

Arthroscopic Acetabular Labral Repair Using the Q-FIX Suture Anchor



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Abstract: The goal of acetabular labral repair is to preserve/restore labral function. Maintaining labral function necessitates recreating the labrum's anatomy, especially avoiding a nonanatomic repair of the labrum to the acetabular rim. The purpose of this report is to detail the technique of acetabular labral repair using this Q-FIX all-suture anchor.

Routine arthroscopic management of acetabular labral tears has morphed from resection to repair.¹ Factors influencing this transition toward repair include the following: the healing capacity of the labrum has been confirmed by animal and clinical models; reliable techniques and technology for restoration have been developed; and rehab strategies have been refined, lessening the burden of recovery.²⁻⁸ The literature is now replete with reports that support superior outcomes with restoration of the labrum compared with simple debridement.⁹⁻¹¹

The labrum has excellent healing capacity, but if its function is to be restored, it is imperative that its anatomic structure be restored as well. Placement of the suture anchors is an essential element in repairing the labrum to its proper site of attachment along the rim of the acetabulum. Anchor placement is influenced by the surgical technique and the properties of the anchor.

To restore the anatomy of the labrum, and hopefully the labral seal, the anchors must be placed reasonably close to the articular edge of the acetabulum. The

smaller the labrum, the more imperative it is to place the anchor close to the edge of the rim. However, the paramount concern is avoiding perforation of the subchondral surface of the acetabulum, which can cause harm to the articular cartilage and potentially destructive arthritic changes to the joint.¹²

The distinguishing features of suture anchors include size, pullout strength, material properties, and method of insertion. In the hip, the smaller the diameter, the better. This allows for greater safety and latitude in repairing the labrum as close as possible to the rim.¹² The pullout strength must be sufficient to withstand tying the knots, as this is likely to be the most tension to which the anchor will be exposed. The labrum in the hip is different from that in the shoulder, where the glenoid labrum is part of the capsulolabral construct and repair involves a capsular shift, thus leaving the repair site with some intrinsic tension. In the hip the capsule attaches separately from the labrum, so the acetabular labrum does not see this type of pull.¹³ Avoiding pullout while the knot is being secured is important because of the potential harm that can be caused to the labrum when subsequently retrieving the anchor.

With regards to technique, the anchor must be placed in a position where there is adequate divergence from the acetabulum to avoid perforation of its articular surface. If adequate divergence is not achieved, it mandates that the anchor be placed further away from the rim to avoid perforation. Placing the anchor further away from the rim lessens the likelihood of restoring the labrum's proper anatomic structure. Also, in an effort to avoid the articular surface of the acetabulum, inadvertent perforation of the medial cortex of the pelvis into the psoas tunnel has been described.¹⁴

The Q-FIX suture anchor is a small diameter (1.8 mm) all-suture product, which is favorable because it leaves

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Fig 1. The single-loaded Q-FIX anchor (A) and straight drill guide assembly (B). The 1.8 mm diameter anchor is passed through a 2.0 mm diameter, 22.3 mm length drill hole. (Smith & Nephew Endoscopy.)

no rigid hardware near the joint. A previous study by this author has shown excellent pullout strength and reliability of this device.¹⁵ Thus, it seems to be well suited for any and all circumstances of labral repair in the hip. The purpose of this report is to detail the technique of acetabular labral repair using this Q-FIX all-suture anchor.

Surgical Technique

Repair is performed with the Q-FIX (Smith & Nephew Endoscopy, Andover, MA) 1.8 mm all-suture anchor (Figs. 1 and 2; Video 1, Tables 1 and 2). A standard 3-portal technique is used for initial access and survey of the joint (Fig. 3).¹⁶ Portals are placed for greatest utility within the joint, as the anchors can be placed percutaneously. The conventional anterior portal is sometimes modified slightly more lateral and distal for optimal triangulation within the central compartment of the hip.

For labral management, the anterolateral portal serves as the viewing portal, while the anterior portal is the principal working portal for correcting any pincer impingement and suture management. The labrum is mobilized only as necessary to expose the pincer lesion to be resected.^{6,17,18}

Anchors are placed percutaneously at a site equidistant between the anterior and anterolateral portals and as far distal as necessary to assure divergence of the anchor from the articular surface of the acetabulum.



Fig 2. The length of the all-suture anchor is 15 mm prior to deployment. When deployed, it collapses to a 3.5 mm deep, 4.0 mm wide ball of suture. These must be placed at least 7.0 mm apart. (Smith & Nephew Endoscopy.)

Table 1. Advantages and Disadvantages

Advantages	Disadvantages
Reliable method applicable in 95% of labral repairs.	Necessitates a separate small skin incision.
Allows anatomic restoration of the labrum.	Not applicable to knotless anchors.
Minimizes risk of perforation of the acetabular chondral surface or medial pelvic cortex.	Not the smallest of all anchors.
Uses small all-suture anchor construct with unparalleled pullout reliability.	

The lower the center-edge angle, the more forgiving the acetabulum is to anchor placement. With a higher center-edge angle, greater caution is necessary to avoid perforation of the subchondral surface. Sometimes the farthest medial anchor is better placed from the relatively conventional anterior portal. The likelihood of perforating the medial cortex of the pelvis is lessened by drilling more anterior to posterior from the anterior portal. However, the paramount issue is to avoid perforating the acetabular surface, which, if in doubt, is better accomplished from the distal site.

Repair begins from anterior to lateral as this is the pattern by which most tears occur. The most far-medial anchor is placed first, as it is usually the most technically difficult, both because of visualization and the limited amount of bone stock into which the anchor can be placed. The anchors are placed as close to the rim as safety allows without violating the articular surface of the acetabulum.

The 2 most commonly used suture patterns are a modified single-limb mattress suture, creating a labral-based fixation, or a simple loop suture. The loop is used when either the quality of the labral tissue is marginal or the labrum is small. A third suture pattern, which is occasionally used when the chondrolabral junction is intact, involves 1 limb of the suture being simply placed through the peripheral margin of the labrum, rolling it up onto the rim of the acetabulum. Generally, whichever suture pattern is chosen, that

Table 2. Pearls and Pitfalls

Begins with meticulous preparation of the rim for where the anchors will be placed.
Place the most medial anchor first, as it is usually the most challenging.
Place percutaneous site as far distal as necessary to avoid the joint. The lower center-edge angle is more forgiving.
Always closely observe the articular surface during drilling, looking for signs of rippling that indicate the placement is too close to the joint.
Be especially watchful when opting to drill from the anterior portal to avoid perforation of the medial cortex; this technique is the most likely to get too close to the joint.
A higher center-edge angle is more concerning for joint violation.

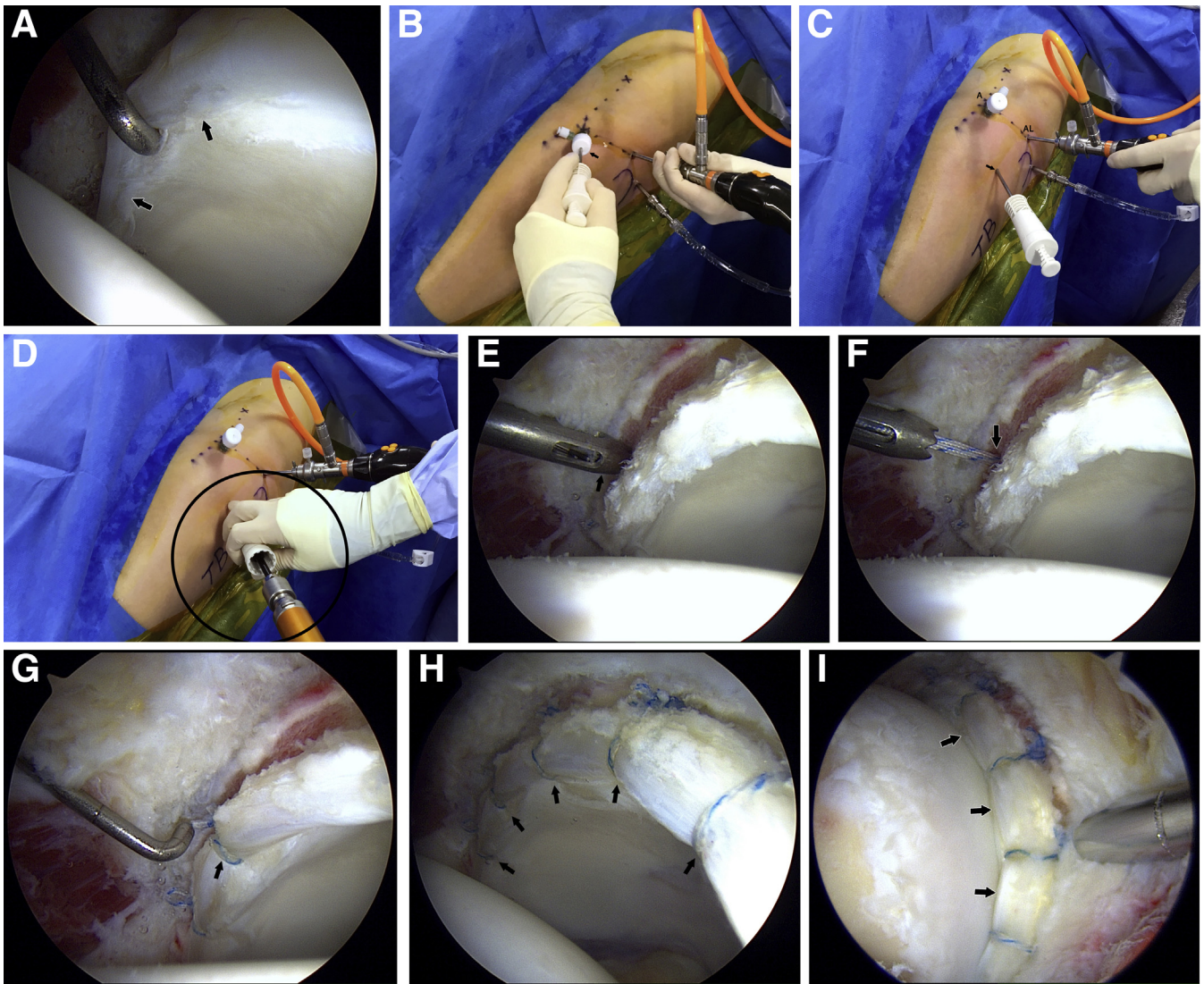


Fig 3. (A) Viewing from the anterolateral portal of this left hip, the tear of a mildly hypoplastic labrum is probed from the anterior portal (arrows). The small size of the labrum especially illustrates the value of a small-diameter, all-suture product when it is important that the anchor be as close to the rim as safely possible. Placing the anchor away from the rim in the presence of a small labrum displaces its normal position and would not restore its labral seal. (J.W. Thomas Byrd, M.D.) (B) On this left hip, the arthroscope is in the anterolateral portal (arrow). Far-medial anchors may be best placed from the conventional anterior portal demonstrated here. (J.W. Thomas Byrd, M.D.) (C) Most anchors are placed percutaneously from a distal site (arrow) equidistant between the anterior (A) and anterolateral (AL) portals. This optimizes divergence, allowing the anchor to be placed as close as safely possible to the edge of the articular surface. From this site, anchors can be placed from the 9 o'clock position anteriorly and well posterior to the 12 o'clock position laterally. (J.W. Thomas Byrd, M.D.) (D) Drilling is performed by the surgeon (circle), allowing tactile feedback. With divergence from the acetabulum, resistance should get easier as the drill is advanced. Increasing resistance suggests it may be getting close to the dense subchondral bone and require redirection. (J.W. Thomas Byrd, M.D.) (E) While drilling (arrows) this left hip, it is paramount to observe the articular surface for any signs of motion that suggest that the drill is too close to the joint. (J.W. Thomas Byrd, M.D.) (F) The suture has been secured in bone (arrow). (J.W. Thomas Byrd, M.D.) (G) The labrum has been fixed with a simple looped suture (arrow) because of its diminutive size. (J.W. Thomas Byrd, M.D.) (H) The final construct is inspected with the repair completed with 6 anchors (arrows). (J.W. Thomas Byrd, M.D.) (I) Viewing from the periphery, the labral seal has been restored (arrows) with coaptation of the labrum against the articular surface of the femoral head. (J.W. Thomas Byrd, M.D.).

pattern is used for all anchors, which lessens any distortion of the labral architecture. Regardless of the suture pattern, all sutures are tied with an Samsung Medical Center (SMC) sliding knot.¹⁹

Supervised physical therapy begins the day following surgery.⁹ General precautions for the first 4 weeks following surgery include protected weight bearing with crutches and avoiding external rotation and

extreme flexion. These limitations are probably overly cautious, but since patients often exhibit poor compliance, expressing some restrictions is probably wise for the clinician. Structured rehabilitation is continued for 12 weeks after surgery, by which time healing should be complete. Functional progression toward return to activities then proceeds over the next 1 to 3 months, based on the patient's range of motion, strength, endurance, and tolerance.

Discussion

The purpose of labral repair is to preserve or restore the labrum's function. If repair is expected to restore this function, it seems essential that the repair restore the labrum's anatomy. Restoring the anatomy is a factor of anchor placement and suture management.

Anchor placement should be consistent with the principal goal of placing the anchors as close as safety allows to the rim of the acetabulum without violating the articular surface. Secondly, it is also preferable to avoid perforating the medial cortex of the pelvis, although with the Q-FIX anchor as it is compressed, it is brought back toward the site of entry and would not be left proud within the pelvis.

Suture management is variable, depending on the size and morphology of the labrum and the quality of its tissue. Repair depends on having sufficient quantity of labrum to approximate to the rim, restoring the chondrolabral junction. In general, it seems preferable to avoid having suture interposed between the labrum and the articular surface of the femoral head, as occurs with a loop suture, although there is sparse evidence in the literature or in our experience that such a suture leads to any harm within the joint. Having sufficient labrum tissue to restore takes precedent and sometimes necessitates the loop configuration, and the literature supports the use of both loop- and labrum-based suture configurations.^{20,21}

Since we initially described the 3-portal technique and supine position for hip arthroscopy, each portal has evolved differently.²² The anterolateral has proven to be the most steady workhorse, used by most everyone with slight variation. The anterior portal has been the most often modified. The original description really just described the safe boundaries for an anterior position relative to the medial-lying femoral neurovascular structures. A more lateral and distal position is often more effective for triangulation into the joint. However, more exaggerated changes are often made to accommodate anchor placement. This is less necessary when the anchors can be placed in a more optimal location with a percutaneous approach. The posterolateral portal is the most neglected, as it is the portal that many surgeons skip. It is the portal that can most often be excluded but can be advantageous for numerous reasons.

The anterior portal is frequently used for the most far-medial anchor, providing a more anterior to posterior direction of drilling and lessening the likelihood of perforating the medial cortex of the pelvis. It allows less divergence from the surface of the acetabulum than the percutaneous, distally based site and thus must be used with more caution to avoid inadvertently perforating the joint surface. Otherwise, percutaneous placement of the drill guide provides the greatest versatility in anchor placement from the 11 o'clock position on the posterolateral acetabular rim of a right hip to below the 3 o'clock anterior position.

In our experience, this strategy accommodates 95% of all anchor placements. Infrequently, for more posterior labral tears, the arthroscope may be switched to the anterior portal and the anchors placed from the lateral direction. Also, on a few occasions, a percutaneous site distal to the anterior portal may be helpful to avoid the articular surface of the acetabulum with the far-medial anchor.

The goal of the technique described here is to accomplish reliable preservation/restoration of labral function with low risk of complications, especially either perforation of the acetabular articular surface by the anchor or ineffective restoration of the labral anatomy due to anchors too far removed from the acetabular rim. The shortcomings of this method include that it necessitates an additional small puncture wound in the skin and is not amenable to current knotless anchors that require anchor placement and suture management to occur from the same site. The qualities of the Q-FIX include its small size and all-suture construct with demonstrated exceptional pull-out reliability. However, it is not the smallest anchor available, and the all-suture construct does not obviate the need for careful attention to avoid the articular surface of the acetabulum.

This technique provides a proven and reproducible method for accomplishing repair for the vast majority of all labral lesions. The Q-FIX suture anchor provides a small all-suture product with unparalleled levels of clinical reliability in terms of pullout, making it suitable for all circumstances of labral restoration around the hip.

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