

EVALUATION OF FUNCTIONAL OUTCOME OF ROTATOR CUFF REPAIR - A SIX MONTHS PROSPECTIVE STUDY

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ABSTRACT

Background. Rotator cuff injuries are a prevalent issue affecting millions worldwide. This study aims to evaluate the efficacy of arthroscopic rotator cuff repair in patients with tears. **Methods:** In this prospective study, 30 patients of both sexes were recruited from the Orthopedic Department of our Tertiary Care Hospital between January 2020 and June 2020. A thorough assessment was conducted, including a detailed medical history, clinical examination, and radiological evaluation. The UCLA, ASES, and range of motion were assessed preoperatively and during postoperative follow-ups. **Results:** Most cases (61.2%) involved partial-thickness tears, while 38.8% were full-thickness tears. A substantial improvement was observed in the range of motion, with flexion increasing from $125.27 \pm 7.83^\circ$ preoperatively to $146.88 \pm 10.68^\circ$ at six months. Abduction improved from $126.42 \pm 11.22^\circ$ to $145.18 \pm 11.11^\circ$, external rotation from $52.24 \pm 5.47^\circ$ to $72.44 \pm 7.58^\circ$, and internal rotation from $42.21 \pm 4.65^\circ$ to $67.65 \pm 4.02^\circ$. There were no significant differences in both objective and subjective outcomes between the full anterior repair technique (ART) and the mini-open technique (MO). **Conclusions:** The results of ART were highly satisfactory, resulting in fewer complications, reduced postoperative pain, shorter hospital stays, and no visible scarring.

Keywords: Rotator Cuff Repair, Arthroscopic Repair, Mini-Open Rotator Cuff Repair.

INTRODUCTION

The rotator cuff is an intricate assembly formed by the junction of muscles and tendons, operating in unison with four muscles of the scapula and humerus to facilitate shoulder joint movement. Rotator cuff injuries encompass a wide array of conditions, from tendon inflammation to severe rotator cuff joint damage. These injuries can range from mild shoulder discomfort to severe movement restrictions and weakness. Among the shoulder's muscular and tendinous structures, the supraspinatus muscle and its tendon are particularly susceptible, as they are the most frequently injured components of the rotator cuff. (1) Rotator cuff injuries are a common ailment, affecting millions globally. The prevalence of rotator cuff conditions is widespread, with an incidence ranging from 6.8% to 22.4% among individuals over 40 years old. Approximately 22.25% of the

population have at least one full-thickness tear, and 4.5% experience bilateral tears, with the risk increasing with age. (2)

The shoulder joint, due to its anatomical configuration and the interplay of its bones, boasts a wide range of motion but is also more prone to dislocation and instability. Contributing factors include previous injuries, preferential use of one arm, existing shoulder tears on the opposite side, smoking, elevated cholesterol levels, poor posture, and certain occupational activities. Degenerative changes can lead to partial tears and, eventually, complete ruptures. (3)

Repairing the rotator cuff is among the most prevalent shoulder surgeries. When conservative measures such as physical therapy fail, surgical

intervention becomes necessary for addressing persistent rotator cuff injuries. Techniques for repairing the rotator cuff have evolved from traditional open repair to the less invasive approaches of arthroscopic-assisted mini-open rotator cuff repair (MRCR) and complete arthroscopic rotator cuff repair (ARCR). Although mini-open repair remains a commonly employed method in many settings, arthroscopic rotator cuff repair has become the preferred option for managing rotator cuff tears. (4) Arthroscopic techniques are now capable of addressing large and retracted tears. These methods are as effective as open and mini-open repairs and allow for a more thorough examination of the joint, enhancing the diagnostic value of the procedure. Arthroscopy presents a minimally invasive option that could benefit recovery and overall outcomes.(5) Thus, the aim of the present prospective study was to assess the effectiveness of arthroscopic rotator cuff repair in patients with rotator cuff tears.

MATERIALS & METHODS

This prospective study recruited 30 cases of rotator cuff tears in patients of both sexes from the Orthopaedic Department of our Tertiary Care Hospital between January 2020 and June 2020. Patients ranged in age from 18 to 70 years, had MRI-confirmed rotator cuff tears, underwent arthroscopic rotator cuff repair, and provided informed consent to participate in the study. Exclusion criteria included the presence of associated shoulder lesions, previous revision rotator cuff repairs, irreparable tears, acromioclavicular joint arthritis, and rotator cuff tear arthropathy.

Patients underwent a comprehensive assessment, including a detailed medical history, clinical examination, and radiological evaluation. The clinical examination involved assessing the range of motion and performing various tests, including the empty can test, belly press test, external rotation stress test, Neer's impingement test, Hawkins test, speed test, and Yergason's test. Following informed consent, a preoperative anesthetic evaluation was performed. Arthroscopic rotator cuff repair was conducted using either a single-row or double-row technique with suture anchors by a single experienced surgeon. Postoperative rehabilitation was carried out according to standard protocols, with evaluations scheduled at three and six months post-surgery. Range of motion, UCLA, and ASES scores were assessed during preoperative and postoperative follow-ups.

Surgical Technique

The patients were positioned in a beach chair posture under general anesthesia. Three standard portals were utilized during the arthroscopic rotator cuff repair (anterior, lateral subacromial, and posterior). After conducting an arthroscopic inspection and addressing any issues within the glenohumeral joint, the arthroscope was introduced into the subacromial space via the posterior portal, and a lateral subacromial portal was created. An anterior portal was also established for inflow and as a working portal. Prior to evaluating and classifying the rotator cuff tear, all bursal and fibrofatty tissue was meticulously debrided from the margins of the rotator cuff. The size and pattern of the tear were assessed, and the mobility and reparability of the torn cuff were determined. An inverted mattress suture was placed through the tendon using fibretape suture. Both ends of the fibretape suture are inserted into the eyelet of the suture anchor utilizing the provided threader loop. The driver handle is lightly tapped to form a bone socket, and the Swivelock SP suture anchor is positioned until the anchor body makes contact with the bone. It is then rotated in a clockwise direction until the anchor body is level with the bone surface. The retention suture is unwrapped and removed. The fibretape tails are trimmed using an open-ended fibretape suture cutter. In cases of larger tears, additional anchors are employed in a similar fashion. Partial thickness tears are typically addressed in a single row after being converted to full thickness tears.

Postoperative Management

A uniform postoperative rehabilitation protocol is implemented for all patients. The affected extremities are secured in a sling for six weeks. During this initial period, only pendulum exercises are permitted, followed by gentle active exercises after six weeks, and deltoid and biceps strengthening exercises after eight weeks. Scapular stabilization exercises are introduced after twelve weeks. Patients are expected to resume normal activities and work within four to six months.

Statistical Analysis

The data obtained from the study underwent statistical analysis using SPSS software (Indian version). Continuous variables were evaluated through the calculation of the arithmetic mean and standard deviation. A paired t-test was employed to compare the preoperative and postoperative UCLA scores, ASES scores, and range of motion.

RESULTS

This prospective study recruited 30 patients to examine the effectiveness of arthroscopic rotator cuff repair procedures. The average age of the participants was 54.6 years, with the majority falling between 40 to 60 years. Out of 30 participants, 17 were males and 13 were females. The majority of cases (61.2%) involved partial thickness tears, while the remaining 38.8% were full thickness tears. A substantial improvement was observed in the range of motion, with flexion increasing from $125.27 \pm 7.83^\circ$ preoperatively to $146.88 \pm 10.68^\circ$ at six

months. Abduction improved from $126.42 \pm 11.22^\circ$ to $145.18 \pm 11.11^\circ$, external rotation from $52.24 \pm 5.47^\circ$ to $72.44 \pm 7.89^\circ$, and internal rotation from $42.21 \pm 4.65^\circ$ to $67.65 \pm 4.02^\circ$. Based on the UCLA Score, 5 patients had a poor outcome, 9 had an average outcome, 10 had a good outcome, and 6 had an excellent outcome. The UCLA Score also showed an increase from 9.25 preoperatively to 28.48 at six months, and the ASES Score improved from 23.84 to 85.66 at six months.

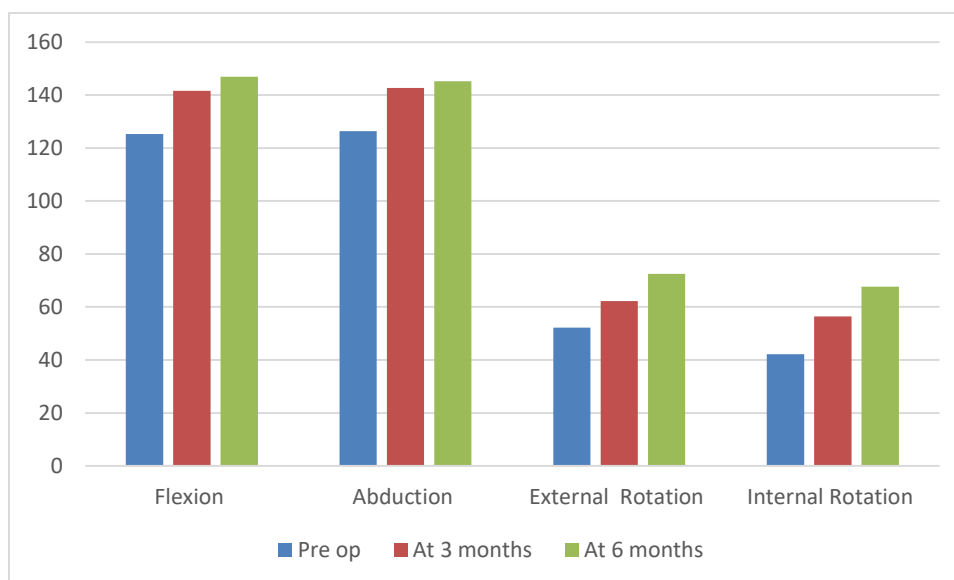
Table No. 1. Comparison of different movements between the preoperative and postoperative periods

Range of movements	Pre op	At 3 months	At 6 months	P value
Flexion	$125.27^0 \pm 7.83^0$	$141.54^0 \pm 12.35^0$	$146.88^0 \pm 10.68^0$	<0.001**
Abduction	$126.42^0 \pm 11.22^0$	$142.67^0 \pm 14.66^0$	$145.18^0 \pm 11.11^0$	<0.001**
External Rotation	$52.24^0 \pm 5.47^0$	$62.27^0 \pm 5.28^0$	72.44 ± 7.89^0	<0.001**
Internal Rotation	$42.21^0 \pm 4.65^0$	$56.43^0 \pm 5.89^0$	$67.65^0 \pm 4.02^0$	<0.001**

Table 2 Functional outcome following arthroscopic rotator cuff repair (UCLA score)

Total Score	No. of patients	%
0-20 (poor)	5	16.66
21-27 (average)	9	30
28-31 (good)	10	33.33
32-35 (excellent)	6	20

Graph 1 Shows the Range of movements



DISCUSSION

Contemporary research indicates that the outcomes of total arthroscopic repair are on par with, and occasionally superior to, open repair, showcasing benefits such as minimized tissue trauma, preservation of the deltoid muscle, shorter hospital stays, and expedited recovery periods. Furthermore, arthroscopic procedures permit a thorough evaluation of the joint, facilitating the identification and management of concurrent conditions. Arthroscopic repair of rotator cuff tears has been linked to a decrease in postoperative stiffness, resulting in improved functionality, enhanced employability, and increased patient satisfaction.(6)

In the present study, participants ranged in age from 40 to 60 years, with an average age of 54.6 years. The data revealed a higher prevalence towards males with a dominant right shoulder for rotator cuff tears. Research by Vamsinath P et al in 2018 (7), Sugaya et al in 2005(8), and Park et al in 2004 have all reported similar findings.(9)

In the present study, age did not significantly impact the clinical results of rotator cuff repairs since the average age was less than 60 years. Similar conclusions were drawn by Bennet WF et al (10), Stollsteimer and Savoie et al (11). Patients in this age group tend to have positive outcomes following cuff repair. The outcomes may be less favourable or affected by age if the patient was over 70 years. Age has been identified as a key determinant of clinical and radiological outcomes following rotator cuff repair, as it is linked to tissue viability and likely predicts the success of the repair. Millar et al (12) reported that patients who underwent arthroscopic repair had better average ASES scores and greater range of motion compared to those who had open repair.

In a retrospective analysis, it has been determined that mini open and arthroscopic rotator cuff repair procedures are both efficacious and feasible alternatives for surgeons in addressing rotator cuff tears. There were no discernible differences in both objective and subjective outcomes between the full anterior repair technique (ART) and the mini open technique (MO) for rotator cuff tears. Consequently, surgeons are advised to select the technique with which they possess greater familiarity.(13)

In the present study, majority of the cases 61.2% were partial thickness tears, while the remaining 38.8% were full thickness tears. No significant change in final outcome was observed between

partial or full thickness tear. In a study by Karin S Peters which assessed the patients by ASES shoulder scoring system pre operatively and at 6 months found no statistical significance difference between partial thickness tear having higher incidence of retears and shoulder stiffness as compared to full thickness tears.(14) Park et al (9) and Deutsch et al(15) reported significant increase in shoulder scores in arthroscopic repair.

In the present study, there was a notable enhancement in range of motion. with flexion increasing from 125.270 ± 7.830 before surgery to 146.880 ± 10.680 at 6 months, abduction moving from 126.420 ± 11.220 to 145.180 ± 11.110 , external rotation increasing from 52.240 ± 5.470 to 72.44 ± 7.890 , and internal rotation moving from 42.210 ± 4.650 to 67.650 ± 4.020 . According to studies, Vamsinath et al (8), and Cole et al (16), Vamsinath et al 2018 observed patients with degenerative tears have less improvement in range of motion compared to traumatic tears. Adequate postoperative rehabilitation programs are determinant to obtain good recovery in terms of range of motion, muscle strength, and function. Initiation of passive range of motion from postoperative day one in the patients could achieved better range of motion. (8)

In the present study, based on the UCLA Score, 5 patients had a poor outcome, 9 had an average outcome, 10 had a good outcome, and 6 had an excellent outcome. In Vamsinath et al 2018, out of 22 patients, 3 patients had poor outcome, 7 patients had average outcome, 8 patients had good outcome and 4 had excellent outcome.8 Similarly, Vikram et al study, 30 patient's (75%) shows good results, 5 patient (12.5%) shows fair, 3 patient's (7.5%) shows excellent and 2 patient's (5%) shows poor results.(7)

In one other study conducted by Christopher K Jones and Felix H. Savoie (17), retrospective study was conducted on patients who were operated for massive and large tears by arthroscopy and assessed by UCLA shoulder scoring system. The study observed that 88% of patients had good to excellent results with 6 patients having failed.

Pain, function and range of motion have shown significantly good improvement in the present study which led to significant patient satisfaction. No infections and neurovascular injuries reported.

CONCLUSIONS

The results of this prospective study suggest that arthroscopic rotator cuff repair is an effective

treatment for patients with rotator cuff tears. The procedure led to significant improvements in the range of motion, pain, and functional outcomes, as measured by the UCLA and ASES scores. The use of arthroscopic techniques allows for a more thorough examination of the joint, enabling the surgeon to address any concomitant pathologies. Additionally, the minimally invasive nature of arthroscopy results in fewer complications, reduced postoperative pain, and a shorter hospital stay compared to open or mini-open techniques. Further studies with larger sample sizes and longer follow-up periods are needed to confirm these findings.

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