University of Baghdad
College of Medicine
2023-2024

Title: Anterior & Lateral compartment of the leg

Grade: One

Module: HSF-I

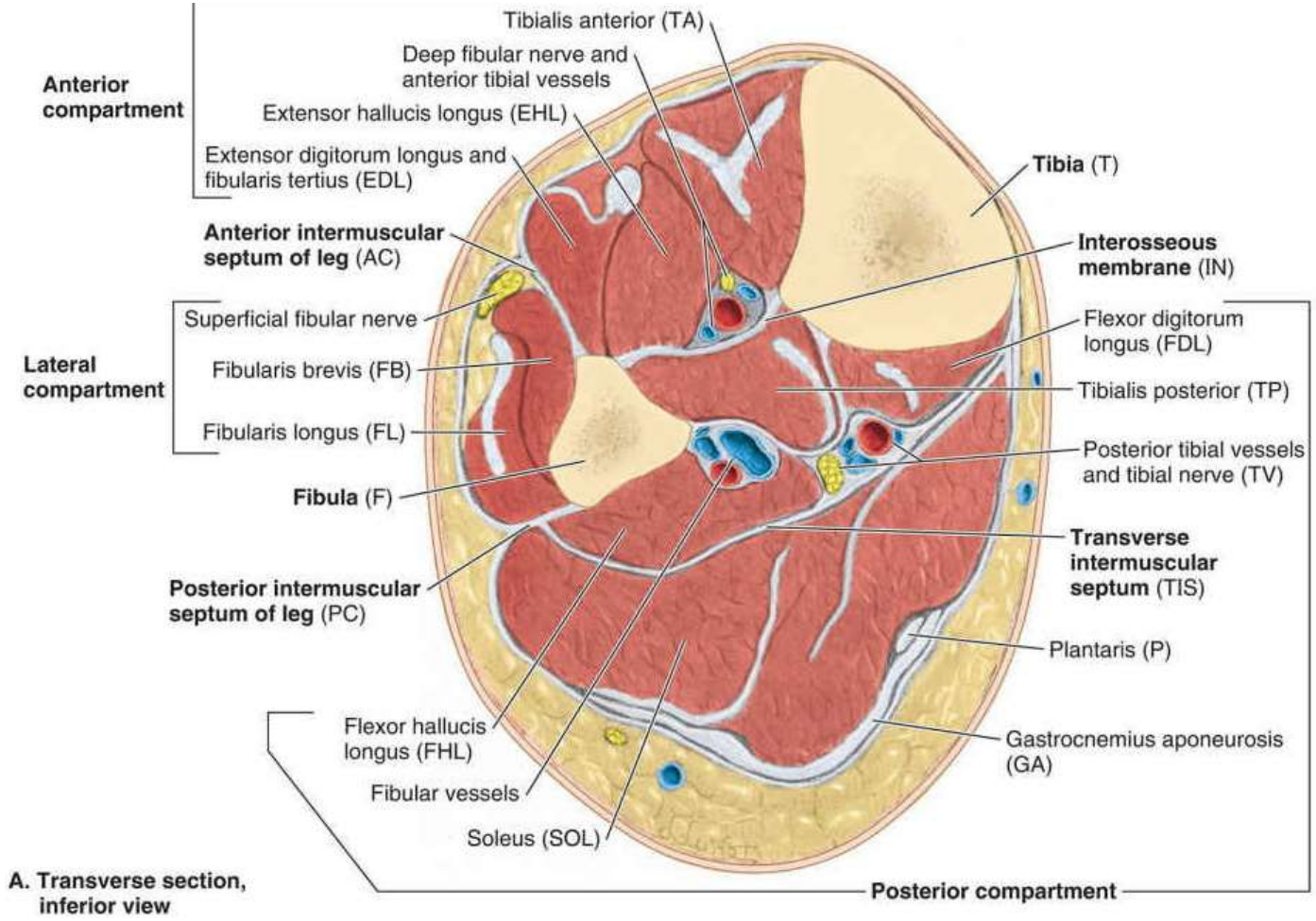
Speaker: Prof. Dr. Malak A. Taha

Date: 5-6/3/2024

Objectives

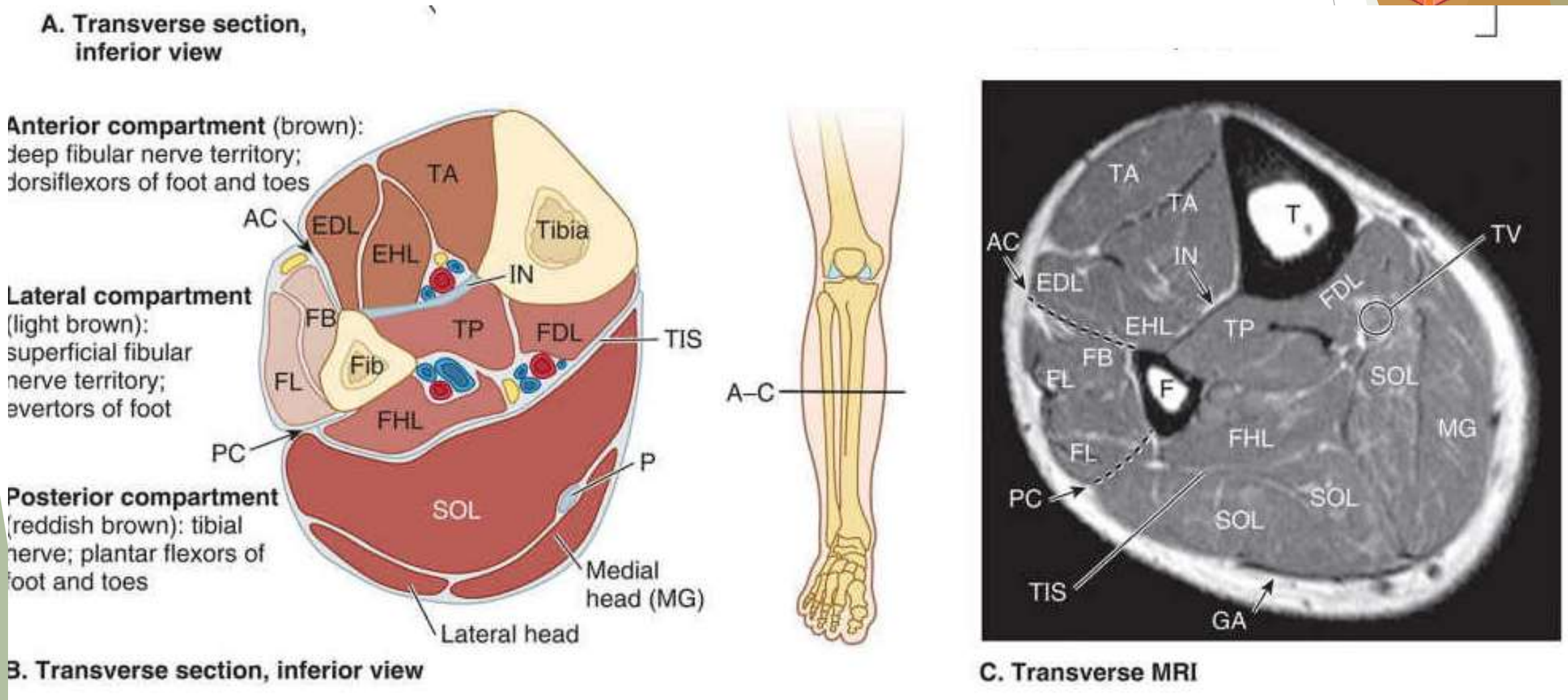
- **Describe** the extensor & peroneal muscles
- **Define** the anterior tibial vessels
- **Explore** the superficial & deep peroneal nerves & main pathologies affecting them
- **Describe** the dorsum of the foot
- **State** some clinical correlates

Anterior compartment of the leg "Extensor compartment"



- ✓ is located anterior to the **interosseous membrane**, between the lateral surface of the **tibia** and the medial surface of **fibula** and anterior intermuscular septum

Anterior compartment of the leg

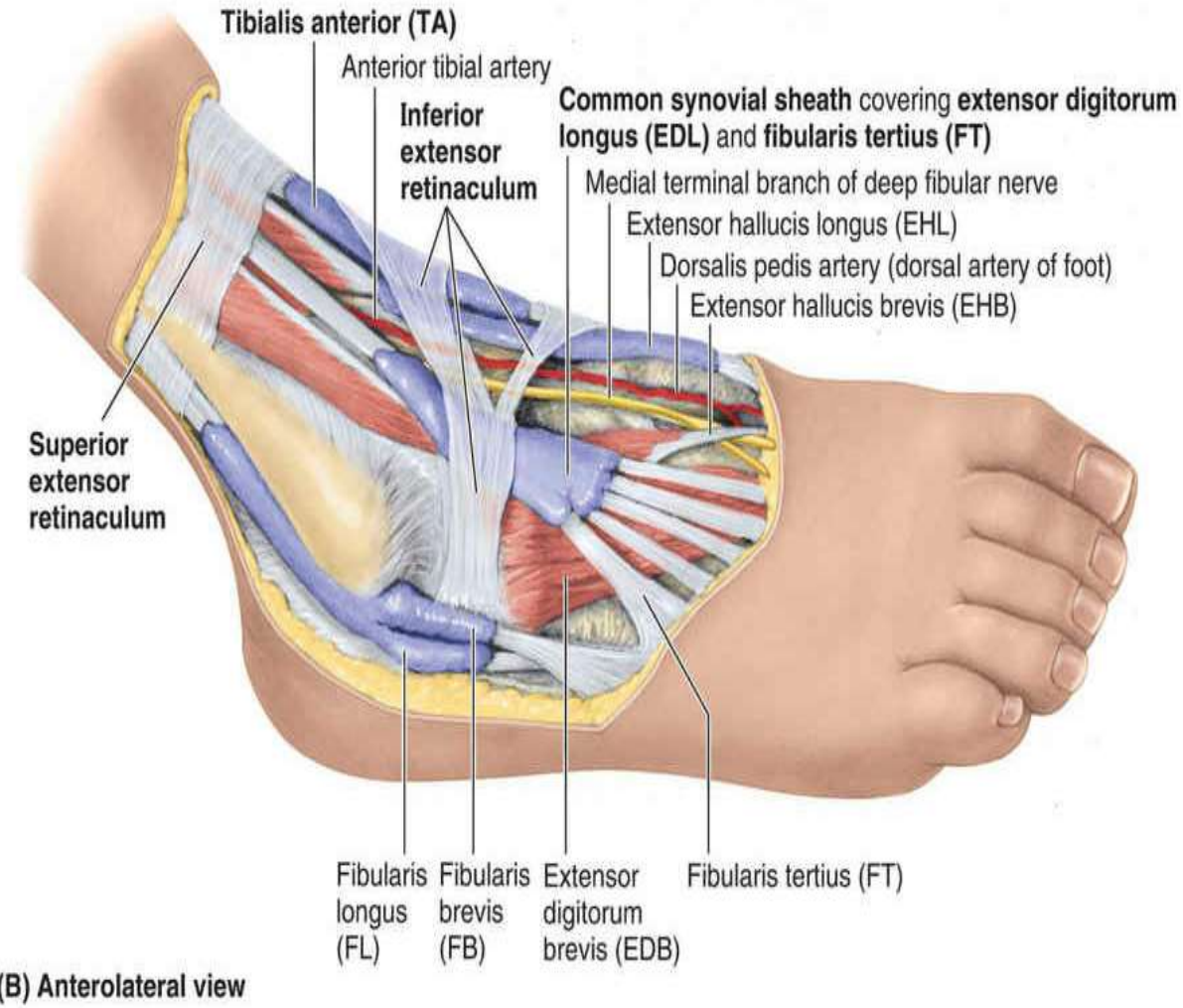


Retinacula

- Two **band-like thickenings of the fascia** form Inferiorly that bind the tendons of the anterior compartment preventing them from bow stringing anteriorly during dorsiflexion of the **Ankle joint**

Superior extensor retinaculum

- is a strong, broad band of deep fascia, which is attached to the **anterior borders** of the tibia and fibula, **proximal** to the **malleoli.**

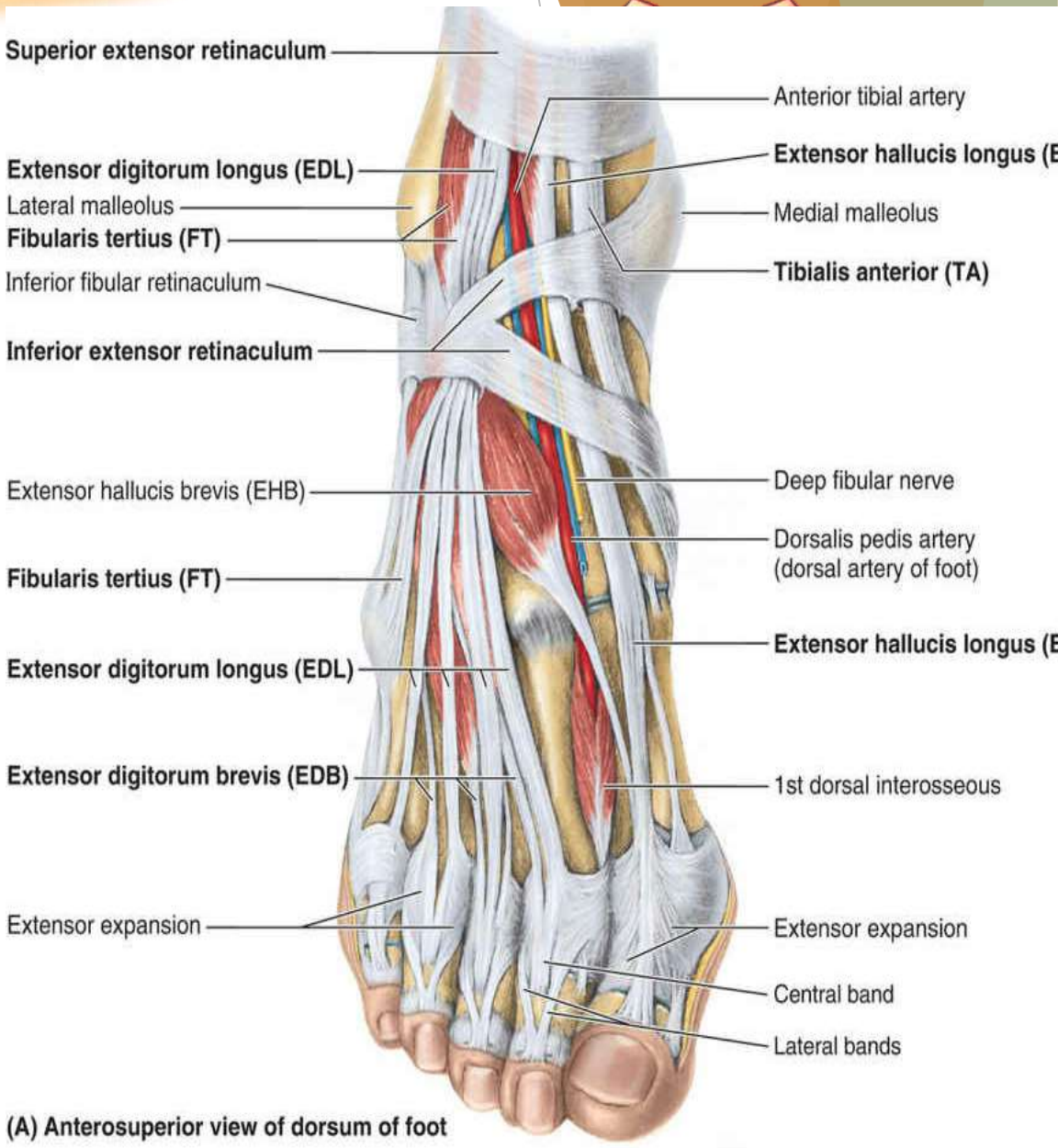


(B) Anterolateral view

Retinacula

Inferior extensor retinaculum

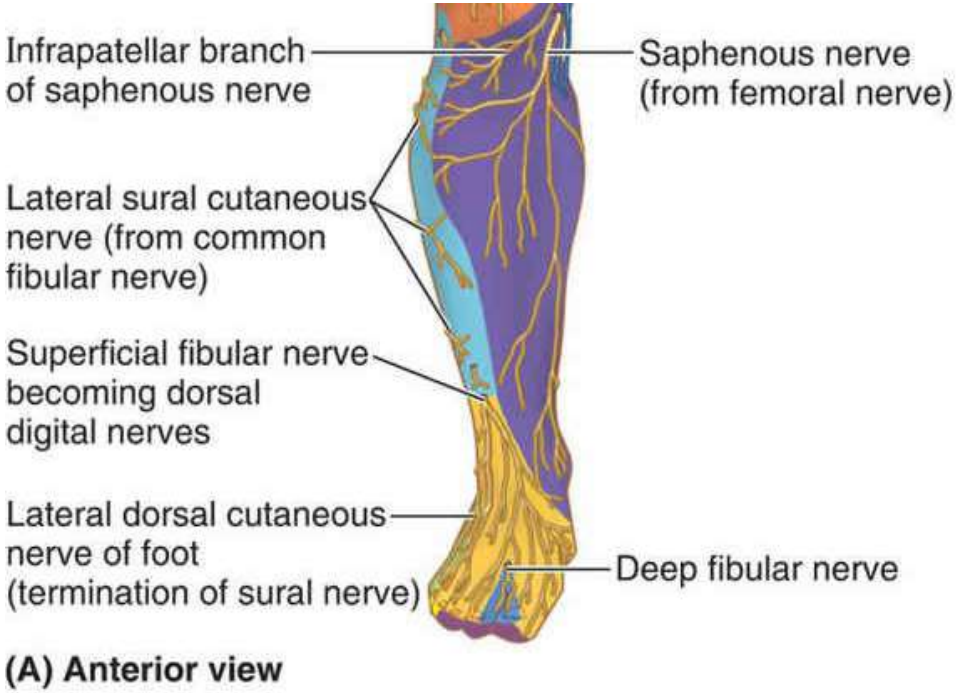
- a **Y-shaped band** of deep fascia,
- arises by a **stem** from the anterosuperior surface of the **calcaneus** on the lateral border of the dorsum of the foot . It forms a strong loop around the tendons of the fibularis tertius and the extensor digitorum longus muscles.
- From the stem **two limbs** diverge. The **upper limb** is attached to the **medial malleolus**, the **lower limb** arches across the tendons on the dorsum and blends with the **plantar aponeurosis**

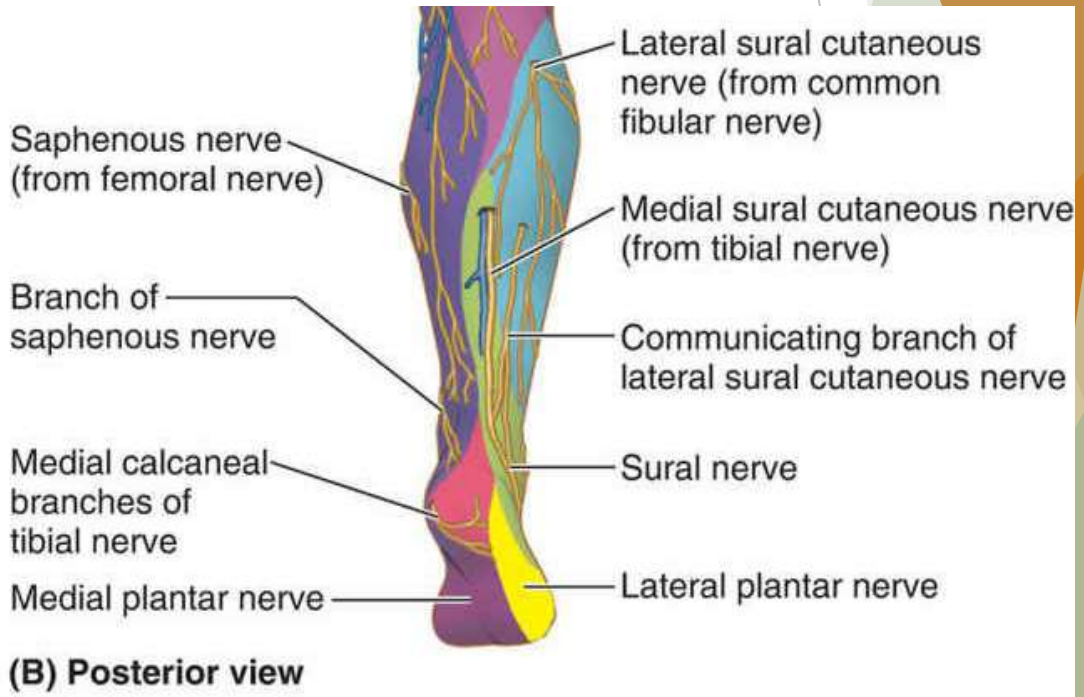


(A) Anterosuperior view of dorsum of foot

Cutaneous innervation

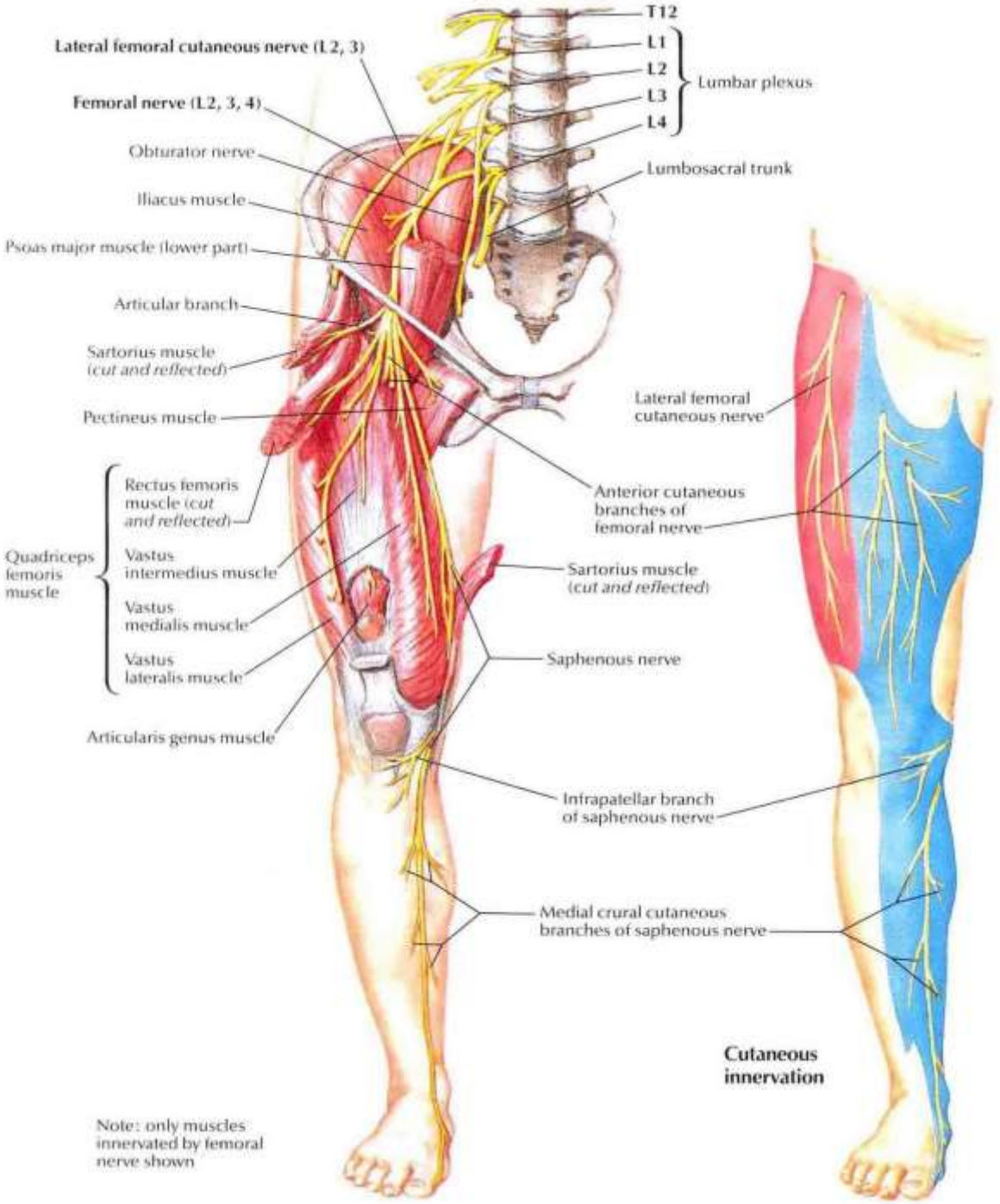
- Saphenous nerve
- Lateral sural cutaneous nerve
- Superficial peroneal nerve





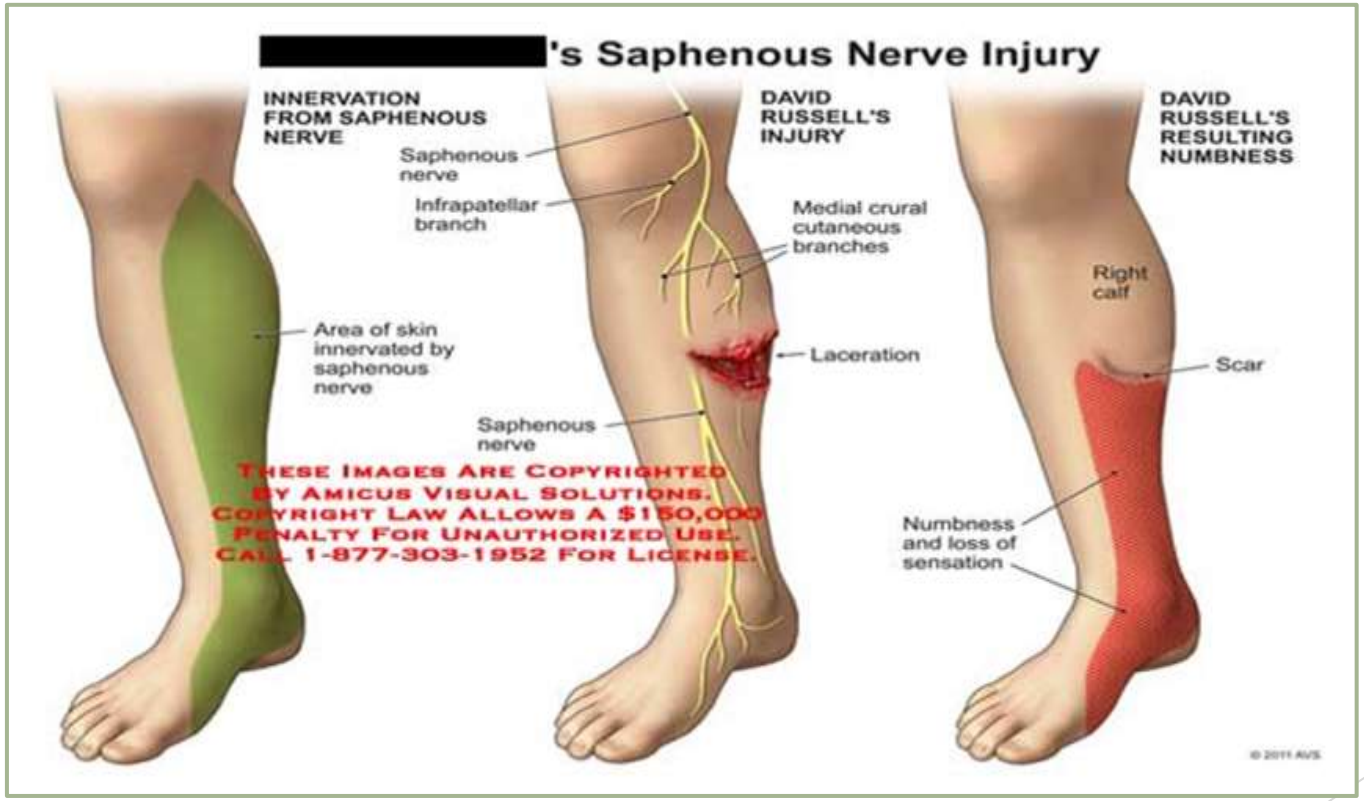
Saphenous nerve

- Traverses adductor canal but does not pass through adductor hiatus;
- Enters between the tendons of the sartorius and gracilis & becomes subcutaneous
- Passes along the tibial side of the leg, accompanied by the great saphenous vein
- Supplies skin on medial side of leg and foot as far as the ball of great toe



Saphenous nerve could be injured in

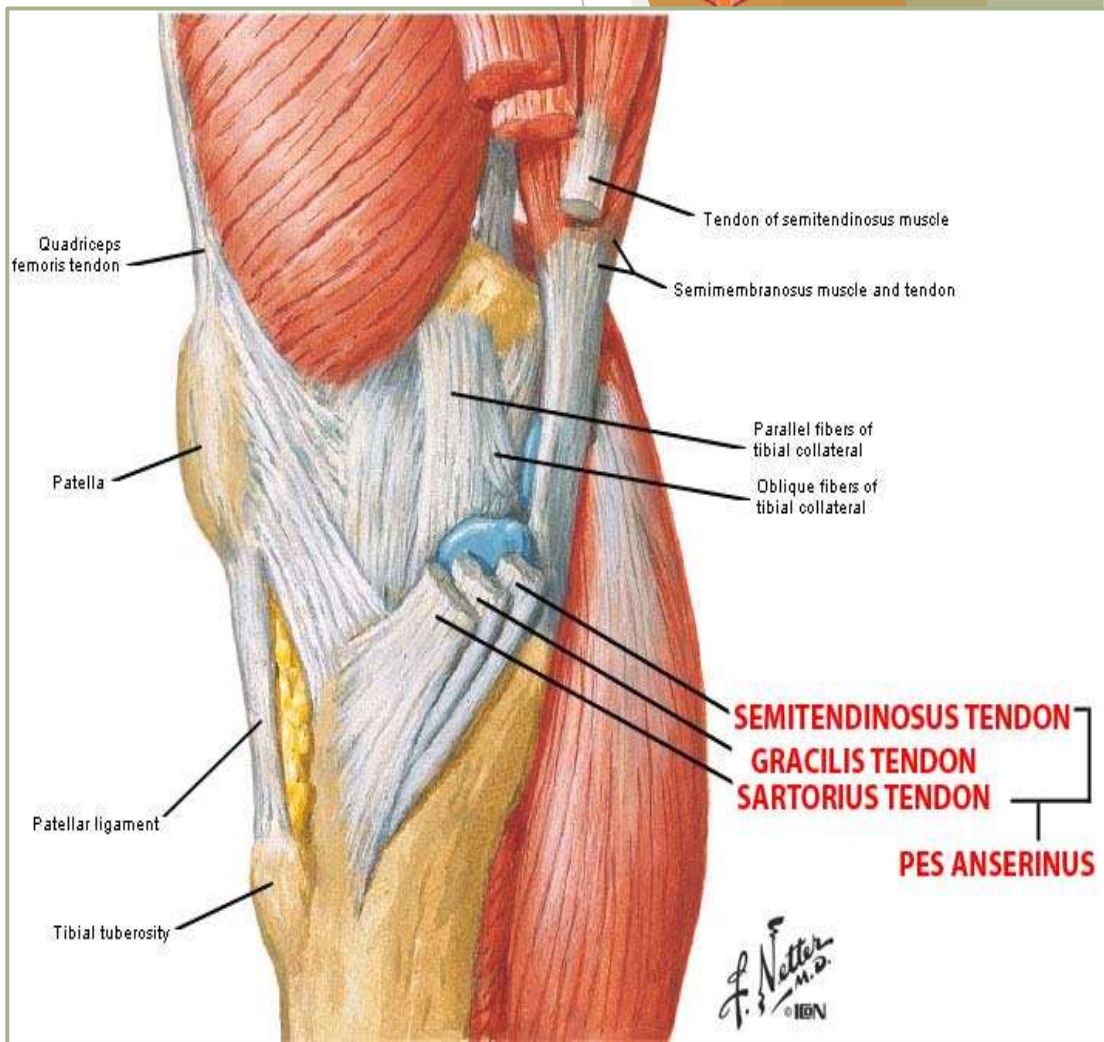
- ✓ **venous cut down**
- ✓ Knee **arthroscopy operations**



Shin

- The subcutaneous surface of the tibia forms the **anteromedial aspect of the leg**
- Apart from partial course of the **saphenous nerve and vein** , the only important structure here is the **pes anserinus**

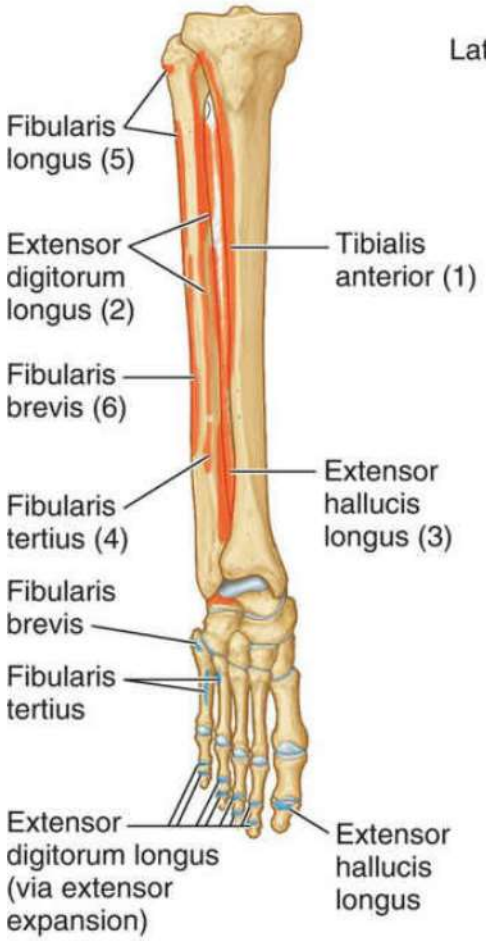
- **Pes anserinus** is the successive insertions sartorius, gracilis & semitendinosus on the superomedial part of the tibia
- A bursa separates these tendons called **bursa anserina**



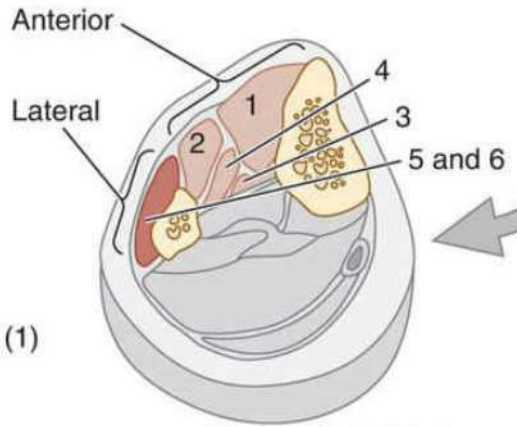
Anserine Bursitis

Leg edema

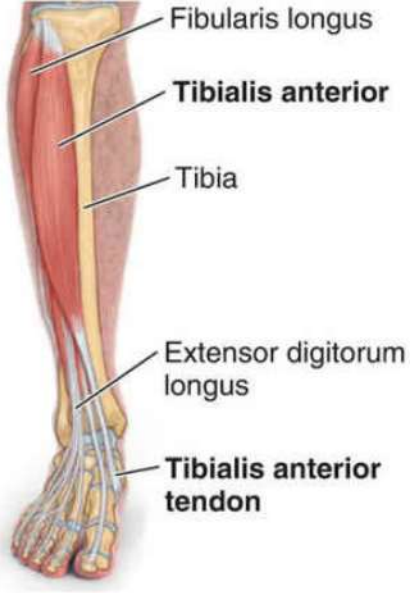
- Local diseases
- Generalized diseases



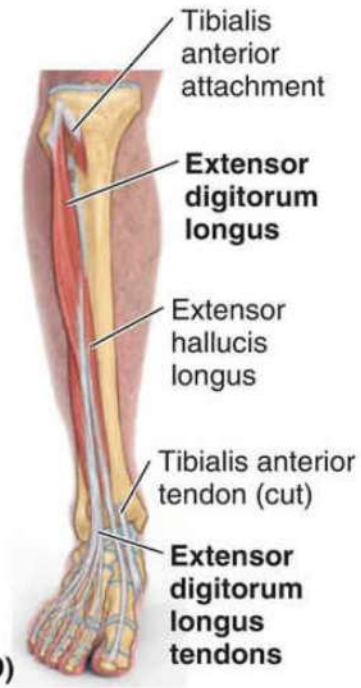
(A) Anterior muscle attachments



(B) Anterior and lateral compartments



(C)



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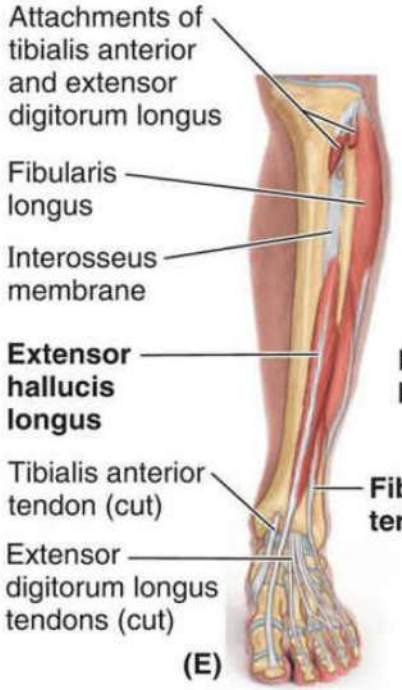
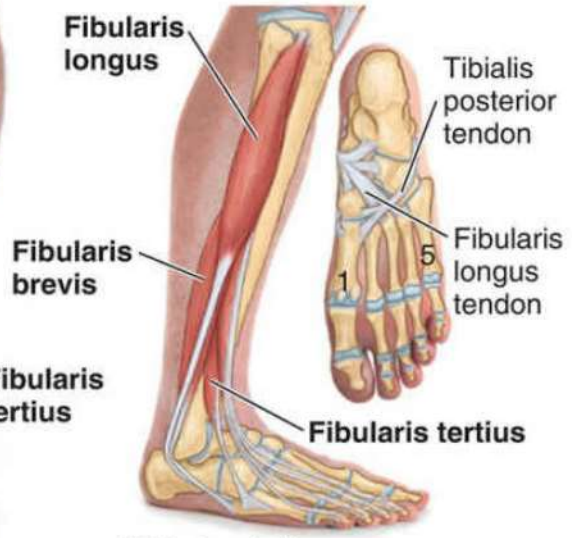


(E)



(F) Lateral view

(A–E) Anterior views

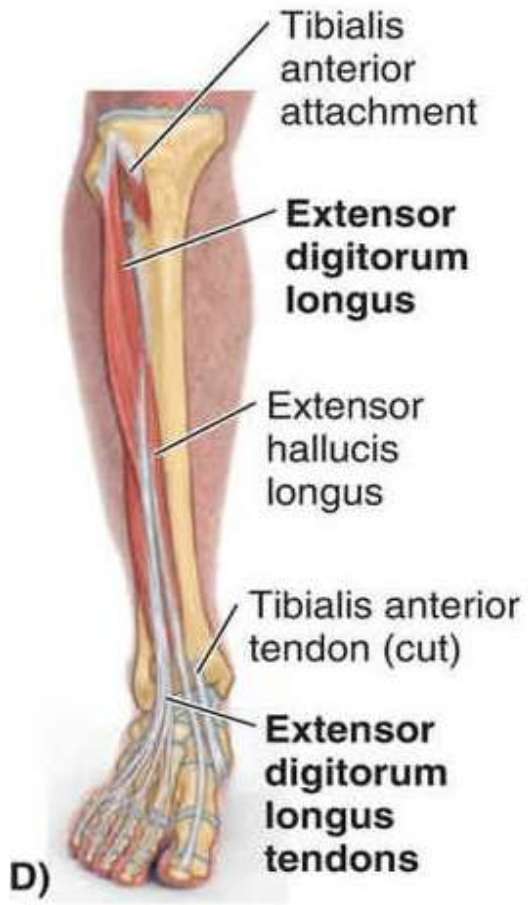
Muscles of anterior and lateral compartments of leg

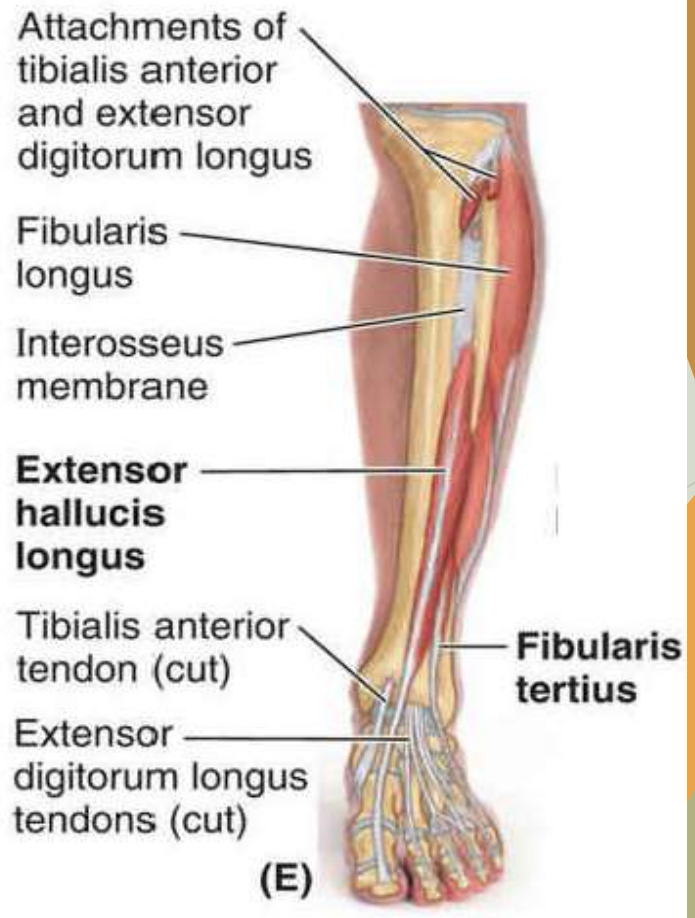
Muscles of anterior compartment of leg

- ✓ Tibialis anterior.
- ✓ Extensor digitorum longus.
- ✓ Extensor hallucis longus.
- ✓ Fibularis tertius.

❑ These muscles are mainly

- ✓ **dorsiflexors** of the ankle joint
- ✓ **extensors** of the toe





Muscle	Origin	Insertion	N Supply	Action
Tibialis anterior	Lateral condyle and superior half of lateral surface of tibia and interosseous membrane	Medial and inferior surfaces of medial cuneiform and base of 1st metatarsal	Deep fibular nerve (L4, L5)	▪ Dorsiflexes ankle ▪ inverts foot
Extensor digitorum longus	Lateral condyle of tibia and superior three quarters of medial surface of fibula and interosseous membrane	Middle and distal phalanges of lateral four digits		▪ Extends lateral four digits ▪ dorsiflexes ankle
Extensor hallucis longus	Middle two quarters of the medial surface of fibula and interosseous membrane	Dorsal aspect of base of distal phalanx of great toe		▪ Extends great toe ▪ dorsiflexes ankle
Fibularis tertius	Inferior third of medial surface of fibula and interosseous membrane	Dorsum of base of 5th metatarsal		▪ Dorsiflexes ankle ▪ aids in eversion of foot

EHL

- ✓ the great toe is dorsiflexed against resistance;
- ✓ if acting normally, its entire tendon can be seen and palpated.

Testing

TA

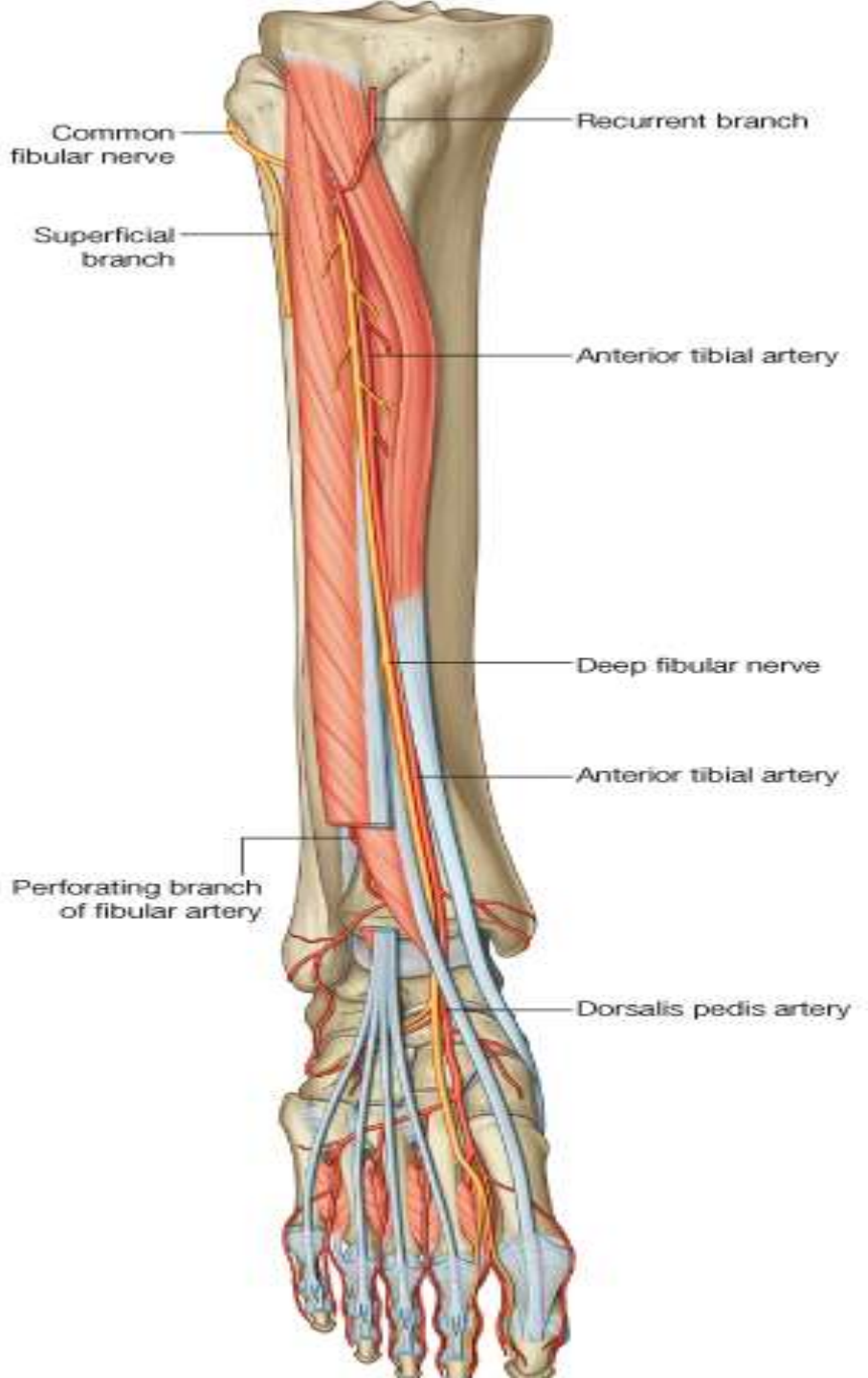
- ✓ the person is asked to stand on the heels or dorsiflex the foot against resistance
- ✓ If normal, its tendon can be seen and palpated

EDL

- ✓ the lateral four toes are dorsiflexed against resistance;
- ✓ if acting normally, the tendons can be seen and palpated

Anterior Tibial Artery

- ❑ The smaller terminal branch of the popliteal artery,
- ❑ begins at the **inferior border of the popliteus muscle**
- ❑ passes forward through the origin of **tibialis posterior** & **over the interosseous membrane** to reaches the **anterior compartment** between TA & EDL
- ❑ When EHL arises, the anterior tibial artery will lie between it & TA
- ❑ **Just above the ankle**, **EHL** crosses medially, here the artery will lie between the tendons of the 2 long extensors
- ✓ Along its course it is accompanied by **2 veins,** & the **deep peroneal nerve** on its lateral side
- ✓ At the ankle joint, midway between the malleoli, the **anterior tibial artery** changes names, becoming the **dorsalis pedis artery**

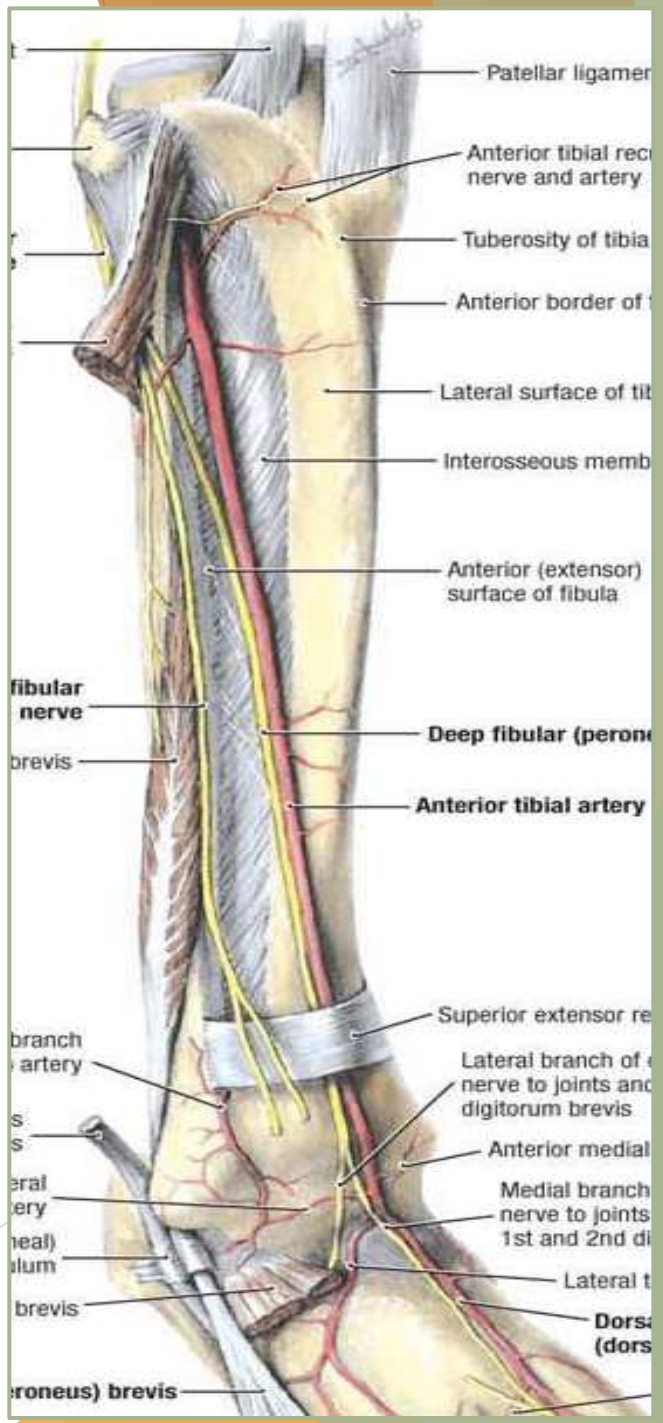


Branches

1- Anterior tibial recurrent artery; shares in the patellar plexus

2- Anterior medial & lateral malleolar arteries ; to the ankle & overlying skin

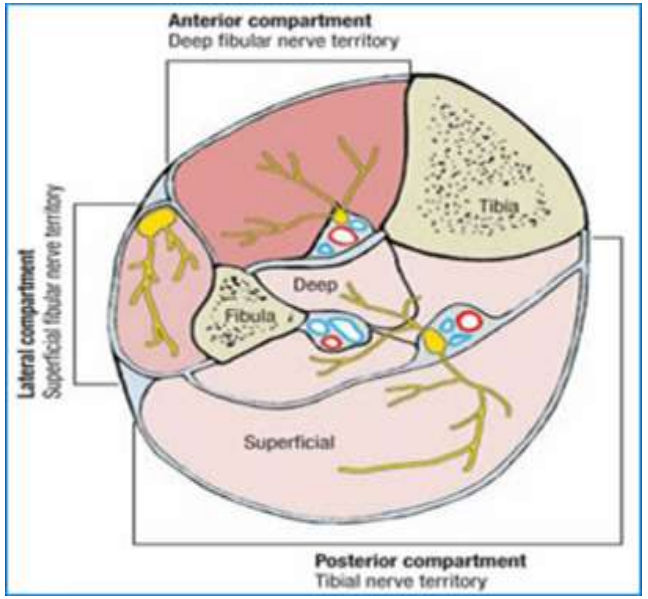
3- Sometimes **the posterior tibial recurrent & circumflex fibular arteries** arise from it



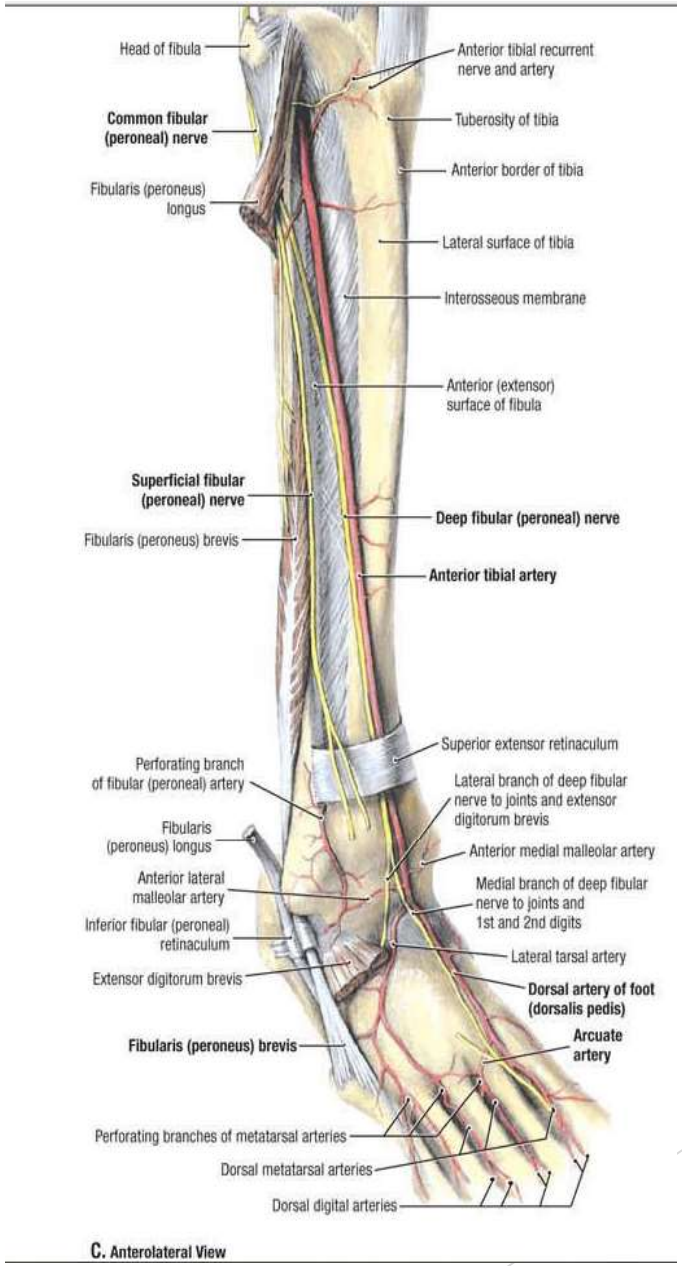
Deep peroneal nerve

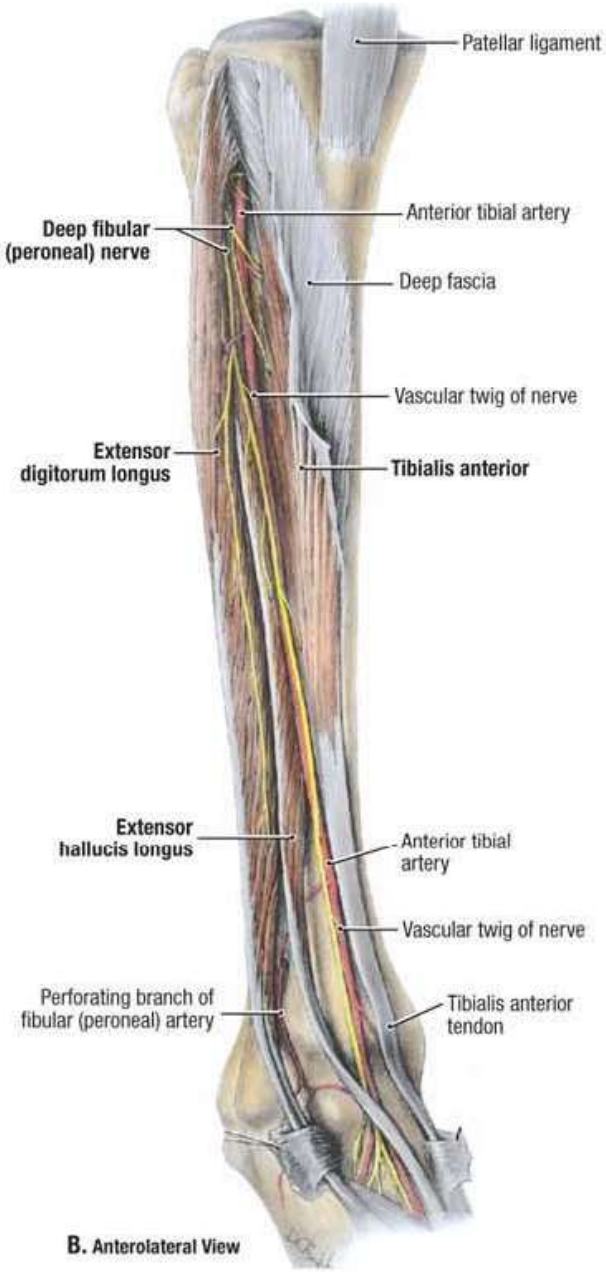
- The **common peroneal nerve** after winding around the fibular neck divides in the upper part of peroneus longus into **superficial** & **deep peroneal nerves**

- The deep peroneal nerve passes deep to the fibres of extensor digitorum longus, and so reaches the interosseous membrane, on the lateral side of the anterior tibial vessels.



- It supplies all muscles of this compartment & **tibio-fibular joints**
- Divide on the **dorsum of the foot** into **medial & lateral branches**
- **A lesion** of this nerve results in an **inability to dorsiflex the ankle** (foot drop).





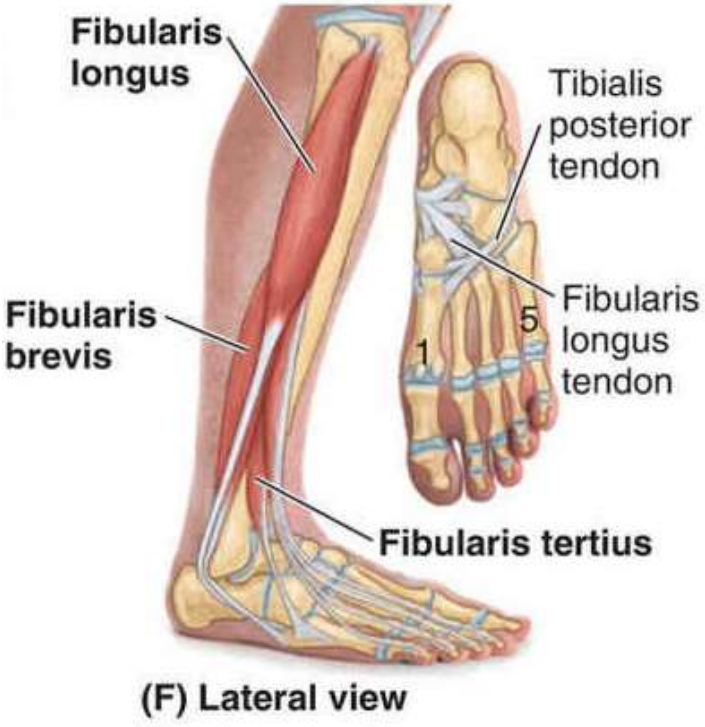
Anterior compartment syndrome of the leg

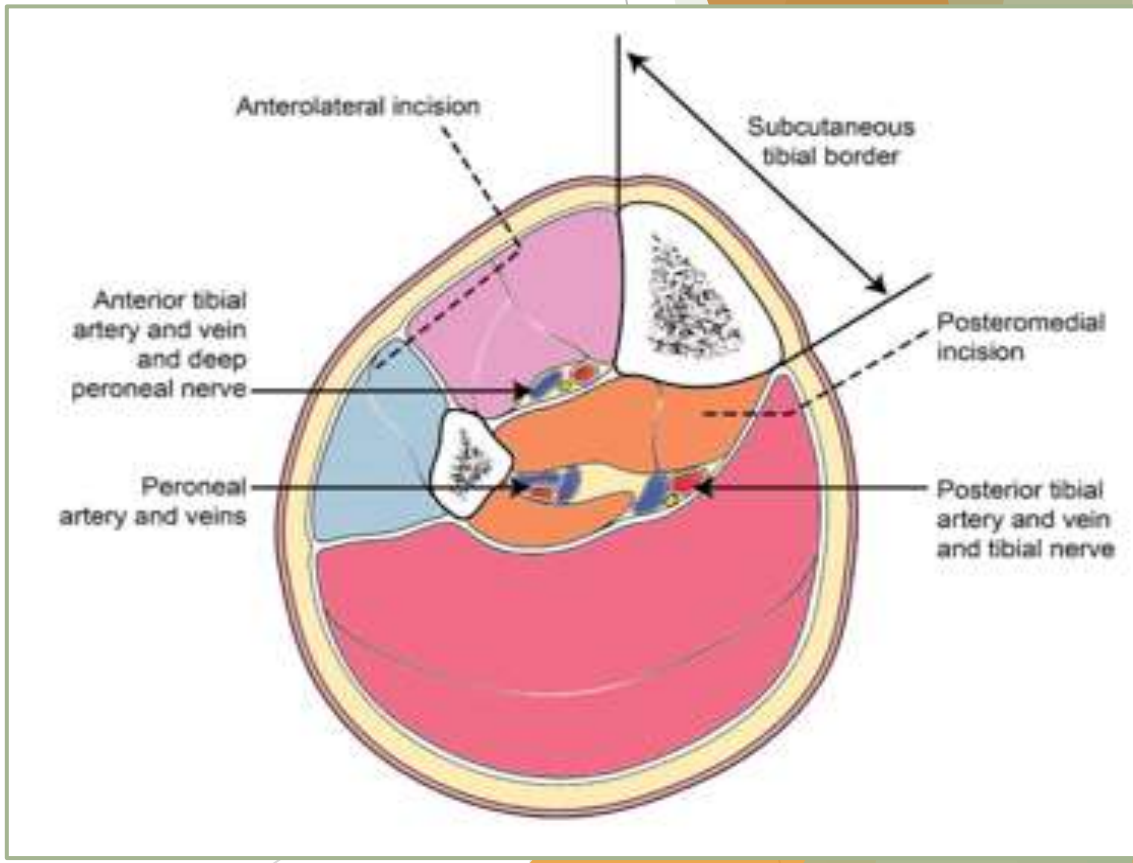
- **Increase in the intracompartmental pressure** that results from **tissue swelling** (fractures is a common cause)
- Arterial supply is eventually cut off by compression, and the **dorsalis pedis arterial pulse disappears.**
- **Paralysis of anterior leg muscles** may follow
- **Loss of sensation** is limited to the area supplied by the **deep peroneal nerve**
- **Decompression** by longitudinal incision through the deep fascia is mandatory

Lateral Compartment of Leg
Evertor compartment

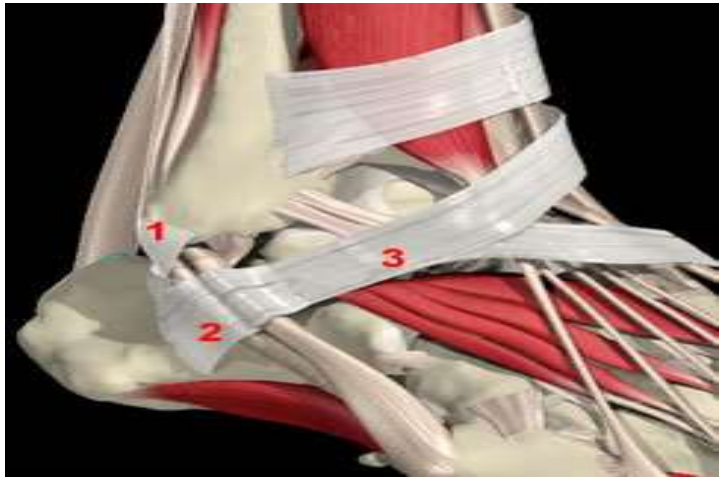
- is the smallest of the leg compartments.
- It is bounded by

✓ the **lateral surface of the fibula**,
✓ the **anterior and posterior intermuscular septa**,
✓ the **deep fascia of the leg**

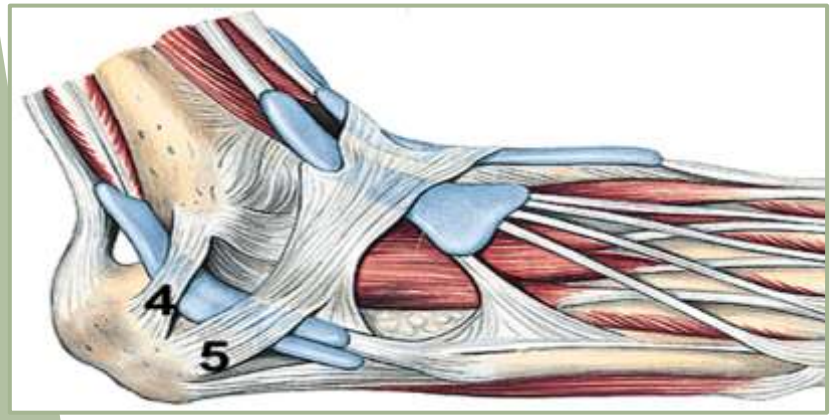




The tendons of the two muscles are bound down at the lateral malleolus and at the peroneal trochlea by :



- **Superior fibular retinaculum:** which spans between the back of lateral malleolus to calcaneus . Here the tendons of fibularis longus and brevis enter a **common synovial sheath**

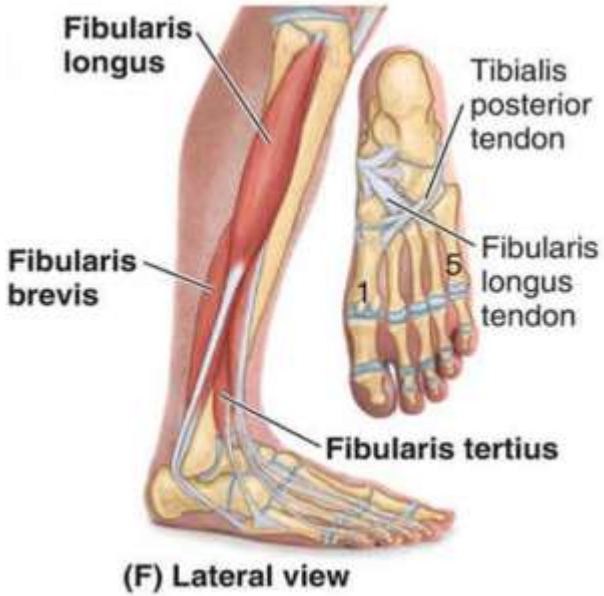


- **Inferior fibular retinaculum:** attached to the anterosuperior surface of the calcaneous where it is continuous with the stem of inferior extensor retinaculum.
- Deep to it, the **common synovial sheath** shared by the fibular muscles **splits** into separate compartments

Tenosynovitis of the Peroneus Longus and Brevis Tendons

Muscles of Lateral compartment of the leg

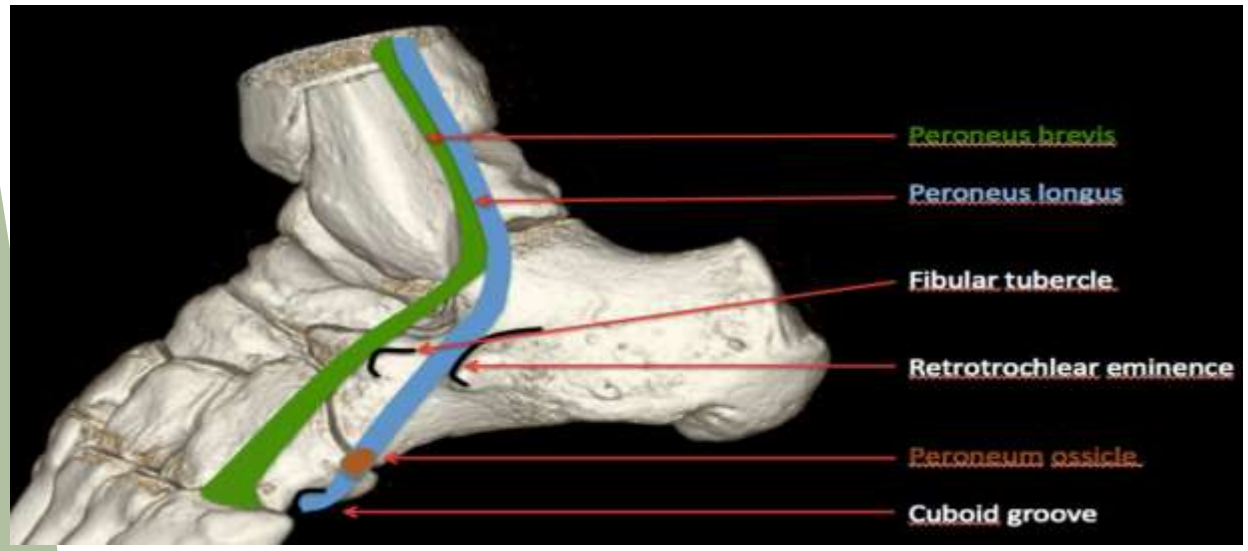
Muscle	Origin	Insertion	N Supply	Action
Fibularis longus	Head and superior two thirds of lateral surface of fibula	Base of 1st metatarsal and medial cuneiform	Superficial fibular nerve (L5, S1, S2)	• Everts foot • weakly plantar flexes ankle
Fibularis brevis	Inferior two thirds of lateral surface of fibula	Dorsal surface of tuberosity on lateral side of base of 5th metatarsal		

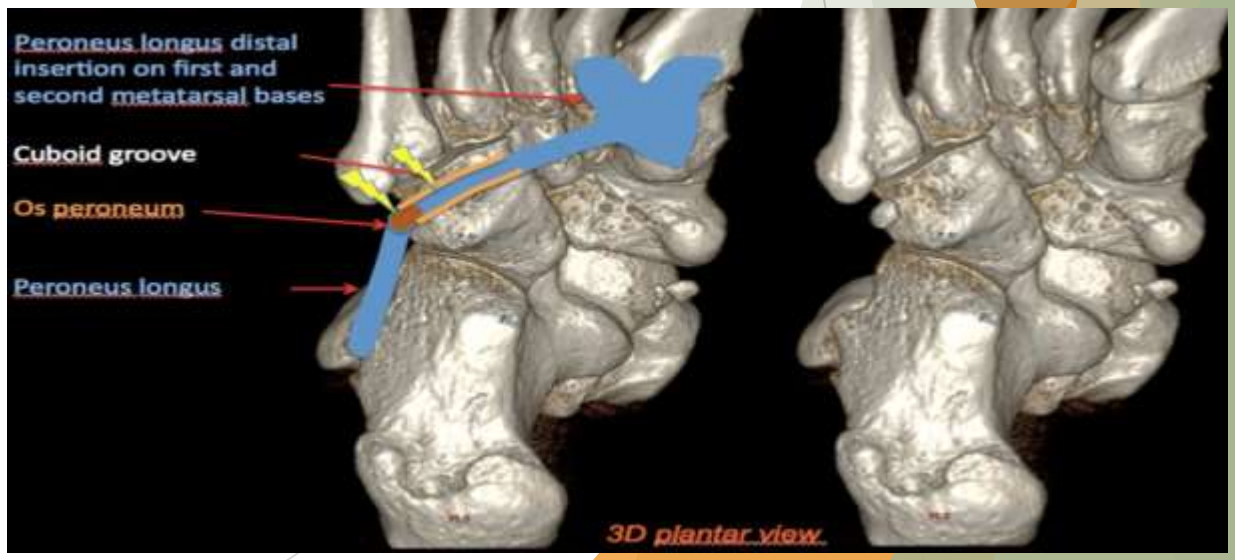


(F) Lateral view

Peroneal tendon in the foot

- The FL passes inferior to the fibular trochlea on the calcaneus and enters a **groove** on the **anteroinferior aspect of the cuboid bone**
- It then crosses the sole of the foot, **running obliquely** and **distally** to reach **its attachment to the 1st metatarsal** and **medial cuneiform** bones
- When a person stands on one foot, the FL helps steady the leg on the foot.





- **Tibia is weight bearing bone**
- **Fibula is for muscle attachment**

With a fractured tibia:

- Patient can't stand on the affected limb
- Immobilization is frequently surgical

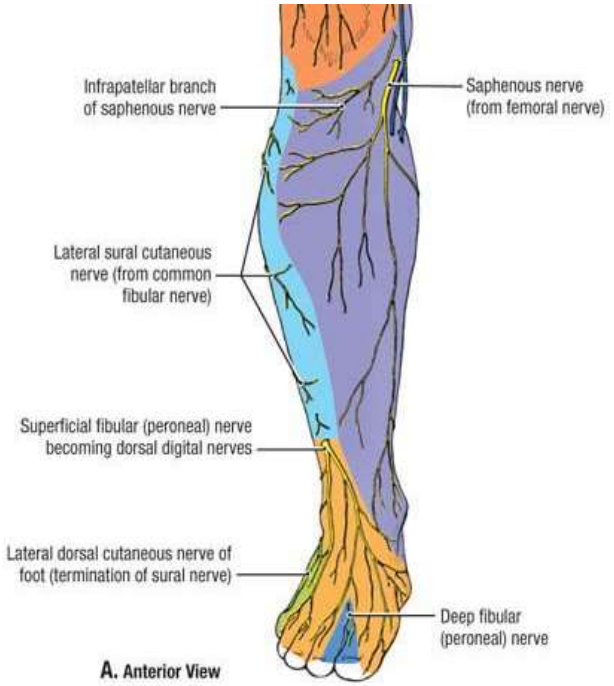
With a fractured fibula:

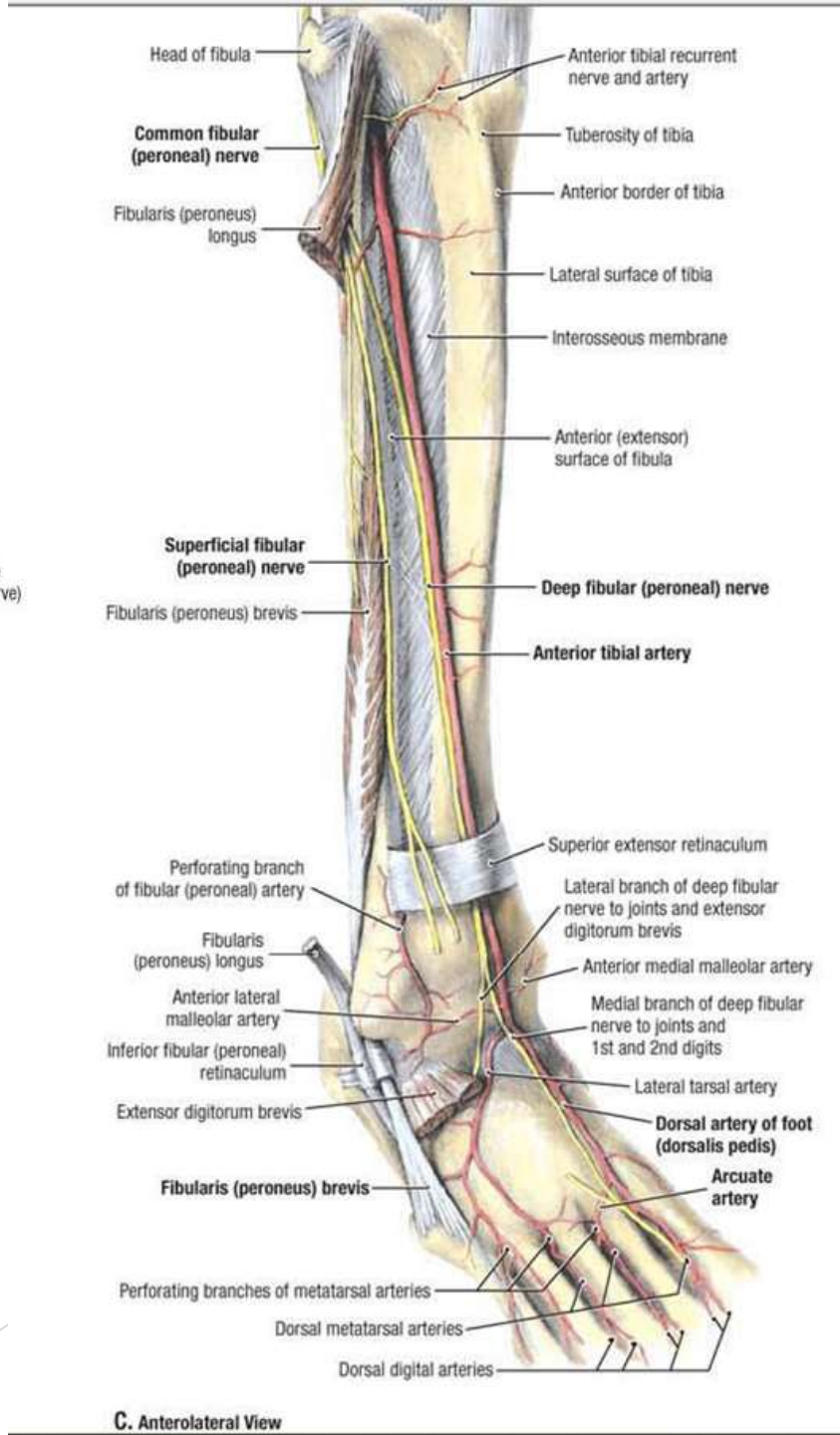
- Patient can stand on the affected limb with pain
- Immobilization is frequently by POP

NERVES IN LATERAL COMPARTMENT OF LEG

Superficial fibular (peroneal) nerve (L4-S1)

- After supplying the FL and FB, the superficial fibular nerve pierces deep fascia at distal third of leg to become a **cutaneous nerve**, supplying the **skin on the distal part of the anterior surface of the leg** and nearly **all the dorsum of the foot** excluding web between great and 2nd toes**.**

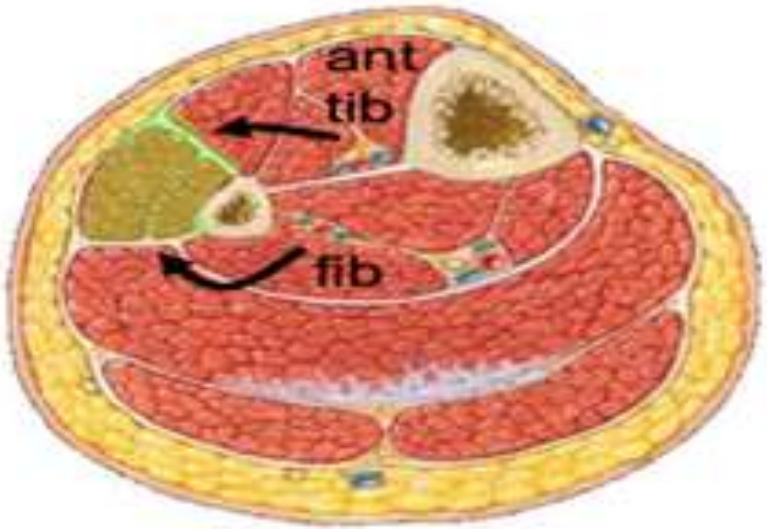




- **The lateral compartment of the leg** does not have an artery coursing through it
- The muscles are supplied

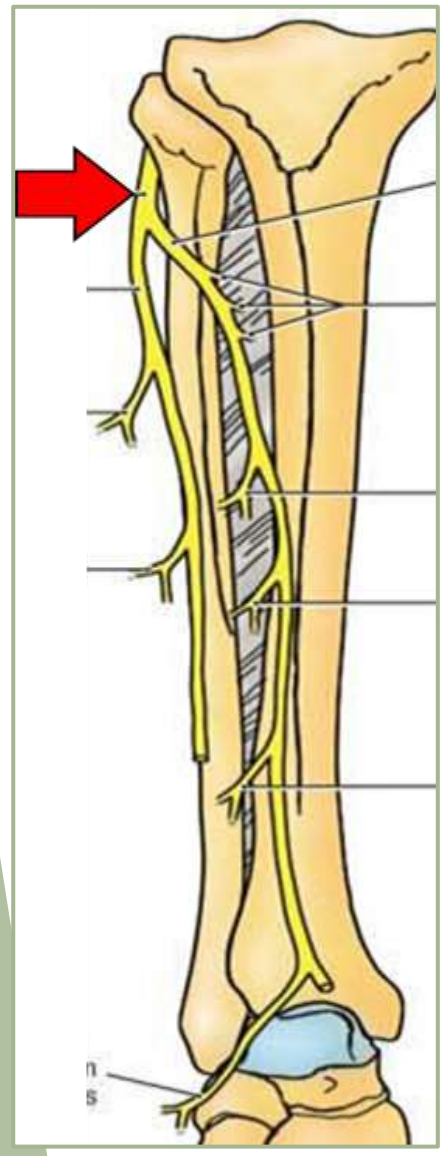
✓ proximally by **perforating branches** of the **anterior tibial artery**

✓ distally by **perforating branches** of the **fibular artery.** These perforating arteries have accompanying veins

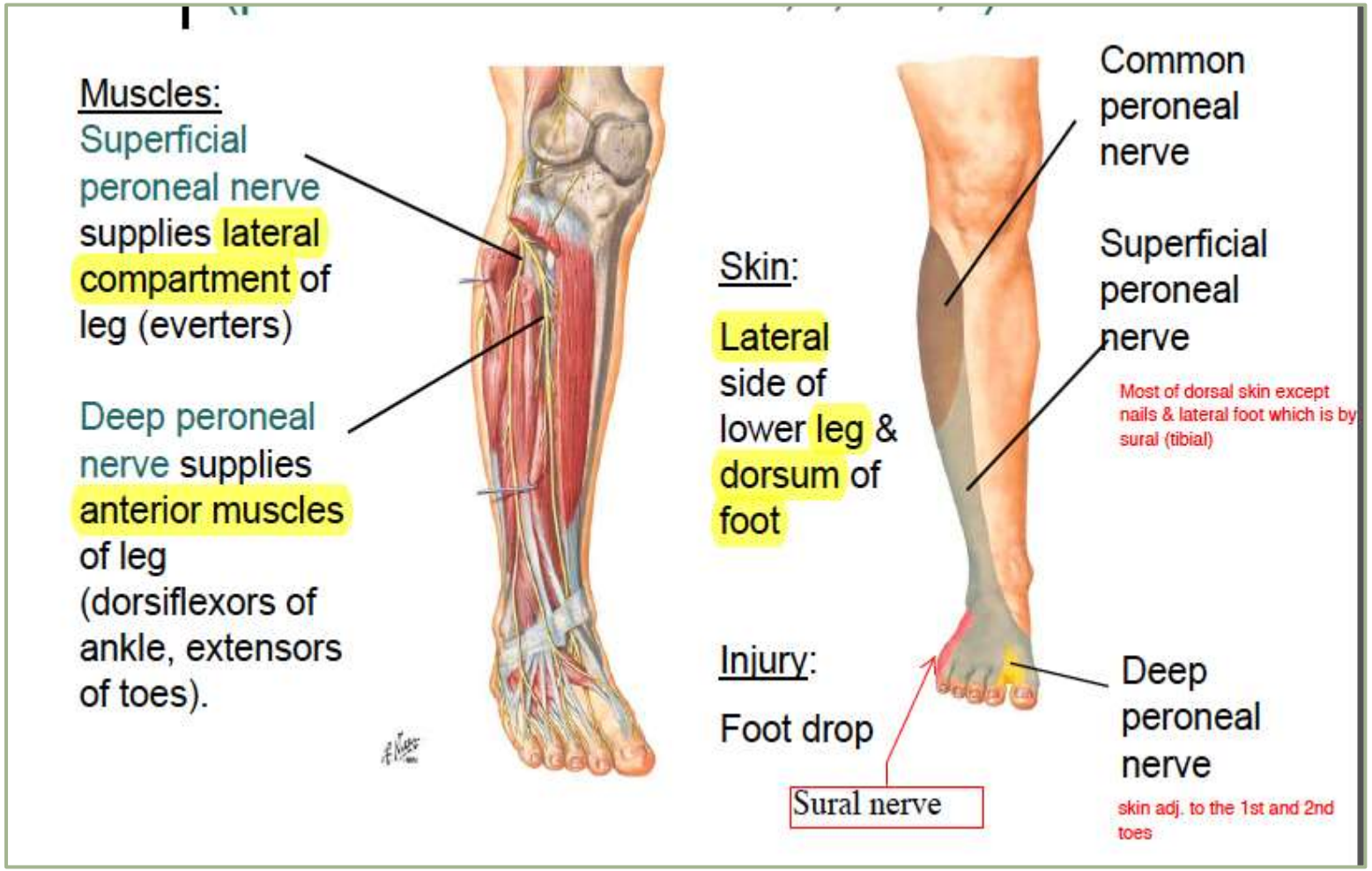


Arteries NOT within lateral compartment

Common Peroneal Injury



- The nerve may be injured
  - direct trauma
  - during fracture of the fibular neck
  - when the knee joint is injured or dislocated.



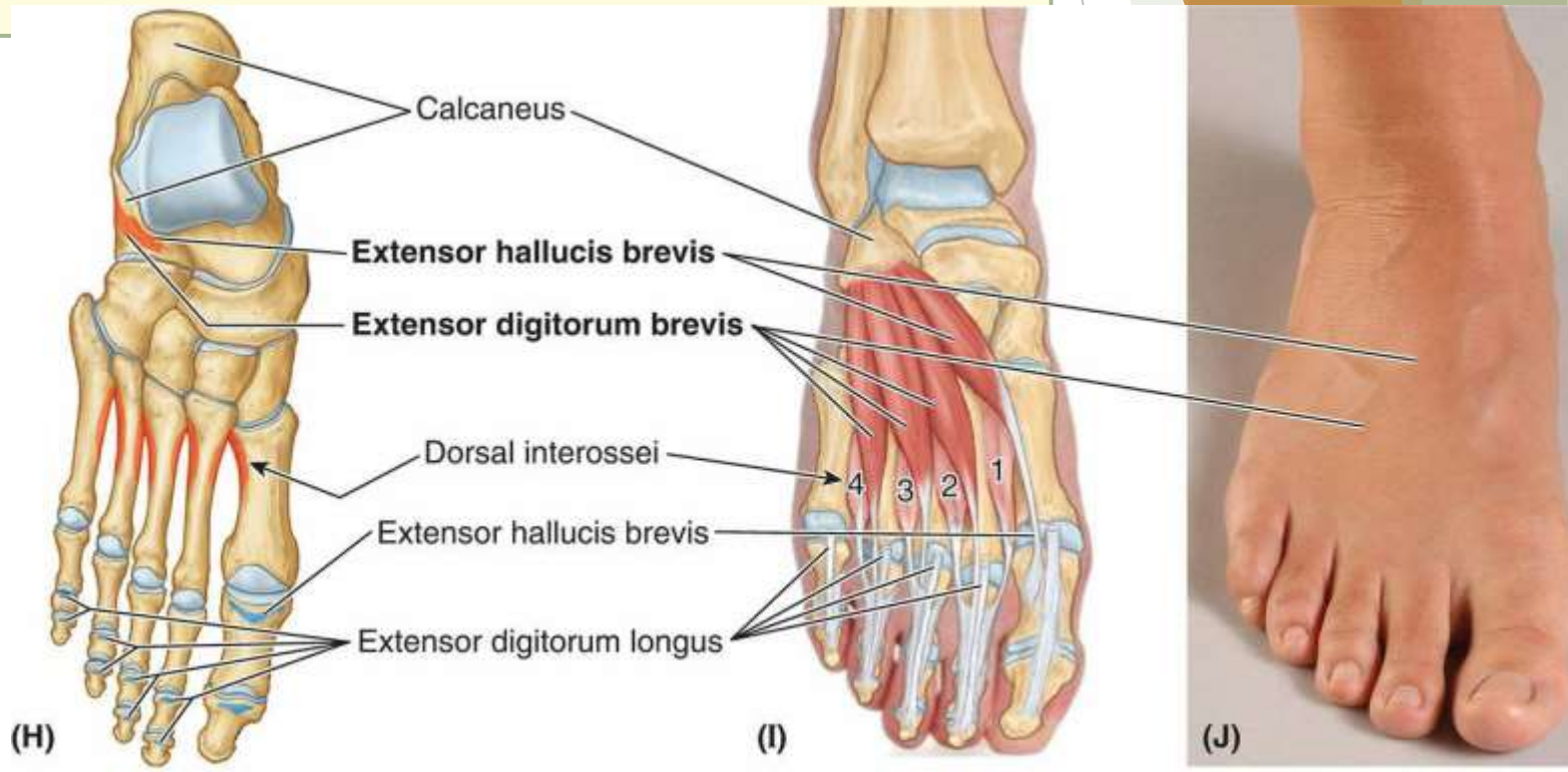
- Severance of the common fibular nerve results in **flaccid paralysis** of all muscles in the anterior and lateral compartments of the leg (**dorsiflexors of ankle and evertors of foot**).

- The loss of dorsiflexion of the ankle causes **foot drop**, which is further exacerbated by **unopposed inversion of the foot.** This has the effect of making the limb "**too long**":

DORSUM OF FOOT

- **Skin** is **much thinner** and **less sensitive** than skin on most of the sole.
- **Subcutaneous tissue** is **loose**; and contains little fat in most people therefore, **edema** is **most marked** over this surface, especially anterior to and around the **medial malleolus**

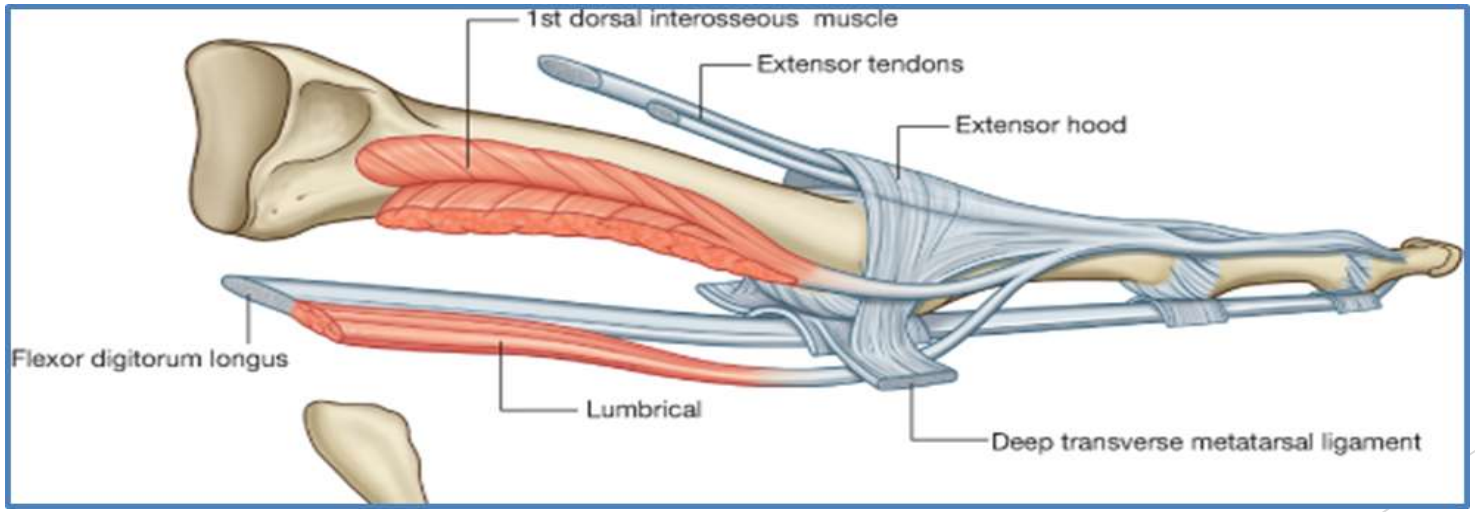
- **Deep fascia** is **thin** where it is continuous proximally with the **inferior extensor retinaculum.** . Over the lateral and posterior aspects of the foot, the deep fascia is continuous with the plantar fascia,(deep fascia of the sole)

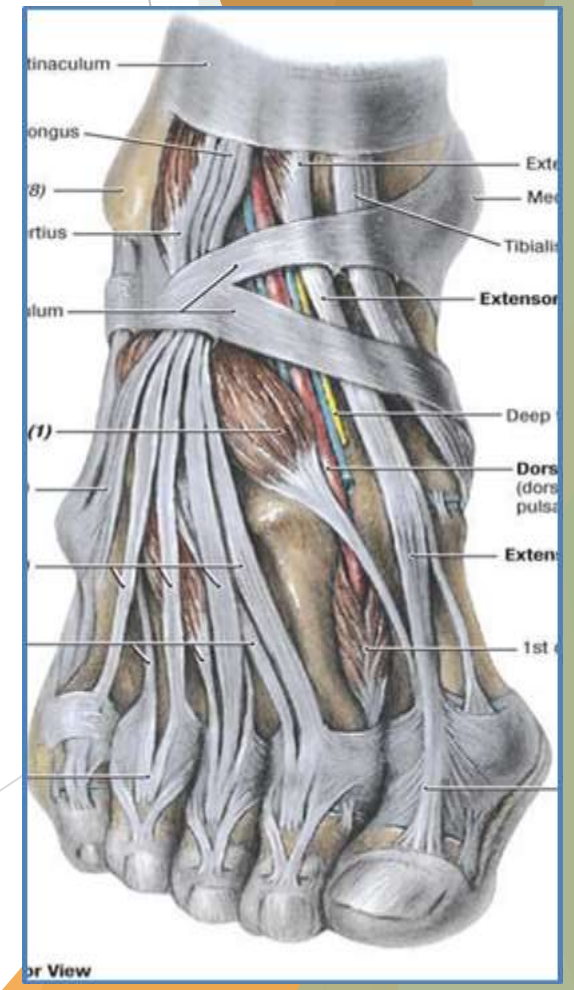


Anterosuperior views

Dorsal extensor expansion (Extensor Hood)

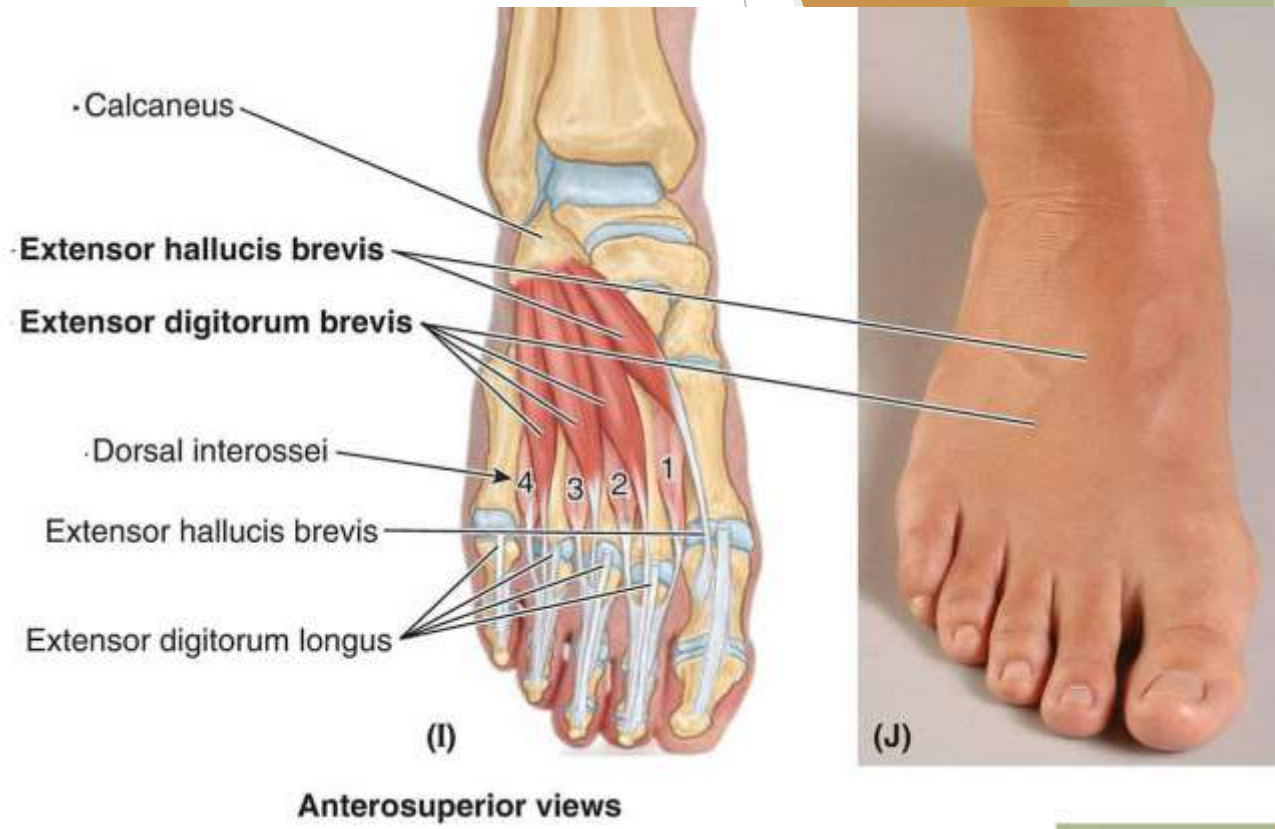
- over the proximal phalanx divides into three slips,
- the central (middle) slip being inserted into the base of the middle phalanx.
- The two side slips reunite after being joined by the tendons of the **interossei** and **lumbricals** and are inserted into the base of the distal phalanx
- Its corners attach mainly to the **deep transverse metatarsal ligament**
- The attachment of these muscles to extensor hood allows the forces from these muscles to cause flexion of the MTPJ while at the same time extending the IPJ





Extensor digitorum brevis

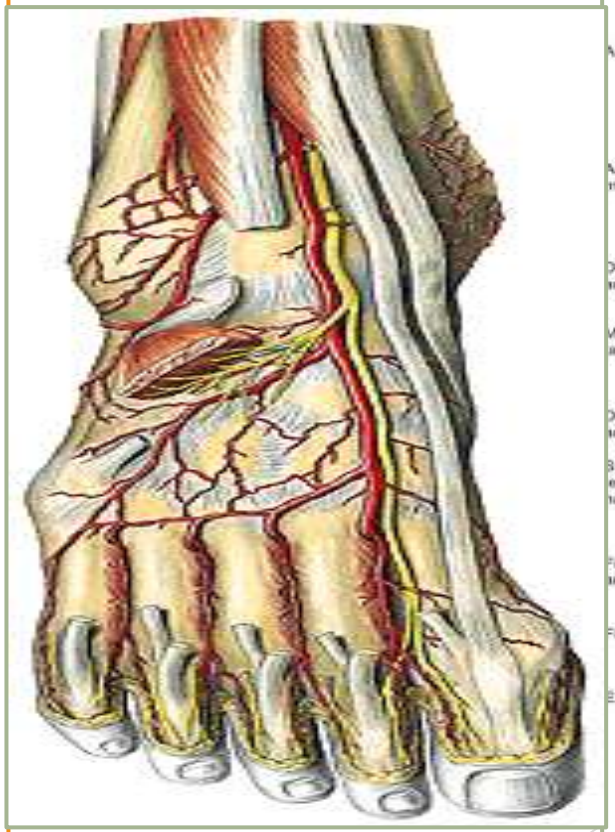
- This thin muscle arises from the extensor retinacula & calcaneus
- The muscle divides into 4 slips for the medial 4 toes
- The most medial is called **EHB** & inserted into the proximal phalanx of the **great toe**
- The rest 3 go to the extensor expansion of the **middle 3 toes**
- Supplied by the deep peroneal nerve
- Aids in extension of the proximal phalanges

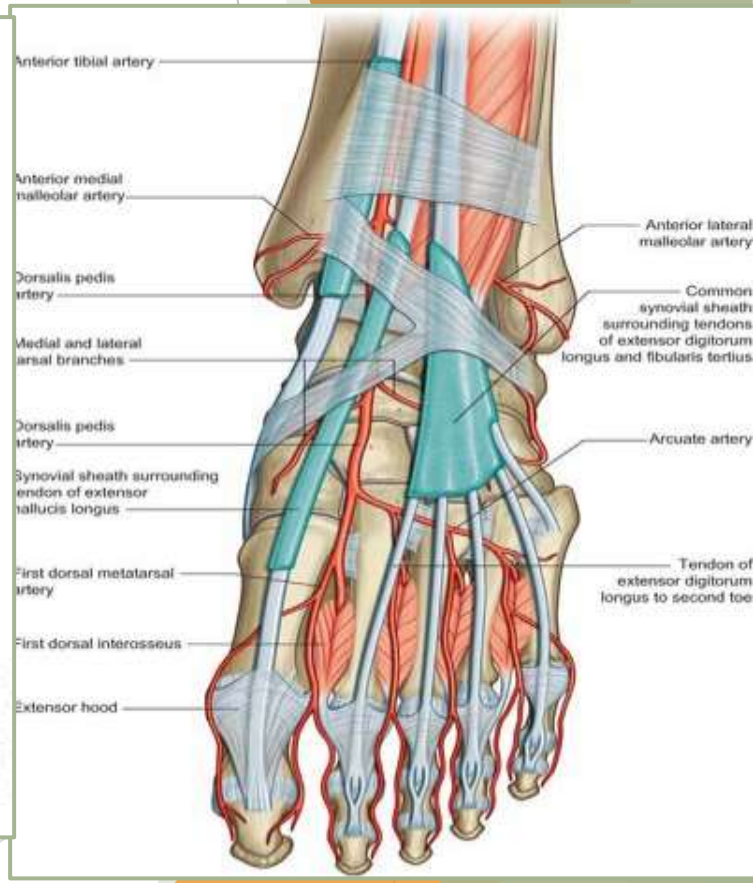


Anterosuperior views

Dorsalis pedis artery

- The continuation of anterior tibial artery begins midway between the malleoli (at the ankle joint) and runs anteromedially, deep to the inferior extensor retinaculum between the extensor hallucis longus and the extensor digitorum longus tendons on the dorsum of the foot.
- The artery lies against bones & crossed by EHB muscle
- Accompanied by the deep peroneal nerve
- passes to the first interosseous space, where it divides into the 1st dorsal metatarsal artery and a deep plantar artery





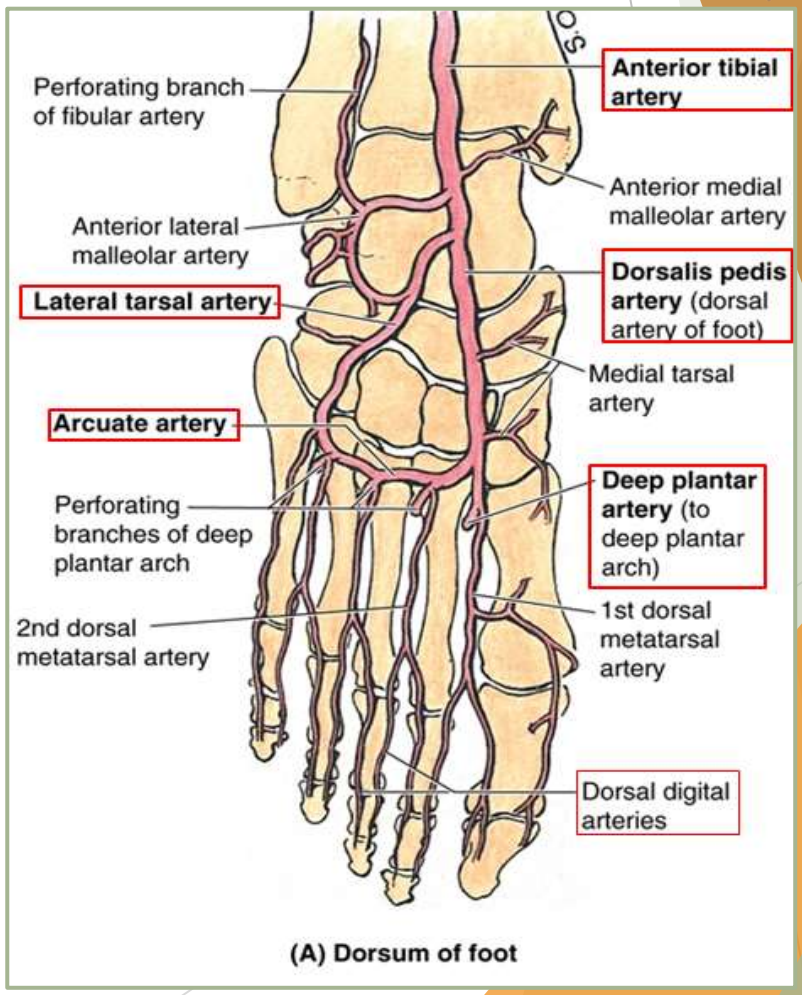
Branches

1- Lateral tarsal artery; supplies structures in the region & anastomoses with the lateral malleolar & arcuate arteries

2- Medial tarsal artery; runs medially to anastomose with the medial malleolar a.

3- Arcuate artery; arises at the level of the **1st interosseous space** , passes laterally across the bases of the lateral four metatarsals to anastomose with the lateral tarsal & plantar metatarsal arteries.

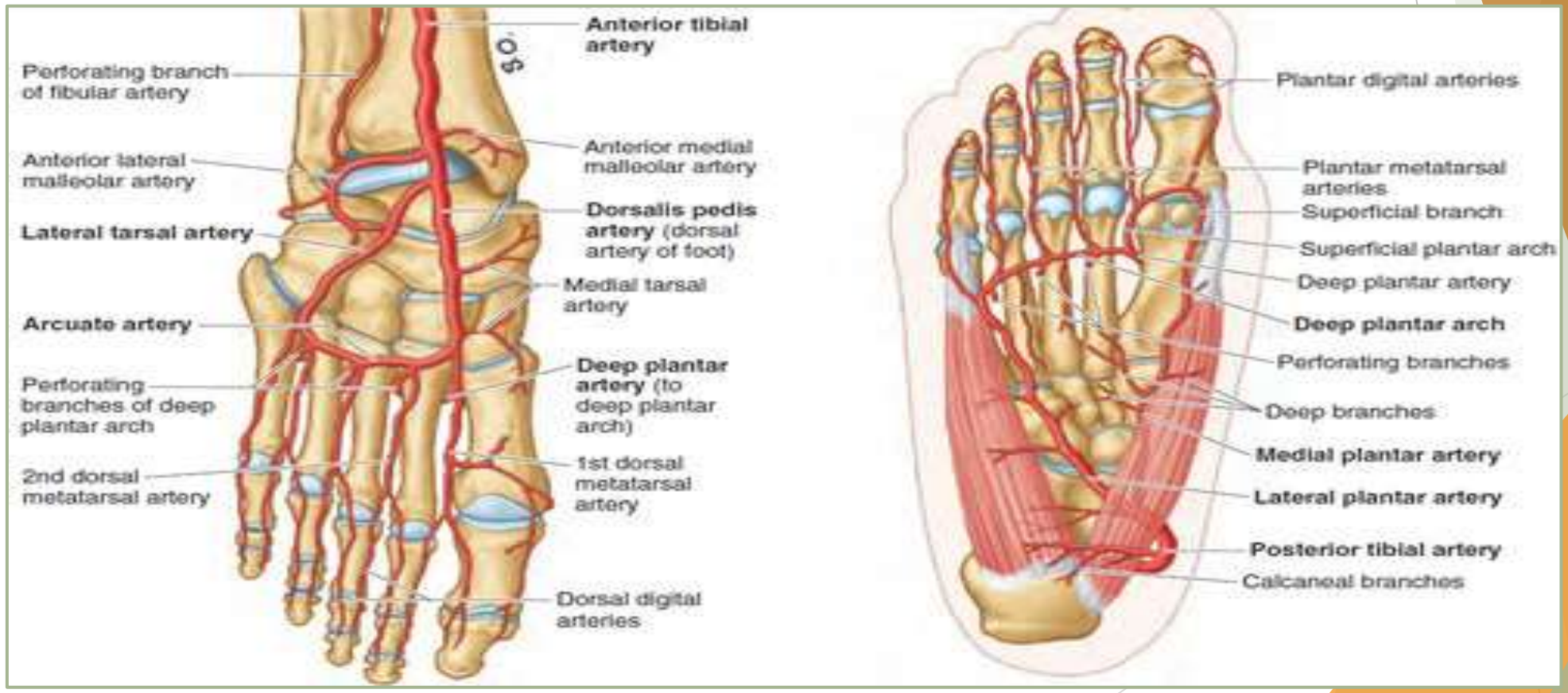
The **arcuate artery** gives off the **second, third,** and **fourth dorsal metatarsal arteries,** which run to the clefts of the toes, where each of them divides into two **dorsal digital arteries**



(A) Dorsum of foot

4- First dorsal metatarsal artery: passes to the 1st web & divides into 2 dorsal digital arteries

5- Deep plantar artery; Dips between the 2 heads of **1st dorsal interosseous muscle** to enter the sole of the foot, where it joins the **lateral plantar artery** to form the **deep plantar arch**



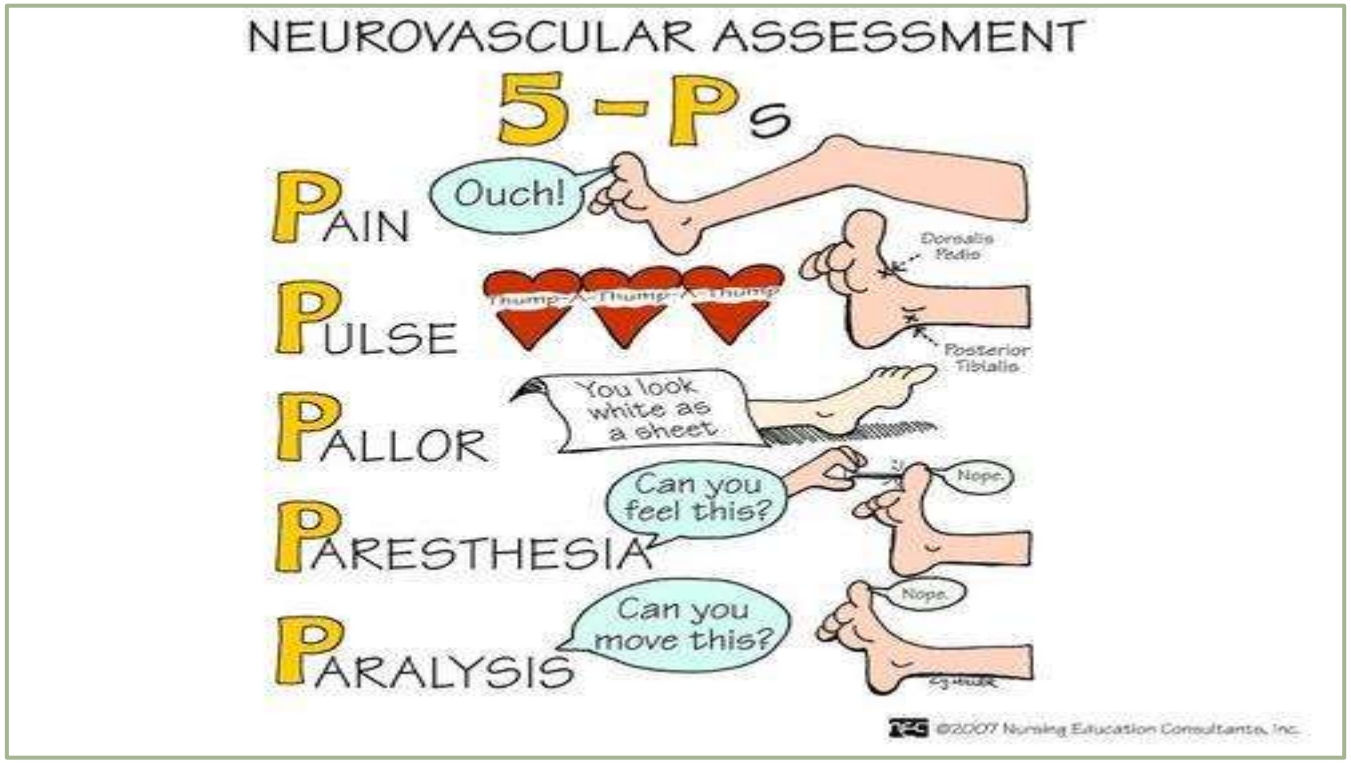
Dorsalis pedis pulsation:

Dorsalis pedis pulses may be palpated with the feet slightly dorsiflexed.

- Midway between the 2 malleoli
- Lateral to tendon of EHL
- Base of 2nd metatarsal

- A diminished or absent dorsalis pedis pulse usually suggests **vascular insufficiency** resulting from arterial disease.

- Some healthy adults (and **even children**) have **congenitally non-palpable dorsalis pedis pulses**; the variation is usually bilateral. In these cases, The **dorsalis pedis artery** is replaced by an **extended perforating fibular artery** of smaller caliber than the typical dorsalis pedis artery, but running in the same location.

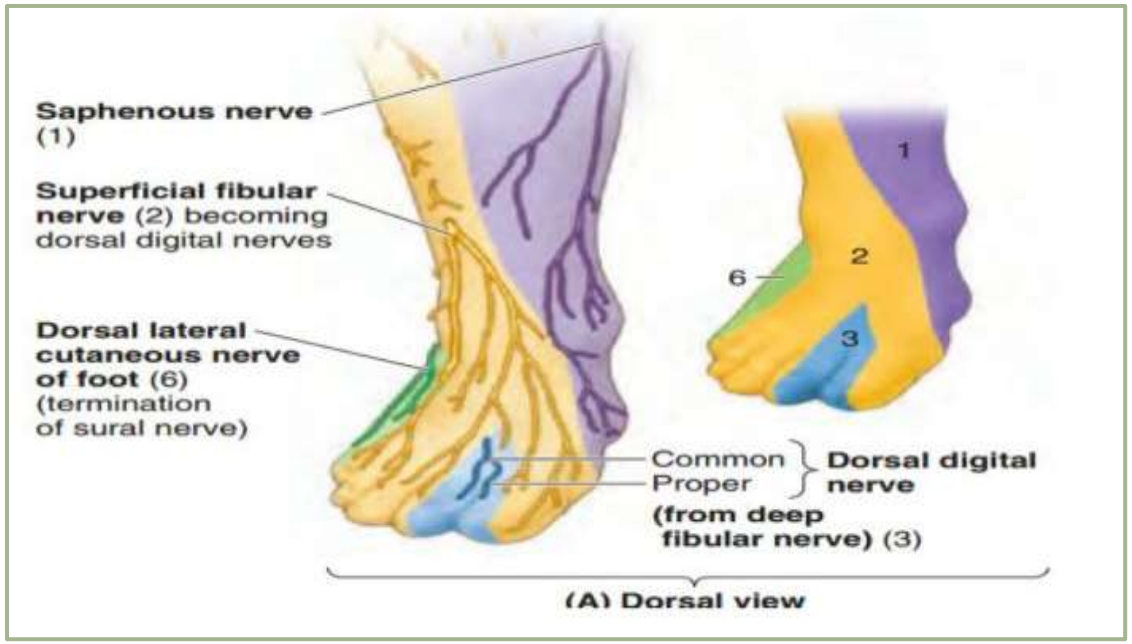


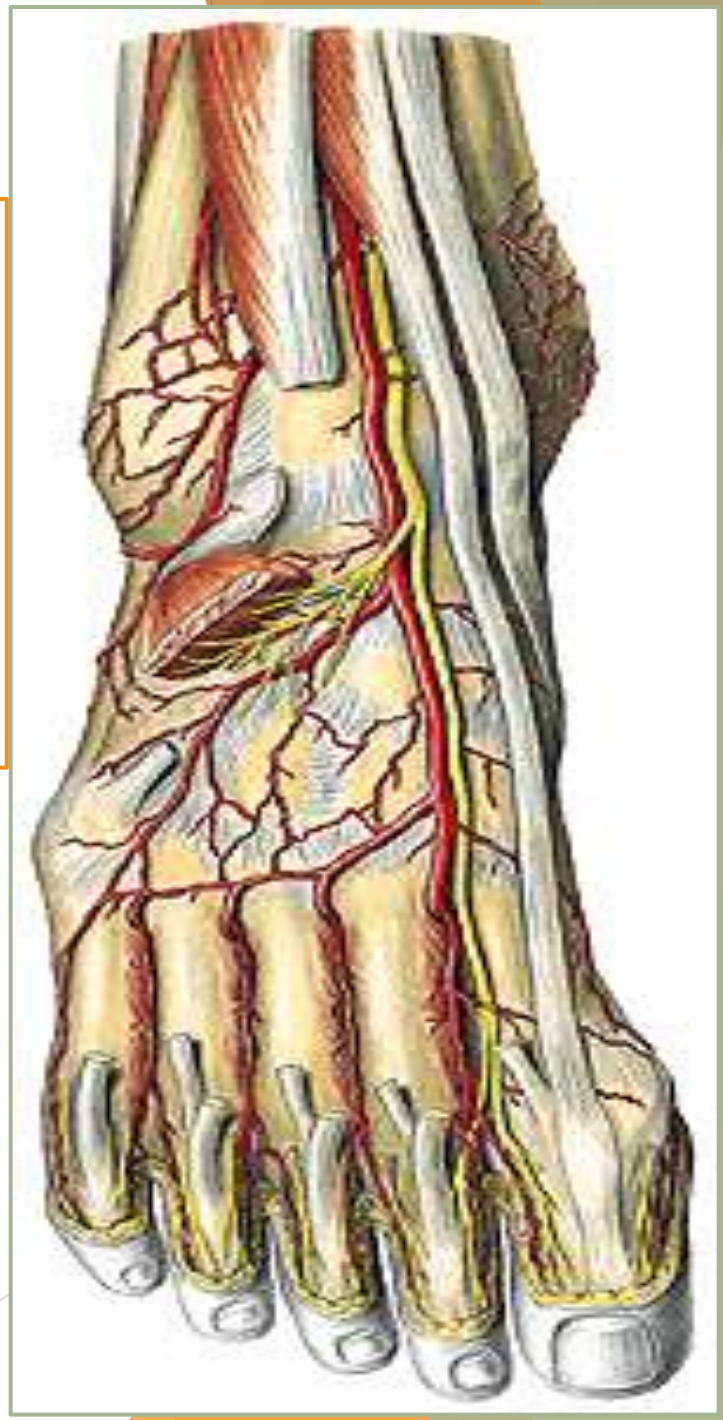
The five P signs of acute arterial occlusion are

- ✓ pain,
- ✓ pallor,
- ✓ paresthesia,
- ✓ paralysis,
- ✓ pulselessness

Deep peroneal nerve

- ❑ Lies parallel & lateral to the tendon of EHL
- ❑ At the lower border of the inferior ER divides into the terminal medial & lateral branches
- ✓ Lateral branch supplies extensor digitorum brevis
- ✓ Medial branch supplies the web between 1st & 2nd digits . It also gives a branch as an additional supply to the first dorsal interosseous muscle






Thank you!