



Reverse shoulder arthroplasty as salvage for failed prior arthroplasty in patients 65 years of age or younger

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Background: This study examined outcomes and complications in young patients undergoing revision reverse total shoulder arthroplasty (RTSA) for failed prior total shoulder arthroplasty or hemiarthroplasty and compared them with those of an age-matched cohort undergoing primary RTSA.

Methods: RTSA as a revision for failed shoulder arthroplasty was performed on 36 patients younger than 65 years. Follow-up was available for 32 patients at an average of 55.3 months. Results were compared with those of an age-matched cohort of 37 patients (33 available for follow-up; average, 54.7 months) undergoing primary RTSA. Average age for both groups was 59.3 years. Outcomes were compared before and after revision surgery and between cohorts.

Results: Preoperative visual analog scale (VAS) for pain and subjective shoulder value (SSV) scores were similar in both groups, 7.3 of 10 and 24%, respectively, before revision, and 7.0 of 10 and 19% before primary RTSA ($P = .3$). Postrevision VAS and SSV scores improved to 1.4 of 10 and 60% ($P < .0001$). Average American Shoulder and Elbow Surgeons and Simple Shoulder Test scores after revision were 69.7 and 58.8, with 9 complications (28.1%; 6 major and 3 minor). VAS and SSV scores improved to 2.1 of 10 and 76% after primary RTSA ($P < .0001$). American Shoulder and Elbow Surgeons and Simple Shoulder Test scores after primary RTSA were 74 and 67.3, with 6 complications (18.2%; 5 major and 1 minor). Only the postoperative SSV score was statistically different in comparing primary and revision RTSA ($P < .05$).

Conclusion: RTSA is effective in reducing pain and improving function after failed arthroplasty in young patients, but complication rates are high and expectations should be managed appropriately. Subjective outcome scores are worse than those for age-matched patients undergoing primary RTSA, but pain, functional scores, and complication rates are similar.

This study has been reviewed and approved by the Brigham and Women's Hospital Institutional Review Board (protocol 2012-P-000631/1).

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The incidence of shoulder arthroplasty in the United States is rapidly increasing.¹⁸ This includes an increasing number of shoulder replacements in young, active individuals who wish to return to a pre-pathology level of function. Consequently, an increased number of revision arthroplasty surgeries have been taking place, particularly in young individuals with high-demand lifestyles.^{6,8} Revision rates in these younger patients are higher than those for older, less active patients.^{11,27}

Improvements in surgical technique and prosthetic design have increased implant longevity over time, leading many surgeons to expand indications for total shoulder arthroplasty to the young and active. This has resulted in an increase of both early and late failures for a variety of causes. Revision total shoulder arthroplasty outcomes have been historically poor, especially in cases with soft tissue dysfunction or glenoid loosening.^{4,7,9} In particular, secondary rotator cuff dysfunction has become increasingly recognized as a late complication after total shoulder arthroplasty, with rates approaching 45% at 10 years postoperatively.³¹

Surgeons face particularly difficult decisions when planning revision surgery in patients with failed prior arthroplasty, especially in young patients with a rotator cuff-deficient shoulder. The same holds true for patients with significant secondary bone loss, as observed in those with a prior hemiarthroplasty for fracture or arthritis.^{19,28}

Consequently, the indications for reverse total shoulder arthroplasty (RTSA) as a salvage procedure for failed prior total shoulder arthroplasty or hemiarthroplasty have expanded over time.^{1,17,20,21,24,25} These include severe glenoid bone loss, rotator cuff dysfunction, prosthetic instability, subscapularis failure, and tuberosity malunion or nonunion. RTSA as a salvage procedure has yielded improved outcomes but with high complication rates.^{20,21,25}

Historically, RTSA was reserved for elderly, sedentary patients with rotator cuff tear arthropathy. Details are emerging about the benefits of RTSA in the young patient (<65 years) with massive irreparable rotator cuff tears and pseudoparalysis, with or without glenohumeral arthritis.¹⁰ Such data on the utility of RTSA as a revision for failed prior arthroplasty in the young, however, are limited.

The purpose of this study was to report outcomes and complications in young patients (<65 years) who underwent RTSA as a salvage operation for prior failed total arthroplasty or hemiarthroplasty of the shoulder. These results are compared with those of an age-matched cohort of patients undergoing RTSA for massive irreparable rotator cuff tears with or without pseudoparalysis. We hypothesized that outcome scores are worse and complications more common in the revision cohort.

Methods

Patient cohorts

This study is a retrospective case-control analysis of patients 65 years of age or younger undergoing RTSA as either a primary or revision arthroplasty procedure. A retrospective analysis of our shoulder arthroplasty database was performed for patients undergoing RTSA who were 65 years of age or younger at the time of surgery. Note was made of the nature and indications for surgery, including primary arthroplasty or revision for failed prior total shoulder arthroplasty or hemiarthroplasty. Patients were subcategorized into *primary* or *revision* RTSA as control and cohort groups, respectively. Patients were included in the primary RTSA group if they had no prior arthroplasty operations; the indications for surgery included massive irreparable rotator cuff tear with pseudoparalysis, with or without glenohumeral arthritis. Patients were included in the revision RTSA group if they had failure of a prior shoulder arthroplasty (hemiarthroplasty or total shoulder arthroplasty) for any of a variety of reasons. The minimum postoperative clinical follow-up required for study inclusion was 2 years, and patients who were unavailable for clinical follow-up were excluded from the study.

Between September 2004 and March 2011, 36 patients aged 65 years or younger were retrospectively identified as having undergone revision RTSA by either of the 2 senior surgeons. During this same study period, 37 patients aged 65 years or younger underwent primary RTSA.

Thirty-two patients in the revision group were available for follow-up and therefore included in the study (2 patients refused inclusion, 1 had passed away, and 1 international patient was lost to follow-up). Indications for revision included a prior infected arthroplasty, painful hemiarthroplasty with glenoid arthrosis or erosion, aseptic glenoid loosening after total shoulder arthroplasty, and rotator cuff failure after total shoulder arthroplasty or hemiarthroplasty. Rotator cuff failure was determined by radiographic patterns (tuberosity resorption, anterior or superior escape) and confirmed intraoperatively. From the control comparison group, 32 patients with 33 primary reverse arthroplasties were included in the study (3 were lost to follow-up and 2 had passed away). Eleven of the 33 primary RTSA shoulders (33%) underwent concurrent latissimus dorsi tendon transfer for external rotation loss in a manner previously described.¹² There was only 1 latissimus transfer performed in the revision group.

Clinical evaluation

Baseline subjective outcome values were recorded from the patients' medical records before surgery. Patients were contacted for follow-up at a minimum of 2 years after surgery, and patient-reported outcomes including visual analog scale (VAS) for pain, subjective shoulder value (SSV), Simple Shoulder Test (SST), and American Shoulder and Elbow Surgeons (ASES) scores were recorded. Patients were also

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