

## Do Comorbidities or the Use of Graft Influence the Preservation of Bohler's Angle Following Open Reduction and Internal Fixation of Intra-Articular Calcaneus Fractures?

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**Purpose:** Various studies have reported different outcomes following the use of grafts for the treatment of intra-articular calcaneus fractures. To our knowledge, no study has compared the type of graft or associated comorbidities in the treatment of intra-articular calcaneal fractures on the maintenance of calcaneal height. We hypothesized the use of calcium-phosphate grafts might lead to a greater degree of Bohler angle preservation compared to the use of allograft or no bone graft and that comorbidities may have an influence.

**Methods:** Intra-articular calcaneal fractures presenting at 14 Level I trauma centers between 2008 and 2019 were reviewed. Fractures were classified using the Sanders classification. Comorbidities, injury characteristics, and type of graft used were recorded. Primary outcome measure was the change of Bohler's angle from postoperative to final follow-up ( $\geq 3$  months to allow for union). An analysis of variance was performed to compare groups by graft and fracture type (2 vs 3 vs 4) and multivariate linear regression modeling was performed to adjust for potential confounders.

**Results:** 651 intra-articular calcaneal fractures were included. The change in Bohler's angle at time of follow-up was not significantly different between patients with no graft, phosphate/sulfate graft, and allograft. This was also true when examining type 2, 3, and 4 fractures individually. In comparison with no diabetes, patients with insulin-dependent diabetes (IDDM) had on average 6° greater angle loss ( $P = 0.04$ ) and patients who sustained an open fracture had on average 4° greater angle loss ( $P = 0.05$ ) than those with closed fractures.

**Conclusion:** The type of graft used for the treatment of intra-articular calcaneus fractures does not significantly affect changes in Bohler's angle from postoperative to follow-up. However, the presence of IDDM was independently associated with a greater loss in Bohler angle and with the numbers available, open fractures were at the edge of significance.