

Anatomic Total Shoulder Arthroplasty: Outcomes and Survivorship at an Average of 11 Years in 172 Shoulders

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INTRODUCTION:

Short to mid-term outcomes following anatomic total shoulder arthroplasty are well-documented. Limited literature exists on long-term follow up following aTSA due to advanced patient age at time of surgery. The available literature has suggested that while improvements are maintained, prosthesis survivorship outcomes are heterogenous. Additionally, previous long-term outcomes studies have included cohorts from the 1970s-1980s, and aTSA has evolved significantly in that time. The objective of this study is to report on a series of long-term clinical and radiographic outcomes following aTSA. We hypothesized that improvements in shoulder function and range of motion are maintained at final follow up following aTSA with low rates of complications and revisions.

METHODS: Patients who underwent aTSA with a minimum of 2.0 years of follow up were included. Patients' range of motion (forward elevation, external rotation, internal rotation), patient-reported outcomes (ASES, SST, and VAS scores), and radiographic variables (glenoid morphology, lateral humeral offset, acromiohumeral interval, and humeral lucency) were recorded. Preoperative, postoperative, and change in pre- to postoperative range of motion (ROM), patient-reported outcomes (PROs), and radiographic measures were compared using a one-way analysis of variance (ANOVA) test. A Pearson's coefficient was used to compare the association between overall BMI and patient's age at surgery, ROM, and PRO scores. Categorical variables were analyzed using either χ^2 or Fisher's Exact test. Kaplan-Meier curves were generated based on a 95% confidence interval for implant survival. Implant failure-free survival was defined as shoulders requiring no revision surgeries post-arthroplasty.

RESULTS:

A total of 172 shoulders (159 patients) met inclusion criteria and were included in this study. The average age for index surgery was 64.3 ± 9.8 years with an average follow-up time of 10.7 ± 5.2 years; 87/172 patients were male. Patients presented for surgery with an average BMI of 27.1. All measurements of range of motion saw significant preoperative to postoperative improvements. Overall, forward elevation improved from $118^\circ \pm 27^\circ$ preoperatively to $149^\circ \pm 24^\circ$ postoperatively ($p < 0.01$). External rotation improved from $21^\circ \pm 24^\circ$ preoperatively to $54^\circ \pm 16^\circ$ ($p < 0.01$); internal rotation improved from L4 to T12 ($p < 0.01$). ASES scores improved from 32 ± 20 preoperatively to 76 ± 22 postoperative ($p < 0.01$). SST scores improved from 3 ± 3 preoperatively to 8 ± 3 ($p < 0.01$). VAS pain index scores went from a mean preoperative score of 7 ± 3 to a mean postoperative score of 2 ± 3 ($p < 0.01$). Radiographic data was available for 161 patients in our cohort. The immediate lateral humeral offset (LHO) was 14 ± 6 and the final LHO was 11 ± 8 ($p < 0.01$). The immediate acromiohumeral interval (AHI) was 11 ± 4 and the final AHI was 9 ± 4 ($p < 0.01$). Humeral loosening was seen in 11/161 (7%) of patients at final follow up. Glenoid loosening was seen in 18/161 (11%) of patients at final follow up. The Walch classification for loose glenoids was A1 (n=3), A2 (n=6), B1 (n=1), and B2 (n=8). Kaplan Meier implant survivorship estimates were 96% at 10 years and 75% at 20 years.

DISCUSSION AND CONCLUSION:

This study provides both a large case series and long-term follow up for patients undergoing anatomic total shoulder arthroplasty. In this series, we found that aTSA provides long-term improvements in range of motion in patients while reducing pain levels. Results are sustained with excellent implant survivorship of 96% and 75% at 10- and 20-years following surgery. When considered together, this demonstrates that most patients undergoing aTSA can have excellent use of their shoulder from age at surgery through end-of-life.

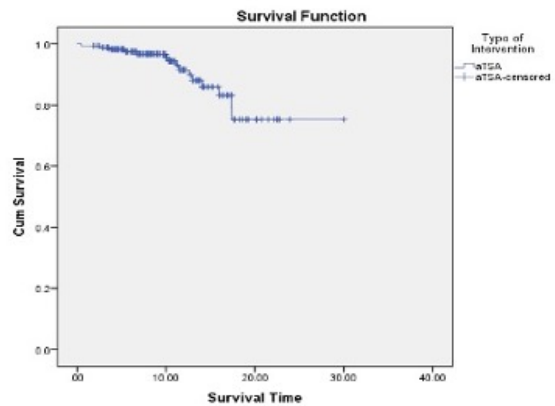


Table 1: Comparison of preoperative and postoperative clinical outcomes

Characteristic	Preoperative Score	Postoperative Score	p-value
Forward Elevation (°)	118° ± 27	149° ± 24°	<0.01
External Rotation (°)	21° ± 24°	54° ± 16°	<0.01
Internal Rotation	L4	T12	<0.01
ASES	32 ± 20	76 ± 22	<0.01
SST	3 ± 3	8 ± 3	<0.01
VAS	7 ± 3	2 ± 3	<0.01