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Comparison of satisfied and dissatisfied patients 2 to 5 years after anatomic total shoulder arthroplasty

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Background: With an increasingly large number of patients undergoing total shoulder arthroplasty (TSA) combined with increased requirements for public reporting of patient outcomes, there is a greater need to better understand the underlying factors related to patient satisfaction. The purpose of this study was to compare patient demographics, nonorthopedic comorbidities, patient-reported outcome scores, and range of motion of patients who reported being either satisfied or dissatisfied with their procedure at midterm follow-up.
Methods: We identified 234 primary TSAs performed by a single surgeon for glenohumeral osteoarthritis with a minimum 2-year follow-up in a prospective shoulder arthroplasty registry. American Shoulder and Elbow Surgeons (ASES) score, patient satisfaction, and active forward flexion, abduction, and external rotation at 0° of flexion-abduction were assessed before and after TSA.
Results: Of the 234 patients, 207 (88.5%) were satisfied with their procedure. Dissatisfied patients had significantly lower ASES scores both before and after surgery ($P < .001$) as well as a significantly lower preoperative to postoperative change in ASES score ($P < .001$). Similarly, dissatisfied patients demonstrated significantly lower changes in active forward flexion ($P = .004$), abduction ($P = .02$), and external rotation ($P = .03$). Patients with ASES score changes <12 points were 19 times more likely to be dissatisfied after TSA (95% confidence interval, 4.4-81.4; $P = .0001$).
Conclusion: Dissatisfied patients had significantly lower improvements in pain, function, and range of motion. Furthermore, a change in ASES score <12 points was associated with a 19-fold increase in the risk of being dissatisfied after TSA.
Level of evidence: Level III; Retrospective Cohort Design; Treatment Study

Keywords: Total shoulder arthroplasty; osteoarthritis; outcome; activities of daily living; satisfaction; pain; range of motion

Anatomic total shoulder arthroplasty (TSA) provides an effective method to reduce pain and functional limitations associated with glenohumeral osteoarthritis.[4] As such, the annual number of shoulder arthroplasties performed in the United States demonstrated a 5-fold increase between 2000 and 2010.[23]

The Institutional Review Board of Texas Orthopedic Hospital approved this study (Protocol TOH162).

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Increased utilization combined with increased requirements for public reporting of patient outcomes has created a need to better understand the underlying factors related to patient satisfaction after TSA. The purpose of this study was to compare patient demographics, prevalence of nonorthopedic comorbidities, patient-reported outcome scores, and range of motion (ROM) of patients who reported being either satisfied or dissatisfied with their procedure 2 to 5 years after anatomic TSA. We hypothesized that dissatisfied patients would have a greater prevalence of nonorthopedic comorbidities as well as inferior postoperative outcomes and ROM.

Materials and methods

We identified 234 primary TSAs performed for primary glenohumeral osteoarthritis with a minimum 2-year follow-up in a prospective shoulder arthroplasty registry (153 men, 81 women; age, 66.7 ± 9.6 years; body mass index, 30.0 ± 5.8 kg/m^2). All procedures were performed by a single, high-volume surgeon (T.B.E.) at a high-volume hospital. Patients who underwent revision surgery or had an intraoperative or postoperative complication were excluded. Similar implant systems were used in all patients (Aequalis, Aequalis Ascend, and Aequalis Ascend Flex; Tornier, Bloomington, MN, USA) with previously described surgical techniques and standardized postoperative rehabilitation.[5,7,16]

Patient demographics and the following nonorthopedic comorbidities were collected as part of our registry: diabetes, depression, back pain, heart disease, high blood pressure, cancer, anemia, preoperative opioid use, smoking status, nickel allergy, kidney disease, liver disease, or lung disease. The American Shoulder and Elbow Surgeons (ASES) score[18] and active forward flexion, abduction, and external rotation at 0° of flexion-abduction were assessed preoperatively and 2 to 5 years postoperatively, with ROM measured using a long-arm goniometer. Patient satisfaction was also recorded at the most recent follow-up by asking the patients to rate themselves as being very satisfied, satisfied, dissatisfied, or very dissatisfied. Patients who were very satisfied or satisfied were categorized as being satisfied for the purposes of this study. Patients who were very dissatisfied or dissatisfied were considered dissatisfied. Patient satisfaction was available for all 234 patients; however, comorbidity information was missing for 1 patient with an incomplete health history form, and ROM was not available for 1 other patient.

The prevalence of nonorthopedic comorbidities was compared between satisfied and dissatisfied patients using either the X^2 or Fisher exact test as appropriate. Separate 2 × 2 repeated-measures analyses of variance (group × pre/post test) were used to compare preoperative and postoperative outcome scores and ROM between groups. In addition, a receiver operating characteristic curve and odds ratio were calculated to determine if there was a threshold of improvement in ASES score associated with postoperative satisfaction. Spearman correlation coefficients (ρ) were calculated to better understand which preoperative and postoperative factors were related to postoperative satisfaction. An α level of $P < .05$ was considered statistically significant for all analyses. All statistical analyses were performed with SPSS Statistics version 22 (IBM, Armonk, NY, USA), with the exception of the odds ratio calculation, which was performed with MedCalc for Windows, version 12.5 (MedCalc Software, Ostend, Belgium).

Results

Of the 234 patients, 207 (88.5%) were satisfied with their procedure. There were no differences in either patient demographics or nonorthopedic comorbidities between groups; however, a significantly greater proportion of dissatisfied patients reported preoperative opioid use (Table I). Dissatisfied patients had significantly lower ASES scores both before and after surgery as well as a significantly lower preoperative to postoperative change in ASES score (Fig. 1). A change in ASES score ≥12 points was associated with a greater likelihood of being satisfied (receiver operating characteristic area under the curve, 0.79; $P < .001$; sensitivity, 0.99; specificity, 0.79). On the contrary, patients with ASES score changes <12 points were 19 times more likely to be dissatisfied after TSA (95% confidence interval, 4.4-81.4; $P = .0001$).

Table I Prevalence of coexisting nonorthopedic conditions for satisfied and dissatisfied TSA patients

	Satisfied patients, No. (%) (207 respondents)	Dissatisfied patients, No. (%) (26 respondents)	*P*
Anemia	11 (5)	2 (8)	.65
Back pain	71 (34)	11 (42)	.61
Cancer	31 (15)	3 (12)	.77
Depression	12 (6)	3 (12)	.39
Diabetes	13 (6)	4 (15)	.11
Heart disease	21 (10)	3 (12)	.74
High blood pressure	114 (55)	19 (73)	.14
Kidney disease	1 (0.5)	0 (0)	>.99
Liver disease	0 (0)	0 (0)	>.99
Lung disease	6 (3)	1 (4)	.58
Nickel allergy	4 (2)	1 (4)	.46
Preoperative opioid use[†]	48 (24)	12 (46)	.03*

* Statistically significant ($P < .05$).

† Preoperative opioid use information was available for 197 of 207 patients in the satisfied group.