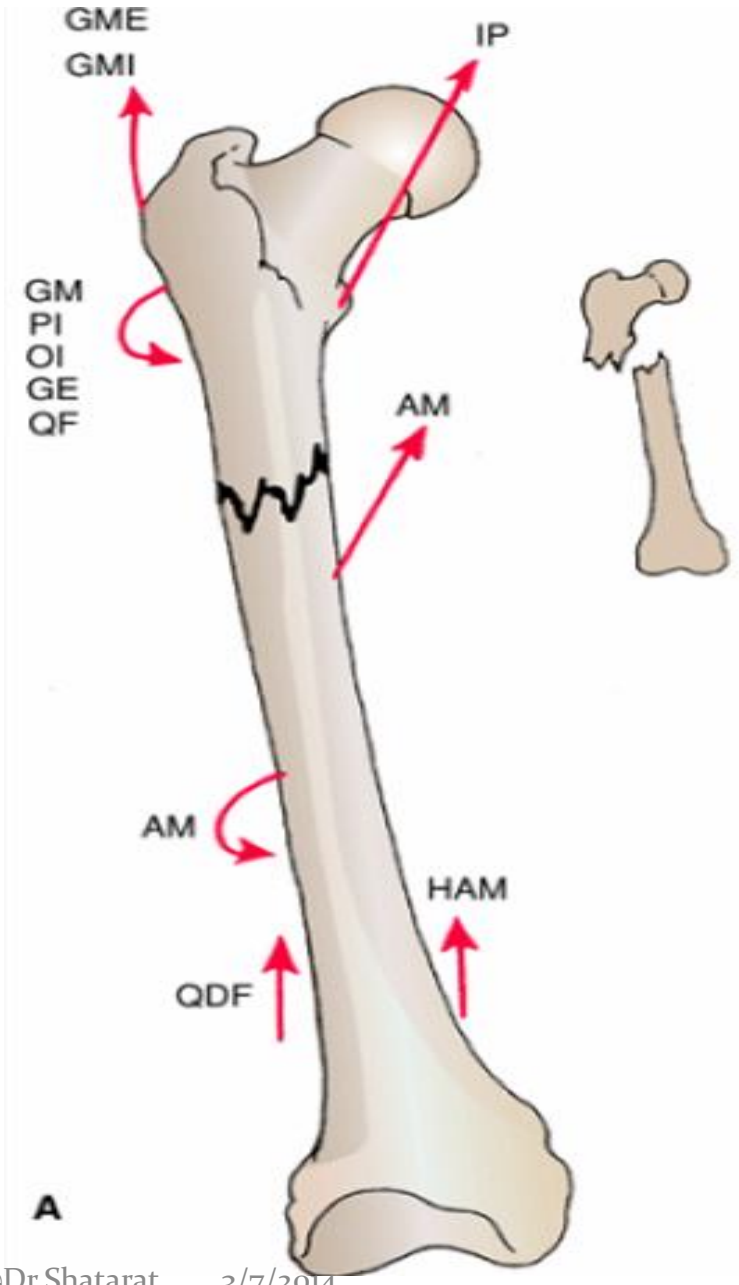
flexed by the ***iliopsoas***

abducted by the ***gluteus medius and minimus***

laterally rotated by ***the gluteus maximus,*** the ***piriformis, the obturator internus, the gemelli, and the quadratus femoris***

The lower fragment *is adducted by the adductor muscles,*

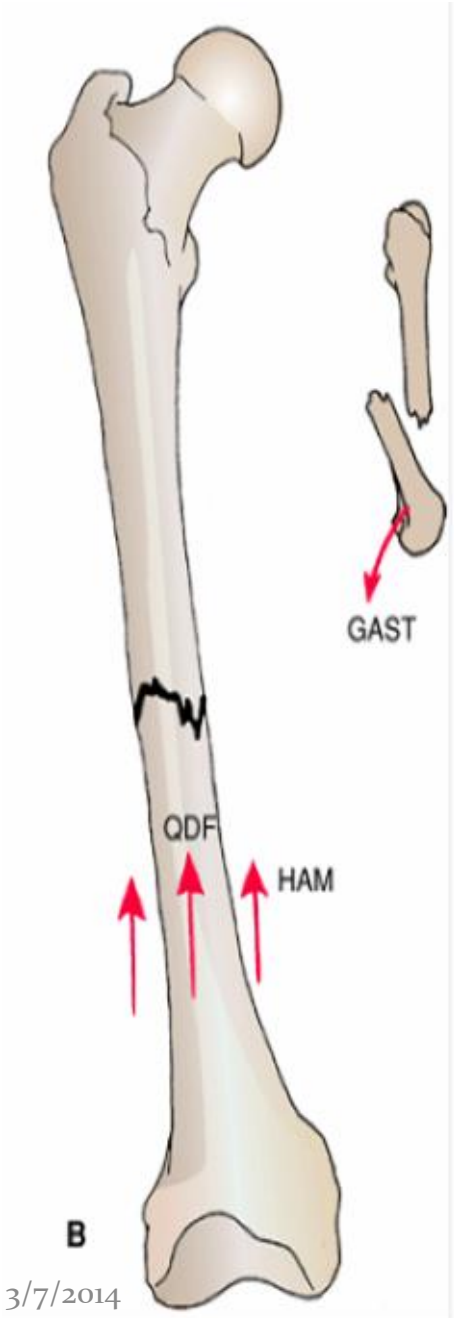
pulled upward by the hamstrings and quadriceps, and laterally rotated by the adductors and the weight of the foot



In fractures of the middle third of the shaft of the femurgastrocnemius

The distal fragment is pulled upward by the hamstrings and the quadriceps resulting in considerable shortening.
The distal fragment is also rotated backward by the pull of the two heads of the

GASTROCNEMIUS



In fractures of the distal third of the shaft of the femur, the same displacement of the distal fragment occurs as seen in fractures of the middle third of the shaft..

However, the distal fragment is smaller and is rotated backward by the gastrocnemius muscle to a greater degree and may exert pressure on the **popliteal artery** and interfere with the blood flow through the leg and foot

Fibular collateral ligament extends from the lateral condyle of the femur inferiorly to attach to the head of the fibula and is not attached to the lateral meniscus. The fibular ligament prevents **medial displacement** (adduction) of the tibia under the femur.

Tibial (medial) and fibular (lateral) collateral ligaments

Tibial collateral ligament extends from the medial epicondyle of the femur inferiorly to attach to the medial aspect of the tibia. It is firmly attached to the capsule and medial meniscus. The tibial ligament prevents **lateral displacement** (abduction) of the tibia under the femur.

Clinical Correlate

The tests for the integrity of the anterior and posterior cruciate ligaments are the **anterior and posterior drawer signs.** Tearing of the anterior cruciate ligaments allows the tibia to be easily pulled **forward** (anterior drawer sign). Tearing of the posterior cruciate ligament allows the tibial to be easily pulled **posteriorly** (posterior drawer sign).

Common Knee Injuries

The 3 **most commonly injured structures at the knee** are the tibial collateral ligament, the medial meniscus, and the ACL (**the terrible or unhappy triad**)—usually results from a blow to the lateral aspect of the knee with the foot on the ground.