Calcaneal External Fixation: A Novel, Minimally-invasive Option for Fracture Fixation

Presenting
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Calcaneal fractures
- High energy injury – usually from an axial load
- Incidence increasing as trauma survivorship increases
- Difficult fractures to treat (delay to surgery, comorbidities, soft tissue management, fixation)

Treatment options
- Non-operative: Buckley, JBJS (2002); Allemacher, JOT (2006)
- ORIF: Sanders, JBJS (2000); Thordarson, FAI (2003)
- Subtalar fusion: Huefner, FAI (2001)
- External Fixation: McGarvey, FAI (2001)

New surgical technique
- An external fixation device to stabilize calcaneal fractures, employing two transfixion pins, two half pins, and medial and lateral rails for fixation
- Two transfixion pins: one in the talar neck, and one in the calcaneal tuberosity
- Two half pins: one beneath the posterior facet and one in the anterior neck
- Fracture reduction is achieved through ligamentotaxis, and manipulation of the sidecars
- Bone graft or void fillers may be used as clinically indicated

Case series
- Case series of 7 calcaneus fractures treated in the past two years with external fixation
- All comers with displaced calcaneus fractures treated
- No exclusions secondary to comorbidities

Comorbidities
- Smoking: 57.1%
- Obesity: 42.9% (defined as BMI > 30)
- Diabetes: 28.6%
- Immunosuppressed: 14.3%
- Multiple comorbidities: 42.9%

Operative time
- Average OR time 37 minutes (20 - 59 minutes)

Time to WBAT
- Average time to WBAT: 37 days (immediate - 71 days)
Time to removal
• Average time to removal: 63 days (42 - 116 days)

Complications
• 3 out of 42 pins became superficially infected and treated with oral antibiotics
• No other wound complication, nonunion, symptomatic DJD, need for bracing, need for fusion, nor amputation reported at this time

Summary
• Calcaneus fractures are difficult injuries to treat, and lend themselves to complications (especially in high-risk populations)
• No ideal treatment method exists
• The studied external fixator is a rigid, less invasive surgical option
• Decreased operative time and fewer wound complications compared with standard ORIF
• External fixation is a viable, new treatment option for displaced calcaneus fractures – especially in patients with high-risk comorbidities

References
Buckley R. et al. Operative compared with nonoperative treatment of displaced intra-articular fractures; a prospective, randomized, controlled multicenter trial. JBJS Am. 2002:84:1733-44


