

Surgical Technique of the “Up-The-Neck” View During Hip Arthroscopy for Femoroacetabular Impingement



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Abstract: In the setting of femoroacetabular impingement, arthroscopy versus open surgery confers many advantages. However, inadequate bony resection remains a concern and is the leading cause of revision surgery. Several strategies have been described to ensure a more-complete resection during hip arthroscopy. In this current technique article, the authors describe a modified anterior portal site view called the “up-the-neck” view. This view allows for greater visualization of the femoral head–neck junction and alleviates challenges faced when assessing resection intraoperatively. The “up-the-neck” view is achieved by placing a 70° arthroscope in the anterior lateral portal and subsequently rotating the camera 90°. The head–neck junction will appear horizontally, rather than vertically, on this view, which allows for the easy identification of missed imperfections. This may reduce the need for revision surgery and future investigation is necessary to determine the reoperation rates following this technique.

Due to a constrained bony anatomy, complexity of surrounding soft-tissue stabilizers, and close proximity of the hip joint to critical neurovascular structures, hip arthroscopy is technically challenging.¹ However, with advancements in surgical instrumentation, coupled with a greater understanding of pathology, the number of arthroscopic hip procedures has risen markedly, reflected in an 18-fold increase in arthroscopic hip operations between 1999 and 2009^{2,3} and an 85% rise between 2011 and 2018.⁴ Patients

undergoing hip arthroscopy typically demonstrate significant improvement in outcomes.⁵⁻⁷ Current indications for arthroscopic hip surgery include lavage of a septic joint, loose body removal, labral repair, management of trochanteric pain, treatment of capsular or synovial disorders, and correction of femoroacetabular impingement (FAI).^{1,2,8}

In FAI, pathologic morphology of the proximal femur and/or acetabulum places extreme compressive forces on the acetabular labrum, resulting in damage to the articular cartilage. This leads to subsequent osteoarthritic changes in the joint if left untreated.⁹ The goal of operative correction, including acetabular rim trimming for pincer lesions and femoral osteoplasty for cam lesions, is to restore normal anatomy and to prevent further damage to bony and soft-tissue structures.^{9,10} In the setting of FAI, arthroscopy offers advantages of a minimally invasive approach with a quicker recovery time and reduced incidence of trochanteric nonunion.⁸ However, inadequate bony resection, particularly at the superolateral head–neck junction of cam lesions, remains a concern and is a leading cause of revision surgery.^{1,11-13}

Several strategies are used to ensure a more complete resection of the lesion. Such strategies include the use of fluoroscopy, careful comparison of preoperative imaging with intraoperative radiographs, and performance of a postresection range of motion examination under direct arthroscopic visualization.^{14,15} More

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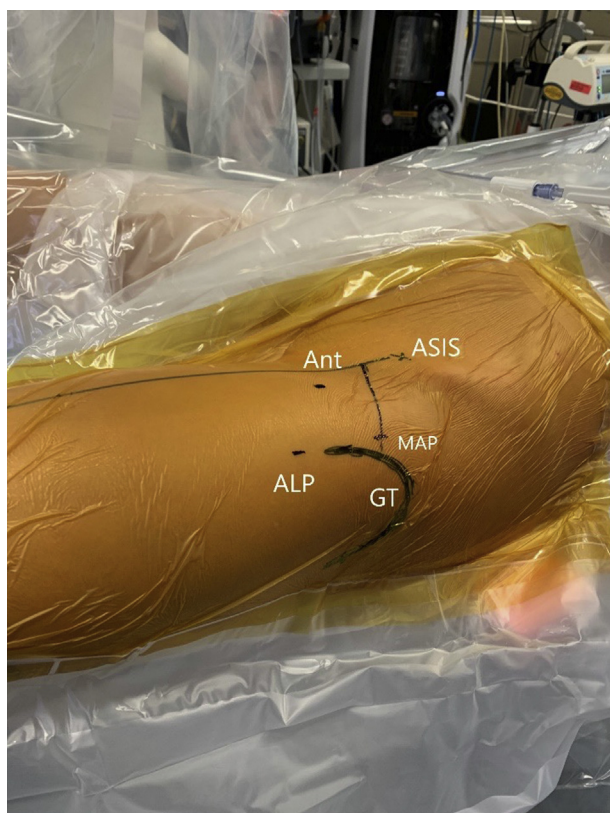


Fig 1. The left hip is prepped and draped in the supine position on the operative table. Anatomical landmarks are identified and portal sites are marked. (ALP, anterior lateral portal; Ant, anterior portal; ASIS, anterior superior iliac spine; GT, greater tuberosity; MAP, mid-anterior portal.)

recently, the upper deck view was proposed as a modified approach to improve visualization for correction of pincer-type lesions.¹⁶ Similarly, we propose a modified anterior portal site view called the “up-the-neck-view” to enable greater visualization of the femoral head-neck junction for cam deformity correction. The authors believe that the use of the “up-the-neck-view” alleviates challenges faced in assessing the cam for successful resection.

Preoperative Examination

Preoperatively, all patients are examined for clinical symptoms consistent with FAI with labral tear, typically presenting with hip pain radiating to the groin that is exacerbated by physical activity and prolonged sitting.¹⁷ Patients are assessed for active and passive range of motion including hip abduction, adduction, flexion, and extension. An impingement test is conducted in which the hip is placed in 90° of flexion, adduction, and internal rotation. Groin pain is indicative of a positive test and is suggestive of impingement at the anterior rim of the acetabulum, though the test is not specific.¹⁷

Anteroposterior (AP) radiographs of the bilateral hips are obtained, as well as AP, false-profile, and 45° Dunn

views of the affected hip. The alpha angle is measured via the technique originally described by Notzli et al.¹⁸ and validated by Barton et al.¹⁹ using AP plain radiographs to determine whether a cam lesion is present. An alpha angle greater than 55° is generally considered diagnostic of a cam lesion by the senior author. In patients with suspected symptomatic FAI who have not responded to conservative treatment, including physical therapy, anti-inflammatory medications, and corticosteroid injections, a preoperative magnetic resonance image without contrast is obtained to assess the integrity of the labrum in case labral repair is indicated at the time of the operation.

Surgical Technique (With Video Illustration)

Positioning and Equipment

Before the induction of anesthesia, a femoral nerve block is placed in the operative leg. The patient is then placed in the supine position on the operative table, and endotracheal intubation under general anesthesia ensues (Video 1). A sequential compression device is placed on the nonoperative leg. The patient’s operative leg is brought through a full range of motion to assess for hip flexion, abduction, and extension. The patient’s feet are placed in well-padded traction boots with a postless technique (Pivot Guardian Distraction System; Stryker, Kalamazoo, MI) and all bony prominences are well-padded. The C-arm is placed on the nonoperative side of the patient. Preoperative AP radiographs of the hip are annotated to highlight the cam lesion and record the optimal shape of the femoral head after resection. The patient and all equipment are prepped and draped in a sterile fashion. A sterile marking pen is used to outline the greater trochanter as well as approximate incision sites for portal placement (Fig 1).

Labral Repair

Before the incision, a final timeout ensues to confirm correct patient and laterality of the procedure. The patient is then placed in traction via a postless technique, and fluoroscopic imaging is used to confirm distraction. Under fluoroscopy, a standard anterolateral arthroscopy portal is created (Fig 1). A modified anterior portal is established using direct visualization from the anterior lateral portal. Throughout the entire procedure, a 70° arthroscope (Ideal Eyes HD Autoclavable Eyepiece Arthroscope; Stryker) is used. A capsulotomy is performed followed by a diagnostic arthroscopy to evaluate the integrity of the labrum and chondral surfaces. The labrum is isolated from the proximal capsule, and a plane is developed to expose the acetabular rim. With a shaver, an acetabuloplasty is performed as needed until a bed of bleeding bone is exposed for labral healing. The labrum is repaired with an anchor and suture construct.

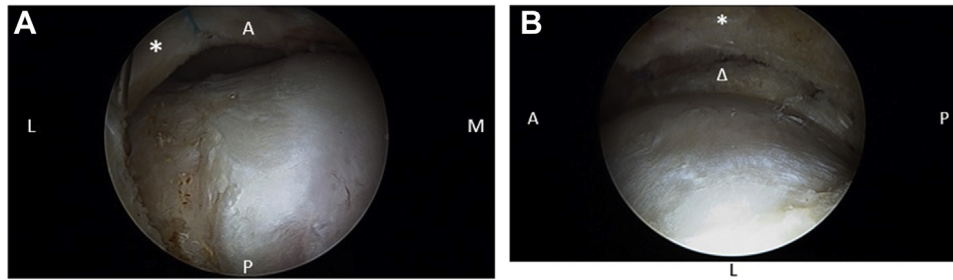


Fig 2. (A) This arthroscopic image demonstrates the cam lesion of the left femoral neck from the standard view in anterior lateral portal prior to resection. *Retracted capsule. (B) This arthroscopic image, again viewed from the anterior lateral portal, demonstrates the same cam lesion of the left femoral neck using the “up-the-neck” view. This view is achieved by rotating the arthroscope 90°. *Capsule; Δ: labrum. (A, anterior; L, lateral; M, medial; P, posterior.)

The hip is then reduced, and the suction seal is evaluated.

Resection of the Cam Lesion

Following labrum repair, attention is then turned to the femoral head for resection of the cam lesion. The distal capsular flap is freed from soft tissue adhesions to provide mobility. An internal T capsulotomy is performed with particular care to protect the circumflex femoral arteries, and retention sutures are placed to optimize exposure of the cam lesion. Fluoroscopy is used to delineate the articular cartilage margin. Electrocautery is performed to remove residual soft tissue for better visualization of the cam. A pre-resection standard view and pre-resection “up-the-neck view” are shown in Fig 2A and 2B. Initial resection of the cam is performed with the camera in in the anterior lateral portal and the shaver in the mid-anterior portal, as shown in Fig 3. This view is used to set the overall slope and depth of the resection. The 70° scope is then rotated 90° to achieve the “up-the-neck-view” such that the head-neck junction appears horizontally on the arthroscopic view. Using the “up-the-neck-view,”

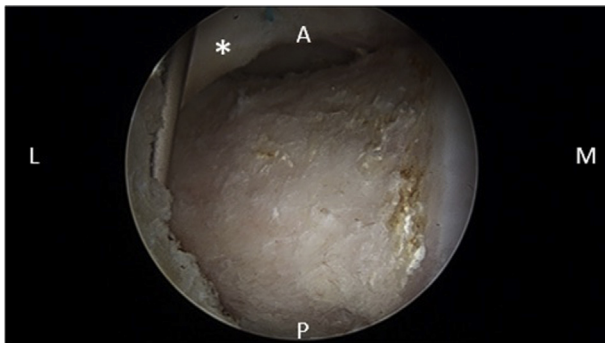


Fig 3. An arthroscopic image demonstrating the partial resection of the cam lesion along the left femoral neck when visualized from the standard view in the anterior lateral portal. *Retracted capsule. (A, anterior; L, lateral; M, medial; P, posterior.)

additional imperfections that may not have been visualized on the traditional view can now be visualized (Fig 4, A and B). Additional resection is performed until a smooth contour of the femoral head–neck junction is achieved (Fig 5, A and B). Fluoroscopic views of the hip in flexion–external rotation, flexion–neutral rotation, and extension confirm adequate resection of the cam. The capsule is then closed using nonabsorbable suture. Compression is applied to allow fluid drainage from the arthroscopic portal sites. The sites are closed and the patient is placed in a hip immobilizer.

Postoperative Care

Postoperatively, the patient is placed in a hip immobilizer. Hip flexion and hip abduction are restricted beyond 90° and 0°, respectively. The patient is instructed to remain toe-touch weight bearing with crutches for 2 weeks postoperatively. Following 2 weeks, patients are permitted to be weight-bearing as tolerated and are instructed to begin a formal physical therapy program aimed at improving balance and stability followed by gradual strengthening and return to sport.

Pearls

Pearls of the procedure are listed in Table 1. To summarize, it is critical not to extend the capsulotomy into the anterior capsule over the iliopsoas to allow for adequate retraction of the medial capsule during osteoplasty. Appropriate placement of the more anteromedial retention suture allows for tenting of the medial capsule, which allows for better visualization of the contour medially at the femoral head–neck junction. Differential tensioning of the capsular retention sutures may be required. Increased tensioning allows for access to the medial femoral neck while decreased tension allows for access to the lateral femoral neck. Finally, it is important to place the arthroscope proximal to the capsular flap and to use the scope as a retractor to allow for adequate visualization up the femoral neck.

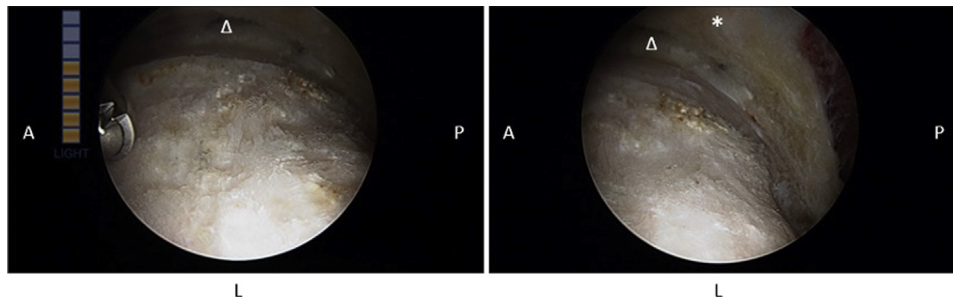


Fig 4. An arthroscopic image demonstrating additional abnormalities of the left femoral neck as viewed from the “up-the-neck” view through the anterior lateral portal that cannot be fully appreciated in the standard view. This image was captured during the resection of the cam lesion. *Capsule; Δ: labrum. (A, anterior; L, lateral; P, posterior.)

Pitfalls

Creating an interportal capsulotomy too distally on the neck may limit the ability to retract the distal capsular flap, impairing visualization of the lateral aspect of the resection. Extension of the capsulotomy into the area of the iliopsoas may compromise the ability to suspend the medial aspect of the capsule with this technique. A medial retention suture placed too laterally may not allow for appropriate medial tenting of the capsule with this technique. Partial-thickness retention suture placement may not allow for adequate visualization of the mid to distal femoral neck.

Discussion

The most common indication for revision surgery following operative treatment of a cam-type FAI lesion is inadequate bony resection of the defect.^{1,11,12,20} With a standard view, the overall slope and depth of resection is obtained. However, by rotating the arthroscope by 90°, the “up-the-neck-view” provides better visualization of the overall contour of the femoral head, and residual imperfections can be appreciated.

This secondary “up-the-neck-view” can be achieved with ease, given that both the standard and the “up-the-

neck-view” are obtained with the 70° scope in the anterior lateral portal while the shaver remains in the mid-anterior portal. In fact, the senior author routinely alternates between the 2 views throughout the resection of the cam lesion. The advantage of using the “up-the-neck” view is that it provides a complimentary, orthogonal view that supplements the standard view [Table 2](#). By only visualizing the cam lesion of the femoral neck through the standard view, the surgeon essentially visualizes a 3-dimensional structure in 2 dimensions. The additional of the orthogonal, “up-the-neck” view allows for the surgeon to fully appreciate the 3-dimensional nature of the cam lesion and it allows for a better assessment of residual imperfections from multiple views. However, like any operative technique, there are inherent limitations to the “up-the-neck” view. There is the theoretical risk of over-resecting the cam lesion when using this technique. Over-resection can lead to the loss of the hip suction seal and subsequent microinstability.²¹

Throughout the operation, proper management of the capsule is necessary to optimize the exposure and achieve adequate resection of the lesion. Care must be taken to ensure appropriate placement and extension of the capsulotomy. In addition, proper placement of

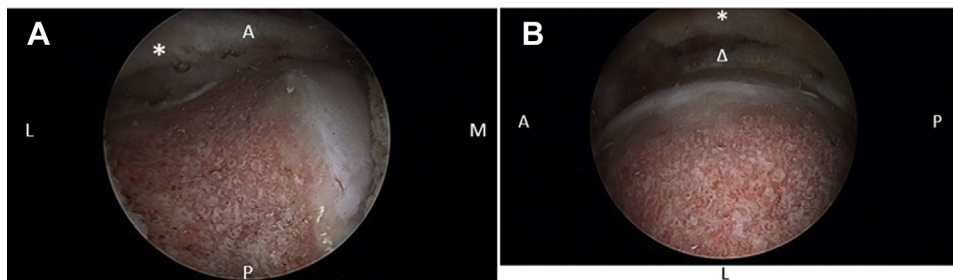


Fig 5. (A) This arthroscopic image demonstrates a complete resection of the cam lesion of the left femoral neck as viewed in the standard view in the anterior lateral portal. *Retracted capsule. (B) Likewise, the complete resection of the cam lesion of the left femoral neck can be appreciated on the “up-the-neck” view through the anterior lateral portal. The combination of the standard and “up-the-neck” views demonstrate that the entire cam lesion was resected and that there are no residual osseous abnormalities. *Capsule; Δ: labrum. (A, anterior; L, lateral; M, medial; P, posterior.)

Table 1. Pearls and Pitfalls

Pearls	Pitfalls
To allow for adequate retraction of the medial capsule during osteoplasty, do not extend the capsulotomy into the anterior capsule over the iliopsoas	Creating an interportal capsulotomy too distally on the neck may limit the ability to retract the distal capsular flap, impairing visualization of the lateral aspect of the resection
Appropriate placement of the more anteromedial retention suture allows for tenting of the medial capsule, which allows for better visualization of the contour medially at the femoral head–neck junction.	Extension of the capsulotomy into the area of the iliopsoas may compromise the ability to suspend the medial aspect of the capsule with this technique.
Differential tensioning of the capsular retention sutures may be required. Increased tensioning allows for access to the medial femoral neck while decreased tension allows for access to the lateral femoral neck.	A medial retention suture placed too laterally may not allow for appropriate medial tenting of the capsule with this technique.
It is important to place the arthroscope proximal to the capsular flap and to use the scope as a retractor to allow for adequate visualization up the femoral neck.	Partial thickness retention suture placement may not allow for adequate visualization of the mid- to distal femoral neck.

Table 2. Advantages and Disadvantages of Using the “Up-the-Neck” View During Hip Arthroscopy

Advantages	Disadvantages
Allows for better visualization of the cam deformity along the femoral neck	Theoretical risk of over-resection of the cam lesion
Can be obtained using the same standard anterior lateral viewing portal	Over-resection can lead to subsequent loss of hip suction seal and microinstability

retention sutures, along with differential tensioning can help maximize visualization of the lesion.

In conclusion, this Technical Note describes the “up-the-neck-view” as an alternative method to ensure adequate bony resection of a cam lesion. When used in conjunction with the standard view, the “up-the-neck-view” provides a secondary approach which enables the surgeon to better visualize any imperfections at the head–neck junction. This may reduce the need for revision surgery due to inadequate bony resection. However, no prospective or retrospective studies to date have examined incidence of reoperation when using this technique. Therefore, future investigation is necessary to determine reoperation rates when using the “up-the-neck-view” in comparison with the use of the standard view alone.

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