Radial Nerve Injury and Recovery After Humeral Nonunion Surgery

*Paul Tornetta, III, MD[1]; **Justin Koh, MD**[1]; Clifford B. Jones, MD; J. Brock Walker, MD[2]; Andrew Sems, MD; Sharul Saxena; Henry Aidoo Boateng, MD; Kathleen Ringenbach, PhD; Clay Spitler, MD; Hassan R. Mir, MD; Shaan Patel; Reza Firoozabadi, MD; Kate Bellevue, MD; Daniel S. Horwitz, MD; Lisa K. Cannada, MD; Michael Bosse, MD; J. Stewart Buck, MD; Jerald Westberg, BA[3]; Andrew H. Schmidt, MD[3]; Laurence B. Kempton, MD; Andrew J. Marcantonio, DO; Peter Carl Krause, MD; Matthew Delarosa, MD; Tayseer Shamaa, MD; Brian H. Mullis, MD; Andrew Gudeman; Ross K. Leighton, MD; Amro Alhoukail, MD; Saam Morshed, MD, PhD; Abigail Cortez, BA[4]; David W. Sanders, MD; Christina Tieszer, BSc*
[1]*Boston University Medical Center, Boston, Massachusetts, USA*
[2]*University of Arizona College of Medicine Phoenix, Phoenix, Arizona, USA*
[3]*Hennepin County Medical Center, Minneapolis, Minnesota, USA*
[4]*University of California, San Francisco School of Medicine, California, USA*

Purpose: Radial nerve palsy(RNP) after humeral shaft fractures is well characterized. Data regarding RNP after humeral nonunion repair is more limited and rates range from 0% to 18.5%, typically from small sample sizes. This study uses multi-center data to determine the rate of RNP after humeral nonunion repair and predictive factors for palsy.

Methods: We retrospectively reviewed 393 adult patients who underwent humeral shaft nonunion repair at 18 centers. Exclusion criteria were pathologic fracture and initial complete RNP. Data included demographics, fracture/nonunion characteristics, and post-op course. RNP deficits either partial or complete. We used multivariate logistic regression to characterize patients with RNP. Additionally, demographics and surgical factors were evaluated with univariate logistic regression and chi-squared contingency testing.

Results: 393 patients (159 M, 234 F, ages 18-93). 25(6.3%) had worse RNP after nonunion repair. 68% were approached anteriorly with a 6% palsy rate, 8% posteriorly with 5% and 7% laterally with 8%. Midshaft nonunions were associated with RNP($P = 0.02$) and bone grafting trended towards association ($P = 0.07$). Logistic multivariate regression showed good model performance for fracture location, nonunion type, and nonunion repair approach($P = 0.036$). Middle third fractures correlated with RNP($P = 0.02$). Of 25 patients with postop RNP, 8(32%) had persistent RNP at final follow-up (273 days; range 40-539). For those who recovered, resolution averaged 23 weeks. On average, partial/complete palsies resolved at 11/42 weeks.

Conclusion: In a large series of patients treated operatively for humeral shaft nonunion, the rate of RNP was 6.3% and the rate of persistent RNP at union was 2.0%. This finding is more generalizable than prior reports. Midshaft fractures were associated with palsy although surgical approach was not.