



# Arthroscopic Identification and Management of Recurrent Iliopsoas Impingement After Total Hip Arthroplasty

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**Abstract:** Arthroscopic release of the iliopsoas tendon for iliopsoas impingement (IPI) after total hip arthroplasty (THA) at the lesser trochanter gives good results. However, where IPI then recurs, due to adhesions between the healing iliopsoas tendon and the surrounding soft tissue, and nonoperative measures have failed, a revision THA procedure is usually considered. We propose a technique of arthroscopic visualization of the recurrent IPI and a subsequent psoas tenotomy at the level of the hip joint using an outside-in capsulotomy approach. This secondary tenotomy, located proximally directly at the level of the recurrent impingement, allows relief of the painful symptoms without compromising the muscle function of the iliopsoas and precludes the need for a complex THA revision.

Iliopsoas impingement (IPI) has been implicated as a cause of persistent pain after total hip arthroplasty (THA) in up to 4.3% of cases.<sup>1</sup> Iliopsoas tendon irritation may be due to impingement with the acetabular component owing to malpositioning, fixation screws protruding through the ilium, or extruded cement debris.<sup>1</sup> These patients usually report insidious hip pain, which is increased during active hip flexion.<sup>2</sup>

Arthroscopic release of iliopsoas tendon after THA is a safe procedure that may provide effective relief of the patient's symptoms.<sup>3</sup> The tenotomy can be performed either at the lesser trochanter or at the hip joint, with no significant differences reported between these 2 techniques.<sup>3</sup> However, the distal tenotomy—at the

level of the lesser trochanter—can predispose to recurrent IPI after a pain-free interval due to (1) muscle fibers within the iliopsoas' musculotendinous unit remaining intact after the tenotomy and (2) the iliopsoas tendon healing/scarring to the adjacent soft tissues. We report the original technique of arthroscopic identification of the recurrent impingement and a revision technique that consists in performing a new tenotomy located more proximally. This secondary tenotomy allows relief of the painful symptoms without compromising the muscle function of the iliopsoas and precludes the need for a complex THA revision.

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## Surgical Technique

### Patient Positioning

The patient is placed in the supine position without needing a fracture table. Fluoroscopic guidance is used to assist this surgical procedure (Fig 1). Instrumentation comprises a 30° arthroscope, an FMS Duo + pump (Fluid Management System, DePuy Mitek, Raynham, MA), which can control inflow and outflow to maintain a constant pressure (set at 50 mm Hg), a VAPR electrode, and a 3.5-mm 90° hook electrode (DePuy Mitek). One milligram/liter of adrenaline is added to the irrigation fluid to improve vision. Only 3 portals are usually required.



**Fig 1.** Left hip. Patient positioning and portal landmarks for arthroscopic release of recurrent iliopsoas impingement after total hip arthroplasty. The patient is placed in the supine position without traction. This surgical technique requires 3 portals. The standard anterolateral (AL) portal, the far distal (FD) portal established between 5 and 7 cm distal to the AL portal on the same vertical line, and the mid-anterior (MA) portal. The AL portal and FD portal were used during the distal lesser trochanter exploration to confirm the previous endoscopic tenotomy of the iliopsoas tendon at the lesser trochanter. The AL and MA portals were used to perform the arthroscopic release of the iliopsoas tendon at the hip joint. (GT, great trochanter.)

### Distal Lesser Trochanter Exploration

A small longitudinal skin incision was made to accept the 5.0-mm trocar to establish the anterolateral (AL) portal (Fig 2, Video 1). The trocar is positioned with a slight posterior superior orientation until the tip is over the lesser trochanter. The far distal (FD) portal is created between 5 and 7 cm distal to the AL portal on the same vertical line. This AL portal must be fixed to allow the surgeon to work both on the lesser trochanter (posterior inferior orientation) and on the anterior hip capsule. The FD portal is used as a viewing portal and the AL portal as a working portal. The 30° arthroscope is placed in the FD portal and the thermal probe in the AL portal; both are advanced under fluoroscopic guidance until they overlie the lesser trochanter. Echoing the advice of Flanum et al.,<sup>4</sup> we emphasize the

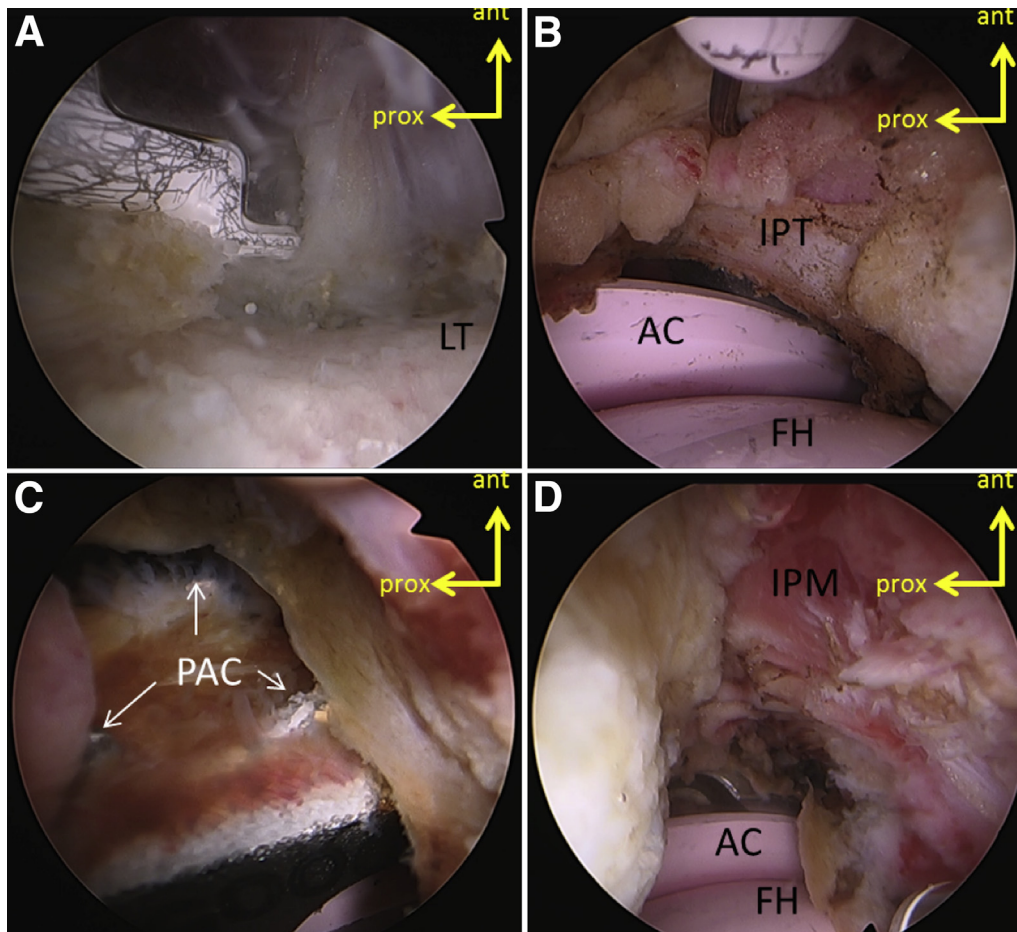
importance of staying in contact with the anterior surface of the femur throughout the placement of the arthroscope and thermal probe. This provides safe access to the insertion of the iliopsoas tendon on the lesser trochanter, and ensures that the only vessels encountered are the small descending branches of the lateral circumflex femoral artery.<sup>4</sup>

After appropriate placement of both the arthroscope and the thermal probe over the lesser trochanter, the thermal probe is used to clear soft tissue until visualization of the iliopsoas tendon is achieved. Slight flexion of the hip (30°) and external rotation will help in the identification of the iliopsoas tendon. In this case, the tendon had already been released in previous endoscopic surgery (Fig 2A). First, the iliopsoas tendon was inspected to ensure that the previous tenotomy at the level of the lesser trochanter was complete. Secondly, all adhesions were debrided. Thirdly, we cleared all adhesions.

### Arthroscopic Tenotomy of Iliopsoas at the Hip Joint

Under fluoroscopic and visual control, the anterior hip capsule was exposed using the AL portal as the viewing portal and mid-anterior (MA) portal as the working portal using the “Capsulotomy first technique” approach (Table 1, Fig 2B-D).<sup>5</sup> The portion of the capsule overlying the anterior surface of the neck prosthesis is the only area of the capsule where there is no muscle insertion. Instead, a precapsular fatty tissue is seen which can be easily debrided to reveal the white fibers of the capsule. This is the only white structure in the whole area, and this white structure must be visualized. The arthroscope is then placed in contact with the capsule and positioned medially to the gluteus minimus and laterally to the iliocapsularis muscle. The MA instrumental portal is then created medially to the tensor fasciae latae, and is located at least 4 to 5 cm from the first portal to triangulate more easily. An outside-in longitudinal capsulotomy is then performed until first the head of the prosthesis and secondly the anterior aspect of the acetabular component are exposed. In this case, inflammatory changes and proximal IPI with anterior margin of the acetabular component were identified, making other intra-articular causes of IPI such as component loosening less likely. IPI was diagnosed by the presence of an initial pocket superficial to the anterior aspect of the iliac bone which was filled by serous fluid. The collection has become encapsulated and persisted between the iliopsoas tendon and the anterior margin of the cup. The brownish-colored/hemosiderin-stained appearance of the surrounding muscles is strongly suggestive of recurrent hematomas (Fig 2C).

Arthroscopic tenotomy at the hip joint level was performed with the thermal probe until the fibers of the cut ends iliopsoas muscle were visible. The portals are closed with 4/0 nonabsorbable suture.



**Fig 2.** Right hip. Arthroscopic release of recurrent iliopsoas impingement after total hip arthroplasty. (A) Lesser trochanter exploration: 30° arthroscope is placed in the far distal portal and the thermal probe in the anterolateral portal over the lesser trochanter under fluoroscopic guidance. Using the thermal probe to clear soft and fibrotic tissues and adhesions from previous endoscopic iliopsoas tenotomy at the lesser trochanter. (B-D) Intra-articular exploration. (B) Identify the iliopsoas tendon (IPT) after an outside-in capsulotomy and (C) then reveal the proximal iliopsoas impingement with the anterior margin of the protruding acetabular component (PAC). (D) Using the thermal probe to perform the arthroscopic release of the iliopsoas tendon at the hip joint until viewing the iliopsoas muscle fibers (IPM). (AC, acetabular cup; FH, femoral head; LT, lesser trochanter.)

### Rehabilitation

On the first postoperative day, the patient was mobilized fully bearing weight, as pain allowed. The early mobilization and normal bipedal gait was not affected. At the 1-month and 6-month follow-up visit, subjectively the patient was pain free and satisfied with the procedure. Objectively, weakness of the affected hip when flexing against resistance (between an arc of 0° and 70°) was noted in comparison with the opposite side.

### Discussion

IPI after a primary THA was first reported in 1991 by Lequesne et al.<sup>6</sup> Arthroscopic release of the iliopsoas tendon has been described at 3 locations (central or peripheral compartment and at the lesser trochanter).<sup>3</sup> Outcomes are generally good, but

transient weakness and atrophy of the iliopsoas on magnetic resonance imaging have been reported. However, complete resolution of the weakness usually occurs by 3 to 6 months after surgery.<sup>3</sup> Ilizaliturri et al.<sup>7</sup> found favorable results with iliopsoas release either at the lesser trochanter or at the hip joint, with no significant differences between these techniques. Although this complication has never been reported after distal tenotomy of the psoas for IPI,<sup>8</sup> we have found that a recurrence of the symptoms is possible, and that it may occur after quite a variable free interval, that may exceed several years. We hypothesize that this recurrence is due to the adhesions, and the healing of the iliopsoas tendon stump to the surrounding soft tissues rather than an incomplete initial release. We concur with Morohashi et al.<sup>9</sup> that unexpected adhesions from the previous surgery may be



**Table 1.** Surgical Steps

|                                                |                                                                                                                                                                                    |
|------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Surgical steps:                                |                                                                                                                                                                                    |
| •                                              | Position the patient supine on the table without traction and use fluoroscopy during the surgical procedure                                                                        |
| •                                              | Establish 3 portals: standard anterolateral (AL) portal, mid-anterior (MA) portal, and far distal (FD) portal between 5 and 7 cm distal to the AL portal on the same vertical line |
| Step 1: Distal lesser trochanter exploration   |                                                                                                                                                                                    |
| •                                              | Use the FD portal as the viewing portal and the AL portal as the working portal                                                                                                    |
| •                                              | Under fluoroscopic guidance, place the 30° arthroscope and thermal probe over the lesser trochanter                                                                                |
| •                                              | Confirm the previous iliopsoas tenotomy at the lesser trochanter                                                                                                                   |
| •                                              | Use the thermal probe to clear all adhesions to the proximal femoral cut                                                                                                           |
| •                                              | Use slight hip flexion and external rotation if needed                                                                                                                             |
| Step 2: Arthroscopic tenotomy at the hip joint |                                                                                                                                                                                    |
| •                                              | Use the AL portal as the viewing portal and the MA portal as the working portal                                                                                                    |
| •                                              | Expose the anterior hip capsule using fluoroscopic and visual control and perform an outside-in capsulotomy approach                                                               |
| •                                              | Intra-articular exploration allows eliminating other causes of painful THA (metallosis, trunnion disease, polyethylene fracture)                                                   |
| •                                              | Dynamic testing and probing of the acetabular component allows the surgeon to assess for aseptic loosening or unseating of the cup from the acetabulum                             |
| •                                              | Identify the iliopsoas impingement at the proud anterior margin of the acetabular component                                                                                        |
| •                                              | Perform an arthroscopic tenotomy of the iliopsoas tendon at the hip joint using a thermal probe                                                                                    |

THA, total hip arthroplasty.

encountered. When releasing the iliopsoas tendon at the lesser trochanter, metachronous proximal adhesions of the tendon may be present either to the proximal femoral at the level of the neck cut or to the anterior acetabular margin or to the anterior lip of the component itself. Furthermore, we hypothesize that new proximal adhesions might be formed after the first arthroscopic release.

We recommend that in cases of recurrent IPI, occurring after an iliopsoas tenotomy at the level of the lesser

trochanter, an arthroscopic revision procedure can be proposed instead of revision THA or other open procedures. In our opinion, arthroscopic revision presents several advantages in comparison with these open surgical procedures. It is a safe procedure with a low complication rate. The arthroscopic procedure shows lower infection risk than open ones and a faster patient recovery allowing us to consider an outpatient management for this arthroscopic treatment. Moreover, the arthroscopic procedure allows us to refine the diagnosis and can eventually precisely identify associated joint pathology. Arthroscopic exploration includes checking the lesser trochanter to ensure that there are no remaining tendon fibers at the level of the previous resection. An arthroscopic exploration of the joint can easily be performed using the same patient installation and by converting the instrumental AL portal in an AL optic portal. A MA instrumental portal is required, and an outside-in capsulotomy is performed. This exploration allows confirmation of the diagnosis of recurrent IPI and eliminates the other potential cause of groin pain (Table 2). If either adhesions or evidence of IPI is found, an arthroscopic iliopsoas tenotomy at the hip joint is recommended. Although this tenotomy or transection may partially sacrifice some active hip flexion, we believe that patients are rarely cognizant of this reduction and will not have any complaint related to this active hip flexor strength. This technique results in a significant volume of muscle fibers remaining intact within the musculotendinous unit, allowing significant forces to be generated for hip flexion. The main advantage of this technique is to avoid revision arthroplasty, which exposes frequently fragile patients to significant morbidity, and does not guarantee relief of their symptoms.

The arthroscopic tenotomy has also some disadvantages including standard complications associated with arthroscopic procedure such as fluid extravasation, iatrogenic tissue damaging, or instrument breakage.

**Table 2.** Pearls and Pitfalls

| Pearls                                                                                                                         | Pitfalls                                                                                                   |
|--------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------|
| • Avoid using the fracture table and potential traction-relation complications. Use fluoroscopic guidance during the procedure | • Contamination or infection risk                                                                          |
| • Use slight flexion to loosen the anterior capsule and external rotation to expose the lesser trochanter                      | • Damage to surface bearings of THA                                                                        |
| • Confirm the previous endoscopic iliopsoas tenotomy at the lesser trochanter                                                  | • Vascular and nerve injuries possible due to inappropriate placement of the arthroscope or thermal probe. |
| • Allows direct visualization of the iliopsoas impingement at the anterior margin of the acetabular component                  |                                                                                                            |
| • Allows dynamic assessment of the hip joint and allows the collection of bacteriologic samples                                |                                                                                                            |
| • Eliminates intra-articular causes of IPI (marked polyethylene wear, signs of infection/pus, bifid iliopsoas tendon.)         |                                                                                                            |
| • Detects implant malfunctions (absence of cup fixation, bearing surface wear)                                                 |                                                                                                            |
| • Avoid using high fluid pressure.                                                                                             |                                                                                                            |

IPI, iliopsoas impingement; THA, total hip arthroplasty.

Moreover, the hip arthroscopic procedure requires a significant learning curve. Nevertheless, in comparison with an open tenotomy or with a surgical THA revision, the benefit/risk balance is strongly in favor of the arthroscopic IPT revision.

This surgical technique, based on the main principles for arthroscopic release of iliopsoas tendon, allows simple, mini-invasive surgical treatment of the symptomatic patient after THA who experiences recurrent symptoms of iliopsoas impingement and who has already had arthroscopic resection of the iliopsoas tendon at the level of the lesser trochanter.

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