

## **For Fracture Nonunion: Crest is Best, Better than all the Rest when Put to the Test**

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**INTRODUCTION:** The purpose of this study was to investigate whether the use of autogenous iliac crest bone grafts as biological stimulation for fracture nonunion repair has greater success in achieving healing than other “graft” types.

**METHODS:** An IRB-approved retrospective review of prospectively collected data was conducted on a consecutive series of patients operatively treated for long-bone fracture nonunions at a single academic medical center between September 10, 2004, and January 20, 2022. These patients were then analyzed based on which bone graft type – iliac crest bone graft (ICBG) vs. alternative graft types—was used during their nonunion repair surgery and whether these patients required a revision surgery. Patient demographics, injury characteristics, and surgical history were reviewed and compared. Outcomes included radiographic healing, time to union, postoperative complications, and need for revision. Cohorts were compared using Independent T-Tests and Chi-Square Tests.

### **RESULTS:**

A total of 445 patients were treated surgically for a long-bone fracture nonunion treated using standard internal fixation and a “bone graft” for biological stimulation and had minimum 1-year follow up. In total, 311 (70%) of these patients were treated with an autogenous ICBG, obtained via a separate open approach. There was no difference between nonunion classification percentages between cohorts. The remaining 134 (30%) were treated with an alternative bone graft type (iliac crest aspirate, allograft, bone morphogenetic protein, reamer-irrigation aspirator, and/or demineralized bone matrix (all others)).

Compared to the all others cohort, the ICBG cohort showed significantly greater healing success after a single nonunion surgery (94% ICBG vs. 79%,  $P < 0.001$ ). Additionally, cases in which ICBG was used resulted in faster healing times for all of those who healed after one surgery, however this only approached significance (4.8 months vs. 5.5 months,  $P = 0.07$ ). Complication rate associated with ICBG harvest was 2.6% and included 6 incidents of iliac crest wound infection and 2 iliac wing fractures. Patients treated with persistent nonunions had more surgery than those that did heal. There was no difference in rates of positive culture at time of surgery ( $P = 0.911$ ), postoperative FRI ( $P = 0.216$ ), hardware failure ( $P = 0.854$ ), or neurovascular injury ( $P = 0.358$ ).

**DISCUSSION AND CONCLUSION:** Although several factors play a role in successful treatment of ununited fractures, autogenous iliac crest bone grafts as the biological stimulus source for the operative repair of long-bone fracture nonunions remains the “gold standard.”