

# Arthroscopic Pincer Resection Utilizing an Outside-In Approach for Intra-articular Access



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**Abstract:** In the standard approach to hip arthroscopy, access to the joint is achieved using fluoroscopic guidance to enter the central compartment of the hip using the Seldinger technique, penetrating the capsule with a needle and subsequently cannulating and obtaining direct visualization of the joint. In such a way, arthroscopists then proceed with accessory portal creation and capsulotomy, as desired, under direct intra-articular visualization. In cases with severe pincer morphology or coxa profunda, it may not be possible to safely access the central compartment under fluoroscopic guidance due to significant lateral overcoverage of the femoral head. We present an outside-in arthroscopic approach for accessing the hip joint in such patients, allowing for safe visualization, osseous pincer resection, and improved central compartment access while minimizing the risk to cartilage and labral tissue.

In recent years, techniques in hip arthroscopy have evolved to allow for comprehensive arthroscopic management of femoroacetabular impingement (FAI).<sup>1</sup> However, the management of patients with severe global pincer morphology and/or coxa profunda remains a challenge.<sup>2</sup> In patients with global overcoverage of the femoral head, standard, safe arthroscopic access to the central compartment of the hip may be precluded.<sup>2</sup> In such cases, open surgical hip dislocation has previously been recommended to allow for direct visualization and treatment of the osseous and labral pathology.<sup>2</sup> However, the undesirable morbidity and complication profile associated with open surgical management may be avoided by utilizing an outside-in arthroscopic technique for accessing the hip joint.<sup>3</sup> With this technique, sufficient space becomes available for arthroscopic access of the central compartment. Subsequently, definitive acetabuloplasty and labral repair or reconstruction may be performed<sup>3</sup> (Video 1).

## Surgical Technique

### Patient Positioning

The patient is positioned supine on a lower extremity suspension table. Their feet are inserted into padded boots, and their pelvis is braced with a well-padded perineal post. The operative hip is prepped and draped in the usual sterile fashion.

### Arthroscopic Access and Portal Placement

A 17-gauge access needle is used to create an anterolateral (AL) portal approximately 2 cm medial to the anterior border of the femur. The needle penetrates the hip capsule at the 12-o'clock position. Under fluoroscopic guidance, once distraction is applied, it can be appreciated that while the central compartment widens, the femoral head translates laterally, preventing access along the lateral acetabular rim, even after capsular venting (Fig 1). The needle is exchanged for a nitinol wire, and a 5.0-mm cannula (Flowport II; Stryker Sports Medicine) is inserted over the wire. Since it can again be seen with fluoroscopy that there is not sufficient space between the femoral head and acetabular rim to safely access the intra-articular space, the cannula is parked extra-articularly just outside the capsule (Table 1), the nitinol wire is removed, and traction is let down to proceed with an outside-in approach to the intra-articular space.

A 70° arthroscope is inserted into the cannula, and a second modified anterior portal (MAP) is created 2 cm distally and 4 cm medially to the AL portal. Care is

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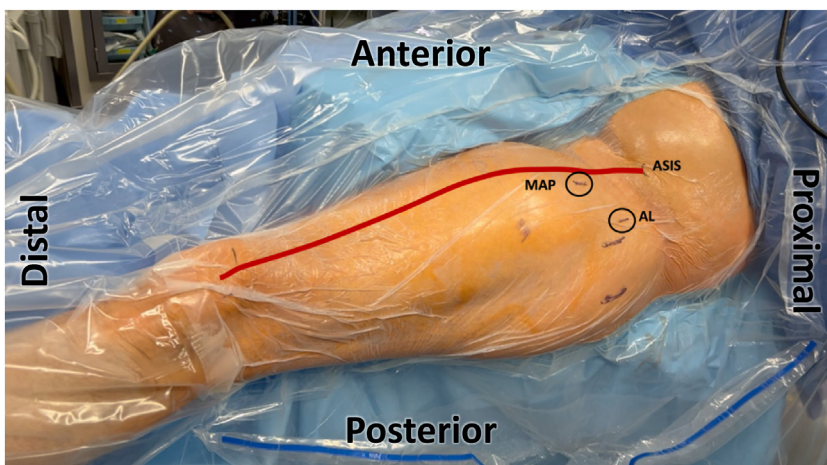
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**Fig 1.** Fluoroscopic imaging under applied hip distraction demonstrating tight needle insertion into the intra-articular space. It can be appreciated here that a cannula would not fit between the acetabulum and femoral head (red arrow). Left hip shown.

taken to ensure that the MAP remains lateral to the safety line connecting the anterior superior iliac spine to the lateral border of the patella (Fig 2). A nitinol wire is triangulated into the lateral extracapsular space to meet the arthroscope, and a 5.0-mm cannula is used to dilate this tract for subsequent instrument passage. An arthroscopic shaver and radiofrequency ablator are used to clear the pericapsular space. In particular, we clear the space between the gluteus minimus laterally and rectus femoris medially (Fig 3), given that the indirect head of the rectus inserts just proximal to the superolateral acetabulum (Fig 4).



**Fig 2.** Arthroscopic access is obtained through the modified anterior portal (MAP) and anterolateral (AL) portal. The MAP should remain lateral to the safety line (red) connecting the anterior superior iliac spine (ASIS) to the lateral border of the patella. Left hip shown.

**Table 1.** Pearls and Pitfalls

#### Pearls

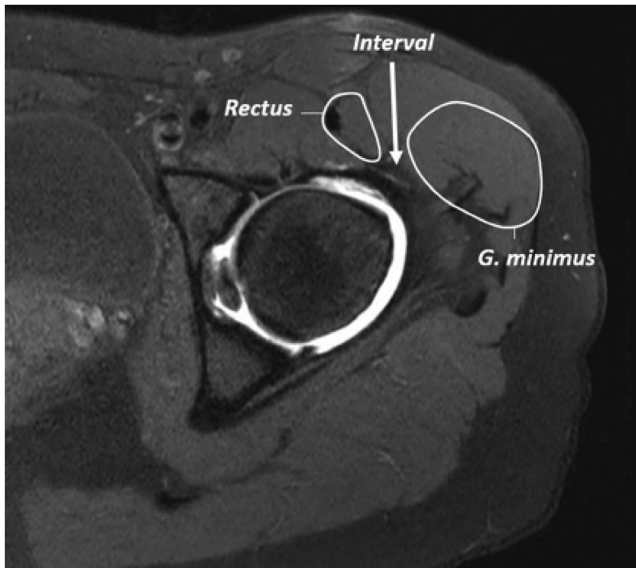
- Using the indirect head of the rectus tendon as a guide ensures accurate location for the interportal capsulotomy.
- Lifting the labrum off the rim using an arthroscopic elevator allows for better access to the acetabular rim, resulting in a more complete and convex resection, particularly distally.
- Consider capsular suspension sutures for improved exposure and visualization.
- Parking the cannula extra-articularly at initial access allows for facile capsular and subsequent rim access.

#### Pitfalls

- Failure to lift the labrum before rim resection can lead to a concave, scooped-out appearance along the rim. This results in deviation from the acetabulum's native anatomy and can lead to incomplete resection.
- Aim for a rim resection of approximately 40° in the case of substantial overcoverage. Over-resection in these patients may result in symptomatic hip dysplasia.
- Ensure satisfactory visualization along the rim from anteromedial to posterolateral. Focal visualization may result in focal rim resection with a residual pincer, most commonly posteriorly.

### Capsulotomy

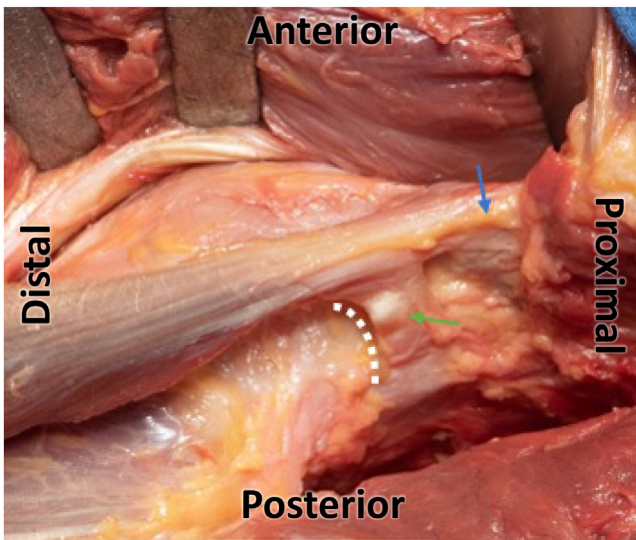
Using the indirect head of the rectus tendon as a guide and viewing from the AL portal (Fig 5), an arthroscopic scalpel is introduced through the MAP and a capsulotomy is created parallel and approximately 5 mm distal to the distal edge of the rectus tendon. This is extended approximately 10 mm posterolaterally, staying parallel to the indirect head of the rectus. To avoid iatrogenic damage to the femoral head, the capsule is incised incompletely with the scalpel, completing our deep transection with a radiofrequency ablator while protecting the underlying femoral head and extending laterally, as necessary for acetabular rim access, now that direct visualization is provided of the labrum and acetabular rim. A suspension suture is employed to lift the proximal capsule leaflet, allowing for improved visualization.



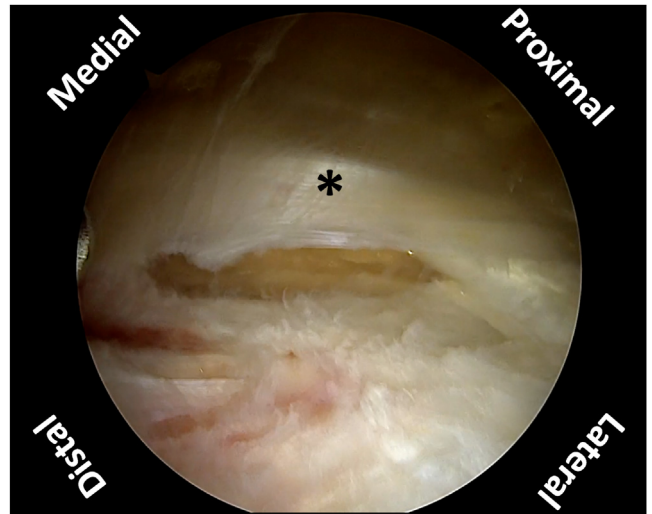
**Fig 3.** Computed tomography with labeled dissection interval between the rectus femoris medially and the gluteus minimus laterally to clear the pericapsular space. Left hip shown.

**Outside-In Joint Access and Initial Pincer Resection**

An arthroscopic 5.5-mm diamond burr (Crossblade XL; Stryker Sports Medicine) is used to resect the pincer from an outside-in approach. Fluoroscopic visualization is used to guide resection, as needed. After initial resection is performed to allow for improved acetabular rim access, with at least 5 mm of lateral space with distraction, traction is reapplied. An arthroscopic elevator is then used to gently lift the labrum off the acetabular rim

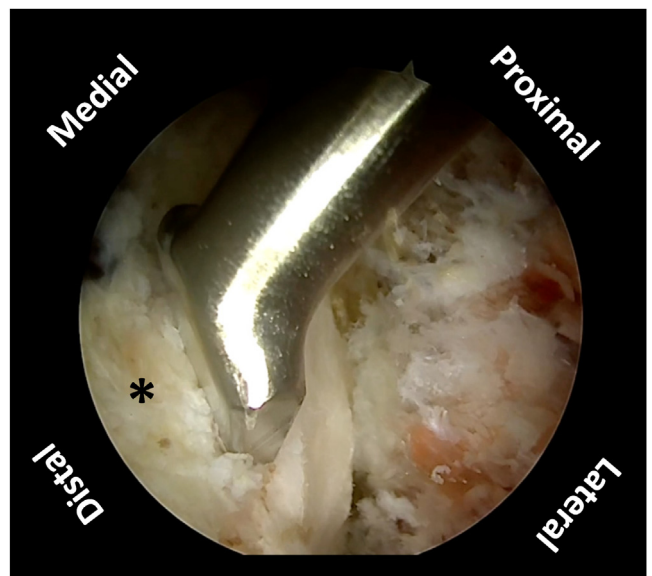


**Fig 4.** Cadaveric dissection showing the insertion points of the rectus femoris. The direct tendon originates on the anterior inferior iliac spine (blue arrow), while the indirect head inserts laterally, originating just above the acetabulum on the ilium (green arrow). The indirect head is used as a guide during the interportal capsulotomy (white dashed line). Left hip shown.



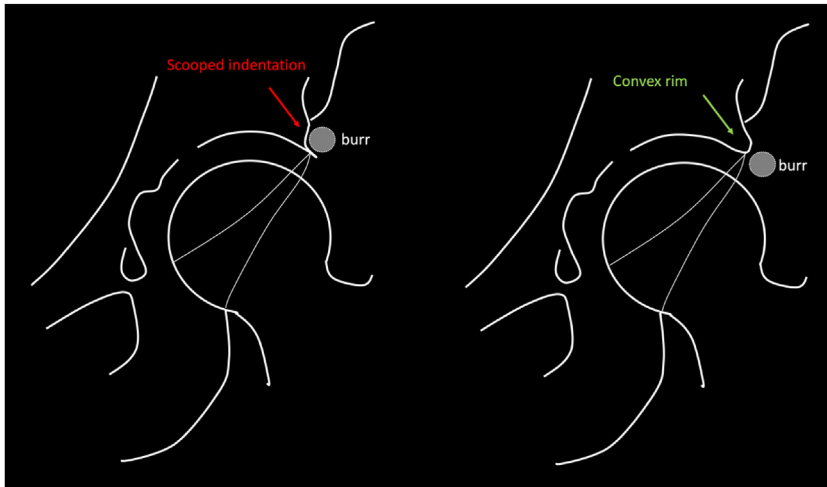
**Fig 5.** Arthroscopic imaging of the indirect head of the rectus tendon (\*), which is used as a guide for the interportal capsulotomy created just distally and parallel to the length of the tendon. Left hip shown.

(Fig 6). This provides access to the distalmost aspect of the rim and avoids creation of a concave indentation during rim resection, resulting in a smooth resection that maintains the convex anatomy of the rim (Fig 7). The labrum is left intact medially and far laterally without radial tearing to allow for repair after rim resection, analogous to techniques historically employed for labral takedown and subsequent repair. A radiofrequency ablator is used to clear the rim (Fig 8) and 5.5-mm and 4-



**Fig 6.** Arthroscopic imaging demonstrating the use of an arthroscopic elevator to gently lift the labrum (\*) off the acetabulum. This allows for improved access to achieve a complete and convex rim resection. Left hip shown.





**Fig 7.** Hip drawing illustrating how a convex (round) burr can leave a scooped indentation in the acetabular rim, leaving behind a distal ledge of bone (left). When an arthroscopic elevator is used to lift off the labrum prior to rim resection, a convex rim is maintained (right). Left hip shown.

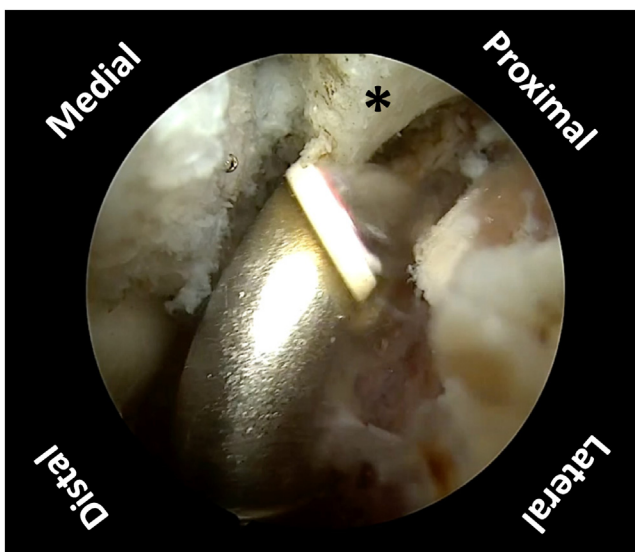
mm arthroscopic burrs are used to complete the rim resection in accordance with preoperative planning, aiming to normalize to a lateral center edge angle of  $40^\circ$  in the case of substantial overcoverage. Satisfactory pincer resection results in access to the intra-articular space with the arthroscope to continue with labral repair and other associated procedures (Fig 9). Capsular repair is performed at the conclusion of the case.

### Discussion

FAI is a well-recognized cause of hip pain resulting from abnormal contact between the acetabular rim and the femoral head-neck junction.<sup>4,5</sup> Radiographs in patients with FAI demonstrate osseous anomalies resulting in impingement, leading to subsequent labral degeneration,

articular cartilage damage, and potentially early-onset osteoarthritis.<sup>6</sup>

Patients with FAI are first managed conservatively with activity modifications, physical therapy, nonsteroidal anti-inflammatory medications, and therapeutic injections.<sup>7</sup> In those with unsuccessful conservative management, hip arthroscopy with resection of cam and pincer morphology as well as labral repair or reconstruction is indicated.<sup>7</sup> This procedure has been shown to offer significant pain reduction and improved hip function, with high patient satisfaction and low revision rates.<sup>8</sup> In the standard approach to hip arthroscopy, traction is applied to the leg to distract the joint, and the joint space is first accessed percutaneously using blunt instrumentation.<sup>9</sup> The joint capsule is then sharply divided from the inside-out under direct arthroscopic



**Fig 8.** Arthroscopic imaging of the radiofrequency ablator used to clear the acetabular rim (\*) prior to resection. Left hip shown.



**Fig 9.** Fluoroscopic imaging with applied hip distraction after pincer resection. It can be appreciated that a cannula will now safely fit between the acetabulum and the femoral head (red arrow), allowing safe arthroscopic access to the intra-articular space and subsequent labral treatment. Left hip shown.

visualization to ensure protection of the labrum and articular cartilage. In patients with severe pincer morphology, it may not be possible to safely access the joint percutaneously due to significant overcoverage of the femoral head.<sup>3</sup> In such cases, as demonstrated here (Video 1), the initial capsulotomy and pincer resection must be performed from outside of the joint to allow for the safe passage of instruments into the central compartment thereafter.<sup>3</sup> Subsequently, hip arthroscopy can proceed employing standard surgeon-specific workflows to address labral and femoral pathology.

### Conclusions

In patients with FAI and severe pincer morphology or coxa profunda, an outside-in technique for arthroscopic access of the hip joint can allow for safe osseous pincer resection, minimize risk to chondral and labral tissue, and mitigate the need for open surgical treatment.

### Disclosures

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