Calcaneal Fractures

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Anatomy
X-rays
Classifications
Treatment Options & Approaches
Complications
What people say
Anatomy

- Subtalar joint
  - Facets: anterior, middle, posterior
- Calcaneocuboid joint
- Sustentaculum
- Tuberosity
- Anterior process
Anatomy:
Facets of ST Joint
Anatomy: Bony

- Sustentaculum
- Ant. process
- Tuberosity
- Sinus tarsi
Imaging: Plain Films

Standard Views

- 1. Lateral
- 2. Broden’s
- 3. Axial
Broden’s View

- Posterior facet
- Positioning
  
  A. 20° IR view (mortise)
  
  B. 10°-40° plantar flex.
Lateral View

Bohler's Angle

Gissane's Angle
Classifications

- Several used - None are ideal
- Most commonly used
  - Essex-Lopresti
  - Sanders
ESSEX-LOPRESTI Classification

- Historical
- Basic

1. Joint depression type
2. Tongue type
Sanders Classification

- Based on CT findings
- # joint fragments
  - 2 = type II
  - 3 = type III
  - 4 or more = type IV
- Predictive of results
Operative vs. Non-op Treatment

- Orthopedic literature is lacking
- **No** prospective, randomized studies with **long-term** follow-up
Treatment: A Rational Approach?

- Many treatment methods attempted
- “Best” method remains controversial
- Assess each case individually
  - Injury/ patient/ surgeon
  - Risks vs. benefits
Operative Treatment: Rationale

- **Restore anatomy**
  - Shape and alignment of hindfoot
  - Articular congruency
- **Return to function & prevent arthritis**
- **Typically, restoring articular anatomy gives improved results if complications are avoided**
Operative Treatment
Options

- ORIF
- Closed Reduction/ Int. Fixation
  - Percutaneous
  - Arthroscopic assisted
- Ilizarov
- Primary Fusion
ORIF: Lateral Approach

- Lateral decubitus
- “L” incision
ORIF: Lateral Approach

- “No touch” technique
- Lateral wall removed
ORIF: Lateral Approach

- Schanz pin to manipulate tuberosity
- Clean out fracture
- Disimpact sustentacular fragment
ORIF: Lateral Approach

- Bone graft?
- Replace lateral wall
- Apply plate
- Recheck radiographs
perimeter plate
Complications

- **Operative**
  - Malunion
  - Stiffness
  - Subtalar arthritis
  - Peroneal tendons
  - Sural nerve pain
  - Heel pad problems

- **Non-operative**
  - Malunion
  - Varus hindfoot
  - Shortened foot = short lever arm
  - Peroneal impingement/dislocation
  - Shoewear problems
  - Stiffness, arthritis(ST)
Operative Treatment: Complications

Wound problems

• Apical wound necrosis
  - Stop ROM
  - Leave sutures in

• Infection
  - Antibiotics
  - I&D
  - Soft tissue coverage?
What people say?
Displaced Intra-Articular Calcaneal Fractures

Effect of operative treatment compared with nonoperative treatment on rate of union, complications, and functional outcome after intra-articular calcaneal fractures.

Among 20 relevant articles:
- 4 RCTs:
  - O’Farrell 1993
  - Parmar 1993
  - Thordarson 1996
  - Buckley 2002
- 2 systematic reviews
  - Randle 2000
  - Bridgman 2000
- 1 abstract of economic analysis study
  - Brauer 2004 OTA Meeting

Bajammal et al, JOT 2005
Conclusion

Evidence from RCTs with methodological limitations revealed:

- No significant difference in pain and functional outcome between the two groups
- Operative treatment maybe superior to nonoperative treatment concerning return to work and the ability to wear the same shoes
Conclusion

- Based on post-hoc subgroup analyses, hypotheses include:
  a. Potential benefit of operative treatment in
     - women
     - not WSIB,
     - younger males
     - higher Böhler angle
     - light workload
     - single, simple displaced intra-articular fracture.
  b. Potential benefit of nonoperative treatment in:
     - 50 years or older
     - males
     - WSIB
     - heavy workload

(Buckley et al, 2002 JBJSA)
Conclusion

- Arthrodesis rates are significantly reduced with operative treatment compared with nonoperative treatment.

- From societal perspective, operative management is less costly and more effective than nonoperative care.
Displaced Intra-articular Calcaneal Fractures: Variables Predicting Late Subtalar Fusion

- Amount of initial injury involved with the calcaneal # is the 1ry prognostic determinant of long-term patient outcome.
- A distinct patient group with a displaced intra-articular calcaneal who are at high risk of subtalar fusion, These include:
  - Male
  - WSIB (3 times)
  - Heavy labor work
  - Böhler angle less than 0° (10 times)
  - Sanders-type IV calcaneal fractures (5.5 times)
  - Initial treatment was nonoperative (6 times)
- Initial ORIF of patients with displaced intra-articular calcaneal # minimized the likelihood that subtalar fusion would be required.

Csizy, Marcel; Buckley, Richard
Bilateral calcaneal fractures
Operative versus nonoperative treatment

- Pts sustaining bilateral calcaneal # are very similar to those in whom the injury is confined to one side.

- Neither objective nor subjective functional outcomes are significantly improved following operative intervention.

- However, careful operative pt selection will minimize complications and lessen need for late subtalar arthrodesis.

Dr. R. Buckley
Summary

- High energy injuries
- Risk for long term morbidity
- ORIF can give good, reproducible results if complications are avoided
- Individualize treatment
- Long-term outcomes studies are needed comparing treatment alternatives