Original Research Article

Assessment of functional outcome of mini-open rotator cuff repair: a hospital based prospective study

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ABSTRACT

Background: The mini-open repair is considered to be the gold standard for rotator cuff repair. This study was aimed to assess functional outcome of mini-open rotator cuff repair of shoulder joint in adult patients.

Methods: This was a one year hospital based prospective study conducted from January 2016 to December 2016. A total of 20 patients diagnosed to have rotator cuff tear of shoulder joint undergoing rotator cuff repair in the department of Orthopaedics, KLES Dr. Prabhakar Kore Hospital and Medical Research Centre, and KLES Dr. Prabhakar Kore Charitable Hospital, Belagavi were studied.

Results: Majority of the patients (85%) of the patients was male and male to female ratio was 5.6:1. Most of the patients were aged between 31 to 40 years (30%). The mean age was 41.90±13.98 years. Most of patients had degenerative rotator cuff tear (45%) and (70%) presented with features of swelling. At enrollment all the patients (100%) had poor constant score (>30) and fair/poor UCLA score (<27) suggestive of severe pain functional restriction. There were gradual but steady increase in scores from enrollment to each follow up till six month follow up with respect to mean flexion (6.25±5.35 to 163.50±7.63),abduction (5.50±5.10 to 112.0±5.94),external rotation (3.00±4.7 to 82.50±2.56),internal rotation (2.50±4.44 to 67.25±3.43) and UCLA score (5.35±1.63 to 29.60±0.82) (p<0.001) also there was gradual but steady decrease in mean VAS score from enrolment (7.70±0.47) to six months follow up (0.00±0.00) and constant score (from 85.70±1.98 to 7.85±1.46 respectively) (p<0.001). The constant score and UCLA score at six month follow up revealed excellent functional outcome.

Conclusions: The mini-open rotator cuff repair of shoulder joint results in excellent functional outcome among adult patients with rotator cuff tear of shoulder joint especially after six month with no complications and complete pain relief.

Keywords: Functional outcome, Mini-open rotator cuff repair, Rotator cuff tear of shoulder joint

INTRODUCTION

In the human body, shoulder is the most mobile and least constrained joint.[1] Functional stability is balanced by a complex combination of static and dynamic stabilizers about the glenohumeral joint. For those above the age of 60 years, rotator cuff injuries are common and hence overall health status and quality of life of patients with shoulder function is affected.[2] Approximately 25% of individuals in their sixties and more than 50% of those in their eighties have full-thickness rotator cuff tears present with increased incidence with age.[3] In old age group, rotator cuff tear of shoulder joint is a common problem either after trauma or after degenerative tear. As traumatic cases are also increased now a days and also as the age increases, rotator cuff tear are at risk.[4] However, there are limited numbers of studies are conducted in India on functional outcome of rotator cuff repair. The

up-to-date knowledge has the potential to facilitate better understanding of rotator cuff repair. This prompted us to assess functional outcome of mini-open rotator cuff repair of shoulder joint in adult patients.

METHODS

This study was conducted at KLES Dr. Prabhakar Kore Hospital and Medical Research Centre and KLES Charitable Hospital Belagavi from January 2016 to December 2016. Adult patients are diagnosed to have rotator cuff tear of the shoulder joint based on clinical and radiological evaluation (Figure 2a) and scheduled to undergo rotator cuff repair in the Department of Orthopaedics, KLES Dr. Prabhakar Kore Hospital and Medical Research Centre and KLES Charitable Hospital Belgaum were studied. A total of 20 patients diagnosed to have rotator cuff tear of the shoulder joint were enrolled in the study.

Inclusion criteria

- Adult patients aged above 18 years of age.
- Degenerative, traumatic, sports injury patients diagnosed radiologically and clinically with rotator cuff tear of the shoulder joint.

Exclusion criteria

- Patients having associated fracture of proximal one third humerus.
- Frozen shoulder.
- Calcific tendonitis.

At the arrival of the patient a careful history was elicited from the patients about demographic data like age and sex. Patients were subjected to clinical examination to obtain vitals following the clinical examination all the patients underwent local examination for the rotator cuff tear in order to evaluate the function of the affected shoulder which included swelling, pain bases on VAS score, functional evaluation based on Constant score and ULCA score and range of motion. Special tests such as impingement test, Hawkins test, empty can test and drop arm test were performed.

Surgical technique and postoperative treatment

Under general anaesthesia, direct repair of the rotator cuff was done via an anterolateral portal extension approach (mini –open) with a deltoid split without detachment. With patient position in beach chair position (Figure 1a), 3 to 4 cms skin incision was made from anterolateral edge of the acromion distally (Figure 1b), and dissection was made to the raphe between anterior and middle deltoid. Care must be taken to avoid axillary narrow which is usually atleast 5 cms from lateral acromion. A stay suture was applied distally to prevent propogation of the deltoid split and potential injury to axillary nerve.

Subacromial bursae are exposed and removed exposing the underlying rotator cuff. The under surface of acromion is palpated and decompression performed. A saw is used to remove about a one third thickness of undersurface of acromion over the anterolateral 2 cm, rotator cuff identified (Figure 1c), and edge of the tear held with two ethibond stay suture. Drill bit was placed at the desired site of anchor insertion and bone anchors were inserted at anterior aspect of supraspinatous foot print and insertion of anchors at 45^0 angle to the bone surface was done. Suture knots need to be kept lateral to greater tuberosity so as to avoid impingement under the acromion. Torn tendon was repaired by single or double row technique using suture anchors (Figure 1d). Following the procedure, the operated arm was placed at the side in a sling with a small pillow. The sling was worn continuously for 6 weeks, except during bathing and exercises.

**Figure 1: (a) Beach chair position,
(b) Marking of skin incision, (c) Tear of rotator cuff of
right shoulder joint, (d) Repair of rotator cuff of right
shoulder joint.**

Follow up

Patients treated post operatively were immobilized for six weeks in shoulder immobilizer with 30 degree abduction and pendulum exercises started from first postoperative day and patients continued in shoulder immobilizer for rest of the day for 6 weeks. Patients were subjected to clinical evaluations at three weeks, six weeks, 12 weeks and six months (Figure 2d-2h) follow up.

Statistical analysis

Data obtained was coded and entered into Microsoft Excel spreadsheet. The categorical data was expressed as rates, ratios and percentages. The continuous data was expressed as mean±S.D. The comparison of mean range of motion was tested by using one way analysis of variance (ANOVA). A 'p' value of less than or equal to 0.05 was considered as statistically significant.

Figure 2: (a) MRI of right shoulder showing partial tear of supraspinatus, (b) Preoperative clinical range of motion (c) Preoperative clinical range of motion, (d) Flexion at 6 months, (e) Abduction at 6 months, (f) External rotation at 6 months, (g) Internal rotation, (h) Internal rotation at 6 months.

RESULTS

In the present study 85% of the patients were males and the male to female ratio was 5.6:1. In this study the most of the patients were aged between 31 to 40 years (30%). The mean age was 41.90±13.98 years and the median age was 39.5 years with range 18 being minimum and 63 being maximum. Most the patients were in army service (30%). In the study, 60% of the patients had rotator cuff tear on right side and 40% of the patients had left sided tear and 45% of the patients had degenerative rotator cuff tear, 30% of the patients had spontaneous rotator cuff tear and 25% of the patients had traumatic rotator cuff tear.

In this study 70% of the patients presented with features of swelling. At enrolment all the patients (100%) had poor constant score (>30) and fair/poor ULCA score (<27). The functional profile of study population was observed that, the mean constant score (85.70±1.98) and ULCA score (5.35±1.63), flexion (6.25±5.35), abduction (5.50±5.10) external rotation (3.00±4.70) internal rotation (2.50±4.44) were suggestive of poor function and VAS scores were high (7.70±0.47) suggestive of severe pain.
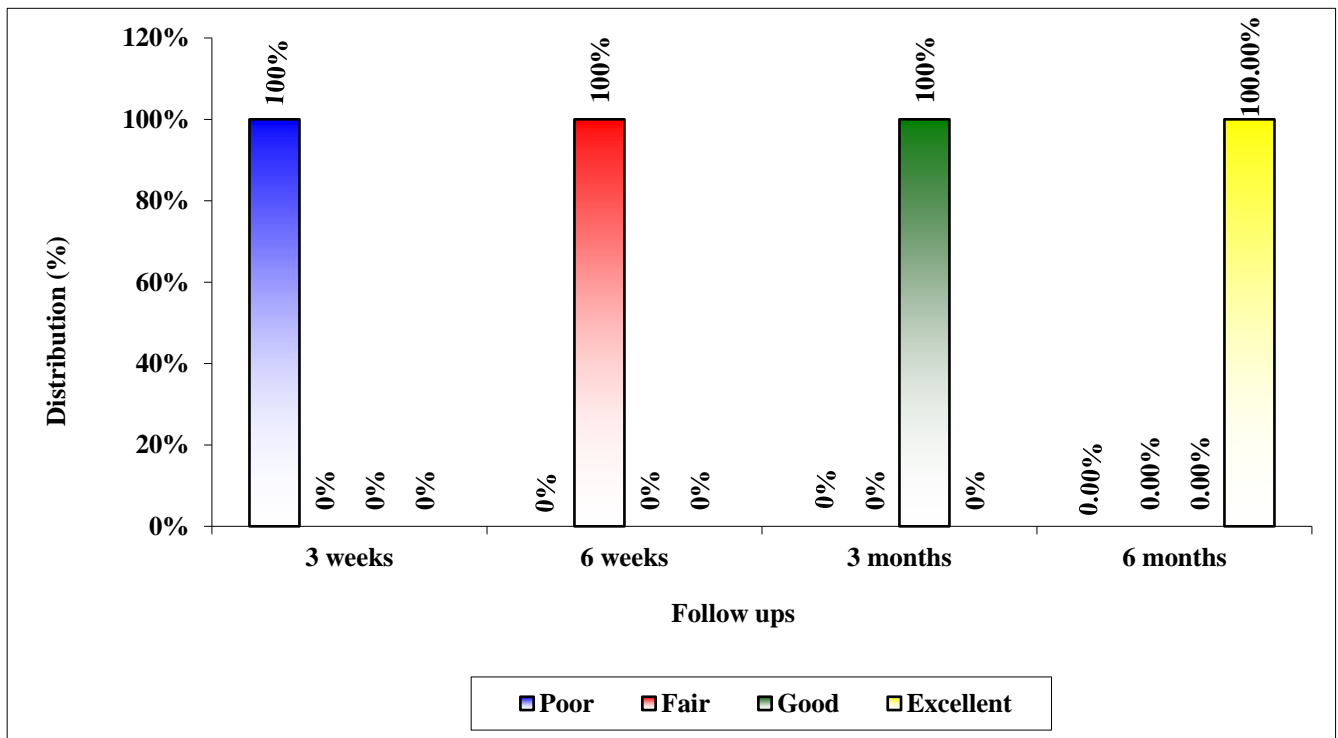

Figure 3: Comparison of constant score at different follow ups.

In this study drop arm test was positive in all the patients, while empty can test was positive among 50% of the patients, external rotation lag test in 25% of the patients and Hawkins test was positive among 5% of the patients.

In this study based on constant score, all the patients (100%) had poor function at enrolment which was fair at 6 weeks follow up in all the patients (100%), good at 3 months follow up in all the patients (100%) and excellent at 6 months follow up in all the patients (100%) (Figure 3).

In the present study based on UCLA score, all the patients (100%) had fair/poor function at enrolment and good/excellent outcome was noted in all the patients (100%) at 6 months follow up in all the patients (100%). (Figure 4).

In the present study MRI findings revealed partial thickness tear of supraspinatus tendon in 55% of the patients and full thickness tear of supraspinatus tendon was noted in 45% of the patients. There was significant gradual but steady increase with respect to flexion, abduction, external rotation, internal rotation and ULCA score during every follow up while there was significant gradual but steady decrease in VAS score and constant score (p<0.001) (Figure 5).
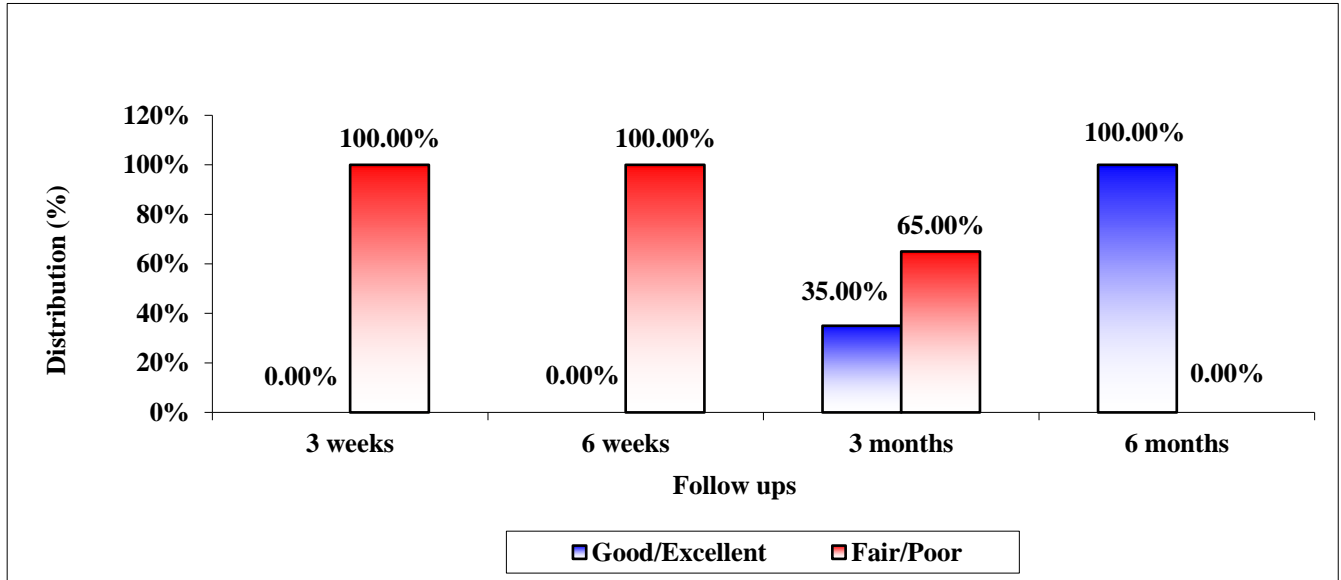

Figure 4: Comparison of UCLA score at different follow up.
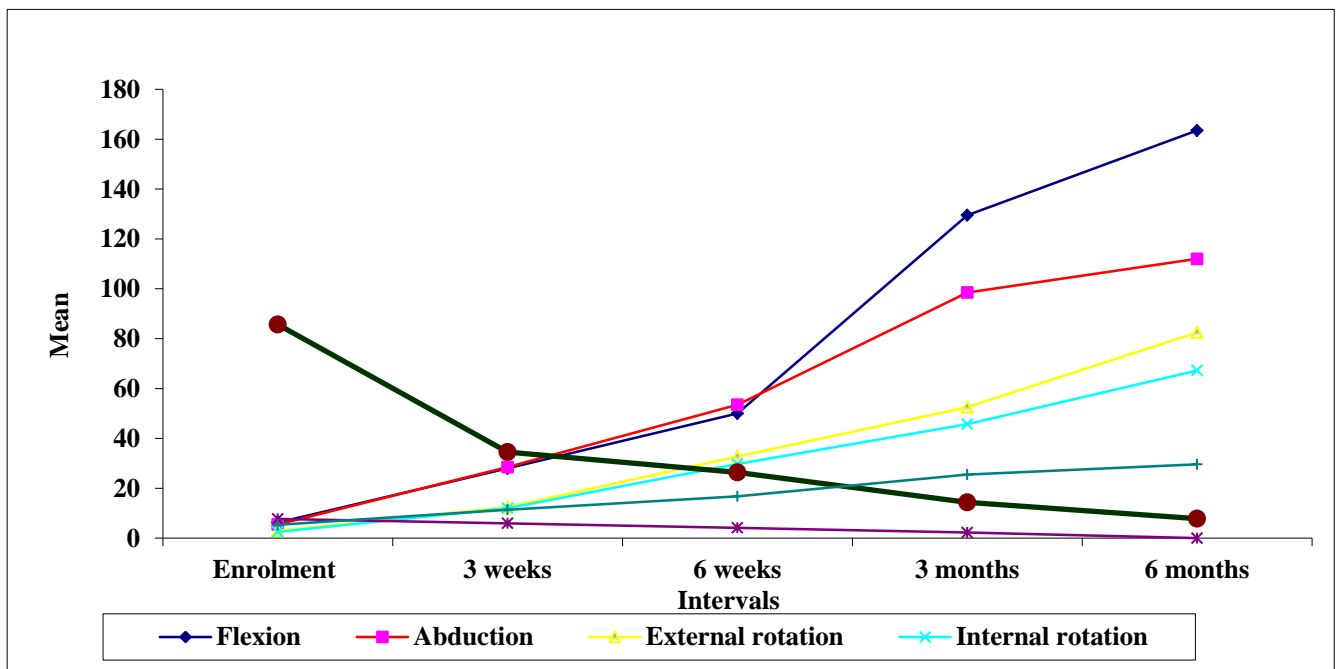

Figure 5: Comparison of functional outcome at different follow up.

DISCUSSION

In the present study males (85%) outnumbered females (15%) as the male to female ratio was 5.6:1 suggesting male preponderance. A recent study by Vaidyar et al to assess the outcome following rotator cuff repair by mini open approach, from Mangalore Karnataka also reported 67% of the male patients and 33% of the female patients.[5]

Epidemiological studies strongly support a relationship between age and cuff tear prevalence. Chronic rotator cuff defects are more in age from 5th decade onwards and

below 40 years it is uncommon. However, in this study age ranged between 18 to 63 years and the most of the patients were aged between 31 to 40 years (30%). The mean age was 41.90±13.98 years and the median age was 39.5 years. These findings suggest that most of the patients in this study were young. In contrast to the findings of this study a community survey by Chard et al on 644 elderly peoples (above age of 70 years) found that rotator cuff was involved in 70% cases of shoulder pain.[6]

In this study majority of the patients (60%) had rotator cuff tear on right side. The degenerative rotator cuff tear was noted among 45% of the patients and 30% of the patients had spontaneous rotator cuff tear and 25% of the patients had traumatic rotator cuff tear. Majority of the patients (70%) had swelling. All the patients (100%) had poor constant score (>30) and fair/poor ULCA score (<27). It was observed that, the mean constant score (85.70±1.98) and ULCA score (5.35±1.63), flexion (6.25±5.35), abduction (5.50±5.10) external rotation (3.00±4.70) internal rotation (2.50±4.44) were suggestive of poor function and VAS scores were high (7.70±0.47) suggestive of severe pain. The drop arm test was positive in all the patients, while empty can test was positive among 50% of the patients, external rotation lag test in 25% of the patients and Hawkins test was positive among 5% of the patients. Furthermore, MRI findings revealed partial thickness tear of supraspinatus tendon in 55% of the patients and full thickness tear of supraspinatus tendon in 45% of the patients.

Optimal repair of the rotator cuff includes achievement of high fixation strength, minimal gap formation and maintenance of mechanical stability under cyclic loading, and proper healing of tendon to bone.[7]

In the present study constant score revealed poor outcome among all the patients (100%) during three weeks follow up while at six weeks follow up all the patients (100%) had fair function suggesting marginal improvement in function. At three months follow up all the patients (100%) had good outcome and at last follow up that is, six months all the patients (100%) had constant score of <11 suggestive of excellent functional outcome. Based on the ULCA score, functional limitation of was noted till six weeks follow up and during three months follow up 35% of the patients had excellent functional outcome while limited function was noted in 65% of the patients but at six months follow up all the patients had excellent functional outcome base on ULCA score. Furthermore, There was significant gradual but steady increase from enrolment to each follow up till six months follow up with respect to mean flexion (6.25±5.35 to 163.50±7.63), abduction (5.50±5.10 to 112.00±5.94), external rotation (3.00±4.70 to 82.50±2.56), internal rotation (2.50±4.44 to 67.25±3.43) and ULCA score (5.35±1.63 to 29.60±0.82) and the difference observed between enrolment to six months follow up was statistically highly significant (p<0.001) suggesting improvement in range of motion and ULCA score. While there was significant gradual but

steady decrease in mean VAS score from enrolment (7.70±0.47) to six months follow up (0.00±0.00) and constant score (from 85.70±1.98 to 7.85± 1.46 respectively) This difference between VAS scores and Constant score from enrolment to six months follow up also was statistically highly significant (p<0.001) suggesting significant reduction in pain and Constant score. In this study no complications were noted.

These findings suggest that mini-open rotator cuff repair of shoulder joint results in results in marginal improvement after intervention and improve gradually over a period of six months and offer excellent functional outcome and complete pain relief at the end of six months as measured by range of motion, constant score, ULCA score and VAS score without any complications. These findings were consistent with a study by Vaidyar et al, Levy et al, Baysal et al, and Barness LA et al despite few methodological differences.[5,8-10]

In 1990, Levy et al reported a preliminary one-year follow-up study of twenty-five patients who had been treated with an arthroscopic subacromial decompression and then a lateral deltoid-splitting open repair.[8] Twenty of the patients had a good or excellent result. However in the present study all the patients had excellent outcome.

Vaidyar et al conducted a prospective study to assess the outcome following rotator cuff repair by mini open approach.[5] This study was done on thirty patients with rotator cuff injuries of which, 13 patients had full thickness tear and 17 patients had partial thickness tear. The patients were followed up for two years following repair by mini open approach and functional scoring was done, preoperatively and postoperatively with the Constant and Murley scoring system. The mean preoperative score was 59.5 while the mean score at 2 year follow up was 91.8 which are highly significant. There was no significant difference between mean scores of the full thickness tear mini open repair versus the partial thickness tear mini-open repair. The study concluded that, mini open repair of rotator cuff injuries offers excellent functional outcome at two years follow-up. There is no difference in functional outcome between partial and full thickness tear treated by mini-open repair. However, the follow up period in this study was two years which was very high compared to the present study where patients were followed up till six months. Despite of lower follow up period the present study showed excellent outcome in all the patients which may be attributed to younger age of the study population in our study. Also functional evaluation was based on constant score but in latter study it was done based on Constant and Murley scoring system.

Baysal et al prospectively reviewed 84 patients with tears of all sizes, including 17 with large or massive tears, who underwent mini-open repair, and reported a statistically significant improvement in shoulder scores and range of

motion. The findings of the present study were consistent with the observations made by Baysal et al.[9]

CONCLUSION

Based on the findings of this study it may be concluded that, mini-open rotator cuff repair of shoulder joint results in excellent functional outcome among adult patients with rotator cuff tear of shoulder joint especially after six months with gradual improvement with respect to time as assessed by constant score and ULCA score. It also offers complete pain relief without any complications.

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