Functional Anatomy of the Foot

Chapter 4

Student Learning Outcomes

After this lesson, students will be able to:
- Identify
  - Bony anatomy
  - Joints
  - Major ligaments of the foot
  - Describe arches of foot and their function

Bony Structure of the Foot

- Rearfoot
- Midfoot
- Forefoot

Lateral view
Bony Anatomy

- **Rearfoot**
  - Provides stability and shock absorbency at initial foot strike
  - Bones:

  ![Lateral view of bones](image)

Bony Anatomy

- **Joints of the Rearfoot**
  - **Subtalar**

  ![Lateral view of subtalar joint](image)

  ![Medial view of subtalar joint](image)

Bony Anatomy

- **Ligaments supporting the subtalar joint**
  - **Interosseous Talocalcaneal**
  - **Ligamentum Cervicis**

  ![Lateral view of ligaments](image)
Bony Anatomy

- Movements of the Rearfoot
  - Pronation
    - eversion
    - abduction
    - dorsiflexion
  - Supination
    - inversion
    - adduction
    - plantarflexion

Bony Anatomy

- Movements of the Rearfoot
  - Weight bearing
    - Talus moves on the fixed calcaneus
  - Non-weight bearing
    - Calcaneus moves on the fixed talus

Bony Anatomy

- Midfoot
  - Increases ROM during inversion and eversion
  - Provides the ability to adapt to uneven surfaces
  - Shock-absorbing
  - Bones:
Bony Anatomy

Joints of the Midfoot
- Talocalcaneonavicular
- Calcaneocuboid
- Cuneonavicualr
- Cuboideonavicualr
- Intercuneiform
- Cuneocuboid

Superior view

Ligaments Supporting the Midfoot
- each intertarsal joint supported by ligaments
- talocalcaneonavicular jt
  - dorsal talonavicular
  - bifurcate
  - plantar calcaneonavicualr

Lateral view

Medial view
Bony Anatomy

- Movements produced by midfoot
  - Superior/inferior glide between each intertarsal joint

Bony Anatomy

- Forefoot and Toes
  - Act as a lever during preswing phase of gait

Bony Anatomy

- Forefoot
  - Tarsometatarsal (Lisfranc jt)
  - Intermetarsals
  - Metatarsalphalangeal (MTP)

- Toes
  - Interphalangeal
Bony Anatomy

- Movements of the Forefoot
  - Tarsometatarsal (Lisfranc)
  - Intermetatarsal
  - Metatarsophalangeal joints
    - abduction, adduction, rotation
  - Interphalangeal

Arches of the Foot

- Maintained by 3 mechanisms
  - Wedging of interlocking tarsal & metatarsal bones
  - Tightening of ligaments on plantar surface
  - Intrinsic & extrinsic muscles of the foot & their tendons

Arches of the Foot

- Function as shock absorbers
  - Medial longitudinal
    - Formed by:
      - Calcaneus
      - Talus
      - Navicular
      - 1st cuneiform
      - 1st metatarsal
Arches of the Foot

- Function as shock absorbers
  - Medial longitudinal
    - Maintained by
      - Tibialis ant
      - Tibialis post
      - FDL
      - FHL
      - Abd hallucis
      - FDB
      - Plantar fascia
      - Plantar calcaneonavicular lig (spring)
      - Long plantar lig
      - Deltoid lig
  
  - Lateral longitudinal
    - Formed by
      - Calcaneus
      - Cuboid
      - 5th metatarsals

- Lateral longitudinal
  - Maintained by
    - Peroneus longus
    - Peroneus brevis
Arches of the Foot

- Function as shock absorbers
  - Transverse arch

Arches of the Foot

- Windlass mechanism
  - Extension of the toes creates a greater medial longitudinal arch

Structural Abnormalities

- Pes Planus
- Pes Cavus
Structural & Functional Abnormalities

- Forefoot varus
  - Rearfoot neutral
  - 1st MT elevated when compared to 5th

Structural & Functional Abnormalities

- Forefoot Valgus
  - Rearfoot in neutral
  - 5th MT elevated when compared to 1st

Structural & Functional Abnormalities

- Rearfoot varus
  - Calcaneus inverted in relation to long axis of tibia
Structural & Functional Abnormalities

- Rearfoot valgus
  - Calcaneus everted in relation to long axis of tibia

Questions?