

## Short Stature Patients Have Higher Risk for Neurologic Complications and Acromial Pain after Reverse Shoulder Arthroplasty

Katherine A Burns<sup>1</sup>, Lynn Robbins, Laura Humphrey, Angela LeMarr<sup>1</sup>, Diane Morton<sup>1</sup>, Melissa Lee Wilson<sup>2</sup>

<sup>1</sup>SSM Health Orthopedics, <sup>2</sup>University of Southern California

**INTRODUCTION:** Neurologic deficits (both transient and permanent) and acromial pain/stress fracture have been described after reverse total shoulder arthroplasty (RTSA). Neurologic deficits in particular have been hypothesized to result from distalization of the arm, which causes traction to the brachial plexus. RTSA is known to generate nerve alerts after reduction due to subsequent arm lengthening. RTSA also increases tension across the deltoid and acromion by lengthening and lateralizing the humerus. Risk factors for acromial stress fracture or stress reaction include female sex, change in deltoid length, and preoperative medialization. Stature has not been identified as a risk factor for worse outcomes or complications after RTSA. In this study we compared clinical outcomes for stature (patients  $\leq 62$  inches and patients  $> 62$  inches).

**METHODS:** A retrospective review of all primary RTSA cases at one institution by one surgeon using a single onlay implant system was performed. Anatomic shoulder arthroplasty, hemiarthroplasty, and revisions were excluded. Patient-reported outcome measures including American Shoulder and Elbow Surgeons (ASES), Simple Shoulder Test (SST), and visual analog scale for pain (VAS) scores as well as forward elevation and strength were recorded. Univariate logistic regression was performed to assess the influence of stature  $\leq 62$  inches on common complications. T-tests were used to assess patient-reported outcomes and range-of-motion. Five multivariable logistic regression models were built to evaluate the risk of fracture (acromial only or all fractures) and/or neurological complications in the whole cohort as well as when restricting to female patients.

**RESULTS:** A total of 468 patients were identified for inclusion; 94 patients were  $\leq 62$  inches and 374 patients were  $> 62$  inches. Short stature patients were more likely to be female (95.7% vs. 43.6%,  $p < 0.001$ ), older ( $73.9 \pm 9.2$  vs.  $68.0 \pm 9.1$ ,  $p < 0.001$ ), and have a higher BMI ( $33.2 \pm 7.7$  vs.  $31.5 \pm 6.3$ ,  $p = 0.024$ ). The differences between cohorts in terms of race, smoking status, or medical comorbidities were not statistically significant. The short stature cohort was more likely to experience neurologic [OR 1.92 (1.05, 3.53),  $p = 0.035$ ] and fracture complications including acromial stress fracture and stress reaction [OR 4.00 (1.71, 9.37),  $p = 0.001$ ]. Despite the increased risk of this subset of complications, the short stature cohort experienced significantly greater improvement in pain ( $\Delta -5.4 \pm 2.9$  vs.  $\Delta 4.5 \pm 2.8$ ,  $p = 0.013$ ) and ASES score ( $\Delta 46.1 \pm 21.6$  vs.  $\Delta 40.9 \pm 21.0$ ,  $p = 0.049$ ). Both groups had similar improvements in strength ( $0.7 \pm 1.1$  vs.  $0.7 \pm 1.1$ ,  $p = 0.792$ ) and range of motion ( $31.4 \pm 38.5$  vs.  $29.8 \pm 37.3$ ,  $p = 0.757$ ). To assess the independent effect of stature in females, a sensitivity analysis was performed restricting analysis to females only. This confirmed that stature was associated with neurologic complications and acromial fractures in females [OR 1.85 (1.02, 3.37),  $p = 0.043$ ].

**DISCUSSION AND CONCLUSION:** Patients  $\leq 62$  inches (157 cm) were more likely to experience complications after RTSA related to lengthening and tensioning of the arm, including neurologic concerns and acromial stress fracture.