Timeline to Achieve Final Clinical and Functional Improvements following Anatomic and Reverse Arthroplasty

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Introduction

The rate of patient improvement following shoulder arthroplasty has not been definitively quantified. Previous investigations have suggested patients can improve from anywhere from 6 months to 2 years after surgery; however, to our knowledge no previous study has evaluated changes in patient outcomes beyond 2 years. Therefore the purpose of this investigation is to evaluate the postoperative timeline to achieve peak improvements following shoulder arthroplasty. In addition, this study sought to evaluate any contrast in maximal improvements between patients undergoing anatomic (TSA) or reverse shoulder arthroplasty (RTSA), as well as to identify any regression in functional outcome measures within 5 years of shoulder arthroplasty.

Methods and Materials

This study utilized a registry for patient analysis with all sites compliant with the institutional review board (IRB) process. Inclusion criteria included patients undergoing primary anatomic or reverse arthroplasty patients with a minimum 5 year follow up and completion of postoperative questionnaires at 1, 2, 3, 4, 5 years. Patient reported outcomes (PRO), range of motion (ROM), and strength were analyzed. Statistical significance was evaluated using Chi-square and paired t.test statistics. Mixed effects linear modeling was used to evaluate each individual patient's improvement over time points. Temporal trends were analyzed between time points and type of arthroplasty.

Results

A total of 188 patients undergoing TSA and 239 RTSA met inclusion criteria. Patients undergoing TSA demonstrated peak improvement in range of motion at one year postoperatively (forward flexion (FF) 148º, external rotation (ER) 54º, internal rotation(IR) L2). PRO peaked at 2 years postoperatively (ASES 90.0, WOOS 90.6, VAS 0.7). Strength continued to improve at the 5 year follow up (constant 11.1 lbs., ER strength 13.6 lbs., belly press 15.3 lbs.). However, patients undergoing TSA did demonstrate significant regression in PRO values (ASES, VAS) when comparing scores at 2 years verse 5 year postoperatively. In all values, patients undergoing TSA outperformed RTSA patients.

Patients undergoing RTSA demonstrated peak improvement in forward flexion (148º), internal rotation (L4) and constant strength (9.4 lbs.) at one year postoperatively. By 2 years postoperatively, RTSA reached maximal improvement in PRO (ASES 84.7, WOOS 86.8, VAS 0.8) and external rotation (47º). External rotation strength (10.5 lbs.) and belly press (11.0 lbs.) continued to improve at the 5 year follow up evaluation. Patients undergoing RTSA did show regression in terms of constant strength at 5 years, but remained stable in all other measures.

Discussion

This data demonstrates that patients undergoing shoulder arthroplasty can expect to improve clinically for an extended time in the postoperative setting. Patients undergoing TSA typically peak in terms of range of motion by one year; however, they demonstrate improvements in subjective scores for two years and their strength scores continue to improve at the five year follow up. TSA patients do demonstrate significant regression in subjective scores at the five year mark compared to their two year follow up but still out perform RTSA patients. Patients undergoing RTSA demonstrate peak range of motion improvement at one year postoperatively; however, they also demonstrate improvements in subjective scores for two years and strength continues to improve at the five year follow up. Ultimately, patients undergoing shoulder arthroplasty can expect improved subjective scores, motion and strength compared to preoperative measures and these values can continue to improve for up to two year to five years in the postoperative setting.