

E-ISSN: 2395-1958
P-ISSN: 2706-6630
IJOS 2020; 6(2): 79-85
© 2020 IJOS
www.orthopaper.com
Received: 04-01-2020
Accepted: 07-02-2020

Dr. Ashutosh Vikram
Assistant Professor, Department
of Orthopedics, Narayan Medical
College and Hospital, Bihar,
India

Dr. Kumar Anshuman
Professor, Department of
Orthopedics, Narayan Medical
College and Hospital, Bihar,
India

Corresponding Author:
Dr. Kumar Anshuman
Professor, Department of
Orthopedics, Narayan Medical
College and Hospital, Bihar
India

Functional outcome of arthroscopic rotator cuff repair

Dr. Ashutosh Vikram and Dr. Kumar Anshuman

DOI: <https://doi.org/10.22271/ortho.2020.v6.i2b.2019>

Abstract

Aim: To improve the clinical outcomes and to detect the significant predictors of outcome of rotator cuff repair, such as age, sex, side, tear size, fixation methods, smoking, and associated pathology have been investigated in the Indian population.

Methods: Forty patients (27 male and 13 female) were included in the study who had complete degenerated rotator cuff tear, managed by arthroscopic single or double row repair technique and follow up till one year at a single institution. Postoperatively, patients were followed up regularly for 4 weeks, and at the final follow-up evaluated using a modified UCLA score. Physical examination and range of motion were analyzed and documented.

Results: More than 87.5% of the patients showed good and excellent results. Thirty patients (75%) showed good results, 3 patients (7.5%) showed excellent results. There were no statistically significant relations of outcome with age, sex, side of the tear, size of tear, alcohol or smoking. Patients showed a 65% drop sign negative compared to a 35% drop sign negative cases which are statistically significant. Belly press test was negative in all patients. Mean UCLA score of both favorable and unfavorable results in terms of improvement of post-operative score compared to pre-operative UCLA score was statistically significant.

Conclusions: We conclude that the functional outcome was very satisfactory with excellent results. Our study found that post-operative clinical outcomes are not associated with age, sex, side, and size of the tear. Our results depicted that the arthroscopic rotator cuff repair could be the considerable option for repairing rotator cuff repair.

Keywords: rotator cuff, UCLA score, arthroscopic rotator cuff repair, tear size, age, fixation methods

Introduction

The rotator cuff is a structural integration (at a musculotendinous junction) and functional co-ordination of four scapulohumeral muscles, attached at tuberosities of humerus and acts as a steerer of shoulder joint ^[1]. Rotator cuff disease encompasses a wide range of pathologies from tendinitis to rotator cuff arthropathy. It may lead to mild shoulder discomfort to severe painful restriction of movement with weakness. The aim of rotator cuff repair is to relieve pain, restore strength and range of motion. Recent studies show that the frequency of tear increases with age. The incidence is 13% among 50-59 yrs. age group, 20% in 60-69 yrs., 31% in 70-79 yrs., and 51% among 80-89 yrs. age group ^[2].

Surgical management of rotator cuff tear started 100 yrs. back, with the first open repair done in 1909 by Codman ^[3]. With the advancement of the procedure, now a day's total arthroscopic repair replaced open and mini-open repair, even in cases of larger tear and the results are comparable. The fundamental technique of Neer's was preservation or repair of deltoid origin, adequate subacromial decompression with removal of osteophytes, surgical release in order to attain freely mobile force couple, nit, secure fixation of the tendon at greater tuberosity and strictly follow the rehabilitation protocol ^[4]. Though, both the procedures (arthroscopy and open) are essentially the same, arthroscopic procedure requires a much smaller incision and allows a thorough visualization of the glenohumeral joint which enables the surgeon to address other pathologies. In recent times there are no studies on the Indian population with degenerative cuff repair and also less information on the evaluation of the factors which may affect the functional outcome of the repair. With this regards, the present study designed to evaluate the functional outcome of arthroscopic repair of full-thickness rotator cuff tears and detect significant predictors of outcome of rotator cuff repair, such as age, sex, side, tear size,

fixation methods, smoking, and associated pathology.

Materials and Methods

A prospective and retrospective study was performed at Narayana Medical College and Hospital. We included forty patients between the age group of 20 to 40 years, who attended ortho outpatient department (OPD) with chronic shoulder problems, clinically suggestive of rotator cuff tear, radiologically confirmed by magnetic resonance imaging (MRI) and not responding to conservative management. Retrospectively patients were selected randomly who were operated in this institute in the last six months. The inclusion criteria were, those who were suffering from symptomatic chronic rotator cuff tears, complete tear radiologically confirmed by magnetic resonance imaging (MRI), patients who failed to improve on conservative methods of treatment *viz.* exercises or ultrasound therapy (UST) or steroid injection. Whereas, patients who had instability problems, neurological problems that affect upper limb, massive and retracted rotator cuff tear, shoulder muscle atrophy or dystrophy and associated bony injuries around shoulder were excluded from the study.

Preoperative evaluation

All patients were subjected to preoperative clinical assessment for the presence of pain during overhead activities as well as during sleep, subjective feeling of weakness, range of motion (ROM) of shoulder, strength of forward flexion, examination of shoulder instability, examination of A-C joint, subacromial crepitation and special tests like impingement sign, Jobe's test, Hawkin's test, Speed test Lift off/Belly press test and power of external rotation in 90° abduction and in adduction were conducted.

Operative Procedure

All the surgeries were done after appropriate cardiological and medical evaluation and optimization. The proper pre-anesthetic check-up was done in every patient before posting for surgery. Diagnostic arthroscopy was performed using posterior portal 15-point appropriate review described by Synder *et al.* [5]. Arthroscopic rotator cuff repair was performed using a single or double row suture anchor technique with subacromial decompression in all cases. General anesthesia was given and made hypotensive during the procedure. The shoulder was positioned on a lateral position with the affected side up and 30° posterior tilt and traction from the fluid stand. The bony landmarks of the shoulder joint (acromion, scapular spine, clavicle, acromioclavicular joint and coracoid) were identified and marked. The first posterior portal was made by making small (8 mm) stab incisions at 2 cm down and medial to the posterolateral tip of the acromion and insert trocar with sleeve followed by arthroscopy. Through the posterior portal, an intraarticular portion of the joint was viewing systematically. The state of the articular cartilage, the glenoid, biceps tendon, synovium, the humeral head and under the surface of the rotator cuff as well as rotator interval. Then made an anterior working portal by 8 mm stab incision halfway between the tip of the coracoid and anterior aspect of acromion under direct vision of arthroscope, through anterior triangle by which synovitis within the joint debrided (if needed) using a 3.5 mm soft tissue resector or by a radiofrequency probe. The scope was then shifted and directed upwards under the acromion outside the rotator cuff towards the subacromial space. Through a lateral portal, the motor shaver introduced into the

subacromial space. Making sure that it was in place under the acromion by moving it around the bursa until it touched the undersurface of acromion or sheath of the scope introduced through the posterior portal. The bursal tissues were removed until the anteroinferior surface of the acromion, as well as the coracoacromial ligament, were identified. The motorized shaver was then replaced by using a 4 mm bony burr which was used to remove the anteroinferior border of the acromion and any present osteophytes. Bone resection was continued until the undersurface of the acromion was flat. After adequate subacromial decompression inspection and probing of the rotator cuff tear took place and especially see the mobility of rotator cuff and then prepare the footprint by the bony bar.

The type of cuff repair depended on the type and size of the cuff tear. We preferred subacromial decompression and shaving of the degenerated portion. After adequate inspection of a full-thickness tear and detecting its size and extension, we prepared the foot-print area by the shaver first and then by bony burr. One or more bone anchors (5 mm Smith & Nephew) depending on the size and extent of the cuff tear was inserted at the foot-print area and placed at a Deadman's angle of approximately 45° [6]. An antegrade suture passing instrument, such as Elite Pass arthroscopic suture shuttle instrument (Smith & Nephew), was used to pass one limb of each suture thread through the margins of the rotator cuff tear and back again through the lateral portal. An arthroscopic knot was then tied outside and pushed inside to close the defect.

Post-operative rehabilitation

All patients were immobilized on a shoulder abduction bag for six weeks and pendulum exercises were conducted. Gradually gentle passive flexion-extension exercises and abduction up to 90° or as tolerated were conducted for two weeks. Gradually from eight to twelve weeks active flexion-extension and abduction exercises with added weight or as tolerated were started. Theraband resistance exercises were started from twelve to eighteen weeks like hand behind the back and posterior capsular stretches and then gradually increased theraband resistance and strength training of rotator cuff, latissimus dorsi and biceps [7].

Postoperative assessment

All patients were followed up regularly at 4 weeks. At the final follow-up a comprehensive evaluation including a physical examination and assessment of the range of motion was done. A post-operative evaluation was made by a modified UCLA scoring system.

Statistical Analysis

Categorical variables are expressed as a number of patients and percentage of patients and compared across the 2 groups using Pearson's Chi-Square test for independence of attributes. Continuous variables are expressed as Mean \pm SD and compared across the 2 groups using unpaired t-test. p-value lesser than 0.05 was considered statistically significant. The statistical analysis was conducted using software SPSS version 20.

Results

The functional outcomes were evaluated using the UCLA score postoperatively, at 6 weeks, 3, 6, and 12 months, and compared with preoperative scores. In our study, the most common age group was 61–70 years, the second-most

common age group was 51–60 years (Table 1 and Figure 1). Out of 40 patients, 27 were male and 13 were female and there was no significant role of sex determination of outcome (Table 2 and Figure 2). Females showed better post-operative results than men, however it was not statistically significant (Figure 3). In our study, 25 cases were right-side dominant and right-side tearing in most cases and 14 cases were in left side among which 1 was dominant and showed there is no difference in outcome whether it is involved at right or left side and dominant or non-dominant side (Table 3 and Figure 4).

Out of 40 cases, 25 (62.5%) had only supraspinatus tear and 15 (37.5%) had both supra and infraspinatus tear and showed in the maximum patient were dealt with supraspinatus tear but results have no significant difference (Table 4 and Figure 5).

With regards to tear size distribution among patients, in our study 17 cases were large, 20 cases were moderate and 3 were small tear. However, there was no statistically significant difference among the patients with regards to tear size (Table 5 and Figure 6). In our study 34 number of study subjects *i.e.* 85% tear repair done by double row technique and 6 (15%) tear repair by single row technique. We found 6 unsatisfactory results (17.65%) in the double row technique and 1 (16.67%) in a single row technique which was clinically non-significant (Table 6 and Figure 7). Smoking and alcohol have no significant influence on cuff repair. Impingement sign positive was shown in 95% and impingement sign negative cases showed in 81.58% of patients and no role in the determinant of outcome (Table 7 and Figure 8).

In our study out of 40 patients, 37 (92.5%) were Hawkin’s test positive and 3 (7.5%) negative and were statistically non-significant (Table 8 and Figure 9). All patients showed 100 % positive for Jobe’s test (Table 9).

In our study drop sign negative patients showed 65% satisfactory results as compared to drop sign positive cases (35%) with statistical significance Table 10 and Figure 10). Belly press test for subscapularis was negative in all the patients. In our cases 30 patients (75%) showed good results, 5 patients (12.5%) showed fair, 3 patients (7.5%) showed excellent and 2 patients (5%) showed poor results. Six patients were speed test positive with 15% unsatisfactory results which are statistically significant (Table 11 and Figure 11). The outcome of the study showed more than 87.5% of patients have excellent to good results. Mean age distribution was 59.85 with a standard deviation of 6.16 with the minimum age of 48 years to a maximum of 70 years.

Mean UCLA score improved from preoperative (15.03) to 12 months postoperative (30.33). Our study showed both pre- and post-operative statistical significance of both favorable and unfavorable results in terms of significant improvement of post-operative UCLA score compared to pre-operative (Figure 12 and 13). Table 12 shows significant excellent and good results along with each component of the ULCA score separately which are significant.

Table 1: Age distribution of our patient

Age	Frequency	Percent
41-50	4	10.0
51-60	16	40.0
61-70	20	50.0
Total	40	100.0

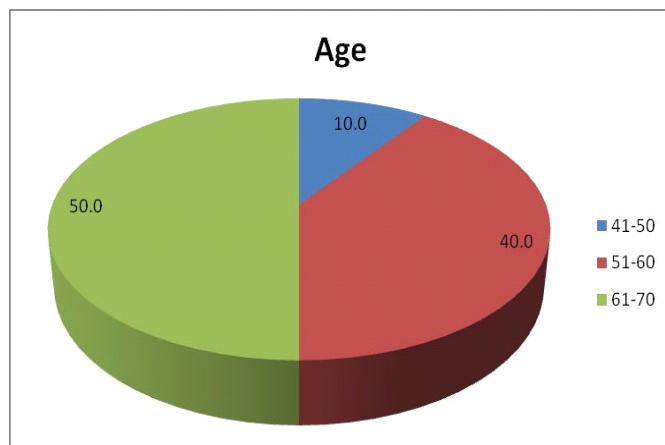


Fig 1: Pie diagram of age distribution of our patient shows maximum in between 61-70 yr. group

Table 2: Sex distribution of patients

Sex	Frequency	Percent
Female	13	32.5
Male	27	67.5
Total	40	100.0

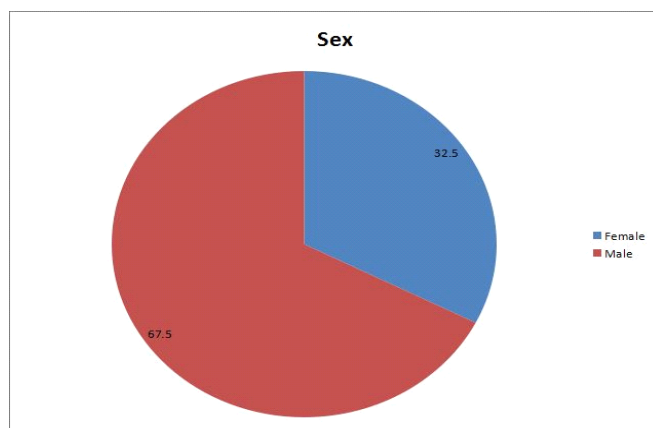


Fig 2: Pie diagram of sex distribution of patients

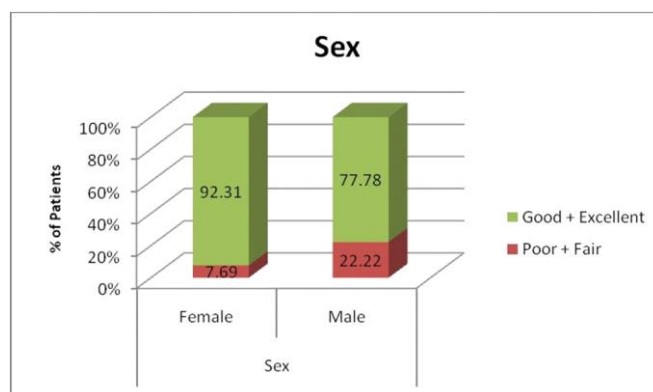


Fig 3: Females with better post op results than men

Table 3: Dominant side tear distribution of patients

Side	Frequency	Percent
Left (Dominant)	1	2.5
Left (Non-Dominant)	14	35.0
Right (Dominant)	25	62.5
Total	40	100.0

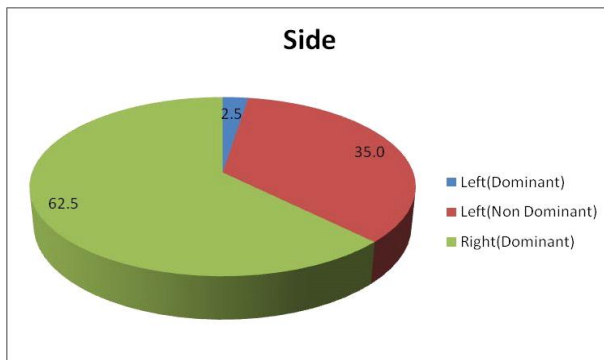


Fig 4: Maximum patients were right side dominant tear and not statistically significant

Table 4: Distribution of rotator cuff tendon involvement

Tear	Frequency	Percent
Supra	25	62.5
Supra, Infra	15	37.5
Total	40	100.0

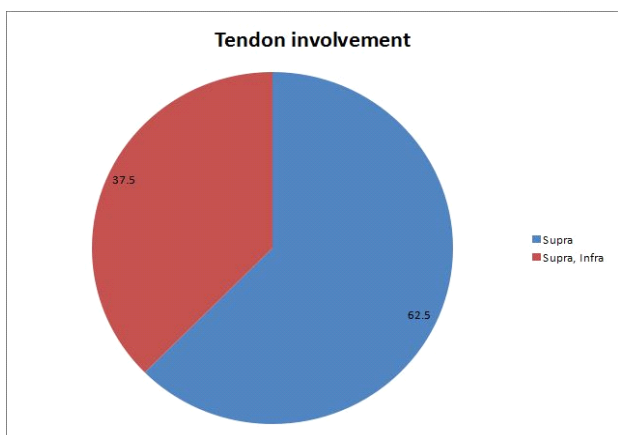


Fig 5: Patients with maximum supraspinatus tendon involvement which is not significant

Table 5: Tear size distribution in patients

Size of tear	Frequency	Percent
Large	17	42.5
Moderate	20	50.0
Small	3	7.5
Total	40	100.0

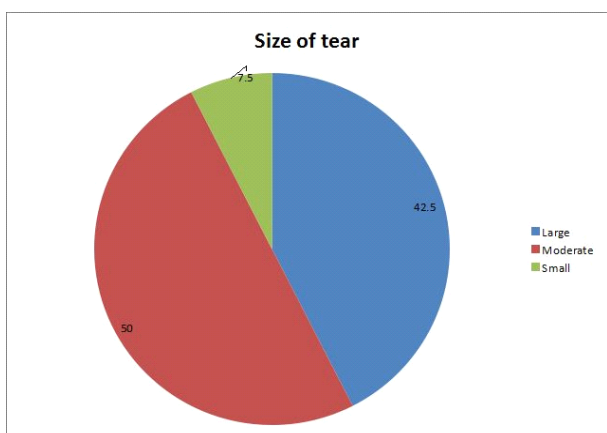


Fig 6: Pie diagram shows moderate size cuff tear in maximum patients and has no statistical significance

Table 6: Repair technique distribution

Technique	Frequency	Percent
Doble Row	34	85.0
Single Row	6	15.0
Total	40	100.0

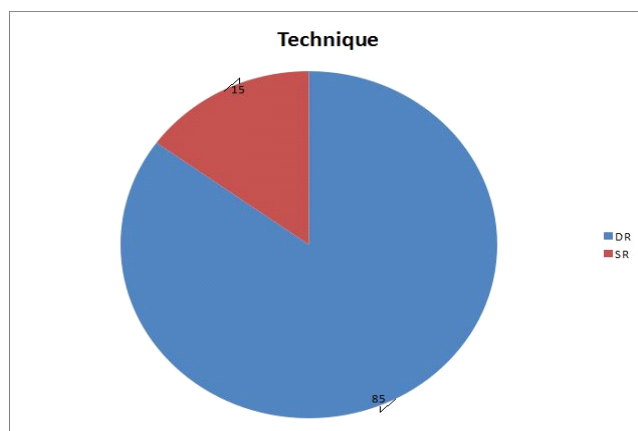


Fig 7: Distribution of repair techniques used in patients

Table 7: Impingement sign distribution

Impingement sign	Frequency	Percent
Negative	2	5.0
Positive	38	95.0
Total	40	100.0

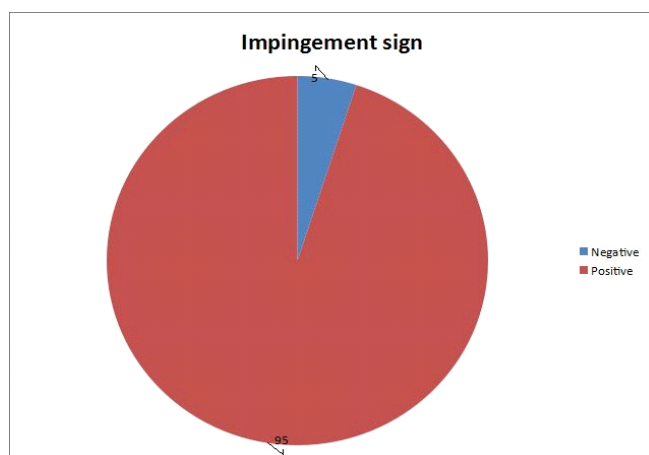


Fig 8: Pie diagram shows 95% of patients were impingement sign positive which is not significant

Table 8: Hawkin’s test distribution

Hawkin's test	Frequency	Percent
Negative	3	7.5
Positive	37	92.5
Total	40	100.0

Table 11: Speed test distribution of patients

Speed Test	Frequency	Percent
Negative	34	85.0
Positive	6	15.0
Total	40	100.0

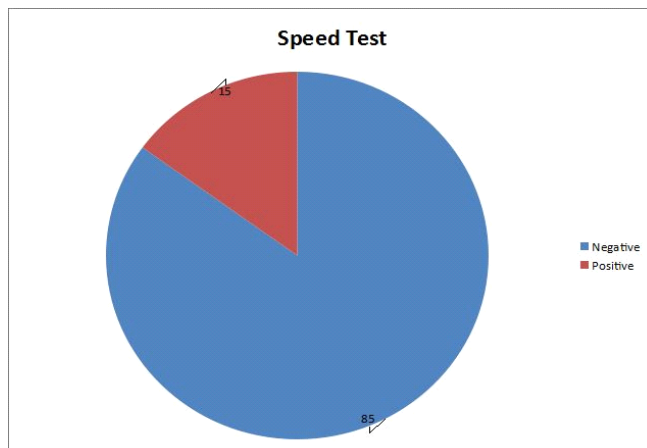
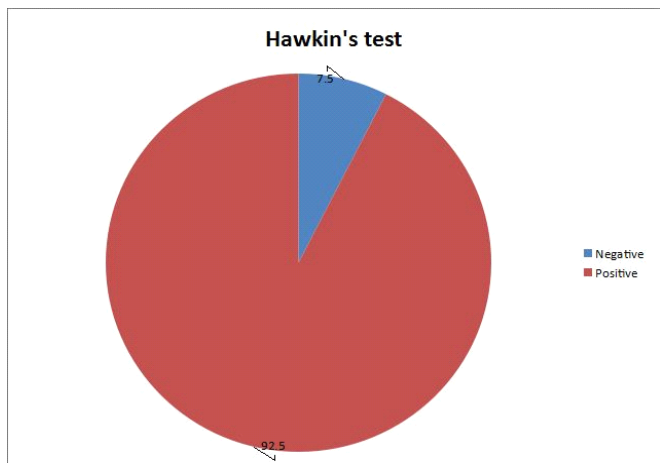


Fig 9: Hawkin’s test shows 92.5% of patients were positive which is not significant

Fig 11: Speed test shows 15% of patients positive

Table 9: Jobe’s test distribution

Jobe's test	Frequency	Percent
Positive	40	100.0

Table 10: Drop sign distribution among the patients

Drop sign	Frequency	Percent
Negative	26	65.0
Positive	14	35.0
Total	40	100.0

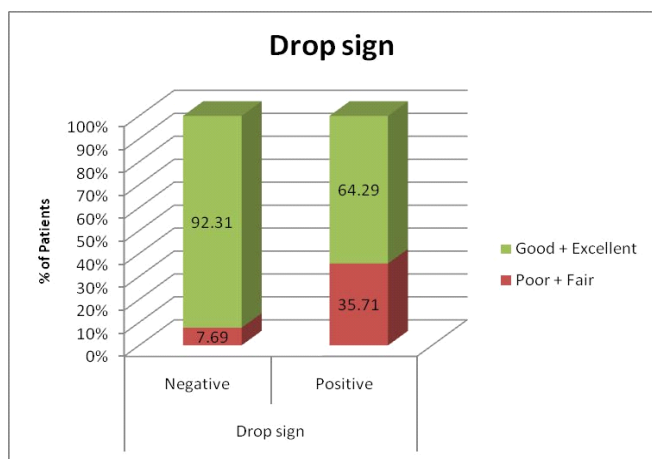
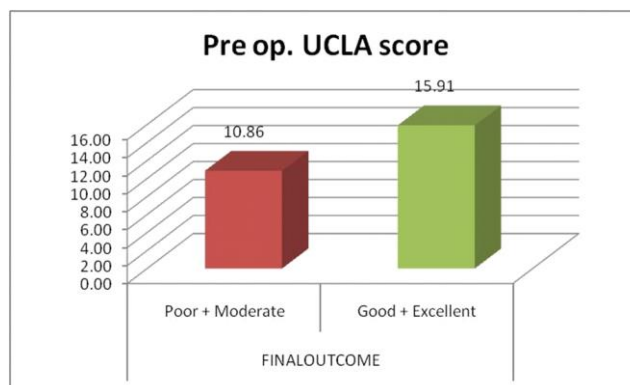


Fig 12: Average pre-operative UCLA score among unfavorable outcome and favorable outcome

Fig 10: Drop sign negative patients shows 92.31% satisfactory results compare to drop sign negative cases (only 64.29% satisfactory results), which is statistically significant

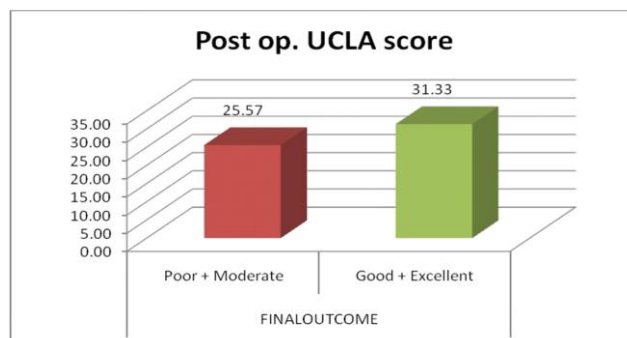


Fig 13: Average post-operative UCLA score among unfavorable outcome and favorable outcome

Table 12: Shows significant good and excellent results along with each component of ULCA score separately which are significant.

Parameters	Final outcome		p-Value
	Poor + Moderate (Mean ± SD)	Good + Excellent (Mean ± SD)	
Pre-operative UCLA score	10.86 ± 3.39	15.91 ± 3.01	<0.001*
Patient Satisfaction Score	3.57 ± 2.44	5 ± 0	0.001*
ROM Score	4.14 ± 0.69	4.79 ± 0.42	0.002*
Strength of Forward Flexion Score	3.43 ± 0.79	4.06 ± 0.5	0.009*
Pain Score	7.43 ± 0.98	8.73 ± 0.98	0.003*
Function Score	7.43 ± 1.51	8.73 ± 1.1	0.011*
Post-operative UCLA score	25.57 ± 5.44	31.33 ± 1.73	<0.001*

*Significant

Discussion

The rotator cuff is a dynamic stabilizer of the glenohumeral joint, and its repair is a necessary to reestablish normal kinematics of the shoulder. Earlier treatment modalities consisted of open and mini-open techniques, but it was quite clear that arthroscopic management of rotator cuff tears has become the standard technique globally for the treatment of such lesions as open repair technique and mini-open repair technique have several disadvantages, such as loss of anterior deltoid function, and higher post-operative pain. Open repair does not allow the patient to be involved in a postoperative accelerated rehab protocol if that is the choice of the surgeon. Recent literature support that results of total arthroscopic repair not only matches with open repair it showed even better results with the added benefit of less tissue damage, deltoid preservation, fewer hospital stays and early recovery. It has also a facility of a thorough evaluation of the joint to detect any other pathology associated with it and manage them accordingly. Arthroscopic repair of rotator cuff tear has led to a decrease in immediate postoperative pain, decreased surgical insult to the deltoid, and decreased postoperative stiffness. Thus, results increased considering functionality, work, and patient satisfaction. In the present study, we have arthroscopically repaired the chronic degenerated rotator cuff tear of 40 patients and their outcome measured post-operatively by a modified UCLA scoring system at 12 months. Their pre- and post-operative values are compared with previous studies. The mean age of patients was 59.85 years (range 41–70 years), among them most fall under 60 to 70 years age group in this study. It is supposedly due to degenerative tear occurring more in the older age group. In the study by Gartsman *et al.* [7] wherein the average age of patients at the time of operation was 60.7 years (range 31–82 years). There were 13 females and 27 males in our study, among them 35 patients had involved right dominant, 1 patient had involved left dominant and another 4 had involved left non-dominant shoulder. It shows trends of tear more towards males with a dominant side (mostly used shoulder). In our cases, the large tear was in 17 (42.5%), a moderate tear in 20 (50%), small tear in 3(7.5%) patients. Among them, 25 (62.5%) had only supraspinatus tear and 15(37.5%) had both supra and infraspinatus tear. 34(85%) tear was repaired by double row technique and 6(15%) were repaired by double row technique. This shows a maximum patient with moderate tear and supraspinatus tendon involvement and repaired by mostly double row technique. These findings were compared with the findings of Sugaya *et al.*, wherein large tear was in 22, a moderate tear in 30, small tear in 8 patients [8]. But, in our study 6 (15%) patients had associated biceps pathology with positive speed test, whose post-operative functional outcome significantly directorial. That means associated biceps pathology has a significant negative role in functional outcome, which was not seen in the previous study. These observations may be due to a small number of sample sizes.

In our patient's pre-operative clinical test was impingement sign positive in 95%, and in 92.5% Hawkin's positive, all patient was Jobe's positive and all are belly press negative. In this study, we found that the majority of rotator cuff tears were atraumatic (59.4%), similarly, like other research studies conducted by Tempelhof *et al.*, Teunis T *et al.*, and Milgram *et al.*, revealed that degeneration was the most common cause of rotator cuff tears [2,9,10]. Huijsmans *et al.* [11] used a surgical technique similar to the technique used in this study. Their repairs were followed by ultrasound, and the patients had 91% good and excellent clinical results and 83% intact cuffs at

final follow-up which is comparable to our study, where more than 87.5% of patients showed good results and 7.5% patients showed excellent results. Sugaya *et al.* [8] performed a nonrandomized study to evaluate the results of single- and double-row repairs. This study was based on patient inclusion in that the early patients were treated with a single-row repair and later patients were treated with a double-row repair. They were unable to find any difference between the groups in functional outcome. The final UCLA score in their study was 32.4 in a single row and double row techniques and are similar to our study where the final post-operative UCLA score was found to be 31.33. Franceschi *et al.* [12] reported on 52 patients who had been randomized to single- or double-row repairs. Patients received UCLA scores for clinical evaluation and had MRI arthrograms at the final follow-up. In this study, UCLA scoring was categorized into preoperative and postoperative, with a pre-operative mean value of 15.03 and the post-operative mean value of 30.33. Similarly in a study done on the Indian population from February 2009 to June 2011 on 30 cases, of an average age of 53.33 years and they evaluated preoperatory with UCLA score 14.06 and post-operatively at 24 months with average score 30.83 [13]. They also found that similar to our study there was no significant role of age, sex, side in outcome determination. Gartsman *et al.* reported in 73 patients 41.7 to 83.6 points. Burks *et al.* observed in 12 patients, mean score increased from the preoperative 44.1 to postoperative 77.8 points [8, 14]. Our results are in concurrence with another study done by Sugaya H *et al.*, wherein 86 shoulders with a full-thickness cuff tear, repaired by double row technique [6]. In our study, the average age of patients was 59.85, which is comparable to other studies [8, 9, 14].

We used a double row technique in a maximum number of cases compared to others as it gives more structural support and strength compared to a single row. In comparison to previous studies our sample size was small and follows up at only a 12-month post-operative period. We compared our study with another study done by Sugaya *et al.* at, they studied over 86 shoulders with a full-thickness cuff tear, repaired by double row technique and our results are comparable with their results [9]. There were no statistically significant relations of outcome with age, sex, side of the tear, size of tear, alcohol or smoking, like other studies but the negative effect with biceps tendon involvement contrary to other studies. In our cases 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. Which are very much satisfactory. Fortunately, there was no post-operative complication in any cases, but there was suspected re-tear in both cases of the poor outcome though MRI not done in the post-operative period. But to make a definite recommendation more sample size and longer follow up required.

Conclusion

In conclusion, arthroscopic rotator cuff repair had very satisfactory results with fewer patient morbidities, post-operative pain, fewer hospital stays, without any apparent scar mark, early post-operative recovery. It has added benefits of a thorough evaluation of joint and can be dealt with other intraarticular pathology simultaneously. The results of present study depicted that the arthroscopic rotator cuff repair could be the considerable option for repairing rotator cuff repair. However, further randomized clinical trials with longer follow-up periods and larger sample sizes are required to be

done for the recommendation of arthroscopic rotator cuff repair in patients suffering from Rotator cuff disease.

References

1. Saha AK, Das AK, Dutta SK. Mechanism of shoulder movements and a plea for the recognition of “zero position” of glenohumeral joint. *Clinical Orthopaedics and Related Research*. 1983; 173:3-10.
2. Tempelhof S, Rupp S, Seil R. Age-related prevalence of rotator cuff tears in asymptomatic shoulders. *Journal of shoulder and elbow surgery*. 1999; 8(4):296-9.
3. Neer CS. Anterior acromioplasty for the chronic impingement syndrome in the shoulder. 1972. *The Journal of bone and joint surgery. American volume*. 2005; 87(6):1399.
4. Snyder SJ. Diagnostic arthroscopy of the shoulder: normal anatomy and variations.
5. *Shoulder arthroscopy*. Philadelphia: Lippincott Williams & Wilkins, 2003, 22-38.
6. Dini AA, Snyder AJ. Rotator cuff repair—the SCOI row method. *Medicina Fluminensis*. 2015; 51:114-26.
7. Snyder SJ. Postoperative protocols – Physical therapy In: *Shoulder Arthroscopy*. 3rd ed. Philadelphia: Wolters Kluwer Health, 2015, 380-3.
8. Gartsman GM, Brinker MR, Khan M. Early effectiveness of arthroscopic repair for full-thickness tears of the rotator cuff. An outcome analysis. *JBJS*. 1998; 80(1):33-40.
9. Sugaya H, Maeda K, Matsuki K, Moriishi J. Repair integrity and functional outcome after arthroscopic double-row rotator cuff repair: a prospective outcome study. *JBJS*. 2007; 89(5):953-60.
10. Teunis T, Lubberts B, Reilly BT, Ring D. A systematic review and pooled analysis of the prevalence of rotator cuff disease with increasing age. *J Shoulder Elb. Surg*. 2014; 23(12):1913-21.
11. Milgram C, Schaffler M, Gilbert S, Van Holsbeeck MT. Rotator cuff changes in asymptomatic adults. *J Bone Joint Surg Br*. 1995; 77:296-8.
12. Huijsmans PE, Pritchard MP, Berghs BM, van Rooyen KS, Wallace AL, de Beer JF. Arthroscopic rotator cuff repair with double-row fixation. *JBJS*. 2007; 89(6):1248-57.
13. Franceschi F, Ruzzini L, Longo UG, Martina FM, Beomonte Zobel B, Maffulli N *et al*. Equivalent clinical results of arthroscopic single-row and double-row suture anchor repair for rotator cuff tears: a randomized controlled trial. *The American journal of sports medicine*. 2007; 35(8):1254-60.
14. Aditya Menon, Irfan Sheikh. Evaluation of the results of arthroscopic repair of rotator cuff tears: A prospective study. *Journal of Medical Thesis*. 2014; 2(2):24-30.
15. Burks RT, Crim J, Brown N, Fink B, Greis PE. A prospective randomized clinical trial comparing arthroscopic single-and double-row rotator cuff repair: magnetic resonance imaging and early clinical evaluation. *The American journal of sports medicine*. 2009; 37(4):674-82.