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Results of closed management of acute dislocation after reverse shoulder arthroplasty

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Background: Postoperative instability continues to be one of the most common complications limiting outcomes of reverse shoulder arthroplasty (RSA). The optimal management of this complication remains unknown. The purpose of this study was to evaluate the outcomes of patients with postoperative dislocation after RSA managed with closed reduction.

Methods: All patients who were treated with a closed reduction for dislocation after RSA in the period between May 2002 and September 2011 were identified and retrospectively reviewed. Final outcomes including recurrent instability, need for revision surgery, American Shoulder and Elbow Surgeons outcome score, and range of motion were evaluated.

Results: A total of 21 patients were identified. Nearly 50% of cases (10 of 21) had previous surgery, with 80% (8 of 10) of these being previous arthroplasty. The average time to first dislocation was 200 days, with 62% (13 of 21) occurring in the first 90 days. At average follow-up of 28 months, 62% of these shoulders remained stable (13 of 21), 29% required revision surgery (6 of 21), and 9% remained unstable (2 of 21). The average American Shoulder and Elbow Surgeons score was 68.0 for patients treated with closed reduction for instability and 62.7 for those treated with revision surgery ($P = .64$).

Discussion: This study shows that an initial dislocation episode after RSA with use of this implant can be successfully managed with closed reduction and temporary immobilization in more than half of cases. Given that outcomes after revision surgery are not different from those after closed treatment, we would continue to recommend an initial attempt at closed reduction in the office setting in all cases of postoperative RSA dislocation.

Level of evidence: Level IV, Case Series, Treatment Study.

Keywords: Reverse shoulder arthroplasty; dislocation; closed reduction; revision; nonoperative treatment; retrospective review

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IRB approval: This study was determined to be exempt from review by the Western Institutional Review Board.

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Reverse shoulder arthroplasty (RSA) has shown successful outcomes for a variety of shoulder pathologic processes including massive and irreparable rotator cuff tears with and without glenohumeral arthritis, rotator cuff dysfunction secondary to proximal humerus fractures, and revision shoulder arthroplasty.[2-4,9,11,14-19,21,23,24,26-29] In

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spite of these good results, complications continue to be of concern. One of the most common complications limiting outcomes of RSA is postoperative instability. In the literature, reports of instability range from 2.4% to 31%.[6]

Stability in RSA is dependent on adequate soft tissue tensioning. Surgical factors related to prosthesis design, such as glenosphere offset and size, humeral neck-shaft angle, and polyethylene thickness and constraint, have been shown to affect tensioning and stability. There are also surgical techniques that have been shown to alter stability by increasing the length of the arm and consequently deltoid muscle tension, such as the level of humeral osteotomy, offset placement of the humeral socket, and glenosphere position on the glenoid.[8,15,17]

There has also been a great deal of work performed on identification of risk factors for instability and prevention of this complication, with conflicting reports. Whereas Wall et al have shown that the risk of instability is higher in revision surgery vs primary cases, others have shown no difference with low rates for both primary and revision procedures.[1,25,27] The surgical approach has also been shown to affect implant stability, with lower dislocation rates for the anterosuperior approach compared with the deltopectoral approach.[20] Management of the subscapularis has also had mixed results, with some authors showing lower rates of instability with subscapularis repair and others showing no difference.[7,10]

In spite of numerous studies investigating risk factors for and prevention of instability, no previous studies have specifically investigated the optimal management of this complication. Many surgeons recommend an initial attempt at closed reduction followed by a period of immobilization for management of the initial dislocation episode, whereas others may seek to rule out infection or other secondary causes; however, there are few data to support either practice. Chalmers et al recently reported on early dislocations (within 3 months) after RSA and found that 44% (4 of 9) remained stable.[5] In contrast, Gerber et al have stated that early dislocations are most likely secondary to surgical error and less likely to be successfully treated with closed reduction compared with late dislocations.[13] However, no one has reviewed the results of this practice for early and late dislocations with a larger cohort of patients. The purpose of this study was to evaluate the outcomes of patients with postoperative dislocation after RSA managed with closed reduction.

We hypothesized that early dislocations would be more likely than late dislocations to be successfully treated by closed reduction. We also hypothesized that there would be no difference in outcomes between patients successfully treated with closed reduction and those requiring revision surgery for recurrent instability.

Materials and methods

After Institutional Review Board approval, a retrospective analysis of a consecutive, nonselected series of all RSAs performed by the senior surgeon (M.A.F.) from May 1, 2002, to September 30, 2011, was performed to evaluate for the complication of postoperative dislocation. During this period, the senior author performed 1293 RSAs. All procedures were performed through a standard deltopectoral approach. The Reverse Shoulder Prosthesis (DJO Surgical, Austin, TX, USA) was used in all cases.

Inclusion criteria were a radiographically documented dislocation that was managed by an initial attempt at closed reduction in the office setting. The reduction was performed with the patient supine on the examination table. With the help of an assistant, longitudinal traction was applied with the arm at the side. A posteriorly directed force was directly applied to the proximal humerus with gentle external rotation of the forearm until the reduction was palpated. After reduction, patients were placed in a 30° external rotation brace to maximize the face of the cup to be facing the sphere for 6 weeks and then allowed to slowly progress activities as tolerated. Exclusion criteria were patients sustaining dislocations that were not initially managed with a closed reduction in the office. A total of 30 dislocations were identified for an overall incidence of 2.3% (30 of 1293). Twenty-one patients met the inclusion criteria and were included in the analysis. Fourteen patients (66%) sustained completely atraumatic dislocations; 7 patients (33%) sustained dislocations during lifting or range of motion activities. Nine patients were excluded as they did not have a closed reduction performed. Eight patients underwent immediate revision secondary to known infection, and 1 patient was unable to be reduced by closed means, either in the clinic or in the operating room, and underwent immediate revision to a larger glenosphere and humerosocket.

Preoperative, operative, and postoperative data were collected. Preoperative characteristics of the patients, including age, sex, preoperative diagnosis, and previous operations, were evaluated. Operative characteristics included glenosphere size, ability to repair the subscapularis, and adjunctive bone graft procedures. Postoperative data included time to dislocation. The primary outcome measure was prosthesis stability, which was defined as no further dislocation events. Secondary outcome measures included American Shoulder and Elbow Surgeons (ASES) score[22] and final range of motion.

Statistical analysis

Descriptive statistics were performed. Numeric data that were intended to be compared between groups (ASES score and range of motion between operatively and nonoperatively treated dislocations) were analyzed first for normality with the Shapiro-Wilk test; statistical significance was set at $<.05$. The data (ASES score and range of motion) were found to be nonparametric, and hence in further analysis we used a nonparametric test. The Fisher exact test was used to test the hypotheses that earlier dislocations (<90 days postoperatively) were more likely to be successfully treated with closed reduction than were later dislocations (>90 days postoperatively), and the Mann-Whiney U test was used to test the hypothesis that patients successfully treated with closed reduction would have no difference in clinical outcomes compared with patients treated with revision. Statistical significance was set at $<.05$.

Results

There were 9 male patients and 12 female patients managed with an initial closed reduction. The average age at the time