

Arthroscopic Technique for Chondrolabral Capsular Preservation During Labral Repair and Acetabular Osteoplasty

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Abstract: Traditional techniques for acetabular osteoplasty in femoral acetabular impingement have required surgical detachment of the labrum at the chondrolabral junction. Such approaches compromise labral blood flow and contribute to a limited ability for healing at the chondrolabral junction. In this technical note and accompanying video, we present a technique for preservation of the chondrolabral junction during labral repair and acetabular osteoplasty. We elevate the chondrolabral complex subperiosteally off the acetabular rim, and the acetabular shelf is then contoured under fluoroscopic guidance. The labrum is then repaired and reconstituted to a new anatomic footprint. We find this technique to be advantageous because it preserves the blood flow to the labrum, thereby maximizing healing potential. Outcome studies are warranted to further elucidate the functional and outcome benefits of this surgical technique.

Femoral acetabular impingement (FAI) has been implicated as a cause for acetabular labral tearing and damage.^{1,2} The labrum plays an important role in hip joint stability and preservation. Thus, increasing emphasis has been paid to labral preservation. A recent study found that at a mean 3.5-year follow-up, patients with FAI undergoing labral refixation have improved outcomes when compared with patients undergoing labral excision/debridement.³ Other studies have similarly found that labro-acetabular preservation leads to superior outcomes during FAI corrective procedures.⁴⁻⁶

There is a paucity of literature, however, on arthroscopic techniques for labral preservation during acetabular osteoplasty for FAI. Previously described techniques for acetabular osteoplasty have required surgical detachment with subsequent repair of the detached labrum.⁷⁻⁹ The current evidence suggests that this technique leads to incomplete healing at the chondrolabral junction.¹⁰ The goal of this technical note

and accompanying video is to present a technique for maintaining the chondrolabral junction during labral repair and acetabuloplasty, thereby enabling chondrolabral capsular preservation.

Technique

The patient is taken to the operating room and positioned supine on the hip distraction table. General anesthesia is administered by endotracheal tube intubation. The patient is then positioned against a well-padded perineal post, with the feet and ankles well padded and placed in boots. The patient is paralyzed, and traction is applied to achieve a positive vacuum sign. All patients are draped and prepared in the usual sterile manner by use of aseptic technique.

The anterolateral portal is established with fluoroscopic guidance. This serves as the main viewing portal for setting up the accessory utility portals, which include the anterior, midanterior, and Dienst portals. After the anterolateral portal is established, the anterior portal is next established. After establishment of the anterior portal under visualization from the anterolateral portal, the arthroscope is then switched from the anterolateral portal to the anterior portal to ensure that the anterolateral portal was placed directly through the capsule and not through the labrum. The midanterior portal is placed next with a 17-gauge needle and a nitinol wire, followed by a 5.5-mm obturator and cannula. Last, the Dienst portal is established approximately one-third the distance between the anterior superior iliac spine and the anterolateral portal. Once all 4 portals have been established, there is a quadrilateral

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The authors report that they have no conflicts of interest in the authorship and publication of this article.

Received February 4, 2013; accepted February 14, 2013.

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2212-6287/1394/\$36.00

<http://dx.doi.org/10.1016/j.eats.2013.02.010>

space for working, viewing, placing anchors, and tying down sutures (Fig 1).

Once the portals are established, we view from the anterolateral portal while working in the anterior portal. Using a beaver blade, we perform a capsulotomy between the anterior portal and anterolateral portal. Once adequate visualization is accomplished, we identify the anterior point of the crossover sign using fluoroscopy. Using either a knife rasp or radiofrequency ablation, we begin labral separation 3 to 5 mm above the capsulolabral junction (Fig 2A). We can palpate the osseous surface and slowly separate the labrum off of the pincer lesion, moving down into the joint to the chondrolabral junction. At this crucial step, care must be taken to preserve the chondrolabral blood vessels and thereby preserve the healing potential of the chondrolabral junction (Fig 2B).

Acetabular recession is next carried out with a 4-mm round abradar through the Dienst or midanterior portal under direct visualization from the anterolateral portal. During the acetabular recession, the burring is performed in the reverse mode so that the labrum and surrounding capsule are not grasped and mutilated. Significant elastic properties of the chondrolabral junction allow the burr to be used all the way down to the chondrolabral junction without violating or perforating the junction itself. The pincer is then removed by use of both fluoroscopic guidance and direct visualization from the midanterior portal or anterolateral portal. If the pincer extends laterally out of access of the

anterior portal, we will switch the viewing portal anteriorly and make the working portal anterolateral. We will then repeat the previously described process.

Acetabular recession also ensures adequate bony preparation for labral repair. Placement of the labrum back to the rim is achieved with 2.3-mm bioabsorbable composite anchors. These anchors are placed through a 5.5-mm cannula in the midanterior portal. Fluoroscopy is then used to verify proper placement of the anchors, with each anchor being separated by approximately 1 cm of distance.

The sutures are then shuttled through the anterior or Dienst portal, and the chondrolabral complex is pierced with a modified 17-gauge needle with a wire suture shuttle relay. Sutures are retrieved through the midanterior portal. We repeat this step for a mattress suture configuration. Sutures are then tied with the knot in place on the capsular recess side away from the articular surface of the joint. A Weston knot with several half hitches is used to secure the repair. It should be noted that we use intermittent traction throughout the procedure. The majority of the procedure is performed without traction. We use traction during acetabular osteoplasty so as to obtain access all the way out to the edge of the acetabulum. We use traction while tensioning the suture knots, as well as to allow the femoral head to reconstitute the natural footprint and hoop stresses of the labrum back to its new anatomic setting. Video 1 provides an audiovisual overview of the key principles and surgical steps of chondrolabral

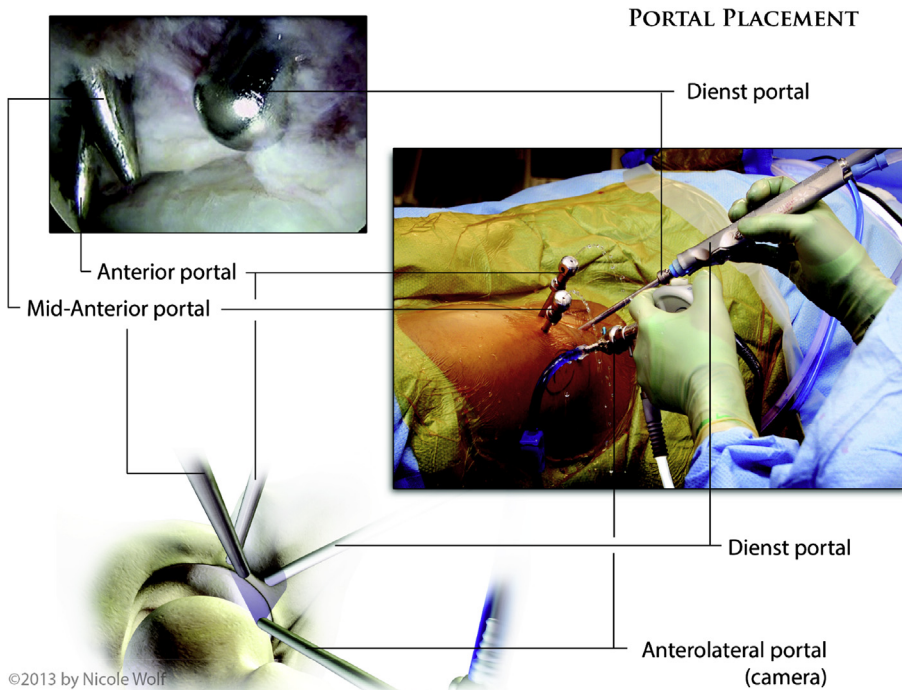
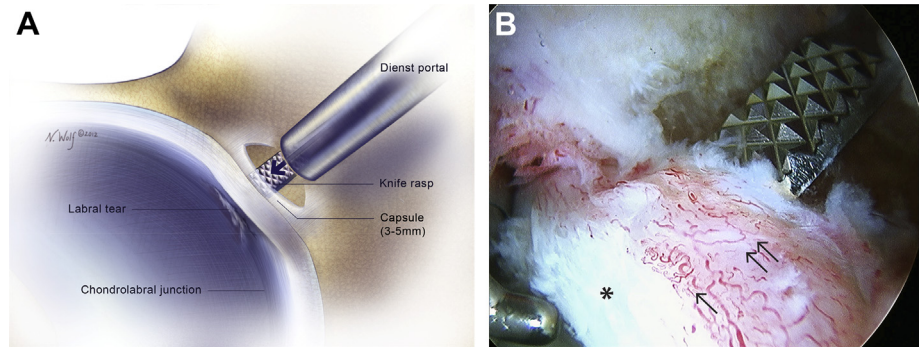


Fig 1. Visualizations of anterior, anterolateral, mid-anterior, and Dienst portals. As seen in both the external and arthroscopic images, the surgeon is working in the Dienst portal while viewing from the anterolateral portal. This maneuver is especially important during the described chondrolabral preservation technique because the Dienst portal provides an optimal trajectory to release the labral complex off of the acetabulum.

Fig 2. (A) Elevation of capsule and labrum off of acetabulum. As shown, a knife rasp is used to begin labral separation 3 to 5 mm above the capsulolabral junction. (B) Arthroscopic view showing elevation of labral complex off of acetabulum. As shown, the chondrolabral blood vessels are spared (single and double arrows), thereby preserving the healing potential of chondrolabral junction (asterisk).



capsular preservation during labral repair and acetabular osteoplasty as outlined in this technical note.

Discussion

We present an arthroscopic surgical technique designed to address the acetabular rim while preserving the chondrolabral junction. We also describe a method for augmenting the hypoplastic labrum using the acetabular capsule. Finally, we recommend setting the arthroscopic knot tension with the joint reduced to visualize appropriate seal restoration. The key aspects of this technique are listed in Table 1.

The chondrolabral junction has an established limited ability to heal after detachment. One study looking at the healing potential of the ovine labrum found histologic evidence of incomplete labral healing 12 weeks post-operatively.¹¹ The authors noted an incompletely healed cleft at the junction of the labrum and the articular surface of the acetabulum. Cadaveric studies have confirmed these findings and suggest that a potential cause for limited healing at the chondrolabral junction is the result of vascular compromise. The articular side of

the labrum has been shown to be relatively avascular compared with the capsular side,¹² and because traditional labral repair and osteoplasty techniques likely transect labral blood vessels,¹³ the chondrolabral junction is at particular risk. The main advantage of the technique we present is that it mitigates the limited healing potential of the chondrolabral junction by preserving the chondrolabral junction while performing acetabuloplasty. As shown in Fig 2B, we preserve chondrolabral blood supply during labral repair. A potential disadvantage of this technique is that it is technically challenging, and as such, we recommend caution when a novice arthroscopist performs this technique. Furthermore, the technical difficulty associated with the procedure may prolong operative time.

In summary, we posit that the technique outlined in this technical note and accompanying video confers additional healing potential to our surgical patients and likely leads to improved long-term outcomes during arthroscopic labral repair and osteoplasty. Outcome studies are warranted to further elucidate the functional and outcome benefits of this technique.

Table 1. Chondrolabral Preservation Technique Pearls

	Description
Equipment needed	Use a distraction table, fluoroscopy device, spinal needle, cannulated needle, guidewire, 70° arthroscope, beaver blade, knife rasp, and 4-mm round abradar (used in reverse mode).
Setup	Place the operative leg in neutral rotation and approximately 20° to 25° of abduction. Apply appropriate traction to create a vacuum sign.
Portal placement keys	The anterolateral portal is established under fluoroscopic guidance using a cannulated needle, nitinol wire, and then a 5.5-mm obturator; a 70° arthroscope is then inserted, and the remaining portals are established under arthroscopic viewing.
Capsulotomy	The Dienst portal is established at approximately one-third of the distance between the ASIS and the anterolateral portal. Perform capsulotomy from the anterior portal while viewing in the anterolateral portal. Use a beaver blade and perform capsulotomy toward the anterolateral portal.
Elevation of capsule and labrum	Use a sharp beaver blade and knife rasp, starting 3 to 5 mm above the capsulolabral junction, to gently peel off the capsule and labrum from the bone. Work in the Dienst portal because this portal provides the optimal trajectory to release the chondrolabral junction off of the acetabulum.
Acetabular recession	Perform acetabular recession with a high-speed burr in reverse mode to prevent capture of the labrum. Remove the pincer lesion using fluoroscopic guidance and direct visualization.
Suturing technique	Repair the labrum with a vertical mattress configuration and western knot with several half hitches. Perform ties with the hip reduced, thereby enabling appropriate suction-seal labral tension.

ASIS, anterior superior iliac spine.

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