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ARTHROSCOPIC SINGLE ROW VERSUS DOUBLE ROW ROTATOR CUFF REPAIR: A COMPARATIVE STUDY

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Abstract

Background: Recent advances in shoulder surgery which has drawn the attention since last two decades has been Arthroscopic shoulder surgery of Rotator cuff repair. RCR has been an integral part of Shoulder surgeries but the ideal modality of treatment has been a topic of discussion worldwide. The notion whether to undertake Single or Double row rotator cuff repair is the most recent one and has divided the surgeons opinions regarding the same. Our study was intended in validating the claim that the SR repair is equally comparable to the DR Repair.

Materials and Methods: 54 patients with full thickness rotator cuff tear treated with arthroscopic single row rotator cuff repair in our institute were evaluated retrospectively, a period from Feb 1, 2014 to October 31, 2016 after confirming the RCT Clinically and by MRI . Clinico-functional assessment was done using UCLA score. We compared our results of single row rotator cuff repair with published literature of double row rotator cuff repair.

Results: Our results confirmed that in patients with mild to moderate rotator cuff tear the results were good to excellent, Results being comparable to published data with the use of ANOVA for double row rotator cuff repair Conclusion: The study concludes that Arthroscopic SR Repair for RCT is an excellent modality of treatment. The SR vs DR Repair analysis showed no significant difference in clinical outcomes hence validating the claim that the SR Repair is a good enough modality of treatment for RCT.

Keywords: *Shoulder Arthroscopy, RCR (Rotator cuff repair), SRRCR (single row rotator cuff repair), DRRC (Double row rotator cuff repair), UCLA score, Rotator cuff tear (RCT).*

Introduction

Arthroscopic Rotator cuff repair is now the gold standard for treatment of rotator cuff tears. Advantages are smaller incision, reduced trauma to the soft tissues no detachment of the deltoid, resulting in faster recovery of function and less postoperative pain compared to mini open repair. Incidence of full thickness rotator cuff tears increases with increasing frequency as the patient ages especially in 5th - 7th decade which has been proven as per Cadaver study[1]. Arthroscopic rotator cuff repair resulted in equivalent or better Clinico-functional results compared to Open and mini open rotator cuff repair[2]. Many case studies after Arthroscopy rotator cuff repair have shown improved shoulder function, strength, pain relief and range of motion[3]. With the availability of advanced imaging like MRI more cases of rotator cuff tear are seen and diagnosed by Orthopaedic Surgeon in today's world. The most recent topic of debate among shoulder Arthroscopy Surgeons is regarding RCR by single or double row, each having its own proponents with various clinical publications and meta-analysis quoting advantages and disadvantages[4]. Single row repair is done by placing suture anchors either double or triple loaded from anterior to posterior on the rotator cuff footprint area on the greater tuberosity of the humerus (Fig 1). Single row rotator cuff repair is technically easier to perform and cost effective compared to double row cuff repair. Double row RCR consists of placing double or triple loaded medial row anchor in the medial side of the footprint 5mm from the articular margin. The sutures are then passed through the rotator cuff in a mattress fashion and tied. Each alternating suture thread from the medial mattress suture knot is passed through the eye of footprint anchor and tightened. The rotator cuff gets pressed on the footprint as the anchor is inserted laterally on the rotator cuff footprint (Fig 2). DR repair shows increased contact area of the rotator cuff to the footprint, a biomechanical strong construct and increased point of fixation of the cuff to the footprint. In spite of the advancements made in arthroscopy surgery, the re-tear rate of the rotator cuff remains high[5, 6,7,8,9]. Re-tear after rotator cuff repair depends on the technique, type and on the quality of the cuff and repair[8,10,11,12,13,14,15]. Many studies have demonstrated the superior biomechanical results of double row repair compared to single row repair[16,17,18] but there is no agreement regarding the superiority of double row rotator cuff repair with regard to clinic functional results compared to single row repair. Ming Chen et al in his meta-analysis study of Arthroscopic SRRCR versus DRRCR found a statistically significant healing rates in tears > 3cm in DRRCR compared to SRRCR but the differences were not clinically significant[18]. Tudisco et al.[16] and different studies and meta -analysis have not observed significant difference in clinical and functional results between single and double row rotator cuff repair[3].

Many critics of the arthroscopic procedure have mentioned about the inferior mechanical strength of suture anchor repair when simple sutures are used[19,20,21]. There are reports that suture anchor repair through single row techniques restores only 67% of the footprint compared to double row repair which restores 100% of the footprint[22].

Consequently since there is no clear convergence among various shoulder surgeons regarding single row versus double row rotator cuff repair. The present Study aims to evaluate the clinical and functional results of single row rotator cuff repair in our Hospital and compare it with published literature of DR RCR to corroborate the above mentioned claims.

Materials and Methods

Fifty four patients who presented to the orthopaedic department of our Hospital with RCT were studied retrospectively during the time period from Feb 1, 2014 to October 31, 2016. The study commenced after ethical clearance was obtained from November 1, 2018. The patients at the time of presenting to our hospital were evaluated thoroughly both clinically and by diagnostic MRI (Fig 3) to confirm full thickness rotator cuff tear. The dimension, retraction, atrophy and fatty infiltration of the rotator cuff were also noted. Clinico-functional results were evaluated preoperatively and at every year post operatively as per the UCLA Score[23,24] for a minimum of 2 years postoperatively to be included in the study. Patients that were included in the study were with full thickness Supraspinatus and Infraspinatus tears as per De Orio Cofields classification[25,26], primary repair patients, degenerative and traumatic tears. Partial rotator cuff tears or tears associated with Bankart and SLAP tears, patients with RCT with Pattes grade 3 and above retraction, and patients with Goutallier grade 3 and above fatty infiltration as per MRI of Rotator cuff were excluded out of the study.

All Patients were operated under General Anaesthesia with Interscalene block in Beach Chair Position (Fig 4) with the arm hanging in neutral abduction, 20 degree of flexion with

1 kg of traction. Through posterior portal Glenohumeral joint diagnostic Arthroscopy was done and via an anterior portal any intraarticular pathology like Biceps tear/Tendinitis and Subscapularis tear was noted. They were treated by tenotomy/ tenodesis of the biceps tendon and repair of subscapularis tendon tear. Subsequently via the posterior portal and lateral working portal arthroscopy of the subacromial space was done and preoperative diagnosis of RCT was confirmed after debridement of the bursa and mobilisation of the tendon. The tear was classified according to Cofields as small (> 1 cm), medium (1-3cm), Large (3-5 cm), or massive (> 5 cm). Mobility of the torn cuff to the footprint was assessed (Fig 5)**.** Through a small stab wound just lateral to the lateral border of the acromion in the anterior half, two to three 5mm Smith and nephew double loaded titanium metal anchors was inserted based on the dimension of the RCT in the rotator cuff footprint, 8-10 mm from the Articular margin and the RCR was done with mattress sutures passed by an antegrade suture passing device (Fig 6). This was done via a lateral portal while viewing from the posterior portal. After all the sutures were passed through the rotator cuff, each suture pairs were tied with a locked sliding knot and three alternating half hitches (Fig 7). The limb was immobilised in a sling in neutral rotation for 4 weeks. Passive movements in the plane of the scapula was started from 4-6 weeks up to 90 degree of elevation. Active Assisted and active movements were started at 6-12 weeks post-op and from the 12th week strengthening exercises were started. In case of concomitant subscapularis repair external rotation was restricted beyond neutral for 6 weeks. Patient was assessed for the Clinico-functional assessment with UCLA Score and every year after the Surgery. We then compared our study with other published studies of DR rotator cuff repairs.

Results

The study included 37 male and 17 female patients (Fig 8). Cause of the lesion was Traumatic in 34 patients and Degenerative in 20 patients (Fig 9). Mean age was 51.68 years. 33 was dominant limb and 17 was non dominant (Fig 10).Smoking history was seen in 11 patients, Systemic factors Diabetes and Steroid intake were present in 7 and 3 patients respectively (Fig 11). Concomitant procedures like biceps tenotomy, tenodesis, and subscapularis repair and sub acromial decompression was done in 10 patients.

Patients mean follow-up was 28.74 months with minimum and maximum follow up of 24 & 37 months respectively. Patient was evaluated every year postoperatively with UCLA Score. Injury size classified by Cofields Grading, ranging from 1-4 with mean Cofields grading of 2.22.The mean Post-operative UCLA score was 32.07±1.47 after 2 years follow-up. The UCLA Scores for various Cofield's grade in our patients is illustrated in Table 1. Results were graded as Excellent in 42 patients (78%), Good in 10 patients (19%)and poor in 2 patients(3%) (Fig 12). In the 2 patients with poor results in our study, one patient with Cofield grade 2 tear had a history of smoking while the other patient had grade 4 tear with no associated comorbidities.

On comparison of our SR rotator cuff repair study with other published data of DR rotator cuff repair, our results were statistically significant ($P<0.001$) with equal to no difference in clinical and functional outcomes (Table 2) compared to DR rotator cuff repair. The study method used was ANOVA.

Discussion

The concept of Double Row Repair came out mainly for better restoration of the anatomical footprint and since it was believed to have better strength of fixation, hence gaining popularity as the superior method of treatment amongst RCT Repairs. Current techniques of discussion among shoulder arthroscopy surgeons pertains to whether to use SR repair or DR repair for better clinico functional results. There are various literatures which point to DR being a superior method of treatment for RCT, however recent studies have also pointed out that SR Repair gives us clinically similar results when compared with DR Repair. Our Study aimed at validating the above statement. 54 patients who came under our inclusion criteria were operated for SR RCR. On Retrospective analysis we observed that the UCLA Scores pre-operatively when compared to the post-operative scores was higher and showed better clinico-functional outcome. The same patient outcomes when compared with the SR Repair of other DR Repair published data showed similar results with respect to clinical and functional outcomes with respect to UCLA scoring. The size of the lesion (Cofields Grading) and co-morbid conditions like Diabetes, Smoking history and Steroid intake influenced the outcome showing poorer results when compared to the other patients without history of the same. Out of the 54 patients, 10 patients required an additional procedure like Subscapularis Repair, Biceps Tenodesis/Tenotomy & Sub

acromial Decompression.

In a study conducted by Senna et al. where there were 29 patients operated for the same, the Post-operative DR UCLA Scores averaged 32.6 ± 4.7. When likened to our study of 54 patients our Post-operative UCLA scores were 32.07 ± 1.47, comparable to our study.

Another study by Carbonel et al showed that in 80 patients who were operated for DR Repair, the Post-operative DR UCLA Scores averaged 29.5 ± 1.6. The study compared another set of patients who had undergone SR Repair and found that there was a significant difference in clinical outcome amongst the two subsets which is more pronounced in patients with a tear of 30mm or more. When the analysis was limited to patients with a tear between 10-30mm, there was no statistical difference.

Franceschi et al, conducted a study which showed no statistical difference between their SR and DR Repair that included 60 patients and a follow up period of 2 years.

Burks et al, showed no statistical difference between their SR and DR treated patients at one year of follow up. Apart from UCLA Scoring, they also used WORC, ASES & SANE scores to confirm the same.

When we compared our SR data with the available data of the above mentioned studies we found no difference between our patients UCLA Score at a minimum period of 2 years follow up when compared to with the DR Repairs. There was a difference noted between our patient's pre and post-operative scores.

During our study we did not encounter any post-operative complications such as Infection, stiffness or any repeat complaints of the same during our study. The few drawbacks that can be mentioned would be the retrospective type of study with a short duration of follow up undertaken for the study. Hence long term (>10 years) complications such as re-tear could not be evaluated. Our data was compared with other studies conducted not only for DR Repairs but even for SR & DR Repairs. A study conducted by Vastamaki ET al[21] with a follow up for 20 years showed significant deterioration of tendon integrity and clinical outcome with time. We also did not perform any Post-operative scan like a MRI to view the rotator cuff and even though functionally the patient outcomes were good to excellent in majority of cases, chances of minor re-tears of the Rotator cuff can be missed.

Thus on comparison of our study with other similar studies of DR repair we found that our study results were similar with regards to clinico-functional results. These results were consistent with other published studies which showed no significant difference in the scores between SR and DR Repair patients. Our results were parallel to the clinical findings of Dodson et al[22]. Who suggested that a good function was more important and prevailed with time even when presence of re-tear was present?

It is fair to make the assumption that DR Repairs are superior since they restore the anatomy of the RC and have also shown in various laboratory tests that they have a better biomechanical advantage[5,16,17,20,27]. However doing a DR Repair requires the use of additional suture anchors, sometimes 2-3 more. With the majority of the Indian population being uninsured or poor, the cost of the surgery rises with every implant used and takes a toll on the patient. Various studies have spoken about the differences between the two groups especially when it comes to the argument of re-tears but the patient clinically shows no difference.

Conclusion

It is thus our conclusion that the SR RCR procedure is adequate for the treatment of RCT as the patients clinically show no difference when compared to other published DR Repair studies. More importantly, considering that most of the patients we treat in India cannot afford basic health care, it is vital that the surgeon has the patient's affordability at the back of his mind when treating them while on the other hand not losing sight of giving them their best option of treatment. Thus SR Repairs for RCT are an ideal treatment modality, is technically easy to perform, require less operative time and hence have lower complication rates like post-operative pain and infection.

Fig 1

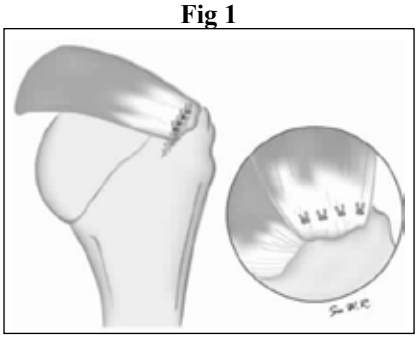


Fig 2

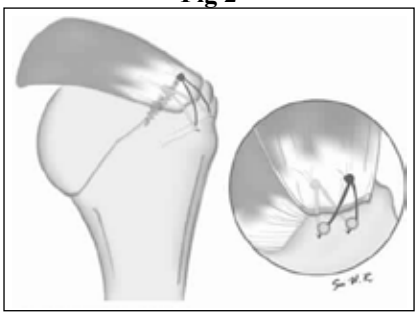


Fig 3

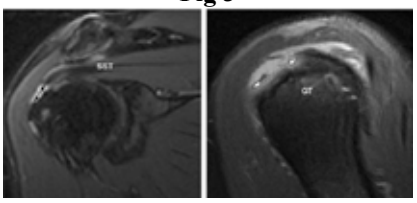


Fig 4

Fig 5

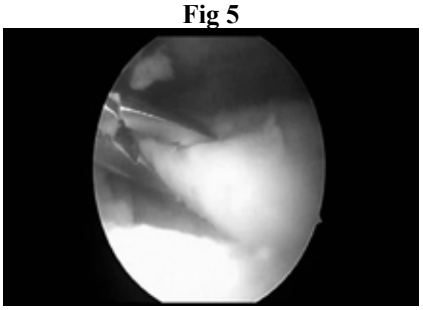


Fig 6

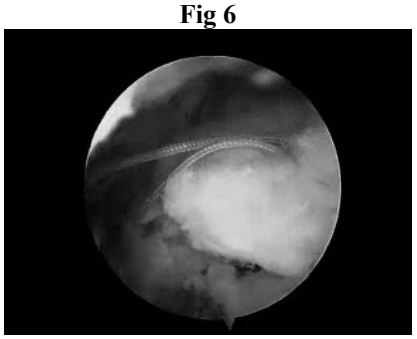


Fig 7

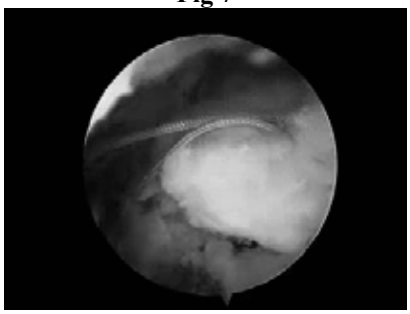


Fig 8

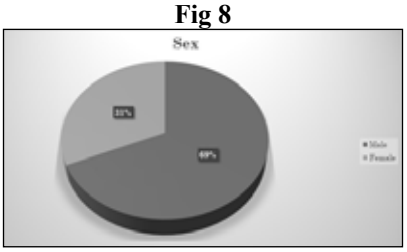


Fig 9

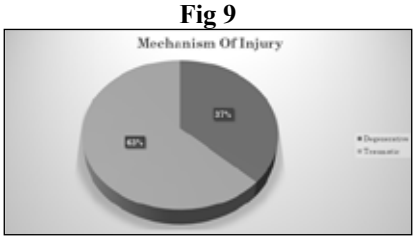


Fig 10

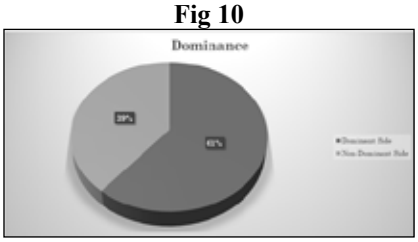


Fig 11

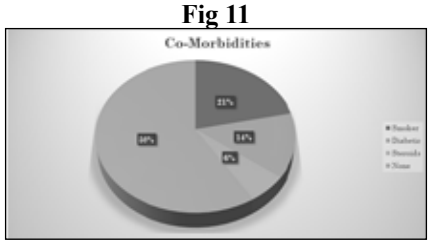
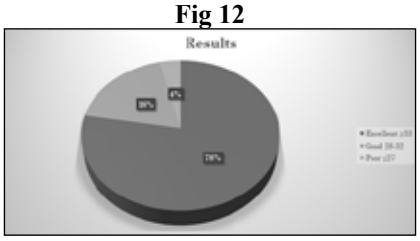


Fig 12



Our SR vs Other Published DR (Table 2)

STUDY	NO OF PATIENTS	TYPE OF STUDY	UCLA SCORE
Our Study	54	SR	32.07 ± 1.47
Senna & Ramos	29	DR	32.6 ± 4.7
Francesco Franceschi, Rocco Papalia	25	DR	33.3 ± 2.1
Carbonel & Martinez Et Al	80	DR	29.5 ± 1.6
Burks Et Al	20	DR	29.5 ± 5.6

UCLA Scores with respect to Cofields Grade (Table 1)

	RESULT			
Cofield Grade	Excellent	Good	Poor	Total
1	1	0	0	1
2	37	0	1	41
3	3	2	0	5
4	1	2	1	4
Total	42	10	2	54

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