

Minimum 5-Year Follow-up After Anatomic Total Shoulder Arthroplasty: Predictors of Excellent Outcomes

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INTRODUCTION: While many short-term studies exist on factors associated with success after anatomic total shoulder arthroplasty (aTSA), there are only limited reports describing preoperative factors predictive of an excellent result after aTSA in the mid- to long-term. Identification of such factors can provide important information in counseling patients pre-operatively. The objectives of this study were to report minimum 5-year outcomes in consecutive patients undergoing aTSA and to determine characteristics of patients in which an excellent outcome was achieved.

METHODS: A longitudinally-maintained shoulder arthroplasty database was retrospectively reviewed for consecutive patients undergoing aTSA from 2010 to 2017. During this time, 393 had an aTSA performed, and 233 were consented for long-term follow-up. Pre-operative demographic variables including age, diagnosis, race, smoking status, alcohol use were included. Simple Shoulder Test (SST) scores were obtained pre-operatively and at a minimum of 5 years. A final SST threshold of ≤ 10 and percentage of maximal possible improvement (% MPI) of 66.7% were determined as optimal thresholds for excellent outcomes. This determination was based on maximal area under the curve (AUC) of receiver operating characteristic (ROC) curves comparing patient satisfaction with SST scores (Figure 1). Univariate and multivariate analysis were performed to identify the pre-operative factors associated with patients with very good (SST ≥ 10 or %MPI $\geq 66.7\%$) 5-year minimum clinical outcomes.

RESULTS: Of 233 eligible patients with surgery over 5 years ago, 188 (81%) had adequate follow-up for inclusion in this study. The average age was 67.9 \pm 8.90 years, and 45.7% were male. Mean SST scores improved from 3.44 \pm 2.40 to 9.72 \pm 2.23 ($p < 0.001$). 95% surpassed the minimal clinically important difference (MCID) of 1.6. 62% of patients surpassed the threshold of final SST ≥ 10 , and 71.3% surpassed the threshold of %MPI $\geq 66.7\%$. On univariate analysis, male sex ($p < 0.001$), insurance type ($p = 0.004$), and pre-operative SST scores ($p = 0.017$) were associated with an excellent outcome identified by SST ≥ 10 , and insurance type ($p = 0.007$) was associated with excellent outcome identified by %MPI ≥ 66.7 . In logistic regression of these significant variables, male sex was identified as being predictor of an excellent outcome (OR 3.70, 95% CI 1.82-7.86; $p < 0.001$), and Workers' Compensation was predictive of patients not obtaining an excellent outcome (OR 0.136, 95% 0.018-0.740; $p = 0.028$) identified by SST ≥ 10 .

DISCUSSION AND CONCLUSION: The MCID threshold is passed by the vast majority (95%) of patients undergoing aTSA and may represent a low bar of success. Thresholds for excellent outcomes including final SST ≥ 10 and %MPI $\geq 66.7\%$ may be more useful in identifying patients who benefit most from aTSA. In this cohort, male sex and pre-operative SST score were predictive of an excellent outcome, while Workers' Compensation insurance was predictive of not obtaining an excellent outcome.

