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Original Research Article

To determine shoulder function after arthroscopic rotator cuff repair using university of California and Los Angeles score

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ABSTRACT

Introduction: Rotator cuff tears are a common contributing factor of shoulder pain and occupational disability. Tears of rotator cuff are becoming increasingly prevalent in today's population. Shoulder arthroscopy has become a reliable and reproducible method of treating rotator cuff tears. Arthroscopic surgery allows for a shorter recovery time and predictably less pain in first few days following procedure than does any open surgery.

Materials and Methods: A prospective and retrospective review of the medical records of 37 cases of rotator cuff tear who underwent arthroscopic rotator cuff repair between January 2017 to May 2020 at Dayanand Medical college Hospital, Ludhiana was performed.

Results: In our study, we had measured UCLA shoulder score over 6 months period in 37 patients. Our study showed improved functional outcome from UCLA score at presentation- 10.27 to UCLA at 6 months- 30.41 with a p value <0.001 which is graded as a good result. There was no significant gender difference in terms of incidence and postoperative functional outcome. Maximum incidence was seen in age group- 51-60 years with etiological inclination towards precedent trauma. No statistical difference between functional outcome of single and double row technique was noted.

Conclusion: Arthroscopic repair of rotator cuff tear offers excellent functional outcome; with minimal morbidity. Improvement in pain, range of motion and strength of cuff tendons can be achieved only by meticulous repair techniques and strict rehabilitation programme.

1. Introduction

Rotator cuff disease encompasses a wide range of pathology from minimal bursal or articular side irritation and tendonitis to severe degenerative rotator cuff arthropathy. Rotator cuff pathology affects adults of all ages and other shoulder afflictions must be ruled out by careful history and physical examination.[1]

In recent past small tears were treated arthroscopically while larger tears would require an open procedure. Advances in procedure now allow arthroscopic repair of even largest tears and arthroscopic techniques are required to mobilize many of retracted tears. Arthroscopic results now match open surgical techniques and allow for more thorough evaluation of shoulder at time of surgery increasing diagnostic value of procedure. Arthroscopic surgery allows for a shorter recovery time and predictably less pain in first few days following procedure than does any open surgery.[2]

During the past 3 decades, arthroscopy has dramatically changed the orthopaedic surgeon's approach to the diagnosis and treatment of a variety of joint ailments. A high degree of clinical accuracy, combined with low morbidity, has encouraged the use of arthroscopy to assist in diagnosis, to determine prognosis, and often to provide treatment.

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2. Materials and Methods

A prospective and retrospective review of the medical records of all cases of rotator cuff tears who underwent shoulder arthroscopy between Jan 2017 and May 2020 at Dayanand Medical college Hospital, Ludhiana were performed. Thirty-seven patients with full thickness rotator cuff tear confirmed by MRI were enrolled in this study. Eleven patients were studied retrospectively and twenty-six prospectively. Double and Single row technique was used in thirteen and twenty-four patients respectively. Patients with rotator cuff tear repaired with open surgery, massive irreparable rotator cuff tear, severe glenohumeral arthritis and biceps injury requiring tenotomy or tenodesis were excluded from this study. Patients were followed up for a minimum duration of six months and maximum duration of six months. Patients were assessed as per the UCLA Shoulder scoring system which involves post operative pain, function of shoulder, active forward flexion, strength of flexion and satisfaction of patient. The final functional outcome was graded as Good (score- 28 to 33)/Excellent (score- 34 to 35) (Score >27 out of 35) and Fair (22-27)/Poor (<21) (Score <27 out of 35) as per documented in the UCLA shoulder rating sheet.

2.1. Operative procedure

Fig. 1:

All the patients were operated in semi beach chair position under general anaesthesia with endotracheal tube taped securely on the side opposite to the side of surgery. A diagnostic arthroscopy was performed followed by repair

Landmarks like acromion, distal clavicle and coracoid process were outlined. Standard posterior portal and anterior portal were used for diagnostic arthroscopy. Anatomy of articular cartilage of humeral head and glenoid labrum, biceps tendon, inferior recess and insertion of the rotator cuff tendons was visualised**.**

For sub acromial arthroscopy the arthroscope was removed from glenohumeral joint and redirected into subacromial space. A lateral portal was made and then a posterolateral portal at posterolateral edge of acromion for complete inspection of sub acromial area. The posterolateral portal used for viewing and lateral portal was used as the working portal. The lateral portal was made after spinal needle localization. Majority of cases performed by principal author had Type II or Type III acromion. The goal was to achieve a flat acromial under surface and to create adequate space for the rotator cuff tendons. Hence, acromioplasty was performed depending on thickness and shape of acromion. Complete subacromial bursectomy was done using a combination of arthroscopic shaver and RF Wand.

Thorough debridement of tendon was done with a full radius shaver and remaining soft tissue was cleared using a radio-frequency ablation wand. The depth and type of tear was determined intraoperatively as well as amount of retraction and mobility of tendon required with the help of arthroscopic grasper. We use the spinal needle to localise the location of posterolateral viewing portal. We move the arthroscope to the posterolateral viewing portal for further characterisation of rotator cuff tear.

Footprint preparation was done using shaver to remove soft tissue from greater tuberosity and cortical bone was exposed. Potential location of suture anchor was defined, separating the insertion points by at least 1 cm to prevent tuberosity fracture. In massive rotator cuff tears medialization of footprint preparation was done in order to decrease detention at repair site. A cancellous bed was prepared at the site of repair by removal of layer of cortical bone with a power burr.

A suture anchor (TWINFIX 5.00 mm ultrabraid, Smith and Nephew) was inserted lateral to the cartilage of humeral head in the cancellous surface of dense metaphyseal bone. The anchors were inserted flushed with the bony surface. The number of suture anchor varied with length of the tear. After all the sutures were inserted, traction was applied to reduce the tendon to its repair site and allowed the suture to be tied without tension. For medium and large size tears, we used double row fixation techniques for better biomechanical stability and lesser rate of retear. in which a lateral row of sutured anchors (FOOTPRINT PK 5.00mm, Smith and Nephew) was inserted at the lateral edge of greater tuberosity. We performed knot tying of lateral row first and then repair was completed with knot tying of medial row. Suturing of portal site was done and sterile dressing was given.

2.2. Post op rehabilitation

Following the procedure, the operated arm was supported with a shoulder immobilizer. The immobilizer was worn continuously for 6 weeks, except during bathing

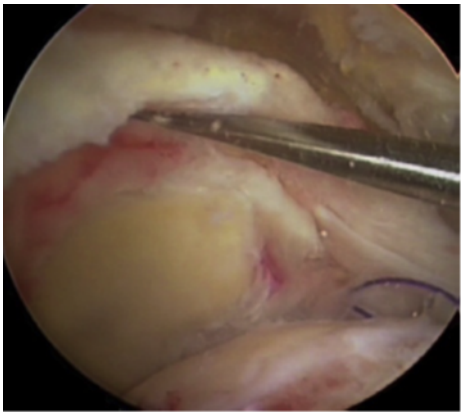

Fig. 2: Intra-operative image showing torn rotator cuff

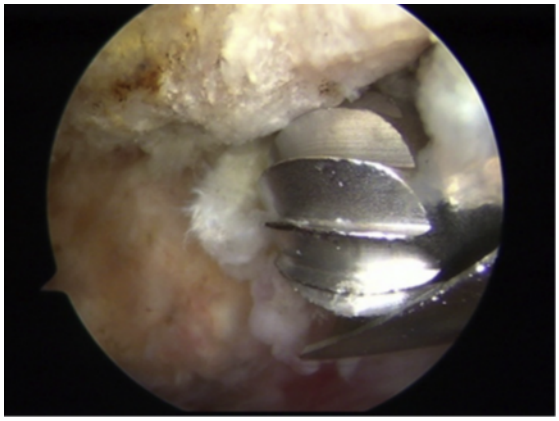

Fig. 3: Intra-operative image showing the acromioplasty

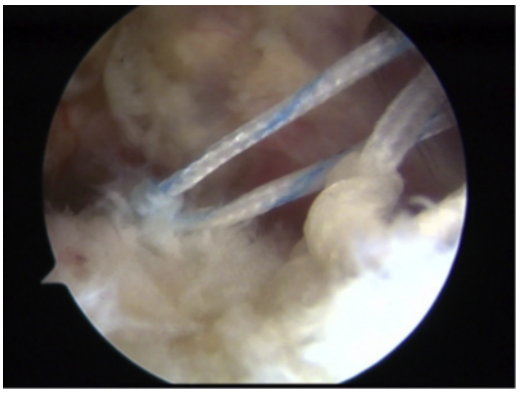

Fig. 4: Intra-operative image showing the repaired cuff

Fig. 5: Post op x-ray

and exercises. The standard postoperative rehabilitation program is summarized below. We did not use any abduction brace as a part of rehabilitation protocol.

2.3. Rehabilitation protocol following arthroscopic rotator cuff repair

0-4 weeks – Initial period of rest to the shoulder joint was given. Hand, wrist and elbow range of motion exercises were performed. Only passive abduction was advised for the first month to avoid stressing the repair.

4-12 weeks- Active abduction exercises were employed after 1^{st} month followed by forward flexion, internal and external rotation.

After 3 months, Strengthening exercises of deltoid, biceps, triceps, rotator cuff, scapular stabilizers

This is how we could achieve range of motion of forward flexion and abduction upto 90 to 120 degrees.

3. Results

The functional outcomes were evaluated using UCLA score postoperatively at 1 and 6 months, and compared with preoperative scores. Majority of the patients were in the age group of 51-60 years with a mean age of 51.46 years (27-67). In a study of 40 patients who underwent arthroscopic RCR by both single and double row techniques by Burks et al,[3] the mean age was 56.5 years. In a study of 65 patients conducted by Boileau et al,[4] all were diagnosed with chronic supraspinatus tears and were treated with arthroscopic rotator cuff repair, the mean age was 60 years with equal distribution of males and females as compared to our study in which 54.1% were males and 45.9% were females. Based on the history, the tear was thought to be associated with some degree of trauma. Around 75% of the cases were due to domestic fall followed by roadside accident cases (16.7%). We found no statistical significance

Fig. 6:

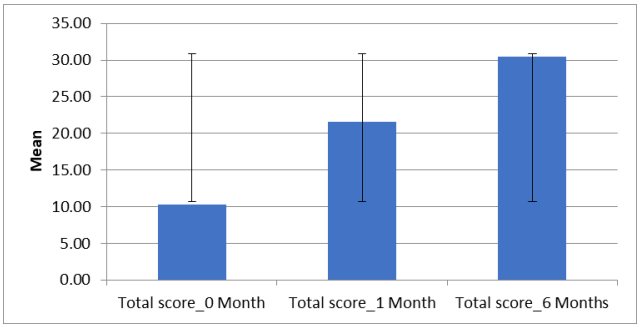

Fig. 7: Distribution of total ucla score

between the age of the patient and postoperative results.

Almost all the cases were diagnosed with complete thickness rotator cuff tears (89.2%) and rest (4 out of 37) patients with high-grade partial-thickness tears. Studies conducted by Boileau et al, Burks et al., Sugaya et al. only included complete rotator cuff tears. While a similar study conducted by Chung et al[5] included patients who had 34 cases of high-grade partial thickness tears and 21 cases with full-thickness tears. In 23 patients (62.2%) 2 anchor sutures were used, in 10 patients single anchor suture and in 4 patients 3 anchor sutures were used. We found that correct placement of suture anchors, using more sutures per anchor, performing bursectomy from the undersurface of acromion and acromioplasty done very carefully yielded promising results. Yet patients presented with stiffness over shoulder (20 out of 37) and redness over operated area (25 out of 37) post operatively. No major complication like nerve injury was noted.

Following is the comparison with other studies in view of parameters of UCLA score:-

The total mean UCLA score was 30.41 out of 35 at the end of follow up. 36 patients came in the category of good result (score between 28-33) while 1 patient had excellent result (scoring 35 out of 35).

Mean UCLA score of 30.46 out of 35 for patients who underwent single row technique (24 out of 37) while 13 patients who underwent double row technique have mean UCLA score of 30.31 out of 35. There was no statistically significant difference between these two techniques.

4. Discussion

Arthroscopic repair of rotator cuff led to decreased immediate post operative pain, decreased surgical insult to the deltoid and decreased post operative stiffness. These effects translate to quicker return to functionality and work with increased patient satisfaction.[6] Arthroscopic repairs of cuff tears of shoulder is an established method of treatment with reproducible results,[7,8] considering that the post operative rehabilitation is as important as the repair itself.[9,10]

Majority of the patients were in the age group of 51-60 years with a mean age of 51.46 years (27-67). In a study of 40 patients who underwent arthroscopic RCR by both single and double row techniques by Burks et al,[3] the mean age was 56.5 years. In a study of 65 patients conducted by Boileau et al(4), all were diagnosed with chronic supraspinatus tears and were treated with arthroscopic rotator cuff repair, the mean age was 60 years with equal distribution of males and females. Around 75% of the cases were due to domestic fall followed by roadside accident cases (16.7%). We found no statistical significance between the age of the patient and postoperative results.

Most common cause of rotator cuff injury in our study was domestic fall 75.7% followed by roadside accidents. Miyazaki et al[11] conducted a study on 63 patients aged under 50 years also found the majority of the patients with traumatic etiology. Twenty-five out of forty patients suffered antecedent trauma in a study by Burks et al.[3]

In our study, we found that clinical examination played a key role in screening as well as diagnosing rotator cuff tears. Positive clinical tests correlated with MRI findings that were positive in all patients. So, the surgeon may not depend on radiological investigation only as it lowers the financial burden on healthcare system and the patient too. The mean pain score at the end of follow up was greater than 8 (8.22) that means patients no longer require frequent use of pain killers. The mean function score at the end of study was also more than 8 (8.16) that means all the patients can do most of the housework, shopping and driving is possible and are able to work above the shoulder level. The

Table 1: Distribution of pain score

	Mean	Std. Deviation	t	p-value	Difference	
					Mean	SD
Pain_0 Month	2.54	1.22				
Pain_1 Month	5.95	0.33	-15.669	0.000	-3.41	1.32
Pain_6 Months	8.22	0.63	-27.654	0.000	-5.68	1.25

Table 2: Distribution of function score

	Mean	Std. Deviation	t	p-value	Difference	
					Mean	SD
Function_0 Month	2.95	1.37				
Function_ 1 Month	5.46	1.54	-7.774	0.000	-2.51	1.97
Function_6 Months	8.16	0.73	-22.090	0.000	-5.22	1.44

Table 3: Distribution of active forward flexion score

	Mean	Std. Deviation	t	p-value	Difference	
					Mean	SD
Active forward flexion_0 Month	1.81	0.81				
Active forward flexion_ 1 Month	3.00	0.00	-8.920	0.000	-1.19	0.81
Active forward flexion_6 Months	4.43	0.56	-23.411	0.000	-2.62	0.68

Table 4: Distribution of strength of forward flexion score

	Mean	Std. Deviation	t	p-value	Difference	
					Mean	SD
Strngth of forward flexion_0 Month	3.03	0.55				
Strngth of forward flexion_ 1 Month	3.49	0.51	-3.643	0.001	-0.46	0.77
Strngth of forward flexion_6 Months	4.57	0.56	-18.548	0.000	-1.54	0.51

Table 5: Distribution of satisfaction score

	Mean	Std. Deviation	t	p-value	Difference	
					Mean	SD
Satisfaction of patient_0 Month	0.00	0.00				
Satisfaction of patient_ 1 Month	3.92	2.09	-11.424	0.000	-3.92	2.09
Satisfaction of patient_6 Months	5.00	0.00				

Table 6: Distribution of technique used

Technique Used	No. of cases	Percentage
Single row	24	64.9%
Double row	13	35.1%
Total	37	100.0%

Table 7: Comparison of ulca score according to single and double row technique

Row	Single		Double		t	p-value
	Mean	SD	Mean	SD		
Total score_0 Month	11.25	2.67	8.46	3.07	2.875	0.007
Total score_ 1 Month	21.29	2.16	22.15	2.61	-1.078	0.288
Total score_6 Months	30.46	1.32	30.31	1.89	0.285	0.778

Table 8: Following is the comparison of mean UCLA score with other studies

Author name	Technique used	Number of patients	Mean age	Follow up duration	Mean UCLA at end of follow up
Sugaya et al [12]	Double row	86	60.5	31 months	32.9 ±3.7
Murray et al [13]	Not available	45	57.6	24 months	33.7±3.0
Ji et al [14]	Single row Double row	22 25	58 56	22 months 24 months	30.82 32.40
Burks et al [3]	Single row Double row	20 20	56 57	12 months 12 months	28.6±3.6 29.5±5.6
Franceschi et al [15]	Single row Double row	26 26	63.5 59.6	22.5 months 22.5 months	32.9(29-35) 33.3(30-35)
Boileau et al [4]	Tension band suture	65	60	29 months	32.3±1.3
Our study	Single row Double row	24 13	53.3 48.1	6 months 6 months	30.46±1.330.31 ± 1.9

active forward flexion in majority of the cases (51.3%) was between 120 to 150 degrees (score increased from 1.81 to 4.43) which is clinically as well as statistically significant result. Patients were advised to use shoulder abduction sling for the initial 3-6 weeks along with active wrist and elbow range of motion followed by active shoulder range of motion (avoiding abduction initially) at 6-12 weeks post-op. Patients were taught stretching exercises for forward flexion, internal and external rotation. Lastly, deltoid, rotator cuff, biceps, and triceps strengthening exercises were started which were continued till the end of the study and this showed excellent results in our patients.

On analysing the final outcome, our mean UCLA score at the end of our study was calculated to be 30.41 which can be graded a good result. All the patients have shown satisfactory results (36 out of 37) shown good result with score between 28-33, while 1 patient shown excellent result with score more than 33).

The advantages of arthroscopic as compared with mini-open repair include the ability to mobilize and release the rotator cuff, decreased surgical insult to the deltoid muscle, improved ability to evaluate and treat pathology of the glenohumeral joint, improved visualization, decreased immediate postoperative pain, decreased postoperative stiffness and no limitation in the size of the tear that can be addressed. [16]

5. Conclusion

The mean total UCLA score improved from 10.27 to 30.41 ($p<0.001$) which is graded as a good and satisfactory result according to UCLA scoring sheet. With a mean final follow up UCLA score of 30.31 in double row technique and 30.46 in single row technique used, we conclude that there was no statistical difference between both the techniques and they were equivalent to each other. Hence, we conclude from our study that arthroscopic repair of rotator cuff tears is a rewarding surgery in improving the pain and functioning of shoulder.

6. Source of Funding

None.

7. Conflict of Interest

The authors declare no conflict of interest.

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