Original Research Article

# A Longitudinal Study to Compare the Clinical Outcome Between Mini-Open and Arthroscopic Rotator Cuff Repair in Tertiary Care Center

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## Abstract

**Background:** With the advancement of a variety of armamentarium and techniques, whole of the concept of arthroscopic rotator cuff repairs had turn into a practically permissible technique. Mini-open repair signified a try to merge the foremost qualities of arthroscopic and open repair. Hence; under the light of above mentioned data, the present study was undertaken for comparing the clinical outcome between mini-open and arthroscopic rotator cuff repair.**Materials & Methods:**A total of forty subjects were enrolled in the current research and were broadly divided into two study groups with twenty subjects in each group as follows: Group A: Subjects treated with arthroscopic repair procedure, and Group B: Subjects treated with mini-open repair procedure. Mean forward flexion, external rotation and VAS were recorded at different time intervals. Patients were assessed by Disabilities of the Arm, Shoulder and Hand (DASH). All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software. **Results:** Mean age among subjects of group A and group B was reported to be 58.4 years and 56.1 years. Non-significant results were obtained while comparing the mean forward flexion and external rotation in between both the study groups at different time intervals. Mean VAS at postoperative 15$^{th}$ day was significantly higher among patients of group B in comparison to group A. Significant results were obtained while comparing the DASH score among both the study groups at postoperative 15$^{th}$ day and postoperative 6 months. Mean operative time among patients of group B was significantly lower (65.1 minutes) in comparison to patients of group A (72.6 minutes). **Conclusion:** Under the light of above obtained data, the authors conclude arthroscopic technique is slightly better in comparison to mini-open technique.

**Keywords:** Mini-open repair, Arthroscopic.



## Introduction

With the advancement of a variety of armamentarium and techniques,whole of the concept of arthroscopic rotator cuff repairs had turn into a practically permissible technique. The potential to assess, organize, formulate, and secure the torn tendons with arthroscopic surgery had resulted in disquiets in relation to eminence of arthroscopic repair and subject's conclusive result. Even in presence of clinical problems associated with technicality with this particular technique, the acute consequences of arthroscopic rotator cuff repair had been encouraging and comparatively satisfactorily in comparison to the data obtained with the open and mini-open technique[1-3].Mini-open repair signified a try to merge the foremost qualities of arthroscopic and open repair. The potential to address intra-articular pathology and still repair the tendon with bone tunnels without taking down the deltoid origin has made miniopen repair a popular technique. Short-term results of mini-open repair have been encouraging[4-6]. Hence; under the light of above-mentioned data, the present study was undertaken for comparing the clinical outcome between mini-open and arthroscopic rotator cuff repair.

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**Materials & Methods**

The present study was undertaken for comparing the clinical outcome between mini-open and arthroscopic rotator cuff repair. A total of forty subjects were enrolled in the current research and were broadly divided into two study groups with twenty subjects in each group as follows:

Group A: Subjects treated with arthroscopic repair procedure, and
Group B: Subjects treated with mini-open repair procedure.

Complete demographic and clinical details of all the subjects were obtained. Subjects with presence of any co-morbid condition or on steroidal therapy were excluded from the present study. All the subjects were treated according to their respective study groups. Mean forward flexion, external rotation and VAS were recorded at different time intervals. Patients were assessed by Disabilities of the Arm, Shoulder and Hand (DASH). All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software. Mann-Whitney U test was employed for evaluation of level of significance.

**Results**

Mean age among subjects of group A and group B was reported to be 58.4 years and 56.1 years. Sixty percent of the subjects of group A and fifty five percent of the subjects of group B were males while the remaining were females. Right side involvement occurred in seventy percent of the subjects of group A and seventy five percent of the subjects of group B. Among the group A, mean forward flexion at preoperative, postoperative 3$^{rd}$ day, postoperative 15$^{th}$ day, postoperative 6 months and postoperative 1 year was 125.4°, 145.7°, 139.5°, 158.4° and 161.7° respectively. Among the group B, mean

forward flexion at preoperative, postoperative 3rd day, postoperative 15th day, postoperative 6 months and postoperative 1 year was 124.1°,148.5°,140.2°, 155.4° and 159.3° respectively. Among the group A, mean external rotation at preoperative, postoperative 3rd day, postoperative 15th day, postoperative 6 months and postoperative 1 year was 39.4°,48.6°,53.1°,65.9° and 70.5° respectively. Among the group B, mean external rotation at preoperative,postoperative 3rd day, postoperative 15th day, postoperative 6 months and postoperative 1 year was 40.1°, 46.2°, 50.7°, 66.9° and 69.4° respectively. Non-significant results were obtained while comparing the mean forward flexion and external rotation in between both the study groups at different time intervals. Among the group A, mean VAS at preoperative, postoperative 3rd day, postoperative 15th day, postoperative 6 months and postoperative 1 year was 6.8, 6.2, 4.8, 1.4 and 0.4 respectively. Among the group B, mean VAS at preoperative, postoperative 3rd day, postoperative 15th day, postoperative 6 months and postoperative 1 year was 6.9, 6.6, 5.6, 1.9 and 0.6 respectively. Mean VAS at postoperative 15th day was significantly higher among patients of group B in comparison to group A. Among the group A, mean DASH Score at preoperative, postoperative 3rd day, postoperative 15th day, postoperative 6 months and postoperative 1 year was 51.6, 48.2, 38.3, 35.6 and 31.9 respectively. Among the group B, mean DASH Score at preoperative, postoperative 3rd day, postoperative 15th day, postoperative 6 months and postoperative 1 year was 52.1, 45.1, 44.8, 41.6 and 32.6 respectively. Significant results were obtained while comparing the DASH score among both the study groups at postoperative 15th day and postoperative 6 months. Mean operative time among patients of group B was significantly lower (65.1 minutes) in comparison to patients of group A (72.6 minutes).

**Table 1: Demographic variable**

| Variable | | Group A: n (%) | Group B: n (%) |
|---|---|---|---|
| **Mean age (years)** | | 58.4 | 56.1 |
| Gender | Males | 12 (60%) | 11 (55%) |
| | Females | 8 (40%) | 9 (45%) |
| Side involved | Left | 14 (70%) | 15 (75%) |
| | Right | 6 (30%) | 5 (25%) |
| Mean BMI (Kg/m$^2$) | | 23.1 | 22.7 |

**Table 2: Comparison of clinical outcome**

| Variable | | Group A | Group B | p- value |
|---|---|---|---|---|
| Forward flexion (°) | Pre-operative | 125.4 | 124.1 | 0.21 |
| | Postoperative 3rd day | 145.7 | 148.5 | 0.42 |
| | Postoperative 15th day | 139.5 | 140.2 | 0.28 |
| | Postoperative 6 months | 158.4 | 155.4 | 0.46 |
| | Postoperative 1 year | 161.7 | 159.3 | 0.37 |
| External rotation (°) | Pre-operative | 39.4 | 40.1 | 0.46 |
| | Postoperative 3rd day | 48.6 | 46.2 | 0.83 |
| | Postoperative 15th day | 53.1 | 50.7 | 0.59 |
| | Postoperative 6 months | 65.9 | 66.9 | 0.76 |
| | Postoperative 1 year | 70.5 | 69.4 | 0.44 |

**Table 3: Comparison of VAS and DASH score at different time intervals**

| Variable | | Group A | Group B | p- value |
|---|---|---|---|---|
| VAS | Pre-operative | 6.8 | 6.9 | 0.11 |
| | Postoperative 3rd day | 6.2 | 6.6 | 0.49 |
| | Postoperative 15th day | 4.8 | 5.6 | 0.00* |
| | Postoperative 6 months | 1.4 | 1.9 | 0.34 |
| | Postoperative 1 year | 0.4 | 0.6 | 0.68 |
| DASH | Pre-operative | 51.6 | 52.1 | 0.37 |
| | Postoperative 3rd day | 48.2 | 45.1 | 0.78 |
| | Postoperative 15th day | 38.3 | 44.8 | 0.00* |
| | Postoperative 6 months | 35.6 | 41.6 | 0.01* |
| | Postoperative 1 year | 31.9 | 32.6 | 0.42 |

*: Significant

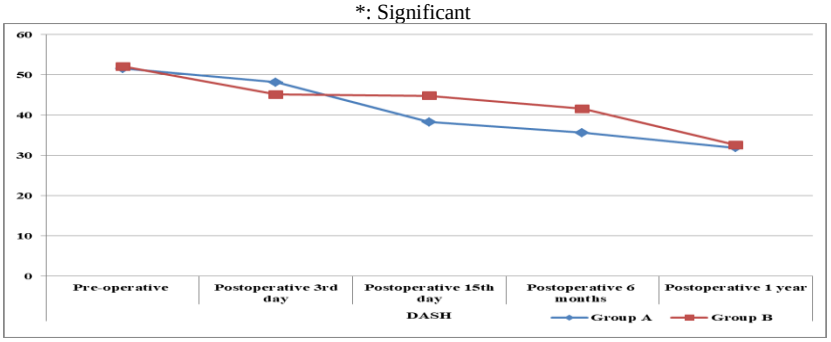


**Fig 1: Comparison of DASH Score at different time intervals**

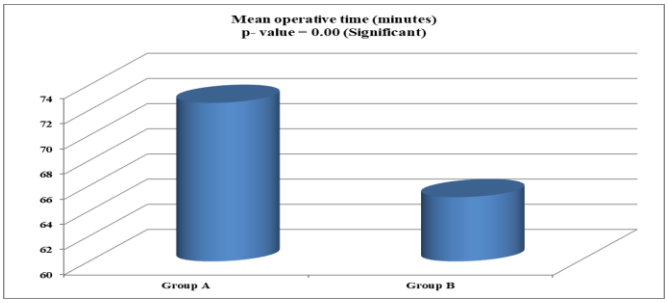


**Fig 2: Comparison of operative time**

**Discussion**

Oldest description of Repair of the rotator cuff goes back to previous century where Codman first described it. From past couple of decades, for managing patients with rotator cuff tear, mini-open repair has been considered as the gold standard procedure. Because of its firm suture fixation results along with lesser learning curve, it has been the treatment of choice for majority of surgeons in the past. However; in the past decade, surgical and orthopaedic specialities have seen broad advancements- both in terms of instrumentation procedures and techniques. This has led to shifting of treatment cascade from mini-open repair to all-arthroscopic (AA) technique[6-9].Hence; under the light of above-mentioned data, the present study was undertaken for comparing the clinical outcome between mini-open and arthroscopic rotator cuff repair.In the present study, mean age among subjects of group A and group B was reported to be 58.4 years and 56.1 years. Non-significant results were obtained while comparing the mean forward flexion and external rotation in between both the study groups at different time intervals. Gartsman et al, in their series of around seventy-three patients who were subjected to arthroscopic rotator cuff repair procedure, observed improvement in patient's ASES scores from approximately thirty to approximately in 2 years. On the basis of evaluation through Constant and Murley scores, more than eighty percent of the subjects showed presence of good to excellent results[4].In the present study, among the group A, mean VAS at preoperative, postoperative 3rd day, postoperative 15th day, postoperative 6 months and postoperative 1 year was 6.8, 6.2, 4.8, 1.4 and 0.4 respectively. Among the group B, mean VAS at preoperative, postoperative 3rd day, postoperative 15th day, postoperative 6 months and postoperative 1 year was 6.9, 6.6, 5.6, 1.9 and 0.6 respectively. Mean VAS at postoperative 15th day was significantly higher among patients of group B in comparison to group A. Our results were in concordance with the results obtained by previous authors who also observed similar findings in their respective researches. Liu J et al, in a previous study, compared the outcome of all-arthroscopic (AA) patients and mini-open (MO) rotator cuff repair patients. They concluded that AA method was accompanied with lower pain and lower DASH score[10].Hui et al. 2017 study of 226 patients compared the immediate costs associated in patients who received mini-open and arthroscopic rotator cuff repairs and indicated that immediate costs incurred by mini-open rotator cuff technique were significantly less than those of arthroscopic technique. However, it is important to note that this was a retrospective study, and outcomes were only analysed only at 1 year follow up[11].In the present study, among the group A, mean DASH Score at preoperative, postoperative 3rd day, postoperative 15th day, postoperative 6 months and postoperative 1 year was 51.6, 48.2, 38.3, 35.6 and 31.9 respectively. Among the group B, mean DASH Score at preoperative, postoperative 3rd day, postoperative 15th day, postoperative 6 months and postoperative 1 year was 52.1, 45.1, 44.8, 41.6 and 32.6 respectively. Significant results were obtained while comparing the DASH score among both the study groups at postoperative 15th day and postoperative 6 months. Mean operative time among patients of group B was significantly lower (65.1 minutes) in comparison to patients of group A (72.6 minutes). Servud and his colleagues compared 35 patients who had undergone mini-open repair with 29 patients with arthroscopic repair. At final follow-up, which averaged 44.6 months, there was no significant difference in function or range of motion. However, they reported that 4 of the 29 patients developed stiffness. Final outcome were similar[2].In a research of one hundred twelve patients managed with open RCT repair, Gumina et al observed that eight percent of subjects had a deltoid muscle detachment 3 months postoperatively [12].

**Conclusion**

Under the light of above obtained data, the authors conclude arthroscopic technique is slightly better in comparison to mini-open technique. However; further studies with larger study group are recommended.

**References**

1. Hoffman F, Schiller M, Reif. G. Arthroscopic rotator cuff reconstruction. Orthopade. 2000;29:888-894.
2. Severud EL, Ruotolo C,Nottage WM. Allarthroscopic versus mini-open rotator cuff repair:A longterm retrospective outcome comparison. Arthroscopy. 2003; 19:234-238.
3. Tauro JC. Arthroscopic rotator cuff repair: Analysis of technique and results at 2- and 3-year follow-up. Arthroscopy. 1998;14:45-51.
4. Gartsman GM, Khan M, Hammerman SM. Arthroscopic repair of full-thickness tears of the rotator cuff. J Bone Joint Surg Am. 1998;80:832-840.
5. Hata Y, Saito S, Murakami N, Seki H, Nakatsuchi Y, Takaoka K. A less invasive surgery for rotator cuff tear: Mini-open repair. J Shoulder Elbow Surg. 2001;10:11-16.
6. Hersch JC, Sgaglione NA. Arthroscopically assisted miniopen rotator cuff repairs. Functional outcome at 2- to 7-year follow-up. Am J Sports Med. 2000;28:301-311.
7. Codman EA. Complete rupture of the supraspinatus tendon. Operative treatment with report of two successful cases. 1911. J Shoulder Elbow Surg. 2011;20:347–9.
8. Baker CL, Liu SH. Comparison of open and arthroscopically assisted rotator cuff repairs. Am J Sports Med. 1995;23:99–104.
9. Paulos LE, Kody MH. Arthroscopically enhanced "miniapproach" to rotator cuff repair. Am J Sports Med. 1994; 22:19-25
10. Liu J, Fan L, Zhu Y, Yu H, Xu T, Li G. Comparison of clinical outcomes in all-arthroscopic versus mini-open repair of rotator cuff tears: A randomized clinical trial. Medicine (Baltimore). 2017;96 (11):e6322.
11. Hui YJ,Teo AQA, Sharma S, Tan BHM,Prem Kumar V. Immediate costs of mini-open versus arthroscopic rotator cuff repair in an Asian population. Journal of Orthopaedic Surgery. 2017; 25(1):1-6.
12. Gumina S, Di Giorgio G, Perugia D, Postacchini F. Deltoid detachment consequent to open surgical repair of massive rotator cuff tears. Int Orthop. 2008; 32:81-84.

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