

## Calcaneal Avulsion Fractures in 35 Consecutive Patients Treated Over 17 Years at a Level I Trauma Center: An Injury Pattern Fraught with Soft-Tissue and Bony Complications

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**Purpose:** Calcaneal avulsion fractures are rare injuries, presumably the result of the powerful contraction of the gastrocnemius complex and resultant displacement of the bony insertion of the Achilles tendon. As these fractures often occur in diabetic and elderly hosts with compromised soft and bony tissues, thoughtful surgical decisions including timing and fixation methods seems imperative. Our goal was to evaluate outcomes of calcaneal avulsion fractures in a sizable consecutive cohort treated at our center.

**Methods:** We reviewed all calcaneal fractures treated at our institution from 2000 to 2017 and reviewed imaging and clinical data to identify all calcaneal avulsion fractures that presented over this 17-year period. We collected demographics, comorbidities, mechanism, presence of soft-tissue compromise, fixation construct, incidence of hardware failure or fracture displacement, and need for additional procedures. A univariate analysis was performed to determine which patient factors were associated with fracture displacement or hardware failure.

**Results:** We identified 35 patients with calcaneal avulsion fractures treated over the study period. 29 patients were treated operatively and 6 were treated closed. The overall complication rate was 60% (21 of 35). 15 patients (43%) had either an open fracture or soft-tissue compromise at the time of presentation. Of those patients treated operatively with 3-month follow-up (n = 27), 8 (29.6%) had catastrophic failure of their hardware and loss of fixation. When including those with fracture displacement without loss of fixation (n = 4), 44.4% of patients (12 of 27) had radiographic evidence of fracture displacement. 8 patients (29.6%) required a secondary operation. No patient factor was associated with an increased risk of failure. There was no difference in the incidence of failure in high versus low-energy fractures (45.4% vs 40.0%, P = 0.78). Use of a washer or addition of a soft-tissue procedure (Strayer, suture anchor, etc) did not have a significant effect on failure rate.

**Conclusion:** Calcaneal avulsion fractures treated at our center had a high overall complication risk of 60%. Soft-tissue compromise relating to the timing of presentation and surgery was 43%, combined with high fixation failure rate of 44% following operative treatment. This high-risk injury should be identified and treated early acknowledging that risks are high. Improvements in fixation over 2 screws alone should be strongly considered.