

**Original article**

**ARTHROSCOPIC BANKART'S REPAIR FOR TRAUMATIC RECURRENT DISLOCATION OF SHOULDER**

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**Abstract:**

**Introduction:** Traumatic dislocation of shoulder leads to labral detachment from the glenoid and also the capsule and periosteum from anterior surface of the neck of scapula, a so-called Bankart lesion. Unless a surgical procedure interrupts the cycle of recurrence, the patient will likely continue to have dislocation or limitation of his activities for fear of dislocation. We report a study and results on 25 patients treated with Bankart's repair. **Material and Methods:** Twenty-five patients with recurrent anterior instability of shoulder operated between February 2005 and January 2010, were included in the study. The patient between the age group of 15 to 45 years having traumatic unidirectional anterior instability of shoulder due to Bankart lesion with or without associated lesions those were identified radiologically or arthroscopically were included in the study. The diagnosis was made on the basis of combination of symptoms, signs, radiological and arthroscopic findings. **Results:** The mean age of the patients was 32.8 years (range, 17 to 43 years). The mode of injury was fall in eighteen patients (72%) and Road Traffic Accident in seven patients (28%). The average number of instability episodes was 4.4 (range, 0 to 25). The patients were followed up for a mean duration of 26.32 months with UCLA mean of 31.5. The results were analyzed after a minimum follow up of 2 years. **Conclusion:** Arthroscopic Bankart repair is a reliable method for treatment of recurrent

anterior glenohumeral instability. This method is able to yield a good clinical outcome in terms of excellent postoperative shoulder motion and low recurrence rate and low incidence of complications.

***Keywords: Shoulder dislocation, Arthroscopic surgery, Shoulder pain.***

## **Introduction**

Recurrent traumatic anterior dislocation of shoulder is a common condition faced by Orthopaedic surgeons in the day-to-day practice. Spontaneous recovery from recurrent dislocation of shoulder is unlikely. Unless a surgical procedure interrupts the cycle of recurrence, the patient will likely continue to have dislocation, or limitation of his activities for fear of dislocation. Biomechanical and clinical studies have shown that traumatic dislocation of shoulder leads to labral detachment from the glenoid and also the capsule and periosteum from anterior surface of the neck of scapula, a so-called Bankart lesion. Operative techniques for the treatment of recurrent anterior instability of the shoulder ideally should achieve stability without loss of mobility and strength<sup>1</sup>. Satisfactory stabilization has been accomplished with open anterior capsulolabral reconstructions such as the Bankart procedure and its modifications<sup>1,2</sup>. However, difficulty in achieving strength and in returning to normal daily activities<sup>3</sup> as well as a decreased range of motion, especially external rotation, following open Bankart procedure has led to the development of arthroscopic stabilization techniques<sup>3,4</sup>. Arthroscopic stabilization for this problem has evolved from the use of metallic staples to transglenoid sutures, to absorbable rivets and to suture anchors. The Bankart operation for recurrent anterior dislocation of shoulder is based on the premise that labral detachment is the causative lesion. The labrum is sutured back to suture anchors in the rim of glenoid, in the event that the labrum is attenuated; the capsule is sutured to the scarified glenoid margin and neck. Multiple

techniques have been proposed for arthroscopic repair of the unstable shoulder. These include the use of staples, trans-glenoid passage of sutures and suture anchors. The proposed advantages of arthroscopic stabilization include smaller skin incisions and hence smaller scars, more complete inspection of the glenohumeral joint, the ability to treat intraarticular lesions, access to all areas of glenohumeral joint for repair, less soft tissue dissection, maximum preservation of external rotation<sup>5</sup> quicker recovery and early economic gain.

### **Material and methods**

Twenty-five patients with recurrent anterior instability of shoulder operated at a single institution between February 2005 and January 2010, were included in the study. The patient between the age group of 15 to 45 years having traumatic unidirectional anterior instability of shoulder due to Bankart lesion with or without associated lesions those were identified radiologically or arthroscopically were included in the study. The diagnosis was made on the basis of combination of symptoms, signs and radiological and arthroscopic findings.

- a) The patient's description of shoulder dislocation or a sensation of looseness or slipping.
- b) Pain or apprehension on instability tests.
- c) Radiographic evidence of anterior glenohumeral instability.
- d) Findings during arthroscopy that confirmed anterior glenohumeral instability.

The patients with multidirectional instability, isolated Rotator Cuff tears or isolated SLAP or Hillsach's lesion or neurological deficit after dislocation were excluded.

### **Preoperative assessment:**

Enough data was collected to rate the shoulders according to the University of California at Los Angeles (UCLA) Shoulder score. Patients were questioned about the mechanism of injury that

resulted in the index dislocation or subluxation, the duration of instability, the total number of dislocations since then and whether the instability resulted in loss of function or activity. The shoulders were examined for passive and active range of motion, which included Forward Flexion, Abduction, External Rotation and behind the back Internal Rotation. The stability was examined using various tests.

### **Operative technique:**

After being administered general anesthesia, the patient was placed in Lateral position with the affected limb held with foam & bandage with 4 to 6 Kg's of skin traction for axial traction. The arm was held in approximately 45° of abduction and 15° of forward flexion. The patient was rotated slightly towards his or her back to allow unobstructed use of instruments through the anterior portal. The shoulder was then prepared and draped under all aseptic precautions.

### **Operative procedure –**

The palpable bony landmarks were outlined before the procedure began. The posterolateral, the anterolateral corner of the acromion and the confluence of distal clavicle and acromion were marked. The posterior portal was established in the soft spot approximately 2 cm. below and 1cm medial to the posterolateral corner of the acromion. The anterior portal was made after the arthroscope placement through the posterior portal. Outside-in technique with the help of a hypodermic needle was used to establish this portal. This portal was located in the rotator interval. Externally this portal was about 1 to 2 cm infero-medial to anterolateral acromion. The anterior inferior portal provides direct access to the anterior inferior glenoid rim. This portal was created under direct vision by inside-out technique. This portal passed laterally to the conjoined tendon and through the lower third of the subscapularis muscle.<sup>6</sup> A diagnostic arthroscopy was then performed

through the posterior portal. On entering the joint the biceps tendon was located and used as a landmark for orientation. The glenoid was oriented in the horizontal plane. As the arthroscope was advanced into the joint the articular surface of humeral head and glenoid were seen. We then observed for chondromalacia or traumatic lesions to the articular surface. The scope was advanced to evaluate for evidence of tear. A SLAP (Superior Labral Anterior to Posterior) lesions should be probed to determine stability. The anterior capsule & subscapularis tendon were inspected to look for fraying or damage. The biceps-labral complex was probed and evaluated and the anterior labrum was examined for fraying or detachment indicating shoulder instability. The arthroscope was then passed inferiorly to visualize the anterior band of the inferior glenohumeral ligament. It is also important to note the Rotator Interval which lies between the anterior border of the Supraspinatus and superior edge of the subscapularis muscle. Another lesion that was looked for was an ALPSA (Anterior ligamentous periosteal sleeve avulsion) lesion, in which the Inferior glenohumeral ligament (IGHL)–Labral complex is avulsed and is healed in a displaced position medially along the anterior inferior glenoid neck. The Bankart lesion i.e. the anteroinferior capsulolabral avulsion was identified and addressed through the anterior inferior portal The anterior capsulolabral tissue was mobilized medially along the glenoid neck and the area was debrided with an arthroscopic burr/shaver to create a suitable bed for attachment of the labral tissue. The repair was started from inferior aspect where the capsule-ligamentous tissue was held and brought upwards and laterally. This was done to bring about proper tension in the IGHL-capsular complex. In some chronic cases no labrum is available, where only the capsule is tensioned. This is known as ‘capsular shift’ technique. The glenoid neck was slightly abraided using a rasper. For repair, the first anchor was placed in the 5.30 o’ clock position 2 mm on to the articular rim at a 45 degree angle relative to the glenoid surface. After the

anchor is implanted, the two suture limbs were separated and a suture retrieval device was placed through the capsulolabral tissue and appropriate suture was attached to the anchor and shuttled through the tissue. The suture retrieval device is placed inferior to the anchor so that when the knot is tied the capsulolabral tissue is shifted cephalad to form a bumper onto the labral surface. Knot-tying is performed with use of self-locking sliding knot. Anchors are placed in sequential order approximately 5 to 7 mm apart for a secure repair. SLAP lesions if associated were repaired similarly. Rotator interval was closed with Ethibond suture if found opened up. It was done by suturing the superior margin of the subscapularis tendon to the superior glenohumeral ligament with the arm held at the side and in maximum external rotation. Skin stab incisions are then sutured with non-absorbable sutures. Data analysis comparing the scores before and after surgery was performed using the Wilcoxon Sign Rank Test. A P value of  $< 0.05$  was taken as statistically significant.

#### RESULTS:

Out of twenty-five patients in our study, twenty-three patients were male. The mean age of the patients was 32.8 years (range, 17 to 43 years). The mode of injury was fall in eighteen patients (72%) and Road Traffic Accident in seven patients (28%). The average number of instability episodes was 4.4 (range, 0 to 25). The patients were followed up for a mean duration of 26.32 months. The results were analyzed after a minimum follow up of 2 years. The UCLA scores in the post-operative period are mentioned in [Table 1] with significant improvement  $p < .05$ . Scores were rated as Excellent (34-35), Good (28-33), Fair (21-27) and whereas Poor (0-20).

Associated injuries with the Bankart lesion are depicted in [Table 2]. Only in one patient we encountered post-operative stiffness of shoulder, his lesion was associated with impingement syndrome and Acromio-Clavicular joint arthritis.

**Discussion:**

Arthroscopic repair for anterior instability of the shoulder is an established method of treatment with reproducible results and with low rate of recurrence. The reported re-dislocation rates following arthroscopic procedures, especially those using trans-glenoid sutures <sup>7</sup>, exceed those following open Bankart procedure. More recently, better results have been reported after Arthroscopic Bankart repairs done using suture anchors. <sup>8,9</sup>

In our study, twenty-five patients underwent arthroscopic Bankart repair with use of 3.5 mm TAG II suture anchors for recurrent anterior instability of shoulder. The dominant limb was involved in 52% cases. Arm dominance had no effect on return to activities of daily living. We detected no significant difference in the outcomes, as measured by functional shoulder score, related to whether the left or the right shoulder was involved, the patient's age, whether the instability occurred following a fall or a road traffic accident, the number of dislocations before operative stabilization, or the interval between the initial symptom of instability and the operative reconstruction. The average number of suture anchors that were used was 3 (range, 2 to 5). The mean UCLA shoulder function score at the mean follow-up period of 26.32 months (range, 3 to 55 months) was 31.5 points  $p < .05$  (range, 18-35). In the present study we found that arthroscopic shoulder stabilization with use of suture anchors had no failure in form of recurrence at a mean follow-up of 26.32 (range, 3 to 55) months. Although recurrence rate may increase with time, these results are better than most of the previous reports on arthroscopic stabilization using suture anchors.

Fabbriciani et al <sup>9</sup> in their study of arthroscopic stabilization using suture anchors have reported zero percent recurrence in thirty patients at a mean follow-up of 24 months. It is known that the humeral bone defects (i.e. Hill-Sach's lesion) lead to postoperative recurrent instability. In our study though,

13 patients had a Hill-Sachs lesion but none recurred. These were shallow and hence were left alone. We did not have to bone graft these or do 'Remplisage' for any of these Hill-Sachs lesions but is a good option as shown by Maiotti M et al<sup>10</sup>.

Five patients had an associated SLAP lesion, and four of these underwent repair using suture anchors. On an average three suture anchors were used (range, 2 to 5). In cases with SLAP lesions along with Bankart lesion four to five suture anchors were used. In our technique, we used absorbable or non-absorbable 3.7 mm TAG II suture anchors on No. 2 Ultrabraid suture.

We repaired the antero-inferior capsule-labral complex by capsular shift procedure so as to tighten the anterior band of IGHL and reconstruct the hammock with IGHL shift. This procedure produced proper tension in the IGHL complex. Speer et al<sup>11</sup> created experimental Bankart lesions and came to the conclusion that pure reattachment from the labrum without proper tensioning of the IGHL leads to failure of surgical procedure. Although studies have shown that the presence of capsular laxity may affect the outcome of arthroscopic stabilization, we do not consider Bankart lesion associated with capsular laxity a contraindication to arthroscopic surgery. On the contrary, Capsular shift procedure can be done arthroscopically to address the issue of capsular laxity and this significantly augments the stability achieved with Bankart repair (Refer to Algorithm).

Our patients expressed a high degree of satisfaction with arthroscopic Bankart repair. Koss et al<sup>12</sup>, in their study, reported an average UCLA shoulder function score of 32 which is comparable to that observed in the present study. In our study the mean UCLA score is 31.5 (range- 18 to 35). Satisfactory range of motion, especially external rotation that allows proper functioning during activities of daily living, is high on priority list for these patients. A good range of motion is considered more or equally important to just stability alone. The mean abduction and forward flexion was >150 degrees, external



rotation >70 degrees and internal upto level of D8. Antunes et al <sup>13</sup> showed good results and concluded saying patients with younger age or with ligamentous laxity were at the greatest risk of recurrence.

In three patients, in addition to Bankart repair, we did Rotator Interval closure with two sutures using Ethibond. Gartsman <sup>14</sup> et al arthroscopically treated fifty-three shoulders out of which thirteen underwent rotator interval closure. It is done by suturing the superior margin of the subscapularis tendon to the superior glenohumeral ligament with the arm held at the side and in maximum external rotation. Earlier, it was believed that frank dislocation of the shoulder is necessary to make a diagnosis of recurrent anterior instability of the shoulder. But now we know that there exists a spectrum of micro-instability which may not manifest with the head of humerus coming out of the glenoid, but symptoms may vary from pain to crepitus.

Koss et al<sup>12</sup> observed higher success rates if patients had five or fewer dislocations before surgical intervention. In our study the number of dislocations in patients ranged from 0 to 25 dislocations with the mean of 4.4 dislocations. One poor outcome in this study was of a female patient who had presented with shoulder pain which was aggravated on overhead abduction and external rotation. Her MRI showed evidence of impingement syndrome with A-C joint arthritis. On arthroscopy though, she was found to have a large Bankart lesion. Considering that the instability developing secondary to the Bankart lesion as the cause of impingement, we did a Bankart repair. At the end of the procedure, the humeral head was well centralized. Postoperatively, with our routine rehabilitation regime, she failed to achieve a good range of motion at the end of 12 weeks due to persistent pain and stiffness. Probably, the existing A-C joint arthritis with superadded postoperative stiffness resulted in the poor functional outcome.

**Conclusion:**

Arthroscopic Bankart repair has many advantages compared to open technique. It offers minimally invasive approach with less surgical trauma and blood loss. Postoperative recovery and rehabilitation is faster, without the need of admission. Postoperative range of motion is also not sacrificed for the sake of stability. Patients are able to have a good range of motion functionally, especially external rotation, which allows them to return to their high demand jobs.<sup>15</sup> With modern techniques of arthroscopic Bankart repair continuing to evolve and improve, a result of this technique is fast catching up and is a very reliable option.

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**Legends of figures and tables:**

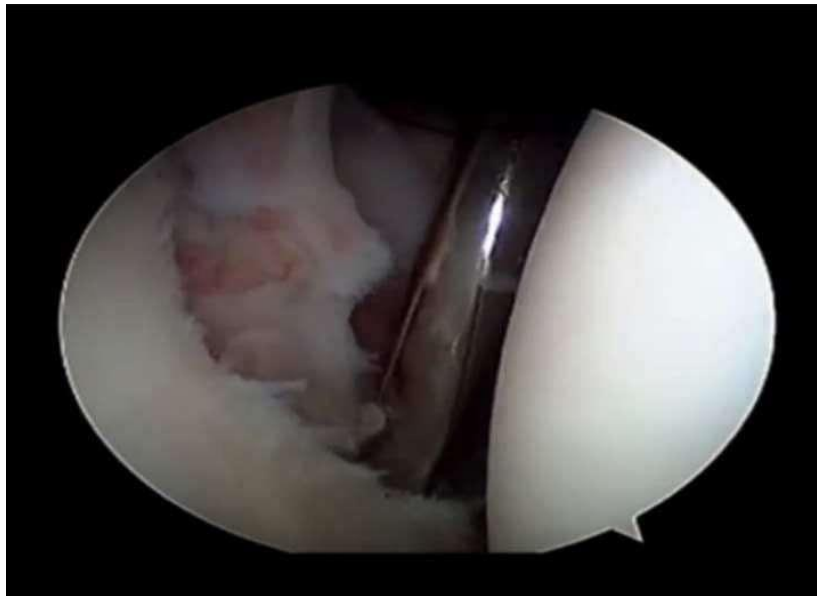
Figure 1: Arthroscopic image showing the torn Antero-inferior part of the labrum.

Figure 2: Intra-op image showing the Bankart lesion repaired by suture anchors with bumper closure.

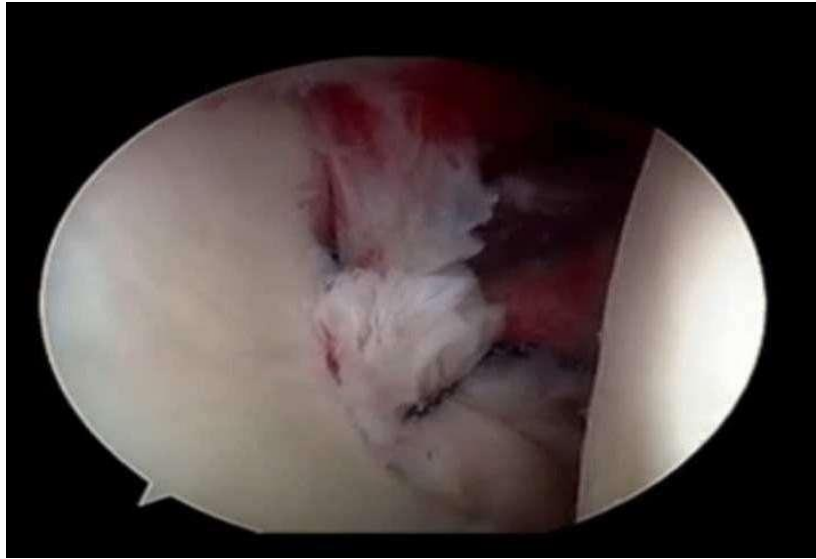
TABLE 1: Grading of results by UCLA Shoulder scoring system:

TABLE 2: Associated injuries with bankart lesion

**Figure 1: Arthroscopic image showing the torn Antero-inferior part of the labrum.**



**Figure 2: Intra-op image showing the Bankart lesion repaired by suture anchors with bumper closure.**



Grading of results by UCLA Shoulder Scoring System:

TABLE 1: Grading of results by UCLA Shoulder Scoring System:

GRADES	NUMBER OF CASES	UCLA SCORE	PERCENTAGE
EXCELLENT	8	34-35	32
GOOD	15	28-33	60
FAIR	1	21-27	4
POOR	1	0-22	4

Table 2: associated injuries with bankart lesion

ASSOCIATED	NUMBER OF	PERCENTAGE
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<b>PATHOLOGY</b>	<b>CASES</b>	
<b>SLAP</b>	5	20
<b>HILLSACH'S</b>	13	52
<b>ALPSA</b>	1	4
<b>IMPINGEMENT WITH A-C ARTHRITIS</b>	1	4
<b>ISOLATED BANKART</b>	5	20

SLAP: Superior Labrum Antero-Posterior

ALSPA: Anterior Ligamentous Periosteal Sleeve Avulsion

A-C Arthritis: Acromio-Clavicular

Arthritis