



# A comparison of full arthroscopic and arthroscopic-assisted mini-open repair methods in rotator cuff tears 1–3 cm in size<sup>☆</sup>

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## ARTICLE INFO

### Keywords:

Arthroscopic surgery  
Rotator cuff tears  
Shoulder joint

## ABSTRACT

**Introduction:** Retrospective evaluation of rotator cuff repair with arthroscopic or arthroscopic-assisted mini-open methods for a diagnosis of non-retracted rotator cuff tear.

**Materials and methods:** A total of 45 patients underwent rotator cuff repair; Group 1 (n = 24) with arthroscopic-assisted mini-open method and Group 2 (n = 21) with full arthroscopic method.

**Results:** Within both Group 1 and Group 2, a statistically significant results is p = 0.001. The patients of Group 2 were seen to return to daily life earlier than those of Group 1 (p = 0.001).

**Conclusions:** Patients where full arthroscopic repair was applied, there was evidence of an earlier return to daily life.

**Level of evidence:** IV, retrospective comparative study.

## 1. Introduction

Many studies have been made on the results of surgical treatment of rotator cuff tears using various treatment methods.<sup>1</sup> Surgical techniques have progressed from traditional open repair to arthroscopic-assisted mini-open and as an increasingly less invasive method, towards full arthroscopic repair. With the use of a smaller incision in arthroscopic rotator cuff repair, despite the advantages such as preservation of the deltoid muscle, the possibility of diagnosis and treatment of concomitant intra-articular lesions, less soft tissue damage and less postoperative pain, which method is best for the repair of full thickness rotator cuff tears is still a matter of debate. The controversy continues because bone-tendon fixation is weaker with the full arthroscopic technique.<sup>2</sup>

In the full arthroscopic method, which is in widespread current use, the postoperative complication rate is lower than that of the open method.<sup>3</sup> The arthroscopic-assisted mini-open repair method for rotator cuff was first described by Levy et al.<sup>4</sup> In this study, a comparison was made of the clinical and functional results of the full arthroscopic and arthroscopic-assisted mini-open techniques used in the repair of rotator cuff tears.

## 2. Method

Between 2009 and 2012, a total of 55 patients with a diagnosis of non-retracted rotator cuff tear, 1–3 cm in size and who had not responded to conservative treatment underwent rotator cuff repair using the arthroscopy-assisted mini-open method (Group 1) or full arthroscopy (Group 2). The surgical technique was decided by the surgeon. This study comprised 45 patients who completed final follow-up examinations and gave informed consent to participate in the study. Follow-up time of 2 year (mean 26 months; range, 16–31 months) for the mini-open group and 2 year (mean 24 months; range, 15–28 months) for the arthroscopic group.

Physical examination, magnetic resonance imaging (MRI) and direct radiography were used in the diagnosis of the patients. Evaluation was made of pre-operative physical examination, direct radiographs, MRI and shoulder Constant Murley Scores and postoperative physical examination and shoulder Constant Murley Scores. The return to daily life of the whole patient group were determined. The patients were separated into groups of arthroscopy-assisted mini-open repair (Group 1) and full arthroscopy (Group 2).

The pre and postoperative physical examination focussed on range of movement and muscle strength. Active and passive range of movement was measured with a goniometer. Abduction, flexion, extension,

<sup>☆</sup> No benefits in any form have been received or will be received from anybody or a commercial party related directly or indirectly to the subject of this article.

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internal and external rotation were examined.

The dimensions and features of the tear were evaluated intra-operatively. Patients with a non-retracted rotator cuff tear, 1–3 cm in size, were included in the study. The time to return to daily life was determined, with the key question being a record of improvement in night-time sleep. None of the patients participated in sports either at a professional or amateur level. The postoperative rehabilitation protocol was similar to that of previously reported studies and included a period of immobilization for 3–6 weeks postoperatively, followed by an active range-of-motion program at 3–6 weeks and strengthening at 6–12 weeks.<sup>3</sup>

Patients were excluded if there were signs of glenohumeral instability or restricted glenohumeral movement as a result of adhesive capsulitis, glenohumeral arthritis, or rheumatoid arthritis, any involvement of the subscapularis tendon, a SLAP lesion, any history of shoulder surgery, diabetes or where there was a high risk of non-compliance, such as patients without a permanent home or with ongoing substance abuse.

### 2.1. Surgical approach

The patients were operated on under general anaesthesia and in the beach-chair position. Arthroscopy portals were made as posterior, lateral and anterior portals. First, the acromion, clavicular distal tip, acromioclavicular joint, coracoid and portal locations were marked with a surgical pen. The posterior portal was opened approximately 2 cm medial and 2 cm inferior to the posterolateral corner of the acromion. The anterior portal was made approximately 2–3 cm anterior to the anterolateral corner of the acromion and the lateral portal approximately 2–4 cm lateral to the posterior of the acromioclavicular joint. The anterior portal was opened 1 cm lateral and 1 cm superior to the coracoid notch.

By first entering from the posterior portal, arthroscopic examination was made of the glenohumeral joint, then it was transferred to the subacromial space. In all patients, a clear angle and image was obtained with radiofrequency, then with the assistance of a shaver, the rotator cuff was cleaned and with full visualisation of the rotator cuff tear, the dimensions were recorded. In addition, acromioplasty was applied with a burr to create a wider space during the rotator cuff repair. Following arthroscopic debridement and arthroscopic acromioplasty in patients with the mini-open method, the deltoid muscle fibres were reached by widening the portal opened from the lateral towards the acromion anterolateral. By stripping the deltoid muscle fibres from the acromion attachment point with cautery, the rotator cuff was reached. Repair of the rotator cuff was made using knotted suture anchors in all the patients of Group 1 and Group 2. A shoulder-arm sling with abduction support was applied to all patients postoperatively.

### 2.2. Statistical analysis

Statistical analysis was performed using NCSS (Number Cruncher Statistical System) 2007&PASS (Power Analysis and Sample Size) 2008 Statistical Software (Utah, USA). In the evaluation of the study data, descriptive statistical methods (mean, standard deviation, frequency, ratio, minimum, maximum) were used and in the comparison of quantitative data, Student's t-test was used in the comparison of parameters of 2 groups with normal distribution and the paired Samples t-test was used in the comparisons within the groups. Values of  $p < 0.01$  and  $p < 0.05$  were accepted as statistically significant.

### 3. Results

The study was completed with a total of 45 patients. The patients were 29 females and 16 males with a mean age of  $48.78 \pm 11.19$  years (range, 32–69 years). The operated side was the right side in 25 (55.6%) cases and the left side in 20 (44.4%) cases. The operated side

**Table 1**  
Distribution of descriptive characteristics of the patients.

(n = 45)		Min – Max	Mean $\pm$ SD
Age (years)		32–69	48.78 $\pm$ 11.19
Return to Daily Life (weeks)		8–15	10.91 $\pm$ 1.92
		n	%
Gender	Female	29	64.4
	Male	16	33.6
Side	Right	25	55.6
	Left	20	44.4
Dominant side	Yes	26	57.8
	No	19	42.2
Operation	Group 1	24	53.3
	Group 2	21	46.7

was the dominant side in 26 (57.8%) cases. The cases were evaluated in 2 groups as Group 1 (n = 24, 53.3%) where the arthroscopic-assisted mini-open technique was applied and Group 2 (n = 21, 46.7%) where a full arthroscopic operation was performed. The return to daily life of the whole patient group was determined as  $10.91 \pm 1.92$  weeks (range, 8–15 weeks) (Table 1).

In the examination of the pre-operative and postoperative physical examination findings, a statistically significant increase was determined in the Group 1 and Group 2 patients in the postoperative range of movement values compared to the pre-operative values ( $p = 0.001$ ,  $p = 0.001$ ). In the paired comparison between the Group 1 and Group 2 patients, no statistically significant difference was determined in any of the physical examination values (Table 2).

No statistically significant difference was determined in the comparison between the groups of the preoperative Constant scores ( $p = 0.869$ ,  $p > 0.05$ ). Similarly, no statistically significant difference was determined between the groups in the postoperative Constant scores ( $p = 0.874$ ,  $p > 0.05$ ). In the postoperative Constant scores a mean increase of  $14.35 \pm 5.68$  was seen in Group 1 patients ( $p = 0.001$ ) compared to the pre-operative values and in Group 2 this increase was  $13.80 \pm 5.94$  ( $p = 0.001$ ) and this was statistically highly significant ( $p < 0.01$ ). No significant difference was determined between the two groups in respect of the increase in the postoperative Constant score ( $p = 0.790$ ) (Table 3, Fig. 1).

The time of return to daily life was  $12.00 \pm 1.54$  weeks in Group 1 and  $9.67 \pm 1.54$  weeks in Group 2. A statistically highly significant

**Table 2**  
The pre and postoperative range of joint movement (External Rotation, Internal Rotation, Abduction and Flexion measurements).

(n = 45)	(Group 1) Mean $\pm$ SD	(Group 2) <sup>b</sup> Mean $\pm$ SD	<sup>a</sup> p
External Rotation preop postop	40.12 $\pm$ 11.20	41.09 $\pm$ 12.30	0.864
	74.16 $\pm$ 12.80	75.25 $\pm$ 13.79	0.723
Internal Rotation preop postop	44.11 $\pm$ 10.22	45.29 $\pm$ 11.90	0.876
	75.23 $\pm$ 12.97	76.11 $\pm$ 10.90	0.853
Abduction preop postop	69.12 $\pm$ 11.27	70.15 $\pm$ 12.30	0.972
	140.72 $\pm$ 27.78	138.72 $\pm$ 27.78	0.768
Flexion preop postop	75.22 $\pm$ 13.11	73.80 $\pm$ 13.69	0.756
	163.26 $\pm$ 23.50	165.38 $\pm$ 24.80	0.790

<sup>a</sup> $p = 0.001$  <sup>a</sup> $p = 0.001$ .

<sup>a</sup>Student t-Test.

<sup>b</sup>Paired Samples Test.

\*statistically highly significant for all increases between the pre-operative and postoperative range of joint movement measurements (external rotation, internal rotation, abduction, flexion).

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