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Functional Outcomes after Arthroscopic Single Row Rotator Cuff Repair: A Retrospective Study of 40 Cases

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Abstract

Purpose: Purpose of the study is to report functional outcomes of arthroscopic single row rotator cuff repair in patients with rotator cuff tear.

Type of study: Retrospective study.

Materials and methods: This retrospective study was conducted at Vaishvi orthopaedic hospital on 40 patients aged between 40 years to 73 years with rotator cuff tear, treated with arthroscopic single row rotator cuff repair between July 2013 to January 2017. Diagnosis was based on true AP radiograph and magnetic resonance imaging of affected shoulder. Patients were followed up for minimum of 6 months with mean follow up of 15.84 months. Pre and post operative rehabilitation protocols were given equal importance with compulsory minimum 4 months post operative rehabilitation and physiotherapy. The results and outcomes were assessed with the use of constant shoulder score and WORC (Western Ontario Rotator Cuff) index. Factors affecting the functional outcomes were also evaluated.

Results: During the period between July 2017 to January 2017 No patient was lost to follow up. In our series of 40 patients with mean age of 56.275, 65% (n=26) patients had traumatic injury and 35% (n=14) patients had degenerative cuff tear. The AFF according to constant score improved from average 71.80 degree preoperatively to 168.70 degree post operatively at minimum 6 months follow up. Average WORC index at the end of follow up was around 89%. Results are evaluated with constant shoulder score and WORC index showing statistically significant improvement in postoperative functional outcome.

Conclusion: Arthroscopic single row rotator cuff repair is effective in improving the functional status of shoulder in patients with rotator cuff tear.

Keywords: Shoulder; Full thickness; Rotator cuff tear; Arthroscopy; Repair; Factors affecting outcome; Constant score; WORC index

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Introduction

Full thickness rotator cuff tear is one of the most common condition affecting the shoulder especially in elderly age group. Incidence increases with advancing age in symptomatic and asymptomatic both groups Rotator cuff repair needs good surgical skill [1]. Results of arthroscopic rotator cuff repair (ARCR) are very promising [2-8]. The primary goals of ARCR are to improve pain and function of diseased shoulder. Over the past few years the medical science is accepting "Less is More", and that is why arthroscopic surgery has overtaken the traditional mini open/ open cuff repair as a result of technology, instrumentation, surgical technique and surgeon experience.

ARCR is gaining popularity now a day because of less postoperative complication, faster rehabilitation, less morbidity. Furthermore, very few studies have emphasised the rehabilitation protocol in postoperative phase of ARCR.

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The purpose of this study is to evaluate the functional outcome of complete arthroscopic single row rotator cuff repair along with strategic aggressive rehabilitation protocol with constant score and WORC Index [9-23]. We also evaluated the factors affecting the results after ARCR **(Figure 1)**.

Methodology

Between the period of July 2013 to January 2017, 40 patients of full thickness rotator cuff tear underwent Arthroscopic single row rotator cuff repair. Preoperative radiograph and MRI were done in all the patients. Size of tear classified according to Cofield classification. Pattern of tear is classified as per Ellman and Gartsman classification [24]. The grade of retraction is encountered with the help of Patte's classification [24,25]. Fatty degeneration is classified according to Goutallier classification [26]. All the patients assessed with constant score in pre and post operative phases. All the patients are also evaluated with WORC Index.

All surgically fit patients having full thickness rotator cuff tear involving supraspinatus and/or infraspinatus tendon with full passive range of motion were included. Patients with tear involving subscapularis and teres minor which require intervention, patients with arthritic changes and patients having restricted passive ROM were excluded.

All patients (n=40) were operated at Vaishvi Orthopaedic Hospital. All were treated with double loaded 5 mm titanium suture anchor (min-1, max-3) with single row repair technique **(Figure 1)**. Arthroscopic footprint repair was performed in 35 cases. Medialization of foot print was done in 5 cases. Acromioplasty was performed in 1 case. Sub-acromion decompression was performed in all patients. Bicep tenotomy was performed on 3 patients. All the patients were given Shoulder Arm.

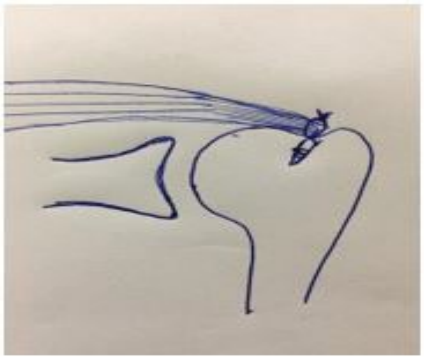

Figure 1 Diagrammatic illustration of single row arthroscopic rotator cuff repair.

Pouch Sling for immobilization for 6 weeks. Patients were followed up periodically for minimum of 6 months. Pendulum and scapula stabilizer exercises were started as early as the patients became pain free after surgery. External rotation up to neutral was advised between 3-6 weeks. Active assisted ROM exercises were started at 4-6 weeks. Patients were evaluated with pre and post operative constant shoulder score. Post operatively patients were also assessed by WORC index.

Preoperative assessment

All the patients were examined clinically thoroughly. Neer's and Howkin's Kennedy tests for impingement, Yergason and Speed test for bicep, Jobe test, Horn blower, Resistive external rotation, Press belly test, Lift off test were performed on each patient. Clinically, inclusion criterias were defined by weak Jobe and resisted external rotation test of affected shoulder as compare to normal shoulder. True anteroposterior view of shoulder was taken in all the cases. The clinical findings in favour of rotator cuff tear were confirmed with MRI. The preoperative evaluation done with constant shoulder score and WORC index **(Figure 2).**

Operative technique

All the patients were operated in sitting position (80 degree inclined) under general anaesthesia. Interscalene block was given in all the patients with the purpose of post-operative pain relief. Systolic blood pressure was kept between 80-100 mmHg during the surgical procedure. All standard portals were taken. The gleno-humeral joint was inspected from posterior viewing portal. Site of rotator cuff tear was identified. Sub acromion space was examined by postero lateral portal and bursectomy was performed in all cases. Cancellous bone bed was prepared with the help of burr and motorised shaver system. Edges of torn cuff were refreshed with duckbill forcep and motorized shaver system. Intraoperative bleeding was controlled by radiofrequency probe. Titanium double loaded 5 mm suture anchores with non-absorbable braided material used. Either 1, 2 or 3 anchors were used according to size of tear and retraction.

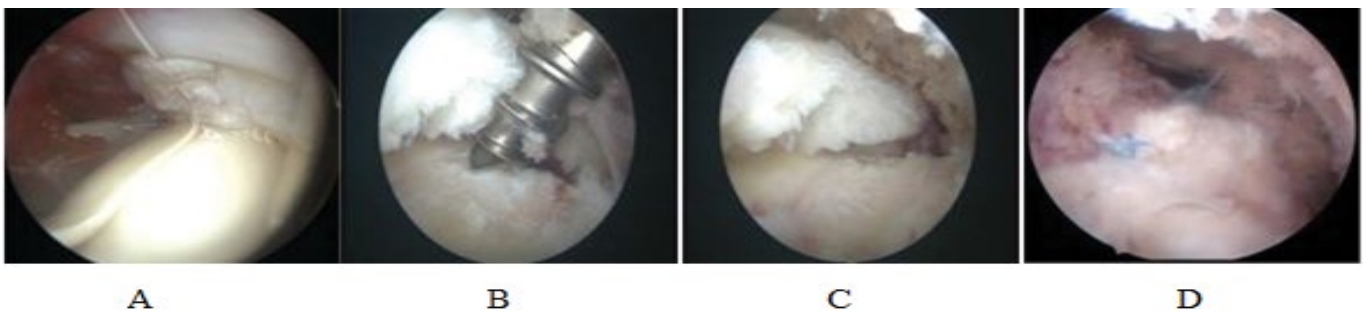

Figure 2 Arthroscopic view of (A) After foot print preparation (B) Suture Anchor placement (C) Subacromial view through posterior portal after single row repair (D) Retensioned rotator cuff cable.

Cuff was repaired with Duncan knot technique. Final view was taken through subacromion space for complete coverage of humeral head with rotator cuff. Re-tensioning of rotator cuff cable was inspected through shoulder joint. Post operatively patient was given Shoulder Arm Pouch Sling for 6 weeks.

Postoperative management

All the patients were advised pendulum and scapula stabilizer exercises as early as patient became comfortable. No active movements permitted for first 6 weeks. Assisted passive movements were started at the end of 4 weeks. Gradual assisted active movements were permitted at the end of 6 weeks. All active movements were not permitted till full passive range of motion achieved. Deltoid strengthening exercises were permitted after achieving enough strength of rotator cuff (tested with Jobe test). Supervised physical therapy was continued till full ROM and strength achieved.

Rehabilitation protocol improvised

Shoulder rehabilitation program after rotator cuff repair emphasized on early dynamic gleno-humeral mobility and restoration of cuff strength. Throughout the program over stressing of the tissues was avoided, striking a balance between regaining shoulder mobility and promoting soft tissue healing. patients were treated in four phases.

- Immediate post-surgical and protection phase (6 weeks).
- Intermediate phase (6-11 weeks).
- Advanced strengthening phase (12 to 19 weeks).
- Return to sports was permitted after 24 weeks.

In the first and second phase patient was instructed about the time and duration of the rehabilitation protocol and the activities to be avoided. patients were taught pendulum exercises, scapular bracing, elevation, shoulder active assisted exercises upto 90 degrees flexion and 60 degrees of abduction. No external rotation was permitted. Isometric deltoid exercises were also initiated. Shoulder sling was maintained for 6 weeks. The third phase included scapula stabilization program and rotator cuff strengthening that was started gradually with thera-bands and progressive shoulder mobilization was continued. Emphasis was also given to correction of abnormal movement pattern. The rehabilitation program was aimed at achieving a full ROM and normal strength. Deltoid strengthening was promoted after achieving enough strengthening of rotator cuff (tested with Jobe test). Return to sports activities were advised only after 24 weeks and after patient completed an advanced shoulder program which included multidirectional restoration of stability and strength.

Scoring and statistical analysis

All the patients were evaluated at regular interval in OPD. All patients in our study were pre-operatively examined and operated by Dr. Jaimeen P. Jesalpura and post-operatively, all patients were examined and evaluated with WORC score and constant scoring system by different orthopaedic surgeons, Dr. Sagar C. Hingrajia and Dr. Dhaval K. Sangada, to avoid the bias. All the patients were examined and evaluated for minimum 6 months after the surgery. Specifically, Constant Score and WORC Index was evaluated using paired t-test. All statistical analysis was performed by statistician. There was no selection bias.

Mean preoperative and postoperative constant score was 23.475

Table 1 Results according to constant score.

Parameters	Number of Patients	Average Preoperative constant score	Average Postoperative constant score
Age			
Below 55 years	19 (47.50%)	24.37	83.79
Above 55 years	21 (53.50%)	22.67	76.91
Sex			
Male	17 (42.50%)	22.53	82.06
Female	23 (57.50%)	24.17	78.78
Size of tear			
Up to12 mm	16 (40%)	23.31	79.63
More than 12 mm	24 (60%)	23.58	80.54
Grade of retraction			
Grade-1	9 (22.50%)	23.67	84.67
Grade-2	24 (60%)	23.04	80.71
Grade-3	7 (17.50%)	24.71	72.57
Grade of fatty degeneration			
Grade-0	19 (47.50%)	22.05	83.47
Grade-1	12 (30%)	23.91	79.92
Grade-2	6 (15%)	25.83	71.5
Grade-3	3 (7.50%)	26	77.67
Mode of injury			
Traumatic	26 (65%)	22.73	82.23
Degenerative	14 (35%)	24.86	76.36
Total patients	40	23.475	80.175

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and 80.175 respectively. Using paired t-test, t=32.567 and p<0.0001 suggestive of statically significant difference between preoperative and postoperative scoring and functional outcome. Arthroscopic single raw rotator cuff repair improves functional outcome of shoulder.

Results

In our study of 40 patients, 57.5% (n=23) were female and 42.5% (n=17) were male. Age of patients range from 40 years to 73 years (average 56.275 years). All the patients presented with 3.82 months of average duration of symptoms. Right shoulder is most commonly injured. In 26 (65%) patients tear was because of trauma and in 14 (35%) patients tear was degenerative. Out of all, one patient was operated for retear due to trauma, who was previously operated at other centre with open technique.

All the patients had full thickness rotator cuff tear diagnosed by MRI and confirmed arthroscopically. Among all patients, 22 were having only supraspinatus tear and 18 were having associated infraspinatus tear. Size of tear ranged from 8 mm to 22 mm (average 14.1 mm). Retraction according to Patte's classification was, grade-1 in 9 (22.5%), grade-2 in 24 (60%) and grade-3 in 7 (17.5%) patients. In 3 patients (7.5%) bicep tenotomy was performed. Medialization of rotator cuff foot print by 5 to 8 mm was performed in 5 patients, having long standing tear with inability to mobilize the cuff upto footprint after adequate release. Average degree of AFF (Active Forward Flexion) improved from 71.80-degree pre-operatively to 168.70degree post operatively.

Various factors affecting the result are mentioned in **Table 1** above. Good to excellent results were noted in male patients, grade 1and 2 retraction of cuff, minimal fatty degeneration (grade-0, grade-1), traumatic injury. Relatively fewer favouring results were noted in female patients, grade 3 and 4 cuff retraction, advanced fatty degeneration and degenerative tears.

All the patients were able to do their activity of daily living with ease. None of them had complaints of pain or night pain after at least 6 months of follow up. All the patients were satisfied with the final results according to WORC Index.

Discussion

It is globally accepted that full thickness rotator cuff tear has successful results with arthroscopic repair. Most of the study are either on double row repair or comparison of single and double row repair. There are very few studies that has documented the results and outcomes on arthroscopic single row rotator cuff repair [27,28]. One of the few studies have reported results using Constant score and WORC index [24]. Constant shoulder score considers physical examination tests and functional evaluation by patients as well. WORC score gives better information regarding patients functional and qualitative outcome after surgery.

In our study Good to Excellent results were achieved in male patients, lesser degree of rotator cuff retraction and fatty degeneration, and with traumatic cuff tear.

Results of study are usually affected by different operating surgeon, different fixation devices, fixation materials and surgical technique. To maintain the uniformity in this study, all the surgeries were performed by same surgeon with similar technique as mentioned previously. The fixation devices used were of similar material.

Preoperative scapula stabilization and core strengthening improves final rotator cuff strength and shoulder function.

Conclusion

Arthroscopic single row rotator cuff repair is effective in improving the functional status of shoulder in patients with rotator cuff tear.

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