The Posterior Malleolus

Disclosures!

• Publications:
  - Rockwood and Green, Tornetta and Einhorn; Subspecialty series. Court-Brown, Tornetta; Trauma, AAOS; OKU Trauma, ICL Trauma 1,2, Tornetta; Op Techn in Ortho Surg. OTA Slide project.
  - Journals: JOT; Deputy editor, CORR, JAAOS, JBJS; Reviewer

• Research:
  - OTA, FOT, AIOD, DOD

• Consultant / Designer
  - Smith and Nephew, Exploramaed

Posterior Malleolus

• Radiographic assessment
  - Fracture not in coronal plane
  - May need CT to evaluate

• Functional
  - Intraop gravity test
  - Subjective
Posterior Malleolus

- Radiographic assessment
  - Fracture not in coronal plane
  - May need CT to evaluate

Pathoanatomy of Posterior Malleolar Fractures of the Ankle

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Biomechanics

• Stability
  - Large enough to allow for posterior subluxation?

• Contact area
  - Decreased enough to lead to arthritis?

Stability

• Harper ‘89
  - 30%, 40%, and 50%
  - NO subluxation
  - Added medial fx
  - NO subluxation
  - PTFL and CFL
  - SUBLUXATION!

• Raasch, et al ‘92
  - 10%, 20%, 30%, and 40%
  - PL corner (realistic)
  - 200 N posterior force
  - NO SUBLUXATION
  - Fibula and AT-FL (synd)
  - SUBLUXATION if > 30%
Contact Area

- Hartford, et al '95
  - 25%, 33%, and 50%
  - 4%, 13%, and 22% decrease
  - Sectioning deltoid...no affect
- Macko, et al '91
  - Increasing PM fragments
  - Multiple positions flex/ext
  - 25%...50% → 69% in dorsiflexion

Fitpatrick, et al '04

- No instability with 50% PM
  - Normal Ankle
    - Stress centrally located
    - Posterior 25% not loaded
  - Posterior fracture
    - Loaded more anteriorly
    - No loading at fracture edge
    - Best with anatomic ORIF
Clinical Studies
• Jaskulka, et al. ‘89
  • Posterior fractures influence prognosis
    • 60% vs 30% G/E results
  • Large fragment + ORIF
    • Better outcomes than large fragments without ORIF and nonstabilized small fragments

Clinical Studies
• Langenhuijsen, et al. ‘02
  • Neither size nor fixation prognostic as long as reduced
  • Larger fragments (>10%) anatomically aligned → better outcome
  • ORIF > 10% only if not reduced
Clinical Studies
• DeVries, et al. ‘05
  • Fracture/dislocations worse outcome
    • Larger posterior fracture size
  • No correlation between size of fragment or displacement & outcome
  • No need to fix

Clinical Study
• Harper and Hardin ‘88
  • > 25% posterior malleolar fx’s
  • Lateral and medial fixation
    • 15 ORIF posterior malleolus
    • 23 No fixation
    • No subluxation
  • No major differences in results

One More Issue
Fixation of Posterior Malleolar Fractures Provides Greater Syndesmotic Stability
  Michael J. Gardner, MD*; Adam Breda, MD*; Stephen M. Briggs, PA-C*; Jason H. Nevelson, MD*; and Dean G. Levitch, MD*
Syndesmosis

- Gardner, et al ’06
  - 10 cadaveric specimens
  - 5mm posterolateral fragment
  - ORIF PM vs syndesmotic screws
  - Torsional MTS testing
  - Posterior malleolar ➞ 70%
  - Trans-syndesmotic screws ➞ 40%

Surgical Indications?

- Any subluxation after ORIF
  - Gravity stress test
  - Posterior translational stress
- ? Percentage
  - 30% safest indication
  - > 40% should be fixed
- Affects syndesmosis
19 year old woman

Posterior Syndesmosis

Treatment
Healed

- 4 Centers
- 72 Patients
- 63 Ankles
- 9 PM + tibial shaft
- 90% within 5° of normal
- 6 Erythema, no deep

The Posterolateral Approach to the Tibia for Displaced Posterior Malleolar Injuries

Paul Tomsic, BSc, MD,* William Ricci, MD † Sean Nork, MD ‡ Cory Collinge, MD ¶ and Brendan Xue, MD*
Elevate FHL

Approach

Posterior Malleolus

Antiglide plates

Joint restored
Stress View

Trimalleolar

Transverse Pattern
Conclusions

- Posterior approach
  - Large posterior malleoli
  - Evaluate carefully!
  - Syndesmosis?

- Technique
  - Kwire or lag before plating
  - Underbend..antiglide
  - Meticulous closure