

Original Research Article

Functional outcome of arthroscopic Bankart repair in post-traumatic recurrent shoulder dislocation in a private tertiary care teaching hospital in eastern India

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ABSTRACT

Background: Recurrent anterior shoulder dislocations are quite common in young patients with Bankart lesions. The open Bankart repair was the gold standard for years, however arthroscopic Bankart repair has gained popularity. The aim of the study was to evaluate the functional results of arthroscopic Bankart repair in patients with post-traumatic recurrent anterior glenohumeral instability.

Methods: Patients who underwent arthroscopic Bankart repair for post-traumatic recurrent anterior shoulder dislocation were included in the study. This was a prospective study conducted at a tertiary care Hospital in Kolkata, India between August 2017 to May 2019. All patients were followed up at an interval of 2 weeks, 6 weeks, 12 weeks, 6 months, 9 months and 1 year. Rowe score was used to assess the functional outcomes of the patients.

Results: 34 (91.9%) patients reported good to excellent results, whereas only 2 (5.4%) patients had fair outcome and 1 (2.7%) patient demonstrated poor surgical result. The total rowe score improved from 46.62 pre-operatively to 94.20 post-operatively after 1 year ($p < 0.01$). By the end of 1-year follow-up, 35 (94.6%) patients had full range of motion in all the planes. Majority of (89.2%) patients did not have any complications. Only 1 patient out of 37 had a recurrence (2.7%).

Conclusion: Arthroscopic Bankart repair is an effective, cosmetic and safe surgical procedure with good clinical outcomes and excellent post-operative shoulder range of motion. This surgical intervention also has low recurrence rate and minimum surgical complications.

Keywords: Bankart repair, Arthroscopy, Shoulder dislocation, Shoulder surgery, Recurrent shoulder injury, Shoulder instability

INTRODUCTION

The shoulder is the most commonly dislocated joint in the body, because of its relative lack of bony limitations and extensive range of motion.¹ The glenohumeral joint requires a stable pivot for keeping the upper extremity at a

wider arc of a circle in the three-dimensional plane. The special orientation of the shoulder provides the glenohumeral joint with a high degree of mobility at the cost of stability.

The glenohumeral joint has the most extensive range of movement as compared to any joint in the body. It is one of the most active joints in the body and because of its role in the protective reflex of the body, it is often injured. Shoulder dislocations comprise approximately 50% of all joint dislocations. The stability of the shoulder joint depends on static and dynamic soft tissue structures such as the labrum, the glenohumeral ligaments, and the rotator cuff.² Dislocation of the shoulder joint occurs in 1 to 2% of the population.³ Its incidence is 1.7% among adults and it is three times more common among men.⁴ 90% of shoulder dislocations are anterior, and traumatic injuries account for 95% of them.^{5,6} In athletic patients under the age of 20 years, the recurrence rates are greater than 90% whereas in patients aged between 20 to 25 years, the rates are between 50 and 75%.⁶ A family history of instability is found in almost 25% of patients who sustain a shoulder dislocation.⁷

Main complication of shoulder dislocation is recurrent instability and it accounts for an average of 70-90% recurrence rate in patients between 20-40 years of age. Following dislocation, injuries occur to surrounding structure such as bone, cartilage and soft tissues, resulting in various pathological conditions. During shoulder dislocations, humeral head is forced anteriorly out of glenoid cavity resulting in detaching fibrocartilaginous labrum from the anterior rim of glenoid cavity. This detachment of glenoid labrum is called Bankart lesion. Bankart lesion is the most common and essential lesion in treatment of anterior shoulder instability.⁸

Management of recurrent anterior shoulder dislocation is by reattachment of labro-ligamentous structure to the glenoid. Bankart repair techniques have improved significantly over the last 90 years since Bankart initially described this lesion. The open Bankart repair was the gold standard for years, with success rates ranging from 75% to 100%; however, postoperative problems such as restriction to external rotation and secondary osteoarthritis were concerns.^{9,10} Arthroscopic Bankart repair gained popularity since it began almost 30 years ago because of improved arthroscopic equipment and increased experience of surgeons.¹¹ Recent advancements in the techniques, suture material, bioabsorbable anchors and concomitant treatment of other pathologies, arthroscopic repair has become a standard care.¹²

METHODS

Institutional ethics committee (IEC) approval was taken before the start of the study. Initially, 39 patients with post traumatic recurrent anterior shoulder dislocation who were treated by arthroscopic Bankart repair in Peerless Hospital and B. K. Roy Research Centre, Kolkata from August 2017 to May 2019 and fulfilling the inclusion criteria were enlisted in this study. But among them 1 patient suffered a proximal humerus fracture on the same arm due to road traffic accident after 5 weeks of surgery and 1 patient lost follow-up immediately after suture removal. So, 37

patients with a minimum 1 year of follow-up were finally considered in this study.

Inclusion criteria

The study subjects were included based on the following inclusion criteria: patients above 18 years of age who are skeletally mature, sustained a post-traumatic anterior dislocation of shoulder of more than 1 episode, Bankart lesion confirmed by Magnetic resonance imaging (MRI).

Exclusion criteria

The subjects were excluded from the study based on the following exclusion criteria: other shoulder pathologies such as bony Bankart, revision Bankart, Hill-Sachs lesion involving more than 25% of the humeral head, habitual dislocations, rotator cuff tear, SLAP lesion, multidirectional instability or posterior instability of shoulder, arthritis of shoulder, past history of fracture of upper end of humerus or operated earlier for any shoulder problem and patients with associated neuromuscular disorder or weakness or seizure disorder or any other mental illness.

Pre-operative assessment

The patients were subjected to a thorough history, clinical examination and pre-operative routine laboratory investigations, which was supplemented by radiographs in antero-posterior, lateral, axillary and scapular Y view along with MRI scan of the affected shoulder joint.

Operative procedure

Anaesthesia and positioning

All the surgical procedures were performed under general anaesthesia with the patients in lateral decubitus position. An arm holder was used to give traction as well as to keep the shoulder in 45 degrees abduction and 20 degrees forward flexion.

Portal placement and diagnostic arthroscopy

The primary posterior portal was created 1.5 cm inferior and 1.5 cm medial to the posterolateral edge of the acromion. A complete evaluation of the capsular complex and osseous structures was done. The Bankart lesion was identified, confirmed and probed. Antero-superior and antero-central portals were created in outside-in fashion using spinal needle localization.

Glenoid preparation

The labral tissue was elevated medially to free up the labrum from anterior glenoid with the help of angled elevator. Rasping of glenoid neck was done to prepare the redundant capsular tissue prior to plication.

Anchor placement and capsulolabral plication

3 anchors preloaded with fibre-wires were put in after making pilot holes at 1, 3 and 5 o'clock for right shoulder and 7, 9 and 11 o'clock for left shoulder. The inferior most anchors (5 o'clock for right and 7 o'clock for left) were placed first.

Knot tying

Capsular stitches were taken 1 o'clock below the respective anchor using suture shuttle and relayed using crochet hook. Then the capsular tissue was secured with six alternate half stitches using a simple knot pusher. At the end of the procedure, it was confirmed whether the capsule-labral complex was like a 'bump' at the glenoid margin and the humeral head was centrally placed.

Skin closure and shoulder immobilization

Non-absorbable suture was used to close the skin. Sterile dressings were applied to the surgical incisions. Patients were placed in a shoulder immobilizer.

RESULTS

Age distribution

The mean age in this study was 26.16 years. The youngest patient was 19 years old and the oldest patient was 42 years old. Overall, 83.8% patients were between the age group of 20-40 years. It might be because younger peoples are more active and involved in outdoor and sports activities which makes them more prone to injuries.

Table 1: Age distribution.

Age (years)	No. of patients	Percentage (%)	P value
18-20	5	13.5	0.001
20-30	25	67.6	
30-40	6	16.2	
>40	1	2.7	
Total	37	100.0	

Sex distribution

In this study, 33 patients (89.2%) were male and 4 patients were female (10.8%). Majority of patients were male (89.2%) which may be because of more outdoor and sports related activities makes them more vulnerable to accidents and trauma.

Side of injury distribution

In this study, number of right shoulder involvement was 28 (75.7%) which was much higher in comparison with

left shoulder involvement which was 9 (24.3%). Higher incidence of right shoulder involvement (75.7%) may be due to right hand dominance.

Occupation distribution

In this study, 20 (54.1%) patients were involved in significant occupation requiring high demand or overhead activities such as students with sports activities, farmers, teacher and professional sportsmen.

Pre-operative dislocations distribution

Among 37 patients, 1 (2.7%) patients had ≥10 episodes of dislocation. 4 (10.8%) patients had 6 to 9 episodes of dislocation of the shoulder in the preceding year, and 32 (86.5%) patients suffered 1 to 4 episodes in the preceding year pre-operatively. The average no. of pre-operative dislocations was 3.62.

Table 2: Pre-operative dislocations distribution.

Total no. of dislocations	No. of patients	Percentage (%)	P value
1-5	32	86.5	0.001
6-9	4	10.8	
≥10	1	2.7	
Total	37	100.0	

Total Rowe score

The total Rowe score (mean and SD) improved from 46.62±23.24 pre-operatively to 94.20±15.92 post-operatively in the final follow-up at the end of 1 year and Z value was found to be -5.174. A dip in the total Rowe score at 2 weeks was due to the shoulder immobilization post-surgery.

Table 3: Total Rowe score.

Total Rowe score	Mean score
Pre-operative	46.62
Post-operative	
2 weeks	35
6 weeks	71.22
12 weeks	73.38
6 months	89.86
9 months	93.51
1 year	94.20

Final Rowe outcome

In a total of 37 patients, 32 (86.5%) patients showed excellent and 2 (5.4%) patients had good results at the end of 1-year follow-up, whereas 2 (5.4%) patients had fair outcome and 1 (2.7%) patient demonstrated poor surgical result.

Complications

Out of 37 patients, 33 (89.2%) patients did not have any complications, whereas 2 (5.4%) patients had shoulder stiffness, 1 (2.7%) patient complained of mild pain and 1 (2.7%) patient had a re-dislocation episode post-operatively.

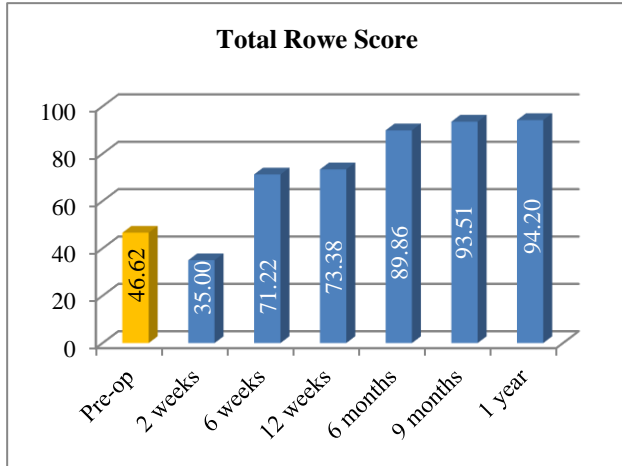


Figure 1: Total Rowe score.

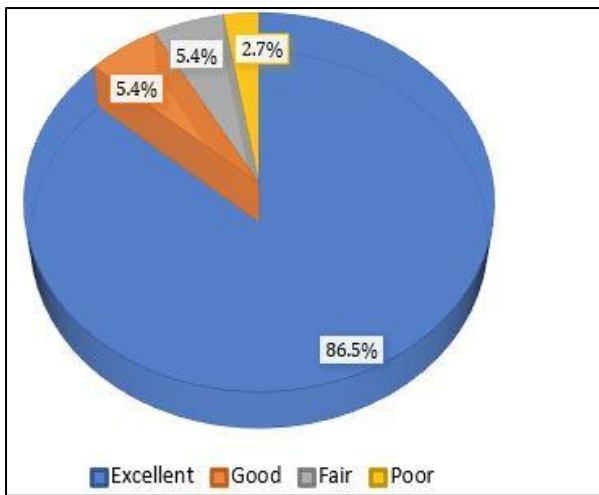


Figure 2: Final Rowe score.

Majority of patients had symptoms for a period ranging from 1-5 years (78.4%). All patients had a positive apprehension test before surgery. 33 (89.2%) patients had limitation of external rotation on 90 degrees abduction pre-operatively. 3 suture anchors were used intra-operatively in all patients. There were no intraoperative complications related to the arthroscopic procedure with regard to nerve injuries, compartment syndrome, infection or anchor loosening. The mean post-operative shoulder score significantly improved at the time of the final follow-up. The total Rowe score improved from a mean and standard deviation (SD) of 46.62±23.24 pre-operatively to 94.20±15.92 post-operatively. 35 patients achieved full range of shoulder movement by the end of 1 year.

Table 4: Final Rowe outcome.

Final Rowe Outcome	No. of Patients	Percentage (%)	P value
Excellent	32	86.5	0.001
Good	2	5.4	
Fair	2	5.4	
Poor	1	2.7	
Total	37	100.0	

Table 5: Complications.

Complication	No. of Patients	Percentage (%)	P value
Stiffness	2	5.4	0.001
Pain	1	2.7	
Re-dislocation	1	2.7	
None	33	89.2	
Total	37	100.0	

DISCUSSION

Shoulder, by virtue of its anatomy and biomechanics, is one of the most unstable and frequently dislocated joints in the body. The Bankart lesion represents the most common form of labro-ligamentous injury in patients with traumatic anterior dislocation of the shoulder. Surgical management is by reattachment of the labro-ligamentous complex to the glenoid either arthroscopically or by an open procedure (Bankart repair).

When treating shoulder instability, the ideal technique should include the ability to assess the glenohumeral joint instability with regard to the type of lesion, the anatomic structures involved, its potential for healing and the type of fixation needed.¹² The ideal technique should also avoid injuries to the surrounding normal tissues. Unlike the open method of Bankart repair, which renders significant loss of range of motion because of disruption of the subscapularis tendon, the shoulder arthroscopic method creates minimal tissue trauma.¹⁴⁻¹⁶

Rowe score was used in this study because it is widely used with much historic significance as well as its simplicity of application on Outpatient department (OPD) basis by the examining clinician, which makes it widely used for evaluation acceptable. In this study, all the patients were young and physically active, mostly males (89.2%), age ranging from 19-42 years with mean age 26.16 years, with higher incidence of right-hand involvement (75.7%) who were engaged in jobs of varying demand. Similar results were seen in studies conducted by Katti et al in Karnataka (India) which had a mean age of 27.19 years with 90.5% males and 70.8% right hand involvement, Jaju et al in Maharashtra (India) having mean age of 27.31 years with 98.3% males and 70.8% right hand involvement, and Ramesh et al in Telangana (India) who had 90% males and 70% right hand involvement in the study.^{8,17,18}

In this study, the average number of pre-operative dislocations was 3.62. This is correlating with studies done by Katti et al (3.1) and Jaju et al (3.96).^{8,17} All the patients (37 patients) had positive apprehension test response pre-operatively. Studies conducted by Sedeek et al in Singapore, Erkoçak et al in Turkey and Kalkar et al in Turkey, all had pre-operative positive apprehension in 100% patients.^{19,20,21} The mean pre-operative total Rowe score in our study was 46.62 which is close to the studies conducted by Sahu et al and Ramesh et al which had a total Rowe score of 48.51 and 45.5 pre-operatively respectively.^{18,22}

In all of the patients, 3 suture anchors were used. Boileau et al in France in a study concluded by suggesting at least four anchor points should be used to obtain secure shoulder stabilization.²³ Shibata et al in Japan showed in their study that use of more than 3 anchors decreases the recurrence rate and prevents re-dislocation within the first year of surgery.²⁴ 2 patients post-operatively experienced apprehension in our study. Study by Mishra et al in New Delhi (India) had 2 and by Chandra et al had 1 patient with apprehension post-operatively.^{25,26}

The mean post-operative total Rowe score in our study was 94.20 which is almost similar to studies performed by Kalkar et al, Jadhav et al and Parmar et al in having a total Rowe score of 95.5, 95.63 and 94.16 post-operatively respectively.^{21,27,28} In this study, out of 37 patients, 32 (86.5%) came out with excellent results, 2 (5.4%) showed good, 2 (5.4%) showed fair and 1 (2.7%) had poor outcome at the end of 1-year follow-up period. The results found were similar to the ones reported by Erkoçak et al, Sahu et al, Sood et al and Kalkar et al 1 out of the 37 patients included in the study experienced one episode of shoulder dislocation at 8 months post-surgery which occurred while lifting a heavy weight overhead.^{20,21,22,29} Similar results of 1 episode of re-dislocation post operatively was seen in studies of Kalkar et al and Katti et al.^{8,21}

Arthroscopic techniques described previously used transglenoid sutures or bioabsorbable tracks. In the past few years, newer techniques involving suture anchor fixation and capsular plication have evolved with promising results. Suture anchors are low-profile fixation devices that minimize articular surface damage of the humeral head offering anatomic reconstruction of the glenoid labrum as well as the glenohumeral ligament complex.

Arthroscopic treatment of shoulder instability has certain advantages compared to open procedures, which includes smaller skin incisions, more complete inspection of the glenohumeral joint with access to all areas for repair, shorter surgical time, less morbidity, less postoperative pain and narcotic use, reduced hospitalization time, faster postoperative recovery and rehabilitation and a decreased risk of complications with maximum preservation of external rotation.³⁰

Limitations of our study include non-randomization, small group of patients, short follow-up period of 1 year and a lack of Control group.

CONCLUSION

Arthroscopic Bankart repair with suture anchors in cases of recurrent post-traumatic anterior shoulder instability is a reliable surgical procedure with respect to shoulder function and motion as it offers good clinical outcome, excellent post-operative shoulder range of motion with improved function. This surgical procedure has better patient compliance, low recurrence rate and minimum surgical complications in properly selected patients.

A larger well-designed study is required to be conducted across the country to corroborate the findings of our study.

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Ethical approval: The study was approved by the institutional ethics committee

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