Does more "normal" shoulder motion after arthroplasty improve patient satisfaction? Correlation of range of motion, patient-reported function, and patient satisfaction following shoulder arthroplasty.

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Background and Objective

Glenohumeral arthrosis is a cause of morbidity in the United States and rates of surgical interventions for this condition are increasing. The predominant goals of total shoulder arthroplasty (TSA) are pain relief and range of motion (ROM) restoration. It is important to ascertain the specific goals of the patient preoperatively and to assess postoperative patient satisfaction.

Regarding the TSA, reverse TSA, hemiarthroplasty, and humeral head resurfacing procedure: (a) Is restoration of range of motion the primary factor of importance to the patient? (b) How is ability to carry out ADLs (activities of daily living) influenced by ROM? (c) How does ADL performance correlate with patient satisfaction? It is hypothesized that more "normal" ROM following shoulder arthroplasty leads to increased patient satisfaction and better performance of ADLs.

Introduction

The predominant goals of shoulder arthroplasty are pain relief and restoration of ROM, which is thought to result in improved ability to perform ADLs. The increasing incidence of shoulder arthroplasty warrants analysis of the patient-perceived success of these procedures, which will aid the decision-making of future surgical candidates. While most studies have focused on objectively-measured outcomes of a procedure or implant, disassociation of imaging structural findings and patient symptoms supports consideration of patient-reported assessments. Many outcomes tools have been developed to measure the quality of life in patients with shoulder pathologies.
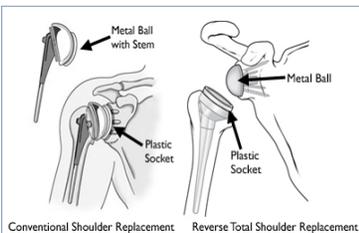
Figure 1. Conventional TSA prosthesis and reverse TSA prosthesis.

Source: Arthritis of the shoulder (January 2013). AAOS.org.

Methods

Patients who underwent TSA, reverse TSA, hemiarthroplasty, or humeral head resurfacing by one surgeon in one institution were included prospectively in a database. 155 patients who had preoperative and 6-month postoperative data including demographics, patient satisfaction (4-point Likert scale), ROM (forward elevation, lateral elevation, cross-body adduction, external rotation, internal rotation), and ADL performance by patient questionnaire (components of ASES and QuickDASH scores) were included. Associations between ROM and patient satisfaction were tested using Fisher's exact test and chi-square tests, with level of statistical significance set at $P \leq .05$. The association between ROM and ADL was tested using the Mann Whitney U test and ANOVA was used to assess the association between total percentage of ROM achieved as normal and ADLs.

Results

The final analysis included 82 (52.9%) females and 73 (47.1%) males, with an average age of 70.9. Of these 155 shoulders, 139 (89.7%) were primary arthroplasty procedures (97 TSA, 29 reverse TSA, 9 hemiarthroplasties, 3 humeral head resurfacing), 14 (9.0 %) were reoperations, and 2 were unknown (1.3%). Response rate for patient satisfaction was 82 (52.9%), with 96.8% reporting they were "satisfied or "very satisfied".

Postoperative ROM was associated with degree of patient satisfaction for 3/5 measurements: forward flexion, adduction, and external rotation. This association demonstrated a "dose-response" relationship, as higher percentage of normal ROM correlated with increased satisfaction.

Mean ADL scores were higher for patients who achieved normal ROM compared to those who didn't, though the association in forward elevation was not statistically significant. ADL scores improved in patients who had higher percentages of normal ROM measurements achieved, with the greatest improvement seen when a patient achieved normal ROM for at least 3 of 5 ROM measurements. There was a significant association between improved ADL and increased patient satisfaction.

Table 1. Association of ROM and satisfaction.

ROM	Satisfied	Very satisfied	Total
Internal rotation (P=0.567)			
Same	10	22	32 (46.4%)
Different	14	23	37 (53.6%)
Total	24 (34.8%)	45 (65.2%)	69
Forward flexion (P=0.001)			
Same	6	32	38 (55.1%)
Different	17	14	31 (44.9%)
Total	23 (33.3%)	46 (66.7%)	69
Abduction (P=0.315)			
Same	15	36	51 (72.9%)
Different	8	11	19 (27.1%)
Total	23 (32.9%)	47 (67.1%)	70
Adduction (P=0.021)			
Same	11	37	48 (73.8%)
Different	9	8	17 (26.2%)
Total	20 (30.8%)	45 (69.2%)	65
External rotation (P=0.006)			
Same	9	35	44 (75.9%)
Different	9	5	14
Total	18 (31.0%)	40 (69.0%)	58

*Internal rotation: P = .567 (Pearson Chi-Square)
*Forward flexion: P = .001 (Pearson Chi-Square)
*Abduction: P = .315 (Pearson Chi-Square)
*Adduction: P = .021 (Pearson Chi-Square)
*External rotation: P = .006 (Fisher's Exact Test)

Table 2. Proportion of ROM measurements the same associated with patient satisfaction.

ROM same (/5)	Satisfied	Very satisfied	Total
P=0.009 (Pearson Chi-Square)			
1 out of 5 same (20%)	3 (100.0%)	0 (0%)	3
2 out of 5 same (40%)	7 (50.0%)	7 (50.0%)	14
3 out of 5 same (60%)	1 (10.0%)	9 (90.0%)	10
4 out of 5 same (80%)	3 (20.0%)	12 (80.0%)	15
5 out of 5 same (100%)	1 (12.5%)	7 (87.5%)	8
Total	15 (30.0%)	35 (70.0%)	50

Table 3. Association between mean ADL score and patient satisfaction.

Satisfaction	N	Mean ADL	Std. dev.
P=0.004			
Satisfied	26	2.50	0.87
Very satisfied	50	1.93	0.73
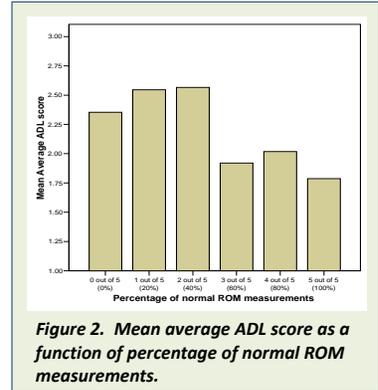
Figure 2. Mean average ADL score as a function of percentage of normal ROM measurements.

Discussion and Conclusions

Of the evaluated patients, satisfaction improved for patients who achieved more normal forward flexion, adduction, and external rotation. There was a "dose-response" relationship between the percentage of normal ROM across all planes of motion and patient satisfaction. A significant increase in ADL functioning was found when at least 3 of 5 ROM measurements were restored to normal, with "normal" referring to equal ROM of the operative and contralateral shoulders.

The correlations between ROM, ADLs, and patient satisfaction that were observed in this study are both encouraging and expected. Unfortunately, the significant loss to follow-up limits any generalizability of this study. Studies with more complete data collection and a minimum of 2-year follow-up are needed to confirm these findings.   Future directions include studies of validated outcomes scores with data collected in either an electronic or professionally-administered format. The impact of other patient-focused variables like preoperative diagnosis, medical comorbidities, pain, and postoperative rehabilitation on patient satisfaction, ROM, and ADLs would provide valuable information. The increasing incidence of glenohumeral joint arthropathy warrants a continued search for factors contributing to patient satisfaction. The creation and utilization of patient registries in countries around the world and the growing interest in patient-centered outcomes have demonstrated the power to promote better quality of care in total joint replacement procedures.