Posterior Malleolus
Fix or Ignore?

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Introduction

• Fracture of the posterior malleolus was described as early as 1822
• Currently no consensus exists regarding optimal management of these fractures
  • When should they be fixed?
  • How should they be fixed?
Important Ankle Anatomy

- **Osseous constraints**
  - medial malleolus
  - lateral malleolus
  - Posteriorly – posterior lip which extends distally forming the posterior malleolus or Volkmann’s tubercle
Important Ankle Anatomy

- Ligamentous constraints
  - syndesmotic complex
    - AITFL
    - PITFL
    - Interosseous ligament
PITFL and Posterior Malleolus

• How IMPORTANT are these??

• PITFL
  • posterior malleolus to posterior fibula
• Ogilvie-Harris et al.
  • Cadaveric study
  • PITFL provides 42% of syndesmotic stability
  • disrupted with fracture of the posterior malleolus

• Ankle instability =
  • non-physiologic mechanics
  • accelerated degenerative change
• Why are we fixing these in the first place?

• To Prevent THIS

• >80% of ankle arthritis is post traumatic
Biomechanics of Posterior Mal Fx

- Cadaveric models of post mal osteotomy
  - Macko et al. and Hartford et al.
  - larger fractures = the remaining joint has
    - decreased joint contact area
    - higher contact forces
• What about fractures involving >30% of the posterior malleolus
• Raasch et al.
• Posterior subluxation of talus ONLY if fibula and AITFL disrupted
  • Suggests the fibula and AITFL are primary restraints to posterior talar subluxation
DIAGNOSIS

• Standard ankle plain radiographs
  • Posterior subluxation
  • Buchler et al
    • reliably estimate the % of articular surface in sagittal plane
  • Ferries et al
    • radiographs compared poorly to CT for assessing fragment size

• 50° External Rotation lateral radiograph
  • Coplanar w/ fracture plane
  • Ebraheim et al suggest this may best visualize the fracture
  • However fracture line is highly variable
Radiographic Assessment

• **Computed Tomography**
  • Likely superior for defining fragment size as well as articular impaction, comminution, and syndesmotic disruption

BUT - do we order them?

RARELY!!
When you fix it - how do you do it?

- **Open posterior approach?**
  - Interval
  - peroneals/FHL

- **Percutaneous?**
  - Anterior to posterior?
  - Posterior to anterior?

- **Fixation**
  - Lag Screw?
  - Antiglide/buttress plate?

- **Fibula or posterior malleolus first?**
  - Fixing the fibula first allows indirect reduction via ligamentotaxis
  - However
    - lateral plates obscure visualization of posterior fragment reduction fluoroscopically
Retrospective case series
27 pts
f/u 32 months
Plate group
  better Short Musculoskeletal Function Assessment (SFMA) scores
No significant difference in ROM
No diff in post traumatic arthritis seen
Clinical Decision Making

• How do we actually practice?
• Gardner et al.
• surveyed 401 orthopaedic trauma and orthopaedic F&A surgeons
  • Most common indication
    • 56% “stability and other factors” (not primarily fragment size)
  • 97% of respondents would fix a 50% articular fragment
  • 9% of respondents would fix a 10% articular fragment
  • Yet, only 29% of surveyed surgeons utilize a 25% fragment-size threshold
  • Trauma surgeons were more likely to utilize an antiglide plate than F&A surgeons
Clinical Decision Making

- Systematic Review of 33 studies (8 biomechanical; 25 clinical)

- Size of fragment did NOT correlate w/ incidence of post-traumatic OA
What do I do?

• less than 20% on the lateral radiograph
  • plate fibula 1st and if reduced - leave it alone
  • if not - A/P screw medial to Tibialis ant.
    • reduce with dental pick reach behind fibula

• if larger than 20%
  • pt prone
  • posterior plate with posterolateral plating of fibula (same incision)
Conclusions

- Biomechanical and clinical studies suggest isolated posterior malleolus fractures are stable and become unstable only with associated medial and/or lateral injury
- Size of the posterior fragment is only weakly associated with outcome despite being commonly utilized as a criterion for fixation
- 3 factors appear associated with prognosis
  - Fracture-dislocation on presentation
  - Articular surface congruity
  - Residual talar subluxation following fixation
- Reduction of lateral and medial structures often reduces the posterior fragment by ligamentotaxis
- Persistent malreduction, articular incongruity, or instability on intraoperative exam likely indicates direct reduction and/or fixation either by lag screw or plate fixation
- Patients should likely remain non-weight bearing nonoperatively for a period of 6-8 weeks pending more robust research supporting early mobilization
Opinions are changing...

- Michael Bercik MD (trauma surgeon)
  - Unpublished data
  - CT scans on all trimalleolar fractures
  - Survey of orthopedic surgeons
    - plain X-rays
      - 1. Would you get a CT scan?
      - 2. how would you treat the Post mal?

- then showed CT scans of same fracture
- asked about management of Post mal.
Opinions are changing...
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Opinions are changing...
Opinions are changing...
Opinions are changing…
THANK YOU.