

Outcomes of Humerus Nonunion Surgery in Patients Whose Initial Fracture Was Treated Nonoperatively

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Purpose: Nonunions develop following nonoperative management of humerus fractures in approximately 10% to 20% of fractures. The only large case series of humerus nonunions reported to date is a single-surgeon review and had a union rate of 91.5% after nonunion surgery in patients whose initial fracture treatment was nonoperative (n = 59). We created the largest dataset of patients with humerus nonunion whose initial fracture was treated nonoperatively, with the aim of better describing generalizable union rates following nonunion surgery and the risk factors for developing a recalcitrant nonunion in this population.

Methods: Nine tertiary academic medical centers retrospectively reviewed their electronic health records to identify patients with humerus nonunions that were treated surgically. Only patients ≥ 18 years of age whose initial fracture was treated nonoperatively were included in this study. In addition to measuring union rates, we performed a univariate regression analysis to determine potential risk factors for development of recalcitrant nonunion (defined as failure to unite with a minimum follow-up of 6 months after nonunion surgery).

Results: We identified 120 patients who met inclusion criteria from a database of 2012 long bone nonunions. Following nonunion surgery, 95 (79.2%) achieved union, while 25 (20.8%) developed recalcitrant nonunion. 36 (30.0%) experienced 1 or more complication(s), including 9 (7.5%) who developed an infection. Only current smoking status ($P = 0.0073$) and having a complication ($P = 0.0001$) were significantly associated with development of recalcitrant nonunion. Interestingly, nonunion type, addition/choice of bone graft during nonunion surgery, initial fracture location, initial OTA fracture classification, body mass index, and diabetes status were not associated with development of recalcitrant nonunion.

Conclusion: We found in patients with humeral nonunion whose initial fracture was managed nonoperatively, only 4 in 5 achieved union following nonunion surgery. Also, nearly 1 in 3 will experience a complication. Smoking and the development of a complication after nonunion surgery were associated with development of recalcitrant nonunion. Interestingly, the use and choice of bone graft was not associated with a difference in surgical outcomes. The success of nonunion repair should be discussed with the patient when considering nonoperative management. In addition, surgeons and patients should carefully weigh the risks and benefits prior to pursuing operative management of humerus nonunion. Further research is necessary to improve outcomes and optimize treatment strategies for humerus nonunion.