Arthroscopic Subacromial Debridement without Acromioplasty or Release of Coraco-acromial Ligament: Long Term (8-12 years) Follow up

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Abstract

Introduction
Impingement syndrome of the shoulder is a common diagnosis. Arthroscopic subacromial decompression is the gold standard of treatment. Many authors studied the use of subacromial decompression by bursectomy without acromioplasty and reported useful results with decompression with acromioplasty. There are no studies in the literature about the long term results of subacromial bursectomy and debridement without acromioplasty or release of the coracoacromial ligaments.

Aim of the study
The aim of this prospective study is report the long term effect of subacromial debridement on symptoms of impingement syndrome.

Patients and methods
Between January 2002 and April 2006, 37 patients were operated on for treatment of impingement syndrome of the shoulder in Benha University hospitals in Egypt. Twenty-three patients (17 males and 6 females) were available at the end of the study. The average age was 53.08 years (range 27-59 years). Follow up at least 8 years after the operation. evaluation using the University of California at Los Angeles rating scale (UCLA score).

Results
The preoperative UCLA score compared to the score at the end of the study are detailed in (table 1). Eighteen patients (78.3%) had good and excellent scores while the other 5 patients (21.7%) showed poor and fair results at the end of the follow-up.

Discussion
In the current study, the pain and function of the shoulder showed significant improvement (p-value < 0.05) in the long-term follow-up. There are 5 patients who showed poor and fair results over 8-12 years follow-up. These results are explained as a part of the degenerative process. The results of the current study are comparative with the long term results of subacromial decompression with acromioplasty.

Conclusion
Arthroscopic subacromial debridement is an effective procedure for long term treatment of impingement syndrome of the shoulder.

Key words
Impingement - Debridement without Acromioplasty - Long Term.

Introduction
Since Codman described the rotator cuff disease in 1934 in his book, The Shoulder, there has been progression in the treatment (1). Meanwhile, Neer, in 1972, popularized the term "impingement syndrome of the shoulder". Neer, furthermore, described subacromial decompression for its treatment, leading to its more common use as a procedure in orthopaedic surgery. Neer’s theory depended on the extrinsic factors and involved subacromial bursectomy anteroinferior acromioplasty and coracoacromial ligament release, while good results were obtained (2). Since the introduction of arthroscopic subacromial decompression by Ellman, there has been good results comparable with the results of open surgery, thus leading to its popularization (3,4). Furthermore, it has been more beneficial for short term regarding the postoperative pain, hospital stay, deltoid function and physiotherapy (3,4).

As a result of the wide use of arthroscopy in the treatment of impingement syndrome, many authors studied the use of subacromial decompression by bursectomy without acromioplasty and reported useful results with decompression with acromioplasty.
Their studies were based on the intrinsic theory, which suggested that the symptoms of impingement syndrome are caused by degenerative tendinopathy. These degenerative changes result from tensile forces and may lead to a subacromial inflammatory reaction. Whereas, histopathologic studies revealed sclerocartilaginous metaplasia with amyloid deposition in the tendon as an aging process. (5,6,7,8,9).

Bigliani et al. classified acromion shape into flat (type I), curved (type II), or hooked (type III) acromion on outlet view radiographs (10,11). Meanwhile, many studies with a high level of evidence reported that there is no relation between the shape of the acromion and the symptoms of impingement syndrome of the shoulder. Thus, these authors recommended that there is no benefits from acromioplasty. (12).

There are no studies in the literature about the long term results of subacromial bursectomy and debridement without acromioplasty or release of the coracoacromial ligaments.

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**Patients and methods**

Between January 2002 and April 2006 and after taking the consultation and approval of the ethical committee, 37 patients were operated on for treatment of impingement syndrome of the shoulder in Benha University hospitals in Egypt. After a start of Thirty-Seven patients, only Twenty-three patients (17 males and 6 females) were available at the end of the study. However, ten patients disappeared during the follow-up process. While, the other four patients developed other complaints (one diabetes mellitus, one cerebral stroke, and two cervical radiculopathy) and were excluded from the study. All patient's were seen clinically by the same surgeon and diagnosed as impingement syndrome of the shoulder through history of pain in the deltoid region, painful range of active abduction and forward flexion. Physical examination was based on tenderness over the subacromial space in the anterolateral aspect of the shoulder, the Neer test, Hawkins test and impingement test. All patients had been received medical treatment in the form of non-steroidal anti-inflammatory drugs, physiotherapy, and modification of life activity for at least 3 months before the operation (range 3 to 8 months).

All patients did radiography in the form of plain x-ray, true anterior, and supraspinatus outlet views. MRI was done for all patients as a routine document after failure of conservative treatment and before operation. Radiological findings suggesting impingement syndrome of the shoulder, including the shape of the acromion and the presence of spur in the undersurface of the acromion, which had been reported and documented. All the MRI studies of the patients were documented in order to have at least signs of bursitis, like thickening of the subacromial bursa. Partial thickness tears of the rotator cuff were also reported.

The inclusion criteria for this study was that all patients diagnosed as impingement syndrome of the shoulder as a primary diagnosis, non traumatic, non diabetic, not proved to be rheumatoid, no cervical disc disease, during the operation, no complete rotator cuff tear, labral tear or slab lesion and follow up at least 8 years after the operation. The MRI study of the patient proved to have bursitis of the subacromial bursa and tendinitis of supraspinatus tendon or partial tear of the supraspinatus tendon.

All patients were suspected to preoperative evaluation using the University of California at Los Angeles rating scale (UCLA score) and documented (3,13).

Written consent was assigned by every patient after discussion of the operation and the postoperative physiotherapy and follow up.

**The operation:**

All patients were operated up on by the same surgeon under general anaesthesia using beach chair position and preoperative antibiotic in the form of one gram of 3rd generation cephalosporin. Hypotensive anaesthesia and pump were used for haemostasis during the operation. Whereas, posterior portal and a 30-degree lens were used for visualization.

Diagnostic arthroscopy of the shoulder was done first to detect abnormal pathology of the labrum, biceps origin or rotator cuff tear. Then, the arthroscope was withdrawn from the joint and redirected to the subacromial space.

Following the antero-lateral portal for the introduction of the motorized shaver (Arthrex), bursectomy was done till the under-surface of the acromion was clearly visualized and also the bursal surface of the supraspinatus tendon was visualized and probed with the blunt prob (figure 1). The portals were closed and a sling was used for the first two days only.
Post operative:

In the first night after operation, the patient started and educated to do pendulous exercises and the other passive movements of the shoulder. Patients were educated to do physiotherapy at home and follow up in the outpatient clinic every week for the first four weeks then every other week for the 2nd and 3rd month and every 6 months for 2 years and every year to the end of the study.

Evaluation had been done as regard the UCLA score, recurrence of symptoms and development of rotator cuff tear and documented every year till the last visit for the patient. Contacts of patients were during visits in the outpatient clinic and through phone calls and personal invitation for the outpatient clinic.

Statistics:

Statistical analysis was done to compare the mean preoperative and postoperative (UCLA) scores using Paired-Samples T-Test. Level of significance set at \( p < 0.05 \). Both descriptive analysis and statistical analysis were performed with IBM SPSS Statistics for Windows, Version 22.0 (IBM Corp., Armonk, NY, USA).

Results

Twenty-three patients (17 males and 6 females) were included in this study. The average age was 53.08 years (range 27-59 years). The average preoperative complaint was 17.4 months (range 9-48 months). They were available for follow up for 8 to twelve years (average 9.7 years).

Three patients were reported preoperatively and documented radiologically (in MRI) and by arthroscopy to have partial thickness rotator cuff tear.

The preoperative UCLA score compared to the score at the end of the study are detailed in (table 1). Eighteen patients (78.3%) had good and excellent scores while the other 5 patients (21.7%) showed poor and fair results at the end of the follow-up.

The postoperative (UCLA) score ranged from 18 to 35 with a mean of 29.17 (SD 5.69) with a statistically significant improvement from the mean preoperative score of 10.30 (\( p < 0.001 \)).

During the follow-up 5 patients (21.7%) showed recurrence of symptoms and 2 of them proved to have complete rotator cuff tear (one of them had been reported to have partial thickness rotator cuff tear in the preoperative assessment) and they were operated up on while the other two patients refused to proceed to arthroscopy.

Figure 1: a) Supraspinatus outlet x ray shows type II acromion
    b) MRI shows subacromial bursitis
    c) Arthroscopic picture shows the under surface of the acromion after debridement.
Table 1: comparison between preoperative and postoperative UCLA scores

<table>
<thead>
<tr>
<th></th>
<th>Preoperative</th>
<th>Postoperative</th>
<th>P value</th>
</tr>
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<tbody>
<tr>
<td>Pain</td>
<td>2.5 points±1.16</td>
<td>8.34 points±1.55</td>
<td>.000</td>
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<tr>
<td></td>
<td>(range 1-6)</td>
<td>(range 6-10)</td>
<td></td>
</tr>
<tr>
<td>Function</td>
<td>2.7 points±1.105</td>
<td>8.26 points±1.389</td>
<td>.000</td>
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<tr>
<td></td>
<td>(range 1-4)</td>
<td>(range 4-10)</td>
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<tr>
<td>Active forward flexion</td>
<td>2.56 points±.590</td>
<td>4.17 points±.717</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>(range 2-3)</td>
<td>(range 2-5)</td>
<td></td>
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<tr>
<td>Strength of forward flexion</td>
<td>2.52 points±.511</td>
<td>4.26 points±.810</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>(range 2-3)</td>
<td>(range 4-5)</td>
<td></td>
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<tr>
<td>Patient satisfaction</td>
<td>0 points</td>
<td>4.13 points±1.938</td>
<td>.000</td>
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<tr>
<td></td>
<td></td>
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<tr>
<td>Overall score</td>
<td>10.3±2.6</td>
<td>29.17±5.68</td>
<td>.000</td>
</tr>
<tr>
<td></td>
<td>(range 7-14)</td>
<td>(range 14-35)</td>
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</table>

P value is considered significant if <0.05

Discussion

Impingement syndrome of the shoulder is the most common cause of shoulder pain. In last 3 decades, arthroscopic subacromial decompression of the shoulder became one of the most common arthroscopic procedures all over the world (8,13,14,15). Recently, subacromial debridement without acromioplasty or coracoacromial ligament release became a common procedure with rising evidence. Researchers, who study the biomechanics of the shoulder and pathogenesis of the impingement syndrome, advocate the bursectomy alone without acromioplasty or release of coracoacromial ligament on the short and mid-term bases. (5,6,7,17,18).

In the current study, the pain and function of the shoulder showed significant improvement (p-value < 0.05) in the long-term follow-up.

There are 5 patients who showed poor and fair results over 8-12 years follow-up. These results are explained as a part of the degenerative process.

The results of this study (18 patients 78.3% good and excellent after 8-12 years follow-up) are comparative with the results of arthroscopic debridement without acromioplasty reported by Budoff et. Al. (5) in his first study at 1998 (81% good to excellent results at 5 year follow up). Also, he reported 79% good to excellent results at 2005 after 9.5 years follow up (6).

Henkus et. al., (7) reported, in his comparative study between bursectomy alone versus bursectomy and acromioplasty after a follow-up period 2.5 years (range, 1-5 years), no significant difference between the two procedures. His conclusion was that both procedures can have effective results.

The results of this study were also compared with the results of studies of arthroscopic subacromial decompression with acromioplasty reported by Massoud et. Al. (19). He reported satisfactory results in 74.5% in 118 shoulders having a small and medium sized rotator cuff tear. Also, the results were also compared with the results of Klintberg et. al. (68% pain free and 88% patient satisfaction at 8 -10 years follow up after subacromial decompression with acromioplasty) (20).

The rule of subacromial bursectomy in treatment of impingement syndrome of the shoulder can be explained by the evidence suggesting that an inflamed and thickened bursa, which contains large number of nociceptors and nerve endings, is the pain generator and removal of the bursa leads to relieving of pain (4,7,8).

Papadonikolakis A. stated that the evidence does not support the theory that rotator cuff abnormality is caused by rubbing on the coracoacromial arch. The evidence indicates that the rotator cuff articulates with coracoacromial arch in the movement of normal shoulders and it normally stabilizes the humerus against upward displacement. The spur that is often associated with rotator cuff tears has been demonstrated within the coracoacromial ligament and not
extending below it (14).

Preservation of the coracoclavicular acromial arch is a theoretical benefit from subacromial debridement without acromioplasty because its destruction may predispose to loss of active glenohumeral elevation and anterosuperior migration of the humeral head as the acromion and coracoclavicular ligament are secondary stabilizers of the humeral head (21-24).

Studies which concerned with the rule of the acromion and its morphology in impingement syndrome concluded that there is no benefits from acromioplasty (9, 22, 24).

The study limitations:

The main limitation of the study is that there is differential diagnosis for chronic shoulder pain with increasing age, including cervical disc disease, acromioclavicular arthritis, and biceps tendon degeneration. This may alter the diagnosis of impingement syndrome and the outcome of the operation especially with long follow-up. With the long-term follow-up, other degenerative diseases could produce shoulder pain and affect the diagnosis and results.

Conclusion

Arthroscopic subacromial debridement is an effective procedure for long term treatment of impingement syndrome of the shoulder.

References

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