

Arthroscopic Anterior and Inferior Labral Repair for Traumatic Shoulder Instability

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Background: Anterior glenohumeral instability is common in the young and athletic population and can develop from a dislocation or subluxation event. Avulsion of the anterior inferior glenoid labrum (Bankart lesion) occurs in over 90% of these events. In patients who have unsuccessful conservative management or present with a high risk for redislocation, surgical intervention is indicated. This video presents our technique for arthroscopic anterior and inferior labral repair.

Indications: In addition to those patients who have unsuccessful conservative management, surgical management of anterior glenohumeral instability is indicated in patients who are at high risk for redislocation after an initial instability event. These patients include young age and participation in contact sports. Generally, glenoid bone loss over 25% warrants open bony augmentation, but arthroscopic bony augmentation techniques are evolving. Further, the management of “near-track” lesions, or “on-track” lesions with a small distance to dislocation value, remains controversial.

Technique Description: This procedure is performed in the lateral decubitus position. A second anterior portal is created distal and lateral to the first anterior portal, entering the shoulder joint just above the subscapularis. The anterior-inferior labrum is prepared with an arthroscopic elevator, followed by a rasp and superior labral anterior and posterior burr. A suture tape is then shuttled around the labrum and the anchor drilled in the appropriate position at the glenoid rim, not violating the cartilage. Anchor placement occurs from an inferior to a superior fashion until the entire labral injury is repaired.

Results: This video presents a technique to achieve arthroscopic fixation of an anterior-inferior labral tear in a young athlete with anterior glenohumeral instability. Patients are taken through 3 phases of rehabilitation before return to sport-specific activities, such as contact sports, around 6 months postoperatively. Return-to-sport rates for contact and collision athletes range from 80% to 100%, with recurrent rates ranging from 5% to 20%.

Discussion/Conclusion: Arthroscopic anterior-inferior labral repair is a useful technique for minimally invasive glenohumeral stabilization in indicated patients who have minimal glenoid bone loss. Portal placement, labral mobilization, and glenoid preparation are paramount in optimizing the healing potential of the fixation construct.

Patient Consent Disclosure Statement: The author(s) attests that consent has been obtained from any patient(s) appearing in this publication. If the individual may be identifiable, the author(s) has included a statement of release or other written form of approval from the patient(s) with this submission for publication.

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VIDEO TRANSCRIPT

Hi, my name is Steve Marcaccio, and together with Dr. Rafael Buerba, Dr. Justin Arner, and Dr. James Bradley, we will present our technique for arthroscopic anterior and inferior labral repair for traumatic shoulder instability. These are our disclosures.

BACKGROUND

Anterior glenohumeral instability is common in the young athletic population.^{1,3} It can develop from a dislocation or a subluxation event. Associated pathologies include Bankart lesions, which are avulsions of the anterior inferior



labrum and anterior band of the inferior glenohumeral ligament (IGHL).^{1,14} Bankart lesions have been known to occur in 97% of dislocations and 96% of subluxations.^{8,13} The counter-coup injury to the Bankart is a Hill-Sachs lesion, which is a lesion in the posterior-superior humeral head. Hill-Sachs lesions are found in 90% of dislocations and 92% of subluxations.^{10,13}

Other associated pathologies that can be found include humeral avulsion of glenohumeral ligament (HAGL), glenolabral articular disruption (GLAD), and anterior labroligamentous periosteal sleeve avulsion (ALPSA) lesions.^{1,14} Axillary nerve injury is usually a transient neuropraxia and can be present in up to 5% of patients.¹⁴ Of note, patients older than 40 years who sustain a dislocation rarely have Bankart and Hill-Sachs lesions. They more commonly present with fractures or rotator cuff tears.¹⁴

Age and activity level are the most important factors in determining who will progress to have recurrent instability. Patients older than 30 years have been known to have a recurrence rate of less than 23%, whereas patients between the ages of 12 and 20 years have recurrence rates as high as 87%.² Participation in contact sports such as football, hockey, and lacrosse also increases the risk of recurrence.^{2,5} It is important to note that untreated recurrent instability can lead to significant instability—subsequent dislocations increase damage to the capsulolabral tissue and raise the risk of developing glenoid bone loss, all of which can increase the risk of developing osteoarthritis and change the surgical treatment plan, including the use of bony augmentation procedures.^{2,3,5,7,8}

Nonoperative management is reserved for patients with low recurrence risk, such as older patients with lower shoulder demands. Of note, studies have shown that when teens and young active military members are treated nonoperatively, their redislocation rates approach 75% to 100%.¹³ There is some controversy regarding nonoperative management, however. It is unclear whether immobilization versus early motion improves outcomes and reduces redislocation rates.^{9,10} There is also a controversy regarding the position in which the shoulder should be immobilized.^{9,10} Regarding in-season athletes, we recommend stabilization of first-time dislocators due to the previously discussed risks of recurrent instability, but we will commonly let patients finish their season with bracing if they accept these risks.

Operative management can be performed arthroscopically or open. Arthroscopic repairs have been shown to have a redislocation rate of 5% to 33% but are advantageous in that they do not violate the subscapularis, and there is a decreased loss of external rotation.^{6,12} Open repairs, on the other hand, have a lower redislocation rate approaching 5% to 9%, but they do have increased morbidity.¹² Critical glenoid bone loss may be as low as 12% to 13% of the diameter of the inferior glenoid. In select patients with this level of bone loss, bony augmentation or addition of remplissage may be indicated.²

New research has categorized instability as a bipolar concept to assist in surgical decision-making regarding anterior glenohumeral instability. It is thus important to understand the definition of on-track lesions, which are

lesions in which the Hill-Sachs defect is smaller than the glenoid articular track and off-track lesions, in which the Hill-Sachs defect is larger than the glenoid articular track.^{4,15} Of note, the management of “near-track” lesions, or “on-track” lesions with a small distance to dislocation value, remains controversial.

INDICATIONS

The following is an algorithm for the treatment of anterior glenohumeral instability. Arthroscopic repair is recommended when the glenoid bone loss is less than 25%, but a remplissage is added for an off-track lesion. For glenoid bone loss greater than 25%, a Bristow-Latarjet procedure is recommended. If the lesion is off track, an additional humeral procedure is recommended.^{2,16}

The Instability Severity Index Score (ISIS) is a useful tool in surgical decision-making regarding whether to proceed with an open versus arthroscopic repair. Essentially, young, competitive contact athletes with certain physical examination and radiographic findings have an ISIS score greater than 6 and should undergo open repair.² The Glenoid Track Instability Management Score incorporates the glenoid track concept into the ISIS score with the use of a 3-dimensional computed tomography scan to evaluate the glenoid track, with scores greater than or equal to 4 leading to a recommendation of open treatment.⁵

For this case, we will discuss a 19-year-old male football player with intermittent left shoulder pain for 3 weeks after tackling an opposing player during a game. He felt like he dislocated his shoulder, and the athletic trainers reduced him on the sideline. He had a similar episode to this one early in the season. He has been doing physical therapy for range of motion, and he feels that his shoulder is unstable with overhead movements.

On examination, he has full range of motion and full strength. He does have a positive posterior instability test as well as a positive apprehension and Jobe relocation test. He has a positive sulcus sign, a 2+ anterior load and shift test, and a 2+ posterior load and shift test.

Left shoulder x-rays are normal. Magnetic resonance imaging shows a soft tissue Bankart as indicated by the yellow circle and a posterior inferior labral tear as indicated by the yellow arrow. There is a loose body in the joint, as highlighted by the yellow circle. On sagittal imaging, the Bankart lesion is indicated by the arrows.

In summary, this is a 19-year-old football player who sustained a traumatic anterior left shoulder dislocation with an on-track lesion due to the small Hill-Sachs and soft tissue Bankart. He also has a posterior inferior labral tear as well as a loose body, and his ISIS score is 5.

TECHNIQUE DESCRIPTION

The patient was therefore indicated for arthroscopic labral repair, with open instrumentation available for backup.

The patient is placed in the right lateral decubitus position with the left arm suspended with 10 pounds of

traction. Local anesthetic is preinjected into the joint and the shoulder is then prepped and draped.

Diagnostic arthroscopy is begun through the posterior portal, and the anterior-inferior soft tissue Bankart is visualized as well as the loose body, which was subsequently removed.

Anterior glenoid is prepared with the arthroscopic elevator followed by a rasp. Great care is taken to ensure that all of the soft tissues are released from the bone so that the capsule and the labrum can be mobilized with ease. Please note that we use a single anterior portal in this procedure, which eliminates portal convergence, but needle localization is recommended to confirm that all anchor trajectories can be obtained through this single portal.

A superior labral anterior and posterior (SLAP) burr is then used to create a bleeding bony bed for the labrum to heal onto.

Starting with the most inferior aspect of the anterior glenoid, a suture passer is used to pass a monofilament suture through the labrum. The suture is then retrieved, and outside the patient, the suture tape is then secured into the monofilament suture, as shown here. The sutures are then shuttled.

While holding tension on the sutures, a 2.9-mm arthroscopic shaver drill is used to drill a hole for the suture anchor. The 2.9-mm biocomposite knotless suture anchor is then loaded and inserted into the hole and hammered into place with the appropriate tension. The suture is then cut.

This process is repeated in an inferior to superior fashion with additional suture anchors. It is important to perform the repair in this manner, as each successive anchor will compress the joint space and minimize visualization of the joint.

After the repair, the anterior superior labrum is probed, and it is shown to be stable.

Please note that while the patient's posteroinferior labral tear was addressed in this case, it is not shown as this is outside of the scope of this technique video.

The final repair construct is then evaluated, and it can be seen that the anterior inferior labrum and posterior inferior labrum have been restored and that the humeral head is well centered on the glenoid.

RESULTS AND DISCUSSION

This slide highlights technical pearls for the most challenging steps when performing this procedure and begins with careful and adequate portal placement, being sure to optimize the trajectory of implants for safe and secure fixation within the glenoid but being careful to minimize instrument traffic and convergence to allow for ease of implantation. This is often accomplished with use of spinal needle localization and only completing portal formation when optimal placement is confirmed. Second, being meticulous with the labral elevation and glenoid preparation is paramount, making sure to visualize the bleeding bone surface of the glenoid while also being careful not to damage the labrum in the process. This is performed with careful use of the arthroscopic elevator or SLAP burr. Third, tailoring capsular plication to the individual patient based on their

sport-specific activities optimizes stability while preserving function.

The postoperative protocol consists of 4 phases. During the first 4 weeks, the patient is in a sling and should perform gentle isometrics and pendulums but no active range of motion. After 4 weeks, formal physical therapy begins. The sling is discontinued at 6 weeks. Range of motion is also increased. At 8 weeks, strengthening begins. During months 3 to 6, functional rehab begins, with plyometrics and a return-to-sport program. Patients may return to full contact sports after 6 months.

Regarding clinical outcomes, this recent systematic review evaluated 34 studies and a total of 1866 patients, investigating the return-to-sport rate among patients who underwent arthroscopic Bankart repair. The authors found rates of 82% and 88% for return to preinjury level of sport and preinjury level of competitive sport, respectively, with significant improvement in all functional outcomes.¹¹

Thank you for your attention, and we hope that you found this technique video to be useful.

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REFERENCES

1. Aronen JG, Regan K. Decreasing the incidence of recurrence of first time anterior shoulder dislocations with rehabilitation. *Am J Sports Med.* 1984;12(4):283-291. DOI: 10.1177/036354658401200408
2. Balg F, Boileau P. The instability severity index score: a simple pre-operative score to select patients for arthroscopic or open shoulder stabilisation. *J Bone Jt Surg Ser B.* 2007;89(11):1470-1477. DOI: 10.1302/0301-620X.89B11.18962
3. Bottoni CR, Wilckens JH, DeBerardino TM, et al. A prospective, randomized evaluation of arthroscopic stabilization versus nonoperative treatment in patients with acute, traumatic, first-time shoulder dislocations. *Am J Sports Med.* 2002;30(4):576-580. DOI: 10.1177/03635465020300041801
4. Di Giacomo G, Itoi E, Burkhart SS. Evolving concept of bipolar bone loss and the Hill-Sachs lesion: from "engaging/non-engaging" lesion to "on-track/off-track" lesion. *Arthroscopy.* 2014;30(1):90-98. DOI: 10.1016/j.arthro.2013.10.004
5. Di Giacomo G, Peebles LA, Pugliese M, et al. Glenoid Track Instability Management Score: radiographic modification of the Instability Severity Index Score. *Arthroscopy.* 2020;36(1):56-67. DOI: 10.1016/j.arthro.2019.07.020
6. Gouveia K, Harbour E, Athwal GS, Khan M. Return to sport after arthroscopic Bankart repair with remplissage: A systematic review. *Arthroscopy.* 2023;39(4):1046-1059. DOI: 10.1016/j.arthro.2022.12.032
7. Hovelius L, Olofsson A, Sandström B, et al. Nonoperative treatment of primary anterior shoulder dislocation in patients forty years of age and younger: a prospective twenty-five-year follow up. *J Bone Jt Surg.* 2008;90(5):945-952. DOI: 10.2106/JBJS.G.00070
8. Hovelius L, Saeboe M. Neer Award 2008: arthropathy after primary anterior shoulder dislocation-223 shoulders prospectively followed up for twenty-five years. *J Shoulder Elb Surg.* 2009;18(3):339-347. DOI: 10.1016/j.jse.2008.11.004
9. Itoi E, Hatakeyama Y, Sato T, et al. Immobilization in external rotation after shoulder dislocation reduces the risk of recurrence: a randomized controlled trial. *J Bone Jt Surg.* 2007;89(10):2124-2131. DOI: 10.2106/JBJS.F.00654

10. Itoi E, Sashi R, Minagawa H, Shimizu T, Wakabayashi I, Sato K. Position of immobilization after dislocation of the glenohumeral joint: a study with use of magnetic resonance imaging. *J Bone Jt Surg.* 2001;83(5):661-667. DOI: 10.2106/00004623-200105000-00003
11. Memon M, Kay J, Cadet ER, Shahsavar S, Simunovic N, Ayeni OR. Return to sport following arthroscopic Bankart repair: a systematic review. *J Shoulder Elb Surg.* 2018;27(7):1342-1347. DOI: 10.1016/j.jse.2018.02.044
12. Ogawa K, Yoshida A, Matsumoto H, Takeda T. Outcome of the open Bankart procedure for shoulder instability and development of osteoarthritis: a 5- to 20-year follow-up study. *Am J Sports Med.* 2010;38(8):1549-1557. DOI: 10.1177/0363546510363464
13. Owens BD, Dickens JF, Kilcoyne KG, Rue JPH. Management of mid-season traumatic anterior shoulder instability in athletes. *J Am Acad Orthop Surg.* 2012;20(8):518-526. DOI: 10.5435/JAAOS-20-08-518
14. Pickett A, Svoboda S. Anterior glenohumeral instability. *Sports Med Arthrosc.* 2017;25(3):156-162. DOI: 10.1097/JSA.0000000000000157
15. Sachs RA, Lin D, Stone M, Lou Paxton E, Kuney M. Can the need for future surgery for acute traumatic anterior shoulder dislocation be predicted? *J Bone Jt Surg.* 2007;89(8):1665. DOI: 10.2106/JBJS.F.00261
16. Wheeler JH, Ryan JB, Arciero RA, Molinari RN. Arthroscopic versus nonoperative treatment of acute shoulder dislocations in young athletes. *Arthroscopy.* 1989;5(3):213-217. DOI: 10.1016/0749-8063(89)90174-6