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# ORIGINAL ARTICLE

## A Comparative Study between the Results of Arthroscopic Rotator Cuff Repair with and Without Acromioplasty

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**Background** Cuff tears can range in severity, with tears affecting the entire tendon and partial-thickness tears affecting only a part of the tendon. The goal of this work was to compare the functional results of arthroscopic cuff repair with and without subacromial decompression.

**Patients and Methods** This prospective randomized study was conducted on 60 patients who had full-thickness supraspinatus with or without infraspinatus tear. The patients were randomized into two equal groups: group I had arthroscopic repair of the tear with acromioplasty and group II underwent arthroscopic repair of the rotator cuff tear only without acromioplasty. All patients underwent general clinical examination, shoulder examination, and imaging evaluation, including plain radiographs and MRI of the shoulder.

**Results** Group I included nine (30%) males and 21(70%) females with a mean age of 51.6 years old. The mean duration of follow-up was 27.1 months. Group II also included also nine (30%) males and 21(70%) females with an average age of 52.53 years old. The mean follow-up duration was 27.6 months. According to postoperative modified University of California-Los Angeles, group II had slightly better functional results, better active forward flexion, relatively higher results regarding postoperative muscle power, less pain, and a higher satisfaction rate, but without significant difference between both groups.

**Conclusions** Arthroscopic cuff repair with or without acromioplasty shows no statistically significant difference in clinical outcomes. This study showed that acromioplasty was not necessary to be a part of cuff repair, as it was believed before.

**Keywords** Arthroscopic, Rotator cuff repair, Subacromial decompression, Tear.
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### INTRODUCTION

The cuff muscles are the main muscle group that stabilize and support the shoulder joint. The four cuff muscles are the supraspinatus, infraspinatus, subscapularis, and teres minor [1]. The cuff tear is considered to be the most common shoulder problem. It was noted that the incidence of cuff tears varies from 25% in patients the age of 60s to over 50% in people in their 80s [2].

Rotator cuff tears can range in severity, with partial-thickness tears affecting only a part of the tendon and full-thickness tears affecting the entire tendon [3].

It appears that cuff injuries could be caused by either intrinsic or extrinsic factors. Intrinsic factors include age-related metabolic, vascular, and shear stress changes. Extrinsic causes are external impingement, instability, internal impingement, acute traumatic injury, and recurrent microtrauma [4].

The pros and cons of surgical versus nonsurgical treatment should be taken into consideration when managing rotator cuff tears. This decision should take into consideration the age of the patient, degree, and size of

the tear, as well as significant irreversible damage to the rotator cuff or glenohumeral joint [5]. Arthroscopy, as compared to open surgery, allows for a proper assessment of the internal joint structures, including the cuff tendons, labrum, and subacromial space [6].

For decades, subacromial impingement held a dominant position as the primary cause of cuff tears. This led to surgical interventions that included both repairing the torn tendons and decompressing the subacromial space. On the contrary, more recent studies have shown that acromioplasty had no impact on the outcomes of cuff repair [7].

The work aimed to compare the functional results of arthroscopic cuff repair with and without acromioplasty.

## PATIENTS AND METHODS

This prospective randomized study was conducted on 60 patients with rotator cuff tears between 2021 and 2022. The study was presented to and approved by the research Ethics Committee of our institute. Informed consent was taken from the participants before the study.

Inclusion criteria were patients 18 years of age or older having medium-sized full-thickness supraspinatus with or without infraspinatus tear diagnosed clinically and by MRI (Figure 1).

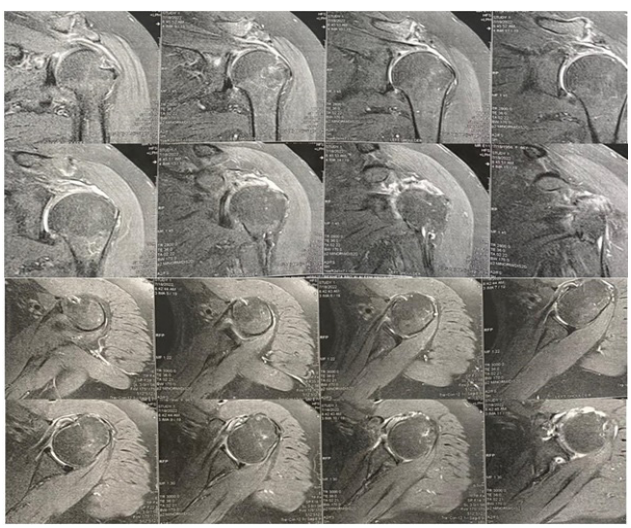

**Figure 1:** MRI of left shoulder (coronal and axial cuts) showing full-thickness tear.

Exclusion criteria were shoulder osteoarthritis, glenohumeral instability, a previous surgical procedure in the same shoulder, severe joint trauma or infection of the affected shoulder, partial-thickness rotator cuff tears, symptomatic acromioclavicular joint arthritis, subscapularis tendon tear and presence of a big acromial spur or osteophytes impinging up against the cuff.

The participants were divided into two equal groups randomly using a list of random numbers generated by the computer. Group I (30 patients) underwent arthroscopic repair of the cuff tear with subacromial decompression, and group II (30 patients) underwent arthroscopic repair of the tear without subacromial decompression.

History was taken from all patients. They underwent shoulder examination and imaging evaluation, including plain radiographs and MRI, and were assessed according to the modified University of California at Los Angeles (UCLA) score system [8].

### Methods of treatment

Both study groups underwent surgery in a beach-chair position under general anesthesia and interscalene block. An ordinary posterior portal was used to introduce the arthroscope. Then the scope is shifted upward to the subacromial space. A lateral portal was made with the help of a spinal needle. The tear was assessed and released from any adhesions. The footprint was prepared with a burr, and the tear was then repaired in a double-row technique using suture anchors (Figure 2). In case of the presence of any lesion of the biceps tendon (degeneration, fraying, or subluxation), it was treated by tenotomy or tenodesis according to the age of the patient and level of activity.

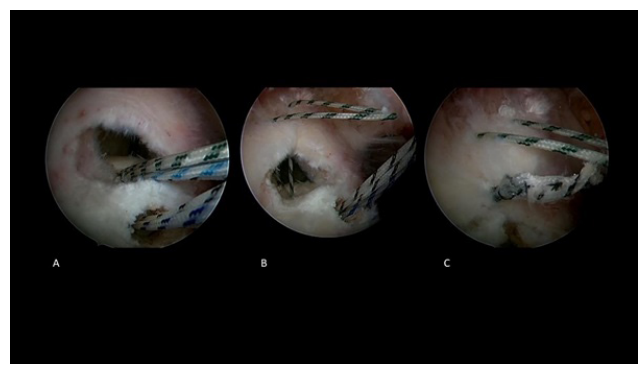


**Figure 2:** (A): Arthroscopic view from the lateral portal shows a rotator cuff tear with one anchor in the medial row and one anchor in the lateral row; (B): The sutures from the medial anchor are passed in a mattress fashion through the rotator cuff; (C): The sutures of the lateral row anchor are passed through the lateral edge of the cuff and tied.

In group I, acromioplasty was also done by removing the bursal tissue from the undersurface of the acromion to expose the bone and coracoacromial ligament with the shaver. Then, the coracoacromial ligament was released from the acromion using radiofrequency to control any associated bleeding. The burr was then introduced through the lateral portal, and the bone was removed from the undersurface of the acromion starting from the lateral and the anterolateral corner of the acromion heading medially towards the acromioclavicular joint without violating it.

The bone was removed using the cutting block technique till reaching a flat and smooth undersurface of the acromion (Figure 3).

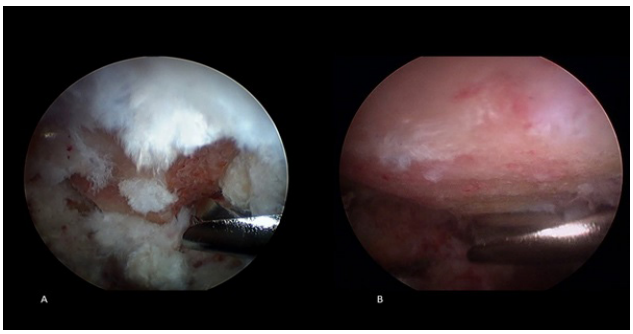

**Figure 3:** (A): The bone was removed using the cutting block technique; (B): The flat and smooth undersurface of the acromion.

**Postoperative care and follow-up**

Patients were discharged postoperatively in a broad arm sling for 6 weeks and seen at 2,6, and 12 weeks postoperatively. Passive range of motion began at 2 weeks postoperatively and progressed to active shoulder motion and strengthening exercises at 6 weeks postoperatively. All patients were followed up for at least 2 years, and at the final visit, all patients were evaluated according to the modified UCLA score system [8], the quality of life using the Disabilities of Arm, Shoulder, and Hand (DASH) score [9], and the extent of pain using the visual analog scale [10].

**Statistical analysis**

SPSS, v26 (IBM Inc., Armonk, New York, USA) was used for statistical analysis. Student's *t* test was used to compare the quantitative variables between both groups. The $\chi^2$ test or Fisher's exact test, when appropriate, was used to analyze the qualitative variables. A two-tailed *P* value less than 0.05 was considered statistically significant. Power analysis was not done to calculate the appropriate sample size.

## RESULTS

In this study, 97 patients were assessed for eligibility; 26 patients did not meet the criteria, and 11 patients refused to participate in the study. The remaining 60 patients were randomly allocated into two groups (30 patients in each). All allocated patients were followed up and analyzed statistically.

Group I included nine (30%) males and 21(70%) females, and the mean age was 51.6 years old. The mean duration of follow-up was 27.1 months. Group II also included nine (30%) males and 21(70%) females, and the average age was 52.53 years old. In this group, eight (26.7%) patients were manual workers. The mean follow-up duration was 27.6 months (Table 1).

**Table 1:** Comparison between the two studied groups regarding basic data:

| | Group I (*N*=30) | Group II (*N*=30) | Test | *P* |
|---|---|---|---|---|
| Age (years) | 51.60±9.34 | 52.53±7.67 | *t*=0.423 | 0.674 |
| Sex | | | | |
| Male | 9(30) | 9(30) | $\chi^2$=0.000 | 1.000 |
| Female | 21(70) | 21(70) | | |
| Occupation | | | | |
| Housewife | 18(60) | 19(63.3) | $\chi^2$=1.300 | 0.575 |
| Manual worker | 6(20) | 8(26.7) | $\chi^2$=1.300 | 0.575 |
| Office worker | 6(20) | 3(10) | $\chi^2$=1.300 | 0.575 |
| Clinical data | | | | |
| History of trauma | 5(16.7) | 4(13.3) | $\chi^2$=0.131 | $^{FE}P$=1.000 |
| The affected side | | | | |
| Right | 20(66.7) | 21(70.0) | $\chi^2$=0.0777 | 0.781 |
| Left | 10(33.3) | 9(30.0) | $\chi^2$=0.077 | 0.781 |
| Dominant hand | | | | |
| Right | 29(96.7) | 29(96.7) | $\chi^2$=0.0 | $^{FE}P$=1.000 |
| Left | 1(3.3) | 1(3.3) | $\chi^2$=0.0 | $^{FE}P$=1.000 |
| Duration of symptoms | 8.10±2.71 | 8.20±2.77 | U=408.0 | 0.850 |
| Duration of follow-up (months) | 27.1±2.68 | 27.6±2.44 | U=408.0 | 0.409 |

Data presented as mean±SD or frequency (%).

All patients showed significant improvement in the modified UCLA score at the final follow-up. The mean modified UCLA score in group I improved from 20.13 points preoperatively to a mean of 27.47 points postoperatively (*P*=0.001). In the other group, the mean preoperative-modified UCLA scores improved from 21.3 points to a postoperative mean of 29.40 points (*P*=0.001). Both groups showed no significant difference at the final follow-up. However, the patients in group II (without acromioplasty) had better active forward flexion, better postoperative muscle power, less pain, and a higher satisfaction rate when compared to the other group, but this was not significant (Tables 2,3).

Group I showed a bit higher overall complication rate than group II. Complications were encountered in 16.7% of group I compared to 13.3% in group II. This difference reflects no statistical significance. Stiffness was the most common complication in both groups, with 13.3% of patients in each group, and there was only one case of rotator cuff retear in group I. The stiffness was due to inadequate physiotherapy in all cases, as the patients were not compliant and they had limited range of motion. They were encouraged to comply with the physiotherapy sessions,

and they showed slight improvement at the final follow-up. They were advised to undergo arthroscopic release to regain a better range of motion, but they refused any further surgical intervention. As for the patient with rotator cuff retears, the patient was advised to do physiotherapy sessions for 6 months and was given two local steroid injections to control the pain. At the final follow-up, the patient was not satisfied with the range of motion of the shoulder, but he refused any surgical intervention to repair the tear as the pain was tolerable.

**Table 2:** Comparison between the two studied groups according to postoperative modified University of California-Los Angeles:

| | Group I (*N*=30) | Group II (*N*=30) | Test | *P* |
|---|---|---|---|---|
| Postoperative UCLA | | | | |
| Poor (0–20) | 5(16.7) | 4(13.3) | | |
| Fair (21-27) | 5(16.7) | 0 | $\chi^2$=5.853 | $^{MC}P$=0.128 |
| Good (28–33) | 17(56.7) | 22(73.3) | | |
| Excellent (34–35) | 3(10.0) | 4(13.3) | | |
| Mean±SD | 27.47±6.46 | 29.40±4.90 | *U*=375.50 | 0.267 |
| Postoperative pain | 7.13±1.63 | 7.73±1.36 | *U*=365.5 | 0.173 |
| Postoperative function | | | | |
| Normal | 10(33.3) | 12(40.0) | | |
| Daily activities | 5(16.7) | 0 | | |
| Light activities | 1(3.3) | 0 | $\chi^2$=7.023 | $^{MC}P$=0.115 |
| Most housework | 3(10.0) | 6(20.0) | | |
| Slight restriction | 11(36.7) | 12(40.0) | | |
| Mean±SD | 7.60±2.37 | 7.60±2.37 | *U*=381.0 | 0.280 |
| Postoperative active forward flexion | | | | |
| 45-90 | 2(6.7) | 1(3.3) | | |
| 90-120 | 4(13.3) | 3(10.0) | $\chi^2$=4.173 | $^{MC}P$=0.266 |
| 120-150 | 19(63.3) | 14(46.7) | | |
| More than 150 | 5(16.7) | 12(40.0) | | |
| Mean±SD | 3.90±0.76 | 4.23±0.77 | *U*=340.0 | 0.071 |
| Postoperative muscle power | 4.67±0.66 | 4.70±0.60 | *U*=438.5 | 0.822 |
| Postoperative satisfaction | | | | |
| Not satisfied | 5(16.7) | 4(13.3) | $\chi^2$=0.131 | $^{FE}P$=1.000 |
| Satisfied | 25(83.3) | 26(86.7) | | |
| Mean±SD | 4.17±1.90 | 4.33±1.73 | *U*=435.0 | 0.720 |

Data presented as mean±SD or frequency (%); UCLA: University of California-Los Angeles.

**Table 3:** Comparison between the two studied groups according to postoperative Disabilities of Arm, Shoulder, and Hand and extent of pain using the visual analog scale:

| | Group I (*N*=30) | Group II (*N*=30) | Test | *P* |
|---|---|---|---|---|
| Postoperative DASH | | | | |
| ≤30 (satisfactory) | 26(86.7) | 27(90.0) | $\chi^2$=0.162 | $^{FE}P$=1.000 |
| >30 (unsatisfactory) | 4(13.3) | 3(10.0) | | |
| Mean±SD | 16.30±10.61 | 12.10±8.07 | *U*=356.0 | 0.163 |
| Postoperative VAS | | | | |
| No pain | 2(6.7) | 1(3.3) | | |
| Mild | 21(70.0) | 25(83.3) | $\chi^2$=2.104 | $^{MC}P$=0.538 |
| Moderate | 6(20.0) | 4(13.3) | | |
| Severe | 1(3.3) | 0 | | |
| Mean±SD | 2.70±1.60 | 2.23±1.07 | *U*=380.0 | 0.283 |

Data presented as mean±SD or frequency (%); DASH: Disabilities of Arm, Shoulder, and Hand; VAS: visual analog scale.

## DISCUSSION

Cuff tears are a frequent cause of shoulder problems. Traditionally, surgical repair of the torn tendon has been combined with acromioplasty during surgery. Acromioplasty is thought to alleviate extrinsic impingement on the cuff tendons. On the contrary, recent studies have shown that acromioplasty had no significant difference as regards the outcome of cuff repair [11].

This current study showed that there was no statistically significant difference between arthroscopic repair of cuff tears with acromioplasty and without regard to the functional outcome using the modified UCLA score, the satisfaction rate using the DASH score, the extent of pain using visual analog scale and complication rate. However, the patients in group II (without acromioplasty) had better active forward flexion, better postoperative muscle power, less pain, and a higher satisfaction rate when compared to the other group, but this was not significant.

Waterman and colleagues, in their study showed that the acromioplasty group comprised 32 participants with a mean age of 56.9 years, while the nonacromioplasty group encompassed 37 participants with an average age of 59.6 years. Following a mean follow-up period of 7.5 years, the study demonstrated no statistically significant differences between the two groups. Additionally, the rates of retear and revision surgery were comparable between both groups [12].

Sayampanathan *et al*., [13] performed a meta-analysis and systemic review to compare rotator cuff repair with and without acromioplasty. The meta-analysis revealed that after a minimum 2 years follow-up, there was no significant difference in American Shoulder and Elbow Surgeons scores, UCLA scores, DASH scores, and rate of further surgery between the acromioplasty and nonacromioplasty groups.

This study demonstrated no statistically significant difference between the two groups as regards the rate of complications. In group I, shoulder stiffness was the most common complication encountered in 13.3% of cases, followed by retear of subscapularis tendon in only one patient (3.3% of cases). While in group II, shoulder stiffness was the only complication encountered in 13.3% of patients.

Baumann *et al.,* [14] performed a meta-analysis to assess the prevalence of postoperative shoulder stiffness (POSS) after arthroscopic repair of the rotator cuff. Out of all patients (9373 patients), 597 had POSS (6.4%). Two thousand four hundred twenty-four patients had a specified tear pattern (partial or full-thickness tear). Ninety-six (5.2%) out of 1862 patients with full-thickness tears and 58(10.3%) out of 562 patients with partial-thickness tears had POSS after arthroscopic rotator cuff repair. The incidence of POSS in their study, regardless of tear type, was 6.4%, which is less than the incidence of POSS in our study (13.3%). This difference could be justified, as some of the patients in the current study were not fully committed to the rehabilitation program.

Song *et al*., [15] conducted a meta-analysis involving five randomized controlled trials to investigate the potential advantages of incorporating acromioplasty during the repair of full-thickness rotator cuff tear. The study included a total of 523 patients. While one study reported a higher rate of retears in patients who did not undergo acromioplasty, the pooled analysis revealed no statistically significant difference in outcomes between the acromioplasty and nonacromioplasty groups regarding the repair of full-thickness tears [7].

Some limitations warrant consideration when interpreting our findings. First, the 24-month follow-up period may not capture the full long-term impact of acromioplasty on patient outcomes and function. Second, our study lacks evidence of cuff healing and an evaluation of bone resection. Third, the influence of acromial morphology on postoperative functional outcomes was not investigated in our present study and this represents a potential area for future research. Fourth, the size of the full-thickness tears may have played a role in the observed treatment outcomes and warrants further investigation. Finally, variations in surgical technique, operator experience, and postoperative rehabilitation protocols between the two study groups may have influenced the findings and should be considered when interpreting the results.

Therefore, further studies with bigger sample sizes and long-term follow-ups may be needed to investigate these issues.

## CONCLUSION

Arthroscopic cuff repair shows no statistically significant difference in clinical outcomes with or without acromioplasty. The findings of our study showed that the routine use of acromioplasty together with arthroscopic cuff repair is not necessary as the short-term clinical results of arthroscopic cuff repair are not improved by acromioplasty. As a result, it appears that the decision to do acromioplasty or not will likely depend on the surgeon's preference.

## CONFLICTS OF INTEREST

There are no conflicts of interest.

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