Clinical Outcomes and Sturctural Integrity of Rotor Cuff Tears after Arthroscopic Single Row Repair

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ABSTRACT

Aim: To determine the functional and structural outcomes of rotator cuff tears after arthroscopic single row repair with biodegradable suture anchors.

Methods: This descriptive study was conducted in Hand & Upper Limb Surgery centre, CMH-Lahore Medical College, Lahore from 3rd January 2016 to 20th August 2019.All patients with rutator cuff tears fulfilling the inclusion criteria were operated arthroscopically with a single row(SR) technique using biodegradable suture anchors. Post operative functional outcomes were assessed at six months follow up with University of California Los Ageles score(UCLA), American Shoulder and Elbow Surgeon score(ASES) and pain assessment with Visual Analogue Scale(VAS).Post operative structural integrity of the rotator cuff was evaluated with ultrasonoghrapic examination. Pearson's correlation test and Fisher's exact test were applied to find the significant association between functional outcomes and different demographic variables. *P* value < 0.05 was considered significant.

Results: A total of 40 patients including 36(90%) male and 4(10%) female were included in our study. Mean age at the time of operation was 46.45±13.79 years (range 24-70 years). Right side was involved in 28 (70%) cases and left in 12(30%) patients. Traumatic and degenerative tears were noted in 28(70%) and 12(30%) patients respectively. Mean follow up peroid was 18.1± 6.17 (range 9-31) months. Functional outcomes at final follow up according to UCLA improved from 23.35±7.47 pre operatively to 33.51±1.1 post operatively while ASES score improved from 43.6±4 preoperatively to 70.45±19.87 post operatively.Pre-operative average shoulder pain on VAS was 5.9±0.69 (range 4-8). At last follow up average shoulder pain was 1.95±0.82 range (1-3) with average improvement of 3.95±1.5. Structural integrity on post operative ultrasonoghrapic examination revealed intact rotator cuff in 36 (80%) cases while 8 (20%) cases had re-tear.

Conclusion: Arthroscopic single row rotator cuff repair produced excellent functional and structural outcomes and significant pain reduction in majority of our patients. We therefore, recommend this intervention as a suitable treatment option for small to medium size rotator cuff tears.

Key words: Rotator cuff tear, Shoulder Arthroscopy, Single row repair, Suture Anchors

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INTRODUCTION

Supraspinatus, infraspinatus, teres minor and subscapularis form the rotator cuff that covers and holds humeral head in glenoid cavity and provide strength, stability and mobility to the shoulder joint.[1] The prevalence of rotator cuff tear is 5 to 40% and the aetiology can be degenerative or traumatic.[2] The most commonly torn muscle is supraspinatus which causes of loss of function, pain and decreased quality of life.[3] Rotator cuff tears can be managed

conservatively or surgically.Conservative treatments consist of pain management, activity modification, physiotherapy and intra-articular injections while surgical repair is done either openly or arthroscopically.[4] Outcomes of rotator cuff repair however, depend on patient age, gender, smoking status and size of the tear.[5]

There are various methods of surgical repair of the rotator cuff ranging from open to mini open and arthroscopic repair. Although open rotator cuff repair techniques are considered stronger fixation with low cost and having relatively shorter learning curve but they are associated with slow recovery, more blood loss and less satisfactory cosmesis.[6] Arthroscopic repair of rotator cuff enables better visualization of the pathology, better assessment of tear pattern, preservation of deltoid origin, early recovery, less blood loss and better cosmesis.[7,8]

The most commonly used arthroscopic techniques of rotator cuff repair are single row(SR) and double row(DR) repair techniques.[9] Although some studies [10-12] have shown biomechanical superiority of double -row over single-row repair, no consus has been achieved yet regarding post operatively functional superiorirty of double-row over single-row repair techniques.[13]Excellent and good functional outcome however, has been reported with single row arthroscopic repair of small and medium(<3cm) rotator cuff tears in many studies.[14,15]

In our institution large rotator cuff tears are usually repaired with arthroscopic double row technique while small tears(<3cm) are treated according to surgeon's choice.Since double row technique is technically difficult,time consuming and expensive, the results of this study would be used to formulate standard guidelines to treat small and medium sized rotator cuff tears in our institution.

METHODS

This descriptive study was conducted in Department of hand and upper limb surgery (HULS) Centre, CMH-Lahore Medical College, from 3rd January 2016 to 20th August 2019.All adults patients of either gender with small and medium size(<3cm) full thickness rotator cuff tears and painful shoulder motion presenting to the OPD were included in our study. Patients with bilateral rotator cuff tears, fracture shoulder,recurrent dislocation and previous rotator cuff surgery were excluded.Patient having traumatic tear were those who were not having any prior pain in shoulder and develop pain and reduce range of motion after trauma. Those who were having prior pain in shoulder and radiological evidence of osteophytes and degenerative changes were classified as degenerative rotator cuff tear. All patients were informed about the procedure and consent was taken. Approval of the study was taken from hospital ethical committee. Preoperative evaluation was completed by detailed history, physical examination and radiological evaluation of the involved shoulder. Radiological evaluation includes plain radiographs in anteroposterior and axillary projections and MRI of the affected shoulder. Patient demography included age, gender; side involved, hand dominance and mechanism(traumatic or degenerative) of tear.

Operative Technique

All operations were done under general anesthesia by two senior surgeons with minimum of five years post fellow ship experience in arthroscopy. Patient was placed in beach chair position. Anatomical land marks were marked with marker. Involved shoulder was scubbed and draped in standard sterile manner. First diagnostic arthroscopy was done by passing posterior portal. Spinal needle was passed just 2cm medial and distal to posterior tip of arcomian directed towards coracoid and 10cc of 2% lignocain was injected. Backflow from the needle confirm that needle was in joint space. Needle was removed and about 0.5 cm incisions was give with No.11 blade and trochar with cannula was passed. Trochar was replaced with arthroscope and diagnostic arthroscopy was done by examining glenoid, humeral head and bicep tendon. Second port was passed under arthroscopic guidance just medial to long head of bicep for additional instrumentation and inflow of fluid. Third port was passed just lateral to the long head of bicep. A lateral port was passed about 3 to 4 cm distal to lateral border of acromian and posterolateral portal at posterolateral edge of the arcomian to asses subacromial area for bursitis.

Tear was identified and its size was measured with help of probe with a scale. Tear was further assessed for its location and wither degenerative or traumatic. Tendon was grasped with grasper and its reparability and reducibility was assessed. In case cuff was not reducible then it was released and foot print was advanced 1cm to medial side of humeral head. In case of reduced subacromial space acromioplasty was performed. Both superficial and deep layers of rotator cuff were repair with standard single row technique with biodegradable suture anchor by passing it in anatomical neck of humerus.

All arthroscopic portals were closed with monofilament suture.

Post operatively an abduction pillow was used for 4-6th weeks.Pendulum motion was started at 2-4 weeks, passive range of motion at 4th weeks, active range of motion at 6-8th weeks and strengthening exercise at 12th weeks. Post operative functional outcome was assessed at 6th months using University of California Los Ageles score(UCLA),[16] American Shoulder and Elbow Surgeon score(ASES)[17] while pain was assessed with Visual Analogue Scale(VAS).This assessment was done by a final year Orthopaedic resident not involved in the study.The UCLA score was rated as excellent/Good(> 27) and Fair/Poor score(< 27 score) while lower ASES score indicated more pain and greater disability.Structural integrity of the rotator cuff was assessed with ultrasonoghrapic examination of the shoulder by an experienced qualified(FCPS) ultrasonologist with minimum of 5 years post fellowship experience and not part of this study.

Data analysis was done using IBM SPSS version 22.0 Frequency, mean and standard deviation was calculated for age, gender, hand dominance, type of tear, UCLA score, ASES score and pain score (VAS). Pearson's correlation test and Fisher's exact tests were applied to find the significant association between functional outcome in terms of UCLA score and ASES score with different demographic variables (age, gender, side affected, type of tear and post-operative pain score).*P* value< 0.05 were considered significant.

RESULTS

The total number of patients in our study were 40.Majority(90%,n=36) were male while female patients were only 4(10%). Mean age at the time of operation was 46.45±13.79 years (range 24-70 years). Right side was involved in 28 (70%) cases and left in 12(30%) patients. Traumatic tears were noted in 28(70%) patients while degenerative in and 12(30%).Mean follow up was 18.1±6.17 months (range 9-31 months). Pre-operative average shoulder pain on VAS was 5.9±0.69 (range 4-8). At last follow up average shoulder pain was 1.95±0.82 (range 1-3) with average improvement of 3.95±1.5. Functional outcomes at final follow up according to UCLA improved from 23.35±7.47 pre operatively to 33.51±1.1 post operatively while ASES score improved from 43.6±4 preoperatively to 70.45±19.87 post operatively.

Structural integrity on post operative ultrasonoghrapic examination revealed intact rotator cuff in 36 (80%) cases while 8(20%) cases had re-tear.Partial thickness tear was noted in 6(75%) patients while full thickness in 2(25%) patients. A significant correlation was found between functional outcomes and age, hand dominance and post operative pain (*P* value< 0.05). Younger male patients(< 30 years) with traumatic tears and right dominant hand and with mild pain(VAS < 3) had better functional outcome and than others (*P* value< 0.05).Two cases(5%) had post-operative serous discharge from port site which were managed with daily dressing and antibiotics.

DISCUSSION

In this study we treated 40 patients of rotator cuff tears with single-row(SR) arthroscopic technique using suture anchors and the functional outcome at six months follow up revealed average UCLA score of 25.35±7.47 (range 13-34), ASES score of 70.45±19.87 (range 43-95) and VAS 1.95±0.82 (range 1-3).Senna and colleague[13] compared 29 rotator cuff repaired with SR technique and 27 with DR technique.The average UCLA score was 30.8 in SR group and 32.6 in DR group(P value > 0.05) at last follow up visit at 37.8 months and 41 months repectively.The ASES score was 82.3 in SR group and 88.8 in DR group.(P value> 0.05).The authors concluded that no statistically significant difference was found in functional outcome between the two techniques when performed by single surgeon.Baums and Kostuj [18] did not not recommend double row rotator cuff repair for all types of tears because they were of the opinion that DR technique was cost effective and evidence of its effectiveness was vague.Dierckman[19] treated 53 rotator cuff tears of 2 to 4 cm with SR repair and triple loaded anchors and augmented with bone marrow vents.The functional evaluation was done with Western Ontario Rotator Cuff(WORC) outcome score and rotator cuff re-tear with MRI.The post operative WORC score was 95.7(range 27.6-100) and intact rotator cuff in 91% patients with excellent patient reported outcome.

Ying and his colleagues[20] analyzed seven randomized controlled trials and four Prospective Cohort studies comparing the functional outcomes of SR versus DR repair techniques for small and large rotator cuff tears.The authors were unable to draw any definite conclusion of the superiority of either technique.Similarly many other small and large randomized trials can be found in literature which revealed equal effectiveness of SR and DR repair of rotator cuff tears. Burks[21] conducted a randomized trial of 20 patients repaired with SR and 20 with

DR.At one year follow up the number of re-tear patients were 2 in each group while no statastical difference was noted in the functional outcome between the two groups as assessed with UCLA,WORC,ASES.SANE and Constant score. Aydin[22] treated 34 patients with small to medium size rotator cuff tear with SR and 34 with DR.At two years follow up although the Constant score was 82.2 in SR and 78.8 in DR,the difference was not significant. Lapner[23] treated 45 patients with SR and 45 with DR repair and functional outcome were assessed at 24 months with Western Ontario Rotator Cuff index(WORC),ASES score and constant score.He found no statastical difference between functional outcome or quality of life in patients operated with either SR and DR techniques except small tear repaired with DR technique had higher healing rates on MRI or ultrasound.

In our study 8(20%) cases had re-tear on ultrasonoghrapic examination at six months follow up. Partial thickness tear was noted in 6(75%) patients while full thickness in 2(25%) patients. Overall a re-tear rate of 11% to 57% have been reported in literature after surgical repair of rotator cuff.[24]Franceschi and Ruzzini[14] treated 26 patients with SR technique and at 2 years follow up documented intact rotator cuff on MRI in 14(53.8%),partial thickness re-tear in 10(38.4%) and full thickness re-tear in 2(7.6%) patients. Age of the patient,initial size of the tear,muscle atrophy,amount of fatty infiltration into the tear and retraction of the tear were found to be associated with adverse surgical outcome.[24,25]

Limitations of our study were descriptive design, small number of patients with predominantly male patients and shorter duration of follow up.The re-tear was assessed with ultrasound and risk factors for re-tears were not analysed.Further studies are recommended to address these limitations and confirm our results.

CONCLUSION

Arthroscopic single row rotator cuff repair produced excellent functional and structural outcomes and significant pain reduction in majority of our patients. We therefore, recommend this intervention as a suitable treatment option for small to medium size rotator cuff tears.However every arthroscopic surgeon must have skills to do single row as well as double row repairs and must be familiar with merits and demerits of each technique.

Conflict of Interest: None

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