Ankle Fractures
Resident Comprehensive Fracture Course

Introduction
- Ankle fractures are extremely common
- Treated by a wide variety of surgeons
- Complex injury
  - Not just “intern’s case”

Physical Examination
- Swelling/ecchymosis
- Pain over syndesmosis
- Neurovascular exam
  - pulses
  - neuropathy

Anatomy
- Bony Structures
- Ligamentous structures
  - Lateral ligaments
    - ATFL
    - PTFL
    - CFL
Anatomy

- Ligamentous structures
  - Medial ligaments
  - Deltoid

Imaging – What’s Normal

- Symmetric mortise
- Fibular length

Imaging – What’s Normal

- Tibiofibular clear space (AP & mortise)
  - $\leq 6\text{mm}$
- Tibiofibular overlap
  - $> 6\text{mm}$ or $\approx 40\%$ fibular width (AP)
  - $> 1\text{mm}$ (mortise)
- Medial clear space

Classification

- Weber
- Lauge-Hansen

Imaging

- Radiographs
  - Ankle 3 views
  - Need Tib-fib films

Stress radiographs?
Imaging
Weight Bearing radiographs

Is the fracture unstable under physiologic loads?

Initial Treatment
- Need to reduce dislocations!

Advanced Imaging
- CT
  - Good for posterior malleolar fractures
- MRI?

Instability
- Loss of normal anatomical relationships at rest or under physiologic loading

Decision Making

<table>
<thead>
<tr>
<th>Stable</th>
<th>Unstable</th>
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<tbody>
<tr>
<td>Conservative Tx</td>
<td>Operative Tx</td>
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Medial Malleolar Fractures
- Nondisplaced fractures may be treated nonoperatively
- Displaced fractures
  - Isolated ?? ORIF
  - Part of bimalleolar pattern → ORIF
  - Horizontal (tension) → compression
  - Vertical (shear) → antiglide plate
Medial Malleolus

- Screw Fixation
  - Standard 2 screws
  - Solid
  - Cannulated
  - Fully threaded

Other compression options for medial side

Medial Malleolus

- Plate Fixation
  - Vertical fracture patterns
  - Additional stability

Lateral Malleolus Fractures
Nonoperative management

- 2-3 mm displacement
- NO medial widening or syndesmotic injury
- Cast or boot
  - Immobilization 6 wks
- WBAT
- Follow closely!
  - Stress view to ensure no medial injury???

Lateral Malleolus

- Traditional Lateral Approach
  - Relatively safe (sup. peroneal n.)

Implant Considerations
Lateral Side

- One-third tubular
  - "neutralization" plate laterally
  - "antiglide" plate posteriorly

- 3.5 LGDCP on shaft
**Other options for lateral side**

**Posterior Malleolar Fractures**

**Posterior Malleolus**

- > 25% rule
  - Based on nothing
- Fix if ANY posterior subluxation

- A → P or P → A
- **Prone** position very helpful

**Methods of Fixation**

- Screws
  - Antegrade
  - Retrograde
- Plate

**Ankle Fractures**

- Posteromedial approach
  - Through floor of PT, FDL
  - Supine or prone
  - Symptomatic HWR
  - Allows for fixation of medial malleolus
Ankle Fractures

- Posteromedial approach

- Posterolateral approach
  - Prone
  - Also allows for ORIF medial malleolus
  - Larger fragments
  - ORIF fibula through same approach

Maissoneuve Fracture

- Fracture of proximal fibula
- +/- medial malleolar fracture
- Pronation-external rotation
- Requires reduction and stabilization of syndesmosis

Anatomy

- Fibula relation to tibia
Anatomy

- Ligamentous structures
  - Syndesmotic ligament
    - AITFL
    - PITFL
    - ITL
    - IOM

Syndesmosis Fixation

- MUST test for Syndesmotic instability after fixation of lateral malleolus
- Have bone hook on table to check stability, Cotton Test

Syndesmosis Controversies

- 1 vs. 2 screws
- 3.5 vs. 4.5 screws
- 4 cortices vs. 3
- Two hole plate
- Tightrope

The key is the REDUCTION!!

Diabetics/Neuropathy

- Diabetics/Neuropathy
  - Alternative Treatments
  - Increased risk of complications

Aftercare

- Splint x 2 weeks
- Boot at 2 wks to allow ROM
- Weightbearing a 6-8 wks in Boot
  - May consider brace for simpler patterns
- Brace and therapy at 10 weeks
  - May consider therapy sooner for stiffness

Special Considerations

- Diabetics/Neuropathy
  - Need more & bigger fixation
  - Prolonged NWB
Summary

- Multiple factors play into determining ORIF
- Select best technique/incision for fixation on an individual basis
- Goal is to provide stability and articular reduction
- Be respectful and humble