Technical Note

Single-Portal Arthroscopic Posterior Shoulder Stabilization

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Abstract: Posterior shoulder instability occurs when the labrum detaches posteriorly from the glenoid owing to significant trauma and is a relatively uncommon type of shoulder dislocation. Although posterior instability has often been treated with open shoulder stabilization, modern arthroscopic procedures are being rapidly pursued by surgeons as an improved option because of decreased invasiveness and reduced operative times. Arthroscopic stabilization of the posterior glenoid labrum typically involves 2 working portals, but the procedure still yields successful results when performed with a single posterior portal and a suture passer. Our technique involves 1 less portal to reduce invasiveness, lower the risk of nerve damage, and decrease the operative time and postoperative pain. The purpose of this article is to describe an arthroscopic posterior stabilization technique with a single working portal.

The glenoid labrum serves an important function in shoulder biomechanics by enhancing glenohumeral stability, centering the humeral head on the glenoid, and acting as an attachment site for glenohumeral ligaments to the glenoid rim.[1-3] Although its design increases resistance to joint subluxation, the glenoid labrum is susceptible to tearing when repetitive microtrauma to the capsulolabral complex and subluxations or dislocations of the glenohumeral joint occur.[4] Unsurprisingly, glenoid labral tears are often found among baseball pitchers in whom the shoulder is repeatedly stressed and chronic labral impingement is caused between the glenoid and humeral head, resulting in subsequent labral detachment.[4,5]

Posterior shoulder instability is posteroinferior labral detachment from the glenoid and reported in only 2% to 4% of all shoulder dislocations.[1,6,7] Conservative and operative treatment methods are used to restore function to the shoulder, after which return to physical activity is promoted.[8] Nonsurgical treatment of posterior shoulder instability includes activity modification and physical therapy focused on strengthening the rotator cuff muscles and scapular stabilizers.[9-11] If rehabilitation of the glenohumeral joint leads to poor results, particularly in patients with shoulder instability arising from traumatic injury, surgical options may be considered before 6 months of conservative treatment is concluded.[11]

Both arthroscopic and open surgical options are available to patients, but studies have shown that arthroscopic treatment is often preferred.[9,12] Arthroscopic stabilization allows for small incisions in the glenohumeral joint, faster postoperative recovery, and improved range of motion while approaching success rates of up to 90% in overhead athletes.[13,14] Standard arthroscopic posterior stabilization involves posterior and posterolateral working portals and 1 anterosuperolateral or anterior portal for visualization.[4,15] The recent literature citing other techniques for posterior stabilization has also noted the inclusion of an anterior working portal to access the posterior and inferior quadrants of the glenoid with instruments.[16]

Although 2 standard portals are traditionally used when performing posterior glenoid labral repair, our technique uses a single posterior portal in addition to 1 accessory anterior portal to reduce invasiveness, operative time, and postoperative recovery time.[17,18]

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Table 1. Pearls and Pitfalls

Pearls
The lateral decubitus position achieves greater visualization of the posterior labrum than the beach-chair position.
Range of motion should be documented preoperatively and under anesthesia.
The technique should be performed in the inferior-to-superior direction.
Pitfalls
Forgoing use of spinal needle or switching stick during dilation for cannula insertion
Portal placement that leads to poor glenohumeral joint inaccessibility and potential iatrogenic nerve injury

Additional working portals are not required because of the ability to perform suture shuttling and anchor placement using the posterior portal only. This article describes our arthroscopic method for posterior shoulder stabilization using a single working posterior portal.

Surgical Technique

A demonstration of the single-portal arthroscopic posterior shoulder stabilization technique is available in Video 1. Important pearls and pitfalls are summarized in Table 1.

Preoperative Considerations

The preoperative assessment consists of physical examination and radiographs to assess for labral tears of the shoulder and rotator cuff pathology. Magnetic resonance imaging can further help with diagnostic testing. Preoperative magnetic resonance imaging of the patient's shoulder is necessary to confirm a partial posterosuperior labral tear and tendinosis of the supraspinatus and infraspinatus tendons.

Patient Positioning and Preparation

The patient is first positioned in the lateral decubitus position, with the head and bony prominences of the patient well padded. The upper extremity is treated with skin preparation and draped in sterile fashion before being attached to the arm suspension device. Anatomic landmarks are marked on the shoulder.

Arthroscopic Portal Placement and Diagnostic Arthroscopy

A standard posterior portal is created using a No. 11 blade for initial intra-articular visualization. The glenohumeral joint is entered using a blunt trocar and a scope sheath, and a diagnostic glenohumeral arthroscopy is performed (Fig 1). With direct arthroscopic visualization, a spinal needle is used to localize the anterior portal. After the anterior portal is created, the arthroscope is transferred from the posterior portal to the anterior portal. A switching stick is used to direct placement of an 8.25-mm cannula (Arthrex, Naples, FL) into the posterior portal (Fig 2). A probe is introduced through the posterior portal to evaluate for additional labral tears.

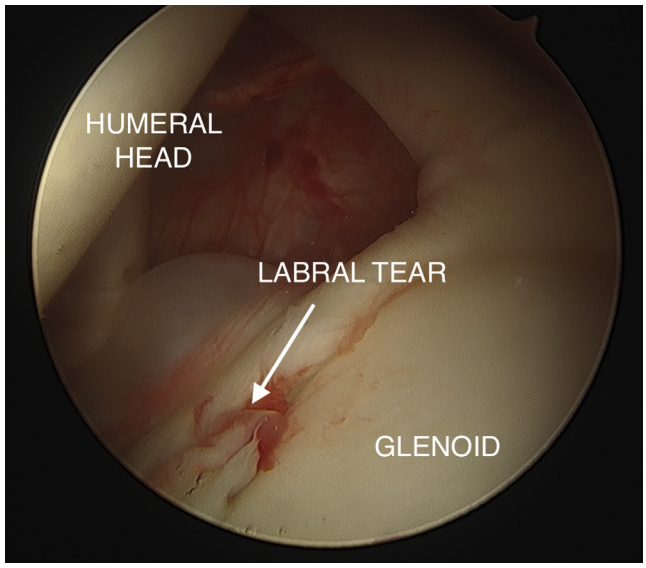

Fig 1. The patient is positioned in the left lateral decubitus position. Diagnostic arthroscopy of the left shoulder from the posterior portal shows a tear of the posterior labrum extending from the 9- to 11-o'clock position.

Glenoid Preparation and Anchor Placement

With viewing from the posterior portal, an elevator is introduced into the joint to free the torn labrum from the glenoid. The elevator is removed, and a curved suture-passing device (Arthrex) loaded with No. 0 polydioxanone sulfate is then introduced into the joint. The suture passer bites the posterior capsule and healthy labral tissue at the 9:30 clock-face position in a

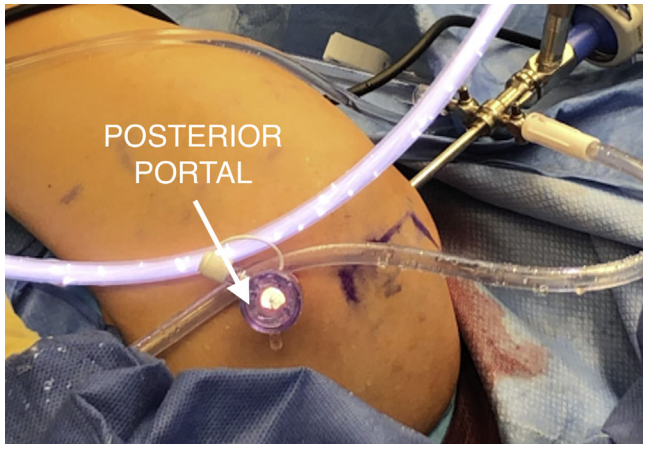

Fig 2. The patient is positioned in the left lateral decubitus position on his right side with the left arm attached to a suspension device. An intraoperative image of the left shoulder shows the standard posterior working portal used to allow access to the posterior glenoid labrum. The anterior portal created via needle localization provides visualization of the interior glenohumeral joint and posterior labrum.

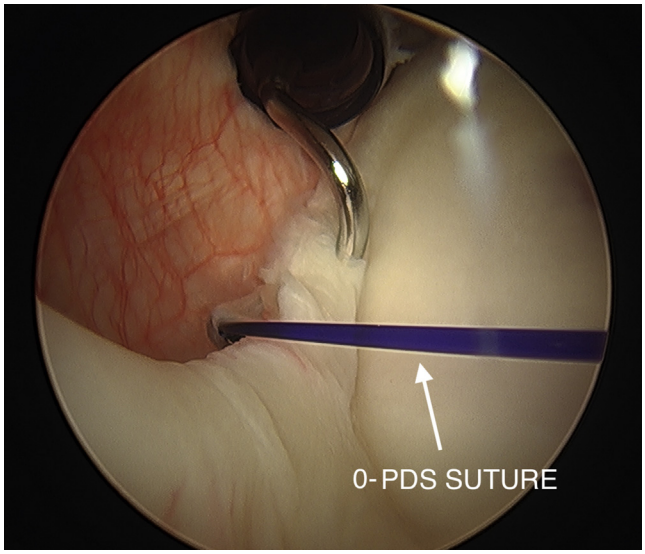

Fig 3. The patient is positioned in the left lateral decubitus position. An arthroscopic image of the left shoulder through the anterior portal shows an uncoiled No. 0 polydioxanone sulfate (PDS) monofilament suture at the 9:30 clock-face position, which is retrieved from the posterior portal to shuttle No. 2 FiberWire attached to its end.

left shoulder or the 2:30 clock-face position in a right shoulder, before unreeling a monofilament suture used to pass a No. 2 FiberWire (Arthrex) (Fig 3). A ring grasper is inserted into the portal to retrieve the monofilament suture. After the No. 2 FiberWire is exposed, it is secured against the glenolabral junction with a cinch suture (Fig 4). By use of a drill guide, pilot

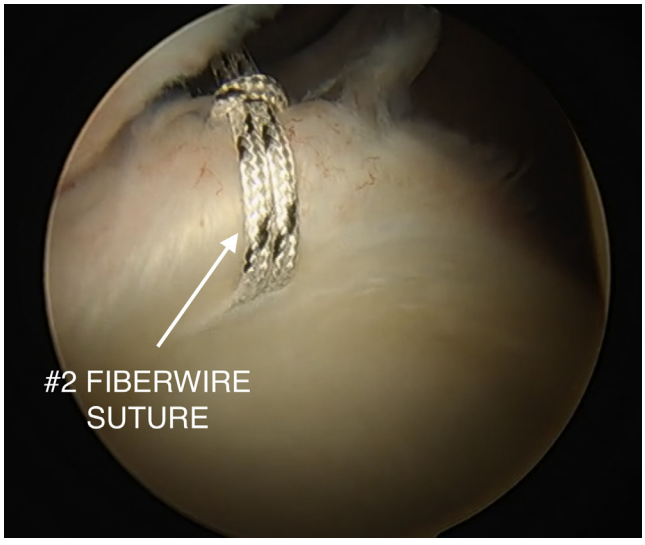

Fig 4. The patient is positioned in the left lateral decubitus position. An arthroscopic image of the left shoulder through the anterior portal shows No. 2 FiberWire suture replacement of No. 0 polydioxanone sulfate monofilament suture, successful passage of No. 2 FiberWire suture around the glenolabral junction, and a successful suture configuration with No. 2 FiberWire suture cinched down to the glenolabral junction.

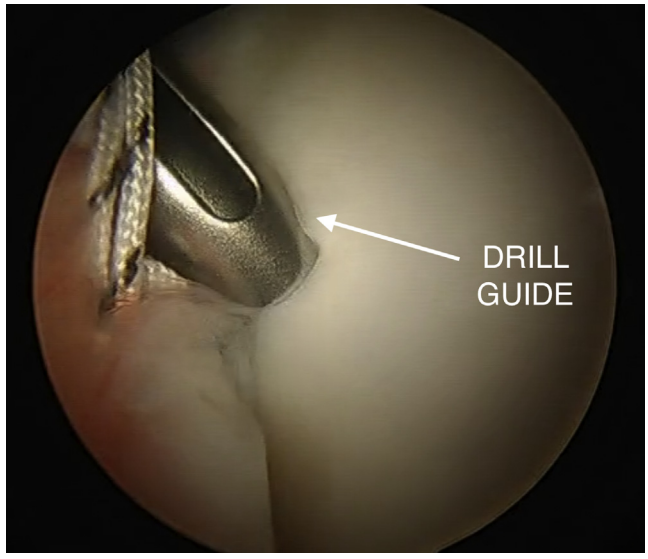

Fig 5. The patient is positioned in the left lateral decubitus position. An arthroscopic image of the left shoulder through the anterior portal shows a drill guide placed at the 10-o'clock position to drill a pilot hole for the 2.9-mm PushLock suture anchor.

holes are drilled at both the 10-o'clock and 10:30 clock-face positions in a left shoulder or the 2-o'clock and 1:30 clock-face positions in a right shoulder (Fig 5). SutureTape (Arthrex) is loaded onto a 2.9-mm PushLock suture anchor (Arthrex), which is impacted into the pilot hole with a mallet at the 10-o'clock position in a left shoulder or the 2-o'clock position in a right shoulder to secure the labrum (Fig 6). Residual suture is cut with an arthroscopic suture cutter (Fig 7). Another 2.9-mm PushLock suture anchor loaded with SutureTape is inserted into the pilot hole at the 10:30 clock-face position in a left shoulder or the 1:30 clock-face position in a right shoulder to achieve sufficient reduction of the labrum.

Final Examination and Postoperative Care

A final probing of the repair is performed to ensure stability of the restored labrum. After confirmation of glenohumeral joint stability, excess fluid is suctioned from the shoulder, and the arthroscopic instruments and arthroscope are removed. The anterior and posterior portal incisions are closed with No. 3-0 nylon suture, and the wounds are dressed in sterile Xeroform (4 × 4 inches), and an ABD, followed by foam tape. The operative arm is placed into an abductor sling and is under immobilization for 6 weeks, with formal physical therapy to commence thereafter.

Discussion

Arthroscopic methods for shoulder stabilization have been controversial compared with open surgical techniques because of higher recurrent instability rates.[19]

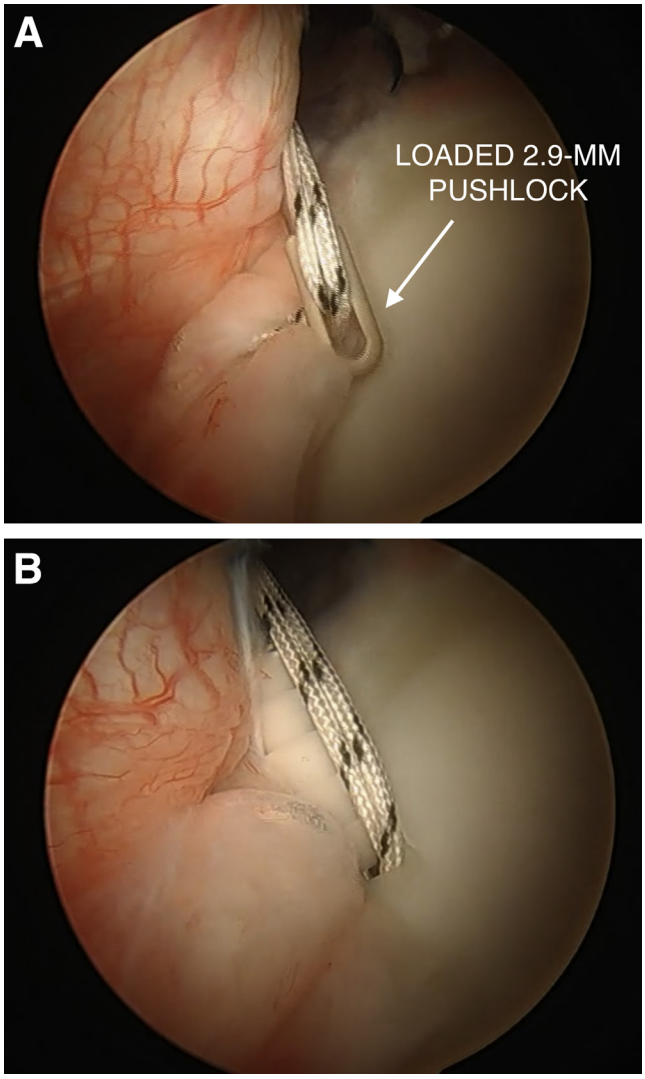

Fig 6. Arthroscopic images of the left shoulder through the anterior portal with the patient positioned in the left lateral decubitus position. (A) The SutureTape is loaded onto a 2.9-mm PushLock suture anchor and tensioned to guarantee a sufficiently reduced glenoid labrum. The 2.9-mm PushLock suture anchor is positioned over the pilot hole at the 10-o'clock position. (B) The 2.9-mm PushLock suture anchor is impacted into the pilot hole with a mallet to secure the glenoid labrum.

However, Doehrmann and Frush[3] noted that in recent years, undergoing arthroscopic stabilization significantly reduced the risk of recurrent instability with rates as low as 8.1%, compared with 19.4% for open surgical procedures. The decrease in postoperative complication rates can be attributed to a better understanding of posterior instability and its indications, as well as improvements in arthroscopic instrumentation and surgeon skill.

The failure rate is also a major consideration in choosing between arthroscopic and open treatment of posterior shoulder instability. Because of the larger surgical dissection and the inability to completely

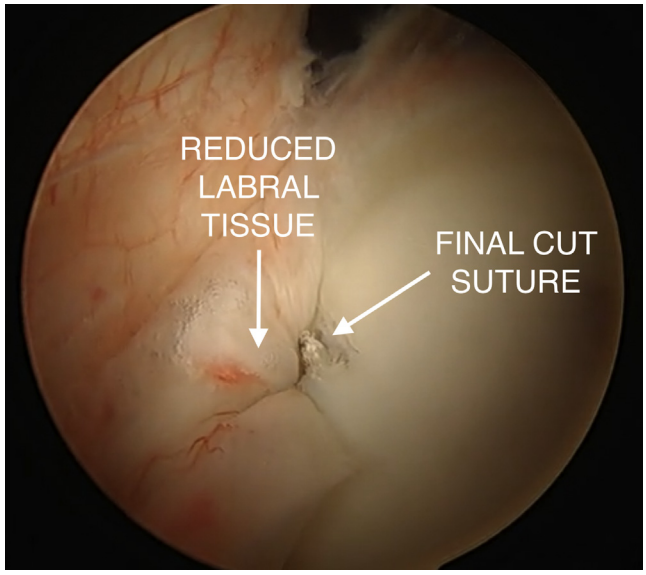

Fig 7. The patient is positioned in the left lateral decubitus position. An arthroscopic image of the left shoulder through the anterior portal shows the final impression of the reduced posterior labral tissue after residual suture is trimmed off with an arthroscopic suture cutter.

visualize pathology of the shoulder, clinical failure rates for open surgery begin at 30% and reach up to 70%.[20] However, for arthroscopic stabilization, failure rates are much lower, averaging below 10%. Although early reports of open stabilization showed low patient satisfaction and an inability to return to sports, the average rate of return to the preinjury level of sports after arthroscopic posterior stabilization is 72% to 93%, which is much higher than the rate of return to sport after arthroscopic anterior stabilization. The timing of return to sports ranges from 4.3 to 8.6 months postoperatively, and collision athletes report a greater rate of return to the preinjury competition level than overhead athletes.[21] Moreover, Katthagen et al.[22] found that patients with traumatic posterior instability returned to sports at a higher rate than those with an atraumatic origin (90% vs 72%).

The single-portal arthroscopic posterior shoulder stabilization technique is still relevantly underexplored because most arthroscopic stabilization techniques

Table 2. Advantages and Disadvantages

Advantages
Less invasiveness and morbidity compared with open surgery
Decreased risk of nerve injury and postoperative pain with fewer portals
Decreased operative time with arthroscopic approach
Decreased risk of failure with suture anchors
Disadvantages
Requires precise posterior portal placement
Possibility of entangled sutures and increased difficulty
Difficult intraoperative conversion to open surgery in lateral decubitus position

depend on the use of 2 or more working portals and injury to the posterior labrum is uncommon compared with anterior labral damage. Although comparisons of single–posterior portal versus 2-portal techniques have not been studied in depth, we have found stabilization of the shoulder using a single–posterior portal method to be an efficient and reliable technique for posterior shoulder stabilization.

The described technique maintains the advantages of multiple working portals while theoretically minimizing postoperative scarring and pain, as well as loss of motion. The feature that allows for use of a single working posterior portal is the curved Spectrum suture passer (ConMed, Largo, FL). When loaded with monofilament polydioxanone sulfate suture, the suture passer enters the posterior portal and bites into the posterior capsule and labral tissue before unreeling. When the passer is withdrawn from the cannula, the suture presents no risk of unloading from within the joint. A ring grasper is then able to retrieve the monofilament suture from the same portal without the need for suture management between the posterior and posterolateral portals, hence eliminating the need for multiple working portals.

This article presents an efficient and effective arthroscopic posterior stabilization technique. A complete list of advantages and disadvantages is provided in Table 2.

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