



Results of arthroscopic acromioplasty for chronic rotator cuff lesion

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The influence of acromioplasty in long standing rotator cuff deficiency with intractable pain was retrospectively evaluated in a consecutive series of 13 patients who were followed for a mean period of 19 months (range, 12 to 42 months) after arthroscopic acromioplasty. The Constant score improved from 59.3 (range, 39.9 to 90.3) preoperatively to 98.7 (69.1 to 122.7) postoperatively. Pain and motion improved significantly whereas strength did not improve.

Arthroscopic acromioplasty in painful chronic rotator cuff avulsion was found to be an effective means to control pain and improve motion ; it can be recommended when conservative treatment has failed.

INTRODUCTION

Chronic rotator cuff ruptures with tendon retraction and/or muscle atrophy may be a very painful condition. When conservative treatment and physiotherapy fail, reconstruction may be considered in young and vigorous patient (15). The numerous methods available give variable clinical results ; they include local tissue transfer from the remaining intact portion of the rotator cuff and the superior portion of the subscapularis (8), advancement of the supraspinatus (21) or a deltoid muscle flap (2, 10), reconstruction with synthetic materials (27) or a tendon allograft (26). Other possibilities are transfer of the latissimus dorsi (17) or pectoralis major (29, 37, 39). In contrast, the low-demand patient with a non-repairable tear may be relieved with a prosthesis, either a reverse total shoulder (4, 20, 34, 36) or a

humeral hemiprosthesis (1, 9, 11, 31, 40), and with arthroscopic debridement. When a prosthesis appears inappropriate, arthroscopy should be considered. Rockwood reported 83% good or excellent results with open acromioplasty, subacromial decompression, resection of the coraco-acromial ligament and débridement of the tendinous lesions in cases of old massive rotator cuff rupture (30).

The aim of this paper is to report our experience with this procedure, performed arthroscopically.

PATIENTS AND METHODS

Thirteen patients with a painful chronic rotator cuff rupture underwent shoulder arthroscopy including acromioplasty. The mean age was 65.3 years (range, 53-79) and 85% were female. There were 9 right and 4 left shoulders. The dominant side was involved in 69% of cases. Only one patient was still professionally active.

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Several patients practised sports on a recreational basis but without true involvement of the upper limb. One patient presented a secondary rupture after suture of a supraspinatus tear several years previously.

Indication for surgery was longstanding shoulder pain causing functional disability. Pain was resistant to 6-month conservative therapy with nonsteroidal anti-inflammatory medication, infiltrations and physiotherapy.

Preoperative evaluation consisted of physical examination of the shoulder, imaging studies including standard radiographs, arthrography, arthrogram and/or magnetic resonance imaging. The final diagnosis was a chronic rotator cuff lesion with muscle atrophy and/or tendon retraction.

A Constant score was obtained the day before the intervention. At surgery the glenohumeral and subacromial space were explored using standard posterior and lateral portals. The supraspinatus tendon was found to be completely ruptured in all cases, and the retraction of the supraspinatus tendon was more than 2 cm in 6 cases. The supraspinatus tear was associated with a tear of the infraspinatus in 2 patients and with a tear of the subscapularis in 2 others. The long biceps tendon demonstrated inflammation in 6 cases and was subluxed in one. In one case the intra-articular biceps tendon was ruptured. Three patients had cartilaginous lesions of the humeral head; in two of them the glenoid cartilage showed degenerative changes as well.

An anterior and inferior acromioplasty with resection of the coraco-acromial ligament was performed in all cases. This was followed by lavage of the subacromial space, bursectomy and débridement of the torn rotator cuff tendon. The biceps was trimmed when necessary or was cut if subluxed.

All patients left the hospital the day after surgery. No physiotherapy was prescribed upon discharge, but the patients were encouraged to use the arm as much as possible. Patients were seen in the outpatient clinic 6 weeks after the intervention and physiotherapy was then prescribed if necessary.

The end result was assessed using the Constant score with correction for age and sex. The preoperative and postoperative data were compared using a paired Student's t-test.

RESULTS

There were no surgical or postoperative complications in this series. One patient underwent shoulder hemiarthroplasty several years after the

arthroscopy for severe pain caused by rotator cuff arthropathy.

The mean follow-up was 19 months (range, 12 to 42). The mean Constant score (table I) improved from 59.3 preoperatively (range, 39.9 to 90.3) to 98.7 after the intervention (range, 69.1 to 122.7). This is a statistically significant difference ($p < 0.001$). Improvement was significant for pain and motion ($p < 0.001$), although in several patients it took about two months before pain really decreased. Complications such as infection or reflex sympathetic dystrophy were excluded as causes for this postoperative pain. Postoperative strength showed no improvement compared to preoperatively.

DISCUSSION

Rotator cuff ruptures represent a common pathology, and their prevalence increases with age (24, 33). While there is general consensus that open or arthroscopic repair is the treatment of choice for a small rupture in the young and active patient, the treatment of choice for massive ruptures associated with retraction of the tendon and/or atrophy of the muscle remains less well defined.

A number of reconstructive interventions have been described in the past for these massive rotator cuff lesions, using local tendon or muscle transfer (2, 8, 10, 17, 21, 29, 37, 39), reconstruction with synthetic material (27), allografts (26) or prosthesis (1, 4, 9, 11, 20, 31, 34, 40). These are all quite invasive interventions which might cause stiffness due to intraoperative tissue mobilisation or the need for postoperative immobilisation. Moreover the older patients with low functional demands often have difficulty coping with a long and heavy postoperative rehabilitation program. Recently, arthroscopic tubero-plasty has been advocated, i.e. a new procedure involving débridement of the subacromial space and glenohumeral joint, removal of osteophytes on the humerus and reshaping of the greater tuberosity to create a smooth, congruent acromiohumeral articulation. The coraco-acromial ligament is preserved and acromioplasty is not performed. Mid-term results are satisfactory, but until

Table I. — Constant scores

Patient	Sex	Age	Preop pain and ADL /35	Postop pain and ADL /35	Preop mobility /40	Postop mobility /40	Preop strength /25	Postop strength /25	Preop Constant score	Postop Constant score
1	M	71	11	26	22	40	6	2	51.3	90.2
2	F	63	12	28	16	40	3	4	43	59.4
3	F	63	24	34	24	26	6	7	77.1	94.3
4	F	53	14	19	24	30	2	1	54.5	69.1
5	F	68	15	35	16	40	3	2	48.4	111.5
6	M	75	21	28	40	40	7	3	90.3	94.4
7	F	79	17	33	28	38	2	4	67.8	116.5
8	F	72	11	30	14	18	5	5	42	76.1
9	F	56	7	33	18	40	3	4	37.8	105.7
10	F	59	9	31	40	40	7	10	76.1	114.6
11	F	51	8	35	18	30	3	4	39.9	93.2
12	F	76	13	33	28	40	3	6	62.7	122.7
13	F	73	14	25	32	36	5	3	79.6	92.8
MEAN		65	13..54	30	30	35.23	4.23	4.23	59.27	98.73

ADL : Activities of daily living.

now we do not have results of long-term follow-up in large series (14, 32).

Rockwood *et al* proposed an open, thorough decompression of the subacromial space by anterior and inferior acromioplasty and removal of the subacromial bursa, resection of the coraco-acromial ligament and débridement of the edges of the torn and necrotic tendons and they published long-term results in 1995 (30). They reported 83% satisfactory results after a mean follow-up of 6.5 years. Rockwood's work was based on the observations by Packer *et al*, who followed two groups of patients after repair of a rotator cuff rupture. One group had only suture of the lesion, the other group had acromioplasty as well. In the acromioplasty group 87% had good relief of pain, compared to only 54% in the group where the rotator cuff was sutured (28). Rockwood concluded that most of the pain in rotator cuff rupture is due to subacromial impingement, rather than to the rupture itself. The good results of Rockwood were confirmed later on by many other authors using an open or an arthroscopic procedure (5, 6, 7, 12, 13, 15, 19, 22, 23, 35, 38). Most of the improvement is due to relief of pain, rather than to a substantial gain in motion and/or strength.

One of the concerns when leaving a massive cuff tear unrepaired is that it might increase in size and lead to cuff-tear arthropathy. This objection was already addressed by Neer *et al* in 1983 in their classic article on cuff-tear arthropathy : they estimated that this complication is likely to occur in only 4% of patients with unrepaired tears (25).

Burkhart (5, 6) performed extensive studies on rotator cuff anatomy and biomechanics after having observed that patients kept on doing well clinically after rotator cuff repair, even though it was found on postoperative imaging studies that the sutured tendon was torn again. He concluded that normal shoulder function is possible even with a massive rotator cuff tear, provided that there is a balance between two important force couples, one in the coronal plane and the other in the transverse plane. This balance depends upon the functional integrity of the anterior cuff (subscapularis), the posterior cuff (infraspinatus and teres minor) and the deltoid. In patients who satisfy these anatomic and biomechanical criteria, the achievement of pain relief through subacromial decompression and débridement seems to be all that is necessary for normal pain free function. Large cuff tears most often expand posteriorly into the infraspinatus ; the

subscapularis is less often ruptured. Integrity of the posterior cuff is best evaluated by testing the strength of resisted external rotation; the subscapularis can be reliably evaluated using the lift-off test (18).

The clinical implication of all these studies is that a patient with pain secondary to an irreparable supraspinatus tear is a good candidate for subacromial decompression and débridement when he has an intact infraspinatus and subscapularis. Taking into account that a normal deltoid muscle is also necessary for good shoulder function, it is obvious that an arthroscopic intervention is preferable to an open procedure in which deltoid detachment from its acromial insertion is compulsory.

In a patient with a strong resisted external rotation and a negative lift-off test, a pain-free shoulder with normal motion should be obtained after arthroscopic subacromial decompression. In the case of a torn infraspinatus and/or subscapularis, a pain-free shoulder can be obtained as well, but as the balance between the different force couples is disturbed, this patient should be warned that restoration of a normal active motion will not be possible.

There seems to be currently a consensus in the literature, to conclude that arthroscopic decompression and débridement of the subacromial space can give an improvement in shoulder function in patients over 55 years of age with low functional demands and a cuff tear larger than 5 cm (3, 5, 6, 30). Good prognostic factors are the presence of an intact anterior and posterior cuff and long biceps tendon, good deltoid function, absence of previous operations on the rotator cuff and absence of superior migration of the humeral head (5, 6, 30). Most of the functional improvement is due to resolution of pain.

CONCLUSION

Older patients with low functional demands and large, unrepairable cuff tears resistant to conservative treatment can have significant improvement of shoulder function with an arthroscopic acromioplasty and débridement of the subacromial bursa and the edges of the torn tendon. Patients should be warned that most of the

improvement comes from relief of pain and that there is only little gain in motion and no gain in strength.

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