

Reduction Quality of Intra-Articular Calcaneal Fractures with Sinus Tarsi versus Extensile Lateral Approach on Postoperative CT Scans and Radiographs

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Purpose: Calcaneal fractures require accurate joint reduction to minimize the risk of subtalar arthritis. The extensile lateral approach (EL) and the sinus tarsi approach (ST) are widely utilized. Most studies comparing ST versus EL approaches use plain radiographs for reduction assessment. Our goal was to evaluate calcaneus fractures with postoperative CT scans and plain films to determine differences in reduction quality based on fracture pattern and approach

Methods: All operative calcaneal fractures from 2012-2018 at our Level-I center were reviewed. Exclusion criteria were: extra-articular fractures, malunion repair, percutaneous fixation, acute fusion, and no postoperative CT scan. Sanders classification was utilized. Cases were split into 2 groups based on EL versus ST approach. CT parameters were step-off or gap within the posterior facet, and tuberosity varus angulation: excellent (E) was no gap, no step, and no angulation; good (G) was <1 mm step, <5 mm gap and/or <5° of angulation; fair (F) was 1-3 mm step, 5-10 mm gap, and/or 5-15° angulation; and poor (P) was >3 mm step, >10 mm gap, and/or >15° angulation. We also evaluated Bohler's angle and Gissane's angle on plain radiographs and graded them as normal (20-40° and 120-145°, respectively), high, or low.

Results: 77 patients with 83 fractures were included. Average age was 42 years, with 57 males. Four fractures were open. There were 37 Sanders II, 43 Sanders III, and 3 Sanders IV. 36 were ST and 47 were EL. Average days to surgery were 5 for ST and 14 for EL ($P < 0.001$). Normal Bohler's angle was achieved more often with EL (91.5%) than with ST (77.8%) ($P < 0.001$). There was no difference by approach for Gissane's angle ($P = 0.5$). EL had better overall reduction quality ($P = 0.02$). ST reduction was: E, 19.3%; G, 36.1%; F, 22.2%; and P, 22.2%. EL reduction was: E, 14.9%; G, 57.4%; F, 25.5%; and P, 2.1%. For Sanders II, there was no difference in reduction quality with ST versus EL ($P = 0.51$). ST reduction was: E, 35.7%; G, 50%; F, 7.1%; and P, 7.1%. EL reduction was: E, 26.1%; G, 69.6%; F, 4.3%; and P, 0%. For Sanders III/IV, EL trended toward better reduction quality ($P 0.06$). ST reduction was: E, 9.1%; G, 27.3%; F, 31.8%; and P, 31.8%. EL reduction was: E, 4.2%; G, 45.8%; F, 45.8%; and P, 4.2%.

Conclusion: EL had better overall reduction quality on postoperative CT scan and Bohler's angle on plain films. However, for Sanders II there was no difference between ST and EL. For Sanders III/IV, EL trended toward better reduction quality. In addition to fracture pattern, early wound complications and long-term outcomes must also be considered in future studies comparing the EL and ST approaches.