The Ankle Joint and Foot Movement

ANKLE, SUBTALAR AND TALOCALCANEONAVICULAR JOINTS

ANKLE (talocrural)
- Effectively a hinge joint but-
- Trochlear surface is slightly wider anteriorly so that there is a slight wiggle in full flexion
- Forces are transmitted to talus from tibia
- Plantar flexion - 30-50°
- Dorsiflexion - 20-30°
- Inversion injury may 1. tear ligaments, 2. pull off lower fibula, 3. pull of lower tibia & fibula

TALOCALCANEONAVICULAR
(effectively a ball and socket joint)
Made up of 2 parts

1
Between talus & calcaneus (2 joints)

Talocalcaneal (2 facets)

2
Between talus & navicular (Single joint)

Talonavicular

+ Talocalcaneal joint (1 facet)

SUBTALAR (3 facets)

Talocalcaneal (posterior & separate, 1 facet)
+
Talocalcaneal part of talocalcaneonavicular (2 facets)

MIDTARSAL (2 facets)

Calcaneocuboid
+
Talonavicular part of the talocalcaneonavicular

INVERSION
Always with some adduction of toes
Muscles: Tibialis anterior/posterior (+/- flexor hallucis longus)

EVERSION
Always with some abduction of toes
Muscles: Fibularis longus/brevis (+ flexion), tertius (+ extension)
As all these tendons insert distal to the midtarsal joint, this joint moves first and a little, soon reaches its maximum and the torque is then transmitted to the subtalar joint which gives most of each movement
TENDON & NEUROVASCULAR RELATIONSHIPS ON MEDIAL ASPECTS OF ANKLE

Flexor digitorum longus (T): flexion
Tibialis posterior (T): flexion & inversion
Flexor hallucis longus (T): flexion

Medial malleolus

Neurovascular bundle:
- Posterior tibial vein
- Posterior tibial artery
- Tibial nerve

"Timothy Doth Vex All Nervous Housemaids"
or "Tom, Dick And A Very Nervous Harry"

Order of structures behind medial malleolus from anterior to posterior:
Tibialis posterior, flexor digitorum longus, posterior tibial vein & artery, tibial nerve, flexor hallucis longus
Mnemonic: Timothy Doth Vex All Nervous Housemaids

Flexor retinaculum
Tip of medial malleolus to medial calcaneal process and plantar aponeurosis
TENDON & NEUROVASCULAR RELATIONSHIPS ON LATERAL ASPECTS OF RIGHT ANKLE

- Tibialis anterior (CF-D): extension & inversion
- Neurovascular bundle:
  - Dorsalis pedis artery
  - Accompanying vein
  - Deep branch of common fibular n
- Extensor hallucis longus (CF-D): extension
- Extensor digitorum longus (CF-D): extension

Mnemonic for dorsal tendons, vessels & nerves from medial to lateral:

“Timothy Has A Very Nasty Diseased Foot”

(CF-S) = Superficial br of common fibular n
(CF-D) = Deep br of common fibular n
ANKLE LIGAMENTS

DELTOID/MEDIAL COLLATERAL
1. Tibiotalar (posterior)
2. Tibiosustentacular
3. Tibio-spring ligament
4. Tibionaviculare

LIGAMENTS OF MEDIAL SIDE OF RIGHT ANKLE

INTERTARSAL
5. Talonaviculare
6. Spring (plantar calcaneo-navicular)
   Thick, strong, non-elastic, from sustenaculum tali to navicular.
   Upper surface articulates with head of talus.

INFERIOR TIBIOFIBULAR LIGAMENT
1. Anterior tibiofibular
2. Posterior tibiofibular

LIGAMENTS OF LATERAL SIDE OF RIGHT ANKLE

LATERAL COLLATERAL LIGAMENT
3. Calcaneofibular
4. Anterior talofibular
5. Posterior talofibular

TARSAL/METATARSAL LIGAMENTS
6. Short/long plantar
7. Lateral talocalcaneal
8. Cervical
9. Bifurcate

POSTERIOR VIEW OF RIGHT ANKLE

Because the fibula sticks out more laterally from the ankle joint than the tibia, the 3 parts of the lateral ligament are less strong and are easily torn in an inversion injury

Joints
- Inferior tibiofibular
- Ankle
- Intertarsal
ANKLE, SUBTALAR AND TALOCALCANEONAVICULAR JOINTS

**ANKLE** (talocrural)
- Effectively a hinge joint but-
- Trochlear surface is slightly wider anteriorly so that there is a slight wiggle in full flexion
- Forces are transmitted to talus from tibia
- Plantar flexion - 30-50°
- Dorsiflexion - 20-30°
- Inversion injury may 1. tear ligaments, 2. pull off lower fibula, 3. pull of lower tibia & fibula

**TALOCALCANEONAVICULAR**
(effectively a ball and socket joint)
Made up of 2 parts

1. Between talus & calcaneus (2 joints)
   **Talocalcaneal**
   (2 facets)
   + **Talocalcanean joint** (1 facet)

2. Between talus & navicular (Single joint)
   **Talonavicular**

**SUBTALAR** (3 facets)
- Talocalcanean part of talocalcaneonavicular (2 facets)

**MIDTARSAL** (2 facets)
- Calcaneocuboid
- Talonavicular part of the talocalcaneonavicular

**INVERSION**
Always with some adduction of toes
Muscles: Tibialis anterior/posterior (+/- flexor hallucis longus)

**EVERSION**
Always with some abduction of toes
Muscles: Fibularis longus/brevis (+ flexion), tertius (+ extension)
As all these tendons insert distal to the midtarsal joint, this joint moves first and a little, soon reaches its maximum and the torque is then transmitted to the subtalar joint which gives most of each movement.