J Shoulder Elbow Surg (2016) ■■, ■■–■■

ELSEVIER

Journal of Shoulder and Elbow Surgery

www.elsevier.com/locate/ymse

ORIGINAL ARTICLE

A comparative analysis of work-related outcomes after humeral hemiarthroplasty and reverse total shoulder arthroplasty

Daniel J. Hurwit, MD[a,*], Joseph N. Liu, MD[a], Grant H. Garcia, MD[a], Gregory Mahony, BA[b], Hao-Hua Wu, BA[c], David M. Dines, MD[b], Russell F. Warren, MD[b], Lawrence V. Gulotta, MD[b]

[a]*Hospital for Special Surgery, New York, NY, USA*
[b]*Sports Medicine and Shoulder Service, Hospital for Special Surgery, New York, NY, USA*
[c]*Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA*

Background: The return to work of young patients undergoing shoulder arthroplasty is increasingly important. Whereas studies have shown superior outcomes of reverse total shoulder arthroplasty (RTSA) compared with humeral hemiarthroplasty (HHA), no prior literature has compared RTSA with HHA in regard to return to work.

Methods: A retrospective review of a prospectively collected shoulder arthroplasty registry was performed to analyze all patients who underwent RTSA or HHA at a single institution. A validated questionnaire evaluating return to work postoperatively was administered at baseline and at follow-up in addition to the American Shoulder and Elbow Surgeons and visual analog scale (VAS) pain surveys.

Results: The study included 40 RTSA and 41 HHA patients. The average age at surgery was 68.6 years in the RTSA group and 60.8 years in the HHA group ($P < .001$). Postoperatively, 65% of RTSA patients returned to work compared with 70.7% of HHA patients ($P = .64$). There was no significant difference in the time to return to work between the RTSA (2.3 months) and HHA (3.1 months) groups ($P = .46$). Both groups had statistically significant improvements in both the American Shoulder and Elbow Surgeons and VAS scores. The improvement in pain on the VAS for patients undergoing RTSA (−5.6) trended toward significance compared with HHA (−4.2) ($P = .056$).

Conclusion: Roughly two-thirds of patients undergoing either HHA or RTSA were able to return to work postoperatively, with no significant difference found between the 2 groups in terms of time to return to work, despite that patients undergoing RTSA were significantly older.

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

Keywords: Shoulder arthroplasty; return to work; patient-reported outcomes; reverse total shoulder arthroplasty; humeral hemiarthroplasty; rotator cuff dysfunction

The number of shoulder arthroplasties performed each year has grown exponentially during the past 2 decades, with the approval of reverse total shoulder arthroplasty (RTSA) by the Food and Drug Administration in 2003 coinciding with a sharp

This study received Institutional Review Board approval from the Hospital for Special Surgery: No. 2014-202.

*Reprint requests: Daniel J. Hurwit, MD, Hospital for Special Surgery, 535 East 70th Street, New York, NY 10021, USA.

E-mail address: hurwitd@hss.edu (D.J. Hurwit).

1058-2746/$ - see front matter © 2017 Journal of Shoulder and Elbow Surgery Board of Trustees. All rights reserved.
http://dx.doi.org/10.1016/j.jse.2016.10.004

increase in the overall rate of these procedures.[15,26] An increasing number of young patients undergoing shoulder arthroplasties has accompanied this growth,[15] and the demand for shoulder arthroplasty in patients 55 years or younger is projected to grow 333% from 2011 to 2030.[20,23] Taking into consideration that the average retirement age continues to rise in the United States,[25] the return to work of shoulder arthroplasty patients is an increasingly important issue.

In the treatment of glenohumeral osteoarthritis, anatomic total shoulder arthroplasty (ATSA) has consistently been shown to have better results in terms of function, pain relief, and range of motion compared with both humeral hemiarthroplasty (HHA) and RTSA.[5,11,24,28-30] However, when ATSA is contraindicated, such as in rotator cuff dysfunction, deficiencies in glenoid bone stock, or proximal humerus fractures, surgeons and patients must decide between HHA and RTSA. Many recent studies have demonstrated more predictable and superior outcomes for RTSA compared with HHA for a variety of diagnoses.[1,4,16] Yet in the younger population, especially those who wish to remain active and employed, surgeons may feel compelled to recommend HHA, given the theoretical risk for glenoid component loosening with a more constrained implant in RTSA. In addition, many surgeons may place more activity restrictions on their patients who undergo RTSA, limiting their work capacity postoperatively.[19]

Multiple studies have investigated return to work rates after individual methods of shoulder arthroplasty, reporting rates of 14% to 31% after ATSA, 69% after HHA, and 14% to 65% after RTSA.[6,12-14,21] Whereas 1 study has compared the return to sports after RTSA and HHA, finding that RTSA patients return to sports at a significantly higher rate (86% vs. 67%),[18] no prior comparative literature exists to evaluate RTSA and HHA in regard to their ability to return patients to work.

The purpose of this study was to determine in patients who are not candidates for ATSA because of rotator cuff dysfunction, deficient glenoid bone stock, or proximal humerus fracture whether RTSA or HHA would (1) more reliably return patients to work and (2) result in better functional and satisfaction scores. We hypothesized that patients undergoing RTSA would return to work at an equivalent rate compared with patients undergoing HHA without an increase in complication rate and that the RTSA cohort would have improved functional and satisfaction outcomes compared with the HHA cohort.

Methods

We performed a retrospective review of a prospectively collected shoulder arthroplasty registry cohort to analyze all patients who had undergone HHA or RTSA at a single institution from 2007 to 2013. All patients received either a Biomet Comprehensive Reverse Total Shoulder Arthroplasty or a Biomet Comprehensive Hemiarthroplasty (Warsaw, IN, USA). The decision between HHA and RTSA was made after discussion between the surgeons and patients. Inclusion criteria were a preoperative diagnosis of end-stage glenohumeral arthritis with rotator cuff dysfunction, deficiencies in glenoid bone stock that prohibited the insertion of an anatomic glenoid component, proximal humerus fracture, and minimum of 1-year follow-up. The study included patients who underwent revision or bilateral procedures. The study excluded patients with other preoperative diagnoses, patients with <1-year follow-up, and patients who had not worked within 3 years preoperatively. Telephone and mail surveys were conducted to collect outcome data.

We reviewed electronic medical records to determine preoperative diagnosis, body mass index (BMI), age, medical comorbidities, operative complications, and revision surgery rates. Telephone interviews with patients confirmed these data. American Shoulder and Elbow Surgeons (ASES) and visual analog scale (VAS) pain scores were obtained from the shoulder arthroplasty registry, and these questionnaires were additionally administered during telephone interviews at final follow-up. The telephone interview also incorporated an outcome questionnaire including questions on whether patients had returned to work after surgery, how long before they returned to work, if they had been able to return to all chores, subjective difficulty of work (classified as sedentary, light, or heavy), and level of satisfaction with the shoulder surgery. The patient's ability to return to any type of work after the procedure, as determined by the questionnaire, was the primary outcome of this study.

Similar postoperative rehabilitation protocols were implemented for both HHA and RTSA. Patients were placed in a sling for 4 weeks, with passive range of motion exercises started at 2 weeks and active range of motion exercises at 6 weeks. Strengthening exercises were begun at 3 months, at which time patients were encouraged to return to their preoperative level of activity. Patients were permitted to return to work on an individual basis, as soon as immediately after surgery, dependent on the intensity of their work.

Statistics

The study compared the 2 subgroups using independent samples *t*-tests for continuous variables and χ^2 and Fisher exact tests for categorical variables after skewness analysis determined a normally distributed data set. Paired samples *t*-tests assessed changes in patient-reported outcome measures. Subgroup analysis controlled for differences between groups in regard to sex, age, and preoperative diagnoses. All tests used 2-sided hypothesis testing with statistical significance set at $P < .05$. All tests were conducted with SPSS 19.0 software (IBM Corp., Armonk, NY, USA).

Results

The study identified 97 HHA and 132 RTSA patients with a preoperative diagnosis of osteoarthritis and cuff tear, deficient glenoid bone stock, or proximal humerus fracture in the institutional registry; 71 HHA and 102 RTSA patients were reached by phone. The study ultimately included 41 HHA patients and 40 RTSA patients who had worked within 3 years before surgery. Average age at surgery was 60.8 years (range, 40-87.8 years) for the patients undergoing HHA and 68.6 years (range, 41-87.6 years) for those undergoing RTSA ($P < .001$). Average follow-up was 64 ± 18.2 months (range, 13.1-90.2 months) for HHA and 32.2 ± 14.9 months (range, 11.5-59.2 months) for RTSA ($P < .001$). There was no statistical difference in the ratio of male to female patients or percentage of dominant extremity operated on in each group. Average