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Clinical and Imaging Evaluation of Arthroscopic Mumford Procedure

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Abstract

Background: Regarding the increasing prevalence of Degenerative Disease of Acromioclavicular Joint and based on the reports on the success of Arthroscopic Mumford among the patients with the disease and considering lack of reports about its impact in Iran, this study was carried out on patients referred to Taleghani Hospital during 2014-2017 in order to determine the impact of this method among patients suffering from Degenerative Disease of Acromioclavicular Joint.

Materials and Methods: This study used a clinical trial method with pre-and-post-operation comparison to investigate all patients diagnosed with degenerative disease of Acromioclavicular Joint. All the participants announced their informed consent to participate in the study when the conservative treatment failed to treat their disease. The patients' range of motion, strength, and pain were evaluated before and after the treatment based on standard methods. The patients undertook Arthroscopic Mumford treatment and were followed for at least three months. The effect of the treatment method was determined based on the three indices and the variations were clinically assessed using with paired T-test and McNemar's test.

Results: 41 patients were enrolled (87% male, 13% female) whose mean age were 48 years old. Before treatment, 26.8% of elderly patients had moderate pain and 73.2% had severe pain, whereas, after treatment 78% of them had experienced no pain and 22% had mild pain (P<0.000). Indices of ROM improved by at least 33%, with the maximum of 60% (P<0.05). Power strengths of flexion and abduction got better but internal and external rotation remained the same.

Conclusion: It seems that the arthroscopic surgical technique is effective for the patients and, accordingly, this method is recommended to be used for them.

Keywords: Arthroscopic Mumford Procedure, Degenerative Disease, Acromioclavicular Joint

Introduction

Acromioclavicular (AC) joint represents the connection between the clavicle and the scapula, which is responsible for the synchronized dynamic of the shoulder girdle [1]. The joint also has motions and it can move upward about 40 to 50 degrees to raise the shoulder [2]. Symptom (pain) of the acromioclavicular joint is common in shoulder diseases, which is the result of direct damage to the AC joint and follows impingement phenomenon caused by rotator cuff rupture and osteoarthritis of the AC joint [3-5]. According to the diagnostic and early diagnosis techniques, the prevalence of this disease is on the rise [6]. Symptomatic disease of the AC joint usually responds to conservative treatment, including resting, anti-inflammatory drugs like NSAIDs, intra-articular injection of corticosteroids, and activity moderation. If these treatments fail, joint debridement and distal clavicular resection, which can be performed using open or arthroscopic techniques, are preferred [6]. Clinical examination for the diagnosis of pain in the

AC joint has high sensitivity and low specificity; however, MRI and radiographic findings are of high specificity and low sensitivity. Hence, they both can be of effect in diagnosis [7-9]. A shoulder's range of motion normally is 160-180 degrees of flexion170 -180 degrees of abduction, 60-100 degrees of internal rotation, and 80-90 degrees of external rotation [6,9]. In cases where the disease needs surgery (for those which do not respond to conservative treatment), open treatment can be employed using arthroscopic technique [6]. Mumford Arthroscopic Procedure described by Snyder et al. revealed acceptable results for distal clavicular resection in patients with degenerative disease of AC joint [10, 11]. Snyder et al. reported the long-term results as good and excellent in 47 (94%) out of 50 patients undertaking arthroscopic distal clavicular resection [6] . Also, the distal clavicular resection can be performed using the open technique on the AC joint by separating deltoid and trapezius muscles and adjacent fascias. Using this method, significant improvements are reported in many studies [10-15].

In a study conducted by Flatlow, et al., the open and arthroscopic distal clavicular resection techniques were compared, and it was shown that patients undertaking arthroscopic technique spent shorter period of therapy in hospitals and returned to full function3 /4 month sooner than the group receiving open treatment. Arthroscopic subacromial decompression and arthroscopic distal clavicular resection can prevent the problems with open procedure. Additionally, arthroscopic surgery provides the surgeon with sufficient view and detection of glenohumeral joint (labrum ruptures), external objects of cartilage lesions, and rotator cuff [3]. There are several methods of arthroscopic treatment for the AC joint. One method is the Superior Technique through which arthroscope and arthroscopic devices are placed inside the AC joint using the Superior portal [14]. Another one is the Subacromial Technique through which arthroscope enters through a posterior and burr portal, a portal a subacromial portal. Snyder first described the arthroscopic Mumford technique [10,11]. In other studies, the rate of recovery ranged from 96% to 98% [3,6]. Since there is no report available or published on the impact of this technique in Iran and due to the prevalence and increasing trend of its diagnosis with the referral of patients using paraclinical methods [9] and considering the difference between the results of previous studies, this study was carried out on patients referred to Taleghani Hospital during 2014-2017 in order to determine the impact of this method among patients suffering from degenerative disease of Acromioclavicular Joint.

Materials and Methods

This study used a clinical trial method with pre and post-operation comparison. All patients had referred to the hospital within the period concerned (2014-2017) and had a definite diagnosis of degenerative disease of Acromioclavicular Joint. Some other aspects including patients' complaints, clinical and paraclinical examinations (MRI or Radiology) were also studied. The patients' age, gender, and cause of referral were also recorded. The severity of pain in the distal clavicle was also determined according to the patients' self-expressions and standard measurements [3]. The severity of pain was evaluated and classified as painless, slight, mild, and severe through causing pain by touch or painful maneuvers [3]. The shoulder's range of motion (ROM) was measured by the orthopedic assistant surgeon and under the supervision of an orthopedic expert using the standard values of flexion, external rotation, internal rotation, and abduction [6,9]. It was determined and marked by degree and ratio of motion to the opposite side. The difference between the healthy and non-healthy was determined based on degrees. The strength level of motions in flexion, internal rotation, abduction, and external rotation was determined and recorded using a standard method based on a five-point intensity (0 to +5) [3]. In a trial study, the surgeon assistant's reliability to test ROM and strength of motions was estimated to be 85%. All patients underwent surgery after submitting written consent forms.

Since 2014-2017, this procedure has been performed on patients with pain in AC part and DJD of acromioclavicular joint and clinical impingement symptoms with AC joint pain as a positive abduction sign and tenderness on distal clavicle. All patients have had non-successful conservative treatment with non-steroidal anti-inflammatory symptoms and corticosteroids injection to the subacromial space. Radiography was performed on all patients before and after surgery (AP and Tangenital view) to evaluate the amount extracted from distal clavicle and the remained part of the distal clavicle in superior capsule of the AC joint. Some patients also had rotator cuff rupture.

Surgery Technique

The patients were placed in the beach chair position and the procedure was adopted after prepping and draping and adding about four milliliters of epinephrine1/1000 to each three-liter bag of arthroscopic fluid by using an arthroscopic pump. First, a diagnostic arthroscopy was performed for all patients. Glenohumeral joint was initially evaluated through using anterior and posterior portals. Then, bypass and rotator cuff tendons were evaluated. Anterior labrums as well as the joint surface of glenoid and humerus were well seen and examined. Then, the arthroscope was removed from the glenohumeral joints and was placed as subacromial. About 2 centimeters of the lateral was created on the lateral acromion boarder through the third portal and the rotator cuff was evaluated. Acromioplasty was performed for all patients. About 7-10 mm of anterior acromion was resected and a smooth surface below the acromion was created. The steps of this procedure as well as arthroscopic view of the AC joint are shown in (Figures 1A-G).

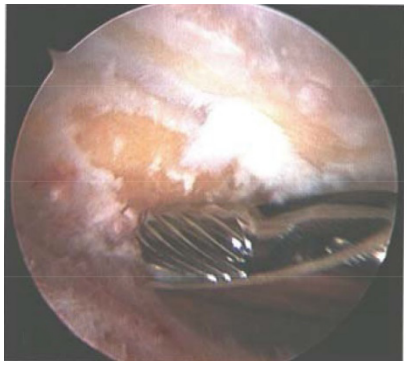


Figure 1A

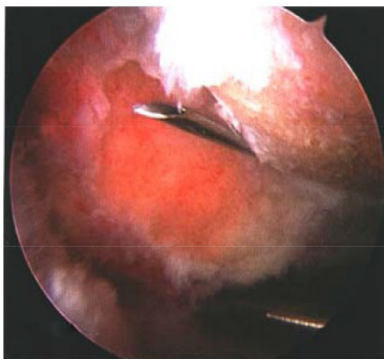
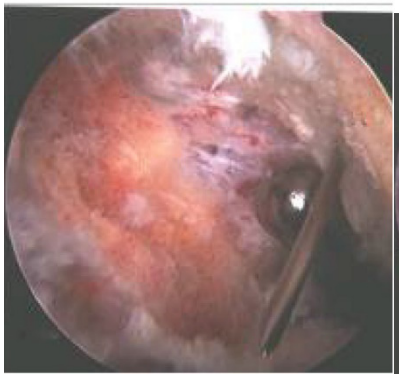


Figure 1B

Figure 1C



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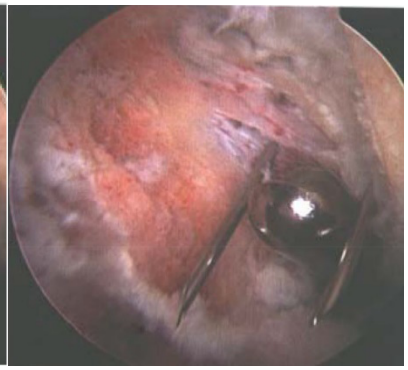

Figure 1E

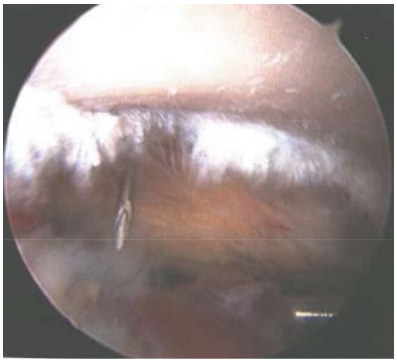

Figure 1F

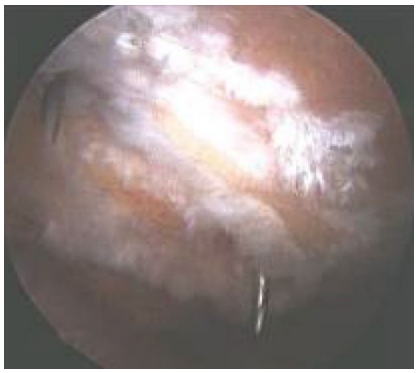

Figure 1G

Figures 1(A-G): Procedure steps and arthroscopic view of AC joint.

Then the arthroscope was inserted into the lateral portal which provides an excellent view of the acromion resection angle. This portal also provides another view of the rotator cuff from the top. Arthroscope was preserved in the lateral portal was preserved and distal clavicular resection was done through the posterior portal and lower surface of the AC joint capsule. The surface below the distal clavicle (about 2 centimeter of length) was exposed to coracoclavicular ligament in the distal with paying close attention to the lateral. The resection started from the inferior and ended up in the superior. At this point, the precision is needed not to hurt the AC joint capsule. About 6_13 mm of the distal clavicle was removed, and the distal clavicle residue was not allowed to be jointed with acromion in forward elevation and adduction. At this time, an assistant pressed the distal clavicle by his finger and this provided a better view of

the superior capsule of the AC joint and the remaining fractures. Then, the rotator cuff rupture was repaired in patients who had suffered it. After doing the surgery in a group with no rotator cuff rupture, the upper limbs were placed in sling and passive ROM and pendulum exercise immediately began. Overhead lifting and pulling were limited for 1-4 weeks and heavy activities or exercises were allowed after 2-3 months. An abduction pillow was put for 4-5 weeks for patients whose rotator cuff rupture was repaired. The same procedure was also taken for them when their rotator cuff was restored. The remaining fractures of clavicle were examined by radiography after the surgery. The patients undertook conservative treatment with regard to the remaining fractures of clavicle and the severity of the symptoms. If not treated, they would undergo arthroscopic surgery (Figures 2-4).

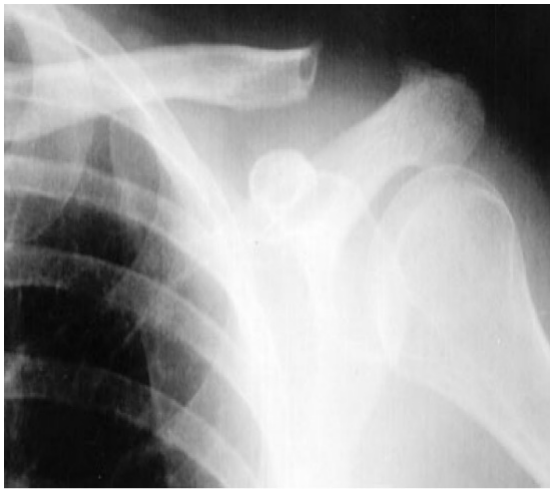

Figure 2: Post-operative radiography, no remaining bone or spike is observed.

Figure 3: Postoperative radiography, small remaining fracture in superior capsule (Type Ia).

Figure 4: Postoperative radiography, small remaining fracture (Type Ib); The patient was asymptomatic.

All patients were followed for at least 6 months. The effect of surgery, the strength of the movements, and the severity of the pain were examined exactly the same as their condition before the operation and recorded in the information form No. 2. Data form the first and second information forms were classified and extracted, and the variations of the indices strength and ROM were compared using paired-sample t-test with statistics. The variations of pain were also statistically compared in terms of lack of pain, slight, mild, and severe degrees prior to and after surgery using Mc Nemar test.

Results

This study was conducted on 41 patients (36 men=78.8% and 5 women=78%). The mean age of the patients was 47 years with an age range of 4 -59 years old. All patients complaining of AC joint pain had referred to the hospital. Conservative method failed to treat them. Of the participants, 27 patients had rotator cuff rupture and received the rotator-cuff repair surgery. Acromioplasty was performed for all patients. There were no remaining fractures of clavicle in 35 patients (85.4%) and 4 patients (9.8%) have a small fracture of Type Ia remained and suffered from slight pain. These four patients responded to conservative treatment and the pain was vanished. There was one subject (2.4%) with large fracture of type Ib, who was asymptomatic, and had a lateral spike (type II) with mild pain. This case was not retrieved with conservative method and it was removed with one more arthroscopy. The average amount removed from the distal clavicle was 1.7 cm.

The patients were followed up for at least 3 to 12 months. The ROM indices specified for the patients before and after the treatment are presented in (Table 1). This table shows that flexion, abduction, internal rotation, and external rotation increased as much as 50%, 60%, 33.3%, and 66.6%, respectively. The paired- sample T-test indicated that all these motion indices were statistically significant ($P < 0.01$).

Indices	Pre-operation/ degree	post operation/ degree	Variation Value/%
flexion	10(0-20°)	5(0_10°)	0.1
abduction	25(5-45°)	10(0_20°)	0.25
internal rotation	15(0-40°)	10(0_20°)	0.050505051
external rotation	15(0-25°)	5(0_10°)	0.032467532

Table 1: ROM value according indices before and after the operation.

According to the severity of pain (i.e., sever, middle, mild and No pain), the distribution of the patients is shown in (Table 2).

Severity of pain after treatment Severity of pain before treatment	Slight and painless (%)	Mild and severe (%)	Total (%)
Slight and painless	0(0)	0(0)	0(0)
Mild and severe	41(100)	0(0)	41(100)
Total	41(100)	0(0)	41(100)

Table 2: Distribution of patients with degenerative disease of AC joint based on severity of pain before and after treatment.

As it is presented in this table, the severity of their pain varied from mild and severe to slight or painless after treatment. Hence, all patients recovered from mild or severe pains. McNemar test indicated that this difference is statistically significant (P <0.05). Distribution of patients based on the severity of pain before and after the treatment is presented in (Diagram 1).

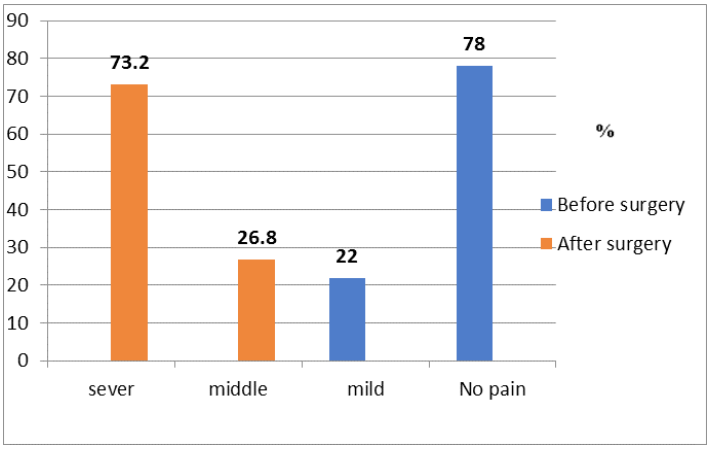

Diagram 1: Distribution of 41 patients with degenerative disease of AC joint based on severity of pain before and after treatment.

Discussion

The research showed that the pain of patients with degenerative disease of AC joint decreased after treatment. In previous studies as mentioned, studies examining the effect of this treatment method have shown that the method has been effective in reducing pain among these patients; however, its effects vary. In one study, the success rate of this method was estimated to be about 94% and another study reported this rate to be 98% [3,6]. The open method also resulted in acceptable results; even though, the morbidity of this method is greater than that of the *arthroscopy* method and return to activity requires longer time [6,16]. Symptomatic and subjective improvement was reported in a study on a group of athletes after distal clavicle removal [16]. Although 4 out of 7 patients who were unable to return to their previous level of activity complained about the power of pressing on the table, preforming this operation with arthroscopy allows us to have this operation without causing the problems of isolation and re-attachment of deltoid or trapezius muscles in distal clavicle and anterior acromion [13,15,16]. It also prevents muscle weakness after surgery and the patient is more likely to return to the previous level of its function within a shorter period (as opposed to the open method) [2]. Also, the resection of the distal part (6_13 mm) of the clavicle was not followed by complications.

The question raised here is that "why and how can this operation reduce pain?" And the answer is as follows: Because this joint has a little motion [1,6] and degenerative joint disease causes joint stiffness in this joint, the pain appears when the shoulder moves in the early stages and when it rests after acting in more difficult stages. With this procedure (Mumford), the distal clavicle is removed and the space, between the ends of the clavicle and the acromion, is then filled with fibrosis tissues and pain is lost. The conservative treatment is a temporary cure and irreversible degenerative changes in advanced stages of the disease cannot return to the first state. Obviously, disappearing pain and local tenderness on the joint is mostly due to the loss of pain caused by the degenerative disease of AC joint. These ensure that the torn rotator cuff is completely repaired. The limitation of this research is that there was no independent control group. It was not morally accepted to include such a group in this study. The strength of this study is the definitive diagnosis of patients using clinical examination, MRI, radiography and direct observation of the lesion during arthroscopy. Surgery was done by one person, and the strength, ROM, and pain were measured by a standard method. In addition, the follow up period of was not short and the sample size was not small.

Conclusion

To sum up, it seems that this surgical procedure is suitable for these patients. Given the prevalence of the disease and the rising trend of its diagnosis and with regard to the known complications of the disease, this method is recommended when treatments have failed. One of the major findings of the study was that all patients improved in terms of strength or ROM or that their health status is not deteriorated. Why can this method improve strength? To answer this question, it should be noted that a decrease in strength

and the ROM is most often caused by pain. After surgery, there is an increase in ROM and strength since pain is vanished.

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References

1. Cisneros LN, Reiriz JS (2017) Management of chronic unstable acromioclavicular joint injuries. Journal of Orthopaedics and Traumatology 18: 305-318.
2. Yoo Y-S (2015) Acromioclavicular Joint Problems in Athletes: Part I-Osteolysis of the Distal Clavicle. Sports Injuries to the Shoulder and Elbow: Springer 2015: 251-263.
3. Freedman BA, Javernick MA, O'Brien FP, Ross AE, Doukas WC (2007) Arthroscopic versus open distal clavicle excision: comparative results at six months and one year from a randomized, prospective clinical trial. Journal of shoulder and elbow surgery 16: 413-418.
4. Zhang LF, Yin B, Hou S, Han B, Huang DF (2017) Arthroscopic fixation of acute acromioclavicular joint disruption with TightRope: Outcome and complications after minimum 2 (2-5) years follow-up. Journal of orthopaedic surgery (Hong Kong) 25: 2309499016684493.
5. Boffano M, Mortera S, Wafa H, Piana R (2017) The surgical treatment of acromioclavicular joint injuries. EFORT open reviews 2: 432-437.
6. Tauber M (2016) [Diseases of the acromioclavicular joint]. Der Orthopade 45: 555-568.
7. Chaudhury S, Bavan L, Rupani N, Mouyis K, Kulkarni R, et al. (2018) Managing acromio-clavicular joint pain: a scoping review. Shoulder & elbow 10: 4-14.
8. Amirtharaj MJ, Wang D, McGraw MH, Camp CL, Degen RA, et al. (2018) Trends in the Surgical Management of Acromioclavicular Joint Arthritis Among Board-Eligible US Orthopaedic Surgeons. Arthroscopy: the journal of arthroscopic & related surgery: official publication of the Arthroscopy Association of North America and the International Arthroscopy Association 34: 1799-1805.
9. Babhulkar DA. Clinical Examination of the Shoulder.
10. Chan D, Philip D, Mahon A, Liow R (2008) THE ARTHROSCOPIC MUMFORD PROCEDURE: AN ANALYSIS OF RESULTS. Orthopaedic Proceedings; 2008: Orthopaedic Proceedings 2008.
11. Snyder SJ, Banas MP, Karzel RP (1995) The arthroscopic Mumford procedure: an analysis of results. Arthroscopy: the journal of arthroscopic & related surgery: official publication of the Arthroscopy Association of North America and the International Arthroscopy Association 11: 157-164.
12. Petchell J, Sonnabend D, Hughes J (1995) Distal clavicular excision: a detailed functional assessment. ANZ Journal of Surgery 65: 262-266.
13. Novak PJ, Bach BR, Romeo AA, Hager CA (1995) Surgical resection of the distal clavicle. Journal of shoulder and elbow surgery 4: 35-40.
14. Flatow EL, Duralde XA, Nicholson GP, Pollock RG, Bigliani LU (1995) Arthroscopic resection of the distal clavicle with a superior approach. Journal of shoulder and elbow surgery 4: 41-50.
15. Daluga DJ, Dobozi W (1989) The influence of distal clavicle resection and rotator cuff repair on the effectiveness of anterior acromioplasty. Clinical orthopaedics and related research 1989: 117-123.
16. Cook FF, Tibone JE (1988) The Mumford procedure in athletes: an objective analysis of function. The American journal of sports medicine 16: 97-100.