The Calcaneus: When and Who to Fix, and How to Not…

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Disclosure

- I have no disclosures.

Calcaneus fractures

- Goals are restoring articular congruency, shape, and alignment of the calcaneus.

- Operation should not be attempted until after swelling in the foot and ankle has markedly decreased (usually 7-14 days)

Displaced intra-articular fractures of the calcaneus; Sanders, R.; JBJS Feb 2001, 82A, 225-250
Calcaneus fractures

- Most common complication is wound dehiscence, as late as 4 weeks post-op
- Lateral extensile approach appears to be associated with fewest soft-tissue complications

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Traits predictive of result

- Traits predictive of satisfaction with surgery include age younger than 40, simple fracture pattern, accurate reduction
- Women 17-65 more likely to have good outcomes from surgery than men (less likely to be heavy laborers)


Traits predictive of result

- Smoking, diabetes, PVD increase risk of complications
  - Smoking should be contraindication for calcaneal surgery because of local wound complications (15% wound slough or deep infection)
  - Pending worker’s comp claim may have poor result regardless of treatment

Risk factors

- Retrospective study of 179 pts and 190 calcaneal fxs undergoing ORIF
- 48 pts (25%) developed wound infections and 40 (21%) required surgical treatment
  - Erythema treated with course of oral antibiotics
  - Immediate surgical treatment for exposed hardware and purulent fluid


Risk factors

- Risk factors identified include diabetes ($p = 0.02$; relative risk 3.4), smoking ($p = 0.03$; relative risk 1.2), and open fractures ($p < 0.0001$; relative risk 2.8)
- Presence of more than one risk factor increased the relative risk of a wound complication requiring surgery


Sanders classification
Complications

- Wound complications
- Sural neuritis
- Joint penetration
- Post-traumatic arthritis
  - 3% of surgically treated patients required fusion while 17% non-op did (Csizy et al. JOT 2003)
  - Bohler angle <0 degrees
  - Male work comp
  - Sanders IV

To operate or not?

- Thordarson and Krieger FAI 1996.
  - Superior results of current operative treatment with early mobilization compared with nonoperative treatment.
- Parmer et al. JBJS Br 1993.
  - No significant difference in outcome between the operatively and the conservatively treated
  - 60% of Sanders II and III could attain anatomic reduction
Longer term studies

- Ibrahim et al. Injury 2007
  - Similar results in surgical and nonsurgical mgmt of displaced fractures at 15 years followup
- Angren et al. JBJS 2013
  - Surgery had higher risk of complications without superior results vs non-op at 1 year followup
  - At 12 year followup, trend towards lower VAS and higher SF-36 scores in surgical group
  - Reduced radiographic prevalence of DJD in surgical group

Surgical approach

- Lateral extensile
  - Complication rate and infection as high as 37% and 20%
  - Vascular supply –lateral calcaneal branch of peroneal artery
  - May already be disrupted before surgery
Sinus tarsi

- Less invasive and less risk of complication
- Timing of surgery – less than 3-4 weeks.
- Reduction of posterior facet, angle of Gissane and lateral wall
- Reduction of varus is more percutaneous
- Less surgical time (up to 52 minutes less), but more hardware removal

Extensile vs sinus tarsi

- Kline et al. FAI 2013
  - Extended incision – 29% overall complication and 20% hardware removal
  - Limited incision 6%/2%
    - All superficial wound dehiscence

Extensile vs sinus tarsi

- Kikuchi et al. FAI 2013 – sinus tarsi
  - Restoration of Böhler's angle and calcaneal width.
  - 3/22 cases with superficial wound infection.
  - 1/22 symptomatic hardware removal.
  - No osteomyelitis, deep infection, or nonunion.
Sinus tarsi

Technique
- Lateral
- Sinus tarsi (~5-6cm)
- ~2cm oblique heel incision
- Extensile

What I do not like about the extensile lateral approach…
- Wound complications
  - 20-30%
- C-C joint/Anterior process access?
- Dislocated peroneals
  - repair SPR?
What I like about the sinus tarsi approach…

- Wound complications
  - ~5%
- Access to C-C joint/anterior process
- Posterior facet visualization
- Dislocated peroneals
- Future ST fusion?

Why do we use the extensile lateral approach?

- “You have to get to it within about 5 days to do the sinus approach.”
- “It’s harder to get the tuberosity reduced with sinus approach.”
- “You have to do at least 25-50 extensile approaches before trying minimally invasive.”

Tuberosity Reduction = The Hard Part

- Same techniques
- Reduction quality same
- Sinus approach = more advantages
36 y/o male, fall off roof

- Waited 3 weeks
- ST approach

Longer wait = increased wound complications with extensile approach?
Healed incisions without complications

Sinus Tarsi - Conclusions
- Fewer wound complications?
- Easier facet reductions
- C-C joint access
- Retinacular repair
- Post-op motion?
Pediatric fractures

- Some research supports non-op treatment
- Recent papers suggest benefit to surgery
- Wound complications and poor fixation not usually an issue