

## A study of functional outcome of arthroscopic rotator cuff repair in rotator cuff tear patients

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### Abstract

**Introduction:** Even though mini-open rotator cuff repair is still commonly performed, and results are comparable to arthroscopic repair, all-arthroscopic repair of rotator cuff tear is now fast becoming a standard care for rotator cuff repair. The purpose of the study was to evaluate the functional outcome of arthroscopic rotator cuff repair in rotator cuff tear patients.

**Materials and Methods:** This prospective study included 22 cases of rotator cuff tear patients of either sex fitting the inclusion criteria at the orthopedic department of Sanjay Gandhi Institute of Trauma and Orthopedics, Bangalore from September 2016 to December 2017. Patients included were between 18 to 70yrs of age with MRI proven rotator cuff tear who underwent all arthroscopic rotator cuff repair and willing to participate in study. Exclusion criteria included associated shoulder lesions, revision rotator cuff repair, irreparable tears, acj arthritis and rotator cuff tear arthropathy. Patients admitted with MRI proven Rotator cuff tear after meeting the inclusion and exclusion criteria are selected for the study. They will undergo detailed history, clinical and radiological evaluation. Arthroscopic rotator cuff repair by single row or double row technique using suture anchors by a single trained surgeon. Postoperative rehabilitation as per standard protocol. Postoperative evaluation done at, 3rd month, 6th month and 1 year. Range of motion, UCLA and ASES scoring done at preoperative and postoperative follow-ups.

**Results:** A Prospective study with 22 patients is undertaken to study the functional outcome of Arthroscopic rotator cuff repair. The mean age in our study is 53.5 years majority are in the age group 40 to 60yrs. Out of 22 patients, 13 were male, 9 were female. Major part of our study contained partial thickness tears (59.1%) rather than full thickness tears (40.9%). 81.8 % (18) patients in our study had traumatic tears and 18.2%(4) patients had degenerative tears. There is significant improvement of flexion from 126.8° preoperatively to 147.0° postoperatively at 1year, abduction from 125.3° to 149.5°, external rotation from 51.1° to 80.2°, internal rotation from 40.45° to 67.5°. In our study according to UCLA score, out of 22 patients, 3 patients had poor outcome, 7 patients had average outcome, 8 patients had good outcome and 4 patients had excellent outcome. Mean UCLA score increased from 9.09 preoperatively to 28.50 postoperatively at the end of 1st year.

**Conclusion:** Arthroscopic rotator cuff repair is as good as mini open repair in outcome. Advantages of arthroscopic rotator cuff repair include, less postoperative pain, small scar and ability to diagnose other shoulder pathologies. Patients need preoperative physiotherapy to achieve good range of motion before surgery for better final outcome.

**Keywords:** Rotator cuff, Functional outcome, Arthroscopic.

### Introduction

Rotator cuff tears are common cause in patients complaining shoulder pain. The rotator cuff undergoes progressive degenerative changes with increasing age and may lead to partial tear of cuff and finally to complete rupture of the rotator cuff. The spectrum of these disorder ranges from inflammation to massive tearing of the rotator cuff musculotendinous unit. Rotator cuff repair is the one of the most frequent procedures performed in the shoulder joint. Surgical treatment of chronic rotator cuff tears is indicated when non operative treatment fails. The techniques of rotator cuff repair have evolved from traditional open repair, to arthroscopically assisted mini-open rotator cuff repair (MRCR), to complete arthroscopic rotator cuff repair (ARCR). Though mini open rotator cuff is commonly performed in many centres, arthroscopic rotator cuff repair is now becoming standard surgery for rotator cuff tear.<sup>1</sup> arthroscopic techniques are now used to repair even large tears and also to mobilize retracted tears. Arthroscopic repair match open and mini open repair in results and also helps in thorough evaluation of joint thereby increasing diagnostic value of procedure.

Arthroscopic technique is a less invasive approach which may have advantageous for postoperative rehabilitation and outcome. The study is meant to evaluate the functional outcome of arthroscopic rotator cuff repair in rotator cuff tear patients.

### Materials and Methods

**Source of Data:** This prospective study included 22 cases of rotator cuff tear patients of either sex fitting the inclusion criteria at the Orthopedic Department of Sanjay Gandhi Institute of Trauma and Orthopedics, Bangalore from September 2016 To December 2017. Patients included were between 18 to 70 yrs of age with MRI proven rotator cuff tear who underwent all arthroscopic rotator cuff repair and willing to participate in study. Exclusion criteria included associated shoulder lesions, revision rotator cuff repair, irreparable tears, acj arthritis and rotator cuff tear arthropathy.

### Methodology

Patients admitted with MRI proven rotator cuff tear after meeting the inclusion and exclusion criteria are

selected for the study. They will undergo detailed history, clinical and radiological evaluation. Clinical examination includes range of motion, empty can test, belly press test, external rotation stress test, neer's impingement test, Hawkins test, speed test and yergason's test. With prior informed consent, a pre-operative anesthetic evaluation is done. Arthroscopic rotator cuff repair by single row or double row technique using suture anchors by a single trained surgeon. Post operative rehabilitation as per standard protocol. Postoperative evaluation done at, 3rd month, 6th month and 1year. Range of motion, UCLA and ASES scoring done at preoperative and postoperative follow-ups.

**Data Analysis:** To examine continuous variables Arithmetic mean, standard deviation, Chi square test, Pearson's correlation and t-tests were used. Paired t-test were used to compared Pre-operative and post-operative UCLA scores, ASES scores and Rom. One way ANOVA was also used to compare more than two variables

**Surgical Technique:** Same technique followed for all patients. Patients kept in beach chair position under General anesthesia. Three standard portals are used during arthroscopic rotator cuff repair (anterior, lateral subacromial, posterior). After arthroscopic inspection and treatment of the glenohumeral joint, the arthroscope is introduced into the subacromial space through the posterior portal, and a lateral subacromial portal is established. An anterior portal is also established for inflow and as a working portal. Before assessing and classifying the rotator cuff tear, all bursal and fibrofatty tissue must be debrided from the margins of the rotator cuff. The tear size and pattern were evaluated and the mobility and reparability of the torn cuff were estimated. Inverted mattress suture is made through the tendon with fibertape suture using suture passer. Both limbs of fibertape Suture are loaded into the Suture Anchor eyelet using the attached threader loop. Driver handle is gently tapped to create bone socket and swivelock sp suture anchor is inserted until the anchor

body contacts bone.it is rotated in clockwise direction until the anchor body is flush with the bone. Tip retention suture is unwrapped and pulled it out. Fibertape tails are cut with an open-ended fibertape suture cutter. More anchors are used in same manner when large tears are present. Partial thickness tears are usually repaired in a single row fashion after converting into full thickness tear.

**Postoperative Management:** Same postoperative rehabilitation protocol followed for all patients. Extremities were immobilized in a sling for 6 weeks. During the initial 6 weeks, only pendulum exercises was allowed followed by gentle active exercises after 6 weeks deltoid and biceps strengthening after 8 weeks. Scapular stabilization exercises allowed after 12 weeks. Patients returned to normal activity and work after 4 to 6 months.

## Results

A Prospective study with 22 patients is undertaken to study the functional outcome of Arthroscopic rotator cuff repair. The mean age in our study is 53.5years. Majority are in the age group 40 to 60yrs. Out of 22 patients, 13 were male, 9 were female. Major part of our study contained partial thickness tears (59.1%) rather than full thickness tears (40.9%). 81.8 % (18) patients in our study had traumatic tears and 18.2%(4) patients had degenerative tears. There is significant improvement of flexion from 126.8° preoperatively to 147.0° postoperatively at 1year, abduction from 125.3° to 149.5°, external rotation from 51.1° to 80.2°, internal rotation from 40.45° to 67.5°. In our study according to UCLA Score, out of 22 patients, 3 patients had poor outcome, 7 patients had average outcome, 8 patients had good outcome and 4 patients had excellent outcome. Mean UCLA score increased from 9.09 preoperatively to 28.50 postoperatively at the end of 1<sup>st</sup> year. Mean ASES score improved from 22.53 preoperatively to 86.60 postoperatively

**Table 1: Range of movements**

Range of movements	Pre op	At 3 months	At 6 months	At 1 year	Preop - 1year	P value
Flexion	126.81 <sup>0</sup> ±8.66 <sup>0</sup>	140.68 <sup>0</sup> ±11.47 <sup>0</sup>	145.90 <sup>0</sup> ±10.98 <sup>0</sup>	147.04 <sup>0</sup> ±12.59 <sup>0</sup>	20.23 <sup>0</sup>	<0.001**
Abduction	125.36 <sup>0</sup> ±10.64 <sup>0</sup>	140.00 <sup>0</sup> ±13.36 <sup>0</sup>	144.31 <sup>0</sup> ±12.08 <sup>0</sup>	149.54 <sup>0</sup> ±12.43 <sup>0</sup>	24.18 <sup>0</sup>	<0.001**
External Rotation	51.14 <sup>0</sup> ±4.61 <sup>0</sup>	62.27 <sup>0</sup> ±5.28 <sup>0</sup>	71.36 <sup>0</sup> ±7.74 <sup>0</sup>	80.23 <sup>0</sup> ±3.61 <sup>0</sup>	29.09 <sup>0</sup>	<0.001**
Internal Rotation	40.45 <sup>0</sup> ±4.33 <sup>0</sup>	54.32 <sup>0</sup> ±5.83 <sup>0</sup>	61.82 <sup>0</sup> ±3.94 <sup>0</sup>	67.50 <sup>0</sup> ±4.56 <sup>0</sup>	27.05 <sup>0</sup>	<0.001**

**Table 2: UCLA total score distribution of patients studied**

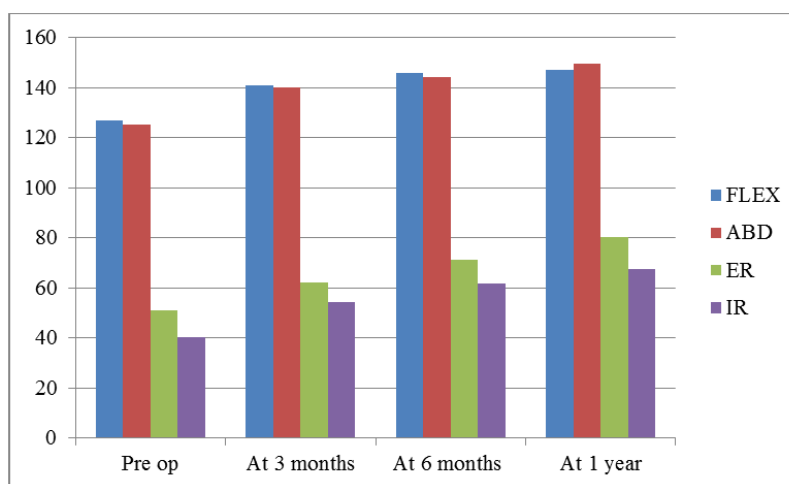
Total Score	No. of patients	%
0-20 (poor)	3	13.7
21-27 (average)	7	31.8
28-31 (good)	8	36.3
32-35 (excellent)	4	18.2

**Table 3: Difference of UCLA and pair wise significance**

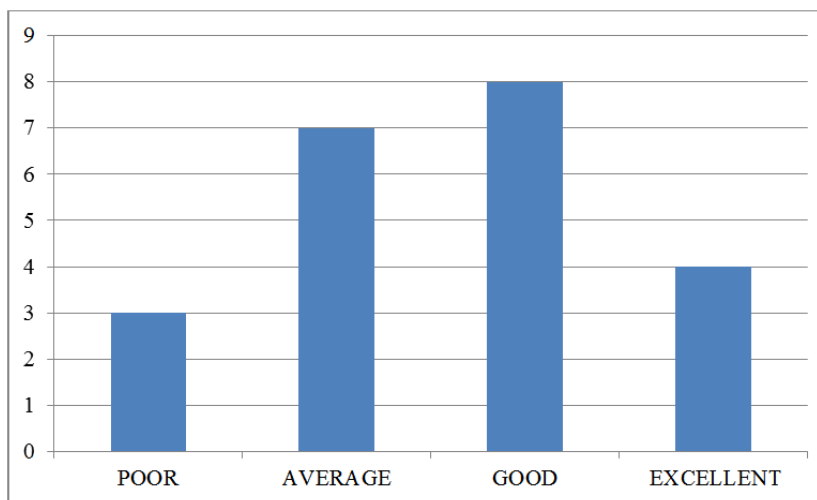
Difference	UCLA At presentation – 3 Months	UCLA At presentation – 6 Months	UCLA At presentation – 1 year
Mean $\pm$ SD	-09.91 $\pm$ 2.81	-15.59 $\pm$ 4.54	-19.41 $\pm$ 4.83
P value	<0.001**	<0.001**	<0.001**

**Table 4: Difference of ASES and pair wise significance**

Difference	ASES At presentation – 3 Months	ASES At presentation – 6 Months	ASES At presentation – 1 year
Mean $\pm$ SD	-46.16 $\pm$ 09.42	-55.10 $\pm$ 10.83	-64.07 $\pm$ 12.24
P value	<0.001**	<0.001**	<0.001**

**Fig. 1: Range of movements**

Flex, Flexion; ABD, Abduction; ER, External rotation; IR, Internal rotation

**Fig. 2: UCLA Total Score distribution of patients studied**

## Discussion

In this study, majority were in the age group between 40 to 60yrs with the mean age of 53.5 $\pm$ 9.21. Similarly studies conducted by Sugaya et al,<sup>2</sup> Park et al,<sup>3</sup> Brian. Cole et al,<sup>4</sup> Burks et al<sup>5</sup> also had mean age of 57.7yrs, 57yrs, 57yrs, 56yrs respectively.

In our study, age of the patient was not found to be a significant factor which affects the clinical outcome of the rotator cuff repairs. Similar observations were made by Bennet WF et al,<sup>6</sup> Stollsteimer and Savoie et al.<sup>7</sup> One reason why age has not found to have any major affect in our series could be because of mean age less than 60 years. This group is known to have good outcome after cuff repair. However, if age exceeds

more than 70 years, the results could have been poorer or age would have shown it affect over the outcome. Age has been proved to be the most important predictor of clinical and radiological outcomes after the rotator cuff repair, as age is a predictor of tissue viability, and therefore, probably predicts success of cuff repair. Many studies have shown that the success of cuff repair decreases with advancing age especially after 65 years, and retear rates may be higher after 65 years. Millar et al<sup>8</sup> reported that mean ASES score and range of motion is better in arthroscopic repair than open repair. Tauro<sup>9</sup> reported lesser hospital stay, small scar, less postoperative pain in arthroscopic group compared to open repair.

In the present study, majority of tears are traumatic tears. Patients with degenerative tears have decreased outcome and range of motion compared to traumatic tears. Very little work has been done in this regard. Braune et al<sup>12</sup> in 2003 had stated traumatic tears to have a better outcome than the degenerative tears.

On the basis of histological investigations,<sup>13</sup> partial tears extend over time and will be converted to full thickness tears, arthroscopic repair is best for partial tears. In our study, we had 9 full thickness tears and 13 partial thickness tears. We found no significant change in final outcome between partial or full thickness tear. Comparing our study to one more similar study where both partial and full thickness tears were treated arthroscopically by single row technique. The study was conducted by Karin S Peters<sup>14</sup> at St. George Hospital where they have assessed the patients by ASES shoulder scoring system pre operatively and at 6 months. They hypothesized that partial thickness tear has higher incidence of retears and shoulder stiffness compared to full thickness group. At 6 months follow up they found there was no statistical significance. Park et al.<sup>15</sup> and Deutsch et al.<sup>16</sup> reported significant increase in shoulder scores in arthroscopic repair.

There is significant improvement of flexion from 126.8° preoperatively to 147.0° postoperatively at 1yr, abduction from 125.3° to 149.5°, external rotation 51.1° to 80.2°, internal rotation 40.45° to 67.5°. In the study conducted by Cole et al<sup>4</sup> and Alberto N M<sup>17</sup> et al also showed significant increase in flexion, abduction and rotations at the end of follow up. We 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. We followed initiation of passive range of motion from postoperative day one in our patients and achieved better range of motion.

In our study out of 22 patients, 3 patients had poor outcome, 7 patients had average outcome, 8 patients had good outcome and 4 had excellent outcome.

In this review they have analyzed the rotator cuff tears depending on technique and post operative UCLA and ASES were analyzed. They found no significance

in outcome of patients treated by both techniques which was similar to our study results. The patients in the analysis were mostly in age group 51-60 which was also seen in our study group. We were not able to compare between the techniques in our study as the most of the cases were single row and comparison cannot be done due to inadequate cases in group operated by double row technique.

One other study where post op function assessed by Ganesh Kamath et al<sup>18</sup> at Barnes – Jewish Hospital and pre operative and post operative ASES results were analysed.

The mean age in both studies is around 51-60 years and pre op and post operative ASES results were analyzed and found to be statistically significant. Similarly Burks et al.,<sup>5</sup> S W Khoo et al,<sup>19</sup> Cole et al,<sup>4</sup> Sugaya et al<sup>2</sup> had similar results as our study.

In one other study conducted by Christopher K Jones and Felix H. Savoie<sup>20</sup> at the southern center for Orthopedics and sports medicine, Georgia a retrospective study was conducted on patients who were operated for massive and large tears by arthroscopy and assessed by UCLA shoulder scoring system. They found at end of study that 88% of patients had good to excellent results with 6 patients having failed but in our study 54% had good to excellent results according to UCLA scoring system. As three dimensional evaluation of a tear is possible with arthroscopy, specific repair for specific tear can be done. Pain, function and range of motion have shown significantly good improvement in our study which had lead to significant patient satisfaction. Patient was able to do all daily routine activities like combing hair, dressing, after getting satisfactory range of motion. There were no infections and neurovascular injuries reported. 4 patients had postoperative shoulder stiffness who continued physiotherapy and nsaid for long time. No re surgery has been done for any patient.

The limitations of the study include less sample, less follow up period and lack of randomization.

## Conclusion

1. Arthroscopic rotator cuff repair is as good as mini open repair in outcome
2. Advantages of arthroscopic rotator cuff repair include, less postoperative pain, small scar and ability to diagnose other shoulder pathologies.
3. There is no difference in functional outcome between partial and full thickness tear treated arthroscopically.
4. Patients need preoperative physiotherapy to achieve good range of motion before surgery for better final outcome
5. Adherence to strict post operative physiotherapy is key for achieving full range of movement and pain free activities of daily living. Age, sex, type of tear do not affect the post-operative result, but a larger clinical trial would be needed to prove the same.

6. Patients with degenerative tears and especially elderly woman will have less satisfactory outcome compared to patients with traumatic tears and young age.

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