

وسهلا

أهلا



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Ankle joint

Lower end
of tibia

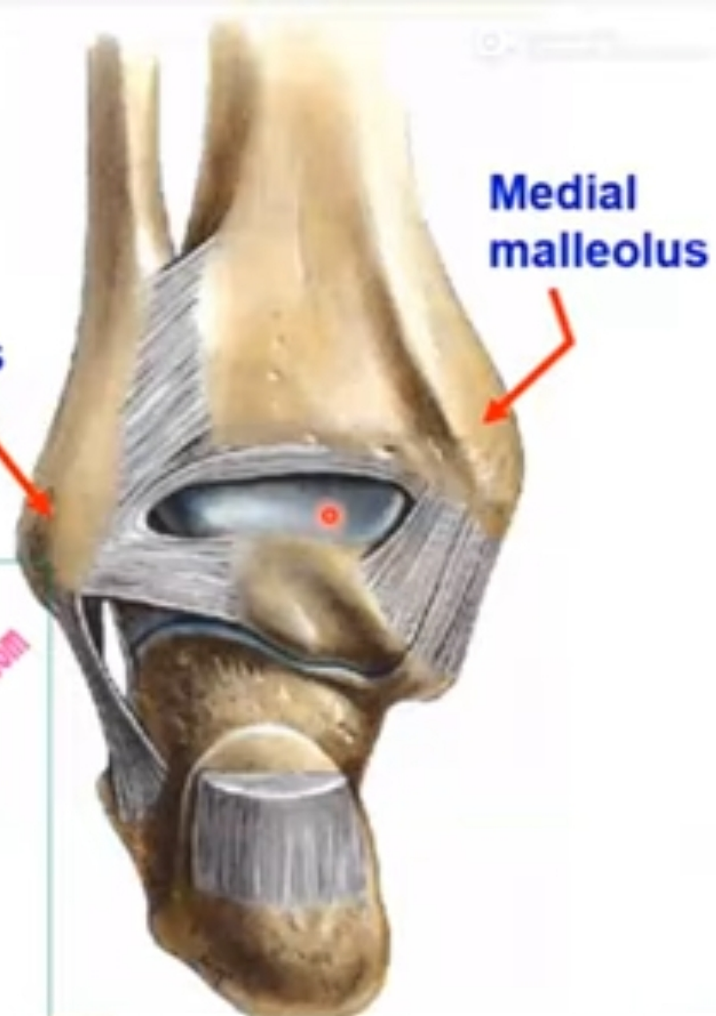
Lateral
malleolus



Medial
malleolus

Lateral
malleolus

Medial
malleolus



- **Ankle Joint**

I- Type; Synovial joint, hinge variety.

II- Articular surfaces

A- Superior articular surface:

- 1) Lower end of the tibia.
- 2) Lateral surface of the medial malleolus.
- 3) Medial surface of the lateral malleolus.

Articular surface of Talus

Superior trochlear surface articulates with lower end of tibia



Coma shape articulates with medial malleolus



Triangle shape articulates with lateral malleolus



- **Capsule:** surrounds the articular surfaces.
- **Synovial membrane:** lines the capsule.

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Ligaments of Ankle joint

❖ Deltoid (medial) ligament

triangular in shape and a very strong ligament

Excessive **eversion** leading to sprain of the joint and tear off the medial (deltoid) ligament

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Medial malleolus

Posterior tibiotalar part

Anterior tibiotalar part

1- Neck of talus

5- Body of talus

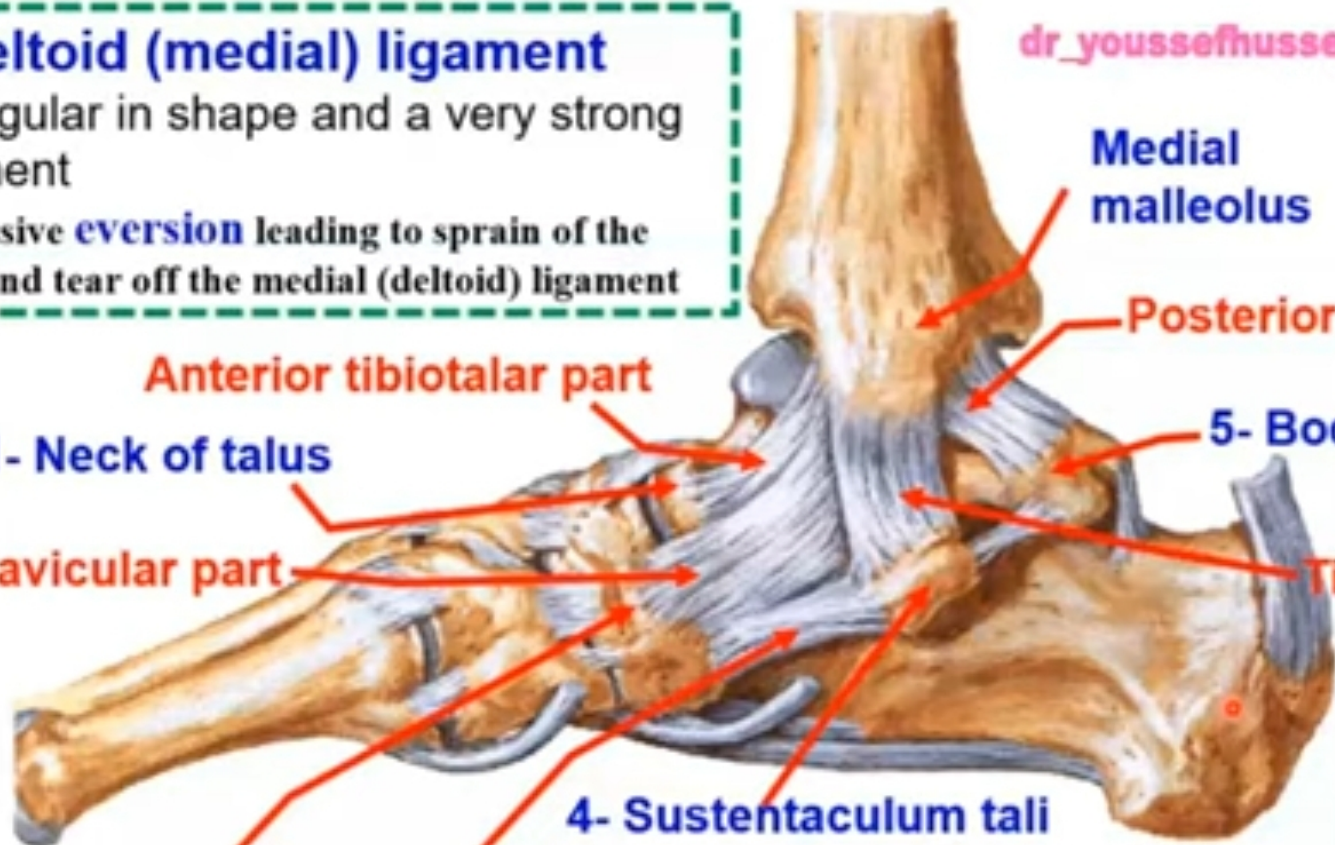
Tibionavicular part

Tibiocalcaneal part

4- Sustentaculum tali

2- Navicular bone

3- Spring ligament
plantar calcaneonavicular



Posterior talofibular to lateral tubercle of talus

Lateral malleolus

❖ Lateral ligament

- ❖ It is formed of three bands attached to the lateral malleolus of fibula
- ❖ Excessive **inversion** leading to sprain of the joint and tear off the lateral ligament

Anterior talofibular to neck of talus

Calcaneofibular to the lateral surface of calcaneus

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Relations of Ankle joint

Anterior relations

Tibialis anterior

Extensor Hallucis longus

Anterior tibial vessel ,nerve.

Extensor digitorum longus

Peroneus tertius

Extensor retinacula

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Posteromedial relations

Flexor hallucis longus

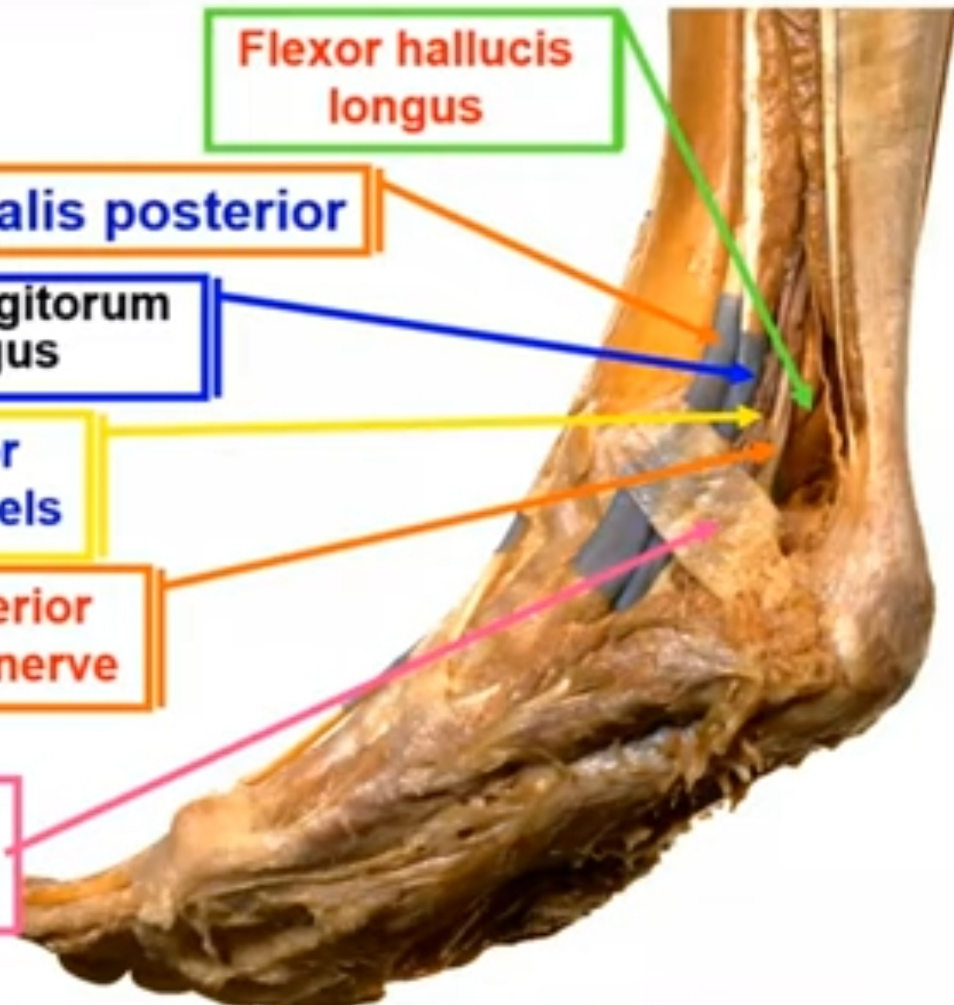
Tibialis posterior

Flexor digitorum longus

Posterior tibial vessels

Posterior Tibial nerve

Flexor retinaculum



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Posterior relations

Lateral relations

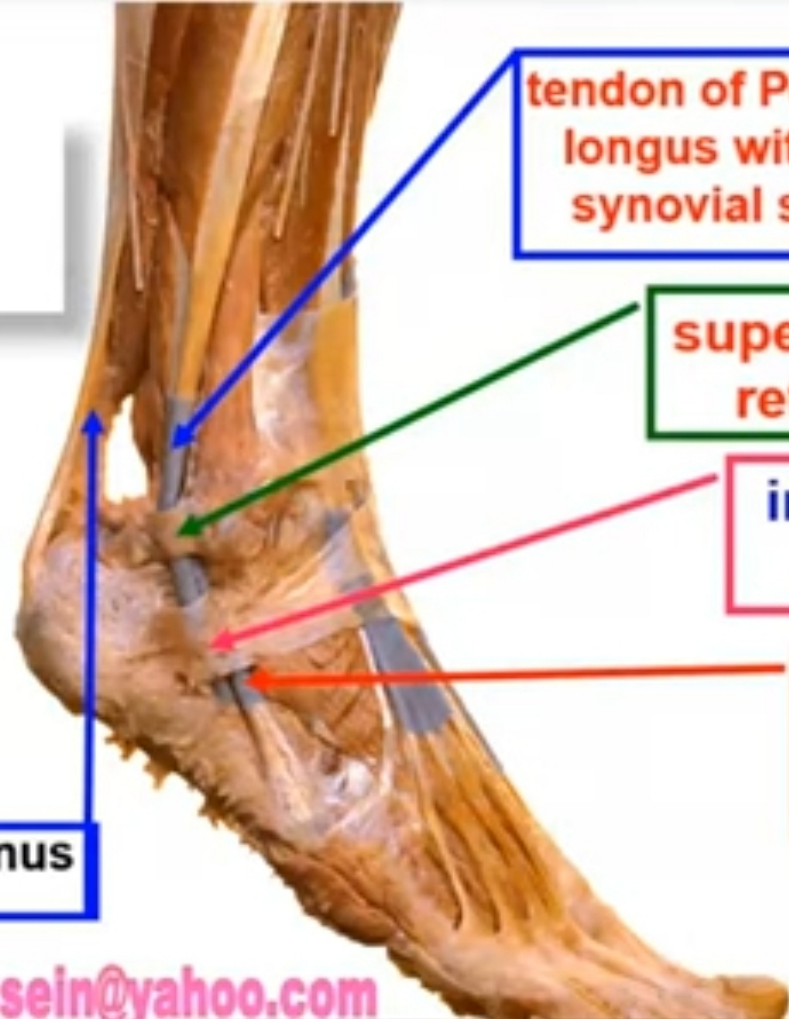
tendon of Peroneus longus within its synovial sheath

superior peroneal retinaculum

inferior peroneal retinaculum

tendon of Peroneus brevis within its synovial sheath

Tendocalcaenus



- **Movements of the ankle joint**

A- Dorsiflexion: by the muscles of the anterior compartment of the leg
1- Tibialis anterior, 2- Extensor hallucis longus., 3- Extensor digitorum longus.,4- Peroneus tertius)

dorsiflexion



Plantar flexion

B- Plantar flexion by muscles of the posterior compartment of the leg
(1- Tendocalcaneus. 2- Tibialis posterior. 3- Flexor Digitorum longus. 4- Flexor Hallucis longus)

- **Locking and unlocking of the ankle joint:**

a- Locking, during **dorsiflexion**, the **wide anterior part** of the trochlear surface of the talus is lodged into the **narrow posterior part** of the superior articular surface (socket).

b- Unlocking, during **plantar flexion**, the **narrow posterior part** of the trochlear surface is lodged in the **wide anterior part** of the superior articular surface. In this position, the foot can be moved slightly from side to side.

❖ Blood supply

❖ Anastomoses around the ankle joint

- **Branches of the anterior tibial artery.**
 - **Anterior medial malleolar** artery.
 - **Anterior lateral malleolar** artery.
- **Branches of dorsalis pedis artery.**
 - Medial **tarsal** artery.
 - Lateral **tarsal** artery.
- **Branches of posterior tibial artery.**
 - Posterior medial malleolar branches.
 - Medial Calcanean branches
- **Branches of peroneal artery.**
 - Perforating branches.
 - Lateral Calcanean branches.
- **Terminal branches of posterior tibial artery;**
 - Medial **plantar** artery.
 - Lateral **plantar** artery.

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Tibiofibular joints

- **Tibiofibular Joints**

- 1- Superior (Proximal) Tibiofibular Joint**

- * **Type:** synovial joint, plane variety.
- * **Articular surface:** head of fibula and fibular facet on the lateral condyle of the tibia.
- * **Movement allowed,** sliding movement.

- 2- Middle Tibiofibular Joint**

- This is the interosseous membrane between of the tibia and fibula.
- **Openings:** 1- At its upper part for anterior tibial vessels
2- Two inches above ankle joint for perforating branch of peroneal artery

- 3- Inferior (Distal) Tibiofibular Joint**

- * **Type;** fibrous joint (syndesmosis).
- * **Articular bones;**
 - 1- Rough impression on the medial side of the lower part of the fibula.
 - 2- Fibular notch on the lower end of tibia.
- * **Movements,** it is an immobile.



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Talocalcaneonavicular joint

Phalanges

**Dorsal aspect
bones of foot**

**3 cuneiform
bones**

**Metatarsal
bones**

Navicular

cuboid

Talus

Calcaneus



Talocalcaneonavicular joint

Ball & socket synovial

Synovial joint

Head of talus

Articular surface;

a- Ball is formed by the head of the talus.

b- Socket is formed by navicular bone, upper surface of the spring ligament, sustentaculum tali and superior surface of the calcaneus.



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Navicular bone

Spring ligament

Sustentaculum tali

Superior surface of calcaneus

- **Spring ligament (Plantar calcaneonavicular); Medial**
 - Extends from the sustentaculum tali to the navicular bone.
 - Its upper surface articulate with the head of the talus in talocalcaneonavicular joint.
 - It maintains longitudinal arch of foot.



Lateral view

❖ **Bifurcate ligament (lateral):** strong Y shaped attached

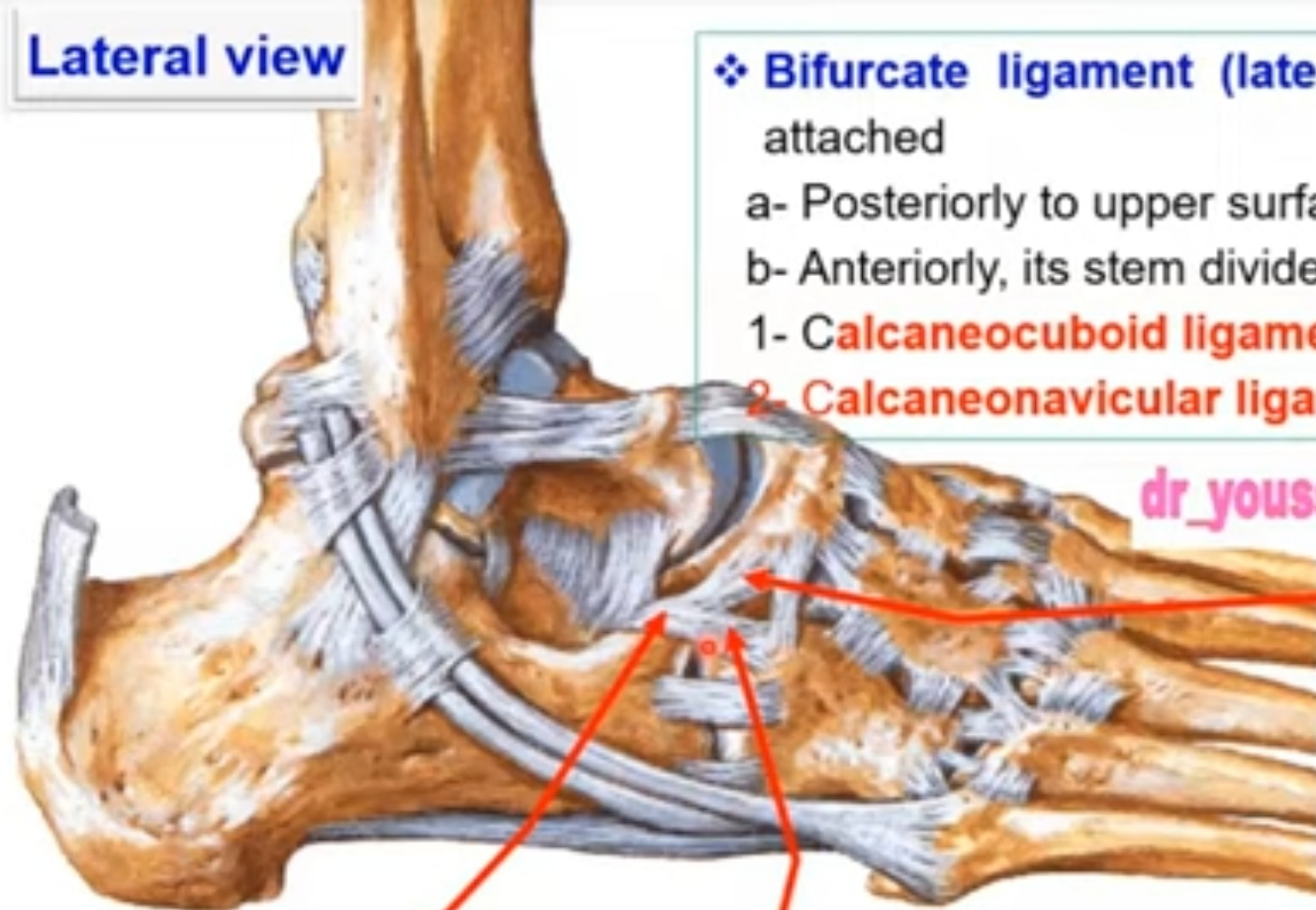
a- Posteriorly to upper surface of calcaneus

b- Anteriorly, its stem divides into 2 limbs:

1- **Calcaneocuboid ligament** to cuboid .

2- **Calcaneonavicular ligament** to navicular

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Calcneonavicular

Bifurcate ligament — Calcneocuboid



Long plantar ligament

Short plantar ligament

- **Short plantar ligament:** connects the **calcaneus** (heel bone) with the plantar surface of **cuboid**.
- **Long plantar ligament:** a strong ligament
 - Its posterior end (narrow) attached to the plantar surface of the **calcaneus**.
 - Its anterior end to the bases of the 2nd, 3rd and 4th and 5th **metatarsal bones**.
- * **Function;** It plays an important role in supporting the longitudinal arch of the foot.

• Inversion and eversion of the foot

1- Inversion; medial rotation of the foot and the sole looks inwards. It is done by

- a) **Tibialis** anterior.
- b) **Tibialis** posterior.
- c) Flexor **hallicus** longus.
- d) Extensor **hallicus** longus.

2- Everson: Lateral rotation of the foot and the sole looks outwards (laterally); It is done by


- a) **Peroneus** longus.
- b) **Peroneus** brevis.
- c) **Peroneus** tertius.



**** Significance:** They occur at talocalcaneonavicular joint, mainly during walking on the **rough** ground.

N.B:- The degree of inversion is more than eversion because Lateral malleolus is Lower than the medial malleolus

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Mechanism of walking

Stance phase

①



Weight bearing foot

②



Heel off

A- Stance phase;

- Occupies 60% of gait cycle

1- **Weight bearing foot:** The foot is on the ground.

2- **Heel off:** The weight of the body is transmitted forwards from the heel to the metatarsal bones.

- The heel is elevated but the toes is still in contact with the ground.

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Swing phase



B- Swing phase

- The limb is off the ground
- 3-Toe off**, the toes are raised from the ground accompanied by slight flexion of the hip and knee joints and dorsiflexion of the ankle joint.
- 4- Heel strike:** The leg is propelled forwards. The swing phase ends when the heel comes in contact with the ground again.

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