

Transosseous Acetabular Labral Repair as an Alternative to Anchors



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Abstract: Labral tears are the most common pathology in patients undergoing hip arthroscopy and the most common cause of mechanical hip symptoms. Labral repair techniques have been described in the literature using suture anchors placed as close as possible to the acetabular rim without penetrating the articular surface. Optimal surgical technique for labral repair is very important, and an inappropriate entry point and guide angulation may lead to intra-articular penetration of the anchor, chondral damage, anchor loosening, or inadequate fixation. A shallow dysplastic hip, the drilling trajectory, the narrow width of the acetabular rim, or some specific anatomic variations may generate difficulty during anchor placement. Suture anchors themselves have been associated with several significant complications, including rim fracture, osteolysis, enlargement of drill holes, and infection. The treatment of labral lesions with transosseous suture is an alternative to anchor use, eliminating the need for anchors and avoiding anchor-associated complications. This technique offers versatility to surgeons and is more cost-effective for patients and health services. We aim to describe the indications and technique for transosseous labral repair without anchors.

The acetabular labrum is a fibrocartilaginous structure that surrounds the acetabular periphery. It is strongly attached to the acetabular rim because of its triangular shaped morphology in cross section. Labral morphology varies depending on the location in the acetabulum, with a tendency toward a higher height and smaller extension beyond the bony rim in the anterior and anterosuperior portion. The labrum also exhibits a quadrangular shape, with a greater extension inside the acetabular rim in the posterior margin.¹

The acetabular labrum has significant biomechanical properties. First, the intact labrum creates a seal between the central and peripheral compartments, opposing the flow of synovial fluid from the central

and peripheral compartments, thereby achieving a negative pressure within the joint, which helps in increasing the stability and resistance of distraction of the femoral head.^{2,3} Second, it creates a central-compartment seal for the uniform distribution of synovial fluid, providing nutrition to the articular cartilage, as well as a smooth gliding surface between the femoral head and acetabulum.⁴ Biomechanical studies have shown that after removal of the acetabular labrum, there is an increase in the contact stresses between the femoral and acetabular cartilage layers of up to 92%, which increases friction between the joint surfaces.⁵

Damage to the labrum is responsible for a marked reduction in its function, resulting in increased resistance to rotation and possible damage to the articular cartilage, which may be the predisposing factor for osteoarthritis.⁶ Several studies have shown significantly improved outcomes with labral repair compared with labral resection.^{7,8} A suture anchor is most commonly used for reattaching the torn labrum to the acetabular rim.⁹ The anchor should be placed as close to the acetabular rim as possible without penetrating the joint to attempt to restore the labral function/labral seal on the femoral head. All previously described repair techniques use anchor placement on the capsular aspect of the acetabular rim and labrum.

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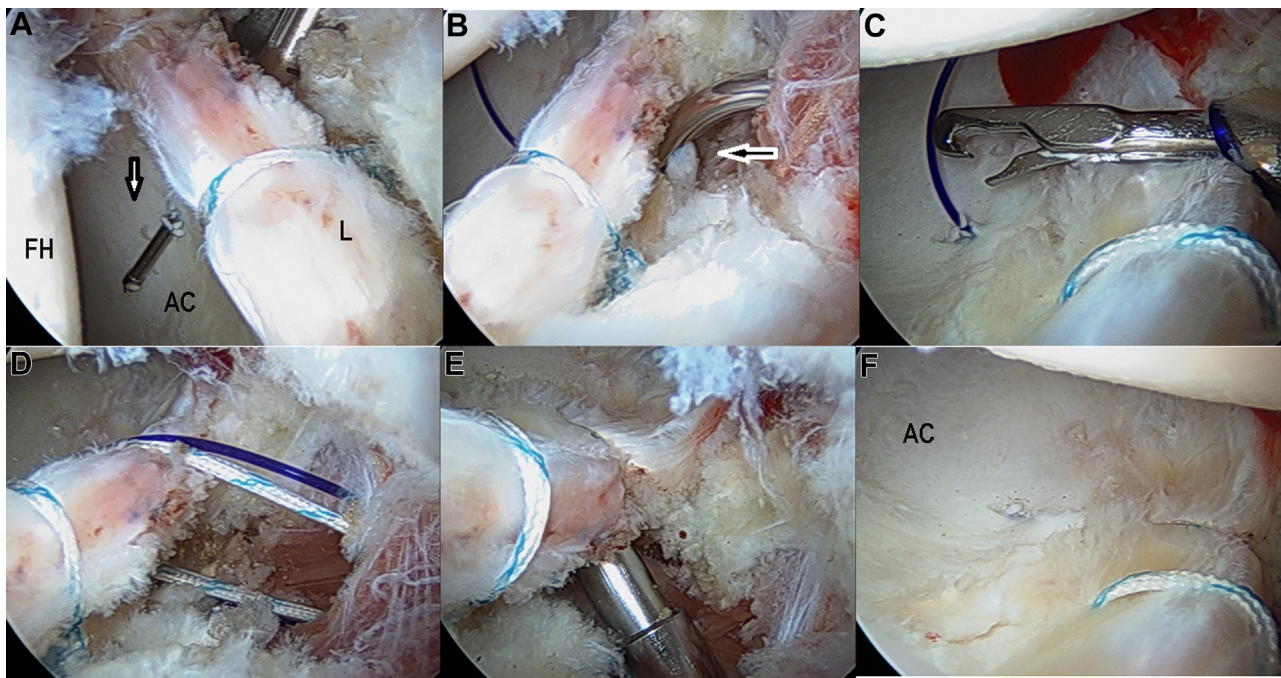


Fig 1. Intraoperative arthroscopic images of our technique (transosseous acetabular labral repair without anchors) in a right hip (case 1). The arthroscope is in the anterolateral portal, with drilling performed through the anteromedial portal. (A) Drilling by the outside-in technique with a flexible-tip penetrator (arrow). A small curved anchor drill guide is on the outer cortex of the acetabulum (3-o'clock position). (B, C) Suture shuttle is passed through the bone tunnel (arrow) from outside to inside the joint and then retrieved outside with the use of a suture shuttle passer. (D, E) The suture is retrieved over the labrum and tied down using standard arthroscopic knot-tying technique. (F) The result is a suture loop over the labrum and secured to the bony bridge in the subchondral bone, leaving the free edge of the labrum intact, continuous, and not everted. (AC, acetabulum; FH, femoral head; L, labrum.)

This position is not always ideal, above all in dysplastic hips, in which the superior deviation of the labrum worsens by the direction of pull of the sutures coming out of the anchor placed behind the labrum, thereby displacing the labrum from the correct anatomic position; this creates an inadequate suction seal with the femoral head, thereby reducing distribution of the cushioning synovial fluid and increasing forces within the joint. In cases of labral tears at the anterior (3-o'clock position) and anteroinferior quadrants, there is a narrow width of acetabular rim that may generate difficulty in anchor placement. To solve this problem, Mei-Dan et al.¹⁰ described an intra-articular anchor placement technique from inside out as an alternative method for anchor placement for labral repair that assists in labral advancement (pulling of the labrum toward the femoral head to create a more functional seal) because of the location of the anchor and direction of suture pull. For such cases and to avoid other complications with anchors during labral repair (anchor breakage, anchor slippage into the surrounding [capsular side] soft tissue, and penetration of the cartilage surface), we report another alternative technique that can be very helpful for the orthopaedic surgeon: transosseous acetabular labral repair without anchors.

Surgical Technique

The patient lies supine on a traction table with the feet well padded and placed into traction boots. After placement of an extra-wide post (perineal post) to protect the perineum, the hip is placed in a position of 10° of flexion, 15° of internal rotation, and neutral abduction. Traction force is applied gradually in the operative limb, with gentle countertraction applied to the contralateral limb. After traction, the leg is placed in slight adduction over the post, which forces the femoral head laterally. The leg is internally rotated to bring the femoral head parallel to the floor. Traction is controlled by fluoroscopy. After sterile preparation and draping, a spinal needle is used for detection of the anterolateral portal (1 cm proximal and 1 cm anterior to the tip of the greater trochanter) with the aid of fluoroscopy, and an arthroscope is introduced into the hip. An anterior modified medial portal is made under direct vision from the anterolateral portal using a 70° arthroscope (6 to 7 cm distal to the anterolateral portal, at 30° to 45°), and an interportal capsulotomy is made to facilitate mobility of the arthroscopic instruments and allow diagnostic arthroscopy to take place.

The labral tear is now assessed regarding its location and size, as well as overall labral tissue quality. In all cases we aim to preserve the labrum. Labral

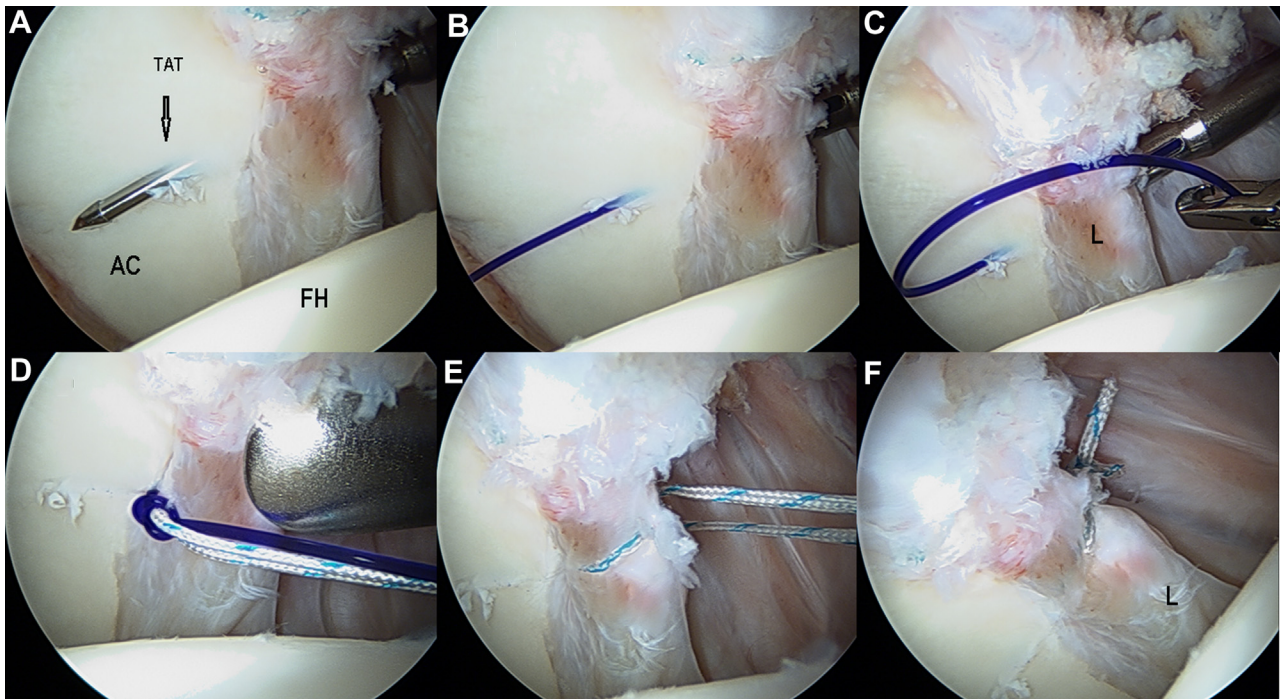


Fig 2. Intraoperative arthroscopic images of our technique (transosseous acetabular labral repair without anchors) in a right hip (case 2). The arthroscope is in the anterolateral portal, with drilling performed through the anteromedial portal. (A) Drilling by the outside-in technique with a flexible-tip penetrator. A small curved anchor drill guide is on the outer cortex of the acetabulum (3-o'clock position). (B, C) Suture shuttle is passed through the drill guide from outside to inside the joint and then retrieved outside. (D, E) The suture is retrieved over the labrum and tied down using standard arthroscopic knot-tying techniques. (F) Final result. (AC, acetabulum; FH, femoral head; L, labrum; TAT, trans-acetabular tunnel.)

debridement is reserved for patients with small peripheral tears that retain enough tissue to maintain normal labral function after resection. With our technique for labral repair ([Video 1](#)), use of the smallest suture anchor drill (1.4 mm) and curved drill guides (Iconix; Stryker, Mahwah, NJ) is advised to create a tunnel between the subchondral margin and the outer cortex of the acetabulum. Drilling can be performed using an outside-in or inside-out technique to create a tunnel, and then, we must widen the extra-articular entrance with the help of the tip of a penetrator. The

surgeon delivers a limb of a suture shuttle (No. 1 polydioxanone suture [PDS II]; Ethicon, Somerville, NJ) through the bone tunnel inside the joint with the help of a SutureLasso shuttle passer (Arthrex, Naples, FL) buried into the hole. Suture shuttle can also be used to pass more sutures through a given number of transosseous holes because we can place multiple single sutures or mattress sutures according to the shape, site, and size of the tear. The suture is then retrieved over

Table 1. Technical Pearls for Transosseous Acetabular Labral Repair as Alternative to Anchors

The operative limb is placed in adduction over the post, which pulls the femoral head laterally and allows good assessment of the central compartment.
A small curved suture anchor drill guide with a flexible drill bit is used.
Enough bone between the in and out of the osseous tunnel must be considered for tunnel preparation to prevent osteochondral fracture of the acetabular rim.
In anterior tears, a slotted cannula is used to protect the drill guide from bending or breaking because of the awkward working angle. A small-diameter suture passer is used.
The surgeon must ensure a good bony bridge between the entry and exit of the tunnel to secure a proper arthroscopic knot to prevent further cut-through of the tissue.

Table 2. Indications for Transosseous Acetabular Labral Repair Without Anchors

Thinner portions of the acetabular wall (3-o'clock position)—the acetabular safety angle is smallest at the 3-o'clock position; therefore, extra care must be taken when drilling or inserting anchors around the 3-o'clock position
Dysplastic hip and narrow acetabular rim
Penetration into the joint by the drill while creating a tunnel
Patients with acetabular chondral lesions treated with microfractures (no further cartilage damage with the intra-articular drill)
Economic issues in developing countries: low-cost method without anchors
Revision cases with loose or large anchors in place
Anchor pullout; above all in patients aged >50 years at risk of osteoporosis
Risk of extra-articular penetration and soft-tissue irritation (psoas in medial anchors)
Alternative to avoid suture anchor complications

the labrum or in a translabral manner and tied down using standard arthroscopic knot-tying techniques (Figs 1 and 2).

The remainder of the surgical procedure continues as any standard hip arthroscopy, with release of hip distraction and evaluation of the peripheral compartment arthroscopically to ensure that a proper seal is created around the femoral head by the repaired labrum. Any osteoplasty of the femoral head bump is undertaken, and impingement is dynamically assessed. Finally, we repair the capsule for completion of the procedure (Table 1).

Discussion

Current existing methods for the treatment of labral tears may be limited in their efficacy in some patients. Preservation of the labrum may necessitate labral refixation, particularly when the labrum is detached for the acetabuloplasty. A safe angle for suture anchor insertion during acetabular labral repair is essential to avoid penetration into the hip joint. Several authors have described the appropriate range of angles in which the anchors must be placed to provide the greatest hold.¹¹ However, in cases with dysplasia, a narrow rim width, and especially far-anterior labral tears (3-o'clock position), the amount needed for significant hold is very difficult—and could be impossible—to achieve. Transosseous and suture anchor repairs in other joints have comparable biomechanical properties.¹² The treatment of labral hip lesions with transosseous suture is an alternative to anchor use, eliminating the need for anchors and avoiding anchor-associated complications. It also lessens the cost of the procedure by the use of inexpensive surgical suture materials and simplifies the reoperation in patients with retears. Anchor pullout and no bone available nearby to place a new anchor, as well as intra-articular penetration of the drill, can be solved with this technique. The versatile nature of the technique should be noted because it can also be used for open, mini-open, and arthroscopic labral repairs. The transosseous (outside-in/inside-out) technique also can be used in patients with acetabular chondral lesions treated with microfractures because no further damage is done in the cartilage (Table 2).

The treatment of labral lesions with transosseous suture is an alternative to anchor use, eliminating the need for anchors and avoiding anchor-associated

complications. The transosseous technique has specific indications, but transosseous suture labral repair could be an inexpensive and practical method for the management of most acetabular labral tears regardless of the site, size, and shape of the tears. We recommend the design of zone-specific devices for performing this technique.

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