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Longitudinal follow up of patients undergoing mini-open repair of rotator cuff tear

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ABSTRACT

Background: Shoulder pain is a common presenting complaint. This study is aimed to understand the role of mini-open repair in the treatment of rotator cuff tear and to assess the functional outcome in such patients over a period of two years.
Methods: This prospective study was conducted on patients who were operated by mini-open repair for rotator cuff tear at the Department of Orthopedics, AJ Institute of Medical Sciences January 2017 till June 2018. Using a pre-designed case report form, demographic and clinical information was noted for all patients. Functional outcome of the patients was assessed by the Constant and Murley score at post-operative follow up at 3 weeks, 6 weeks, 12 weeks, 6 months, 1 year and 2 years.
Results: Partial thickness tear was present in 57% of the pateints and rest had a full thickness tear. Mean Constant and Murley score at the time of presentation was 59.50 which improved during the follow up period and at the final follow up the score was 91.80. The score was not significantly different at one year and second year follow up. The score was consistently higher among patients with partial thickness as compared to those with full thickness, though the difference was significantly different only at 6 month follow up (p=0.007).
Conclusions: Significant improvement in range of motion was seen in our patients at 6 months post-operatively. Full range of motion was observed at the end of 1 year and functional outcome did not improve after that.

Keywords: Mini-open, Rotator cuff, Repair

INTRODUCTION

Shoulder pain is a common presenting complaint to outpatient orthopaedic clinic and sports medicine clinics and rotator cuff pathology is the most common condition of the shoulder for which patients seek treatment.[1] Operative approach for a torn rotator-cuff tendon can either be open or mini-open or all-arthroscopic. The mini-open approach involves an arthroscopic acromioplasty and repair of the torn tendon through a small open incision. Advantages of this approach are less perioperative morbidity and a decreased risk of deltoid detachment.[2] Past decade has seen a shift from mini-open to all-arthroscopic approach in surgical management of rotator cuff repair. However, labelling one method as being more effective than the other is still undecided, given that both techniques have been shown to be associated with good clinical outcomes.[3,4] Literature on the outcomes of mini-open approach from Indian settings is limited. Additionally, much of the published literature is retrospective in nature. This study is aimed to understand the role of mini-open repair in the treatment of rotator cuff tear and to assess the functional outcome in such patients over a period of two years.

METHODS

Study design and sampling

This prospective study was conducted on patients who were operated by mini-open repair for rotator cuff tear at the Department of Orthopedics, AJ Institute of Medical Sciences from January 2017 till June 2018. All patients who were diagnosed with rotator cuff tear were prescribed conservative management for 6 weeks at least, failing which were decided to operate upon. Diagnosis of rotator cuff tear was made based on clinical evaluation and magnetic resonance imaging studies. Patients with other fractures associated with rotator cuff tear and those with glenohumeral instability were excluded. Patients were explained the purpose of the study and an informed consent was obtained. Those refusing to consent were excluded from the study and their clinical management was not affected in any manner. The study was approved by the institutional ethics committee and was performed according to the bioethical guidelines prescribed by the Indian Council of Medical Research, New Delhi.

Surgical technique

All patients underwent diagnostic arthroscopy for viewing the entire shoulder joint. Direct repair of the rotator cuff was done via an anterolateral portal extension approach (mini-open technique) with a deltoid split without detachment. The edges of the tear were debrided, insertion site for suture anchors on greater tuberosity was prepared, tear was mobilized, sutures were placed through the edge of the tear and tied down to the anterolateral aspect of the greater tuberosity with suture anchors. For large tears, under some tension, special intratendinous sutures were placed through the cuff and were repaired using the suture anchors placed in the superolateral greater tuberosity. Post-operatively the arm was placed at the side in a sling for 6 weeks. Postoperative rehabilitation program included immobilization in a sling, active movements of wrist and passive external rotation in adduction only for first 6 weeks; active range of motion of shoulder avoiding lateral abduction during next 6 weeks; strengthening of deltoids, biceps, triceps beyond 12 weeks. Normal shoulder activities were advised after 6 months.

Data collection and data analysis

Using a pre-designed case report form, demographic and clinical information was noted for all patients. Eliciting detailed history, type of tear, underlying etiology and chief complaints were noted. Findings of the Jobe's test or the suprasinatus test were noted.[5] External rotation stress test was performed to test the integrity of the external rotators of the shoulder, specifically the infraspinatus and the teres minor. The lift off test described by Gerber and Krushell was performed to detect an isolated rupture of the subscapularis tendon.[6] Additionally, to detect decreased internal rotation the Belly press test was conducted and results were noted.[7] Functional outcome of the patients was assessed by the Constant and Murley score at each follow up, which included assessing for pain, activities of daily living, range of motion and power.[8] Score higher than 91 denoted excellent outcome, between 81 and 90 as good, between 71 and 80 as satisfactory, between 61 and 70 as adequate and below 60 as poor. Functional outcome was assessed at the baseline and then post-operatively at 3 weeks, 6 weeks, 12 weeks, 6 months, 1 year and 2 years. Data were entered and analysed using SPSS software (version 21 for Windows). Quantitative data were expressed as mean and standard deviation and qualitative as number and percentage. Means of Constant and Murley score at different time points in the follow up period were compared using the repeat measure analysis of variance (ANOVA) test, followed by a post-hoc test. Using student's t-test means of Constant and Murley score of patients with full and partial thickness were compared at different follow up time points. All the results were considered to be significant at the 5% critical level.

RESULTS

Of the 30 patients included in the study 33% were females and 51 to 60 years was the most common age group (Table 1). Partial thickness tear was present in 57% of the patients and rest had a full thickness tear. Trauma was underlying etiology in 73% of the patients. Inability to lift shoulder was the chief complaint in 80% of the patients and rest complained of pain in shoulder. Jobe's empty can test was positive in all patients. Restricted external rotation was seen in 83% of the patients. Arm lift off was observed to be positive in 10% of the patients. Belly press test was positive in 37% of the patients and biceps weakness as assessed by speed test was not observed in any of the patients under investigation. Mean Constant and Murley score at the time of presentation was 59.50 which improved during the follow up period (Table 2). At the final follow up (at 2 years), mean Constant and Murley score were 91.80. Applying post-hoc test to repeat measure ANOVA, we found significantly improved Constant and Murley score at and after the follow up at 6 months till follow up at one year. The score was not significantly different at one year and second year follow up. Further, mean Constant and Murley score was compared between patients with full thickness and partial thickness tear at different time points during the follow up period. We found the score to be consistently higher among patients with partial thickness as compared to those with full thickness, though the difference was significantly different only at 6 month follow up (p=0.007) (Table 3).

DISCUSSION

Management of rotator cuff tears depends upon several factors which include the duration of symptoms, side affected, the type of tear, age, comorbidities, and activity

level of the patient.[9] Treatment options include surgical repair and non-operative management. Very few randomized trials have directly compared surgical and nonsurgical management of rotator cuff tears.[10] Surgical repair of the rotator cuff can be performed arthroscopically or open. Open procedures involve either a standard or a mini-open technique. However, the mini-open approach for rotator cuff repair have shown to achieve satisfactory outcomes by a large number of clinical trials. Mini-open repair is a relatively easier technique compared with arthroscopic repair but has the potential disadvantages of limited visualization and deltoid morbidity. Furthermore, in a meta-analysis of Level I randomized controlled trials, no differences in the surgery time, functional outcome score, visual analogue pain score, and range of motion during the follow-up were detected when mini-open technique was compared with arthroscopic approach.[11]

Table 1: Distribution of patients according to their demographic and clinical characteristics.

Variable	N (%)
Age distribution (years)	
Less than 40	1 (3)
41 to 50	8 (27)
51 to 60	11 (37)
More than 60	10 (33)
Gender distribution	
Female	10 (33)
Males	20 (67)
Type of tear	
Full thickness	13 (43)
Partial thickness	17 (57)
Underlying etiology	
Degenerative	8 (27)
Trauma	22 (73)
Chief complaint of the patients	
Inability to lift shoulder	24 (80)
Pain in shoulder	6 (20)
Jobe's empty can test	
Positive	30 (100)
Negative	0
Restriction of external rotation	
Positive	25 (83)
Negative	5 (17)
Arm lift off	
Positive	3 (10)
Negative	27 (90)
Belly press test	
Positive	11 (37)
Negative	19 (63)
Speed test	
Positive	0
Negative	30 (100)

Table 2: Mean Constant and Murley score of the patients at different times during follow up.

Time of assessment	Mean±Standard deviation
At the time of presentation	59.50±5.21
At 3 weeks	61.17±4.55
At 6 weeks	71.87±6.15
At 12 weeks	81.23±5.83
At 6 months	86.80±3.29
At 1 year	89.97±2.29
At 2 years	91.80±1.51

Table 3: Mean Constant and Murley score of the patients in relation to the type of tear.

Time of assessment	Full thickness (n=13)	Partial thickness (n=17)	P value
At the time of presentation	58.79±4.06	60.13±6.09	0.49
At 3 weeks	60.29±4.19	61.94±4.85	0.33
At 6 weeks	69.86±5.66	73.63±6.18	0.95
At 12 weeks	79.57±5.86	82.69±4.62	0.11
At 6 months	85.14±3.84	88.25±1.84	0.007
At 1 year	89.21±2.96	90.63±1.25	0.09
At 2 years	91.36±1.39	92.19±1.55	0.13

Long term follow up patients after the mini-open repair is very important. There have been very few published studies which report long-term outcomes of mini-open approach. Galatz et al reported satisfactory outcomes in thirty-three patients who had been followed for ten years after rotator cuff repair.[12] The authors found a slight improvement in age-adjusted Constant scores over time. Zumstein et al reporting on massive rotator cuff tear found that follow-up Constant scores did not change significantly when compared at 3.1 and 9.9 years follow up.[13] Furthermore, the mini-open approach seem to have a higher incidence of post-operative stiffness, which involves not only the subacromial space, but often progresses to a traditional adhesive capsulitis in the genohumeral joint. This stiffness led to unsatisfactory functional outcomes and arthroscopic capsular release to restore motion became necessary.[14] The underlying cause of increased incidence of stiffness post mini-open technique is not completely understood. Smaller exposure through the lateral deltoid split requiring significant traction on the deltoid during the procedure, resulting in an unrecognized injury, has been suggested as one mechanism.[15]

CONCLUSION

Present study found no difference in functional outcome between partial and full thickness tear treated by mini-open repair. Significant improvement in range of motion was seen in our patients at 6 months post-operatively.

Full range of motion was observed at the end of 1 year and functional outcome did not improve beyond that achieved at the end of one year post-operatively. Further randomized controlled trials are required to support the findings of this study.

Limitations

The present study has some limitations. We do not have long- term data of the patients included in the study. We focussed mainly on short-term results, as minimal invasiveness of mini-open technique has been associated with faster functional improvement. Analysing a small sample size may have missed a few important associations. Finally, we did not assess postoperative analgesic use and time the patients took to return to their occupations.

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