

SHOULDER IMPINGEMENT SYNDROME

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An analysis of the results of 53 patients treated by an open Neer decompression for chronic impingement of the shoulder is presented. Patients were evaluated pre- and post-operatively on the UCLA Shoulder Rating Scale, which includes an assessment of pain, function, range of motion, strength and patient satisfaction. After an average period of 27.3 months, good or excellent results were found in 81.1%. Satisfactory results (according to Neer) were found in 94.3%. Differential diagnosis of acromioclavicular pathology and cervical syndromes is important.

Keywords : impingement syndrome ; shoulder ; open acromioplasty.

Mots-clés : syndrome compressif ; épaule ; acromioplastie à ciel ouvert.

SAMENVATTING

E. VAN HOLSBECK, G. DECLERCQ, J. DERIJCKE, M. MARTENS, J. VERSTREKEN en G. FABRY. Schouderimpingement syndroom.

De resultaten van 53 patiënten, die voor schouderimpingement een Neer-decompressie kregen, werden geanalyseerd. De patiënten werden pre- en post-operatief geëvalueerd met behulp van de UCLA Schouder Meetschaal, die een bepaling geeft van pijn, functie, beweging, kracht en subjectieve bevrediging van de patiënt. Na een gemiddelde follow-up van 27.3 maanden werden goede en excellente resultaten gevonden bij 81.1%. Bevredigende resultaten werden (volgens Neer) bij 94.3% van de patiënten gezien. Differentiële diagnose met acromioclaviculaire pathologie en cervicagie is belangrijk.

RÉSUMÉ

E. VAN HOLSBECK, G. DECLERCQ, J. DERIJCKE, M. MARTENS, J. VERSTREKEN et G. FABRY. Syndrome compressif de l'épaule.

Cinquante-trois patients ont été opérés d'un syndrome compressif chronique de l'épaule selon la technique de décompression ouverte de Neer. Les patients ont été évalués en pré- et postopératoire selon l'échelle de l'UCLA. Celle-ci inclut une étude de la douleur, de la fonction, de la mobilité, de la force et de la satisfaction des patients.

Avec un recul de 27.3 mois en moyenne, il y a 81.1% de bons et d'excellents résultats. Les résultats satisfaisants (selon Neer) représentent 94.3%. Le diagnostic différentiel d'avec une pathologie acromioclaviculaire et un syndrome cervical est important.

INTRODUCTION

The impingement syndrome of compression of the rotator cuff supraspinatus tendon against the anterior edge of the acromion, the coracoacromial ligament and sometimes the acromioclavicular joint (AC) has been described by Neer (3).

Many causative factors can give rise to an impingement upon the rotator cuff, the overlying

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subacromial bursa and occasionally the tendon of the long head of the biceps against the anterior edge of the acromion and its associated coracoacromial arch. These factors are rotator cuff tendinitis, incomplete cuff rupture with bolstering, acromioclavicular joint arthritis with inferior lipping, spurs of the anterior tip of the acromion, a prominent irregular greater tuberosity of the humerus.

Three progressive stages are described by Neer.

Stage 1 : consists of edema and hemorrhage of the subacromial bursa, usually seen in patients under 25 years of age.

Stage 2 : if impingement continues, the condition becomes chronic and produces thickening and fibrosis of the bursa and tendinitis of the cuff. This is frequently noted in patients of 25 to 40 years of age.

Stage 3 : results from further impingement, producing degeneration or complete or incomplete tears of the rotator cuff. These more advanced changes are usually seen in patients over 40 years old (3).

MATERIALS AND METHODS

Fifty-three patients (41.5% male and 58.5% female) with advanced stage 2 and early stage 3 rotator cuff disease had an open decompression for chronic impingement syndrome.

The follow-up period ranged from 12 to 47 months averaging 27.3 months. The age of the patients ranged from 19 to 73 years, with an average of 49.9 years.

There were 22 men and 31 women.

The right shoulder was involved in 28 patients and the left in 25 patients. The dominant shoulder was involved in 84.9% (45 patients). Thirty five, eight % of our patients were laborers requiring repetitive overhead working ; 22.7% had an intellectual job ; 41.5% had no job or were retired. Regular sport was done by 14 (26.4%) patients.

All patients were initially managed with conservative therapy (consisting of rest, passive range of motion exercises and analgesics) before an intervention was arranged. Patients complained

for an average of 25.5 months (range 2-168 months).

The majority of the patients received at least one steroid injection (averaging 4.9 injections).

Fifteen of the patients presented with a history of injuries (2 fractures of the clavicle, 2 fractures of the greater tuberosity, 4 sustained a fall on the shoulder, 2 had a car accident and the remaining 5 had an indirect trauma).

Overhead activity was involved in the occupation or sport of 92% of our patients. Night pain was noted in 89% of the cases.

The impingement sign (forced elevation of the humerus against the anterior acromion) was positive in all patients. A pain ablation test (relief of pain by subacromial local anesthetic injection) was done, except in those who already had a relieving injection in the past or in those who refused.

Prior to surgical intervention patients stopped their work for an average of 3 weeks (range 0-20 weeks).

Surgical technique

The approach to the subacromial area was through a sagittal incision over the acromioclavicular joint through a plane between the clavicular and acromial deltoid. The subdeltoid bursa was incised and the coracoacromial ligament resected. Incongruity of the undersurface of the acromioclavicular joint or upper surface of the cuff was evaluated. A routine anterior acromioplasty according to Neer was done. Patients with cuff tears were excluded from the study. In cases of incongruity of the acromioclavicular joint an AC resection was done (four patients). In 5 cases resection of a calcification was done. An additional manipulation for associated frozen shoulder was done in 6 patients.

RESULTS

The UCLA Shoulder Rating Scale was used as objective rating system (H. Ellman, 1986, see table I).

Table I. — University of California at Los Angeles. End-result scores

	Points
<i>Pain</i>	
present all of the time and unbearable, strong medication frequently	1
present all of the time but bearable, strong medication occasionally	2
none or little at rest, present during light activities ; salicylates frequently	4
present during heavy or particular activities only ; salicylates occasionally	6
occasional and slight	8
none	10
<i>Function</i>	
unable to use limb	1
only light activities possible	2
able to do light housework or most activities of daily living	4
most housework, shopping, and driving possible	6
able to do hair and dress and undress, including fastening brassiere	8
slight restriction only, able to work above shoulder level	10
normal activities	10
<i>Active forward flexion</i>	
150 degrees or more	5
120-150°	4
90-120°	3
45-90°	2
30-45°	1
less than 30°	0
<i>Strength of forward flexion (manual muscle-testing)</i>	
grade 5 (normal)	5
4 (good)	4
3 (fair)	3
2 (poor)	2
1 (muscle contraction)	1
0 (nothing)	0
<i>Satisfaction of the patient</i>	
satisfied and better	5
not satisfied and worse	0
Maximum score, 35 points	
E = Excellent (34-35 points) ; G = Good (28-33 points)	
F = Fair (21-27 points) ; P = Poor (0-20 points)	

The results were graded on the UCLA Shoulder Rating Scale before operation and at follow-up. According to this scheme pain and function are

each rated on a scale of 1 to 10, with 1 point being the worst score and 10 points the best score. Range of motion, strength and patient satisfaction were rated on a scale of 1 to 5 with a maximum total score of 35 points. Results were divided into excellent (34-35 points), good (28-33 points), fair (21-27 points) and poor (0-20 points). Criteria suggested by Neer to divide the results into "satisfactory" or "unsatisfactory" groups were : satisfaction with the operation, no significant pain, full use of the shoulder with less than 20° loss of overhead extension and at least 75% of normal strength.

Pain score

The average UCLA pain score indicated an improvement from 3.8 (little pain at rest, present during light activities) preoperatively to 8.9 (occasional and slight discomfort) at 27.3 months postoperatively.

Function score

The average function score changed from 4.2 (light housework) preoperatively to 8.6 (slight restriction only, ability to work above shoulder level with occasional slight restriction) at 27.3 months postoperatively.

Active forward flexion

The active forward flexion score changed from 3.2 (90-120°) preoperatively to 4.6 (approximately 150°) at 27.3 months postoperatively.

Strength of forward flexion scores

The average strength of forward flexion score changed from 3.5 (fair) to 4.5 (good) at 27.3 months postoperatively. It was rather difficult to determine if there was intrinsic muscle weakness or relative weakness due to pain.

Patient satisfaction

Of all the patients 94.3% were satisfied with the results of their surgery.

Objective scores

Objective results of excellent or good were obtained in 81.1% of the patients and fair and poor results in 17 and 1.9% of the cases.

Associated surgery

Of 19 patients with signs of arthritis of the acromioclavicular joint on the plain radiographs only 4 were symptomatic and required an AC

resection. Eighteen others had calcification of the cuff; 5 of these had a resection of an obvious calcification mass during acromioplasty. A calcification mass diminishes the subacromial space and can cause an impingement syndrome. It must be differentiated from a chronic calcifying tendinitis with intratendinous calcification and with a normal subacromial space! Six patients required an additional manipulation of the shoulder prior to a Neer decompression because of an associated adhesive capsulitis (table II).

Table II. — Results of decompression in associated pathology

	Patient satisfaction			Objective rating			
	number	yes	no	E	G	F	P
AC arthrosis on X-ray	19	18	1	8	5	6	0
resection of AC	4	4	0	2	0	2	0
calcification on X-ray	18	18	0	11	7	0	0
resection of calcification	5	5	0	2	3	0	0
+ manipulation	6	6	0	4	2	0	0
+ cervical syndrome	9	8	1	1	5	2	1

Complications and unsatisfactory results

No real postoperative complications were noted. One patient developed a shoulder hand syndrome and did not well. Analysis of the unsatisfactory results demonstrated a wrong diagnosis in two cases (cervical syndrome due to a cervical hernia and a dead arm syndrome). A third unsatisfactory result followed a probably insufficient acromioclavicular resection. A C 4 radiculopathy can give irradiating pain to the acromial region. A dead arm syndrome is a transient anterior shoulder subluxation and can give secondary false positive impingement signs.

A cervical syndrome in itself is not a contraindication to surgery. We had 9 patients with a cervical syndrome in association with chronic impingement of the shoulder and they did well (6 patients had an excellent or good result, two had a fair and another had a poor result; table II). The preoperative workstop averaged 3 weeks

compared with 2.9 months postoperatively. Patients returned to their regular activities after an average of 5.1 months (range 2-12 months). Four patients never returned to their previous level.

DISCUSSION

A painful arc of motion is a frequent cause of shoulder disability. It is caused by mechanical impingement on the rotator cuff as it passes under the coracoacromial arch. After a sufficient period of conservative therapy an anterior acromioplasty as described by Neer is indicated. This procedure is an effective procedure in the long term. The relief of pain, especially night pain, is gratifying. Most patients improved functionally because of the pain relief.

Neviaser *et al.* recommended that the acromioclavicular joint should be resected routinely as part of what they described as a "four-in-one arthro-

plasty" (4). Watson reported on 23 patients who underwent a Neer decompression and an AC resection. He recognized osteoarthritic changes in the acromioclavicular joints of all his patients (7). We feel it is unreasonable to resect all the AC joints in combination with a routine Neer decompression. The majority of our patients with osteoarthritic changes on the plain radiographs were not symptomatic and did well without an AC resection. It is very important to recognize these patients clinically by a positive adduction stress test or by the relief of pain by an injection of xylocaine in the acromioclavicular joint. It is also crucial to examine the cervical spine because of the similar character of symptoms. Patient satisfaction was found in 94.3%. Good and excellent results were found in 81.1%. This shows that despite some loss of motion and strength patients were happy with their result. A subacromial decompression is a good treatment for relief of subacromial pain (94.3% satisfactory results). Secondary to the pain relief many patients improved functionally (81.1% excellent and good results in the UCLA score).

Our excellent results may be influenced by the "older" population who did not stress their shoulders during daily life. In contrast to similar studies laborers with repetitive overhead activities were a minority in our study. R. J. Hawkins and J. S. Abrams (2) reviewed 108 acromioplasties and had an overall success rate of 86%. One third of his study included Worker's Compensation patients, who made up 55% of the failures.

J. Thorling *et al.* (6) studied a population of 51 patients with the same characteristics as our population. He had good or excellent results in 33 patients (65%). His results were influenced by associated AC resections and cervical spine problems. Our results were not similar to his because we routinely examine the AC joint by adduction tests.

Finally M. Post and J. Cohen (5) reviewed 72 patients with chronic impingement without cuff

tears, who were predominantly not sportive and who had an average age of 42 years. He had an overall success rate of 89%. In only a few cases he found lateral clavicle resection necessary. His results can be compared with ours.

CONCLUSION

Anterior acromioplasty is an excellent procedure for relief of pain due to impingement. Additionally, beneficial results are obtained in range of motion and muscle strength.

It is crucial to make an accurate clinical diagnosis of the impingement syndrome and to exclude any cervical syndrome.

One should also determine clinically and not radiographically if an AC resection is necessary.

REFERENCES

1. ELLMAN H., HANKER G., BAYER M. Repair of the rotator cuff. *J. Bone Joint Surg.*, 1986, 68-A, 1136-1144.
2. HAWKINS R. J., ABRAMS J. S. Impingement syndrome in the absence of rotator cuff tear. *Orthop. Clin. North Am.*, 1987, 18, 373-382.
3. NEER C. S. Impingement lesions. *Clin. Orthop.*, 1983, 173, 70-77.
4. NEVIASER T. J., NEVIASER R. J., NEVIASER J. S., NEVIASER J. S. The four-in-one arthroplasty for the painful arc syndrome. *Clin. Orthop.*, 1982, 163, 107-112.
5. POST M., COHEN J. Impingement syndrome. *Clin. Orthop.*, 1986, 207, 126-132.
6. THORLING J., BJERNELO H., HALLIN G., HOVELIUS L., HAGG O. Acromioplasty for impingement syndrome. *Acta Orthop. Scand.*, 1985, 56, 147-148.
7. WATSON M. The refractory painful arc syndrome. *J. Bone Joint Surg.*, 1978, 60-B, 544-546.

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