

Inside-Out Anchor Placement: A Technique to Instrument Far Medial Anchors in Acetabular Labral Repair



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Abstract: Labral tears most commonly occur anteriorly between the 12- and 3-o'clock positions, with the 12-o'clock position denoted as superior and the 3-o'clock position denoted as anterior. When approaching the 3-o'clock position and beyond, suture anchor placement becomes difficult given the challenging arthroscopic trajectory and an overall thin anterior rim of cortical bone for anchor purchase, resulting in a narrow angle of safe drilling. The purpose of this technical note is to present a safe and reproducible method of suture anchor placement during acetabular labral repair approaching the 3- and 4-o'clock positions, with the 12-o'clock position representing the superior anatomic location and the 3-o'clock position representing the anterior anatomic location regardless of hip laterality. We use an inside-out anchor placement technique to place far medial anchors, which differs from the conventional techniques (e.g., outside-in technique) in which anchor placement is performed along the external margin of the acetabular labrum.

The acetabular labrum serves an important biomechanical role in the hip joint and is often addressed surgically at the time of hip preservation surgery. With advancements in both technology and surgical technique, hip arthroscopy for labral pathology is becoming increasingly more common. The primary goal of arthroscopic labral repair is to restore the biomechanical function of the labrum and improve patient subjective symptoms and pain related to labral pathology. Studies have consistently shown that labral repair results in superior clinical outcomes when compared with debridement.¹

Hip arthroscopy is a technically demanding procedure with a significant learning curve.² The standard method for acetabular labral repair is performed through placement of suture anchors in the capsulolabral recess around the acetabular rim with suture

passage through the chondrolabral junction.³ When describing the anatomic location of acetabular labral tears, a clock-face analogy has been previously used, with the 12-o'clock position denoted as superior and the 3-o'clock position denoted as anterior (Fig 1). This clock-face analogy applies to the same anatomic locations (12-o'clock position, superior; 3-o'clock position, anterior) regardless of hip laterality. By use of these descriptors, labral tears most commonly occur anteriorly between the 12- and 3-o'clock positions, with larger tears generally requiring more suture anchors for adequate repair.⁴

When approaching the 3-o'clock position and beyond, suture anchor placement becomes difficult given the challenging arthroscopic trajectory and an overall thin anterior rim of cortical bone for anchor purchase, resulting in a narrow angle of safe drilling.⁵ The use of fluoroscopy and curved drill guides can be helpful in safe suture anchor placement, but there remains a substantial technical challenge in establishing a drilling angle into sufficient bone stock for anchor placement when labral tears are located far medially or anteriorly. Therefore, the purpose of this technical note is to present a safe and reproducible method of suture anchor placement during acetabular labral repair approaching the 3- and 4-o'clock positions using an inside-out anchor placement technique (Video 1).

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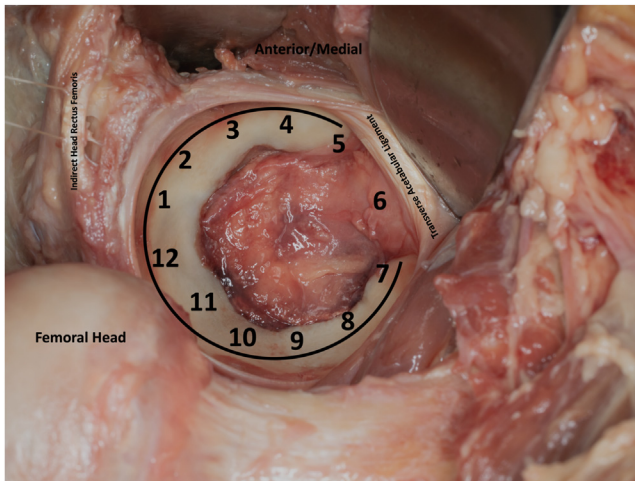


Fig 1. Clock-face description of acetabular labral orientation in right hip, with anterior-medial at top and proximal on left.

Surgical Technique

Patient Positioning

A lower-extremity suspension table is the preference of the senior author (M.H.) for patient positioning (Fig 2). A padded perineal post is used to secure the patient for traction. The patient's feet are prepared in padded boots wrapped with Coban (3M, St Paul, MN). The feet are subsequently secured into the traction footholds of the lower-extremity suspension table. Under fluoroscopic guidance, traction is applied to ensure the hip is distractible. The patient is then prepared and draped in standard surgical fashion.

Arthroscopic Access, Portal Placement, and Capsulotomy

Under fluoroscopic visualization, a standard anterolateral (AL) portal is established at the 12-o'clock position. The 70° arthroscope is introduced through the access cannula (Stryker Sports Medicine, Greenwood Village, CO) (Fig 3) into the AL portal. While under direct visualization from the AL portal, needle localization is used to establish a modified anterior portal (MAP) with an outside-in technique, penetrating the

joint capsule at the 2-o'clock position. An interportal capsulotomy is performed using an arthroscopic scalpel to connect the AL portal and MAP, leaving a cuff of capsular tissue on the acetabular side to close at the conclusion of the case. With the arthroscope placed in the AL portal, a percutaneous distal anterolateral accessory (DALA) portal is established through the same outside-in technique.

Inside-Out Technique

Once adequate debridement of the capsulolabral space has been performed, No. 1 Vicryl suture (Ethicon, Somerville, NJ) is loaded through a suture-passing instrument (SlingShot; Stryker Sports Medicine). It is then introduced through the MAP. The acetabular leaflet of the capsule is pierced at the 3-o'clock position (far medial), and the suture is passed through the capsule and retrieved through the same MAP. Tension is placed on the suture and the suture is subsequently clamped just outside the skin to provide tension and suspend the capsule. This is then repeated as needed with additional suspension sutures placed more laterally, allowing for a satisfactory view of the acetabular rim. The medial extent of the labral tear is identified (Fig 4). Standard rim preparation is performed with a 5-mm diamond-tip burr (Stryker Sports Medicine). By use of a percutaneous DALA portal, a 25° curved guide (Fig 3) is introduced onto the interior aspect of the medial labrum. A flexible drill is used to drill to a positive stop within the drill guide (Fig 5). This allows for the anchor to eventually sit in a more countersunk position to avoid prominence at the articular margin. A 1.4-mm suture anchor (NanoTack; Stryker Sports Medicine) is seated and subsequently impacted 1 to 2 mm past the laser line visible in the distal aspect of the guide and the intra-articular guide window to ensure no prominence of the anchor whatsoever (Fig 6). A 45° curved penetrating suture passer (BirdBeak; Arthrex, Naples, FL) is instrumented through a 8.5 × 110-mm cannula (CLEAR-TRAC; Smith & Nephew, Watford, England) (Fig 3) placed in the MAP to traverse between the acetabulum and labrum in an outside-in fashion via a gentle pronation-supination motion of the operator's



Fig 2. Patient positioned in supine position on lower-extremity suspension table. A well-padded perineal post and traction boots are used to provide intraoperative hip distraction.



Fig 3. Useful instruments (from left to right): 25° curved drill guide, clear threaded cannula with obturator, arthroscopic hip cannula with obturator, 45° angled soft tissue—penetrating suture grasper, and angled suture retriever.

hand to atraumatically exit at the level of the chondrolabral junction. A suture limb from the anchor is fed into the jaws of the penetrating suture passer and pulled out across the chondrolabral junction (Fig 7). The second limb of the suture is also retrieved from the MAP (Fig 8), and an arthroscopic knot is tensioned, tied, and subsequently cut (Fig 9). Additional anchors are placed, as needed, progressing farther medially and inferiorly (Fig 10). Repeated probing shows a stable medial labral repair.

Discussion

This article presents an inside-out technique to drill and place far medial anchors for acetabular labral repair. This differs from the conventional techniques (e.g., outside-in technique) in which anchor placement is performed along the external margin of the acetabular labrum. Typically, this is performed using curved

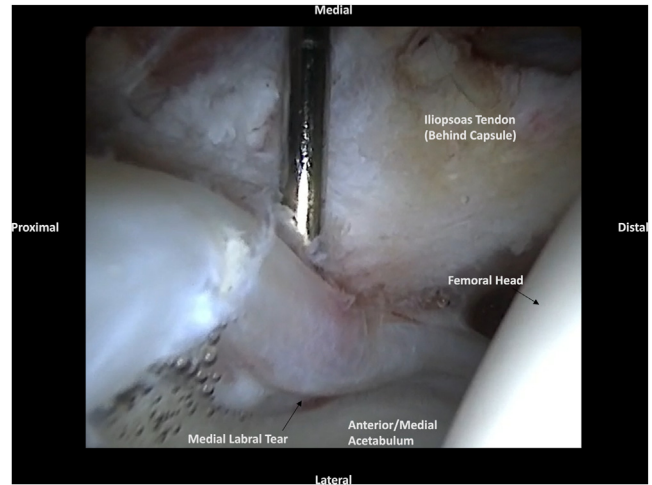


Fig 4. Right hip in patient positioned supine with standard anterolateral portal as viewing portal. The medial extent of the labral tear is identified, and instability is demonstrated at the 3-o'clock position with a surgical probe.

guides through the DALA portal because it provides a divergent drilling angle to avoid intra-articular penetration. However, we have found that the conventional technique can lead to a drilling angle that is too tangential with respect to the acetabulum near the 3-o'clock position. This increases the possibility of skiving and cortical perforation medially near the psoas tendon, in an anatomic area often referred to as the “psoas tunnel” or “psoas U.”⁶ Conversely, the inside-out technique allows for ergonomic and reproducible

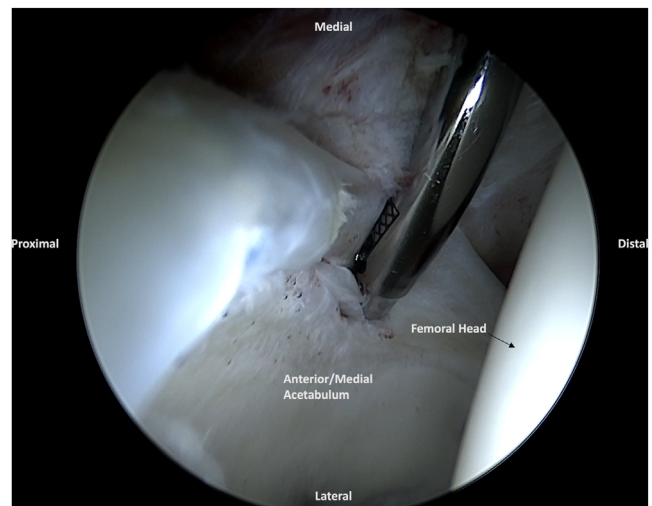


Fig 5. Right hip in patient positioned supine with standard anterolateral portal as viewing portal. A flexible drill placed through a percutaneous distal anterolateral accessory portal is used to drill the anchor on the edge of the acetabular articular margin, demonstrating an inside-out approach. This allows for the anchor to eventually sit in a more countersunk position to avoid prominence at the articular margin.

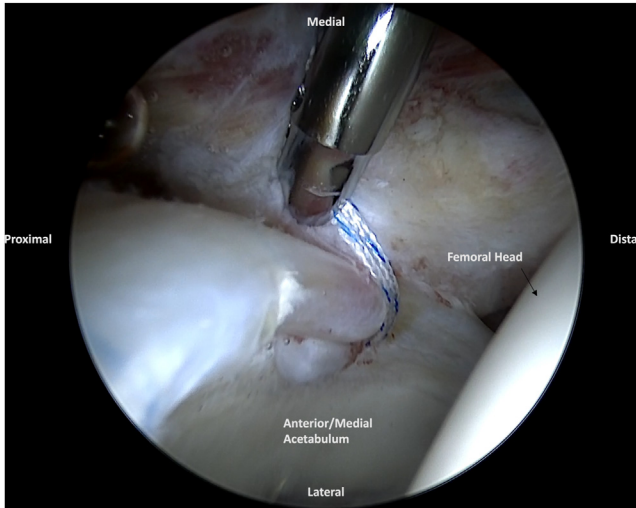


Fig 6. Right hip in patient positioned supine with standard anterolateral portal as viewing portal. A 1.4-mm suture anchor is seated and subsequently impacted 1 to 2 mm past the laser line, demonstrating anchor placement without intra-articular prominence.

anchor placement with a trajectory that permits access to adequate bone stock while remaining low profile and extra-articular (Fig 4). This lowers the risk of potential cortical skiving of the anterior acetabular wall. However, some disadvantages of the inside-out technique should be acknowledged as well. Limitations include a potential for anchor prominence in the acetabular cartilage if the anchor is not countersunk, in addition to the need for specialized tools such as a curved tissue

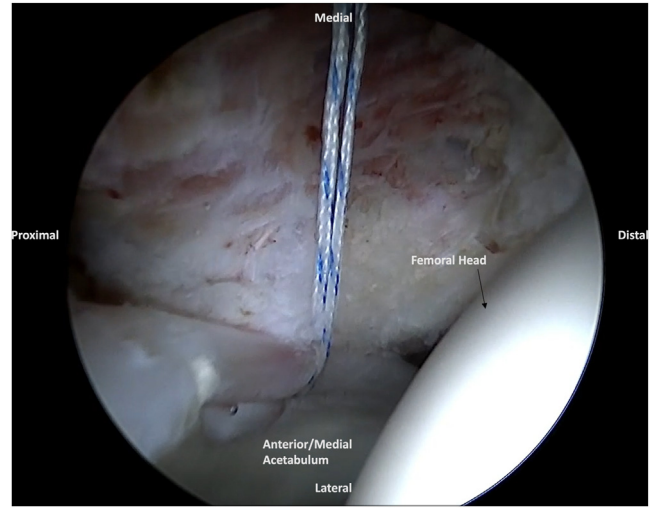


Fig 8. Right hip in patient positioned supine with standard anterolateral portal as viewing portal. Suture limbs from anchor.

penetrator and curved guide to promote ergonomic and atraumatic instrumentation (Table 1).

Adequate capsulotomy with capsular suspension is one of the more important pearls that can aid in access to the far medial labrum (Table 2). Care should be taken to avoid injury to the iliopsoas tendon—or further medial neurovascular structures—when carrying the capsulotomy to the far medial aspect of the hip. A T-shaped capsulotomy is not necessary for this technique; however, it may be used for subsequent portions of routine hip arthroscopy such as adequate

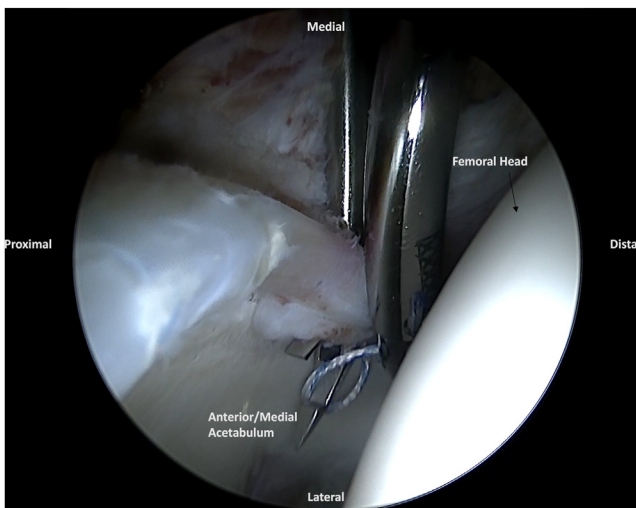


Fig 7. Right hip in patient positioned supine with standard anterolateral portal as viewing portal. A 45° curved penetrating suture passer placed in a modified anterior portal is used to receive suture from the drill guide, passing the suture in an inside-out manner across the chondrolabral junction.

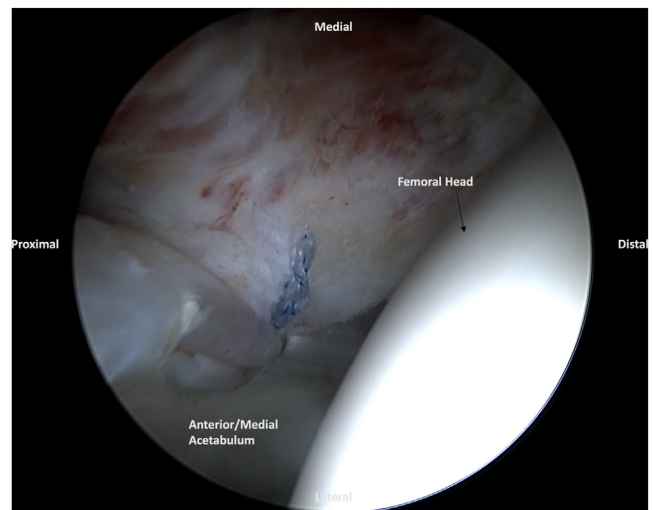
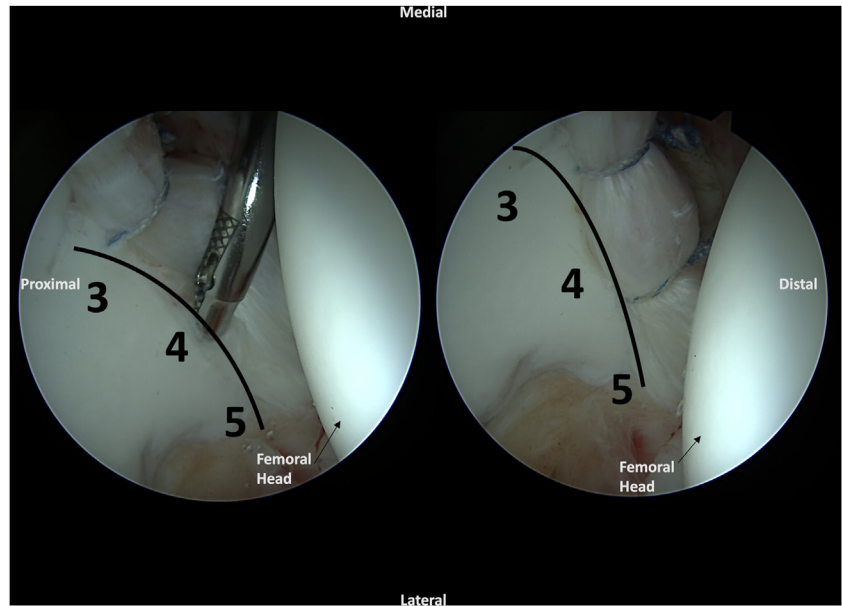


Fig 9. Right hip in patient positioned supine with standard anterolateral portal as viewing portal. Fixation of medial labral tear with arthroscopic knot.

Fig 10. Right hip in patient positioned supine with standard anterolateral portal as viewing portal. An example of the extent of far medial repair possible with an inside-out technique is shown with the clock-face analogy, in which the 12-o'clock position represents the superior anatomic location and the 3-o'clock position represents the anterior anatomic location regardless of hip laterality.



visualization and resection of moderate to large cam lesions.

Ultimately, addressing the entire extent of a labral tear is critical to restoring labral stability. Restoration of the chondrolabral interface has been shown to improve intra-articular fluid pressurization and native joint physiology.⁷ Addressing labral tears that have propagated to the 3-o'clock position or beyond is technically challenging, but neglecting their repair can negatively impact postoperative outcomes, particularly given that recurrent or incompletely treated labral tears are among the most commonly reported indications for revision hip arthroscopy.⁸ Thus, knowledge of techniques that provide the ability to safely instrument anchors for labral repair in various acetabular quadrants is a helpful tool for optimizing hip arthroscopy outcomes.

Table 1. Advantages and Disadvantages of Inside-Out Anchor Placement

Advantages
Better trajectory to obtain safe drilling angle
Reduces risk of cortical skiving of anterior acetabular wall
Ergonomic and reproducible anchor placement
Disadvantages
Anchor prominence in acetabular cartilage if anchor is not countersunk
Specialized tools such as curved tissue penetrator and curved guide may be necessary to promote ergonomic and atraumatic instrumentation

Disclosures

The authors declare the following financial interests/ personal relationships which may be considered as potential competing interests: Funding was provided by the Foderaro-Quattrone Musculoskeletal-Orthopaedic Surgery Research Innovation Fund. A.J.K. reports a consulting or advisory relationship with Arthrex and B. Braun Medical and reports board membership with *American Journal of Sports Medicine*, International Cartilage Repair Society, and International Society of Arthroscopy, Knee Surgery & Orthopaedic Sports Medicine. M.H. reports a consulting or advisory relationship with DJO Enovis, Moximed, and Vericel and reports board membership with *Journal of Cartilage and Joint Preservation*. All other authors (F.M., Z.C.R., X.P.)

Table 2. Pearls and Pitfalls of Inside-Out Anchor Placement

Pearls
Visualize cartilage while drilling to ensure extra-articular placement.
Carry capsulotomy anteriorly/medially toward psoas tendon or make small accessory capsulotomy.
Consider suspension of capsule for exposure in larger capsulotomy.
Countersink anchors by 1-2 mm to mitigate prominence along articular margin.
Pitfalls
Bear in mind that curved drill guide requires anchor to be seated in hole prior to impacting; otherwise, it can deflect and deform.
Avoid placement partially onto articular surface (unlike shoulder labrum).

declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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