Calcaneal Avulsion Fractures: A Case Series and Prognostic Factors

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Summary:
Calcaneal avulsion fractures present a difficult problem with a relatively high incidence of soft tissue problems, failure of fixation and need for additional surgeries. Our results of a case series of 33 patients indicate that initial fracture displacement and soft tissue compromise portends a relatively poor prognosis with a high rate of operative treatment and subsequent additional surgical procedures required.

Introduction:
Calcaneal avulsion fractures are a rare variant of calcaneal fractures. Due to soft tissue threatening and problems with fixation we hypothesize that calcaneal avulsion fractures have poor outcomes, often necessitating secondary surgeries for either revision fixation or procedures to address soft tissue problems. We describe the results of a case series of 33 patients.

Methods:
A retrospective review was undertaken at two Level I trauma centers of all calcaneus fractures treated at our institutions from 2002 to 2011. After radiographic review, patients with calcaneal avulsion fractures as classified by Beavis, et al. were identified. Tongue type fractures, as described by Essex Lopresti, where the posterior facet is in continuity with the fractured superior tuber, were excluded. Age, sex, mechanism of injury, initial fracture displacement, fracture size, initial treatment and associated medical comorbidities were documented. The medical record was additionally surveyed for documentation of posterior soft tissue threatening. Need for additional surgeries after the index procedure including revision fixation, irrigation and debridement, flap coverage and/or amputation was noted as the primary outcome for review. Secondary outcome measures included soft tissue complications and loss of fixation.

Results:
509 patients who sustained calcaneal fractures were reviewed. Of those, 33 patients who sustained calcaneal avulsion fractures were identified. There were 15 men and 18 women. The mean age was 53 years of age (range: 17 – 89 years of age). According to the classification system as described by Beavis, et al. there were 5 type I fractures and 28 type II fractures. There were no type III fractures seen in our series. Of the 33 patients, 13 (39.4%) ultimately had skin and soft tissue complications. 22 (66.7%) underwent initial surgical fixation. Of the 22 that underwent surgery 6 (27%) had failure of initial fixation. All failures demonstrated gross loss of reduction and failure of internal fixation. There was a need for secondary operations in 12 (36.4%) of all cases. Of those that required additional procedures 10 (83%) were for wound complications, 5 (41.7%) were for failure of fixation. 3 (25%) had both failure of fixation and soft tissue complications. Two subjects required below knee amputation. The mean number of additional operations required was 2.25. Fracture displacement (p = 0.032) and skin threatening at presentation (p = 0.001) were associated with need for surgical fixation. Increased age was significantly associated with wound complications (p = 0.029) and there was a trend toward need for additional procedure with increasing age (p = 0.085). Hypothyroidism (p = 0.003), peripheral vascular disease (p = 0.022) and presence of more than one comorbidity (p = 0.005) were significantly associated with need for secondary surgical intervention. Skin threatening at time of presentation was significantly associated with subsequent soft tissue complication (p = 0.036) and failure of fixation (p = 0.046).
Paper Session 14: TRAUMA

Moderators:

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Conclusion:
Calcaneal avulsion fractures present a difficult problem with a relatively high incidence of soft tissue problems, failure of fixation and need for additional surgeries. Our results indicate that initial fracture displacement and soft tissue threatening indicates a need for surgical reduction and fixation, but comorbid conditions and increased age portend a poor prognosis with a significant association with wound complications and need for additional surgeries.