Case Report
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Is arthroscopic debridement an effective treatment option for rotator cuff arthropathy?

Abstract

To determine the clinical effectiveness of arthroscopic debridement in patients with rotator cuff arthropathy that is refractory to non operative management, we retrospectively reviewed data for 29 consecutive patients (mean age, 70 years [range, 52-83 years]) with rotator cuff tear arthropathy who underwent arthroscopic debridement by 1 surgeon, had 24 months or more of follow-up (range, 24-69 months), and had complete subjective and objective outcomes evaluations. Statistical analysis involved paired Student's t-test, post hoc analysis, analysis of variance, and the Fisher exact test (significance, P<.05). At 2 years, 18 (62%) satisfied patients graded their shoulders as 66% of normal; the 11 dissatisfied patients graded their shoulders as 31% of normal (P=.006). Satisfied patients had lower visual analog scale scores for night and overall pain and higher mean American Shoulder and Elbow Surgeons (61±21 VS 40± 32) and University of California Los Angeles Shoulder Rating Scale (24±6 VS 11±4, P=.001) scores. Satisfaction was not correlated with biceps release or postoperative range of motion. Patients with Hamada classification of Grade 4 or 5 are poor candidates for this procedure (with a 2.5 times [95% confidence interval 93-6.61] greater probability of dissatisfaction).

Keywords: Arthroscopic debridement, Reverse shoulder replacement, Rotator cuff arthropathy, Rotator cuff tear, Shoulder arthritis, Shoulder arthroscopy

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Introduction

Rotator cuff arthropathy is often associated with disabling pain and shoulder dysfunction. When non operative treatment options have failed, reverse shoulder replacement is usually indicated. Alternative treatment options may be prudent in younger patients, those with multiple co morbidities compromising surgical options, or those unable to comply with postoperative rehabilitation. There is little guidance in the literature regarding the role of arthroscopic glenohumeral joint debridement for the treatment of rotator cuff tear arthropathy. In the absence of glenohumeral osteoarthritis, arthroscopic debridement of irreparable rotator cuff tears affords sustained pain relief and improved range of motion.[1-6] Conversely, when the rotator cuff is intact, investigators have noted that arthroscopic debridement of mild to moderate glenohumeral osteoarthritis can produce pain relief and improved range of motion.[7-12] The purpose of our study was to determine the subjective and clinical outcomes of arthroscopic debridementin patients with rotator cuff arthropathy refractory to non operative management.

Patients and methods

Institutional review board approval was obtained for this retrospective cohort study. From 2007 through 2011, 43 patients with rotator cuff arthropathy refractory to non operative treatment were considered candidates for arthroscopic debridement rather than reverse shoulder replacement because of co morbidities (38), inability to undergo the necessary postoperative rehabilitation (4), or age less than 55 years (1). The diagnosis of rotator cuff arthropathy was made by a complete history, physical examination and radiological and magnetic resonance imaging studies. Of the 14 (33%) patients excluded from the study, 6 declined participation, 3 could not be reached, 2 had died, 2 had advanced dementia, and 1 was non-English speaking and could not complete the questionnaires. Therefore, our cohort consisted of 29 patients with minimum 24-month follow-up (range, 24-69 months).

Demographic information, including age, sex, and hand dominance, was recorded. Ten men and 19 women had a mean age at surgery of 70 years (range, 52-83 years) (Table 1). Surgery was performed on the dominant arm for 22 of 29 (76%) patients. No patient had pending litigation or worker's compensation claims. Subjective visual analog scale (VAS) pain scores (0-100 points) and physical examination findings, including shoulder range of motion, were documented. Grashey, scapular Y, and axillary radiological views of all shoulders were obtained at the initial patient appointments. Magnetic resonance images showed irreparable rotator cuff tears with greater than Goutallier[13,14] stage III atrophy in all patients. Surgery was indicated for shoulder pain that was unresponsive to a non operative treatment program at a minimum of 12 weeks, including shoulder injections, medical management of shoulder symptoms, and shoulder-specific physical therapy focused on range of motion and cuff and scapular strengthening.

Table 1 Demographic Data

Parameter	All Patients (N=29)	Arthroscopic Debridement		P Value
		Alone (N=22)	Converted to Replacement (N=7)	
Mean age ± SE(yr)	70±2	70±2	70±3	0.93
Sex (n%)				0.541
Men	10 (35)	8 (36)	2 (29)	
Women	19 (65)	14 (64)	5 (71)	
Dominant arm (n%)				0.556
Dominant	22 (76)	17 (77)	5 (71)	
Nondominant	7 (24)	5 (23)	2 (29)	

SE: Standard Error

Operative technique

All procedures were performed on an outpatient basis. Each patient was positioned in a beach-chair position with regional anesthesia and intravenous sedation. Posterior and midanterior portals were used

for inspection of the glenohumeral joint and instrument placement for arthroscopic debridement. All chondral lesions and degenerative labral tears were debrided to a stable surface using a 4.0-mm shaver. The rotator interval was released using a shaver and bipolar thermal ablation (VAPR Wand, DePuy Mitek, Inc, Raynham, Massachusetts). An anterior capsular release was performed, preserving the subscapularis tendon. The posterior capsule was also released, avoiding the 5-o'clock to 7-o'clock interval where the axillary nerve is most vulnerable. None of the rotator cuff tears could be effectively mobilized for repair. When present, the biceps was released at the glenoid origin by electric cautery. The subacromial space was inspected, and all adhesions were debrided. For 5 patients, an anterior acromioplasty was performed with a 5.5-mmbarrel burr (Stryker, Kalamazoo, Michigan). A gentle manipulation was performed, releasing the inferior capsule. The portals were closed with number 3 Monocryl sutures (Ethicon, Somerville, New Jersey) and steri-strips. After surgery, a sling was usedf or comfort. After regional anesthesia had resolved, the sling was discontinued, and active shoulder range of motion was permitted as tolerated. All patients were instructed by a physical therapist for a home-based strengthening program after postoperative follow-up, 2 to 3 weeks after surgery.

Outcomes analysis

Preoperative evaluation: Before surgery, all patients completed questionnaires that assessed VAS pain scores. The senior surgeon documented shoulder range of motion, including active forward flexion and active external rotation with the arm at the side. Preoperative radiographs were graded in a blinded fashion by the senior surgeon using the classification system of Hamada and colleagues[15] for rotator cuff arthropathy.

Postoperative evaluation: At a minimum of 24months of follow-up, all 29 patients completed validated questionnaires[16] by mail (5 patients) or telephone (5 patients) or were seen for follow-up(19 patients) to assess range of motion and level of satisfaction with the procedure. American Shoulder and Elbow Surgeons (ASES) score,[17] University of California Los Angeles Activity Shoulder Rating Scale (UCLA) score,[18] and Single Assessment Numeric Evaluation (SANE) score[19] were calculated from the data obtained in the follow-up questionnaires.

Statistical analysis

Paired Student's t-tests was used to assess the degree of improvement in clinical parameters at the time of latest follow-up. A post hoc analysis of patients stratified by satisfaction was used to identify risk factors for dissatisfaction. Parametric data were compared using analysis of variance. Nonparametric data were compared using the Fisher exact test. Significance was set at a P value less than .05. SPSS statistical software (IBM Corp, Armonk, New York) was used for data analysis.

Results

Of the 29 patients, 18 (62%) were satisfied and 11 (38%) were dissatisfied with surgery; 7 of the dissatisfied patients were converted to reverse shoulder replacements.

Multiple benefits from surgery were observed (Table 2).Overall, VAS pain scores decreased from the preoperative scores (P=.020). Mean active forward flexion and active external rotation with the arm at the side increased by 16% and 38%, respectively. Satisfied patients showed a significant improvement in overall VAS pain scores (P=.009), but dissatisfied patients did not. Satisfied patients had lower mean VAS pain scores for night, rest, and activity-related pain compared with dissatisfied patients.

Table 2 Subjective and Objective Outcomes[a]

Parameter	Preoperative (N=29)	Postoperative (N=29)	P Valueb
Active forward flexion(°)	131±6	152±3	0.002
Active external rotation arm at side (°)	41±4	57±4	0.007
Overall pain VAS scores	7.0±.5	5.0±.6	0.02

VAS:Visual Analog Scale

[a]Values are given as standard error of the mean.

[b]Statistically significant difference (P<.05) by paired Student's t-tests of preoperativeversus postoperative scores.

A post hoc analysis revealed multiple postoperative differences between satisfied and dissatisfied patients (Table 3). Dissatisfied patients had SANE scores less than half of those of their satisfied counterparts (P=.006) and had significantly worse UCLA scores (P=.0001).

Table 3 Comparison of Subjective and Objective Outcomes Stratified by Patient Satisfaction with Surgery

Parameter	All Patients (N=29)	Not Satisfied with Surgery (N=11)	Satisfied with Surgery (N=18)	*P* Value
Age(yr)	70.0±2.0	63.0±4.4	70.9±2.1	0.126
Follow-up (months)	45.7±2.4	49.5±4.6	45.5±2.4	0.398
Outcome scores				
SANE (%)	60±5	31±6	66±5	.006b
ASES (points)	57.3±5.0	40.4±16.1	61.1±4.8	0.114
UCLA (points)	21.3±1.7	10.8±2.1	23.7±1.5	.001b
Active forward flexion (°)				
Preoperative	131±6	139±17	129±6	0.535
Postoperative	152±3	158±2	151±4	0.432
Change	21±6	28±18	20±7	0.639
Active external rotation arm at side (°)				
Preoperative	41±4	38±11	42±4	0.684
Postoperative	57±4	73±4	54±4	0.073
Change	16±5	47±7	11±5	.010b
Overall pain VASscores				
Preoperative	7.0±.5	7.5±1.0	6.9±.5c	0.634
Postoperative	5.0±.6	7.5±.6	4.5±.7c	0.071
Postoperativepain VAS score subcategories				
Night pain	4.1±.8	6.0±2.2	3.7±.8	0.272
Restingpain	2.7±.6	4.3±1.9	2.3±.6	0.247
Activity pain	5.4±.7	7.5±1.3	4.9±8	0.178

ASES:American Shoulder and Elbow Surgeons Score; SANE: Single Assessment Numeric Evaluation; UCLA: University of California Shoulder Rating Scale; VAS:Visual Analog Scale

[a]Values are given as ± standard error of the mean.

[b]Statistically significant difference (P<.05)by analysis of variance test of satisfied versus dissatisfied patients.

[c]Statistically significant difference(P=.009)by paired Student's t-tests of preoperative versuspostoperative scores.

To determine the factors that influenced patient satisfaction, we compared the characteristics of satisfied and dissatisfied patients. For the purpose of this analysis, we considered patients who were converted to reverse shoulder replacement to be dissatisfied with the arthroscopic debridement procedure. We found no significant

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differences, with a trend toward greater dissatisfaction with preoperative Hamada Grade 4 or 5 rotator cuff arthropathy (Table 4). These patients had a 2.5-times (95% confidence interval 93-6.61) greater probability of dissatisfaction with surgery compared with patients with rotator cuff arthropathy of less than Hamada Grade 4.

Table 4 Comparison of Hamada Rotator Cuff Arthropathy Classification Stratified by Patient Satisfaction with Surgery[a]

Parameter	N	Hamada Classification (n, %)	
		Grade <4	Grade 4 or5
Not satisfied	11	4 (36)	7 (64)
Satisfied	18	13 (72)	5 (28)
All patients	29	17 (59)	12 (41)

[a]Fisher exact test; P=.065

Discussion

To our knowledge, ours is the first study to characterize the benefit of arthroscopic debridement specifically for patients with rotator cuff arthropathy that is refractory to non operative treatment. At a minimum follow-up of 24 months, 7 patients ultimately underwent shoulder replacement and 4 others were not satisfied, but the remaining 62% were satisfied with arthroscopic surgery. The procedure described resulted in clinically significant improvement in pain relief, range of motion, and functional outcomes.

Multiple investigators have endorsed arthroscopic debridement in the presence of glenohumeral osteoarthritis alone without rotator cuff tears.[7-12] In a study of 71 patients, Van Thiel and colleagues[20] showed that 55 had significant improvement in range of motion, ASES scores, and VAS scores at a mean follow-up of 27 months. Weinstein and colleagues[12] reported well to excellent results at 34 months in 80% of patients with arthroscopic debridement of glenohumeral osteoarthritis and capsular release. More recently, Millet and colleagues[9] studied a cohort of 29 relatively young patients with advanced glenohumeral arthritis at a mean follow-up of 2.6 years, finding that comprehensive arthroscopic management, including humeral osteoplasty, axillary neurolysis, distal clavicle resection, subacromial decompression, and/or long head biceps tenodesis, improved shoulder function, diminished pain, and potentially delayed replacement.

Investigators have also shown the effectiveness of debridement for isolated massive rotator cuff tears.[1-6,21,22] Klinger and colleagues[4] reported an 82% satisfaction rate for arthroscopic debridement of massive rotator cuff tears in a cohort of 33 patients with a mean follow-up of 31 months. Rockwood and colleagues[22] reported an 83% success rate for open tendon debridement and decompression of massive rotator cuff tears in 50 patients at a mean follow-up of 6.5 years. Burkart[21] advocated the use of rotator cuff debridement in massive rotator cuff tears, particularly when the balance of the anterior and posterior cuff could be preserved. In 25 patients with supraspinatus tears, arthroscopic debridement plus acromioplasty resulted in pain relief and restored shoulder function.

To our knowledge, no studies have specifically examined the role of arthroscopic debridement for rotator cuff arthropathy. Our results are similar to those of the studies of patients with advanced glenohumeral osteoarthritis or massive rotator cuff tears described above. Despite the patient-described satisfaction in our series, the ASES, SANE, and UCLA outcome scores were low, this is likely related to the cumulative burden of both glenohumeral osteoarthritis and irreparable rotator cuff tears. The mean postoperative ASES and VAS score improvements of 20.2 and 2.0 points, respectively, showed significant improvement and exceeded the clinically significant changes in ASES and VAS scores of 17 points[23] and 1.3 points,[24] respectively, as reported in the literature.

In our study, Hamada's radiographic classification of rotator cuff arthropathy of Grade 4 or 5 was associated with patient dissatisfaction with the procedure. Other authors have made the same observation with advancing stages of glenohumeral osteoarthritis alone. Ogilvie-Harris and Wiley,[10] in one of the first descriptions of arthroscopic management of osteoarthritis, examined 54 patients at a mean follow-up of 3 years and found that patients with mild arthritis on arthroscopy fared better than those with severe degeneration after arthroscopic debridement. In patients with glenohumeral osteoarthritis, Kerr et al.[25] found that those with unipolar lesions had higher outcome scores than patients with bipolar lesions after arthroscopic debridement. Van Thiel and colleagues[20] advocated the judicious use of arthroscopic debridement for less severe glenohumeral osteoarthritis in patients with residual joint space and an absence of large osteophytes.

There are several limitations to our study. The analysis was retrospective, with limited sample size and power and no control group, and it relied on the accuracy of information documented in medical records or patient questionnaires. A longer follow-up is necessary to determine natural disease progression and longevity of the treatment effect. Furthermore, there was selection bias by the senior author and surgeon, given that patients included in the study were not considered candidates for reverse replacement. Finally, preoperative ASES, UCLA, and SANE patient scores were not available. Nevertheless, given the lack of other guidance, the clinician can use this information to counsel patients with rotator cuff arthropathy about treatment options.

In conclusion, arthroscopic debridement is an effective treatment that can decrease pain and improve shoulder range of motion in carefully selected patients with rotator cuff arthropathy. Patients with Hamada classification of Grade 4 or 5 are likely poor candidates for this procedure.

Acknowledgments

None.

Conflicts of interest

None.

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