Ankle and Foot

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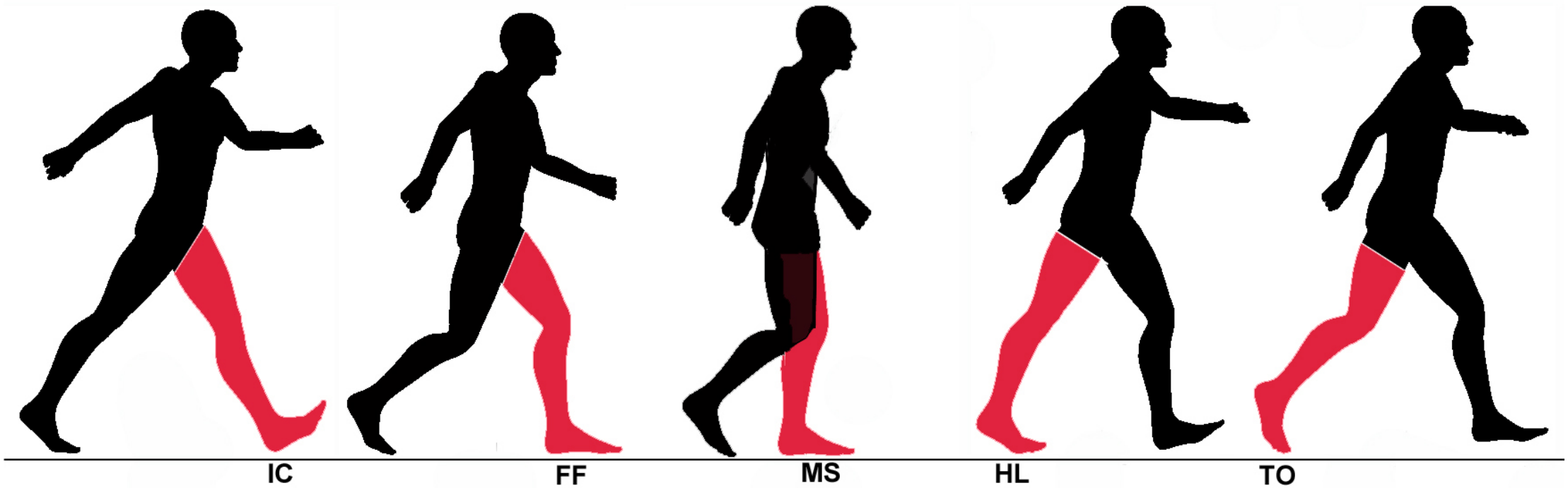
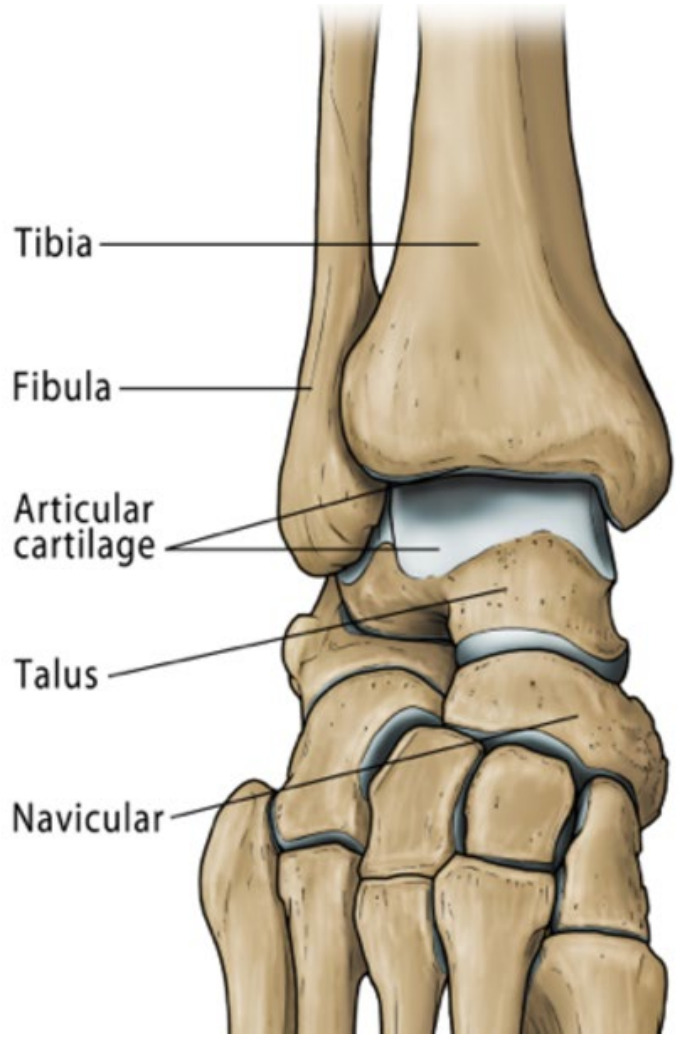
Mutah University

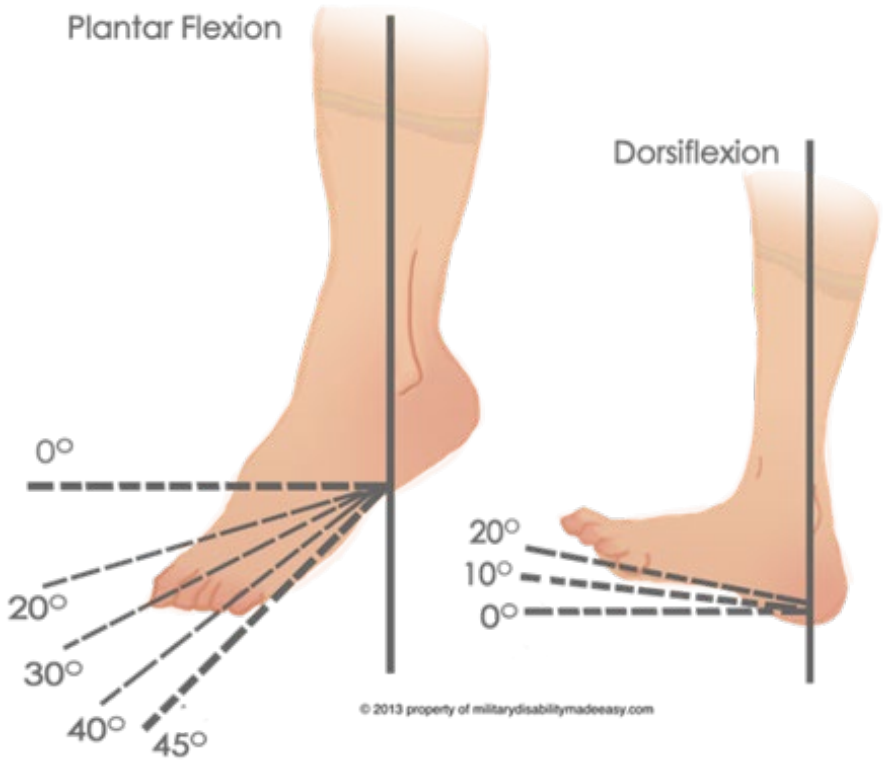
2022

THE GAIT CYCLE




Tibia
Fibula
Articular cartilage
Talus
Navicular

Range of motion



Plantar Flexion

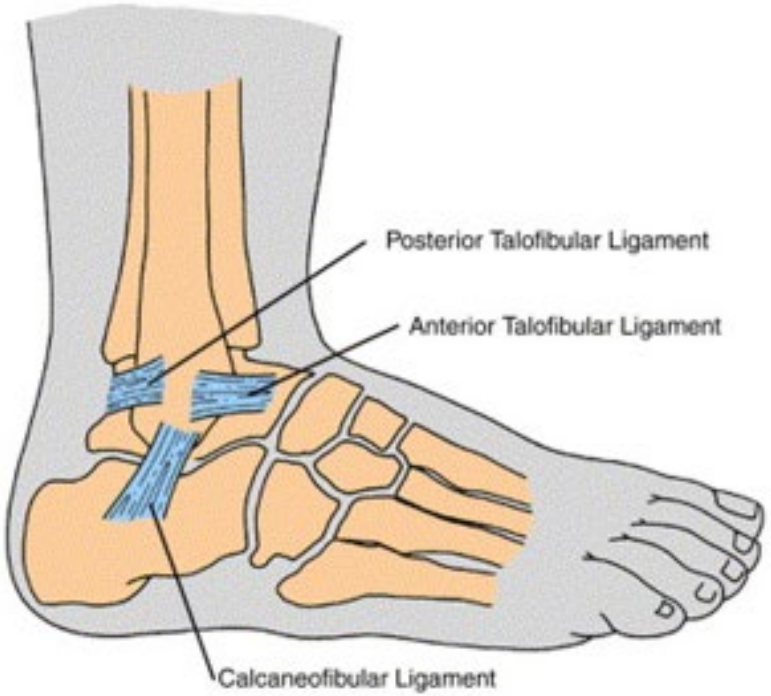
- Gastrocnemius
- Soleus
- Plantaris
- Peroneus Longus & Brevis
- **Tibialis Posterior**
- **Flexor Hallucis Longus**
- **Flexor Digitorum Longus**

Dorsiflexion

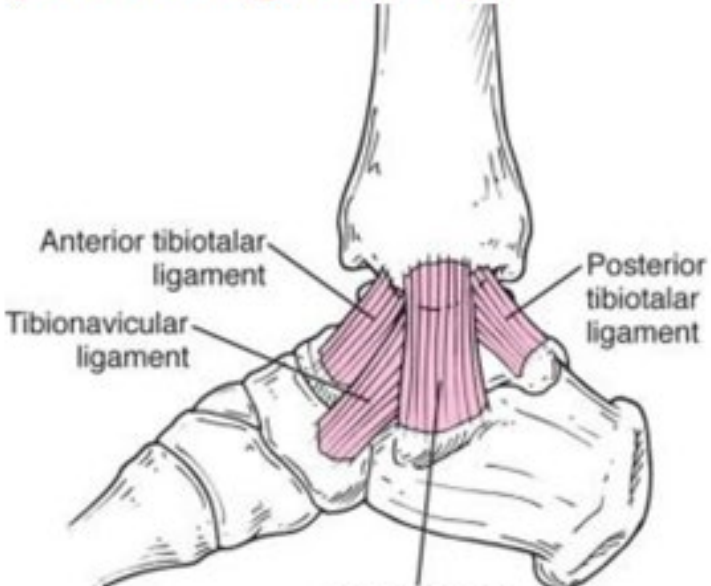
- Peroneus Tertius
- **Tibialis Anterior**
- **Extensor Hallucis Longus**
- **Extensor Digitorum Longus**

Ligaments

lateral collateral ligaments

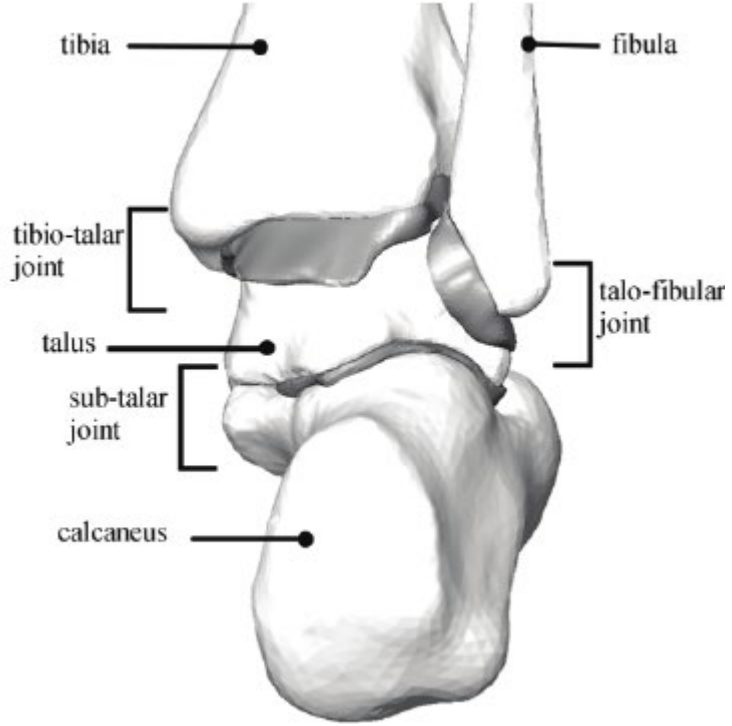


medial collateral ligaments (deltoid ligament)

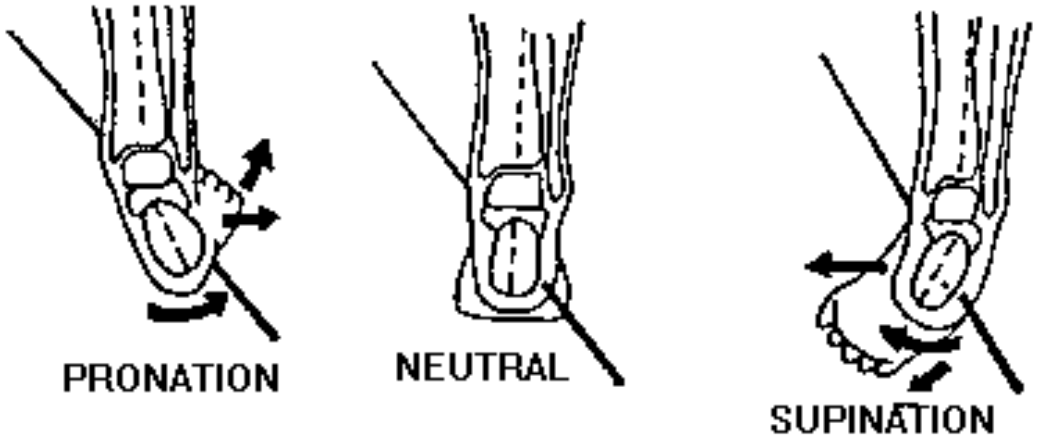


Hindfoot

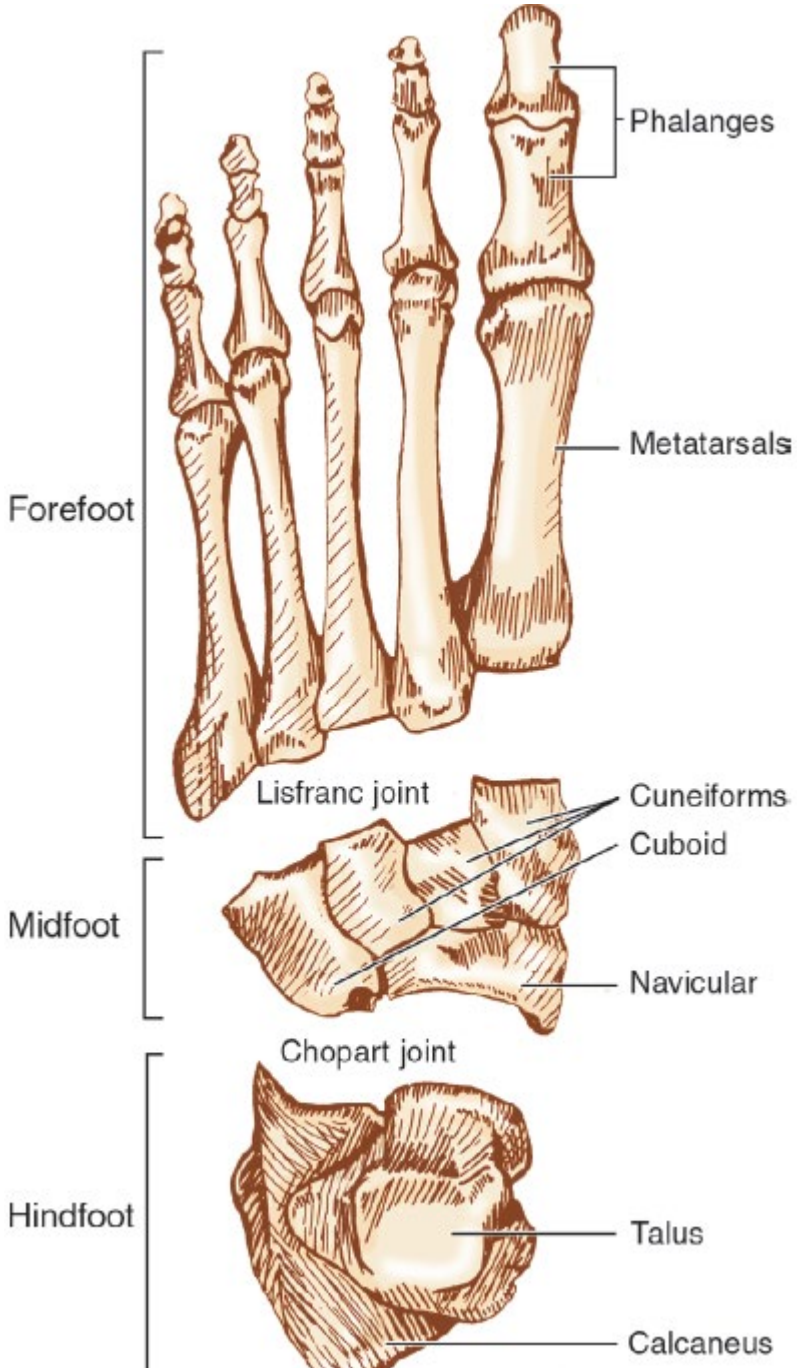

Hindfoot
Midfoot
Forefoot

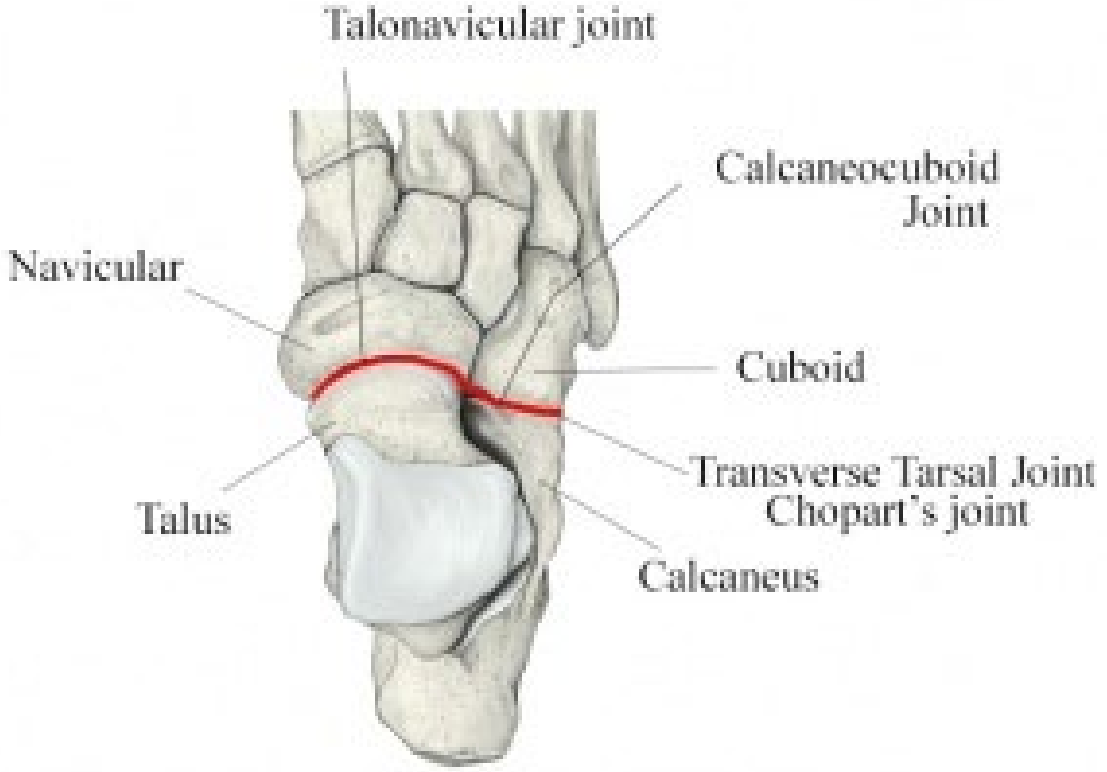

tibia
fibula
tibio-talar joint
talo-fibular joint
talus
sub-talar joint
calcaneus

Subtalar Joint



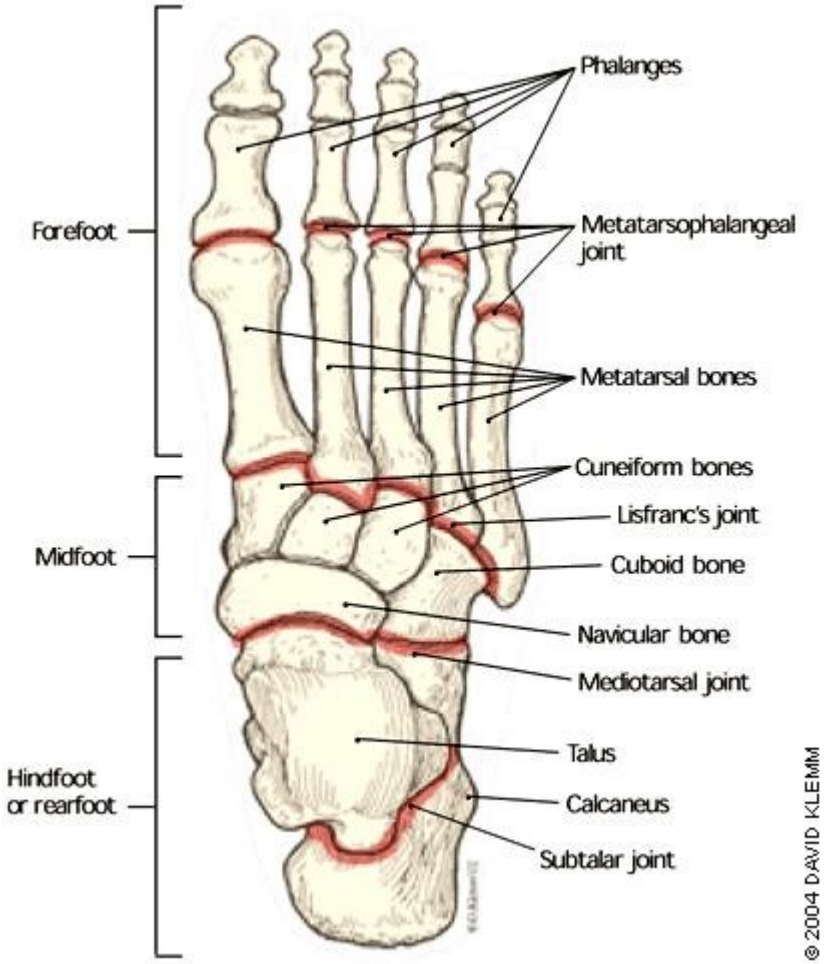
Chopart joint





Midfoot


Hindfoot
Midfoot
Forefoot


Forefoot
Midfoot
Hindfoot
or rearfoot
Phalanges
Metatarsophalangeal
joint
Metatarsal bones
Cuneiform bones
Lisfranc's joint
Cuboid bone
Navicular bone
Mediotarsal joint
Talus
Calcaneus
Subtalar joint
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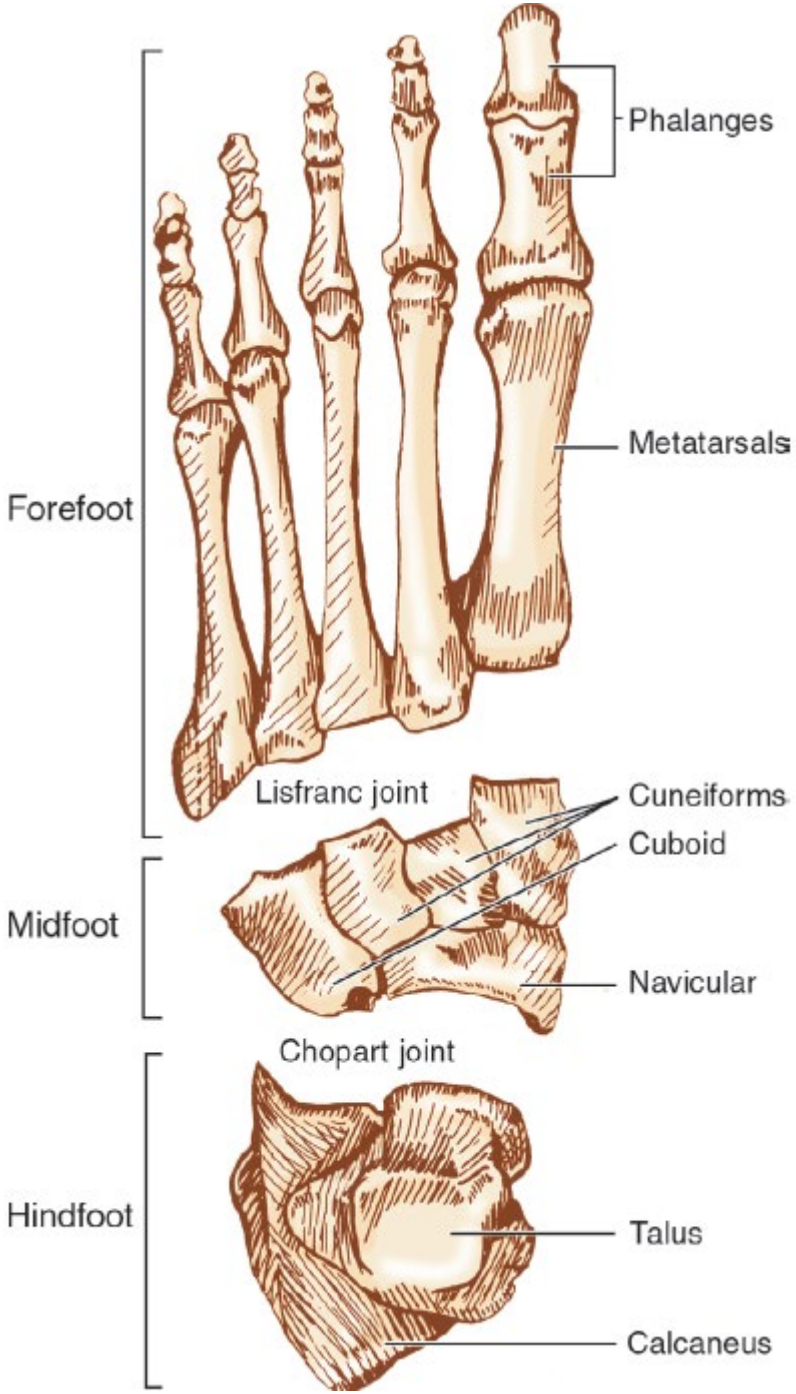
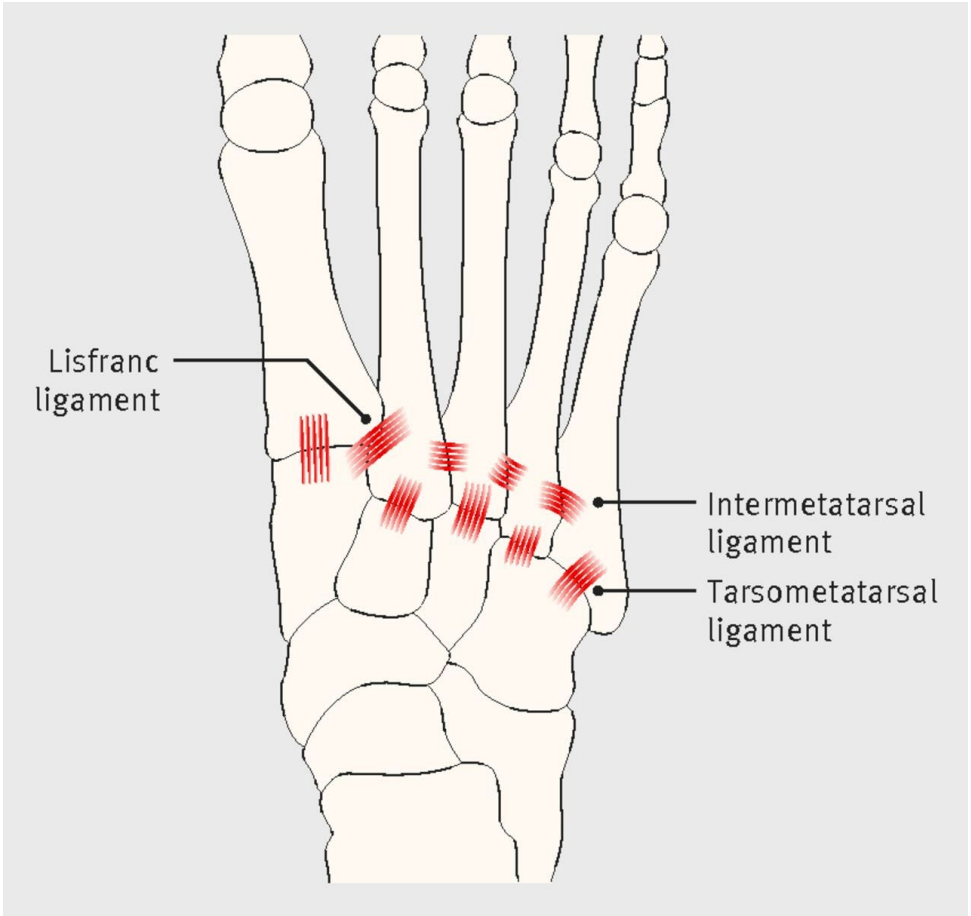
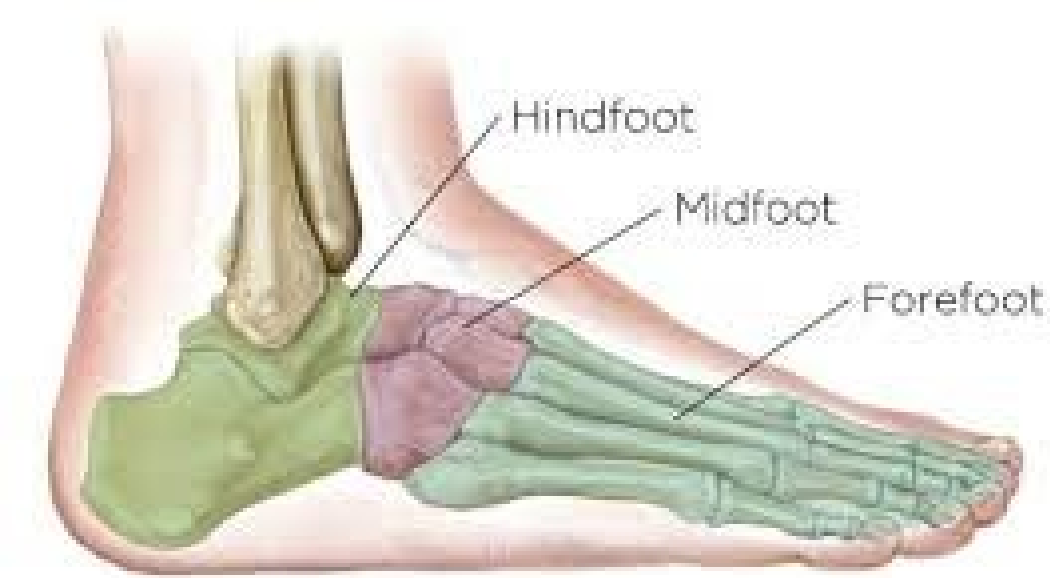
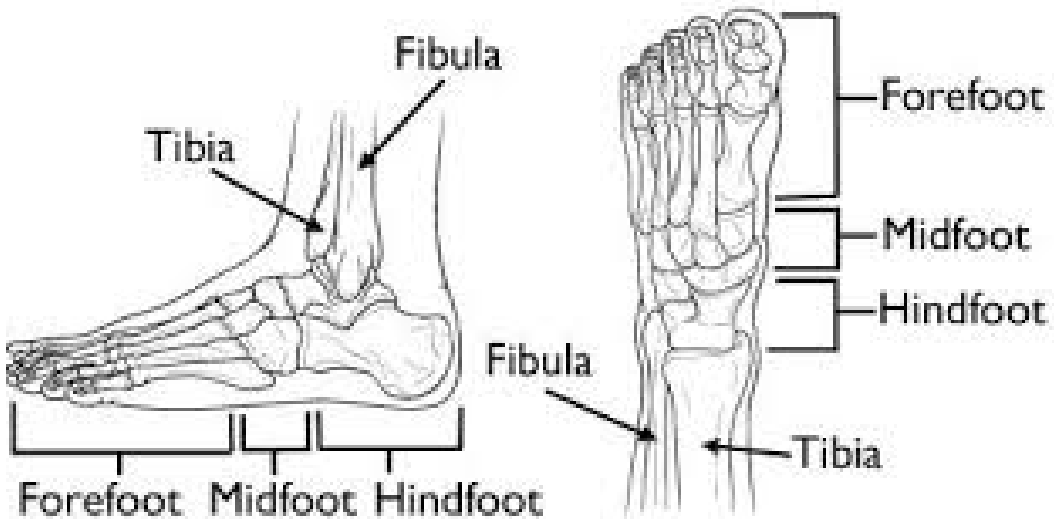
Lisfranc Joint



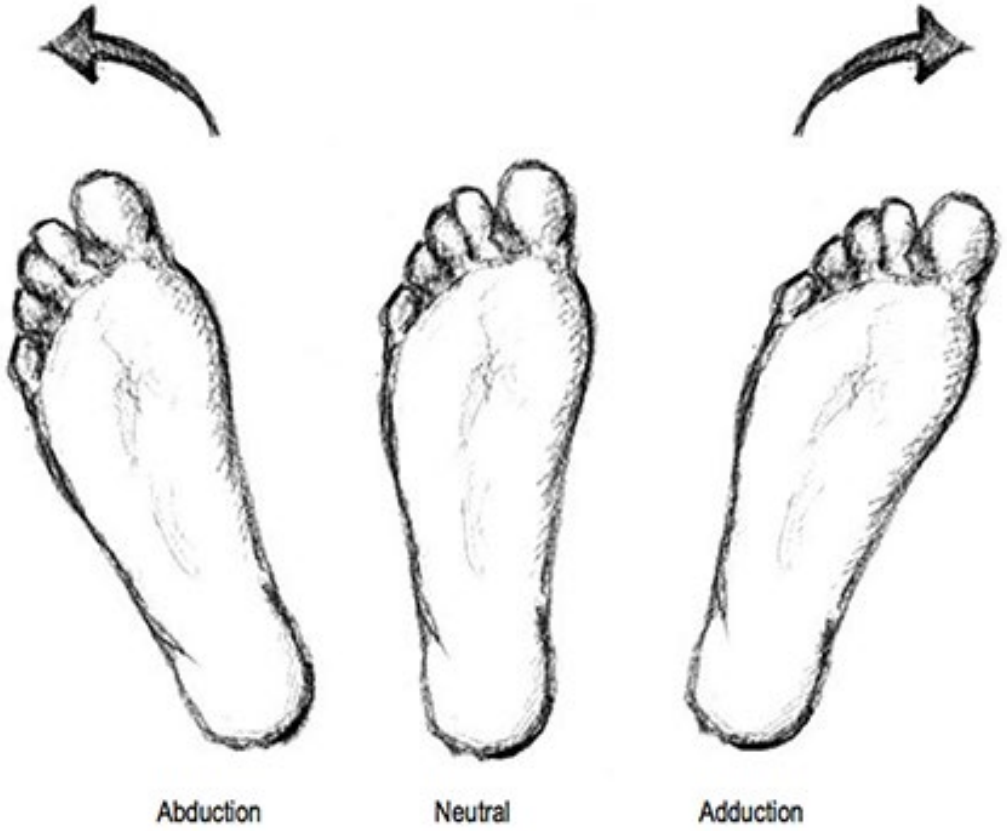


Forefoot

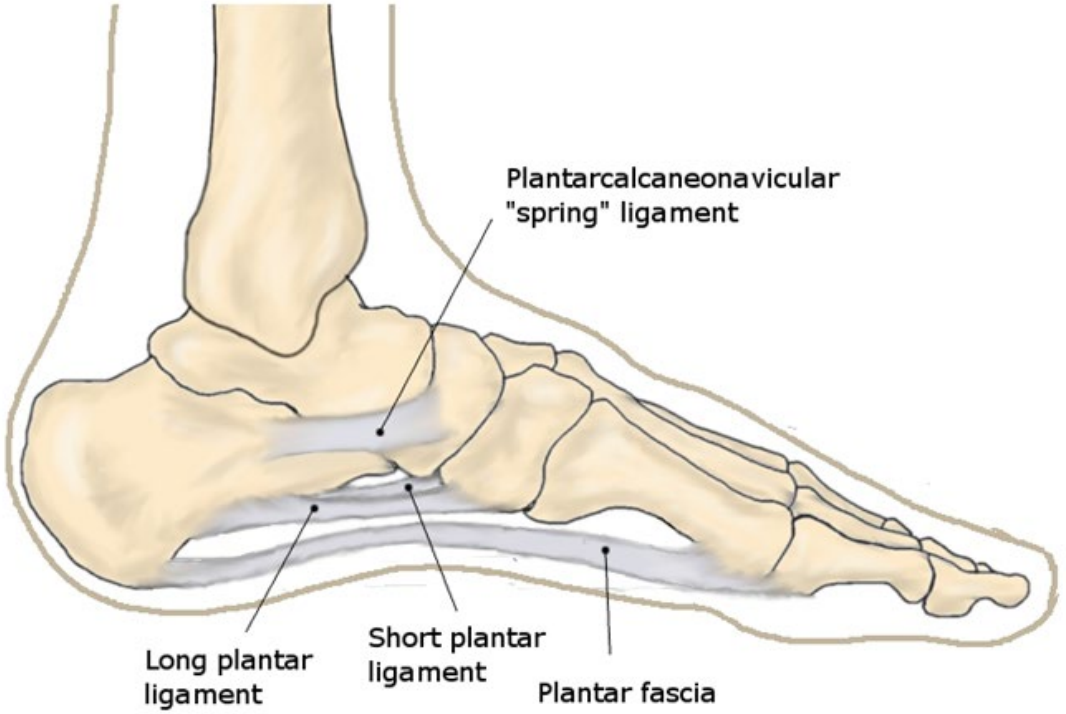

Hindfoot
Midfoot
Forefoot

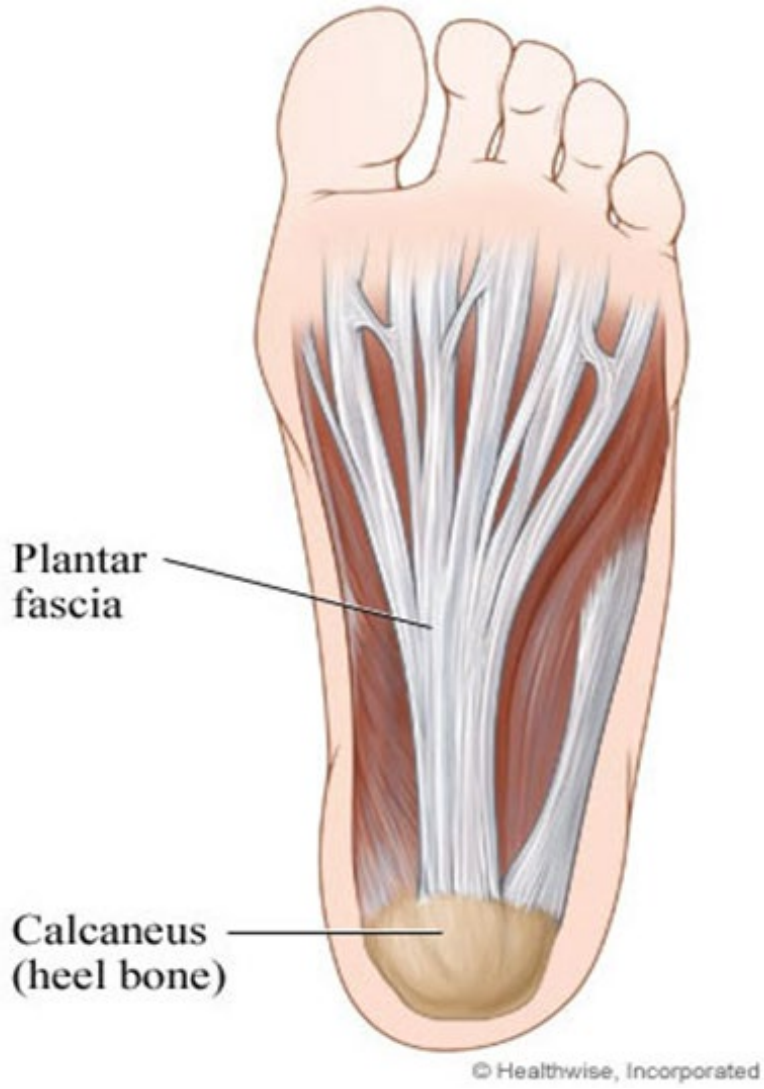

Fibula
Tibia
Forefoot
Midfoot
Hindfoot
Forefoot Midfoot Hindfoot
Fibula
Tibia

Range of Motion

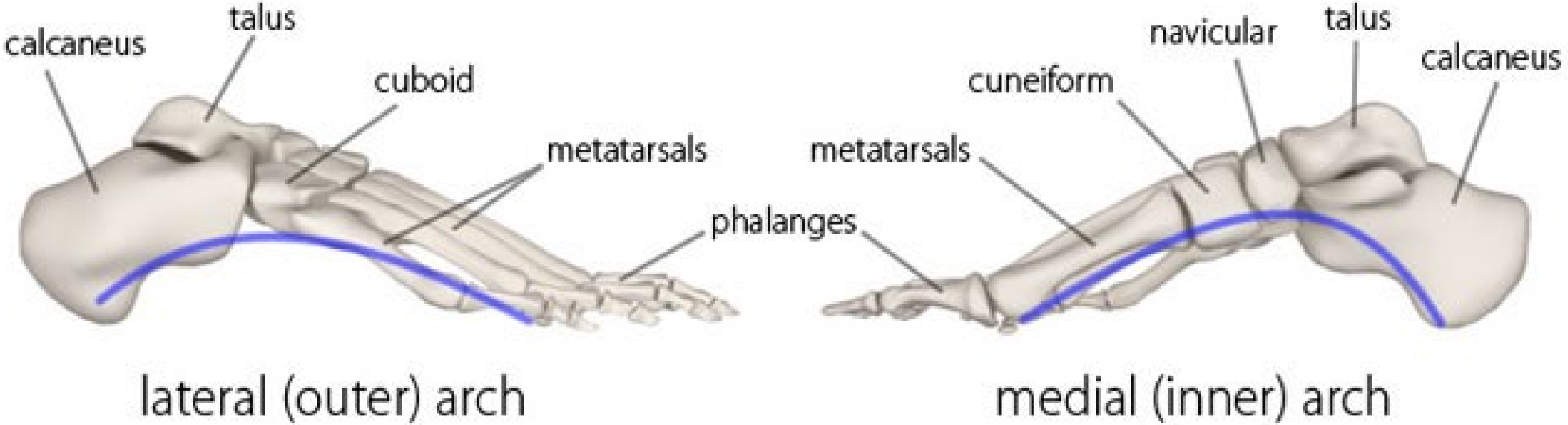


Plantar Fascia





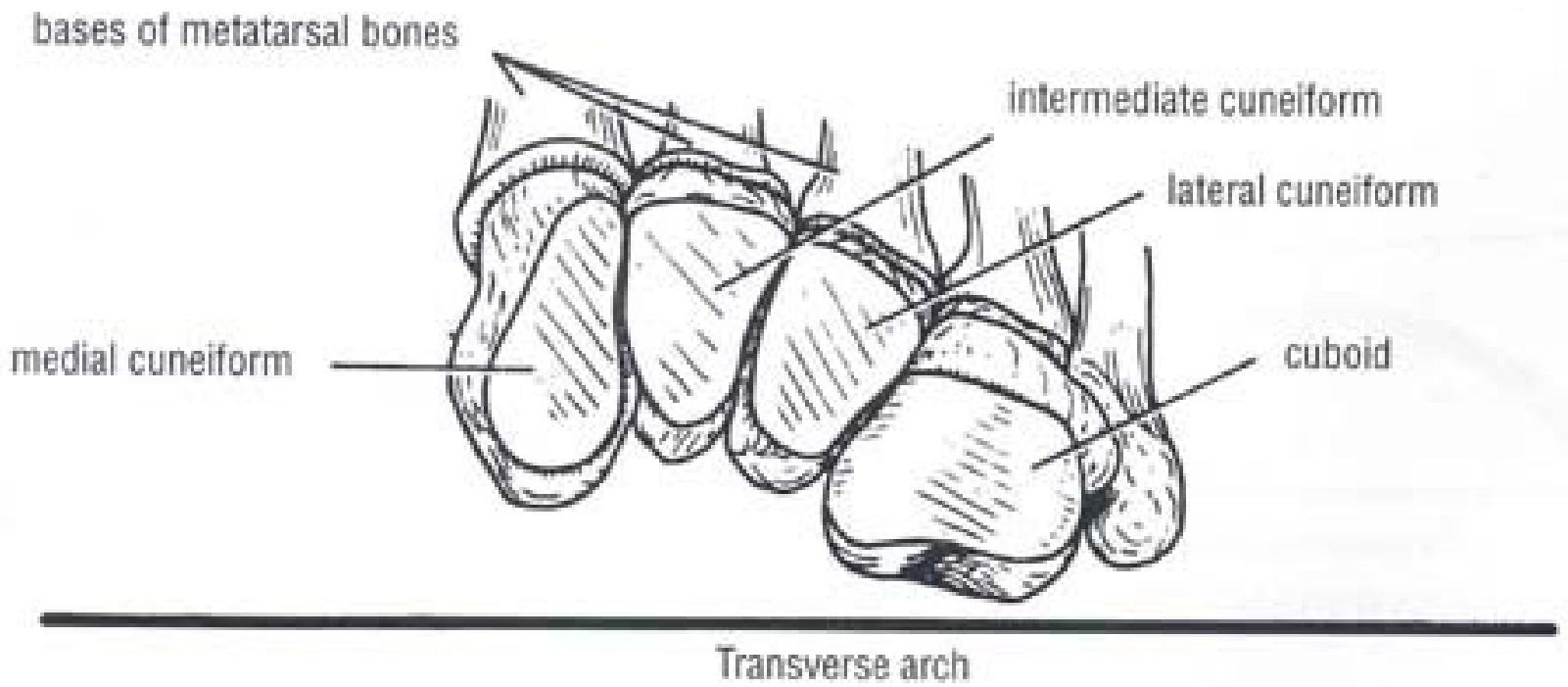
Arches of the foot



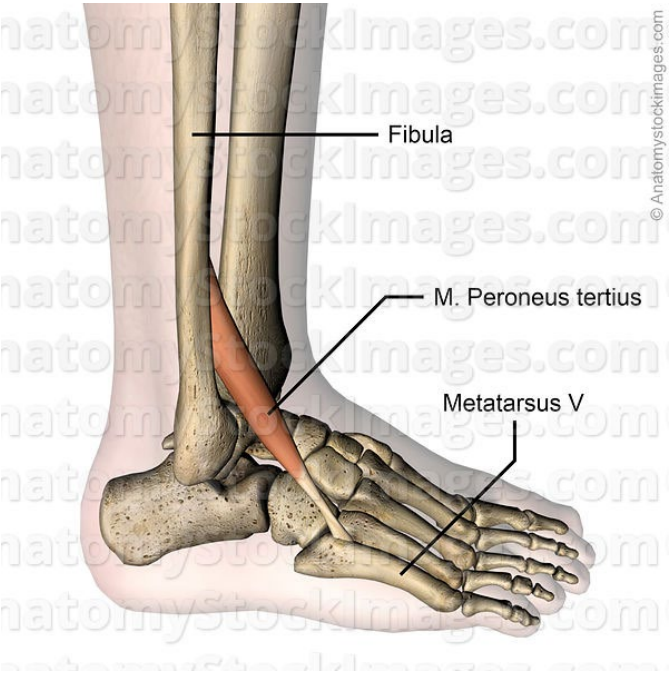
lateral (outer) arch

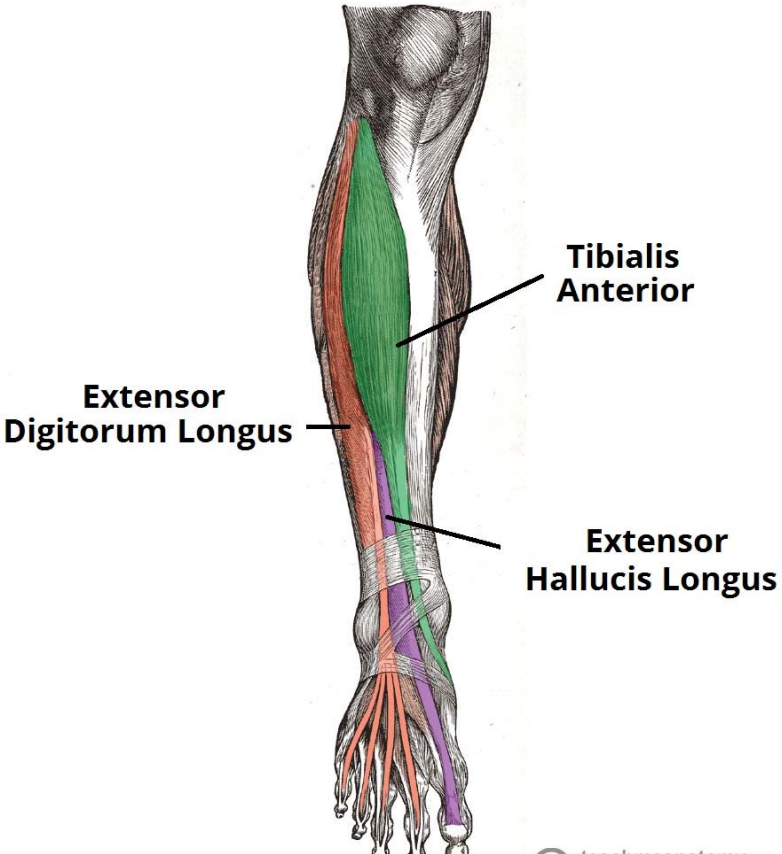
medial (inner) arch

Transverse Arch

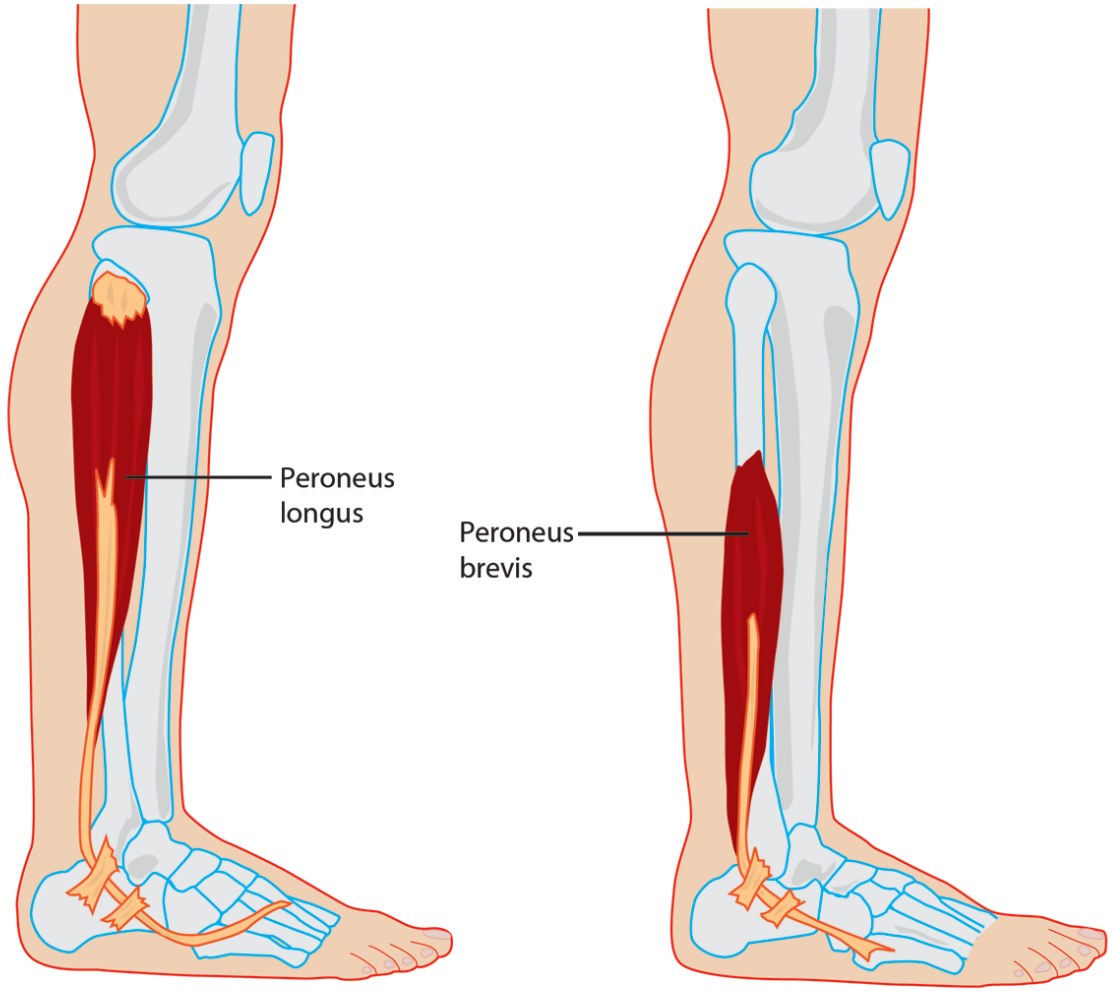


Extrinsic Muscles of the Foot
Anterior Compartment;
(deep peroneal nerve), a branch of the common fibular nerve.

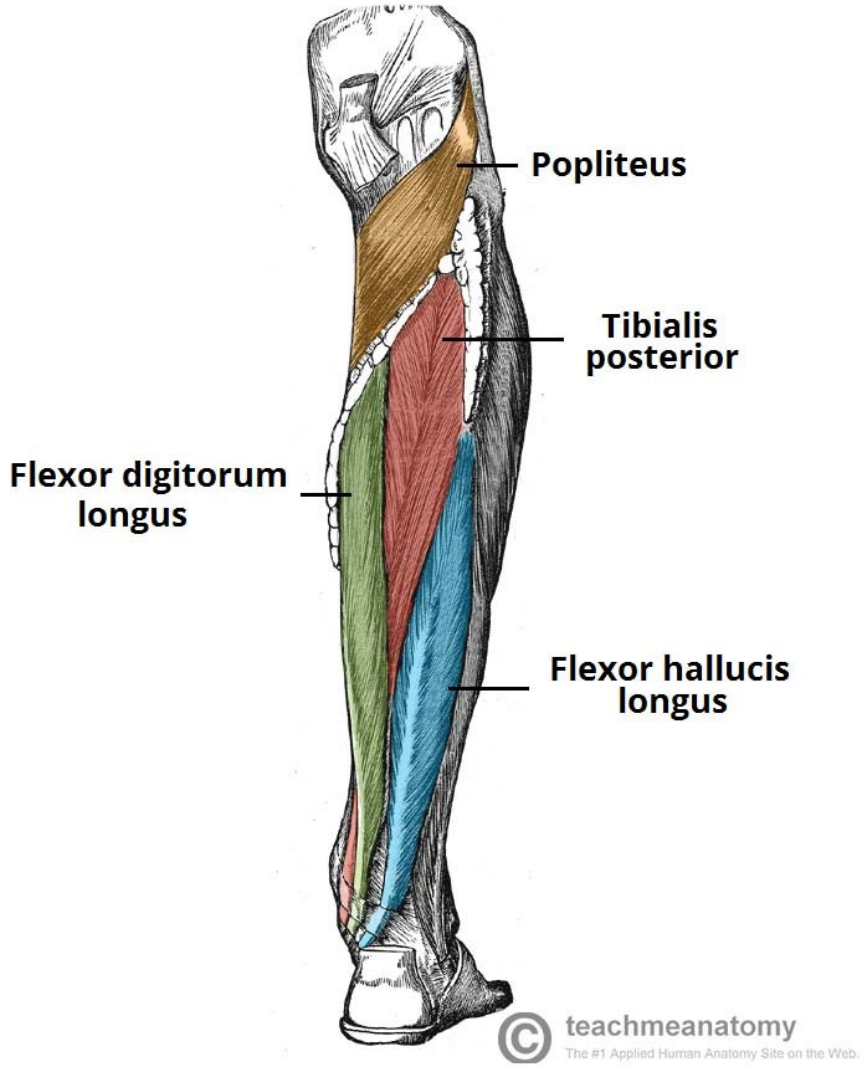




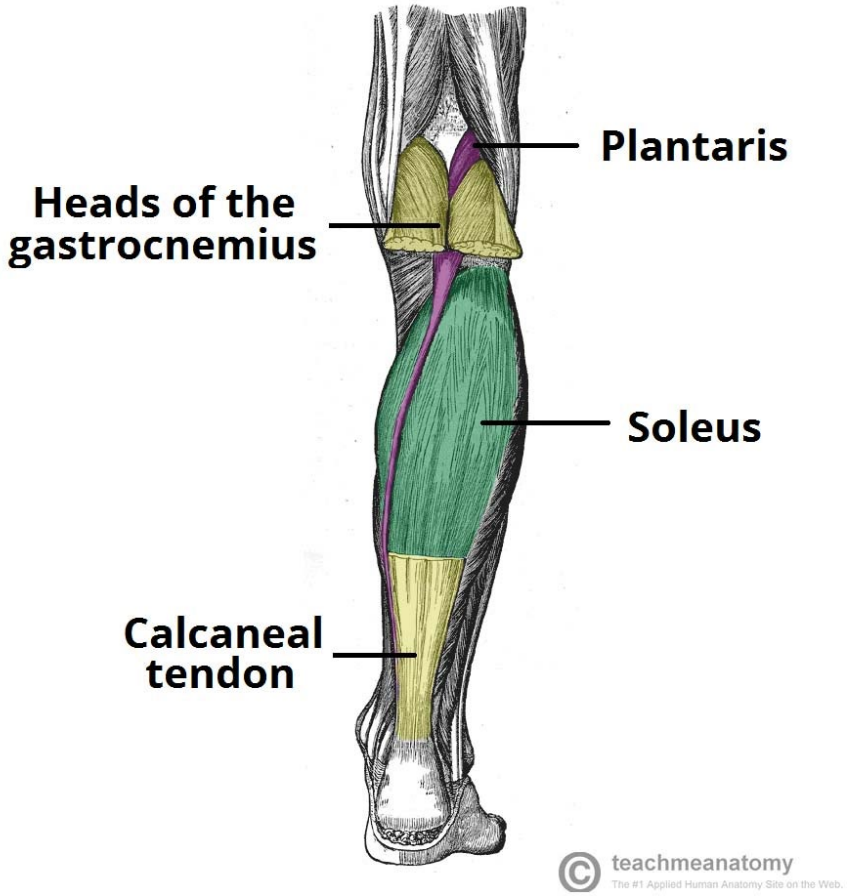
Lateral Compartment superficial peroneal nerve



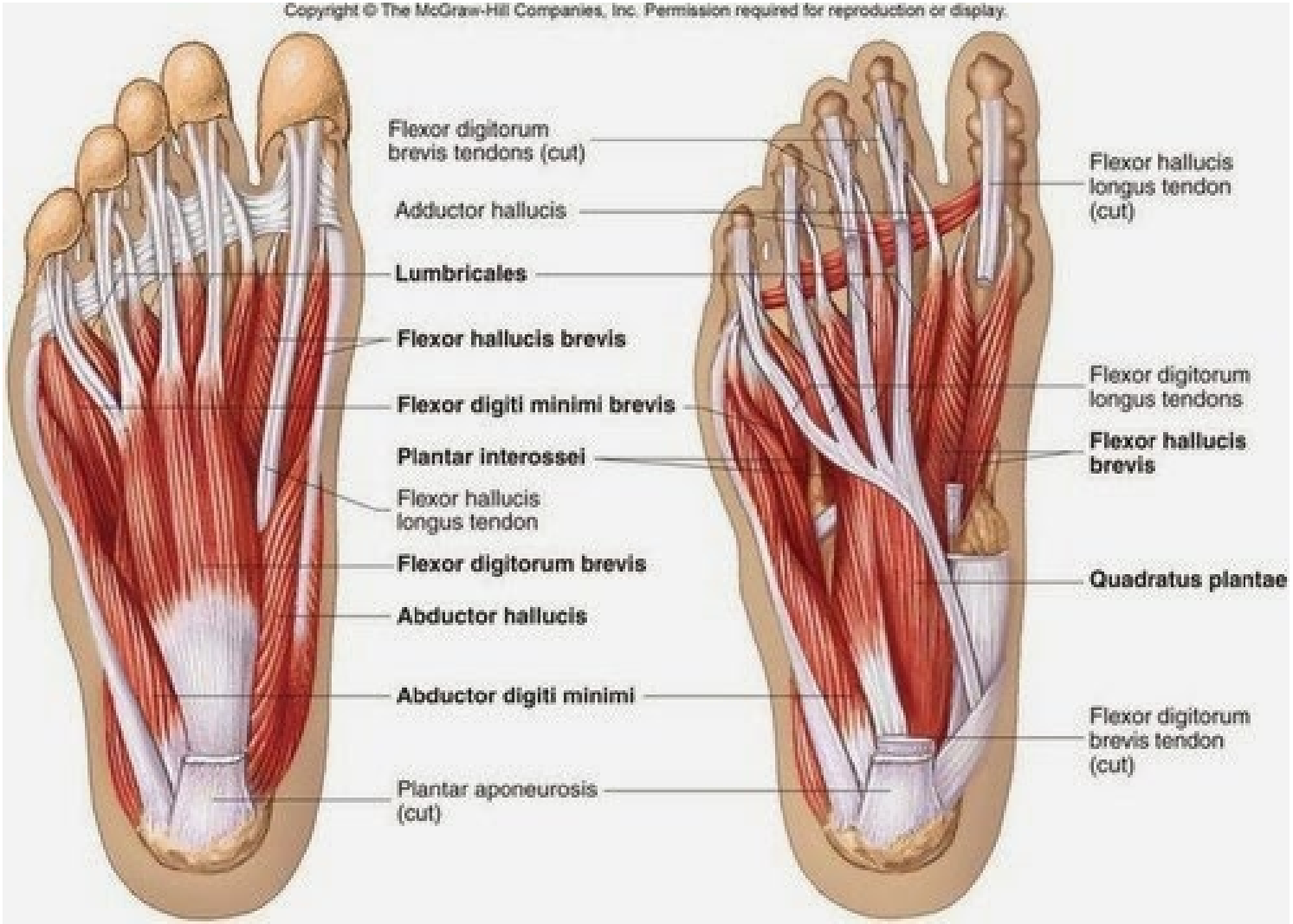
Deep Posterior Compartment
Tibial nerve, a terminal branch of the sciatic nerve.



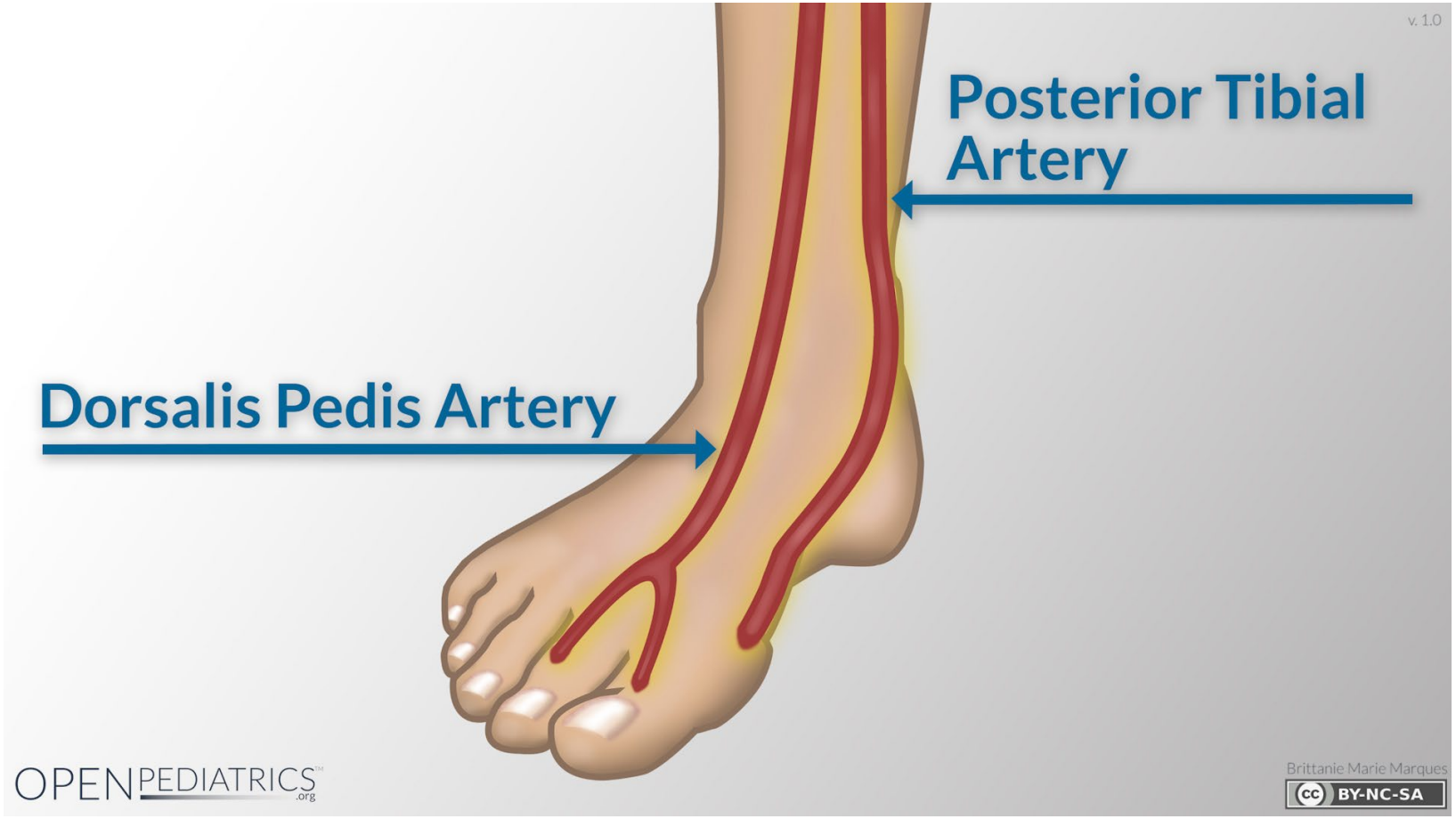
Superficial Posterior Compartment



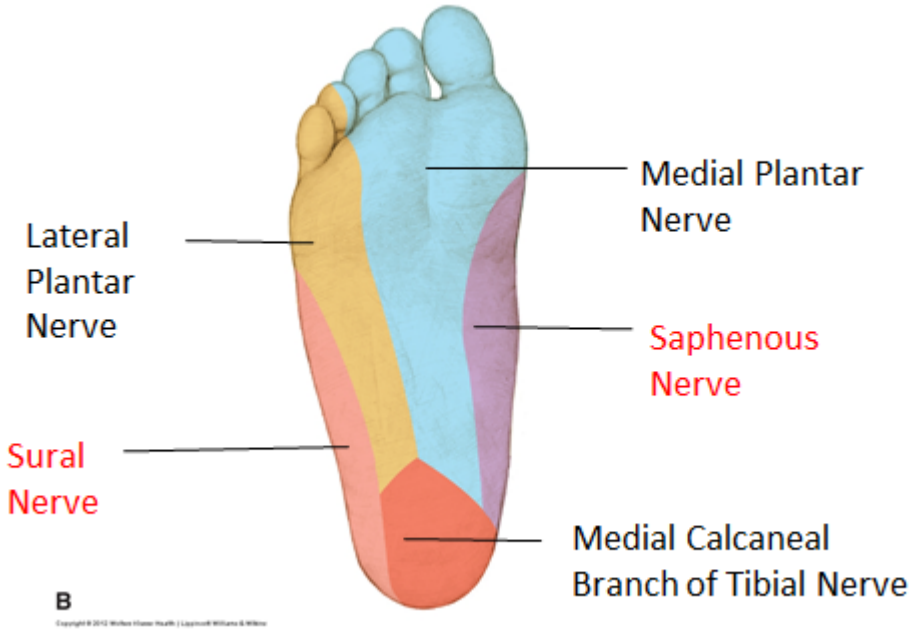
Intinsic Muscles
All of them are innervated either by the medial plantar nerve or the lateral plantar nerve, which are both branches of the tibial nerve.

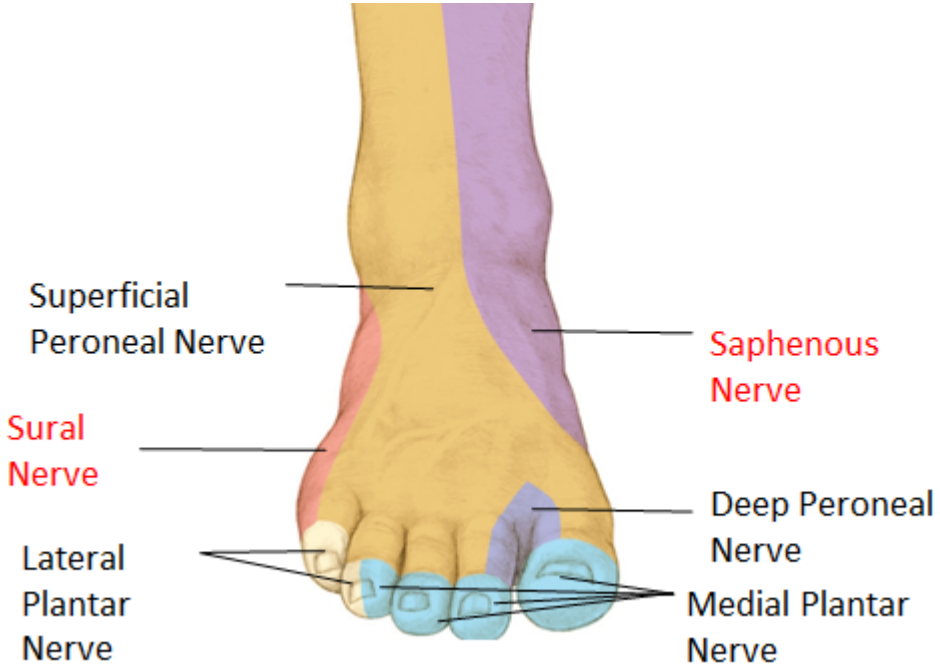


Neurovascular Bundle

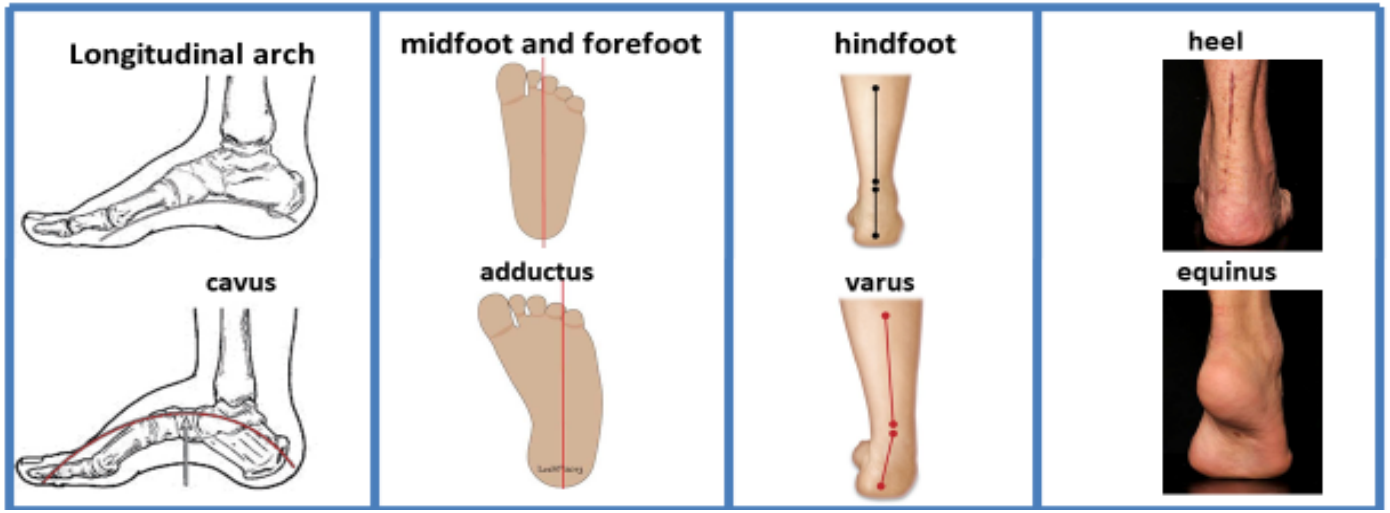


Sensation


Lateral Plantar Nerve
Medial Plantar Nerve
Saphenous Nerve
Sural Nerve
Medial Calcaneal Branch of Tibial Nerve
B


Superficial Peroneal Nerve
Saphenous Nerve
Sural Nerve
Deep Peroneal Nerve
Lateral Plantar Nerve
Medial Plantar Nerve

Club Foot
Congenital Talipes Equino Varus
CTEV



Etiology

- Increased in children with neuromuscular disorders, such as:
* **cerebral palsy**
* **myelomeningocele**
* **arthrogryposis**

- Oligohydramnios.

- Amniotic Band Syndrome.

Examine for DDH

X-ray

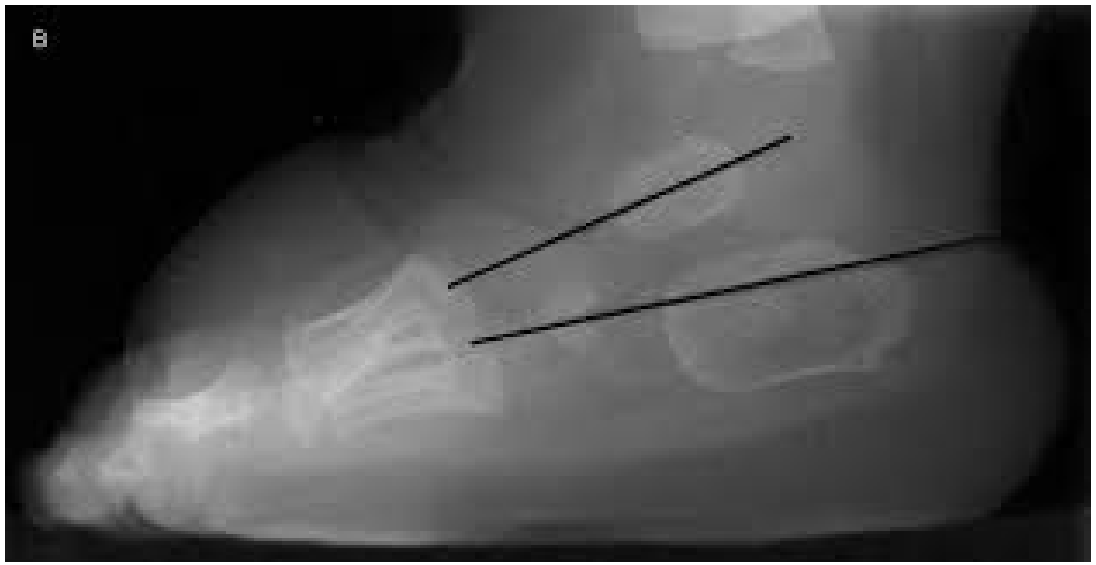
AP

Talocalcaneal angle (kite's) is < 20°

lateral

Talocalcaneal angle of < 35°
and flat talar head
(normal is around 40°)

- taken with the foot in forced dorsiflexion.




AP

Treatment

There are several methods of treatment, depends age of presentation and severity of the disease**, but relapse is common**, especially in babies with associated neuromuscular disorders.

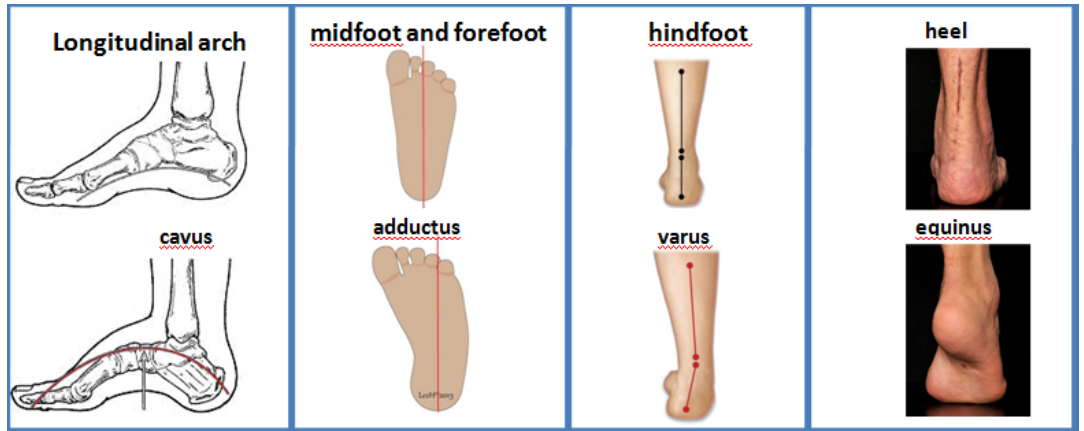
Ponseti method

The Treatment Phase

- Deformity is corrected completely
- Serial casting of lower limb using a strictly defined technique and weekly change of casts
- Manipulation
- Percutaneous tenotomy of tendo achilles

main components of the deformity are always corrected in the following order :

C A V E



The Maintenance Phase

* To prevent recurrence
- Bracing (abduction foot orthosis)
- physiotherapy

Operative

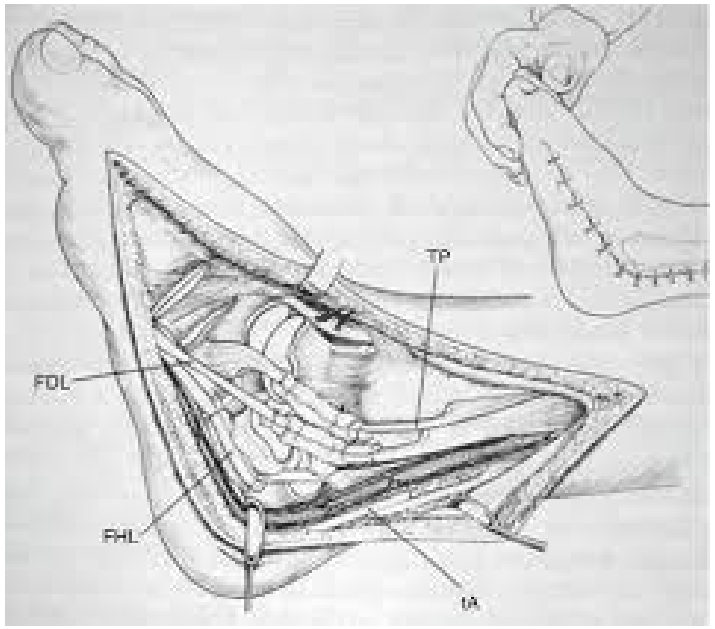
- Resistant cases will need surgery.

- The objectives are :

* complete **release of joint tethers** (capsular and ligamentous contractures, and fibrotic bands).

*** Lengthening of the tendons** so that the foot can be positioned normally without tension.

After operative correction, the foot is immobilized in its corrected position in a plaster cast.



- If not corrected early, 2ry growth changes occur in the bones & these are permanent.

- In late relapsed cases.

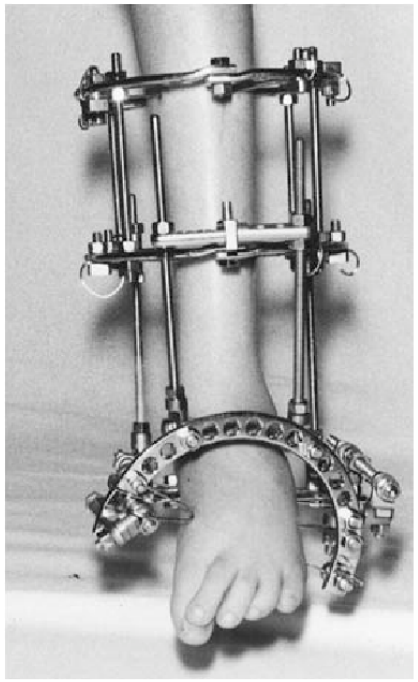


Fig. 1a

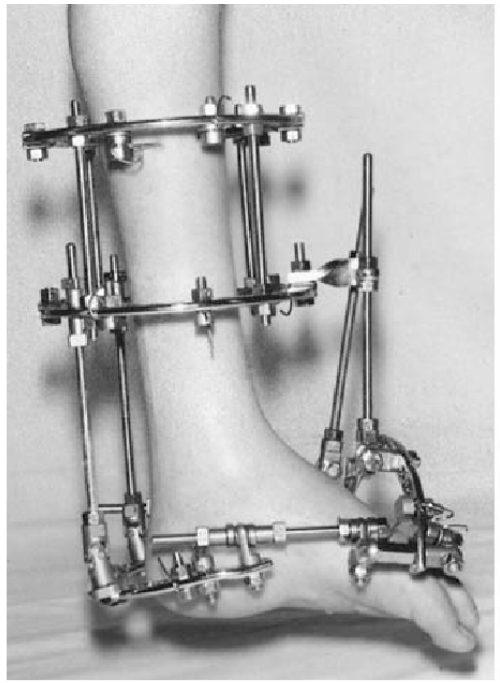


Fig. 1b

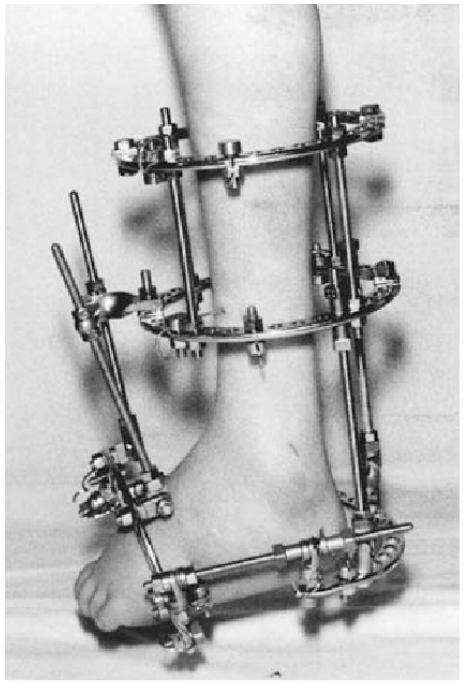


Fig. 1c

Anteroposterior (a) medial (b) and lateral (c) views of the frame

Flat foot (pes planus)

The term ‘flatfoot’ applies when

- The apex of the arch has collapsed.
- The medial border of the foot is in contact (or nearly in contact) with the ground.
- The heel becomes valgus.
- The foot pronates at the subtalar-midtarsal complex.

- FLAT FEET CAN produce
  - Tendonitis.
  - Arthritis.
  - Plantar fasciitis.
  - Bunions & Hammertoes.
  - Corns and callosities.

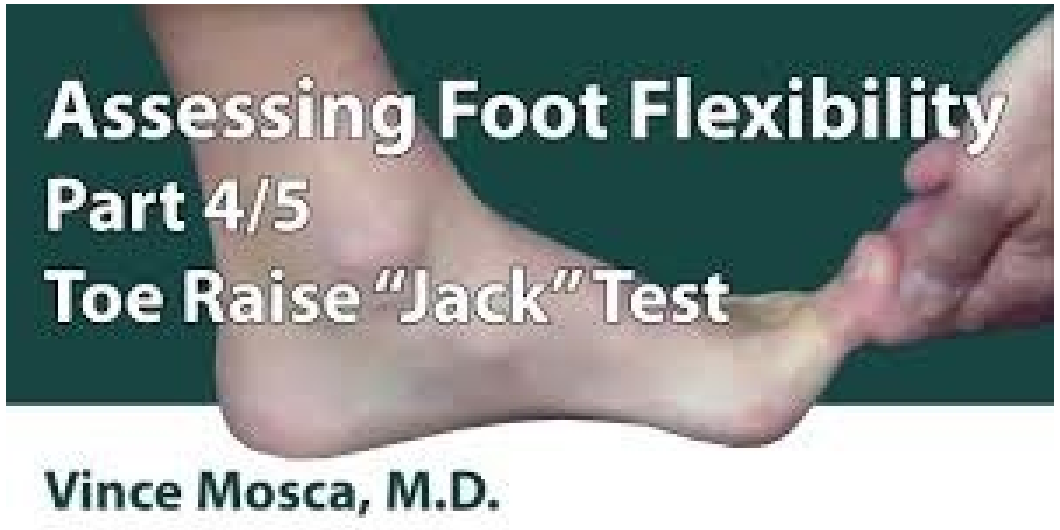
Physiological

Flexible Flat Foot

- Appears a normal stage in development.

- It usually disappears after a few years when medial arch development is complete, sometimes though it persists into adult life.

- The arch can often be restored by simply dorsiflexing the great toe (**jack's test**) and during this maneuver the tibia rotates externally.



- Many of the children with flexible flat-foot have ligamentous laxity and there may be a family history of both flat-feet, and joint hypermobility.

- Usually there is no symptoms.

- Management; stretching exercise and shoes inserts.

Infantile flat-foot

(congenital vertical talus / congenital convex pes valgus)

- It's a rare neonatal condition usually affects both feet.
- The foot is turned outwards (valgus) and the medial arch is not only flat, it actually curves the opposite way from the normal, the appearance of a "rocker-bottom" foot.
- The talus points almost vertically towards the sole; the forefoot is abducted, pronated and dorsiflexed, with subluxation of the talonavicular joint.
- Passive correction is impossible.

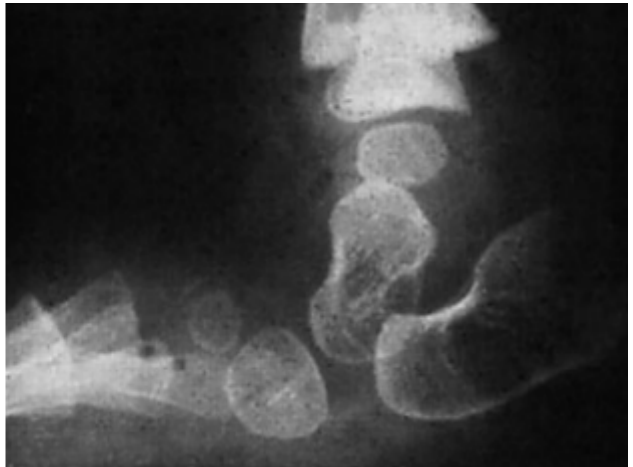
Infantile flat-foot

The x-ray features are characteristic :

- Talus point into the sole of the foot .
- The navicular bone is dislocated dorsally into the neck of talus.

It is important to repeat the lateral x-ray with the foot maximally plantarflexed; in congenital vertical talus the appearance will be unchanged, whereas in flexible flatfoot the dorsally subluxated navicular returns to the normal position.

- The only effective treatment is by operation, ideally before the age of 2 years.



Tarsal Coalition

- Structural anomaly between two or three tarsal bones causing a rigid flatfoot
- Congenital (most common)
- Acquired (trauma, degenerative and infections)

Pathoanatomic classification

Fibrous coalition (syndesmosis)

Cartilagenous coalition (synchondrosis)

Osseous coalition (synostosis)

Symptoms

- Asymptomatic

  Most coalitions are found incidentally

  75% of people are asymptomatic

- Pain worsened by activity

Age of onset

- Calcaneonavicular (most common)usually 8-12 years old.

- Talocalcaneal usually 12-15 years old

Management

- Nonoperative; observation, shoe inserts and immobilization with casting, analgesics.

- Operative; coalition resection with interposition graft, +/- correction of associated foot deformity or arthrodesis.

Acquired flat foot

- Posterior Tibial Tendon Dysfunction.
- Inflammatory arthritis, such as rheumatoid arthritis.
- ligament injuries, fractures and dislocations of the bones in the midfoot; Lisfranc injury.
- Diabetic Collapse (Charcot Foot).

Posterior Tibial Tendon Insufficiency (PTTI)

- Posterior tibial tendon insufficiency is the most common cause of adult-acquired flatfoot deformity.
- more common in women often presents in the sixth decade

Risk Factors

- Obesity.
- Hypertension.
- Diabetes.
- Increased age.
- Corticosteroid use.
- Seronegative inflammatory disorders.

Management

- Non operative;

Ankle foot orthosis.

Immobilization in walking cast/boot.

Custom-molded in-shoe orthosis.

- Operative

  Tenosynovectomy

  Tendon Transfer

  Arthrodesis

Hallux Valgus

- Hallux valgus is the commonest of the foot deformities.

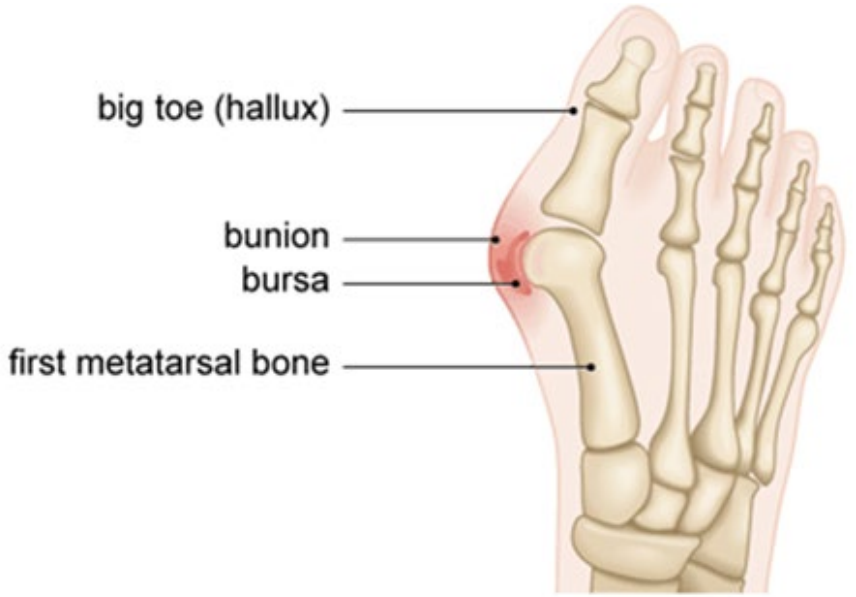
- varus angulation of the first metatarsal, predisposes to lateral angulation of the big toe in people wearing shoes and most of all in those who wear high-heeled shoe.

Hallux Valgus

- Hallux valgus is also common in rheumatoid arthritis, probably due to weakness of the joint capsule and ligaments.
- It may be due to loss of muscle tone in the forefoot in elderly people.
- positive family history in over 60 % of cases.

Hallux Valgus

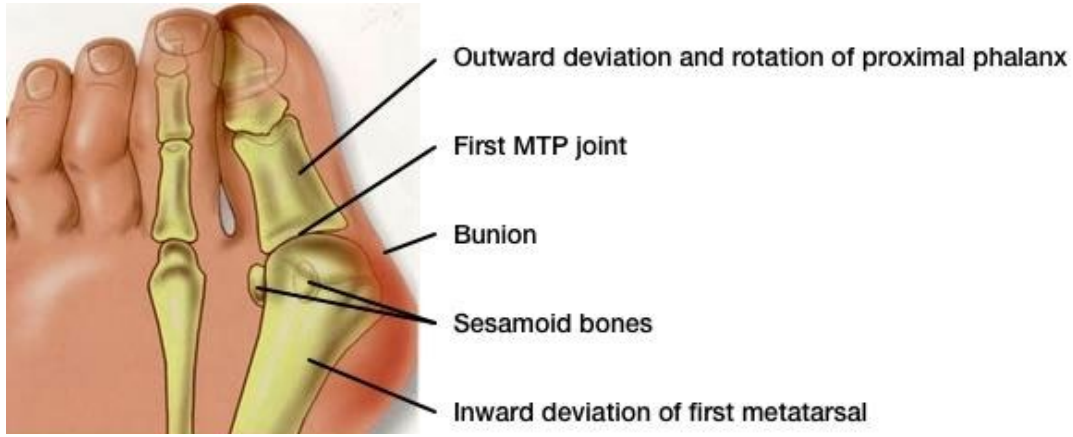
- - The elements of the deformity are :
- Lateral deviation and rotation of the hallux
- Prominence of the medial side of the head of the first metatarsal and overlying bursa which together forming a prominent bump or (a bunion)



Hallux Valgus

- Lateral deviation of the hallux may lead to **crowding** and deformity of the other toes and sometimes **overriding** of adjacent toes

- When the valgus deformity exceeds 30 or 40 degrees
*the great toe rotates into pronation so that the nail faces medially
*the sessamoid bones of flexor hallucis brevis are displaced laterally



Hallux Valgus

- The contracted adductor hallucis and the lateral capsule contribute further to the fixed valgus deformity

Hallux Valgus

Clinical features:

- Usually bilateral.

- Deformity.

- The commonest complaints are pain over the bunion

- Pain if present ,may due to :

*Shoe pressure on large or inflamed bunion.
*Splaying of the forefoot and muscle strain (metatarsalgia)
*Associated deformities of the lesser toes
*2ry osteoarthritis of first metatarsophalangeal joint

Hallux Valgus

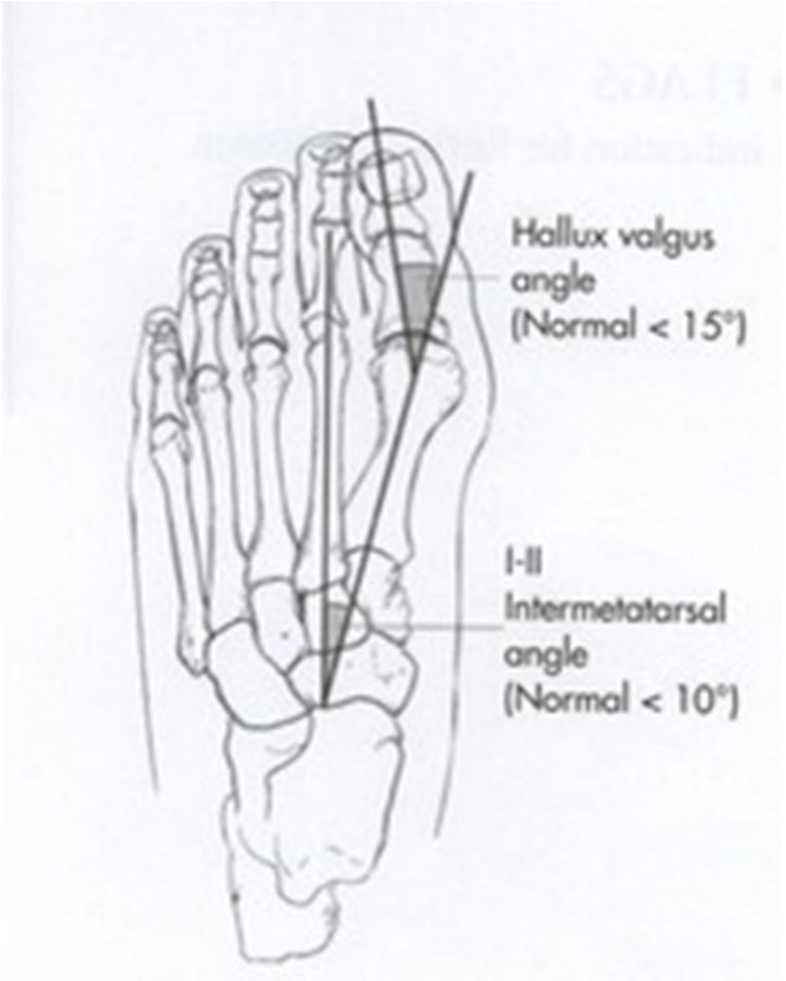
X-rays:

- Should be taken with the patient standing to show the degree of metatarsal and hallux angulation.

- The first metatarsophalangeal joint may be sublaxed, or it may look osteoarthritic.

- Lines are drawn along the middle of the first and second metatarsals and the proximal phalanx of the great toe

- Normally the intermetatarsal angle is less than 10 degrees



- The valgus angle at the MTP joint less than 15 degrees.

Management

- Conservative treatment is justified as a first measure.

- If deformity progresses, a corrective osteotomy of the first metatarsal and soft tissue rebalancing around the metatarsophalangeal joint may produce a satisfactory correction.

- Operative correction carries a 20-40% of recurrence rate

- If the metatarsophalangeal joint is osteoarthritic, arthrodesis of the joint may be better option.

Hallux Rigidus

- Arthritis of the first metatarsophalangeal joint.
- Presents with pain with axial loading and flexion/extension.
- Xrays will show osteoarthritic changes

Management

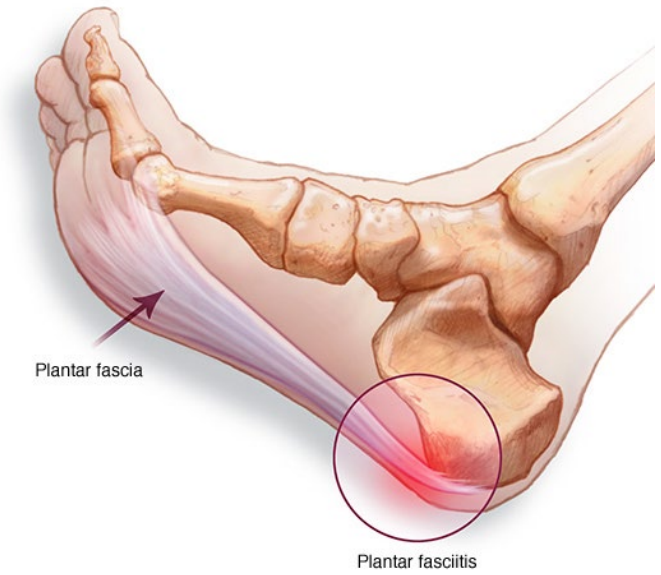
- Conservative treatment.
- Operative; arthrodesis.

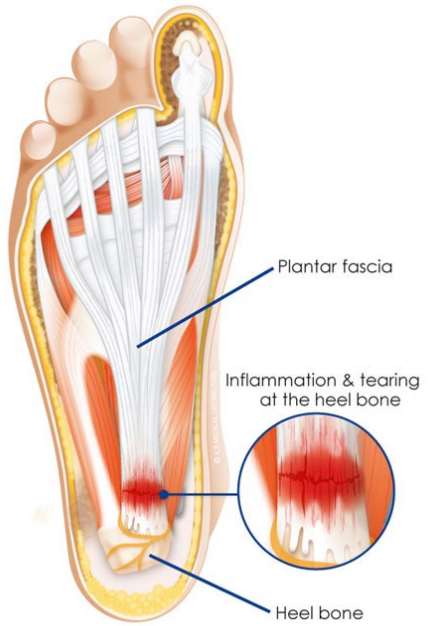
Planter Fasciitis

- A degenerative condition that may or may not be associated with inflammatory changes in the tissues.

- There may be micro-tears in the fascia, and the fascia thickens.

- There is pain and tenderness **in the sole of the foot**, mostly under the heel, with standing or walking.





Planter Fasciitis

- The condition usually comes on gradually, without any clear incident or injury.

  - sometimes associated with inflammatory disorders such as :
  *gout
  *ankylosing spondylitis
  *Reiter’s disease

Planter Fasciitis

History

- Morning pain
- pain on standing after prolonged sitting

Physical Exam

- Tenderness to palpation on the anteromedial aspect of the heel.
- Ankle dorsiflexion limited by calf tightness.
- Pain increased by toe extension or by standing on toes.

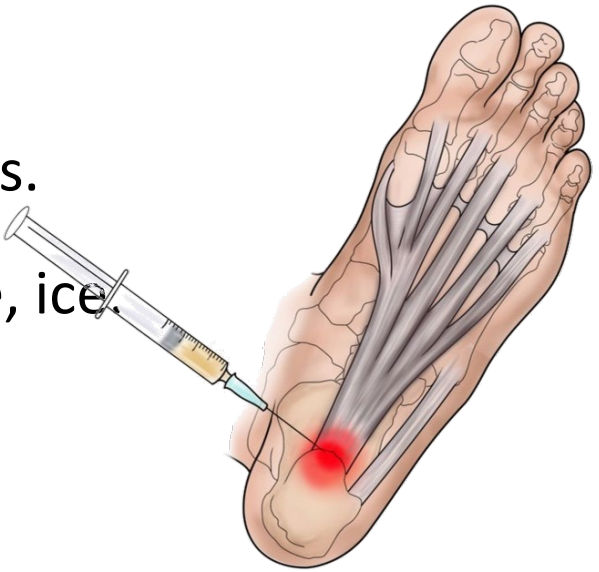
Planter Fasciitis

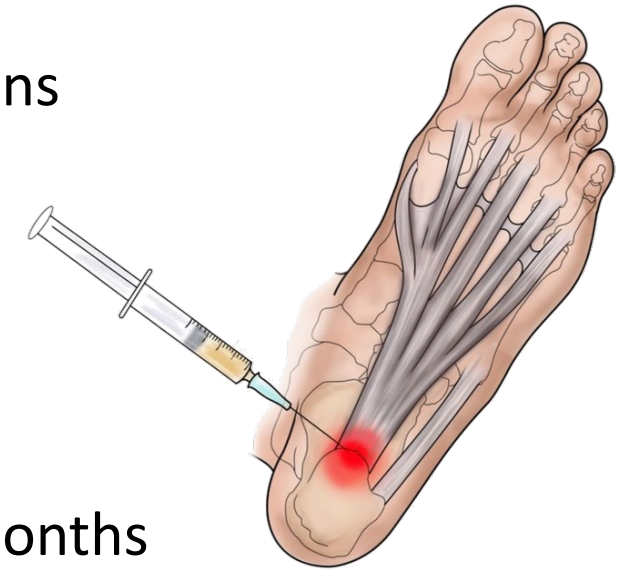
- Risk Factors
  *Obesity
  *Occupation requiring prolonged standing
  *Pes planus or cavus
  *Calf tightness
  *Toe runners, running up hills or in sand
  *Rapid change in activity level: intensity or duration
  *Lack of warm up or cold weather

Planter Fasciitis

Treatment :

- Activity modification.
- Shoe inserts / orthotics / taping / supportive shoes.
- Night splints.
- Stretching program: arch, calf, soft tissue massage, ice.
- NSAIDS.
- Corticosteroid injections
- Shock wave therapy





Prognosis

- 80% are better in 12 months
- Surgical intervention is rare

ACHILLES TENDINITIS

- pain and swelling around the tendo Achillis, due to local irritation of the tendon sheath.

  - may come on gradually, or rapidly following a change in sporting activity (or a change of sports footwear), less commonly there is a history of direct trauma to the Achilles tendon.

  - If the onset is very sudden, suspect tendon rupture.

ACHILLES TENDINITIS

Management

- Rest
- Stretching and later strengthening of the calf muscles
- Switching to a different, less strenuous sport
- Icing
- Physical therapy, ECSW
- Anti-inflammatory medication.
- Wearing a shoe with a built-up heel to take tension off Achilles tendon

ACHILLES TENDON RUPTURE

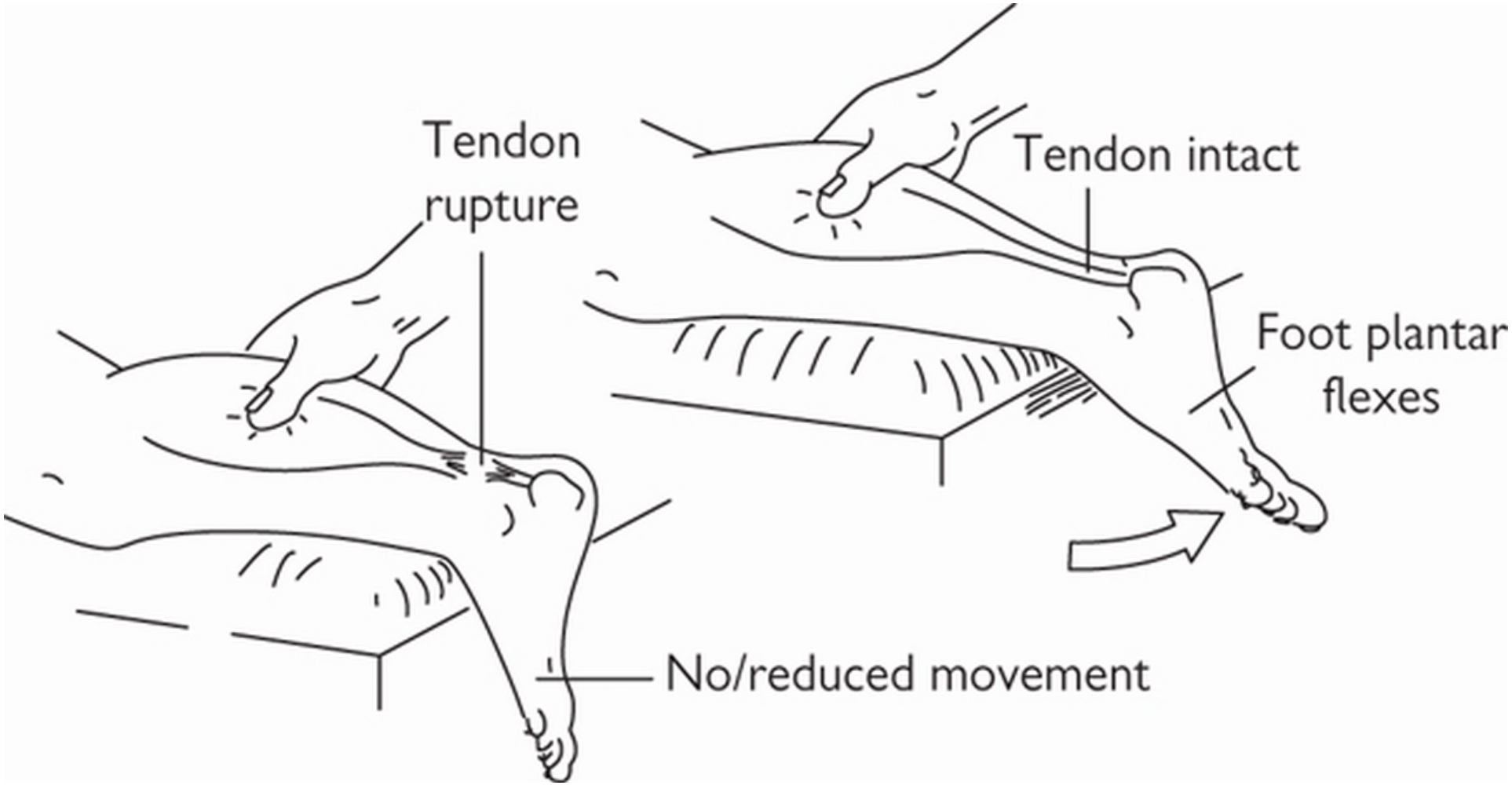
- A ripping or popping sensation is felt, and often heard, at the back of the heel.

- The typical site for rupture is at the vascular watershed about 4 cm above the tendon insertion.

- Plantarflexion of the foot is usually inhibited and weak

- There is often a palpable gap at the site of rupture; bruising comes out a day or two later.

The calf squeeze test (Thompson's or Simmond's test) is diagnostic



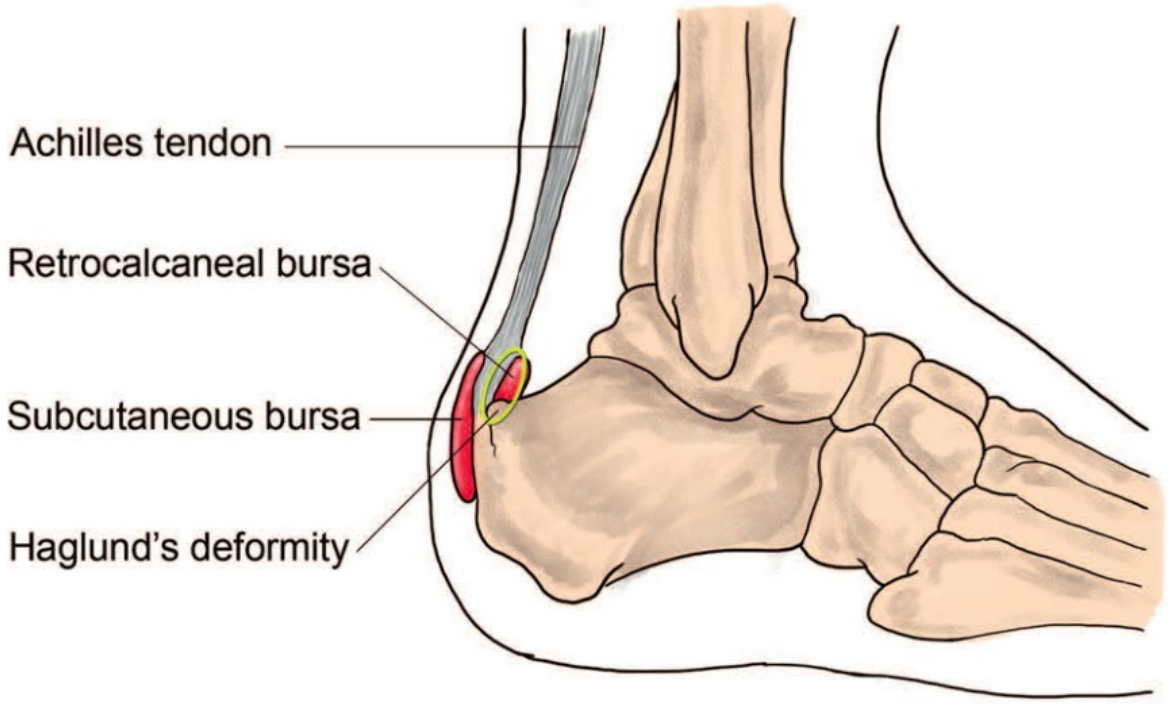
ACHILLES TENDON RUPTURE

Management

- Surgical; direct repair of achillis tendon
- Conservative; cast with the foot in plantar flexion

Retrocalcaneal bursitis

- Retrocalcaneal bursitis is inflammation of the bursa between the anterior aspect of the Achilles and posterior aspect of the calcaneus.
- Haglund deformity an enlargement of the posterosuperior tuberosity of the calcaneus.



Physical exam

- Pain localized to anterior and 2 to 3 cm proximal to the Achilles tendon insertion
- Fullness and tenderness medial and lateral to tendon
- Pain with dorsiflexion
- Bony prominence at Achilles insertion

Management

- Nonoperative

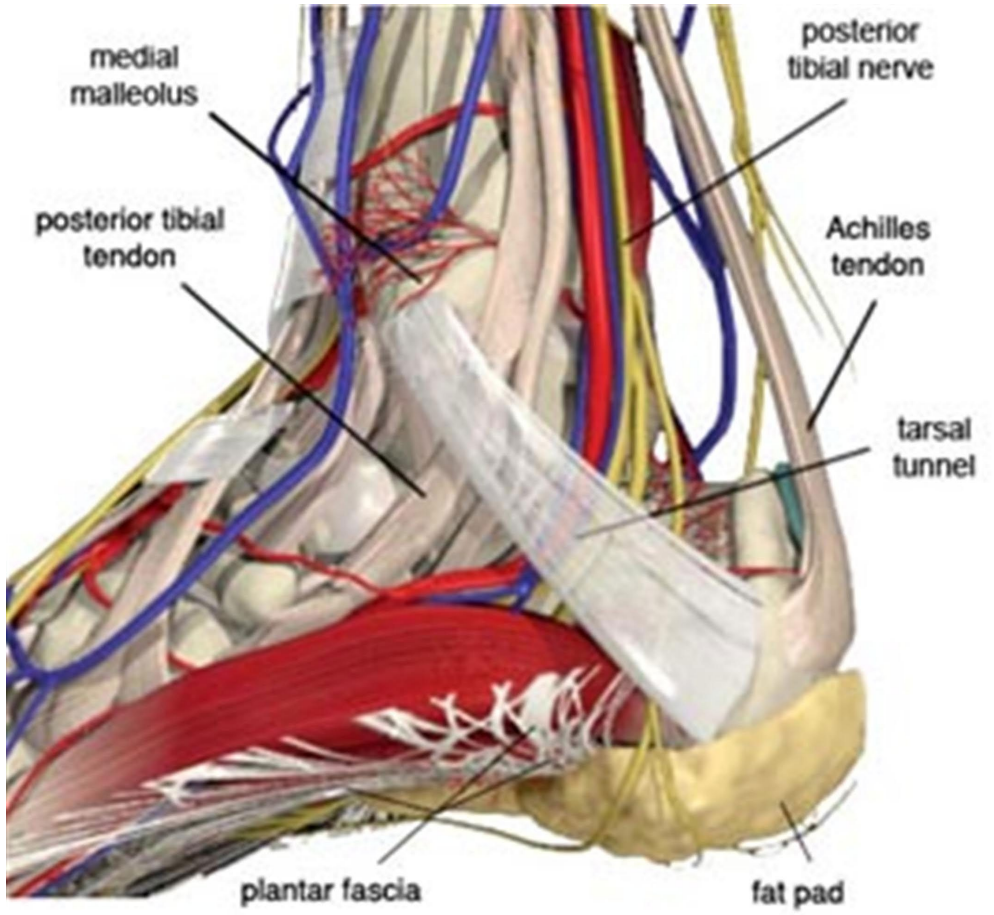
  Activity modification, shoe wear modification, physical therapy, NSAIDs.

- Operative

  Retrocalcaneal bursa excision and resection of Haglund deformity.

Tarsal Tunnel Syndrome

- Compressive neuropathy caused by compression of the tibial nerve.
- Pain with prolonged standing or walking; often vague and misleading medial foot pain.
- sharp, burning pain in the foot.
- Numbness and intermittent paresthesias.



Management

- Nonoperative

  Lifestyle modifications, bracing, and NSAID medications

- Operative; surgical release of tarsal tunnel.

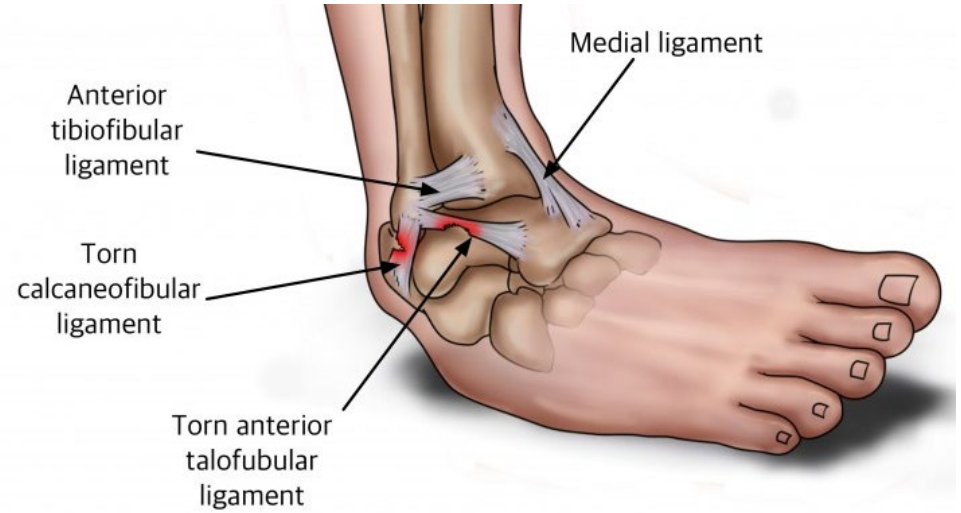
Ankle sprain (twisted ankle)

- Ankle sprains are the most common type of ankle injury.

- Inversion injury most common mechanism.

* eversion ankle sprain is more severe, with greater instability.

- types :
*Lateral (Inversion) Sprains
*Medial (Eversion) Sprains
*High (Syndesmotic) Sprain



*Pain.

*Swelling.

*Ecchymosis.

*Inability to walk.

*Ankle Instability.

Classification of Low Ankle Sprains

	Ligament disruption	Ecchymosis and Edema	Pain with Weight Bearing
Grade 1	None	Minimal	Normal
Grade 2	Stretch without tear	Moderate	Mild
Grade 3	Complete tear	Severe	Severe

From Orthobullets.com/foot-and-ankle/7028/low-ankle-sprain

Toes deformities

- Hammer toe is an abnormal flexion posture of the proximal IPJ.

- Patient present with ulcer or callosities over proximal IPJ

Claw toe deformity

- Abnormal extension posture of the MTP and flexion of the PIPJ and DIPJ.

- Caused by imbalance of the extrinsic and intrinsic muscles of the toes.

Thank You