

Open Supraspinatus Tear Repair versus Arthroscopic Reconstruction

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Abstract

Background: Rotator cuff tears are observed to be the common amongst the elderly and athletes. There are many techniques for repairing the rotator cuff tears such as open supraspinatus tear repair, mini-open tear repair, arthroscopic, etc. Although, previous studies have shown that both techniques are associated with good clinical outcomes, the most effective method of repair is yet to be determined. **Aim:** The aim of the present study was to evaluate the early and late clinical outcomes of arthroscopic technique versus open repair technique in patients with full-thickness rotator cuff tears. **Method:** It was a randomized clinical trial performed on 100 patients undergoing rotator cuff repair using arthroscopic technique or open repair technique. All the patients with shoulder pain, visiting OPD between July 2019 and June 2020, were evaluated for the presence of a full thickness rotator cuff tear. Patients were evaluated using the simplified version of the Disabilities of the Arm, Shoulder and Hand (DASH) Score and Constant Murley Score (CMS). Pain was rated using a self-rated visual analog scale (VAS). **Results:** Forward Flexion and External Rotation, of the shoulder joint in both groups was improved postoperatively and there was no statistically significant difference between the groups at any point of time. The VAS was significantly higher at Post-operative Day 1 and Month 1 for open repair technique as compared to arthroscopic technique. The DASH score was significantly higher at Post-operative Month 3 and Month 6 for open repair technique as compared to arthroscopic technique. The CMS was significantly higher at Post-operative Month 1 for arthroscopic technique as compared to open repair technique. **Conclusion:** Both the techniques deliver similar results in long-term outcome, but arthroscopy technique delivers better recovery at short-term follow-ups.

Keywords: Rotator Cuff Repair, Arthroscopic, Open Tear Repair, Shoulder.

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Introduction

In the today's fast paced life, injuries have become part of every individual's life. Among all such injuries, Rotator cuff tears are observed to be the common amongst the elderly and athletes[1]. In such cases, the best option is to undergo surgery to regain the muscle strength, function and flexibility of the shoulder, and to relieve the pain. There are many techniques for repairing the rotator cuff tears such as

open supraspinatus tear repair, mini-open tear repair, etc. In fact, for decades, mini-open repair has been regarded as the gold standard for rotator cuff tear repair[1]. Results show that mini-open repair shows excellent outcomes in 90 per cent of the patients[1]. Moreover, majority of the surgeons preferred this technique over others due to its stronger suture fixation and shorter learning curve[1].

However, with the passage of time and advancement in the operative technique and surgical instrument, nowadays more and more surgeons are shifting towards arthroscopic technique in rotator cuff repair surgery from open repair technique[1]. The main reason behind this is faster recovery and better cosmetic results[1]. Although, previous studies have shown that both techniques are associated with good clinical outcomes, the most effective method of repair is yet to be determined[1]. As per previous studies, arthroscopic is associated with shorter hospital stay, low deltoid morbidity, decreased postoperative pain, and faster

rehabilitation[1,2]. On the other hand, open repair is associate with less soft tissue dissection, smaller skin incisions, and decreased chance of deltoid muscle detachment[1,2,3]. Till date, many studies have been performed on comparing open repair and arthroscopic for tear repair. However, majority of those studies were of low quality due to retrospective follow-up and non-randomized sampling. Thus, the significance of this study was to evaluate the short and long-term outcomes of both approaches.

Aim

The aim of the present study was to evaluate the early and late clinical outcomes of arthroscopic technique versus open repair technique in patients with full-thickness rotator cuff tears.

Methods

It was a randomized clinical trial performed on the patients undergoing rotator cuff repair using arthroscopic technique or open repair technique. All the patients with shoulder pain, visiting OPD, were evaluated for the presence of a full thickness rotator cuff tear on the basis of history, clinical examination, standard anteroposterior and scapular Y-view radiographs of the shoulder, and magnetic resonance arthrography in a 1.5-T scanner. A total of 100 patients, visiting the OPD between July 2019 and June 2020, fulfilling the inclusion criteria were included in the study. Out of 100 patients, 50 patients undergone arthroscopic technique for tear repair and remaining 50 patients undergone open repair technique.

Inclusion Criteria

- Patients age between 30 and 70
- Patients with supraspinatus and/or infraspinatus tendon tear with stage <3 fatty muscle infiltration based on magnetic resonance imaging findings

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- Patients with medical or life insurance coverage for at least 3 years were included for better follow-up compliance

Exclusion Criteria

- Patients with glenohumeral instability or restricted glenohumeral movement
 - Patients with a history of shoulder surgery
 - Patients with severe metabolic co-morbidities
 - Patients with high risk on non-compliance
- Patients were evaluated using the simplified version of the Disabilities of the Arm, Shoulder and Hand (DASH)[1] Score and Constant Murley Score (CMS)[1] after their admission, as well as

1, 3, 6, and 12 months postoperatively. Pain was rated using a self-rated visual analog scale (VAS) ranging from 0 (no pain) to 10 (unbearable pain) preoperatively; postoperative days 1, 3 and 7; and at 1, 3, 6, and 12 months postoperatively. Range of shoulder motion was checked preoperatively and postoperatively at time points same as those in VAS score, using a continuous passive motion machine. Categorical data was analysed using chi-square test and continuous data was analysed using t-testing through SPSS-27. Statistical significance was set at a P value <0.05.

Results

Table 1: Demographic Parameters

Parameters	Arthroscopic Technique	Open Repair Technique
Mean Age (Years)	49.6±6.8	51.4±5.7
Mean BMI	21.6±1.3	21.3±1.6
Mean Weight (kgs)	58.6±8.5	61.5±5.3
Mean Height (cms)	165.9±5.5	166.1±5.1

As per table 1, Patient characteristics were comparable between the 2 groups

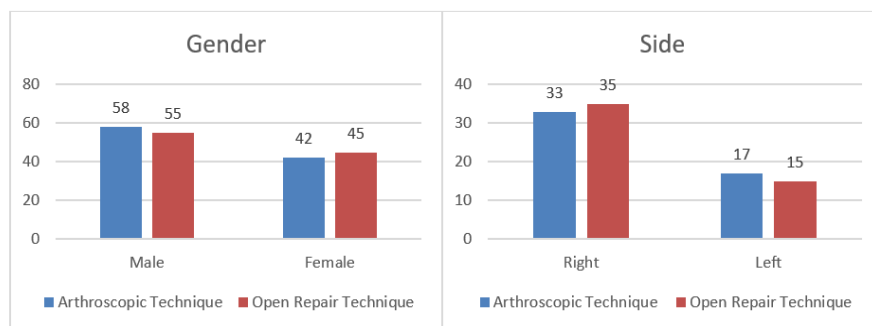


Figure 1: Distribution Based on Gender and Side

Table 2: Comparing Forward Flexion and External Rotation between the Groups

Forward Flexion	Arthroscopic Technique	Open Repair Technique	P-Value
Pre-operative	124.2±8.3	125.3±7.9	>0.05
Post-operative Day 3	142.9±4.2	142.6±4.1	>0.05
Day 7	144.6±2.6	145.3±2.1	>0.05
1 Month	135.9±9.9	135.7±9.4	>0.05
3 Month	139.9±5.7	142.4±5.9	>0.05
6 Month	161.3±5.9	160.1±4.9	>0.05
12 Month	160.5±5.5	159.7±4.3	>0.05
External Rotation			
Pre-operative	38.6±6.6	38.4±6.4	>0.05
Post-operative Day 3	50.4±3.2	51.8±2.6	>0.05
Day 7	50.1±5.5	50.2±5.4	>0.05
1 Month	47.9±2.1	47.8±2.3	>0.05
3 Month	60.3±5.1	59.9±3.9	>0.05
6 Month	66.8±5.4	54.7±3.3	>0.05
12 Month	68.1±5.1	69.1±5.5	>0.05

The range of motion, that is, Forward Flexion and External Rotation, of the shoulder joint in both groups was improved postoperatively and there was no statistically significant difference between the groups at any point of time.

Table 3: Comparing VAS between the Groups

VAS	Arthroscopic Technique	Open Repair Technique	P-Value
Pre-operative	6.5±0.3	6.3±0.9	>0.05
Post-operative Day 1	6.3±0.4	6.6±0.7	<0.05
Day 3	5.4±0.2	52.6±0.1	>0.05
Day 7	3.6±0.6	4.3±0.1	>0.05
1 Month	2.9±0.9	3.7±0.4	<0.05
3 Month	2.6±0.7	2.4±0.9	>0.05
6 Month	1.3±0.9	1.1±0.9	>0.05
12 Month	0.5±0.5	0.7±0.3	>0.05

The VAS was significantly higher at Post-operative Day 1 and Month 1 for open repair technique as compared to arthroscopic technique. No difference in the score was found at other time points.

Table 4: Comparing DASH Score between the Groups

DASH Score	Arthroscopic Technique	Open Repair Technique	P-Value
Pre-operative	49.5±8.3	52.3±5.9	>0.05
Post-operative 1 Month	49.3±4.4	48.6±5.7	>0.05
3 Month	45.4±8.2	47.6±5.1	<0.05
6 Month	38.6±4.6	42.3±9.1	<0.05
12 Month	32.9±4.9	30.7±7.4	>0.05

The DASH score was significantly higher at Post-operative Month 3 and Month 6 for open repair technique as compared to arthroscopic technique. No difference in the score was found at other time points.

Table 5: Comparing CMS between the Groups

CMS	Arthroscopic Technique	Open Repair Technique	P-Value
Pre-operative	35.5±2.3	34.9±4.9	>0.05
Post-operative 1 Month	52.3±3.4	50.6±4.7	<0.05
3 Month	57.4±6.2	56.6±5.2	>0.05
6 Month	68.6±6.6	69.3±8.1	>0.05
12 Month	72.5±8.9	72.9±6.4	>0.05

The CMS was significantly higher at Post-operative Month 1 for arthroscopic technique as compared to open repair technique. No difference in the score was found at other time points.

CMS	Arthroscopic Technique	Open Repair Technique	P-Value
Inpatient Days	5.5±2.3	4.9±4.9	>0.05
Surgery Time (mins)	72.3±3.4	55.6±4.7	<0.05
Hospital Cost (INR)	1,75,000	1,60,000	>0.05
Training Time/Week	4.6±1.6	39.3±1.1	>0.05

Mean operative time was longer in the Arthroscopic group compared with that in the open group ($p < 0.05$). No significant difference between the 2 groups was found in other secondary outcome measures such as length of hospitalization, hospital cost, and training time per week.

Discussion

It was a randomized clinical trial performed on 100 patients undergoing rotator cuff repair using arthroscopic technique or open repair technique. Patients were evaluated using the simplified version of the Disabilities of the Arm, Shoulder and Hand (DASH) Score and Constant Murley Score (CMS). Pain was rated using a self-rated visual analog scale (VAS) and range of shoulder motion was checked preoperatively and postoperatively. The study found that patients in open repair group had higher post-operative VAS and lower DASH and CMS after the short time rehabilitation as compared to arthroscopic technique. As per the study performed by van der Zwaal et al. (2013)[1] and Cho et al. (2012)[1], patients who opted for the arthroscopic procedure obtained faster rehabilitation in terms of function score, VAS pain, and range of motion compared with patients in the open repair group. Similar results are obtained in the present study. The present work also found that arthroscopic group had better VAS score on the first postoperative day and 1 month later, as well as range of FF after 2 weeks postoperatively. On the other hand, Sauerbrey et al. (2005)[1] and Verma et al. (2006)[1] found contradicting results as their work did not identify significant difference on rehabilitation or pain between the 2 groups.

The present study found that at months 3 and 6, the DASH of patients in the arthroscopic group was higher than that in the open repair group, and at 1 month, the CMS of patients in the arthroscopic group was higher than that in the open repair group. The results of the present study were in-line with that of Codman et al. (2011)[1], Verma et al. (2006)[18], Youm (2005)[11] and Buess et al. (2005)[8] who also found that DASH, CMS, or other scales evaluating shoulder function showed higher scores in the arthroscopy group than those in the open repair group in short and long terms. The main reasons for this were higher frequency of rehabilitation training, less pain and better range of motion. Thus, it can be said that better functional recovery can be achieved in patients with more frequent shoulder exercises. According to Wright (2010)[1], the early rehabilitation of patients who had arthroscopy may result from less deltoid muscle tissue injury and less detachment of muscle fiber from the acromion.

However, study of van der Zwaal et al. (2013)[15] and Ji et al. (2015)[1] found no statistically significant differences in postoperative functional or VAS pain between groups. This is contradicting to the present study, as the present research found the statistical differences only on postoperative day 1 and 1 month after surgery.

Limitations of the Study

- Limited sample size
- It was not double-blinded study
- No standardized rehabilitation program was used for all patients

Scope for Future Research

Further research with a larger number of patients, standard rehabilitation procedure and recording more confounding factors such as single-row or double-row repair techniques, acromioplasty, type of rehabilitation training, and characteristics of patients is still necessary.

Conclusion

Overall, the study concluded that arthroscopy technique is associated with less pain, lower DASH score, and higher CMS in the early recovery period. However, no significant difference was found between the two techniques for any of the primary or secondary outcome. Finally, it can be said that although both the techniques deliver similar results in long-term outcome, arthroscopy technique delivers better recovery at short-term follow-ups.

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