Decreasing Rate of Operative Management of Proximal Humerus Fractures in Adolescents: A National Database Study

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INTRODUCTION:
Pediatric proximal humerus fractures are usually treated with nonoperative management due to their significant remodeling potential. However, older children have decreased fracture remodeling and recent studies in these patients have shown good outcomes with operative treatment. The purpose of this study was to investigate the trends in treatment of proximal humerus fractures in the adolescent population and investigate predictors of operative management.

METHODS:
This is a retrospective study using the Pediatric Health Information System database, which includes data from children's hospitals across the United States. This study included patients between the ages of 10 to 18 who sustained a proximal humerus fracture between 2004 to 2019. International Classification of Disease, 9th and 10th Revisions codes were used to confirm diagnosis. Patients with open fractures were excluded from the analysis. Descriptive, univariate, and multivariate analyses were used to determine rates operative management of adolescent proximal humerus fractures and identify factors associated with operative management. All statistical analyses were performed using R statistical software version 1.0.44.

RESULTS:
A total of 17,515 proximal humerus fracture admissions were identified and 2,081 (11.9%) were treated operatively. The mean age was 12.5 years and 37.5% of patients were female. The rate of operative management decreased from 15.1% to 8.9 during the study period (p<0.01). There was a higher rate of operative management in boys (13.4% vs. 9.4%, p<0.01). The operative cohort was older (13.4 years vs. 12.4 years, p<0.01), and patients who were treated in rural areas had twice the rate of operative management (20.7% vs. 10.8%, p<0.01). Operative patients had higher billed charges and longer hospital stay (p < 0.05), but there was no significant difference in mean estimated household income between operative and nonoperative groups (p > 0.05). A multivariate analysis showed increased odds of operative management with older age (OR 1.32, 1.29-1.36), and treatment in the South (OR 1.19, 1.05-1.34). The odds of operative management were lower in more recent years (OR 0.94, 0.93-0.95) and in urban settings (OR 0.41, 0.35-0.47).

DISCUSSION AND CONCLUSION:
From 2004 to 2019, there has been a significant decrease in the rate of operative management of adolescent proximal humerus fractures at children's hospitals. Patients who are older, male, or are treated in rural areas or the South are more likely to be treated operatively. Further study is needed to investigate temporal trends and geographic differences in practice, and to identify differences in patient outcomes between operative and nonoperative management.