Functional results after arthroscopic anterior labral repair±capsulorrhaphy in recurrent shoulder dislocations: short-term results

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Received: 08-Sep-2023
Revised: 14-Oct-2023
Accepted: 18-Oct-2023
Published: 08-Mar-2025

The Egyptian Orthopaedic Journal 2024, 59:439–443

Background
Recurrent anterior shoulder dislocation occurs in approximately 50–96% of individuals having first dislocation under the age of 20 years and in 40–74% of patients between the ages of 20–40 years. The anterior shoulder dislocation contains tear of the inferior capsule-ligamentous complex and labrum from the anterior inferior glenoid in around 97% of cases and if not healed in a proper position may lead to recurrent episodes of dislocation.
Methods
This'prospective cohort study'aimed to evaluate the results of the arthroscopic Bankart repair of the capsule-labral lesions in patients having recurrent anterior dislocation of the shoulder.
Results
The UCLA score was calculated for all patients preoperatively, and 3 and 6 months postoperatively. Preoperatively, the UCLA score ranged from 15 to 25 (mean 20.1 ± 2.3), 3 months postoperatively it ranged from 27 to 32 (mean 29.4 ± 1.2) and 6 months postoperatively from 27 to 33 (mean 30.4 ± 1.3).
Conclusion
The present research demonstrated that arthroscopic Bankart repair with the the application of suture anchors is a dependable managing pathway, with positive clinical conclusions, outstanding shoulder movement postoperatively, besides reduced rates of recurrence in selected patients.

Keywords:
ALPSA, anchors, Bankart repair, glenoid bone loss, Hill-Sachs lesions, labral lesions, shoulder dislocation.SLAP lesion, UCLA score

Egypt Orthop J 2024, 59:439–443

1110-1148

Introduction

The shoulder joint belongs to the diarthrosis and multiaxial synovial ball and socket categories. Due to its great degree of mobility and the fact that the humeral head is rather large compared with the shallow glenoid fossa (surface-area ratio= 4:1), it is considered one of the further most recurrently dislocated joints within the human body [1].

Recurrent anterior shoulder dislocation occurs in approximately 50–96% of individuals having first dislocation under the age of 20 years and in 40–74% of patients between the ages of 20–40 years [2].

The anterior shoulder dislocation contains tear of the inferior capsule-ligamentous complex and labrum from the anterior inferior glenoid in around 97% of cases and if not healed in a proper position may lead to recurrent episodes of dislocation [2].

Earlier researches have shown mediocre clinical findings for arthroscopic procedures that apply either bioabsorbable tacks or trans-glenoid sutures compare with the convectional open surgery [3]. However, in several recent publications, with the progression of both the biomaterials and arthroscopic techniques, the rates of recurrences are parallel to the open surgery [4-6].

The purpose of our study is to evaluate the results of arthroscopic Bankart repair for recurrent anterior shoulder dislocation (Fig. 1).

A custom-made approach to the patient having recurrent shoulder instability has been made possible by these technical innovations as well as our comprehension of glenohumeral instability's multifaceted causation and

Figure 1

Portals for arthroscopic Bankart repair.

our capability to recognize the complex injury contexts with innovative imaging methodologies.

These arthroscopic treatments use a diversity of instruments, knot-tying methods, suture passer, and smart automation to treat the labral pathologies as well as the capsule-ligamentous laxity [3].

Currently, the shoulder arthroscopic stabilization is regarded by countless orthopedic surgeons as the favored managing technique as it enables a thorough diagnostic of coexisting intra-articular shoulder pathology and is linked to less dissection of the soft tissue, less postoperative pain, optimal conservation of the external rotation, improved cosmesis, and less morbidity rates [7].

Patients and methods

A prospective cohort study to evaluate the outcome of arthroscopic Bankart repair for recurrent anterior shoulder disclocation.The study was conducted on 27 patients aged between 20 and 40 years with recurrent anterior shoulder dislocation.

Inclusion criteria

(1) Young adults of 20–40 years old.
(2) Recurrent anterior shoulder dislocation at least 2 times
(3) Follow-up for at least 6 months

Exclusion criteria

(1) Patients with hyperlaxity.
(2) Multidirectional instability.
(3) Hill-Sachs lesion ≥50%.
(4) Glenoid bone loss ≥25%.
(5) Voluntary dislocators.

Preoperative assessment

Clinical evaluation of the patients in the clinic included history taking, and then examination of the patient for shoulder instability including

(1) Anterior drawer test
(2) Posterior drawer test
(3) Apprehension test 45°, 90°, and 120°
(4) sSulcus sign.

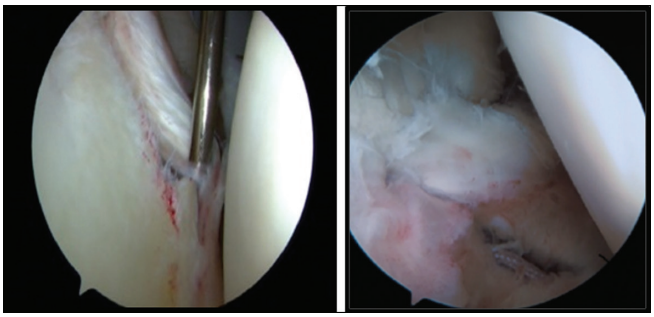
Then followed by plain radiograph, three-dimensional CT measurement, and MRI.

Surgical procedure

The arthroscopic Bankart repair was performed usually with an interscalene nerve block in conjunction with general anesthesia, for better control of postoperative pain. The operation was performed in the semi-sitting position. The shoulder was prepped and draped in a sterile manner, and the bony landmarks were marked carefully to maintain orientation throughout the procedure, and prophylactic antibiotic was given with induction of anesthesia (Fig. 2).

At first, a standard posterior arthroscopic portal was established two fingers down the acromion and two fingers medial in the direction of the coracoid, and a systematic diagnostic examination of the glenohumeral joint was performed. A single lateral portal was established using the outside-in technique with a needle. The anterosuperior portal was made in the rotator interval just inferior to the anterior edge of the acromion. The Bankart lesion was mobilized from the anterior glenoid surface using a periosteal elevator and rasping of the edge of the glenoid was done for refreshment of the labral bed to allow good healing. The goal was to mobilize the labrum such that it could be shifted superiorly and laterally. After mobilization of the labrum and glenoid preparation, through the anterosuperior portal a first anchor (2.8–3 mm) was placed at the 5 o'clock position, while a shuttle suture was passed through the IGHL and the labrum at the 6 o'clock position, which results in a good capsular shift decreasing the inferior capsular space. The sutures were shuttled and tied arthroscopically with a sliding knot construct. A variable number of anchors were used, varying accordingly with the labral lesion. Some degree of capsulorrhaphy was performed (in conjunction with the labral repair) in every patient based on intraoperative findings. The second anchor was placed at the 3 o'clock position and passed through the IGHL

Figure 2



Pre- -post-arthroscopic Bankart repair.

and the labrum at the 4 o'clock and for more stability another anchor is placed at the 1 o'clock position.

For the left shoulder, the anchors were used mainly at the 7 and 9 o'clock position and for more stability at the 11 o'clock position. At the final stage, the stability of the repair was tested, and the number and position of anchors needed to restore stability was recorded.

Postoperative care

All the patients were rehabilitated according to the same protocol. In the first two postoperative weeks, sling use was maintained continuously, being only removed for pendulum exercises and for elbow and wrist flexion–extension.

After 2 weeks, sutures were removed, and passive pendulum exercises and shoulder forward flexion, and extension ranges were started.

At the third and fourth weeks, the priority was restoration of range of motion. Active-assisted range of motion in the plane of the scapula was progressed to 90°.

After 4 weeks, the immobilizer was discontinued and active-assisted range of motion was progressed in forward flexion and external rotation. Patients were also taught to do isometric rotator cuff exercises during this period.

From weeks 6 to 12, gradual strengthening was added to help patients' ability to perform a pain-free daily activity-related program with isokinetic internal and external rotation exercises. Noncontact sports were allowed after 2 months and contact sports after 6 months postoperatively.

Assessment criteria

Post-physiotherapy patients (20–24 sessions on average) were assessed using the UCLA score [8] for functional ability, pain, satisfaction and range of motion in abduction, forward flexion, internal rotation, and external rotation at 3 and 6 months follow-up visits.

Table 1 Characteristics related to shoulder instability

	N (%)
Affected side	
Right	19 (70.4%)
Left	8 (29.6%)
Dominant side	
Yes	22 (81.5%)
No	5 (18.5%)
Trauma or fits	
Trauma	25 (92.6%)
Fits	2 (7.4%)

Results

This study included 27 patients: 19 (70.4%) were right handed and 8 (29.6%) were left handed; in 22 patients (81.5%) the dominant side was affected and in five (18.5%) the nondominant side. Trauma was the cause of dislocation in 25 patients (92.6%), while fits were the cause in two cases (7.4%) (Table 1).

Clinical evaluation

The recurrence rate preoperatively ranged from 2 to 9 times dislocation to each patient (4.9 ± 1.8); three patients (11.1%) were atheletes with throwing sport and 24 (88.9%) were not.

Apprehension test was positive in all patients at 45 degrees and 90 degrees, and seven cases (25.9%) had a positive apprehension test at 120 degree in addition. All patients had positive anterior drawer test and seven cases (25.9%) had positive posterior drawer test as well. Sulcus sign was negative in all cases (Table 2).

Radiological findings

Hill-Sachs lesions and glenoid bone defects were assessed by CT scan; five patients (18.5%) had Hill-Sachs lesions 25–50%, 4 (14.8%) had less than 25%, and 18 (66.7%) with no Hill-Sachs. All Hill-Sachs lesion cases were on-track. No cases had glenoid bony defects (Table 3).

Number and position of anchors

Number and position of anchors needed to restore stability were as follows:

In 14 patients (51.8%), the lesion was fixed by two anchors at the 3–5 o'clock, while in six patients (22.2%) by two anchors were inserted at the 7–9 o'clock; three anchors' fixation was used in five patients (18.5%) at the 1–3–5 o'clock and two patients (7.4%) at the 7–9–11 o'clock position (Table 4).

Table 2 Clinical evaluation

	Mean±SD	Range
Recurrence	4.9 ± 1.8	2–9
	***N* (%)**	
Athlete/throwing		
Throwing sport	3 (11.1%)	
No	24 (88.9%)	
Apprehension test 45		
Positive	27 (100.0%)	
Negative	0 (0.0%)	
Apprehension test 90		
Positive	27 (100.0%)	
Negative	0 (0.0%)	
Apprehension test 120		
Positive	7 (25.9%)	
Negative	20 (74.1%)	
Anterior drawer test		
Positive	27 (100.0%)	
Negative	0 (0.0%)	
Posterior drawer test		
Positive	7 (25.9%)	
Negative	20 (74.1%)	

Table 3 Radiological findings

	N (%)
Hill-Sachs lesions	
25–50%	5 (18.5%)
≤25%	4 (14.8%)
No Hill-Sachs	18 (66.7%)

Table 4 Number and position of anchors

	N (%)
Mode of fixation: number/position	
2 anchors 3–5 o'clock	14 (51.8%)
2 anchors 7–9 o'clock	6 (22.2%)
3 anchors 1–3–5 o'clock	5 (18.5%)
3 anchors 7–9–11 o'clock	2 (7.4%)

Postoperative assessment by UCLA score

The UCLA score was calculated for all patients preoperatively, 3 and 6 months postoperatively for patient satisfaction, active forward flexion, strength of forward flexion, pain, and function. Preoperative UCLA score ranged from 15 to 25 (mean 20.1 ± 2.3), 3 months postoperatively ranged from 27 to 32 (mean 29.4 ± 1.2), and 6 months postoperatively from 27 to 33 (mean 30.4 ± 1.3). These improved values proved to be statistically significant with $P<0.0001$ (Table 5).

Recurrence and patient satisfaction:

Three patients (11.1%) had recurrence of dislocation postoperatively during the 6 months follow-up and 24 patients (88.9%) had no recurrence at the final follow-up visit.

In all, 24 patients (88.9%) were satisfied postoperatively and 3 (11.1%) were not satisfied because of pain and recurrence with no trauma (Table 6).

Table 5 UCLA score

	Mean±SD	Range
Preoperative	20.1 ± 2.3	15–25
3 months postoperative	29.4 ± 1.2	27–32
6 months postoperative	30.4 ± 1.3	27–33
***P* value**	<0.0001 (S)	

Table 6 Recurrence and Patient satisfaction

	N (%)
Recurrence	
Yes	3 (11.1%)
No	24 (88.9%)
Patient satisfaction	
Satisfied	24 (88.9%)
Not satisfied	3 (11.1%)

Discussion

In the current research, our data were parallel to those reported in the most recently published literature review, with a rate of recurrence altogether of 11%. In our subjected patients, particularly the young aged, trauma, ligamentous laxity, and high demand patients have been associated with recurrence next to their anterior stabilization.

According to Voos *et al*., appropriate counseling of patients in addition to considering the open stabilization by recognizing the recurrence risk factors may enable for correcting of anterior instability. They discovered that patients under 25 years, having ligamentous laxity, and enormous Hill-Sachs lesion (>250 mm^3) were at the highest risk of recurrence [9].

Following surgical stabilization, to be able to predict the probability of failure, the index score of instability severity was subsequently created. Age at the time of intervention, intensity and type of played sports, shoulder's hyperlaxity, occurrence of Hill-Sachs lesion, and the loss of glenoid contour were all considered as independent prognostic variables. In our patients, the number of anchors was not a noteworthy risking element. However, the current research's data confirmed that there is a propensity to use a bigger number of small-diametric anchors through the years. Hypothetically, applying numerous sutures and anchor sites may elevate the sum of attachment points and permits for an enhanced loading distribution. Despite the use of multiple anchors, it carries the risk of glenoid fracture (postage stamp fracture) [10].

Moreover, as large holes would have to be drilled near each other in the comparatively narrow anterior glenoid, larger anchors could conceivably increase the risk of fractures. Many fixation places within the glenoid with smaller suture anchors and more bone

between each anchor site might diminish glenoid fracture occurrence. For labral repairs, suture anchors must preferably provide enough resistance against motion to permit the inherent tissue to heal and make the joint's normal function to return without raising the danger of the anchoring bone breaking.

Lastly, the arthroscopy-performing surgeon must be aware of each case's demand, and his/her clinical evaluation. Also, CT and MRI must be performed before the time of arthroscopy to take a proper decision. A good preoperative selection of patients along with intraoperative evaluation of sites is a must. In addition, for getting the best outcomes, the number of the needed anchors and their stability is essential.

We had limitations in our study regarding the relative small number of patients and relative short period of follow-up, so we recommend further studies with more number of patients and a longer period of follow-up for further assessment of the reliability of arthroscopic Bankart repair because other studies in the literature suggested high recurrence rates after a long period of follow-up [11-14].

Complications

Three cases had recurrence of dislocation postoperative: two cases were related to the second event of trauma; one of them was fixed by three anchors and had another surgery and fixed by two anchors and with an UCLA score of 25. The other was fixed by two anchors dislocated during sport practice and refused another surgery and had strengthening exercises and with an UCLA score of 24; the third had a redundant capsule dislocated after lifting up a heavy object and was fixed by two anchors and the patient had strengthening exercises and did not have another operation and now the UCLA score was 24 Table 7.

In all our patients, we did not face lack of external rotation. All patients returned to work except two because of pain in lifting up heavy objects (reflex sympathetic dystrophy). We did not need a long rehabilitation time, more than 24 physiotherapy sessions, no loosing of anchors, and no postoperative infection.

Table 7 Associated variants in patients with postoperative recurrence

Assosiated variant	Hill-Sachs lesion	Number of anchors
ALPSA lesion	25–50%	3 anchors
ALPSA lesion	≤25%	2 anchors
SLAP lesion	25–50%	2 anchors

Conclusion

Arthroscopic Bankart repair with the application of suture anchors is a reliable treatment option, with a positive clinical outcome, excellent shoulder movement postoperatively, besides reduced rates of recurrence in selected patients.

Various elements of risk have been associated in the recurrence rating of the after-stabilization including: ligamentous laxity, high levels of athletic competition, young age, a bony defect occurrence either in the glenoid or the humeral head, and the suture anchors' number.

Acknowledgements

Nil.

Financial support and sponsorship

Nil.

Conflicts of interest

The authors declare that there is no conflict of interest.

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