

UHealth.  
Orthopaedics &  
Sports Medicine

**Ankle & Pilon Fractures**  
-the basics-

Expert Panel & Case Discussions OTA NP/PA  
Course, October 2013, Phoenix, AZ

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**Disclosures**

- None
- The opinions or assertions contained herein are the private views of the author and are not to be construed as official or reflecting the views of the United States Air Force or the Department of Defense. The author is an employee of the United States Government.

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**Credits**

- Borrowed heavily from OTA resident core curriculum lecture series.
  - Available on OTA website
  - Great resource for all fracture/trauma care
  - Matt Graves, MD- most recent ankle fracture update
  - Cory Collinge, MD- most recent pilon fracture update

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## Ankle Fractures

- The basics
  - Physical exam:
    - mechanism, timing, soft-tissue injury, bone quality, comorbidities, associated injuries
    - Skin, nerves, blood vessels, pain, deformity
  - **Basic does not mean un-important**

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## Ankle Fractures

- The basics
  - Radiographs:
    - Standard 3 views
      - AP: tib-fib overlap  $\approx$  10mm; tib-fib clear space  $<$  5mm; talar tilt
      - Mortise: medial joint space; tib-fib overlap  $>$  1mm
        - » “the dime test”, shenton’s line of the ankle
      - Lateral: talar subluxation; distal fibula translation/angulation, syndesmotic relationship; occult hindfoot injuries



Fig. 4-46 The mortise view of the ankle joint. 1. Tibiofibular overlap. 2. Tibiofibular clear space. 3. Tibiofibular overlap. 4. Tibiofibular clear space. 5. Tibiofibular overlap. 6. Tibiofibular clear space.

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## Ankle Fractures

- Initial Management...
  1. Injury recognition
  2. A “good” closed reduction
  3. Well-splinted
    - Best opportunity for a good splint is ED or OR
- If the above done well, definitive management is more efficient, and, if operative, can do so sooner and more safely

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### Ankle Fractures

- Definitive Management...
- Goal is stable, reduced, healed ankle fracture to allow ambulation

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### Lauge-Hansen Classification

- *Archives of Surgery* 1950
  - First word: position of foot
  - Second word: force applied to foot relative to tibia
- SER
  - SAd
  - PER
  - PAb

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### Ankle Fractures

- Supination-External Rotation
  - Most common, 70% of ankle fractures
    - Typical posterosuperior to anteroinferior oblique fibula fracture
    - Deltoid ligament injury or medial malleolus fracture



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## Ankle Fractures

- Which SER ankle fractures indicate surgical fixation?
  - Assume:
    1. Isolated fibula fractures with stable mortise will heal without functional deficit
    2. Isolated fibula fractures with unstable mortise will lead to functional deficit (unstable mortise leads to talar shift)
- Do you need a stress test (gravity, manual...)?
  - Develop a logical algorithm and use it with risk:benefit for patient.

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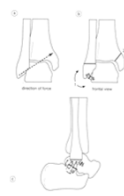
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## Ankle Fractures

- Supination-Adduction
  - Low transverse fibula fracture
  - Vertical medial malleolus fracture
    - Beware of “gutter” articular impaction
  - Consider an AM approach
  - Medial antiglide fixation




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## Ankle Fractures

- Pronation-External Rotation
  - Medial deltoid or transverse medial malleolus fracture
  - High, spiral fibula fracture
    - Restore length and rotation
  - Expect syndesmotic disruption
  - Image the whole tibia




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## Ankle Fractures

- Pronation-Abduction
  - Transverse medial malleolus fracture
  - Shortened, impacted fibula fracture
  - Fix the medial side first
    - Centers the talus
  - Consider extraperiosteal plating of fibula
    - Restore fibular length
  - Look for lateral gutter impaction
    - Chaput fragment



Matt Graves, MD

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## Ankle Fractures

- The Posterior Malleolus
  - Difficult to accurately image on plain radiographs
  - CT can be very useful
  - Should we fix the posterior malleolus, fix the syndesmosis, or fix both?
  - Fix if >25% weight bearing surface?
    - Historical dogma, but hard to measure that, obliquely oriented, comminuted, involves incisura, etc.

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## Ankle Fractures

The syndesmosis: **obtain and maintain** an accurate reduction

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|--|---|
| <ul style="list-style-type: none"> <li>• <b>OBTAIN</b></li> <li>• Recent literature shows that we routinely do a poor job accurately reducing the syndesmosis</li> <li>• Intra-op radiographic parameters not as reliable as we thought                             <ul style="list-style-type: none"> <li>• Shown with post-op CT studies</li> </ul> </li> <li>• Significant anatomic variability of tib-fib relationship</li> <li>• Be vigilant</li> </ul> | <ul style="list-style-type: none"> <li>• <b>MAINTAIN</b></li> <li>• 3.5 v 4.5</li> <li>• 3 cortices v 4 cortices</li> <li>• Retain v remove</li> <li>• Metallic v suture</li> <li>• No consensus</li> </ul> |
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### Ankle Fractures

- Beware the diabetic ankle fracture
- Treatment goals are the same
- Complications much higher regardless of treatment modality chosen
- “Double everything”
  - Fixation, time to suture removal, time to weight bear, frequency of office visits for wound checks, cast changes, etc.
- Be vigilant

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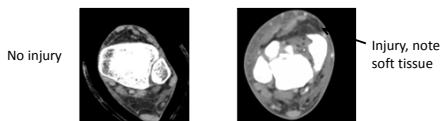
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### Pilon Fractures

- Complex injuries
- Bone and **Soft Tissue** Injury
  - Delicate skin, little underlying soft tissue, obstructions to surgical approach
- High Risk for complications & poor outcomes



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### Pilon Fractures: Early Treatment

- Ruedi, Allgower *CORR* 1979
  - Early treatment
  - 74% good-excellent results
  - Validated AO approach
  - Lower energy injuries
    - “off the slopes”
- Teeny, Wiss *CORR* 1993
  - Early treatment
  - 50% major complication
    - Deep infection
    - Wound breakdown
    - Flaps and BKA
  - Many C2/3 injuries
  - Higher energy injuries
    - “off the highway”

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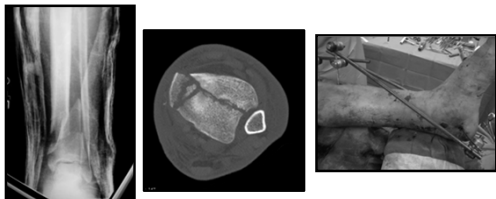
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### Pilon Fractures: Staged Treatment

- Ex Fix: Traction and stability
- CT: Personality of injury/ pre-op plan
- Elevate and wait: soft tissue "recovery"
- Reconstruction when soft tissues recovered



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### Staged Protocol ≈ Standard of Care

- Wait for soft tissues to be ready
- 10 days, 2 weeks, 3 weeks, never?



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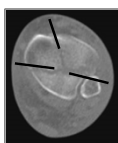
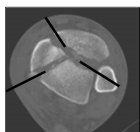
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### Pilon Fractures

- CT for pre-op planning does impact plans
  - Tornetta et al CORR 1996
  - CT added information 82% and changed plan 64% of cases
- CT will show "consistent" pattern
  - Cole et al JOT 2005



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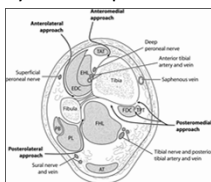
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## Pilon Fractures

- Approaches & Technique
  - Beyond this scope
  - Anteromedial, anterolateral, posterior, anterior, perc, MIPO, perc with IMN, ringed fixation, etc.
  - Determined by fracture pattern and “primary” injury




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## Pilon Fractures

- Post- op Care
  - Make it protocol
  - Strict elevation post-op: 23 hrs/day
  - Maintain O2 sats
  - Motion ASAP- when soft tissues reliably healed
  - NWB 10-12 weeks

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## Pilon Fractures

- Outcomes
- Pollack et al *JBJS-Am* 2003
  - High energy pilon fractures; C-types with staged protocol
  - SF-36 >2 SD below norms in 4/8 categories
  - Lots of persistent problems
    - 35% ankle stiff
    - 29% chronic swelling
    - 33% ankle pain
    - 43% unemployed (86% due to plafond)
  - Complications had worst outcomes




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Ankle and Pilon Fractures

Thanks

Questions?

Comments?

Anecdotes?

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