

Predictors of Humeral Diaphyseal Nonunion: NSAIDs, BMI, and Nonoperative Management Are Associated With an Increased Risk of Nonunion

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Purpose: The primary aim was to identify patient and injury factors independently associated with humeral diaphyseal fracture nonunion after nonoperative management. The secondary aim was to determine the effect of management (operative/nonoperative) on nonunion.

Methods: Over a 10-year period, 734 humeral shaft fractures (732 consecutive patients) were retrospectively identified from a trauma database. Follow-up was available for 663 fractures (662 patients, 90%) that formed the study cohort. Patient and injury characteristics were recorded. There were 523 patients (79%) managed nonoperatively and 139 (21%) managed operatively. Outcome (union/nonunion) was determined from medical records and radiographic review.

Results: The median age at injury was 57 years (range, 16-96) and 54% (n = 359/662) were female. Median follow-up was 5 months (range, 1.2-74). Nonunion occurred in 22.7% (n = 119/524) of nonoperatively managed injuries. Multivariate analysis demonstrated preinjury NSAIDs (nonsteroidal anti-inflammatory drugs (adjusted odds ratio [OR] 40.8, 95% confidence interval [CI] 2.6-632.3; P = 0.008) and being underweight (body mass index [BMI] <18.5 kg/m²) (adjusted OR 7.3, 95% CI 1.3 to 40.2; P = 0.022), overweight (BMI 25-29.9 kg/m²) (adjusted OR 2.5, 95% CI 1.1 to 5.9; P = 0.034), and class II obesity (BMI 35-39.9 kg/m²) (adjusted OR 4.5, 95% CI 1.4 to 15.5; P = 0.014) were independently associated with an increased risk of nonunion. Operative fixation was independently associated with a lower risk of nonunion (2.9%, n = 4/139) compared with nonoperative management (adjusted OR for nonoperative/operative management 11.0, 95% CI 2.8 to 43.6; P = 0.001). Based upon these results, 5 patients would need to undergo primary operative fixation to avoid 1 nonunion.

Conclusion: Preinjury NSAIDs and BMI were independently associated with nonunion following nonoperative management of a humeral diaphyseal fracture. Operative fixation was the independent factor most strongly associated with a lower risk of nonunion. Targeting operative fixation to high-risk patients may reduce the rate of nonunion and the morbidity associated with delayed definitive management.