



Arthroscopic Labrum Reconstruction in the Hip Using the Indirect Head of Rectus Femoris as a Local Graft: Surgical Technique

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Abstract: The importance of the acetabular labrum has been well documented for the health and function of the hip joint. Labral reconstruction has proven effective but often requires the use of a cadaveric allograft or auto graft from the fascia lata or gracilis. The indirect head of the rectus femoris is in close proximity with the anterior superior acetabulum, which is the most common site of labral tears. Using the indirect head of the rectus femoris as a local graft minimizes surgical invasiveness by mitigating the need to harvest the graft from a different location, in case of an autograft, and by minimizing donor site morbidity and damage to local tissues. The graft is harvested and fixed to the acetabular rim through the same arthroscopic portals. Hip labral reconstruction using the reflected head of the rectus femoris tendon is a minimally invasive surgical procedure that restores stability to the hip joint, is applicable in all patients undergoing hip labral reconstruction, and offers decreased tissue morbidity compared with other grafting techniques.

The importance of the acetabular labrum has been well documented for the health and function of the hip joint^{1,2} (Table 1). The acetabular labrum enhances hip stability by effectively increasing the area of articulation between the acetabulum and the femoral head. Furthermore, the labrum serves as an articulating seal that allows for the exchange and retention of synovial fluid in the joint.³ Increased localization of synovial fluid may protect the joint and delay pathology.

Initially, debridement of the labrum alone was devised to treat labral pathology. Labral repair was then developed and proved to be superior to labral debridement.^{4,5} Following the development of labral repair, labral reconstruction was developed to better restore function to the labrum following tears in the case of irreparable labral tear (Fig 1 A and B). Labral

reconstruction has proven effective but often requires the use of a cadaveric allograft or auto graft from the fascia lata or gracilis.⁶⁻⁸

The indirect head of the rectus femoris is in close proximity to the anterior superior acetabulum, which is the most common site of labral tears.^{1,9,10} Using the indirect head of the rectus femoris as a local graft minimizes surgical invasiveness by mitigating the need to harvest the graft from a different location, in case of an autograft, and minimizing donor site morbidity and damage to local tissues. The graft is harvested and fixed to the acetabular rim through the same arthroscopic portals.

Complete sacrifice of the indirect head of the rectus femoris tendon is not necessary during the graft harvest as only a desired split of the tendon is harvested.¹¹ Additionally, a surgeon can choose the width of the graft, tubularization is not necessary, and the indirect head of the rectus femoris can retain part of its native blood supply after grafting, increasing tissue viability. This may promote healing and integration of the graft into the osteolabral junction. Labral reconstruction using the indirect head of the rectus femoris tendon has shown good results in over 30 patients.¹¹ We present our technique for arthroscopic labral reconstruction in the hip using the reflected head of the rectus femoris tendon (Video 1).

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Table 1. Key Points

- The acetabular labrum serves as a joint seal that localizes synovial fluid to increase lubrication and cartilage nutrition and assist in load sharing and hip stability.
- Restoring the labral suction seal is essential for joint preservation.
- Labral reconstruction should be planned and discussed with patients undergoing hip arthroscopy for labral tear.
- The reflected head of the rectus femoris can be used as a local graft for labral reconstruction.

Surgical Technique

The key points of the technique are summarized in [Table 2](#), and the technique is demonstrated in [Video 1](#). Informed consent was obtained from all patients for hip arthroscopy, osteoplasty and labral debridement, repair, or reconstruction. Hip arthroscopy was performed under general anesthesia on an orthopaedic traction table with the patient in either the supine or lateral position. The feet were well padded, and an extralarge perineal cushion was used to optimize distraction of the hip joint with the least amount of traction. The hip was then prepared and draped in standard fashion. Adequate distraction was confirmed with fluoroscopic visualization of 10–15 mm of joint space widening in the anteroposterior plane. Key bony landmarks were identified, including the anterior superior iliac spine and the greater trochanter. Portal establishment was performed in accordance with that previously described by Kelly et al.¹² In order to obtain adequate central compartment access, the anterolateral portal was placed directly off of the anterior superior portion of the greater trochanter under fluoroscopic guidance. This was followed by placement of a modified anterolateral portal, under direct vision. This portal was established by identifying the intersection of the vertical line drawn from the anterior superior iliac spine distally and the horizontal line drawn from the superior surface of the femoral greater trochanter medially. Capsulotomy

between the 2 portals was conducted with an arthroscopic blade to facilitate instrument maneuverability.

A thorough diagnostic evaluation of the hip was performed using a 70° arthroscopic lens. Acetabuloplasty and rim trimming were performed if indicated. Acetabular chondral defects were treated with debridement of any unstable cartilage flaps. The labral tear was probed and evaluated regarding its gross appearance, tissue quality, and stability. In the case of irreparable labral tear, a labral reconstruction was performed. The torn labrum was debrided to stable margins. The capsule between the reflected head of the rectus femoris and the labrum was carefully debrided with a shaver to expose the tendon without damaging its integrity. An arthroscopic knife was used to split the tendon in parallel to the longitudinal fibers ([Fig 2](#) and [Fig 3 A and B](#)). The width of the graft should be chosen to match the approximate width of the native acetabular labrum. A low profile suture anchor with a sliding suture was placed at the most anterolateral portion of the acetabulum that underlies the tear ([Fig 3C](#)). A sliding stitch of the suture anchor was looped around the graft at the tendon origin, and the graft was then secured to the acetabulum with arthroscopic knots. Four to 5 additional suture anchors are placed 1 cm apart to secure the graft to the acetabular rim. The technique used for securing the remainder of the graft is similar to the technique used for repairing large labral

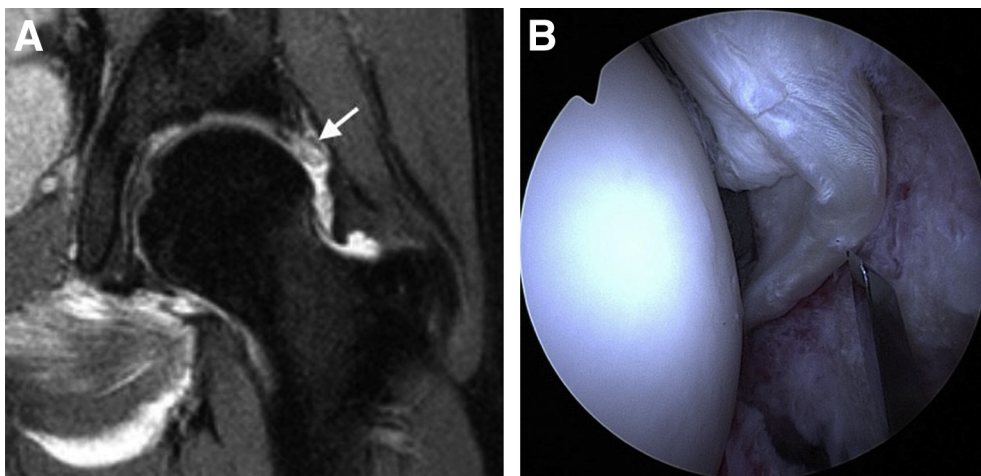


Fig 1. (A) Magnetic resonance images showing large labral tear (arrow) on coronal view. The labral tissue is distorted and degenerative anterosuperiorly. (B) Arthroscopic view from the modified anterior portal shows the torn and degenerated labrum.

Table 2. Pearls and Pitfalls for Hip Labral Repair Using the Reflected Head of the Rectus Femoris

Pearls

- Obtain informed consent for labral reconstruction in all patients undergoing hip arthroscopy for femoral acetabular impingement and/or labral tear. Obtain informed consent for any additional procedures that may require intraoperative decisions.
- Carefully remove the capsular remnant off the anterolateral acetabulum to expose the reflected head of the rectus femoris tendon.
- Use an arthroscopic blade to split and harvest the desired width of graft.
- Knotless anchors may facilitate graft apposition onto the desired location on the acetabular margins.

Pitfalls

- Iatrogenic tendon damage from a shaver or thermal device during acetabular osteoplasty and capsular stripping.
- Overaggressive acetabular osteoplasty.
- Graft fixation under excessive tension may result in loose graft apposition to the acetabulum.

tears. Once the graft comes under excess tension, the traction is released and the hip is flexed to 40°. The muscular attachment is then completely released. An open tendon stripper may facilitate this step (Fig 3D). Fixation of the remaining graft to the acetabular rim was completed and finished with side-to-side anastomosis of the graft with the remaining labrum. The completed labral reconstruction is shown in Figure 3E.

Upon completion of labral fixation, traction was released. The hip was mobilized and cycled to ensure stability of the labrum and lack of impingement and to assess the functional restoration of the labral seal.

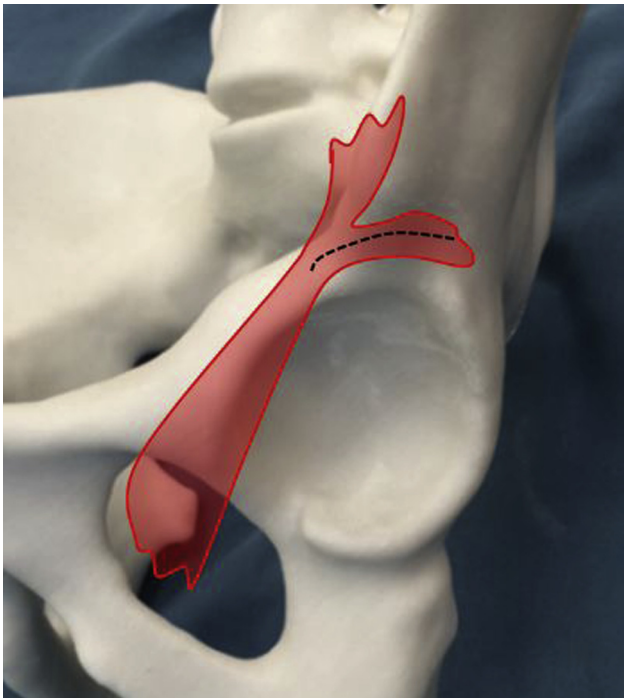


Fig 2. Depiction of the direct head and reflected head of the rectus femoris tendon. The dotted line demonstrates how the reflected head will be split with an arthroscopic knife for grafting with anchors onto the acetabular rim.

Femoral osteoplasty of the head-neck junction was then carried out if necessary.

Discussion

The described technique is an iteration of labral reconstruction using the indirect head of the rectus femoris tendon. Although similar to the techniques described by Philippon et al.⁸ and Matsuda,⁷ this procedure does not require the use of additional arthroscopic portals for ascertaining the graft, there is no need for “back table work” to prepare the graft, and the distal blood supply of the grafted tissue may remain intact.¹¹

Using 8 cadavers, Nepple et al.¹³ found that labral reconstruction with an iliotibial band graft significantly improved joint pressurization and stability to distractive force. This biomechanical research helps to elucidate the mechanism of improvement in patients who undergo labral reconstruction. Philippon et al.⁸ demonstrated that patients with labral tears had good outcomes and high satisfaction after arthroscopic reconstruction using a free iliotibial band graft. Matsuda⁷ used the gracilis tendon for grafting with good outcomes as well.

Using the indirect head of the rectus femoris tendon has the added benefit of reducing the number of incisions as well as eliminating a need for back table work. There is no donor site morbidity as the harvesting and fixation are completed through the same portals. Retaining blood supply to the graft is another added benefit, although further studies will be required to fully understand its impact.

Hip labral reconstruction using the reflected head of the rectus femoris tendon is a minimally invasive surgical procedure that restores stability to the hip joint, is applicable in all patients undergoing hip labral reconstruction, and offers decreased tissue morbidity compared with other grafting techniques.^{6,7,11,14}

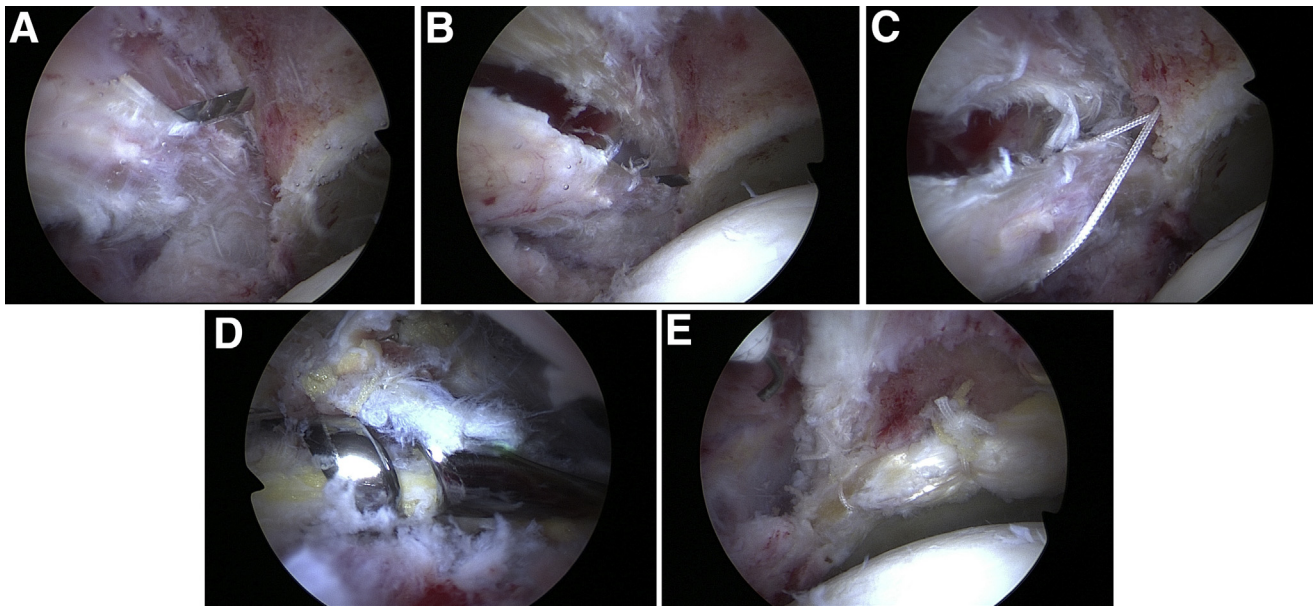


Fig 3. (A, B) Intraoperative view with the scope positioned in the modified lateral portal. The arthroscopic blade, introduced through the lateral portal through a slotted cannula, is used to split the longitudinal fibers of the reflected head of the rectus femoris tendon. The desired width of the tendon graft is based upon the size of the native labrum and the labral defect. If the width of the tendon to be split is not sufficient upon blade insertion, the arthroscopic blade can be repositioned proximally in the rectus tendon. Once the desired graft width has been achieved, the blade is drawn distally along the longitudinal fibers of the rectus femoris tendon to harvest the desired graft length. (C) A suture anchor with a sliding suture is placed at the most anterolateral portion of the acetabulum that underlies the tear. The anchor is placed as close to the articular cartilage as possible without risking intra-articular anchor penetration. (D) The muscular attachment of the reflected head of the rectus femoris tendon is completely released in order to perform a side-to-side anastomosis with the remaining labrum. An open tendon stripper may be used to facilitate this step. (E) The completed labral reconstruction is shown.

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