

Comparative Study between the Results of All Arthroscopic and Arthroscopic Assisted Mini Open Repair of Rotator Cuff Tears

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Abstract

Among the elderly and athletic, rotator cuff tears are a frequent injury. This randomized study was carried out to assess the functional and clinical results of arthroscopic assisted mini-open and arthroscopic rotator cuff repair in a comparative case series of patients followed for at least 6 months. At the time of surgical intervention, a total of 40 patients with large sized full thickness rotator cuff tears were randomized to either arthroscopic assisted mini-open [Group I] or arthroscopic [Group II] rotator cuff surgery. The clinical outcomes were assessed using the UCLA score from the University of California, Los Angeles. All patients completed at least 6 months of follow up. Patients with Mini-open operation had a mean age of 56.05 ± 8.22 years old and 49.05 ± 6.61 years old for all arthroscopic operation. There was no discernible difference between the two groups, however the UCLA score had improved significantly in both studied groups postoperatively.

Keywords: Rotator cuff tear ; Arthroscopy and Open surgery.

1. Introduction

A rotator cuff tear, one of the most common shoulder injuries, can cause persistent discomfort, disability, and a loss of strength and range of motion. Surgical candidates are those who do not respond to nonsurgical therapy for shoulder discomfort and function impairment. There is evidence that open, mini-open, and arthroscopic rotator cuff restoration methods [3-5] produce good to outstanding pain management, functional results, and patient satisfaction in the majority of patients.[4]

Traditional open rotator cuff repairs are a successful therapy for rotator cuff problems. However, this technique has been linked to morbidities such as arthrofibrosis, deltoid separation and/or degeneration, as well as significant early postoperative pain. [6]

Mini-open repairs were established also with goal of lowering deltoid morbidity, and they've shown results that are equivalent to those of open repairs. [7]

For rotator cuff repair surgery, the all-arthroscopic approach has replaced the mini-open technique during the last two decades. This development is a consequence of growing reports of excellent and satisfactory outcomes from all arthroscopic treatments for rotator cuff injuries.[8]

There have been several clinical trials examining the effects of arthroscopic and mini-open rotator cuff restoration.[9]

This study assessed the early clinical results of arthroscopic rotator cuff surgery versus mini-open rotator cuff repair. Moreover, the functional outcomes of patients with large

full-thickness injuries were compared between the two restoration techniques.

2. Materials and methods

This study included 40 patients from March 2020 to March 2022. Inclusion criteria were full thickness tear Type III [3-5 cm] or IV [Massive tears] Based on Snyder classification [10].

Exclusion criteria were Patient received prior surgical intervention for any shoulder pathology.

Patients were randomized into two equal groups: Group I: mini-open repair group and Group II: arthroscopic repair group.

Surgical techniques

All patients were operated on while seated in a beach chair under general anesthesia. The shoulder was prepared and wrapped sterilely, as is customary.

Diagnostic arthroscopy is done for both groups using three portals:

- Posterior scope portal.
- Anterior working portal.
- Lateral working portal.

Arthroscopic evaluation of the glenohumeral joint, biceps tendon subscapularis tendon is performed, biceps tenotomy is done if needed.

Arthroscopic evaluation of the subacromial space then performed, acromioplasty done if needed.

Mini-open repair technique

Beginning at the anterolateral acromion tip and continuing approximately 5 cm distally, a limited anterolateral deltoid splitting incision is made.

This tendon is divided longitudinally along its fibers for 3 to 4 cm distal to the acromion between anterior and posterior raphe.

The footprint was prepped for the tendon's reinsertion. Applying 1-3 suture anchors and two pairs of non-absorbable No. 2 sutures, the supraspinatus was repaired in a double row pattern.

Arthroscopic repair

After shifting the arthroscope to the posterolateral portal, the footprint was prepared using an acromionizer and a the tear was fixed using 1-3 suture anchors with two pairs on non-absorbable No.2 sutures in a double row configuration.

Postoperative rehabilitation

Postoperative rehabilitation encouraged immediately postoperative in the form of three phases. [The same program for both groups]

- Phase 1: passive range of motion [PROM] [0-4 weeks postoperative].
- Phase 2: active range of motion [AROM] [4-8 weeks postoperative].
- Phase 3: strengthening exercise [8-12 weeks postoperative].

Patient evaluation

Patients were evaluated and followed up for 6 months using modified UCLA [11] score [University of California in Los Anglos].

Statistical analysis

Using SPSS version 25 software for tabulation and analysis, the gathered data were reviewed, coded, and analyzed. The Kolmogorov-Smirnov test was utilized to confirm the distribution's normality. The significance of the acquired results was evaluated at a level of 5%. The presented graphs were created using Microsoft Excel.

3. Results

Each study group included 20 patients, 55% [11] male, 45% [9] females.

The mean age of participants with Mini-open group were 56.05 ± 8.22 years old and 49.05 ± 6.61 years old for all arthroscopic group.

About 95% of patients with mini open operations and 60% of patients with all arthroscopic operation had isolated SST [Supraspinatus tendon] tear, Most patients were smoker, 75% of patients who had Mini open operation and 70% of patients with all arthroscopic operation.

The mean tear size of patients who had Mini open operation was 3.9 ± 0.78 and 4.29 ± 0.72 of patients with all arthroscopic operation Table (1).

Table (1): Demographic data symptoms and diagnosis according to their operation type of the studied patients.

Demographic data	Operation Type				Test of sig.	
	Mini-open		All arthroscopic		Test of sig.	p
	No.	%	No.	%		
Gender						
Male	11	[55%]	11	[55%]		
Female	9	[45%]	9	[45%]		
Age [years]					t-test	
Mean [SD]	56.05	[±8.22]	49.05	[±6.61]		
Median	56		48		2.99	0.005*
Min.-Max	40-70		40-62			
Dominated Hand					χ^2	
Right	16	[80%]	17	[85%]		
Left	4	[20%]	3	[15%]	0.173	0.5
Diagnosis					χ^2	
SST	19	[95%]	12	[60%]		
SST+IST	1	[5%]	1	[5%]	8.58	0.008*
Massive RC tear	0	[0%]	7	[35%]		
Affected side						
Right	12	[60%]	13	[65%]	0.107	0.74
Left	8	[40%]	7	[35%]		
Occupation					χ^2	
Employee	7	[35%]	6	[30%]		
Engineer	2	[10%]	1	[5%]	7.08	0.51

Table (1): Continue

Housewife	8 [40%]	4 [20%]		
Security	2 [10%]	2 [10%]		
Retired	1 [5%]	2 [10%]		
Accountant	0 [0%]	1 [5%]		
Housekeeper	0 [0%]	3 [5%]		
Manual worker	0 [0%]	1 [5%]		
Smoking Status				
Smoker	15 [75%]	14 [70%]	0.125	0.723
Nonsmoker	5 [25%]	6 [30%]		
Comorbidities				χ^2
None	9 [45%]	9 [45%]		
Hypertension	5 [25%]	6 [30%]		
Diabetes Mellites	3 [15%]	0 [0%]	5.38	0.257
Hypertension and Diabetes mellites	2 [10%]	5 [25%]		
HT+ DM+ Cardiac	1 [5%]	0 [0%]		
Tear size				U
Mean [SD]	3.9[±0.78]	4.29[±0.72]		
Median	4	4	241.00	0.158
Min.-Max	3.5-5.5	3.5-5.5		

Table (2): shows the pre and postoperative distribution of UCLA score in the mini-open group. There was a significant difference between mean UCLA total score between preoperative [10.8±2.98] and postoperative [24.6±4.8][z=3.92, p=0.00].

UCLA		Mini-open	All arthroscopic	U	P-value
		Mean [SD]	Mean [SD]		
Total UCLA score	pre	10.8[2.98]	10[2.66]	204.5	0.904
	post	24.6[4.8]	24.8[4.25]		
Z[p]		3.92[0.00] **	3.94[0.00] **		
Pain score	pre	2.1[0.91]	2.15[0.88]	258.5	0.114
	post	5.9[0.77]	6.8[1.51]		
Z[p]		3.95[0.00] **	3.98[0.00] **		
Active forward flexion score	pre	2.05[0.61]	1.65[0.49]	222.5	0.547
	post	2.75[0.44]	2.9[0.64]		
Z[p]		3.74[0.00] **	4.06[0.00] **		
Function score	pre	3.7[1.87]	3.6[1.54]	182.0	0.64
	post	6.8[1.51]	6.6[1.47]		
Z[p]		3.72[0.00] **	3.95[0.00] **		
Muscle power score	pre	2.95[0.61]	2.6[0.5]	124.5	0.04*
	post	3.95[0.73]	4.1[0.224]		
Z[p]		3.61[0.00] **	4.07[0.00] **		
Satisfaction score	pre	0.00	0.0	190.0	0.79
	post	4.75[1.12]	4.5[1.54]		
Z[p]		4.36[0.00] **	4.24[0.00] **		

Table (2): Distribution of the patients' demographic data symptoms and diagnosis according to their operation type:

There was a significant difference between mean UCLA total score between preoperative [10.8±2.98] and postoperative [24.6±4.8]. [z=3.92, p=0.00] in the Mini-open group.

There was a significant difference between mean UCLA total score between preoperative [10±2.66] and postoperative [24.8±4.25]. [z=3.94, p=0.00] in the All-Arthroscopic group.

The difference in the mean of UCLA total score between Mini-open and All-Arthroscopic operations was statistically insignificant [U = 204.5, p = 0.904].

Table (3) Comparison between total UCLA score in both groups pre, and post-operative.

UCLA		Mini-open	All arthroscopic	U	P-value
		Mean [SD]	Mean [SD]		
Total UCLA score	pre	10.8[2.98]	10[2.66]	204.5	0.904
	post	24.6[4.8]	24.8[4.25]		
Z[p]		3.92[0.00]**	3.94[0.00]**		

5. Complications

Two cases suffered failure of the tendon repair in all arthroscopic group, treated with physiotherapy sessions and pain management.

In the mini-open group two cases of hematoma with delayed wound healing, a case of seep infection, a case of post operative stiffness, and a case of repair failure were encountered.

6. Discussion

A very popular method of treating a supraspinatus tear is with arthroscopic supraspinatus repair. Small incision and better tear visualization are the two main advantages of an arthroscopic repair. For supraspinatus repair, it has become a very popular method, and surgeons' training and experience are still growing. Additionally, generates less discomfort, which makes rehabilitation much more agreeable. [12, 13]

On the other hand, mini open repair provides the advantages of open repair without significantly harming the deltoid. In recent years, mini-open repairs have become more common. The main advantage of this method is that early active mobilization can be initiated owing to the superior strength of repair. A recommended third option between open and all arthroscopic rotator cuff repair procedures is the mini-open technique. [14,15]

The results of the UCLA shoulder score, which covers pain, function, active forward flexion range, strength, and patient satisfaction, formed the basis for the current investigation. For the research. The assessments and comparisons of these criteria by both research groups are undertaken.

The results of the UCLA shoulder score, which includes factors as pain, active forward flexion range, function, strength, and patient satisfaction, were the basis for the current study. For the study, no additional factors are considered. Both study groups' evaluations and comparisons of these criteria are conducted.

Liu et al showed that the [all arthroscopic] group had a higher score on the first postoperative day and 1 month afterwards, as well as a lower range of forward flexion after 2 weeks. [16]

Eid et al revealed that the mean value of the total UCLAS score, function score, pain

score, strength of active flexion score, and active forward flexion score all improved significantly after surgery. [17]

Verma et al. followed up on 38 patients who had received all-arthroscopic surgery and 33 patients who had undergone mini-open repair for at least two years. Regarding the range of motion data, scoring scale values, VAS data, and patient satisfaction data. At the final follow-up, there was no significant difference in all score scales and range of motion values between the arthroscopic and mini-open groups. [18]

Kasten et al. conducted randomized research with 34 participants in 2011 [211]. The pain levels of 17 patients who received arthroscopic repair and 17 patients who underwent mini-open repair were similar for the first three weeks postoperatively, but the mini-open repair group had reduced pain from weeks four through eight. The arthroscopic repair group used less analgesics during the first postoperative week, indicating less pain, although pain levels were greater in weeks 4 through 8 compared to the mini-open repair group.[19]

Zhang et al found no statistically significant difference between the MO and the arthroscopic groups. They also be noted that the arthroscopic group had a greater retearing rate than the mini-open group. At 24-month follow-up.[20]

7. Conclusions

Short-term data indicate that, with the exception of a higher risk of retears in the arthroscopic repair group, both mini-open and arthroscopic rotator cuff surgeries produce good subjective outcomes and objective stability. When the research was limited to patients with full-thickness, major rotator cuff injuries, arthroscopic rotator cuff repair demonstrated significantly higher repair failure rates and stronger shoulder strength than mini-open rotator cuff surgery.

Superficial, deep infection, stiffness and wound complications were higher in the mini-open group.

8. Limitations

There are limitations to the present investigation. First, the sample size was rather

small, hence the results may not be comparable to studies with higher sample sizes. Second, the validity of the UCLA score in assessing functional outcome has been called into doubt. Although the UCLA score was validated in 2013, it may be prudent to propose alternate outcome measures. Nonetheless, when we began collecting data, UCLA evaluations were the norm, allowing us to compare preoperative and postoperative results. In conclusion, there was no lengthy period of follow-up. As a result, the researcher cannot forecast whether long-term results would differ between the two groups. Future study should examine the clinical results of the two groups over an extended period of time.

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