

# The comparison of arthroscopic acromioplasty with and without acromioclavicular coplaning

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## ABSTRACT

**BACKGROUND:** Coplaning means the removal of medial acromial spurs and inferior aspect of the distal clavicle. The aim of the study was to evaluate the outcomes of arthroscopic acromioplasty with and without coplaning in patients without acromioclavicular (AC) joint arthritis.

**METHODS:** Because of impingement syndrome, arthroscopic subacromial decompression and acromioplasty was performed in Group 1 (9 males/31 female). In addition, coplaning was performed in Group 2 (8 males/21 females) by two different surgeons. The mean age was 48 in Group 1, 46 in Group 2. The mean follow-up was 50 months and 44 months, respectively.

**RESULTS:** Constant score, cross-body adduction test and AC joint tenderness was used for follow-up. The mean preoperative Constant scores were 45 points (range: 34–76 points) in Group 1, 39 points (range: 32–69 points) in Group 2. The mean Constant scores at the latest follow-up was 78 points (range: 68–100 points) for Group 1, 84 points (range: 72–100 points) for Group 2. There was no statistically difference between two groups at the latest follow-up ( $p < 0.05$ ). In two patients in Group 2, cross-body adduction test was positive but asymptomatic.

**CONCLUSION:** Excision of the inferior side of the lateral clavicle to the level of the acromion with minimal disruption of the joint capsule does not develop AC joint symptoms in long-term follow-up.

**Keywords:** Acromioclavicular joint; acromioplasty; arthroscopy; coplaning; impingement; shoulder.

## INTRODUCTION

The subacromial impingement syndrome of the shoulder is treated with acromioplasty and subacromial decompression.<sup>[1]</sup> The frequency of this procedure has increased dramatically in the last decade.<sup>[2,3]</sup> Subacromial decompression, described by Neer, includes acromioplasty, division of the coracoacromial ligament, and excision of the inferior spurs of the distal clavicle. Outlet impingement typically begins at the anteroinferior aspect of the acromion and progress medially to involve the acromioclavicular (AC) joint.<sup>[4,5]</sup> After acromioplasty, an abrupt step-off may be formed between acromion and distal end of the clavicle, which may behave like a spur. Distal clavicle coplaning was advocated in the original descriptions of arthro-

scopic subacromial decompression.<sup>[6–9]</sup> Coplaning means the removal of the inferior side of the distal clavicle. Previous studies have reported that the disruption of the AC joint increased joint mobility, suggesting that this would lead to AC joint pain.<sup>[10,11]</sup> Spurs located at the inferior aspect of the joint were shown to be associated with rotator cuff pathologies.<sup>[12]</sup> This asymptomatic, coincidental situation is treated by most shoulder surgeons by coplaning at the end of the arthroscopic acromioplasty procedure. There is no enough data in the published literature regarding the results of coplaning procedure with minimal disruption of the joint capsule.

The aim of this study was to compare two groups of patients who were operated with an arthroscopic acromio-

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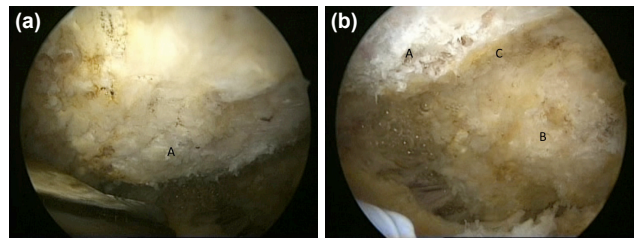


plasty with and without coplaning in patients without AC arthritis.

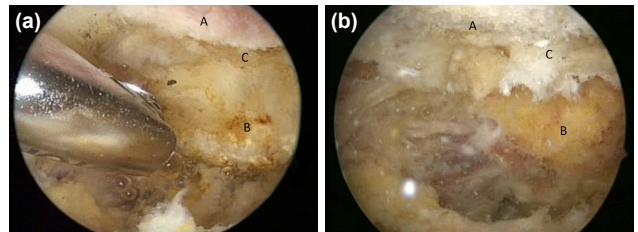
## MATERIALS AND METHODS

A retrospective review of the surgical database was performed to detect all patients operated with impingement syndrome. The surgical data was collected from the patient files. The patients who had shoulder impingement with chronic symptoms were included in the study. There were 69 patients, including 17 men and 52 women with a mean age of 48 years (range: 29–66 years). All patients underwent plain radiography and MR imaging of the shoulder. The inclusion criteria were a positive Neer's test, type-II or type-III acromion shape; pain in the shoulder which was non-responsive to immobilization, anti-inflammatory drugs, subacromial steroid injections, and physiotherapy; and symptoms persisting for >3 months. All patients had thus been treated with physical therapy at their primary hospital or at our institution. This included exercise programs, massage, heat, and transcutaneous nervous stimulation. The patients with history of glenohumeral surgery, acromioplasty with rotator cuff repairs, AC joint arthritis, labral tears, rotator cuff with fatty infiltration, intraarticular biceps tendon pathologies, and arthritis were excluded. The surgeries were performed by two surgeons. Patient groups were assigned by the surgeon. Surgeon A was routinely not performing coplaning in acromioplasty cases (Group 1). Surgeon B was performing coplaning in acromioplasty cases. The review of the surgical data resulted with the classification of the patients into two groups. Group 1 included the patients with acromioplasty alone and Group 2 included the patients with acromioplasty and coplaning.

During the surgery, surgical field was palpated and the bony structures were marked with a sterile pen. Surgery was performed under general anesthesia. All operations were performed with the patient in the beach chair position. The scope was placed through the posterior portal and a systematic evaluation of intraarticular structures was performed. The same standard portal was used to access the subacromial space. Debridement and decompression were performed through an anterolateral portal by radiofrequency probe (Starvac 90, ArthroWand, Arthrocare, Texas, USA). Acromioplasty was performed using an oval burr; the resection of the lateral acromion starting anteriorly was performed first, followed by the resection of the medial acromion extending up to the AC joint. Range of motion of the shoulder was evaluated under arthroscopic visualization to check for any local impingement. Bone resection was performed to remodel type-II or type-III acromion to a type-I acromion. In the Group 1, no coplaning was performed (Fig. 1). In the Group 2, the inferior side of the lateral clavicle was excised to the same level of the acromion with minimal disruption of the joint capsule (Fig. 2). A sling was used for a week, and mobilization was permitted with free active movements, starting with gravity-assisted rotation movements as pendulum exercises. Following this, pa-



**Figure 1.** (a) The scope is at the posterior portal: Before the acromioplasty of type-III acromion. (A) Acromion. (b) After performing acromioplasty. (A) Acromion after resection, (B) Distal end of the clavicle without coplaning, (C) Acromioclavicular joint.



**Figure 2.** (a) After performing acromioplasty. (A) Acromion after resection, (B) Distal end of the clavicle before coplaning, (C) Acromioclavicular joint. (b) After the acromioplasty and coplaning. (A) Acromion after resection, (B) Distal end of the clavicle after coplaning, (C) Acromioclavicular joint.

tients received personalized, progressive exercise programs. The patients were followed-up with Constant scores. At the final examination, AC joint tenderness and cross-body adduction test was performed to test for any AC joint issues.

The t-test was used to compare the differences between preoperative and postoperative Constant scores in both groups. All statistical analyses were performed by an independent statistician using SPSS 11.0 software (SPSS Inc.). The significance level was set at  $p=0.05$ .

Ethical clearance for this study was provided by Acibadem University Medical Research and Evaluation Board.

## RESULTS

Group 1 included of 40 patients (9 men and 31 women). The mean age was 48 years (range: 28–60 years). The mean follow-up duration was 50 months (range: 26–70 months). Group 2 had 29 patients (8 men and 21 women). The mean age was 46 years (range: 29–63 years). The mean follow-up was 44 months (range: 24–66 months).

The mean preoperative Constant scores were 45 points (range: 34–76 points) in Group 1 and 39 points (range: 32–69 points) in Group 2. The mean Constant scores at the latest follow-up was 78 points (range: 68–100 points) for Group 1 and 84 points (range: 72–100 points) for Group 2. There was no statistically significant difference in mean Constant scores between two groups at the latest follow-up ( $p>0.05$ ). No patients had AC joint symptoms in Group 1. Mild pain

was detected in cross-body adduction test in two patients in Group 2. In these two patients, there was no joint pain or tenderness around. One patient in Group 2 had fracture of the distal end of the clavicle with intra-articular extension after a fall at home. Complete removal of the AC joint was performed arthroscopically in a second operation.

## DISCUSSION

Excision of the inferior side of the distal end of the lateral clavicle to the level of the acromion with minimal disruption of the joint capsule does not result in AC joint symptoms in long-term follow-up. After the removal of the anterior acromion, a visible step between the resected area and the lateral clavicle may occur. This step may behave like a spur. Petersson et al.<sup>[12]</sup> showed that coplaning would decrease the pressure on supraspinatus tendon and muscle by this step created by the acromioplasty.

Klintberg et al.<sup>[13]</sup> have reported satisfactory results in patients treated with arthroscopic subacromial decompression in long-term follow-up. When the arthroscopic acromioplasty is performed, the AC joint could be disrupted to some extent unless the resection of the acromion stops short of the medial end of the acromion.<sup>[14]</sup> The common finding is that the coplaning may disrupt the AC joint capsule and the joint may become unstable.<sup>[6,8,15-18]</sup> Resection of a big portion of the joint capsule may likely result in increase of the movement. Destabilization of the AC joint would make it possible for future arthritis of the joint with symptoms.<sup>[5,19]</sup> Human cadavers which various arthroscopic procedures performed were evaluated.<sup>[20]</sup> It was shown that the resection of 25% of the AC joint increased joint range of motion. Elevation and rotation of the lateral clavicle were the significant movements. It is also well known that a total resection of the lateral clavicle may result in the destabilization of the whole clavicle.<sup>[19]</sup> Another study by Kim<sup>[4]</sup> showed that excision of the distal clavicle combined with rotator cuff repair for asymptomatic AC joint arthritis has lower functional scores because of temporary pain in the early postoperative period, but better functional outcomes with satisfactory pain relief and no reoperation rate were observed after 2 years.

A retrospective study on coplaning in connection with subacromial decompression did not report these issues.<sup>[21]</sup> In Weber's study, the lateral joint capsule was observed to include 25% of the medial acromial side, with some osteophytes located on the medial acromion. This means that it is not possible to perform acromioplasty, as it is commonly thought, without joint capsule damage. The review of 1259 arthroscopic acromioplasties with a follow-up was 7 years, three patients were undergone total removal of the lateral clavicle. In this study, the medial aspect of the acromion was resected. In addition, the joint capsule was damaged. Any visibly prominent inferior portion of the lateral clavicle beyond the level of the medial acromion was removed. The impor-

tant surgical point is that the articular cartilage of the AC joint was not damaged. However, in the recent study, the cartilage was disrupted. But this was not shown with an increase in AC joint pain. Weber stated that if a significant portion of the joint is not damaged, it will not result in AC joint pain.<sup>[14,19,21]</sup> The clinical evaluation of AC joint motion is a simple and trustworthy method to assess the clinical results.<sup>[22]</sup>

Our findings are similar to Weber's findings. In two patients, pain was seen in cross-body adduction test at long-term follow-up without any joint symptoms. A patient in the coplaning group had a distal clavicle fracture after a fall at home. Coplaning might have led to weakening and mechanical failure of the bone. The most common two causes for persistent pain after acromioplasty are the failure of diagnosis and surgical technique. The common surgical issue associated with arthroscopic acromioplasty is inadequate bone excision.<sup>[14,23-25]</sup> It is shown that 23% patients still have a hooked acromion after acromioplasty.<sup>[25]</sup>

The study has some limitations. The first, only Constant score, which is not specific for AC joint, was evaluated during follow-up evaluations. The second is the varying preoperative management in the patients. All patients in the study received preoperative physiotherapy in their primary hospital or in our institution. Hence, the patient group was not standardized for preoperative physical therapy. Some patients were referred to clinics to other institutions. That is why we could not manage to have them in our physical rehabilitation department to have the same postoperative rehabilitation protocol.

Overall, without enough coplaning of the distal inferior portion of the lateral clavicle and spur of the acromion, the supraspinatus tendon becomes tight; the long-term consequences of this on rotator cuff anomalies might not manifest for years.<sup>[14]</sup>

## Conclusion

Although the coplaning of AC joint might influence AC joint motion, it is unclear if these effects are clinically relevant. Excision of the inferior side of the distal end of the lateral clavicle to the level of the acromion with minimal disruption of the joint capsule does not lead to AC joint symptoms in long-term follow-up.

Conflict of interest: None declared.

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## ORIJİNAL ÇALIŞMA - ÖZET

### Akromiyoklaviküler eşplanlama yapılan ve yapılmayan artroskopik akromiyoplastilerin karşılaştırılması

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**AMAÇ:** Eşplanlama medial akromiyal spuruların ve distal klavikulanın alt kısmının çıkarılması demektir. Bu çalışmanın amacı, akromiyoklaviküler artrit olmayan hastalarda, eşplanlama uygulanan ve uygulanmayan artroskopik akromiyoplasti tedavisi yapılan hastaların değerlendirilmesidir.

**GEREÇ VE YÖNTEM:** Sıkışma sendromu nedeniyle, Grup 1'deki hastalara (9 erkek/31 kadın) artroskopik subakromiyal dekompresyon ve akromiyoplasti uygulandı. Aynı endikasyon ile Grup 2'deki hastalara (8 erkek/21 kadın) Grup 1'deki tedaviye ilave olarak eşplanlama uygulandı. Ortalama yaş, Grup 1'de 48, Grup 2'de 46 idi. Ortalama takip süresi sırasıyla 50 ay ve 44 ay idi.

**BULGULAR:** Takipte Constant skoru, çapraz addüksiyon testi ve akromiyoklaviküler hassasiyet kullanıldı. Ortalama ameliyat öncesi Constant skoru Grup 1'de 45 (aralık: 34–76), Grup 2'de 39 (aralık: 32–69) olarak bulundu. En son takipte ortalama Constant skorları Grup 1 için 78 (aralık: 68–100 puan), Grup 2 için 84 (aralık: 72–100 puan) olarak bulundu. En son takipte iki grup arasında istatistiksel olarak anlamlı fark yoktu (p<0.05). Grup 2'deki iki hastada, çapraz addüksiyon testi pozitif fakat semptomsuzdu.

**TARTIŞMA:** Klavikula lateralinin alt tarafının eklem kapsül bütünlüğünde minimal bozulma oluşturarak akromiyon ile aynı seviyeye gelecek şekilde eksizyonu uzun dönemde akromiyoklaviküler eklem semptomları oluşturmamaktadır.

**Anahtar sözcükler:** Akromiyoklaviküler eklem; akromiyoplasti; artroskopi; eşplanlama; omuz; sıkışma.

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