Arthroscopic Bankart Repair With Suture Anchors: Tips for Success

Kevin D. Plancher, MD,* and Stephanie C. Petterson, PhD†

Anterior instability treated by arthroscopic surgery is a viable option to return the athlete and nonathlete back to activities. The use of suture-loaded anchors has become a standard method with reliable fixation. Arthroscopic Bankart repair can successfully restore range of motion and stability and yield successful outcomes with a low recurrence rate. This article describes arthroscopic Bankart repair with a modified inferior capsular shift in the lateral decubitus position.

Oper Tech Sports Med 21:192-200 © 2013 Elsevier Inc. All rights reserved.

KEYWORDS shoulder, anterior instability, arthroscopic Bankart, inferior capsular shift

A nterior instability is the most common form of shoulder instability.1 The incidence of traumatic anterior glenohumeral instability in the general population is 1.7%,2 with the incidence of Bankart lesions in first-time traumatic dislocators as high as 97%.3 A patient account of a traumatic fall with a resultant anterior dislocation documented by radiography and positive physical findings is a good indication of a Bankart lesion. Although changes in the capsule and the glenohumeral ligaments play an important role to avoid a repeat dislocation, the labrum must be addressed to restore normal glenohumeral mechanics.4

Open repair has been the gold standard of treatment for surgical repair of Bankart lesions; however, results of arthroscopic repair now rival those of open intervention as a result of advances in surgical equipment, technique, and surgeon’s experience. The aim of this article was to demonstrate a practical, step-by-step guide to arthroscopic repair of a Bankart lesion with a reproducible success rate to return athletes and nonathletes back to their desired activities.

Relevant Anatomy

The fibrocartilaginous labrum surrounds and attaches to the glenoid in a 360° fashion. Although anatomical variants do occur,5,6 the anteroinferior portion, involved in the essential or Bankart lesion, normally adheres in a strict fashion (Fig. 1).

A Bankart lesion is the avulsion of the glenoid labrum, with or without a bony lesion, with the anterior band of the inferior glenohumeral ligament (IGHL) from the anterior inferior glenoid. The anterior band of the IGHL is the primary restraint to anterior translation of the humeral head, particularly when the shoulder is in 90° abduction and placed in an externally rotated position.7,8 A second restraint to anterior humeral translation is the muscular contribution of the subscapularis. Its insertion onto the anterior shoulder joint capsule implicates its role in shoulder stability. Although many other structures are very important to understand shoulder anatomy and their functional significance, we refer the reader to other sources.

Patient History

A thorough history is essential to surgical decision making. Exploring the nature of the traumatic event and determining subsequent dislocation or subluxation episodes after the event provides important information to the examiner. Description of events that occur during sleep and bilateral apprehension without a traumatic event are more characteristic of multidirectional instability, which is beyond the scope of this article. First-time dislocators in certain demographics are good candidates for early arthroscopic repair because of higher failure rates with delayed surgical intervention.9

The most common mechanism of an anterior dislocation injury involves a posteriorly directed force when the arm is in a position of abduction and external rotation. Therefore, patients are often reluctant to move their shoulder in an abducted and externally rotated position (“apprehension” on physical examination) during the critical period following an anterior dislocation for fear of recreating the provocative event or even a subluxation event. Observation of functional activities in the
Clinic, such as taking off a coat, can easily help to identify aberrant movement patterns.

A common complaint after a traumatic anterior dislocation is numbness to the limb in an ulnar distribution, often involving the little finger and medial half of the ring finger. Numbness typically resolves in the first 14 days after the event. Patients who are 40 years and older should always be questioned and examined for any weakness in the upper extremity for fear of missing a concomitant rotator cuff lesion or in patients older than 50 years, more commonly, a nondisplaced, lesser or greater tuberosity fracture. A functioning deltoid with intact sensation in the axillary nerve distribution should always be confirmed.

**Physical Examination**

A comprehensive physical examination can be conducted in less than 5 minutes and can ensure an accurate diagnosis. The examination should assess range of motion, neurovascular integrity, periscapular atrophy (Fig. 2), and strength, particularly of the rotator cuff. Special testing should include apprehension, relocation, augmentation, and lag signs (Fig. 3). Comparison with the opposite side must always be made to appreciate the presence or absence of ligamentous laxity and normal range of motion for the individual being examined. An anterior dislocation or subluxation event would stress the anterior band of the IGHL, which can contribute to increased shoulder laxity, therefore, the examiner should gain an appreciation of the patient’s baseline external rotation.
in the opposite upper extremity. In addition, arm dominance and sporting activity should also be taken into account when inspecting the shoulder because of adaptations that occur, particularly in the overhead-throwing athlete. Complaints of instability in midranges of motion (e.g., 20°-60° of abduction) are frequently reported in persons with concomitant bone loss and should be a red flag for treatment.11

**Radiographic Evaluation**

Radiographic examination should include a true anterior-posterior (AP), scapular-Y, and axillary views. The axillary view provides good visualization of the anterior and posterior aspects of the glenoid fossa, the glenohumeral relations, and the acromioclavicular joint. The axillary view aids in the detection of AP subluxation or dislocation and can detect anterior or posterior glenoid rim fractures. Very often, the axillary view is avoided for fear of pain provocation. We have routinely used a technique for more than 20 years to obtain this essential view; the patient lies supine on the x-ray table holding an IV pole with his or her arm abducted at 45° (Fig. 4A). If bone loss is suspected on the humeral side (Hill-Sachs lesion), a true AP with internal rotation is recommended (Fig. 5). Special views like the West Point view may aid in visualization of the anterior and inferior glenoid to detect possible bony defects. Computed tomography or magnetic resonance imaging should be used to assess for other concomitant soft tissue or bony pathologies and assist with preoperative planning to avoid unexpected findings in the operating room.

**Figure 4** (A) Axillary view with patient positioned. (B) Plain axillary radiograph of a normal glenohumeral joint. (C) Arthritis of the glenohumeral joint.

**Figure 5** AP with internal rotation view.
Evaluation of Bone Loss

The amount of bone loss associated with a Bankart lesion is a factor that must be considered in surgical decision making. Patients with recurrent dislocations should undergo a rigorous investigation to identify glenoid or humeral bone loss. In these instances, a 3-D computed tomography scan should be pursued to evaluate possible glenoid bone loss and possible Hill-Sachs lesion. Arthroscopic Bankart repair can be successful for glenoid bone loss of <20%-25%.12 Bone loss greater than 25% would require a bony procedure to avoid high recurrence rates.13 There are many ways described in the literature to quantify the amount of bone loss to ensure that the arthroscopic Bankart repair would yield a successful outcome (Fig. 6).

Operative Treatment

Proceeding with surgical intervention should only occur following the extensive evaluation described earlier and a lengthy discussion with the patient. It is imperative that patients understand the pros and cons, ramifications, expectations, and possible complications of the proposed surgical intervention as well as those associated with not having surgery.

Although age does not exclude a patient as a candidate for an arthroscopic procedure, patients younger than 25 years must understand reported recurrence rates of 15%-98%, which have been published by various authors, especially in the athlete who plays contact sports.14 We have also found that wrestlers have a much higher recurrence rate compared with athletes in other contact sports.

Historically, outcomes of arthroscopic repairs were poor. The technical components of arthroscopic Bankart stabilization have matured over the years and failure rates have decreased ranging from 8%-25% depending on patient characteristics (eg, athlete in recreational and collision sports).15-20 First-time dislocators who participate in collision activities are motivated, and the ones who desire to participate in overhead activities are the ideal candidates for the procedure described later.21

Preparation, Positioning, and Draping

The patient is examined in the preoperative area and the appropriate limb is marked before proceeding. The patient is then placed supine on the operating room table. Following appropriate anesthesia, an intraoperative examination should be conducted on both the limbs to confirm the preoperative impression and evaluate shoulder laxity or the ability to freely dislocate in the absence of muscle guarding by the patient. A time-out is performed and antibiotics are routinely administered.

Arthroscopic Bankart repair can be performed in the lateral decubitus (Fig. 7) or beach-chair positions. We believe that our experience in performing the procedure in the lateral decubitus position reproducibly provides access to the 6-o’clock position and permits a sure way to easily return the capsulolabral complex to its anatomical position with a modified inferior capsular shift or Bankart repair as described by others.22

The lateral decubitus position aids in positioning the glenoid parallel to the floor, creating a standard reference point, and allows for excellent visualization and workspace during the operation, whether a muscular or small patient.23 Risks associated with the lateral decubitus position include compression of the common peroneal nerve and the contralateral brachial plexus, which are minimized with appropriate positioning and padding, verified by the surgeon and detailed later.

A beanbag is placed in advance on the operating table and the patient is laid in the lateral decubitus position. The beanbag is placed up, but not above, the inferior border of the scapula of the affected side. The patient is then moved to the head of the table with his or her head in line with the head of the table. The patient is secured in place. The lower leg is padded with a pillow and a foam donut or gel pad is placed with the fibular head draped, free and protected to avoid nerve compression. A pillow is placed between both the legs and both the ankles are wrapped with padding. Sequential pneumatic boots are placed on both legs. A warming blanket is placed below the nipple area and not inflated until the patient is appropriately draped.
Finally, understanding preoperatively the version of the glenoid, the table is tilted toward the surgeon to allow the glenoid to be parallel to the floor. The operating table is turned so that the surgeon can work at the head of the table with 2 monitors, one to the right of the surgeon and the other opposite the surgeon, when standing behind the patient. An arm holder is placed on the opposite side of the operating room table as low as possible to allow for traction to be maximum, when needed.

Following examination under anesthesia, the arm is secured in a holder in approximately 45° of abduction and 15° of forward flexion and neutral rotation. We have not found any postoperative stiffness with our patients in this position, as long as the arm is maintained in an abducted and externally rotated position with limited weight, no greater than 3.18-4.54 kg. Caution must be taken when applying traction in this position to prevent damage to peripheral nerves and the brachial plexus. Tractioning in this position may assist in defining labral tears and improving access to the labrum, subacromial space, inferior capsule, and underside of the rotator cuff. Split U sheets are used when draping to expose the midsternal line anteriorly and the medial border of the scapula posteriorly. Commercially available preparations are used; however, our patients must wash their entire body with Hibiclens (Molnlycke Health Care Inc., Norcross, GA) or PishoHex (Sanofi-Aventis, Bridgewater, NJ) scrub for 5 days before surgery.

Anesthesia

Arthroscopic Bankart repair is performed with an interscalene block placed under ultrasound guidance and supplemental, general endotracheal anesthesia. Although some have cautioned against the use of the interscalene block because of temporary or permanent neurologic complications,24 we have found it to be a safe, reliable regional anesthetic for shoulder surgery.25-27 The use of the interscalene block is associated with decreased blood loss;25,28 shorter stays in the recovery room, decreased postoperative opioid use, and faster discharge from the hospital. In conjunction with intra-articular analgesic injections following the surgical intervention, interscalene injection can enhance pain control and has been shown to decrease the use of morphine consumption in the first 24 hours following surgery.25 Our patients more often than not refrain from opioid use and use only NSAIDs in the postoperative period. The phrenic nerve is affected with an interscalene block, which normally leads to an ipsilateral hemidiaphragmatic paresis, and we avoid its use in patients with complex respiratory diseases.

Surgical Technique

Portal Placement

We use a modified 3-portal technique similar to that of Nebelung.22 Portals are established with an outside-in technique using an 18-gauge spinal needle to optimize positioning. The placement of the 2 anterior portals is crucial; too close proximity would lead to crowding of the cannulas. Swelling can be avoided with a pump pressure as low as possible (≈ 40 mm Hg) and turning off all fluids when not actively performing a task inside the shoulder (ie, when waiting for anchors or any equipment).

Posterior Portal
The posterior portal is typically the first portal placed and is the primary viewing portal for the diagnostic arthroscopy. A standard posterior portal is created 3 fingerbreadths inferior to the posterior lateral border of the acromion and 2 fingerbreadths medial in the soft spot in a routine fashion for shoulder arthroscopy.

Anterosuperior Portal
The purpose of the anterosuperior portal is 3-fold, to visualize the pathology, to prepare the glenoid rim, and to repair the Bankart lesion. With the scope visualizing the rotator interval after inspecting the 15 points described by Snyder,24 an 18-gauge spinal needle is introduced superiorly and must touch the 1- or 11-o’clock position (right or left shoulder). The spinal needle is positioned 45° to the glenoid rim. The position of the spinal needle must be in line with the anterior lateral border of the acromion and is often 1 cm inferior. The spinal needle is replaced by a 5.5 cannula at first and then a long switching stick is used with a metal dilator with the placement of an 8.0-mm × 90-mm cannula.

Anteroinferior Portal
A second cannula is introduced in a similar fashion with a spinal needle staying lateral to the coracoid at all times, with the tip of the needle approaching the 5:30-6:00 position of the glenoid rim at a 45° angle and perpendicular to the glenoid. We have often placed our cannula through the subscapularis or even inferior to the tendon with impunity. Placement below the subscapularis allows the portal to be placed accurately 2.5-4 cm from the axillary nerve, which is safe.22,31 The portal provides improved access to the glenoid for optimal anchor placement in good bone stock to the articular margin of the medial glenoid rim. The 5:30 position in a right shoulder or 6:30 in a left shoulder. We have never detected any weakness, pain, or clinical issues with this low portal.

Once the spinal needle is introduced in the proper position, it is left in place. An 11-blade (single-piece blade) is introduced alongside the needle and is brought into the joint under direct visualization to open the capsule. The knife is withdrawn and now a long, double-ended switching stick is introduced into the joint through the same opening and the 8.0-mm × 90-mm cannula can now be easily introduced without struggling when pushing through or even below the subscapularis. It is important when dilating to ensure that the switching stick is in the same position that the spinal needle was placed to ensure that the cannula is directed perfectly. With the 2 anterior cannulas placed, the operative procedure is nearly complete as the rest is now a technical exercise. We have noted not to abduct
Diagnostic Arthroscopy

Although complete examination of the joint is required for all shoulder procedures, this article only discusses our technique for treatment of traumatic anterior shoulder instability. Visualization from the posterior portal is begun with evaluation of the subscapularis recess. An attempt is made to visualize possible medial displacement of the capsulolabral complex, which more often than not requires visualization from the anterosuperior portal. It is important to use the switching sticks to maintain the portals. Turning the inflow off whenever waiting for an instrument minimizes swelling of the shoulder and allows this procedure to be completed safely and with ease. In addition, the usage of a larger cannula 8.0 mm × 90 mm allows passage of instrumentation in a facile manner.

Glenoid Neck Preparation

The glenoid preparation requires complete mobilization of the Bankart lesion (soft tissue or bony fragment). The capsulolabral complex must be completely freed up with an elevator from the glenoid neck, and the subscapularis muscle belly must be visualized before bringing the burr onto the glenoid surface while viewing with the camera from the anterosuperior portal. After confirming the glenoid has no more than 20% bone loss, a round, 3.5-mm burr is used to prepare the glenoid neck. Placement of the anchors on the glenoid face allows for the best bone purchase and recreates an anatomical position to reestablish a labral bumper (Fig. 9).

Anchor Placement

We have always agreed with recent studies that encourage the usage of a minimum of 3 anchors for stabilization. These anchors are placed below the 3-o’clock position, 45° relative to the glenoid rim, and at least 3-mm inside the edge of the glenoid surface. We have found that in the lateral position, the tension on the capsulolabral structures is maintained in a good position with slight external rotation. If the portals have been placed correctly as instructed earlier, separation of the 3 anchors is easily attained. Once the anchor is implanted, the suture limbs are retrieved. One limb is retrieved through the anterosuperior portal and the other limb is ready to be used for soft tissue tensioning. Use of double-loaded or triple-loaded anchors is based on surgeon preference (Fig. 10).

Capsular Imbrication

Capsular stretch owing to repeated dislocations shoulder never be forgotten, as failure to address this issue can result in an arthroscopic failure. Adequate tissue must be sewn with a soft tissue grasper placed from the anteroinferior portal, at a position several millimeters inferior to the already placed anchor (Fig. 11). This would allow for not only anterior stabilization but also an inferior capsular shift. This task is easily accomplished with many lasso passers, now commercially available. Before knot tying, the limb is retrieved from the anterosuperior portal and brought back into the anteroinferior portal. A knot pusher is passed down both the limbs to ensure that no crossing of sutures has

Figure 8 (A) Cannulas in place. Facilitates passage of instruments in and out of the shoulder and facilitate suture management.

Figure 9 (A) Burr in place. Anterior glenoid rim is debrided to create a bleeding bony bed. (B) Spatula in place. Cartilage may be removed for suture placement. The labrum would not heal to cartilage.
occurred with either limb. Simple knots are tied (we use a modified Weston knot) by tying the knot on the nonarticular side of the repair, holding the soft tissue in place (Figs. 12 and 13). On completion of the inferior-most knot, the procedure is repeated moving in a superior direction. When tying each knot, a small amount of the weight is released from the traction device. Closure of the surgical incisions is routine, using Vicryl and Monocryl sutures. The joint is infiltrated under direct visualization with 10-mL 0.25% Marcaine without epinephrine. To date, we have not seen chondrolysis in our patients up to 10 years postoperatively.

**Rotator Interval Closure**

In the multiple dislocated shoulder of patients reporting subluxation or dislocation symptoms in their sleep, the arthroscopic rotator interval is closed (Fig. 14). When doing so, the arm is abducted to 45°, with 45° of external rotation in the lateral decubitus position. We are aware as reported by others that interval closure is associated with reduced AP translation and decreased motion. To minimize this risk of postoperative stiffness or loss of external rotation, we ensure correct positioning of the arm.

---

**Postoperative Care and Rehabilitation Protocol**

All postoperative medicines, braces, and slings are given to the patient preoperatively. The patient is then seen on postoperative day 1 for a dressing change and to review instructions and postoperative rehabilitation. The patient is instructed to come out of the sling and abduction pillow 3 times a day to allow the arm to hang at the patient’s side for 5 minutes. Biceps isometrics are also initiated. This protocol is followed for 3.5 weeks after surgery. At 2 weeks, sutures are removed and passive supine forward flexion is checked. If the patient is stiff (ie, they cannot maintain 90°), passive flexion range of motion is started. External rotation beyond 10° is prohibited and not begun until 4 weeks postoperatively. External rotation is always limited to half the range of motion of the contralateral side for 12 weeks. The abduction pillow (Fig. 15) is discontinued at 4 weeks, and a soft sling is used while sleeping and when out in public for an additional 2 weeks. Supine, active-assisted forward flexion to 120° progressing to 160° is initiated at 4 weeks. Scapular-stabilization exercises are initiated 6 weeks postoperatively. Strengthening is initiated at 8 weeks when
motion has been attained in a supine and upright position. Patients involved in noncontact sports are allowed to return to most sports after 3 months. Athletes who play contact sports (ie, basketball, wrestling, football, and hockey) are not allowed to return to sport until 4-5 months. The last exception, baseball pitchers, must wait 9 months before throwing on the mound at full speed, although a true dislocation in this type of athlete is rare.

Complications

Many patients have discussed the various problems associated with failure of arthroscopic Bankart repair. The following section describes some of the pitfalls that should be avoided.

Significant Bone Loss

Osseous glenoid lesions affect the success of arthroscopic management for anterior shoulder instability, therefore careful consideration and preoperative planning are key to successful outcomes. Bone loss greater than 25% should be addressed by other procedures. The capsulolabral defect with such a great loss of bone would not suffice to yield stability. Potential options include the Latarjet-Bristow, remplissage, humeral head osteotomy, and osteochondral allograft transplantation. All of these procedures are discussed elsewhere in this journal.

Poor Mobilization of the Bankart Lesion

Poor mobilization of the Bankart lesion can lead to inferior outcomes. The goal in mobilizing the labrum is to be able to shift the capsule superiorly and laterally to attain adequate stability and fixation. Failure to mobilize the labrum will lead to recurrence. As outlined earlier, visualization of the subscapularis muscle must be evident. On completion of the mobilization, we often place the arthroscope in the superior portal to inspect if we have performed an adequate job.

Insufficient Anchors and Incorrect Placement

Recent studies have substantiated the need for an adequate number of anchors (4 minimum) with placement on the
Summary

Traumatic anterior shoulder instability and avulsion of the anterior inferior labrum occurs quite often in sports. The arthroscopic technique presented here provides the opportunity to repair the capsulolabral complex in a successful manner and return our athletes to competition.

References