Radiographic Outcomes from Intra-articular Calcaneus Fractures Treated with a Two-incision, Minimally Invasive Approach

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DISCLOSURES

- Snow Daws, MD: None
- Linda Dunaway, APRN, NP-C: None
- Gregg Lundeen, MD, MPH:
  - Or a member of his family owns stock options in the Orthopaedic Implant Company
  - Or a member of his immediate family member serves on the editorial board of:
    • Foot and Ankle International
    • Techniques in Foot and Ankle Surgery
  - Or a member of his immediate family serve on the Board of Directors of the Nevada Orthopaedic Society
INTRODUCTION

• Calcaneus fractures are serious traumatic injuries that can have disabling outcomes
• Anatomic reduction and careful soft tissue management are crucial to successful outcomes
• Minimally invasive techniques have recently gained interest in the literature
• There have been concerns about the ability of minimally invasive techniques to achieve anatomic reduction
METHODS

- Displaced intra-articular calcaneus fractures that underwent open reduction and internal fixation with a two-incision (medial and sinus tarsi) approach were identified.
- Retrospective radiographic and chart review analysis.
- Patients treated from 2007-2016 by one Foot & Ankle fellowship trained Orthopaedic Surgeon.
- Radiographs included a lateral, axial, and Broden’s view.
METHODS: Minimally Invasive Technique

- Two incisions: Medial and Sinus Tarsi
- Medial incision utilizes push-pull technique that allows for anatomic reduction of the calcaneal tuberosity due to the stability of the medial spike – re-establishing calcaneal height and length
- Sinus Tarsi incision allows for reduction of the posterior facet articular surface and anterior calcaneus
- Posterior to anterior rafting screws are utilized for severe comminution
- Ideal for Sanders II-III calcaneus fractures
MINIMALLY INVASIVE TECHNIQUE

AOFAS 2016
MINIMALLY INVASIVE TECHNIQUE
METHODS:
Primary Outcome Measures

• Radiographic Measurements
  – Bohler’s Angle
  – Angle of Gissane
  – Calcaneal Height
  – Calcaneal Length

• Postoperative Wound Complications

• Postoperative Neurovascular Complications
RESULTS

• 29 calcaneal fractures that met inclusion criteria were identified

• Classification
  – Sanders IIA: 15
  – Sanders IIB: 9
  – Sanders IIIAB: 2
  – Sanders IIIAC: 2
  – Sanders IV: 1

• 1 open fracture, 28 closed fractures

• Demographics
  – 23 male, 6 female
  – Average Age 50 years (range 22-79)
  – 28% smokers (8/29)
  – 0 diabetes

• Average time from injury to surgery 8 days (range 0-19)

• 3/29 patients had fracture blisters preoperatively, but not at the time of surgery
RESULTS: Clinical Outcomes

- Minimum follow up of 10 weeks (Mean 35 weeks, Range 10-212 weeks)
- No cases of nonunion of deep infection
- 2 superficial infections treated with local wound care
- 1 superficial infection treated with I&D and local wound care
- 3 secondary surgeries
  - 2 Removal internal fixation
  - 1 Excision Haglund
- 1 patient developed subtalar arthritis, treated with steroid injections
- 1 patient with postoperative numbness in calcaneal branch of the tibial nerve distribution
RESULTS: Radiographic measurements (Preoperative vs Final Follow Up)

Bohler's Angle

- PREOP: 124
- POSTOP: 125
- p < .001

Angle of Gissane

- PREOP: 128
- POSTOP: 127

Calcaneal Height

- PREOP: 5.2
- POSTOP: 5
- p < .001

Calcaneal Length

- PREOP: 7.7
- POSTOP: 7.8
CONCLUSIONS

• There was a significant improvement in Bohler’s Angle and Calcaneal height using this two-incision, minimally invasive approach for intra-articular calcaneus fractures with minimal postoperative complications.

• There was no significant difference in radiographic measurements from immediately post-op to final follow up, indicating no significant settling of fractures.