



# Circumferential Labral Reconstruction Using the Knotless Pull-Through Technique—Surgical Technique

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**Abstract:** Arthroscopic labral reconstruction is an alternative procedure for an irreparable hip labrum in the nonarthritic hip population. Although labral reconstruction is a relatively new procedure, data in the literature show favorable outcomes. Patients have shown beneficial outcomes from labral reconstructive surgery as well as when compared with labral repair and debridement patients. However, one of the challenges in performing labral reconstruction has been correctly measuring the graft to perfectly fit the area of labral deficiency. We propose a labral reconstruction technique that will eliminate inaccuracies in graft measurement while incorporating beneficial characteristics of the knotless suture. The advantages of this technique will increase procedural accuracy and brevity.

The hip labrum is an important structure that plays a role in stability and kinematics of the joint, and has nerve endings facilitating proprioception and pain.<sup>1,2</sup> Treating the damaged labrum is essential and the correlation with the development of osteoarthritis of the hip is well established.<sup>3</sup> Labral reconstruction is one of the well-established treatments for labral tears in the hip.<sup>4-6</sup> In addition, literature has shown that labral reconstruction has better outcomes than debridement in cases of an irreparable labrum.<sup>7</sup> One of the techniques involves measuring the labral defect with a FiberWire (Arthrex, Naples, FL) suture or with an arthroscopic measuring tool (Arthrex).<sup>7</sup> In the previously published technique, we place 2 PushLock anchors (Arthrex) on both sides of the graft. This technique requires a precise defect measurement, accurate graft

preparation, and targeted anchor placement. Each of these steps in the labral reconstruction procedure may lead to errors in matching the graft length to the defect. This Technical Note presents a modified technique for labral reconstruction. Intra-articular graft customization eliminates graft length errors. Furthermore, this technique takes advantage of knotless technology to create a reproducible and efficient procedure.

## Surgical Technique

The technique is shown in [Video 1](#).

### Patient Preparation and Portal Placement (1-4)

1. Preoperation preparation begins with placing the patient in the modified supine position on a traction table, in slight Trendelenburg, with a well-padded perineal post.
2. A spinal needle is introduced into the joint to vent and allow distraction.
3. Traction is first pulled on the nonoperative leg and then applied as needed to the operative leg at a maximum of 50 lbs.
4. The hip joint is accessed throughout the procedure using anterolateral, mid-anterior, distal lateral accessory portal, and posterolateral portals.

### Diagnostic Arthroscopy and Labral Assessment (5 and 6)

5. A diagnostic arthroscopy assesses the ligamentum teres, labrum, chondral damage, and labral size. Procedures to

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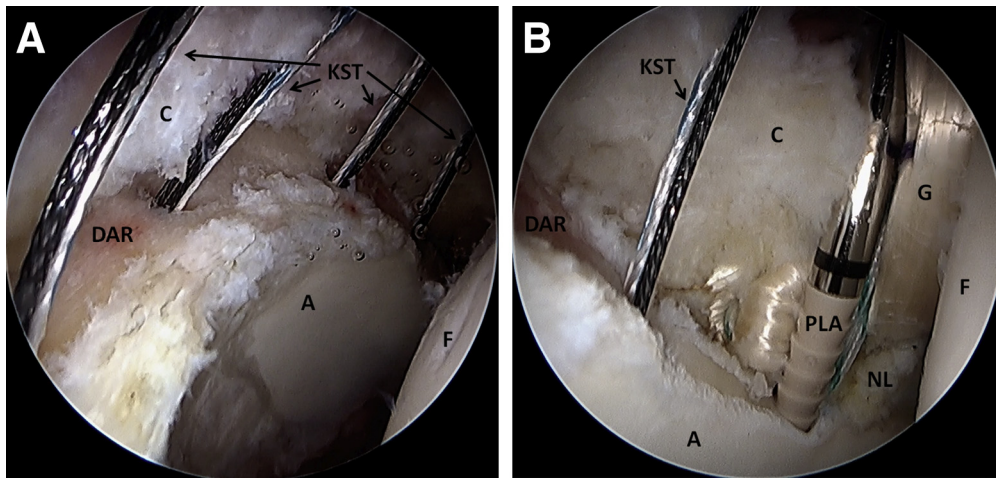
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**Fig 1.** For patients indicated for labral reconstruction, the native labrum is resected followed by decortication of the acetabular rim. This figure shows a right hip in the supine position. (A) Four knotless sutures (KST) are placed 6-8 mm from one another on the DAR. (B) The graft is introduced into the joint through the DLAP, whereas the camera is positioned through the anterolateral portal. The PLA is attached to the anterior part of the graft. This anchor is placed in a hole previously drilled into the anterior aspect of the segmental defect adjacent to the NL. (A, acetabulum; C, capsule; DAR, decorticated acetabular rim; DLAP, distal lateral accessory portal; F, femoral head; G, graft; KST, Knotless SutureTak; NL, native labrum; PLA, PushLock anchor.)

treat the pathologies revealed are determined by the findings in the diagnostic arthroscopy.

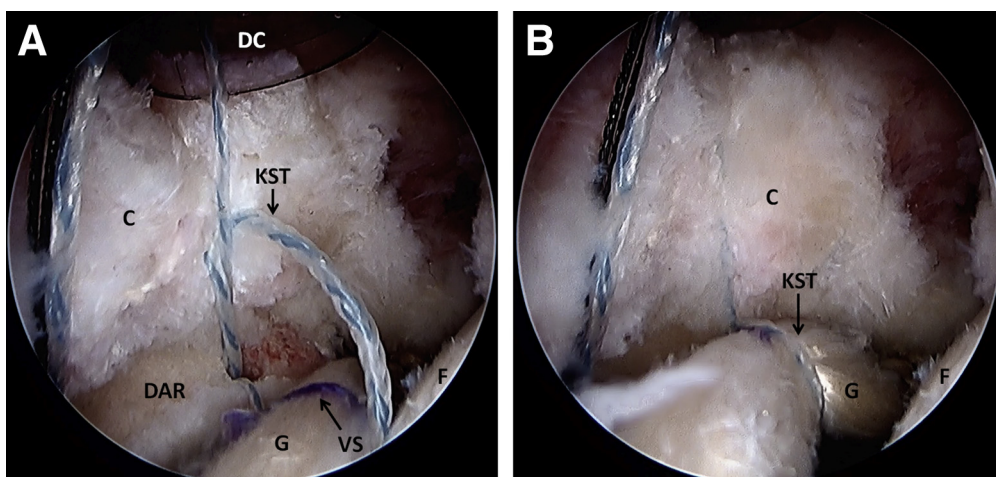
6. If a diagnostic arthroscopy reveals an irreparable labrum in a patient who would benefit from a reconstruction over debridement, the remaining labrum is debrided, and the acetabular rim is decorticated.

#### Labral Reconstruction Technique (7-18)

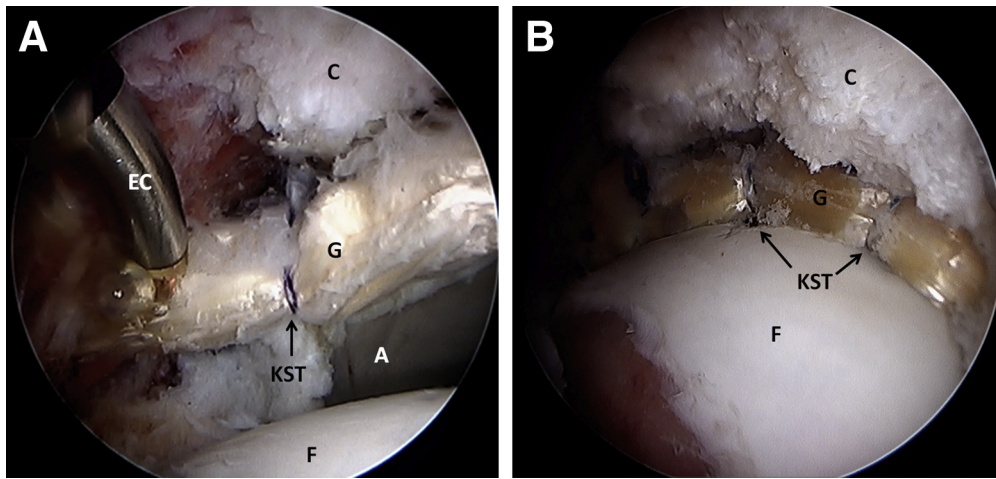
7. The 2.9 hip PushLock Drill (Arthrex) is used to create a hole in the most anterior aspect of the

segmental labral defect. This hole will be used in step 11 to introduce a PushLock anchor (Arthrex) attached to the anterior aspect of the graft.

8. Knotless SutureTak (Arthrex) anchors will be placed with approximately 6 to 8 mm of spacing (Fig 1A).
9. The graft is made of a double-stranded semitendinosus allograft, prepared with a PushLock anchor (Arthrex) attached to one side and a FiberLoop (Arthrex) to the other. No graft or defect measurement is necessary.



**Fig 2.** The graft being secured to the DAR with KSTs. This figure shows a right hip in the supine position. (A) The graft is positioned along the DAR before applying tension to the KSTs. Mild tension must also be applied to the graft using the FiberWire (Arthrex) through the posterolateral portal to prevent graft malpositioning. (B) The graft is secured in the desired position along the DAR after applying tension to the KSTs. During this step, the camera is positioned through the anterolateral portal. (C, capsule; DAR, decorticated acetabular rim; DC, disposable cannula; F, femoral head; G, graft; KST, Knotless SutureTak; VS, Vicryl suture.)



**Fig 3.** The secured graft is truncated to the appropriate size for final evaluation. This figure shows a right hip in the supine position. (A) The graft is amputated to the desired length using EC. This ensures that the graft perfectly covers the segmental defect and overcomes the necessity of precise labral defect measurements before the procedure. (B) The suction seal is evaluated after the graft is secured along the DAR using the camera positioned through the anterolateral portal. (A, acetabulum; C, capsule; DAR, decorticated acetabular rim; EC, electrocautery; F, femoral head; G, graft; KST, Knotless SutureTak.)

10. The graft is tied with 3-0 Vicryl (Ethicon, Somerville, NJ) sutures every 2 cm to maintain graft shape and integrity.
11. The graft is introduced to the joint through the distal lateral accessory portal, with the PushLock (Arthrex) anchored to the anterior aspect of the segmental defect (Fig 1B).
12. The graft is pulled through the joint with the FiberLoop (Arthrex) suture, which is attached to the free end of the graft, using the posterolateral portal.
13. After anchoring the PushLock (Arthrex) and while tensioning SutureTak (Arthrex), it is important to maintain mild tension on the graft while pulling the FiberLoop (Arthrex) through the posterolateral portal (Fig 2A).
14. Proceed with the reconstruction using the Knotless SutureTak (Arthrex) adjacent to the PushLock (Arthrex). The sutures are pulled through the internal mechanism of the knotless anchor and tightened to the desired tension to achieve a secure repair of the graft to the acetabular rim (Fig 2B).
15. Proceed with the repair using the remainder of the Knotless SutureTaks (Arthrex).
16. After completion of the repair, the end of the graft is amputated to the desired length using electrocautery (Fig 3A).
17. After amputation, the fiber loop is pulled to allow for removal of excess graft through the posterolateral portal. This yields a perfectly sized graft that exactly fits the segmental defect.
18. Once traction is released, evaluation of the suction seal of the femoral head and the graft is performed (Fig 3B).

The pearls and pitfalls for this technique are summarized in Table 1.

## Discussion

The purpose of this technique is to restore the irreparable labrum's anatomy and function. The aforementioned measureless technique uses one anterior PushLock (Arthrex) anchor, a variable number of Knotless SutureTaks (Arthrex), and a semitendinosus allograft.

In the last 5 years, the literature has shown good clinical short-term outcomes with arthroscopic hip labral reconstruction. Philippon et al.<sup>6</sup> had a minimum 1-year follow-up over 47 patient who had undergone arthroscopic labral reconstruction. The mean modified Harris Hip Score (mHHS) improved from 62 to 85 ( $P = .001$ ) and the median patient satisfaction was 8 out of 10. Geyer et al.<sup>4</sup> followed 76 hips after arthroscopic labral reconstruction with a follow-up time of 3-6 years. They showed a survivor rate of 76%, and among those

**Table 1.** Pearls and Pitfalls of the Technique

Pearls	<ul style="list-style-type: none"> <li>• Use a double-stranded semitendinosus graft</li> <li>• Place Vicryl sutures (Ethicon) every 2 cm along the graft to maintain integrity</li> <li>• Use a FiberWire suture (Arthrex), attached to the posterior part of the graft, to pull the graft along the joint through the posterolateral portal</li> <li>• For the prevention of graft malpositioning, apply mild tension to the graft using the FiberWire suture (Arthrex) while securing the graft to the decorticated acetabular rim using Knotless SutureTak anchors (Arthrex)</li> </ul>
Pitfalls	<ul style="list-style-type: none"> <li>• Improper placing of anchors</li> <li>• Improper suture management</li> </ul>

**Table 2.** Advantages, Risk and Limitation of the Technique

Advantages	<ul style="list-style-type: none"> <li>• Precise measurement of the segmental labral defect is not necessary</li> <li>• Precise preparation of the graft and anchor placement is not necessary</li> <li>• Using Knotless SutureTak anchors (reduced surgical time, controlled suture tension under direct visualization, ideal for single portal repair, can be performed with an “inserter-out” technique)</li> </ul>
Risk	<ul style="list-style-type: none"> <li>• Minor risk of infection using an allograft</li> </ul>
Limitation	<ul style="list-style-type: none"> <li>• Technically demanding procedure</li> </ul>

patients, the mHHS increased from 59 to 83. Hip Outcome Score for Sports and Activity of Daily Living were both increased significantly and median patient satisfaction was 8 out of 10. White et al.<sup>8</sup> reviewed 142 patients who underwent arthroscopic labral reconstruction using an iliotibial band allograft and a front-to-back fixation technique at a minimum 2-year follow-up. There were significant improvements in all outcome measures including mHHS, Lower Extremity Function score, and visual analog scale. Mean patient satisfaction was 9, and 13.7% required a revision surgery. Matsuda and Burchette<sup>5</sup> followed 8 patients who underwent arthroscopic labral reconstruction and compared them with 46 patients who had arthroscopic labral refixation with a minimum 2-year follow-up. They concluded that, despite a more severe labral insufficiency in the reconstruction group, they were not predisposed to having inferior outcomes. Furthermore, Domb et al.<sup>7</sup> compared 11 cases of arthroscopic labral reconstruction with 22 matched arthroscopic segmental labral resection in patients with femoroacetabular impingement with a minimum 2-year follow-up. They found that arthroscopic labral reconstruction is superior to segmental resection for irreparable labral tears.

The advantages of our technique are bypassing measurements, no precise graft preparation, and anchor placement. This can save surgery time and reduce chances of measurement mistakes. Apart from this, the inclusion of Knotless SutureTaks (Arthrex) incorporates this suture’s advantages. From our experience, the advantages are reduced surgical time, ideal for single portal repair, controlled suture tension under direct visualization, and the procedure can be performed with an “inserter-out” technique. The disadvantages of the

SutureTak (Arthrex) are that the graft can be misplaced if overtightened and that the anchors are nonabsorbable. In addition, there is a minor risk of infection due to the use of an allograft, and the main limitation to this technique is its technical complexity. The advantages, risks, and limitations of this technique are summarized in Table 2.

Hip labral reconstruction is a relatively new field, established in the last decade. Consequently, medium- and long-term data analysis is still needed. Nevertheless, as the short-term results are beneficial for the patients, technique innovation to improve the procedure is of high importance.

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