Outline

- Anatomy and common ankle views
- Ottawa Ankle Rules
- Classifications (Weber, Lauge-Hansen)
- Biomechanics
- Named fractures
**Lateral Ankle Ligaments**

- CFL = Calcaneofibular ligament
- PTFL = Posterior talofibular ligament
- ATFL = Anterior talofibular ligament

**Medial Ankle Ligaments**

- Deltoid Ligament
Ottawa Ankle Rules

- Before introduction of the rules, all injured ankles were X-rayed but only 15% were positive for fracture.
- The ankle is the most commonly injured weight bearing joint.
- Unnecessary X-rays: costly, time consuming, and possible health risk.
X-rays are only required if there is bony pain in the malleolar zone AND any one of the following:

• 1 – Tenderness along the distal 6cm of the posterior edge of the tibia
• 2 – Tenderness along the distal 6cm of the posterior edge of the fibula
• 3 – Inability to bear weight immediately after injury and in the ER
Ottawa Ankle Rules

Lateral view

A. Posterior edge or tip of lateral malleolus

B. Posterior edge or tip of medial malleolus

C. Base of 5th metatarsal

D. Navicular

Medial view

Malleolar zone

Midfoot zone
Classification Schemes

- **Danis-Weber system**
  - Level of the fibular fracture in relationship to the ankle joint (A, B, C)
  - Ideal for the primary care setting – allows you to classify the injury easily and guides treatment

- **Lauge-Hansen system**
  - 2-word descriptors detailing position and motion of the foot each with 2-4 stages specifying exact locations of fractures
  - More descriptive but very complicated
  - i.e. pronation-abduction-stage 2
Biomechanics

Dorsiflexion

Eversion

Adduction

Plantarflexion

Inversion

Abduction
Biomechanics

- Simple unidirectional forces can be involved in an ankle injury resulting in ligamentous damage and isolated fractures.

- Multidirectional forces are usually involved making diagnosis a challenge.
Biomechanics

- Lateral Complex
  - Distal fibula
  - Lateral facet of the talus
  - Lateral ligaments of the ankle
  - Subtalar joints

- Lateral complex injuries typically occur with inversion and supination

- The most common ankle injury
Biomechanics

Inversion force avulses the lateral malleolus and continued force causes oblique fracture of the distal tibia.
Biomechanics

- Medial Complex
  - Medial malleolus
  - Medial facet of the talus
  - Superficial/deep deltoid ligament

- Medial complex injuries typically occur from eversion and abduction
Eversion force avulses the distal medial malleolus (young/elderly) and continued force results in rupture of the syndesmosis or transverse fracture of the distal fibula.
Horizontal avulsion fracture through the medial malleolus and oblique-vertically oriented compression fracture through the distal fibula. The syndesmosis is disrupted and abnormally widened, with no overlap between tibia and fibula.
MAISONNEUVE FRACTURE

- Proximal half of fibula
- Strong eversion
- The more proximal the fracture, the more unstable the joint
TILLAUX FRACTURE

Lateral margin avulsion of the distal tibia

Abduction +
External Rotation

Typically occurs in adolescents after medial epiphyseal plate closes but before the lateral (18 month window)
TRIPLANE FRACTURE

1 = vertical frxr thru the epiphysis
2 = horizontal frxr thru the physis
3 = oblique frxr thru the metaphysis

Twisting Injuries - adolescents
TRIMALLEOLAR FRACTURE

- Can be caused by talar eversion and posterior displacement
- Also known as a Henderson fracture