Arthroscopic Decompression for Subacromial Impingement Syndrome

Arthroscopic decompression and cuff debridement was performed on 47 cases in 45 consecutive patients with either stage II or stage III impingement syndrome : 19 with no actual tear of the cuff(stage II) ; 13 with a partial thickness tear (stage IIIa) ; 10 with complete tear less than 3 cm long (stage IIIb) ; and 5 with complete tear longer than 3 cm(stage IIIc). Patients were classified into impingement syndrome without tear(Group I), impingement syndrome with partial thickness tear (Group II), and impingement syndrome with full thickness tear (Group III). Group I had 19 cases, group II had 13 cases, and group III had 15 cases. Patients were followed up for an average of 39.3 months (24~62 months). In group I, postoperative UCLA ratings improved in 18 cases (95%) to satisfactory result rate. In group II, 11 patients (85%) had improvement to satisfactory result rate. In group III, 12 cases (80%) had improvement to satisfactory result rate. The arthroscopic subacromial decompression and rotator cuff debridement was effective in the treatment of subacromial impingement syndrome. *(JKMS 1997;12:123~7)*

Key Words : *Arthroscopic decompression, Rotator Cuff, Impingement, Shoulder.*

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INTRODUCTION

Impingement syndrome is a common cause of shoulder pain due to repetitive overhead activities among athletes. Neer (1, 2) presented three stages of impingement syndrome which, if left untreated, can progress from stage I through stage III with eventual rotator cuff tear. Degenerative changes within the rotator cuff tendon and the coracoacromial arch are commonly followed by rotator cuff tears among older athletes. In the conservative treatment of impingement syndrome, strengthening of cuff muscles is very important to prevent proximal migration of the humeral head. Subacromial decompression is a part of the surgical treatment. Usually arthroscopic debridement alone is done in case of an incomplete tear without the impingement and calcific rotator cuff tendinitis without impingement. Arthroscopic acromioplasty is indicated in a normal rotator cuff with impingement, incomplete rotator cuff tear with impingement and complete rotator cuff tear with impingement.

Recently, Burkhart et al. (3) reported that satisfactory results were obtained through arthroscopic debridement and acromioplasty without rotator cuff repair in the full thickness, large or massive tear. According to Burkhart and his co-workers (3, 4), the rotator cable and crescent were in the rotator cuff, and they resulted stress-shielding of the crescent by the cable. They also noted that when the tear was limited in the crescent, arthroscopic decompression without repair might be a good treatment modality for a full thickness tear. But this is still theoretical and needs long-term follow-up. The purpose of this study was to review the effectiveness of arthroscopic decompression and rotator cuff debridement without rotator cuff repair for stage II and stage III impingement syndrome.

MATERIALS AND METHODS

Arthroscopic decompression and rotator cuff debridement was performed on 47 cases of 45 consecutive patients with either stage II or stage III impingement. There were 31 males and 14 females. Nineteen patients were found to have no cuff tear (stage II), 13 patients had partial thickness tear (stage IIIa), 10 had a complete tear on the cuff less than 3 cm long (stage IIIb). Five patients had a complete tear on the cuff more than 3 cm in length (stage IIIc). They were classified into impingement syndrome without tear (group I), impingement syndrome with partial thickness tear (group II), and impingement with full thickness tear (group III).

At the time of surgery, the age ranged from 17 to 63 years. The mean age was 40 years old for men and 46 years old for women. The mean age was 36 years old for group I, 40 years old for group II, and 53.1 years old for group III. There were 43 (91%) dominant shoulders and 4 (9%) non-dominant shoulders involved. Twenty-one (45%) cases did sports or jobs performing frequent overhead activities. Preoperatively, 18 (75%) patients suffered from night pain of the affected shoulder in the 24 patients investigated. Forty-five (96%) cases had a positive impingement sign and 2 (4%) cases were negative. An impingement test was performed in 27 cases. There were 25 (93%) positive cases and 2 (7%) negative cases. The mean duration of symptoms was 14 months in group I, 17 months in group II, and 15.4 months in group III.

A minimum of 6 months conservative treatment including physical therapy and nonsteroidal anti-inflammatory drugs were tried on all patients. Radiographic evaluation included both shoulder anteroposterior, axial and supraspinatus outlet view. With these films, preoperative subacromial pathology and the adequacy of the postoperative acromioplasty were evaluated. The acromial profiles defined by Bigliani et al. (6, 7) were investigated in 17 patients by the supraspinatus outlet view and we found type I in 1 (6%), type II in 5 (30%) cases and type III in 11 (64%) cases.

OPERATIVE TECHNIQUE

Under general endotracheal anesthesia, the patient was placed in the lateral decubitus position on the operating table. After tilting the patient 30 degrees posteriorly, the position was stabilized by the use of a bean bag under the crest and full width adhesive tape on the iliac crest. Preparation and draping was done in the usual manner. The arm was placed in a traction device in a position of 40 degrees of abduction and 20 degrees of flexion. The arm was distracted with 10 lbs of weight.

The skin was pierced with a No. 11 blade on the posterior portal, 1 cm below and medial to the posterolateral tip of the acromion. The blunt trocar with a sheath was inserted through the posterior portal into the glenohumeral joint after touching the posterior rim of the glenoid. The joint was thoroughly inspected.

The arthroscope was removed from the glenohumeral joint and redirected to the undersurface of the acromion. Three liters of irrigation fluid with 1 ml of 1:1,000 epinephrine was used for inflow through the anterior portal, 1 cm lateral and superior to the coracoid process. Debridement was done with a motorized shaver. Spinal needles were inserted through the anterior acromioclavicular joint and the anterolateral margin of the acromion. The needles help define the coracoacromial ligament and the acromioclavicular joint viewed arthroscopically. Abrasion on the undersurface of the acromion, spurs on the undersurface of the distal clavicle and rotator cuff tears were identified. The soft tissue was removed from the anterior acromion. The acromioplasty was done from 2 cm posterior to the anterior edge of the acromion and sloped foreward anterior to the leading edge of the distal clavicle with an acromionizer. After interchanging the arthroscope to the lateral portal and the acromionizer to the posterior portal, the acromion was then thinned to a flattened state.

Finally, the free superior portion of the coracoacromial ligament was removed with a punch forcep to prevent reattachment to the acromion. Bleeders from the bone and the ligament were cauterized. Following acromioplasty, the rotator cuff was examined again. Partial tears and some complete tears were debrided by trimming, rather than requiring open surgery. At the end of the procedure, the traction was released and the shoulder was put through a range of motion to investigate if adequate decompression had been done.

Postoperatively, the pain was relieved by the application of ice compression and the use of analgesics. Circumduction exercises were initiated on the day of surgery including a passive and active range of motion exercises as tolerated. Active exercises could be started one to six days after surgery.

RESULTS

The results were graded preoperatively and postoperatively using the UCLA shoulder ratings (5) (table 1). The mean range of motion of the affected shoulder improved for all stages. There were 2 failures secondary to insufficient resection of the acromion, so arthroscopic acromioplasty was done and finally the UCLA score was improved to a good grade in both patients. One patient suffered from postoperative stiffness of the affected shoulder.

For those 19 cases without rotator cuff tear (group I), preoperative UCLA score was an average of 2.5 and postoperatively an average of 8.4 for the pain rating; preoperatively an average of 6.6 and postoperatively an average of 7.6 for the function rating; preoperatively an average of 4.0 and postoperatively an average of 4.9 for the active forward flexion rating; and preoperatively an average of 3.8 and postoperatively an average of 4.5 for the strength of forward flexion rating (table 2). Postoperatively all patients were satisfied with results except for one case. The preoperative total scores were fair in 3

Table 1. University of California at Los Angeles shoulder rating scales[a, b]

	Score
Pain	
Present always and unbearable; strong medication frequently	1
Present always but bearable; strong medication occassionally	2
None or little at rest; present during light activities; salicylates used frequently	4
Present during heavy or particular activities only; salicylates used occasionally	6
Occasional and slight	8
None	10
Function	
Unable to use limb	1
Only light activities possible	2
Able to do light housework of most activites of daily living	4
Most housework, shopping, and driving possible; able to do hair and to dress and undress, including fastening brassiere	6
Slight restriction only; able to work above shoulder level	8
Normal activities	10
Active forward flexion	
>150°	5
120-150°	4
90-120°	3
45-90°	2
30-45°	1
<30°	0
Strength of forward flexion (manual muscle-testing)	
Grade 5 (normal)	5
Grade 4 (good)	4
Grade 3 (fair)	3
Grade 2 (poor)	2
Grade 1 (muscle contraction)	1
Grade 0 (nothing)	0
Satisfaction of the patient	
Satisfied and better	5
Satisfied and worse	0

[a] Maximum score 35 points: excellent (34-35), good (28-33), fair (21-27), poor (0-20)
[b] Satisfactory = excellent + good; unsatisfactory = fair + poor.

Table 2. Average UCLA score for group I.

	Preoperative	Postoperative
Pain	2.5	8.4
Function	6.6	7.6
Active foeward flexion	4.0	4.9
Strength of forward flexion	3.8	4.5

Table 3. Average UCLA score for group II

	Preoperative	Postoperative
Pain	2.6	8.7
Function	4.4	8.9
Active foeward flexion	3.0	4.6
Strength of forward flexion	3.0	4.9

cases and poor in 16 cases. The postoperative total scores were excellent in 5 (26%) cases, good in 13 (69%) cases, and poor in 1 (5%). The one case of postoperative poor grade was the patient who had instability and calcific tendinitis.

For those 13 cases with partial rotator cuff tear (group II), the UCLA score was preoperatively an average of 2.6 and postoperatively an average of 8.7 for the pain rating; preoperatively an average of 4.4 and postoperatively an average of 8.9 for the function rating; preoperatively an average of 3.0 and postoperatively an average of 4.6 for the active forward flexion rating; and preoperatively an average of 3.0 and postoperatively an average of 4.9 for the strength of forward flexion rating (table 3). Postoperatively all patients were satisfied with the results except for one case. The preoperative total scores were fair in 2 cases and poor in 11 cases. The postoperative total scores were excellent in 4 (31%) cases, good in 7 (54%) cases, and fair in 2 (15%) cases.

For those 15 cases with full thickness rotator cuff tear

Table 4. Average UCLA score for group III

	Preoperative	Postoperative
Pain	2.3	7.7
Function	3.3	6.4
Active foeward flexion	2.2	4.1
Strength of forward flexion	2.6	3.9

(group III), the UCLA rating was preoperatively an average of 2.3 and postoperatively an average of 7.7 for the pain rating; preoperatively an average of 3.3 and postoperatively an average of 6.4 for the function rating; preoperatively an average of 2.2 and postoperatively an average of 4.1 for the active forward flexion rating; and preoperatively an average of 2.6 and postoperatively an average of 3.9 for the strength of forward flexion rating (table 4). Postoperatively all patients, except one, were satisfied with the results. The preoperative total scores were fair in 1 case and poor in 14 cases. The postoperative total scores were excellent in 1 (7%) case, good in 11 (73%) cases, and poor in 3 (20%) cases.

DISCUSSION

In 1972, Neer (2) described the impingement syndrome of the rotator cuff and provided insight into the pathomechanics. He also described an open anterior acromioplasty for refractory disease. In 1983, Ellman (5) performed the first arthroscopic acromioplasty for the impingement syndrome. The purpose of anterior acromioplasty was the removal of hypertrophied subacromial bursa, the release of coracoacromial ligament, abrasion on the undersurface of the anterior acromion, and debridement of the rotator cuff.

The shape and slope of the acromion are considered as important factors related to the development of the impingement syndrome. The shape of the acromion was divided into 3 types according to the presence and size of the anterior prominence of the acromion (6, 7). Because adequate bony resection was imperative to achieve a satisfactory result, the radiographic value of the supraspinatus outlet view was important. So we evaluated the preoperative and postoperative supraspinatus outlet view in 17 patients. In the postoperative outlet view with poor results in 6 cases, inadequate resection of the acromion was found in 2 cases. After a 6 months follow-up, the symptoms were not improved, therefore arthroscopic acromioplasty was performed and improvement was obtained.

Open anterior acromioplasty is a good treatment modality for impingement syndrome. Hawkins and Abrams (8) reported that satisfactory results were obtained in 87% of patients with open acromioplasty. Post and Cohen (9) found significant reduction of pain in 89% of patients through open acromioplasty. Similar results have been reported by others (10, 11). Recently, arthroscopic subacromial decompression has become a popular technique having many advantages, and has been reported as a comparable treatment modality to open acromioplasty. Sachs et. al. (12) performed a prospective randomized study about open versus arthroscopic acomioplasty in patients with shoulder impingement syndrome. He concluded that arthroscopic acromioplasty should become the procedure of choice for patients with impingement syndrome refractory to conservative treatment.

Ellman and Kay (13) achieved on overall success rate of 88% from arthroscopic subacromial decompression both in stage II and selected stage III impingement, with a success rate for full thickness tears of 80%. In group I (no actual tear of cuff), our results of a 95% satisfactory rate were in agreement with 81%~100% of others (14~18). For group II (partial thickness tear), 85% satisfactory results were obtained in our patients. Similar results have been reported by others (14~20).

With regard to full thickness tear, 80% satisfactory results were obtained in our patients. Esch et al. (14) cited 77%, Seitz et al. (19) 45%, Gartsman (15) 56%, Levy et al. (21) 84% satisfactory results. Recently Zvijac et al. (22) reported that 84% satisfactory results at an average of 24.6 months follow-up deteriorated to 68 % satisfactory results at average 45.8 months follow-up. So they concluded that the results of arthroscopic subacromial decompression alone for full thickness rotator cuff tears deteriorated drastically with length of follow-up. But Burkhart et al. (3) reported that 88% satisfactory results in 25 patients of full thickness rotator cuff tear were obtained at an average of 54 months follow-up which he attributed to careful selection of the patients with functional cuff tear. He also attributed the common mechanical causes of pain to impingement or an unstable redundant margin to the tear (edge instability). He also proposed the "suspension bridge model" for the rotator cuff tear. If the suspension bridge was intact in the case of full thickness rotator cuff tear, the function of the shoulder could be maintained. So, in spite of a rotator cuff tear, arthroscopic decompression and rotator cuff debridement was a good treatment method by eliminating edge instability and maintaining load-bearing cable. He proposed that guidelines for the treatment of rotator cuff tear were : to create a functional cuff tear (intact suspension bridge) and stabilize its edge. He also insisted that the important factor for rotator cuff tear was the location of the tear rather than its size. But in young

and active patients, repair of an acute complete torn rotator cuff should be done. The function of the rotator cable is less prominent in younger ages.

Instead of the routine posterior portal, 3 cm below and 2 cm medial to the posterolateral tip of the acromion, we used the posterior portal, 1 cm below and medial to that. The reason was that the shape of the acromion was flat in the lateral aspect and concave in the medial aspect. During anterior acromioplasty the shaver was located obliquely to the anterior border of the acromion in routine posterior portal, but it was located parallel to that in our posterior portal. So the anterior acromioplasty was made safer and more reproducible by use of our posterior portal than by the use of a routine posterior portal. In addition, the excessive removal of the acromion was prevented. We recommend our posterior portal, 1 cm below and medial to the posterolateral tip of the acromion, in anterior acromioplasty.

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