

# Arthroscopic Acetabular Recession With Chondrolabral Preservation

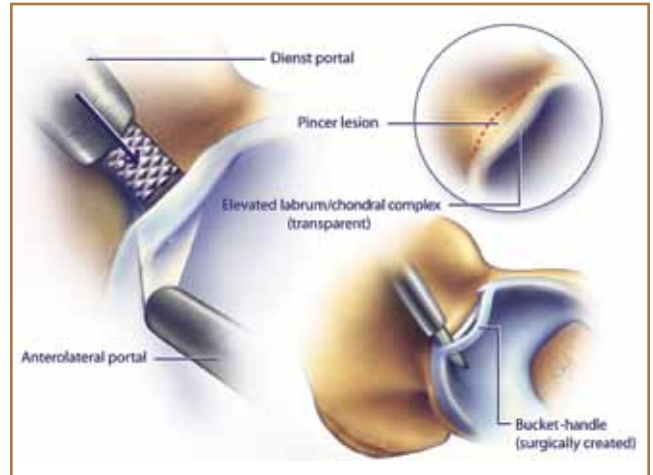
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## Abstract

Cam and pincer lesions found in femoral acetabular impingement (FAI) serve as bony substrates for the development of labral tears and can lead to osteoarthritis. Prior acetabuloplasty techniques have described surgical detachment of the labrum at the chondrolabral junction to facilitate osteoplasty. Histologically, the healing at the chondrolabral junction may be limited and surgical labral detachment may compromise the vascular supply to the labrum. We present a technique of maintaining the chondrolabral junction during acetabuloplasty. The labrum/chondral complex is subperiosteally elevated off the acetabular rim and the acetabular shelf is contoured with fluoroscopic guidance. Intermittent traction is used to minimize total traction time. Vertical mattress stitches are used to repair the labrum. The main advantage of this technique is that it allows contouring of the underlying pincer deformity commonly found in FAI without compromising the contiguous transition zone between the articular surface of the acetabulum and labrum.

Femoral acetabular impingement (FAI) and associated labral pathologies have been increasingly implicated as sources of hip pain and causes of progressive degenerative changes in the hip.<sup>1-5</sup> Cam and pincer lesions found in FAI serve as bony substrates for the development of labral tears and can lead to early osteoarthritis.<sup>1,5-7</sup> Labral damage from cam impingement occurs in the anterosuperior part of the acetabulum, causing separation at the chondrolabral junction. In pincer impingement, the labral damage occurs peripherally as the labrum is crushed between the acetabular shelf and femoral neck.<sup>6</sup>

Studies have shown that the labrum has a key role in preserving normal joint function by sealing the hip joint to main-



**Figure 1.** Using knife rasp to elevate labrum/chondral complex subperiosteally. Using blade to create bucket-handle labral tear to reach bony pincer lesion (lower right). (Illustration by Nicole Wolf.)

tain lubrication and hydrostatic pressure. It also allows for the protective distribution of contact forces across articular cartilage.<sup>8-12</sup> Removal or debridement of the labrum may therefore detrimentally alter its physiologic function and initiate pathologic changes in the hip.<sup>13</sup> Among patients who had FAI surgically managed, those who underwent labral refixation recovered sooner and had better clinical and radiographic results than did those who underwent labral debridement.<sup>14</sup>

The ability to correct bony impingement and repair labral tears has become possible with advances in hip arthroscopic technique and instrumentation. Acetabuloplasty techniques have required surgical detachment of the labrum at the chondrolabral junction to facilitate osteoplasty. Subsequently, the detached labrum is repaired.<sup>15-18</sup> Investigators have reported that healing at the chondrolabral junction may be limited<sup>19</sup> and that surgical labral detachment may compromise the vascular supply to the labrum.<sup>20</sup> In this article, we present a technique to maintain the chondrolabral junction during acetabuloplasty.

## Surgical Technique

Studies have shown that underlying bony lesions are often etiologic in labral tears,<sup>1,5-7</sup> making it necessary to consider os-

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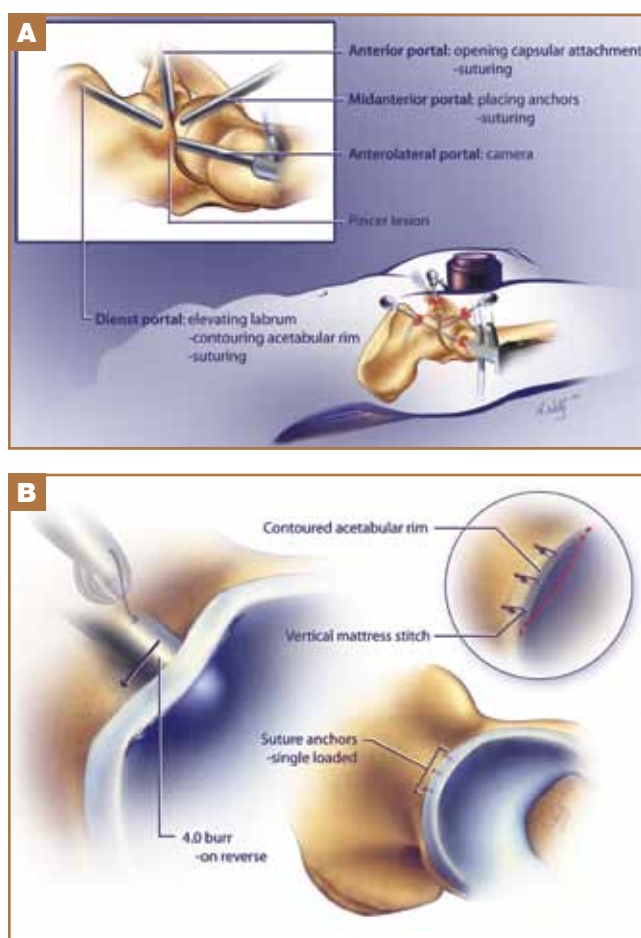
teoplasty with arthroscopic labral repair. Surgeons using both open and arthroscopic acetabuloplasty techniques to address pincer lesions have described surgically detaching the labrum at the chondrolabral junction in order to visualize the acetabular shelf.<sup>15-18</sup> The intact labral periphery is sharply detached at its base, and the labrum is separated from the acetabular rim, akin to creating a bucket-handle tear of the meniscus<sup>14,18</sup> (Figure 1). Once the osteoplasty is completed with an osteotome or high-speed burr, the surgically detached labral rim should be reattached with suture anchors.<sup>14,15,17,21</sup>

### Chondrolabral Preservation Repair

After induction of general anesthesia with paralysis, the patient is placed in a supine position on a traction table against a well-padded perineal post with a silicone pad. After sterile preparation and draping, an anterolateral portal is established under direct fluoroscopic guidance. The remaining portals (anterior, midanterior, Dienst, proximal anterior) are established under direct arthroscopic visualization (Figure 2A). After the pathoanatomy is arthroscopically visualized, the pincer lesion is addressed.

First, a radio frequency ablation is used to open and debride the capsular attachment 5 to 10 mm above the labrum. Next, a knife rasp is used to subperiosteally elevate the labrum/chondral complex off the acetabular rim as a single, intact unit through the length of the pincer lesion. The angled knife rasp allows for good control when elevating the labrum/chondral complex off desired bone sections (Figure 1). An associated type II labrum tear is often present. The acetabular shelf and the underlying pincer are recessed and recontoured with a 4.0 round abradar under fluoroscopic guidance. It is important to use the abradar on reverse to avoid damaging the chondrolabral junction. The labrum/chondral complex itself is a relatively stout and elastic structure that allows for manipulation with instruments within reason (Figure 2B). After the acetabuloplasty is complete, traction is released off the extremity. Although the bony substrate of the pincer cannot be fully visualized with an intact chondrolabral complex, we use fluoroscopic guidance when delineating the needed amount of osteoplasty. Approximately 3 to 5 mm of bone is removed, and we can see the elimination of the crossover sign on fluoroscopy. The crossover sign is the projection of the anterior wall of the acetabulum lateral to the posterior wall of the superior aspect of the acetabulum.

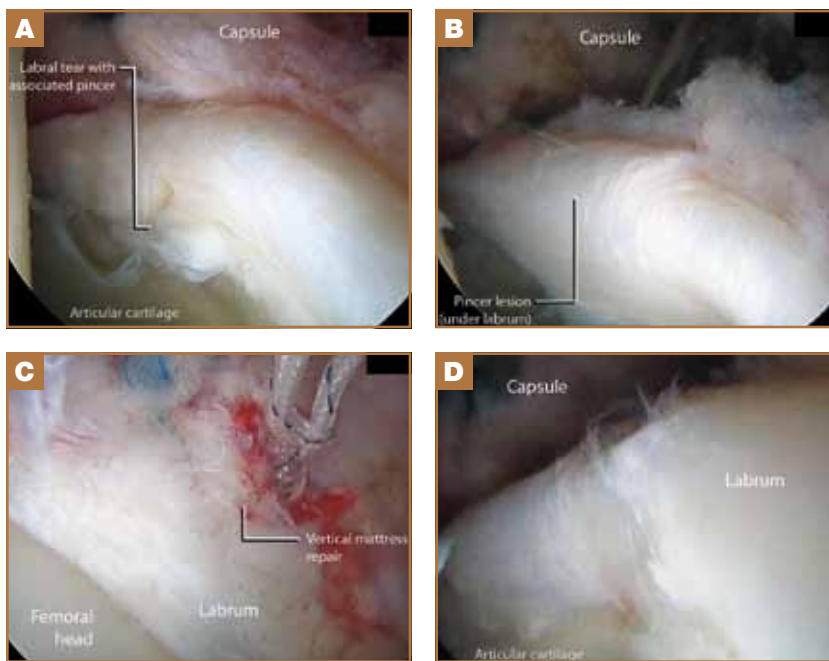
Bioraptor 2.3-mm suture anchors (Smith & Nephew Inc, Andover, Massachusetts) are then placed at the acetabular shelf under fluoroscopic assistance. Vertical mattress stitches are used to reduce the labrum, and the repair is secured with modified Weston knots. If the labral tissue is insufficient for holding a vertical mattress stitch, a simple suture looped around the labrum is used (Figure 2B). Traction is again released off the extremity while the sutures are being tied. With the release of traction, the head centers in the acetabulum, helping reduce the labrum to the acetabular shelf. Reducing the labrum to the new recessed acetabular rim allows for anatomical reduction with less chance of eversion on tie-down (Figures 3A-3D).



**Figure 2.** Patient positioning and arthroscopic portals (A). Acetabular shelf/pincer recession using round abradar on reverse below chondrolabral junction (B). Contoured acetabular rim with labral repair using vertical mattress sutures (upper right). (Illustrations by Nicole Wolf.)

The use of intermittent traction is critical to minimizing neuropraxia. Traction is applied to the operative extremity when entering the central compartment for diagnostic arthroscopy, identifying the labral tear/pincer lesion, and performing chondrolabral elevation, bony pincer contouring, and anchor placement. After sutures are passed through the labrum, traction is released; it is also kept released for knot tying. Traction is reapplied for placement of the next suture anchor and passing of sutures. This process is repeated for any further suture placement. In addition, traction is kept released when contouring the cam lesion in the peripheral anterior compartment. Use of intermittent traction keeps total traction time to about 1 hour, well short of the recommended 2-hour limit for continuous traction.<sup>22</sup>

Once the labral repair is complete, all traction is removed, and the knee is flexed 45° to 60°. Under direct fluoroscopic guidance, the scope is inserted into the peripheral compartment through the preexisting anterolateral portal. After the peripheral compartment is visualized, a 4.0-mm round abradar is used on reverse to decompress any cam lesion. First, fluo-



**Figure 3.** Arthroscopic image of pincer lesion with labral tear (A). Pincer lesion under labrum (B). Labrum tear repaired after acetabuloplasty using vertical mattress sutures (C). Repaired labrum after decompression of pincer lesion (D).

roscopy is used to isolate the lesion. The bone is contoured at the head-neck junction for approximately 5 mm. Bony resection is performed in the zone between the lateral retinacular vessels and the medial synovial plica. The lateral synovial fold and the posterior superior retinacular vessels are protected during decompression.

Traction must be sufficient to avoid damaging chondral surfaces. We usually apply enough traction to the operative extremity so that there is at least 1 cm of space between the femoral head and the acetabulum as visualized on fluoroscopic images. This space allows for safe entry between chondral surfaces. It is crucial to have the patient under absolute muscular paralysis during the traction phases of the case.

After surgery, patients are allowed to fully bear weight with use of crutches for 6 weeks. This protocol allows the pelvis to remain relatively level during ambulation and prevents a lurching gait, which can stress the surgical labral repair.

## Discussion

Studies have shown that the labrum significantly augments both the articulating surface and the acetabular volume.<sup>12,23</sup> It also increases joint stability during extreme ranges of motion.<sup>24</sup> Labral pathology secondary to bony impingement has been proposed as a cause of early osteoarthritis in the hip joint.<sup>1-7</sup> In this article, we have presented an arthroscopic surgical technique designed to address the acetabular rim while preserving the chondrolabral junction.

The ability of the acetabular labrum to heal at the chondrolabral junction may be limited. In a study evaluating the healing potential of arthroscopically repaired sheep labra,

Philippon and colleagues<sup>19</sup> found that 12 weeks after surgery all labra appeared grossly healed and stable. Histologic analysis, however, showed that labral healing was incomplete. A cleft remained at the junction of the labrum and the articular surface of the acetabulum. Either labral repair tissue originated at the joint capsule, or direct labral healing occurred through new bone formation at the acetabulum. A potential etiology of the limited healing may be vascular. A histologic study of cadaveric labra found that, though blood vessels were present in the peripheral third of the labrum, the internal portion was avascular.<sup>13</sup> In a cadaveric study identifying the blood supply of the acetabular labrum, the typical surgical labral detachment performed for acetabuloplasty transects the vessels that supply the labrum.<sup>20</sup> In another cadaveric labrum study, Kelly and colleagues<sup>25</sup> found the articular side relatively avascular compared with the capsular side. This finding suggests that healing may be particularly limited on the articular side of the area where typical surgical detachments are

performed in acetabuloplasties. In addition, the finding may explain the cleft noted in the histologic study of surgically repaired sheep labra.<sup>19</sup>

A goal in our acetabuloplasty technique is to preserve the chondrolabral junction, given its diminished healing potential. We have performed this technique for more than 200 patients, including 140 patients with minimum 2-year follow-up. Of these 140 patients, 117 (84%) had good or excellent outcomes. The main advantage of this technique is that it allows for contouring of the underlying pincer deformity commonly found in FAI without compromising the contiguous transition zone between the articular surface of the acetabulum and the labrum. Articular cartilage delamination at the acetabular rim is thought to be one of mechanisms involved in early osteoarthritis.<sup>1,6</sup> We speculate that creating a surgical lesion at this location may predispose the acetabulum to subsequent degeneration.

A limitation of our chondrolabral preservation technique is that it is more technically demanding and therefore may require more traction time. For this reason, we emphasize making judicious use of traction time; using fluoroscopic guidance and/or direct visualization of the acetabular shelf from the midanterior portal; releasing traction when tying knots to obtain better reduction and avoid overreduction; using the round abradar on reverse; and having a good working knowledge of knot tying, as pass pointing and visualization can be limited.

Preservation and repair of the acetabular labrum are increasingly being recognized as important goals in hip arthroscopy. Performing chondrolabral preservation during acetabular osteoplasty is intended to allow for anatomical restoration of the acetabular labrum during arthroscopic intervention for FAI.

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### Webcast

A video of the acetabuloplasty technique described in this study, Arthroscopic Acetabular Recession With Chondrolabral Preservation by Hasan M. Syed, MD, and Scott D. Martin, MD is available online. See, [www.amjorthopedics.com/webcast.aspx](http://www.amjorthopedics.com/webcast.aspx)