ORIGINAL ARTICLE

Do younger patients have better results after reverse total shoulder arthroplasty?

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Background: As surgeons have become more adept and midterm to long-term results have demonstrated improved patient outcomes, the indications for reverse total shoulder arthroplasty (RTSA) have expanded. This study compares the clinical outcomes and complication rates between patients 65 years and younger and patients 70 years and older undergoing RTSA.

Methods: A retrospective analysis of a prospectively collected cohort with minimum 2-year follow-up was performed at a single institution. Patient demographic data, American Shoulder and Elbow Surgeons (ASES) score, range of motion, patient satisfaction, notching, and complication rates were analyzed.

Results: There were 32 patients (57 ± 4.9 years old) in the 65 years and younger group, whereas 50 patients (76 ± 4.9 years old) were in the 70 years and older group. The mean follow-up time was 3 years (range, 2-8 years). There were no significant differences in preoperative, postoperative, or change in ASES scores between the younger and older groups. Postoperatively, the younger cohort achieved a higher degree (mean) of forward flexion (133° vs. 117°), abduction (127° vs. 110°), and external rotation (40° vs. 27°) ($P < .05$). The average improvement in forward flexion and external rotation was also found to be larger in the younger cohort ($P < .05$). The younger and older groups had comparable complication rates, notching rates, and overall satisfaction rates.

Conclusion: Patient-reported outcomes scores and complication rates after RTSA of patients aged 65 years and younger were similar to those of patients aged 70 years and older. However, younger patients were able to achieve increased postoperative range of motion.

Level of evidence: Level III; Retrospective Cohort Design; Treatment Study

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Since approval by the Food and Drug Administration for use in the United States in 2003, reverse total shoulder arthroplasty (RTSA) has been used to successfully reduce pain and to improve function in patients with rotator cuff arthropathy and other rotator cuff–deficient conditions.[5] Recently, the indications for RTSA have expanded. Acute proximal humerus fracture, nonunion and malunion, revision arthroplasty, pseudoparalysis, and post–tumor resection have all been published as indications for RTSA with excellent results.[6,20]

With this expansion of indications for RTSA, trends demonstrate increases in RTSA use in younger patients.[8,11] Early outcomes in these patients appear to be promising, with multiple studies demonstrating improvements in pain and functional outcomes.[7,10-12] Despite these published results, many

surgeons remain hesitant to perform RTSA on younger patients for fear of worsening prosthesis performance over time and elevated expectations of the patients.

Although there have been previous studies reporting outcomes of RTSA in cohorts of younger patients, there has been only 1 study comparing outcomes of younger patients undergoing RTSA with an older cohort in the same institution.[2,7,9,10,12,17] This allows similar comparison of indications and standardization of prosthesis and postoperative protocols. The purpose of this study was to compare the outcomes of a younger cohort of patients with those of an older cohort treated at the same institution during the same time frame. We hypothesized that younger patients undergoing RTSA will have comparable results in regard to pain relief and functional improvements, without an increase in complications, compared with an older cohort.

Materials and methods

This is a retrospective cohort study with minimum 2-year follow-up performed at a single institution. Reverse shoulder arthroplasty was performed by 3 sports medicine and shoulder fellowship–trained orthopedic surgeons. We included all patients who had undergone RTSA and had complete preoperative and minimum 2-year follow-up American Shoulder and Elbow Surgeons (ASES) and range of motion (ROM) data. The young patient group was defined as 65 years of age and younger, and the older patient group was defined as 70 years of age and older.

RTSA was performed with the Zimmer Trabecular Metal Reverse Shoulder System (Zimmer, Warsaw, IN, USA). The glenosphere construct consisted of a baseplate with a 15-mm metal post, 2 cancellous screws, and a 36-mm glenosphere. The humeral component was cemented in 10° of retroversion. A polyethylene liner was placed and reduced to ensure a firm fit. All of the patients underwent the same postoperative rehabilitation protocol of 6 weeks in a sling followed by 6 weeks of ROM exercises and then initiation of a strengthening program at 12 weeks postoperatively.

Clinical evaluation

Patients were prospectively enrolled before surgery. Demographic and patient-reported outcome surveys (ASES) were collected during the preoperative and follow-up postoperative visits. These data were entered into a privacy-protected, Health Insurance Portability and Accountability Act–compliant electronic database (Research Electronic Data Capture [REDCap] system). Patient satisfaction with the procedure was also recorded.

An independent evaluator evaluated patients' function preoperatively and postoperatively. ROM and strength were assessed for each patient by the independent evaluator, and measurements were entered into the REDCap system.

Complications

Complications were recorded for each patient and included infection, return to the operating room, revision, acromial stress fracture, nerve palsy, dislocation, periprosthetic fracture, and heterotopic bone formation. An independent researcher performed a chart review of

each patient included in the study. This included an evaluation of complications, adverse events, and reoperations for each patient. Scapular notching was recorded but not included in complication data.

Radiologic evaluation

We evaluated the patients' most recent follow-up radiographs for glenoid lucency and scapular notching with a minimum of 2 views (anteroposterior and axillary lateral). The independent grader was blinded to patients' clinical history as well as to outcomes.

Scapular notching can occur at the inferior scapular neck after RTSA. The grade of scapular notching was assessed according to that of Sirveaux-Nerot.[13] Notching was graded 0-4, as follows: 0, absence of bone erosion in the inferior scapular neck; 1, defect limited to inferior pillar; 2, erosion contacting the lower fixation screw of the baseplate; 3, erosion covering the lower screw; 4, bone eroded under the baseplate.

Statistical analysis

Statistical analysis was performed with SPSS 21 statistics package (IBM, Armonk, NY, USA). Comparison of ASES scores and ROM between the younger and older groups was done using a Student t-test. As suggested by Werner et al, ASES scores were also broken down by minimal clinically important difference (MCID) of 9 points and a substantial clinical benefit of 23 points and compared between groups.[18] Categorical data were assessed using χ^2 test and Fisher exact test. Statistical significance was set at $P < .05$.

Results

The demographic data (Table I) include a list of the primary diagnoses for surgery between the 2 groups. The average age

Table I	Demographic data	
	Younger ≤65 years	Older ≥70 years
No.	32	50
Age (y), mean ± SD	57 ± 4.9	76 ± 4.9
Male/female	11 M/21 F	27 M/23 F
Follow-up (y)	3.4	3.1
BMI	30	34
Prior surgery		
Yes	15	21
No	17	29
Diagnosis		
Failed ORIF shoulder	1	1
Failed shoulder replacement	6	5
Fracture	2	5
Infection	4	5
Instability	2	0
Malunion or nonunion	0	1
RA	0	1
Osteoarthritis	5	10
RCT arthropathy	12	22

SD, standard deviation; *BMI*, body mass index; *ORIF*, open reduction–internal fixation; *RA*, rheumatoid arthritis; *RCT*, rotator cuff tear.