Technical Note

# Posterior Labral Repair Using Knotless "All-Suture" Suture Anchors

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**Abstract:** Isolated posterior instability is well described but relatively uncommon, accounting for less than 10% of all shoulder instability cases. When nonoperative management fails, surgical outcomes demonstrate improved patient-reported outcomes with a high level of return to sport. Knotless suture anchor and "all-suture" suture anchor technology are now available and used for instability procedures in the shoulder. This technical description describes knotless "all-suture" suture anchor fixation for isolated posterior labral tears.

## Introduction

Isolated posterior labral tears occur in the minority of symptomatic instability cases. The incidence is traditionally reported between 10 and 12% of instability patients.[1-4] This may be underestimated in specific overhead athletic or high-risk military populations and can often be challenging to diagnose clinically.[1,5-7] Unlike anterior unidirectional instability, posterior instability can present more subtly as a vague pain, which athletes can find difficult to describe, rather than a sensation of frank instability.[5] In such cases, a thorough physical examination, imaging workup, and appropriate failure of nonoperative management are crucial to indicate patients who will benefit from surgical stabilization.[5,8,9]

After appropriate workup, surgical intervention in this select patient population has shown excellent outcomes in function, recurrence, and return to high-level activity.[2,10-14] Previous surgical techniques, including posterior capsular plication, hard-body suture anchor stabilization, and labral repair, have been well described.[9,15,16] Additionally, the use of both knotless and soft, or "all-suture" suture anchor constructs have gained popularity for instability procedures within the shoulder.[17,18] Previous biomechanical studies comparing "all-suture" suture anchors to traditional suture anchors have demonstrated similar load-to-failure and functional outcomes when used in anterior shoulder instability cases.[19-21]

This Technical Note article describes the use of knotless "all-suture" suture anchors for the arthroscopic stabilization of an isolated posterior labral tear.

## Surgical Technique

### Step 1: Preoperative Workup

All patients being considered for arthroscopic posterior labral repair are evaluated with a complete history, physical examination, and preoperative imaging workup. Instability and provocative examination maneuvers are documented.[5] Standard radiographs are routinely performed and evaluated closely for evidence of fracture, malalignment, retroversion, dysplasia, and bone loss. Advanced imaging, including magnetic resonance imaging exam (MRI), is also standard for patients with suspected labral pathology. The use of contrast injection (MRI arthrogram) is not routinely

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performed by the senior author. Computed tomography is only used if substantial bone loss or preexisting bony deformity is observed, as evaluated on prior plain films and/or MRI.

### Step 2: Surgical Positioning

While effective labral repair can be performed from either the beach chair or lateral decubitus position, the senior author prefers to perform instability cases in the lateral decubitus position.[22-25] After general and regional anesthesia are induced, the patient is transitioned to the operation table and positioned in a sloppy lateral decubitus position, rotated ~30° posteriorly, to accommodate surgical access and orient the glenoid level with the operative theater floor. Care is taken to ensure all bony prominences are well padded, particularly at the elbow of the "down" upper extremity and both knees. Standard surgical prepping and draping are performed, and an intraoperative arm positioner is used to provide gentle traction and distraction through the glenohumeral joint.

### Step 3: Diagnostic Arthroscopy

Superficial anatomical landmarks are palpated and drawn on the surgical shoulder, including the clavicle, coracoid process, Neviaser portal area, and acromion. The Neviaser portal is located at the inner corner of the acromion, where the posterior border of the clavicle, acromioclavicular joint, and scapular spine meet.[26] A high posterolateral portal is then established ~1 cm inferior and 1 cm medial to the posterolateral aspect of the acromion. Of note, this portal is placed more superior and lateral than the standard posterior portal that is typically used for rotator cuff repair. Diagnostic arthroscopy is performed, and pathology is noted (Figs 1-3; Video 1). Next, two or three additional portals are sequentially established, including a high anterior portal, a low mid-glenoid portal, and a 7 o'clock posterolateral accessory portal. Anteriorly, a superior portal is created from outside-in using a spinal needle, being careful to hug the biceps superiorly, and an 8-mm cannula is placed (Gemini, Arthrex Inc., Naples, FL). An additional low mid-glenoid anterior portal can also be placed, pending the pathology to be treated, and is also established with a spinal needle under direct arthroscopic visualization from outside-in, positioned just superior to the subscapularis and lateral enough to access the labrum posteriorly, working across the joint. A second 8-mm cannula is placed in this portal (Gemini, Arthrex). Next, a switching stick is used to hold the posterior portal position, while the camera is placed anterosuperior for viewing, and a third 8-mm cannula can be placed over the switching stick in the posterior portal (Gemini, Arthrex). Finally, a 7 o'clock posterolateral accessory portal is created at a 45° angle off the posterolateral aspect of the acromion under direct arthroscopic visualization using an outside-in technique and a spinal needle.[27] After sequential dilation, an additional 8-mm cannula can be placed in this posterolateral portal (Gemini, Arthrex). Of note, the senior author does *not* place cannulas in all 4 portals in every case. Often, percutaneous approaches are used for the low mid-glenoid portal just above the subscapularis and/or the 7 o'clock posterolateral portal. The need to do both portal and cannula placement is

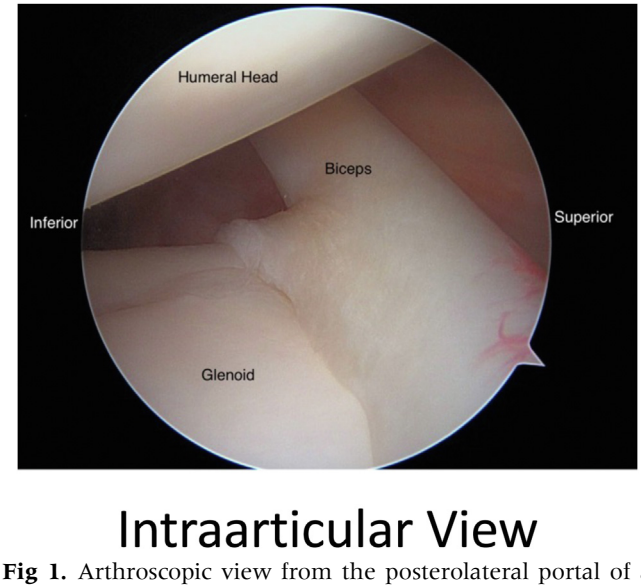


**Fig 1.** Arthroscopic view from the posterolateral portal of a left shoulder identifying the humeral head, glenoid, and long head biceps tendon.

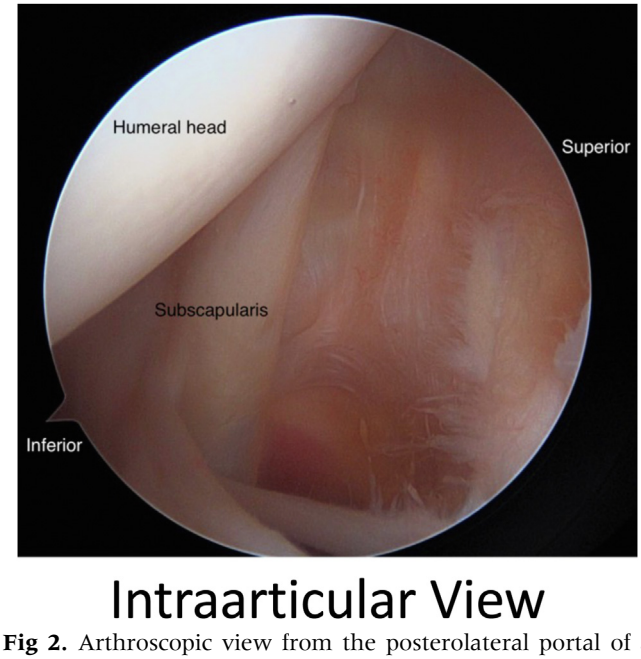


**Fig 2.** Arthroscopic view from the posterolateral portal of a left shoulder identifying the humeral head and subscapularis tendon.

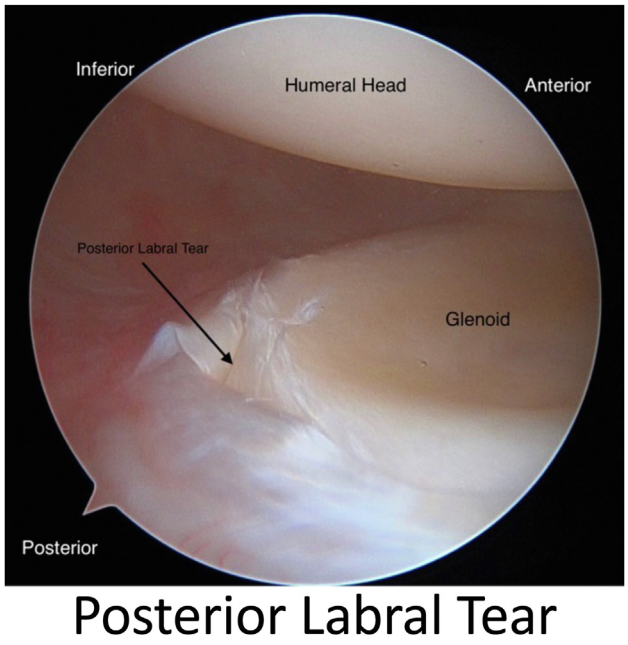


**Fig 3.** Arthroscopic view from the posterolateral portal of a left shoulder looking inferiorly, identifying the posterior labral tear (black arrow).

made on a case-by-case basis, individualized to the patient's specific pathology being treated.

### Step 4: Glenoid and Labral Preparation

With the scope in the standard (superior) posterior portal, the posterior labral tear is well visualized. Labral liberation is initiated with the soft tissue elevator and then the rasp, working across the joint through either of the anterior portals (Fig 4, Video 1, Table 1). During this process, care is taken to avoid iatrogenic damage to the articular cartilage surfaces of the glenoid and humeral head. The scope is then switched to viewing through the anterosuperior portal. The posterior and posterolateral portals are utilized to fully liberate the posterior labrum and rasp the glenoid/labrum junction. After the elevators and rasps are used, ringed curettes and a bone-cutting shaver are used to prepare the posterior glenoid bone and improve the future biologic healing potential.

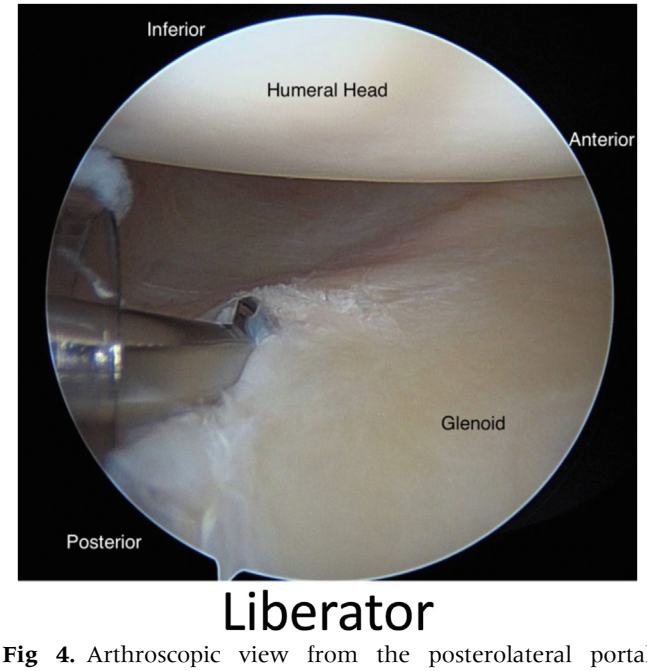


**Fig 4.** Arthroscopic view from the posterolateral portal looking inferiorly with the liberator working through a posterior inferior accessory portal.

### Step 5: Anchor Placement and Suture Passing

While visualizing through either the posterior portal or the anterosuperior portal, the 7 o'clock posterolateral portal (either via the cannula or via a percutaneous approach) is used to place the first low-profile knotless 1.8-mm "all-suture" suture anchor (knotless 1.8-mm FiberTak Soft Anchor, Arthrex). We sequentially place subsequent anchors, starting inferiorly and working superiorly up the glenoid. In our experience, a curved guide and flexible drill provide facile access to inferior anchor placement and allow controlled placement on the junction of the glenoid face and the area of the detached labrum. A suture passing device (SutureLasso, Arthrex) is then used to shuttle the anchor's repair stitch (blue suture) through the capsulolabrum complex (Fig 5 and Video 1). Unlike in the vast majority of anterior instability repair cases, during posterior labral repair, care is taken to avoid overtensioning the posterior capsular tissue if there is no significant capsular injury to avoid overconstraining the shoulder. After being passed around the labrum, the blue repair suture is shuttled through the knotless mechanism of the anchor and tensioned appropriately. The suture limb is *not* cut at this time. The senior surgeon prefers to leave the limb of the suture intact and dock it out an accessory portal (i.e., one of the anterior portals) to allow for future sequential retensioning of all anchors to reduce creep within the repair construct (Table 1). This process is repeated until an adequate labral repair has been achieved. After every suture is in place, the suture limbs of each anchor are retrieved and sequentially retensioned to ensure a well-reduced and tensioned repair before cutting these sutures (Figs 6 and 7, Video 1). Typically, a minimum of 3 knotless "all-suture" suture anchors are used.

### Step 6: Rehabilitation Protocol

Rehabilitation for posterior shoulder instability is divided into 4 phases in our practice. The first 2 weeks postoperatively include sling immobilization without any dedicated therapy. Phase 2 extends from weeks 2-6 postoperatively. This includes ongoing sling and abduction pillow use. The initiation of therapy focused

**Table 1.** Pearls and Pitfalls of Posterior Labral Repair Utilizing Knotless "All-Suture" Suture Anchors

| Pearls | Pitfalls |
|---|---|
| When establishing portals, ensure soft tissue tension on the spinal needle is minimal, as this will increase facile movement for repair with cannulas in place. | Avoid single portal suture passage and fixation to prevent unintentional suture tangle of the knotless construct. |
| Use anterior portals for posterior labral liberation, working across the joint to improve the angle for the posterior labral repair. | Avoid placing the posterior accessory portal at a medial/lateral position, making suture labral passage difficult. |
| Leave fixed knotless anchor tails in place and dock them in an unused anterior portal to allow for sequential retensioning after complete labral repair. | |

on passive range of motion and active assisted range of motion (PROM/AAROM) from 0 to 90° during weeks 2-4. During weeks 4-6, this progresses to 0-120° PROM/AAROM. Combined adduction and internal rotation are prohibited. Isometric exercises begin at 4 weeks. Phase 3 extends from weeks 6-12 and oversees the progression of the active range of motion to an as-tolerated level. Exercises include continuation of isometrics with the addition of anterior shoulder glides and scapular stabilizer work. Phase 4 includes weeks 12-24 postsurgery and gradual progression of activity, as tolerated, with a return to sport after 20 weeks postsurgery.

## Discussion

Isolated posterior instability is an uncommon but well-described phenomenon making up 10-12% of all instability cases.[3,4,8] Despite the appropriate diagnosis, activity modification, and nonoperative management, a subset of these patients will progress to surgical intervention.[3,5,7,28] Outcomes of isolated posterior shoulder labral repair have consistently demonstrated improved patient-reported outcomes with a high level of return to sport or high-demand activity.[2,11-14] However, prior literature reviewing factors associated with clinical outcomes after a posterior labral repair has suggested that throwing athletes can expect a lower return to sport rate than the general athletic population or contact sports athletes.[2] Additionally, arthroscopic suture anchor-based repair has shown lower recurrence rates and increased patient-reported outcomes compared to suture fixation alone or open surgical interventions.[2]

Prior biomechanical work evaluating "all-suture" suture anchor fixation strength versus traditional suture anchors has demonstrated similar load-to-failure outcomes.[19,21] Clinical studies looking at recurrence rates, patient-reported outcomes, and return to sport in fixation of anterior instability with "all-suture" suture anchor labral repair have similarly been promising.[19,20] Radiological review of patients who underwent "all-suture" suture anchor fixation also demonstrated similar healing rates to traditional suture anchor

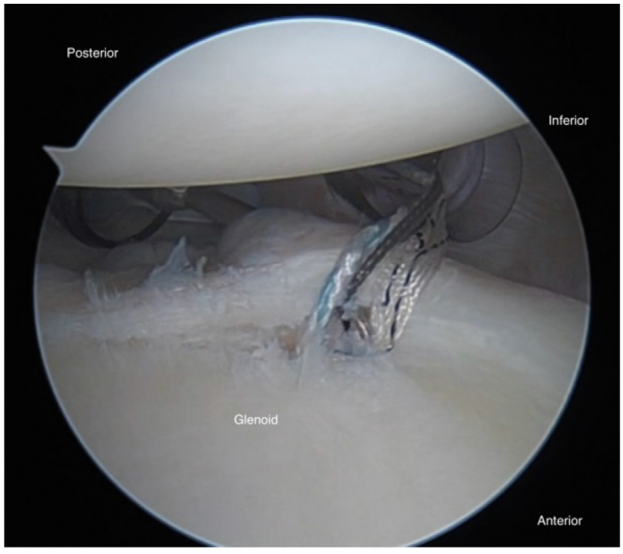


**Fig 5.** Arthroscopic view from the superior anterior portal of a left shoulder, visualizing the posterior accessory portal with a suture passer and a previously placed anchor with a suture docked through the posterolateral portal.

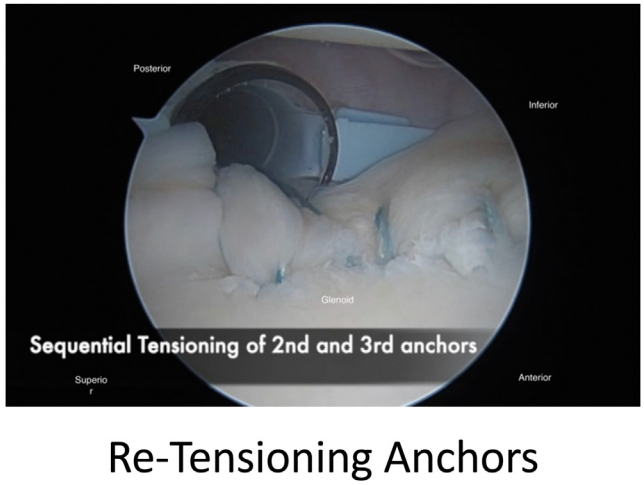


**Fig 6.** Arthroscopic view from the superior anterior portal of a left shoulder visualizing sequential retensioning of multiple anchors through the posterolateral portal.

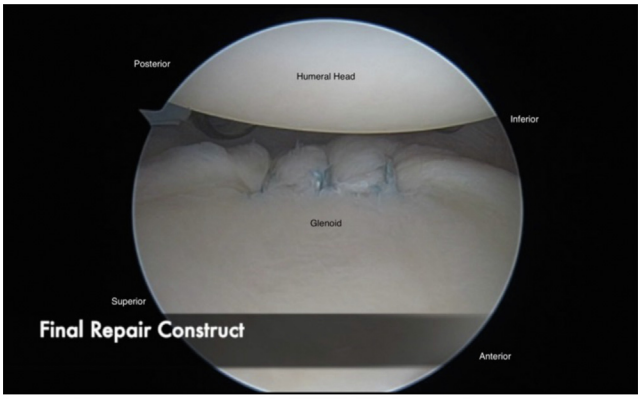


**Fig 7.** Arthroscopic view from the superior anterior portal of a left shoulder visualizing the completed "all-suture" suture anchor posterior labral repair.

counterparts without bony reactions or cystic changes.[18] The addition of knotless technology to labral repair has similarly been studied and has shown equivalent patient-reported outcomes with potentially decreased operative time, as well as the decreased potential for soft-tissue damage from knot stacks from traditional (non-knotless) anchors (Table 2).[17]

This technique paper describes the arthroscopic fixation of isolated posterior labral instability utilizing knotless "all-suture" suture anchor fixation. Knotless anchor fixation has increased in utilization, and previous work in the shoulder has looked at "all-suture" suture anchor fixation, which has prompted this technical description.[4] Advantages of this technique include the use of a high-strength suture allowing a stable repair. This stability is achieved with a low-profile construct minimizing damage to the surrounding tissue. In addition, without the need to tie knots, these anchors allow for a more efficient, reproducible, and reliable procedure. The ability to sequentially retension each anchor allows for a very robust repair and allows the surgeon to customize the tension for each patient. The potential disadvantages of this technique include the cost of the implants and the learning curve associated with using a new technology (Table 2).

In summary, posterior glenohumeral instability is an uncommon but well described pathology. In the correct patient, arthroscopic posterior labral repair using knotless "all-suture" suture anchor fixation is a technically feasible and facile technique for labral repair.

**Table 2.** Advantages and Disadvantages of Posterior Labral Repair Using Knotless "All-Suture" Suture Anchors

| Advantages | Disadvantages |
|---|---|
| Lower recurrence rates and increased patient-reported outcomes compared to suture fixation alone or open surgical interventions | Cost of implants |
| Similar healing rates and load-to-failure outcomes compared to traditional suture anchors without bony reactions or cystic changes | Learning curve |
| Promising recurrence rates, patient-reported outcomes, and return-to-sport | |
| High-strength sutures provide a stable repair with a low-profile construct that minimizes damage to the surrounding tissue. | |
| Decreased operation time | |

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