Arthroscopic Iliopsoas Release at the Level of the Lesser Trochanter Following Total Hip Arthroplasty

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Abstract: Iliopsoas impingement is an uncommon cause of pain after total hip arthroplasty. If pain persists after a trial of conservative treatment, surgical intervention can alleviate the patient's symptoms. Multiple advantages exist to release the iliopsoas tendon at the level of the lesser trochanter. The purpose of this Technical Note is to demonstrate a technique for arthroscopic release of the iliopsoas tendon at the lesser trochanter after total hip arthroplasty.

Iliopsoas impingement (IPI) is an uncommon cause of persistent pain after total hip arthroplasty (THA). Previous studies have demonstrated an incidence as high as 4.3% after THA.[1] IPI after THA often occurs because of hardware irritation. Most commonly, it is due to anterior overhang of the acetabular component, due to either a retroverted or oversized component. Other causes of IPI that have been described after THA include anterior acetabular screw protrusion,[2] oversized femoral head (typically in metal on metal prosthesis), and acetabular component cement extrusion.[3] When prominent hardware causes IPI, conservative management is less likely to provide long-term relief, but should still be pursued initially.

Clinically, patients describe groin pain, especially when standing from a seated position. This pain can be reproduced by moving the hip from a flexed and externally rotated position to an extended and internally rotated position.[4] A snapping sensation may also accompany pain during this physical examination maneuver.[5] Conservative management of IPI includes activity modification, physical therapy for stretching of the iliopsoas, and an injection of cortisone and local anesthetic into the tendon sheath. This injection can be very helpful from both a therapeutic standpoint and a diagnostic standpoint.[6]

When conservative management fails, operative release of the iliopsoas tendon is an option for definitive management. Multiple open techniques have been described to release the iliopsoas tendon with good results.[7,8] However, repeat open exposure of the hip after THA can be challenging for the surgeon, and temporarily debilitating and possibly harmful to the patient. Consideration of anatomic variations of the iliopsoas tendon is also critical during surgical release, because incomplete release may result in residual pain. In a previous anatomic study, the prevalence of a single-, double-, and triple-banded iliopsoas tendon was 28.3%, 64.2%, and 7.5%, respectively.[9] Arthroscopic techniques to release the iliopsoas tendon have been described in the central compartment, peripheral compartment, and at the level of the lesser trochanter. Anatomic studies have demonstrated that at the level of the labrum (central compartment), the iliopsoas consists of 40% tendon and 60% muscle, compared with 60% tendon and 40% muscle at the level of the lesser trochanter.[10] Because of this discrepancy, hypothetically a more thorough release could be performed at the level of the lesser trochanter.

The purpose of this Technical Note is to demonstrate a technique for arthroscopic release of the iliopsoas tendon at the lesser trochanter after THA.

Technique

Preoperative Workup

Radiographs of the affected hip should be obtained (anteroposterior and lateral) looking closely at femoral

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Fig 1. Demonstration of an operating room setup. Note that the patient is supine, in traction boots, with the right hip prepped and draped. Also, the large C-arm is draped and entering from the contralateral side. Note the neutral position of the ipsilateral foot.

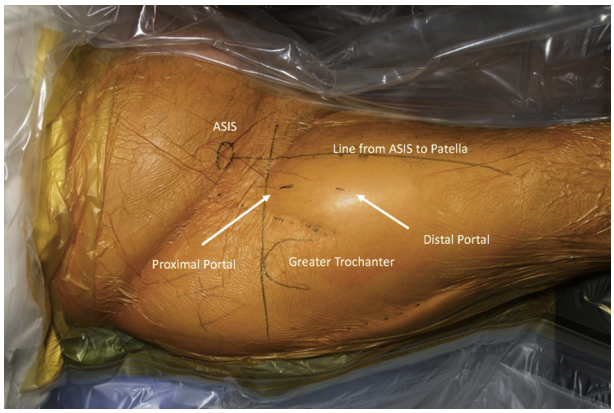

Fig 2. Right hip, supine position, traction boots with no traction, neutral rotation of the operative leg. The greater trochanter and anterior superior iliac spine (ASIS) are palpated and marked. A line is drawn from the ASIS to top of the patella, with a perpendicular line at the level of the greater trochanter. The proximal portal is marked out just distal to the level of the greater trochanter and 2 to 3 cm lateral to the line drawn from the ASIS. The distal portal is in the same medial-lateral plane and approximately 5 cm distal to the proximal portal.

head size and position, screw prominence, anterior overhang of the acetabular component, and version of the acetabular component. Physical examination for suspected iliopsoas impingement should include an evaluation of passive and active range of motion of the hip, pain with resisted hip flexion, and significant pain with bringing the hip from neutral into hip flexion, abduction, and external rotation and then back to neutral.[11] A diagnostic and therapeutic injection of the iliopsoas tendon sheath should be performed with local anesthetic and corticosteroid and the response monitored.[12,13] The patient should be re-examined and questioned after injection to assess pain relief.

Operating Room Setup

The patient is positioned supine on the surgeon's preferred hip arthroscopy table with traction boots applied to the bilateral legs. Large C-arm should be draped and accessible, coming in from the contralateral side, to localize the lesser trochanter (Fig 1). No peroneal post is required for this operation. Traction does not need to be applied. For a list of recommended equipment, see Table 1.

Portal Placement

The greater trochanter should be palpated and drawn out along with the anterior superior iliac spine (ASIS). A line should be drawn from the ASIS toward the patella and a perpendicular line to this at the tip of the greater trochanter (Fig 2). The proximal portal is marked out just distal to the level of the greater trochanter and 2 to 3 cm lateral to the line drawn from the ASIS. The distal portal is in the same medial-lateral plane and approximately 5 cm distal to the proximal portal. Access needles (Smith & Nephew, Andover,

Table 1. Recommended Equipment

Equipment
• Smith and Nephew 4.5- and 5.0-mm access cannulas
• Smith and Nephew spinal access needles
• Nitinol guidewires
• Smith and Nephew E-flex ablater
• 70° arthroscope

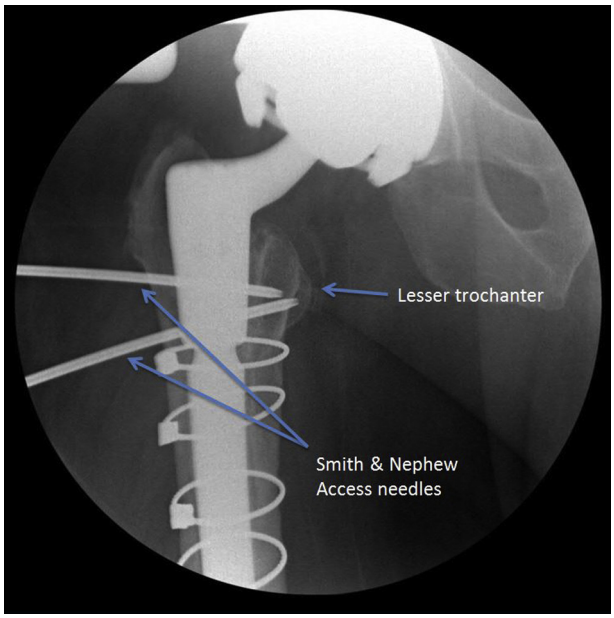

Fig 3. Right hip, supine position, traction boots with no traction, neutral rotation of the operative leg. Anterior posterior radiograph of the appropriate trajectory of Smith and Nephew access needles from both proximal and distal portals. Note that the leg is in neutral rotation at this time to prevent injury to the neurovascular structures.

Fig 4. Right hip, supine position, traction boots with no traction, external rotation of the operative leg. Once cannulas are placed and soft tissue planes have been established beneath the neurovascular structures, the hip can be flexed to 30° and maximally externally rotated bringing the lesser trochanter into view.

MA) are used with the femur in neutral rotation to localize the lesser trochanter. Fluoroscopic imaging is used to access the iliopsoas tendon at the level of the lesser trochanter (Fig 3). Once the proper trajectory of the needle is confirmed with fluoroscopy and tactile feedback, a guidewire is placed through the access needle. The 5.0-mm access cannula is then twisted into the area overlying the lesser trochanter. A second portal is now created approximately 5 cm distal to the first portal using the access needle, then a guidewire, and finally the 4.5-mm access cannula.

Once both cannulas are in place safely beneath the neurovascular structures, the hip is flexed to 30° and the foot is externally rotated to bring the lesser trochanter into view (Fig 4). Some blunt dissection with the cannula is performed up and down to clear some of the soft tissues around the iliopsoas tendon. Blunt dissection in the medial-lateral plane should be avoided to minimize risk to the neurovascular structures.

Psoas Tenotomy

A 70° arthroscope is then placed through the proximal 5.0-mm cannula and the pressure is set to 40 mm Hg. Before the initiation of inflow, the belly is palpated so a baseline of gross abdominal pressure is obtained. A 60° ablater (Smith & Nephew) is inserted through the distal 4.5-mm cannula and the iliopsoas bursa is identified and cleared off the tendon (Fig 5).

Once excellent visualization of the iliopsoas tendon is obtained, release of the iliopsoas tendon is performed while taking care to cut toward the femur (Fig 6). Previous anatomic studies have demonstrated that the average tendon diameter is 2.7 cm at the level of the lesser trochanter.[10] Because of the trajectory of instrumentation and rounded nature of the lesser trochanter, the most posterior bands can be difficult to release with the rigid ArthroCare device. The Smith and Nephew E-flex device may facilitate complete release of the more posterior tendon.

Hemostasis is achieved using the E-flex electrocautery or ArthroCare device and all fluid is evacuated using suction. Abdominal pressure is again assessed with palpation of the abdomen. If any significant increase in pressure is noted, then communication with anesthesia is critical to ensure that there are no hemodynamic signs of abdominal compartment syndrome. See Table 2 for a list of technical pearls and pitfalls for this procedure.

Rehabilitation

Postoperatively, the patient is made weight bearing as tolerated, and range of motion as tolerated. Physical therapy is used for gait training and iliopsoas stretching to ensure minimal adhesion formation.

Please see the accompanying Video 1.

Discussion

Although more technically challenging compared with open releases, arthroscopic iliopsoas release has been shown to achieve improvement in patients' symptoms after THA. Filanti et al.[14] reported a case series of 35 patients with IPI after THA with improvement in Harris hip scores from 44.1 preoperatively, to 83.2 at 24 months' follow-up from arthroscopic iliopsoas release. However, in this series of patients, the

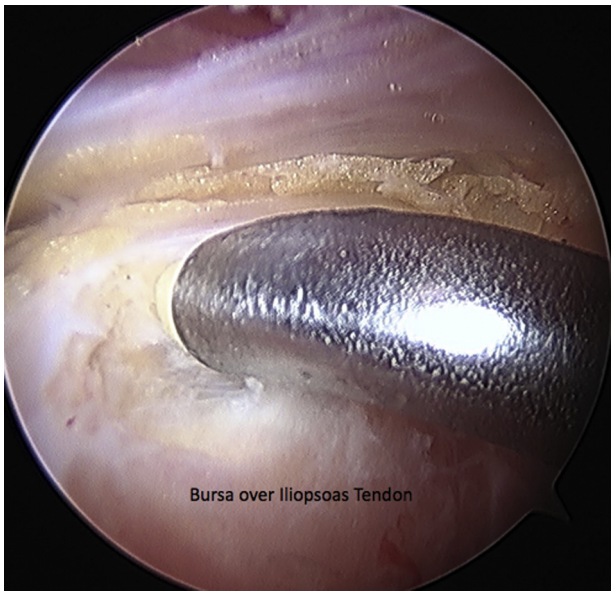

Fig 5. Right hip, supine position, traction boots with no traction, external rotation of the operative leg. Viewed from the proximal portal, shaver from the distal portal. The bursa overlying the iliopsoas tendon is removed to achieve adequate visualization of the tendon. Care is taken to shave toward the femur.

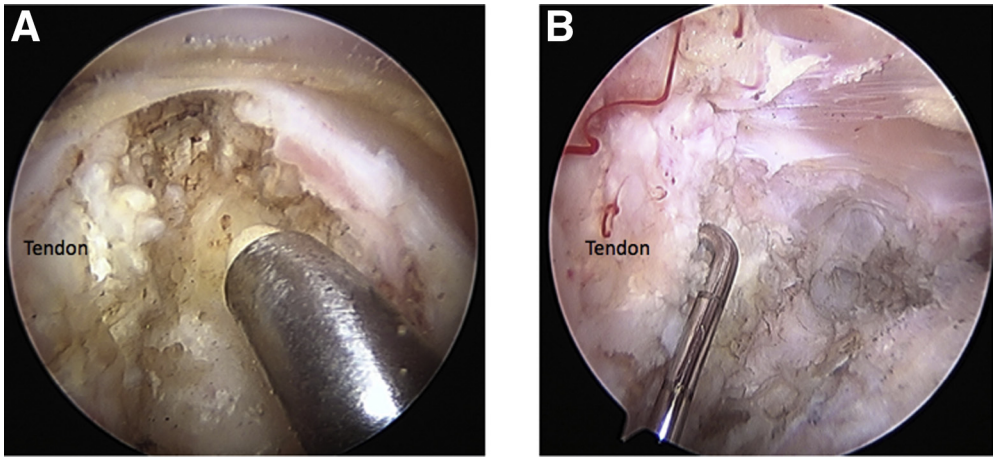

Fig 6. Right hip, supine position, traction boots with no traction, external rotation of the operative leg. Viewed from the proximal portal, shaver from the distal portal. A 60° ablater (A) can be used to perform the tenotomy (B) taking care to cut toward the femur. Probe should be used to assess complete tenotomy and measure the distance retracted.

release was performed in the central compartment requiring access to the hip joint. Ilizaliturri et al.[4] reported a randomized control trial of 19 patients who underwent iliopsoas release at either the level of the lesser trochanter, or through the peripheral compartment, and found no difference in patient outcomes, although patients in their study were not THA patients. There have been other case series that have reported improvement in symptoms after arthroscopic iliopsoas release in the central compartment after THA.[15,16]

Concerns have been raised about an increased risk of complications when a release is performed at the level of the lesser trochanter due to its proximity to the femoral neurovascular structures. Gédouin and Huten[17] reported a case series of 10 patients who underwent arthroscopic iliopsoas release at the lesser trochanter after THA. No complications were reported and 90% of patients were satisfied with their results. To minimize risk to neurovascular structures, all portals are created with the foot in relative neutral to slight internal rotation, which keeps the neurovascular bundle more medial. Once instruments are in place and the proper soft tissue tracts have been created safely, the foot is externally rotated for better visualization of the lesser trochanter and iliopsoas tendon. All portals are also started lateral to the level of the anterior superior iliac spine.

After release of the iliopsoas tendon, some postoperative weakness can be expected. Previous studies have demonstrated that with central compartment release the volume of the iliopsoas is reduced by 25% and seated hip flexion strength is decreased by 20%; however, supine hip flexion strength remains intact.[18] Previous randomized control trials have noted no difference in return of hip flexion strength and patient reported outcomes in those with release of the iliopsoas at the level of the lesser trochanter compared with the central compartment.[19] The patient can be expected to climb stairs without support approximately 8 weeks after release, regardless of the technique.[19]

The advantages of performing a release at the level of the lesser trochanter are multiple. First, there is minimal disruption and scarring of the native anatomy at this level, because most surgeons do not formally expose the lesser trochanter for routine THA. Second, entrance into the hip joint is not required.

Table 2. Pearls and Pitfalls

Technical Pearls	Pitfalls
• When creating and instrumenting portals keep the hip in neutral rotation, after soft tissue tracts are developed then externally rotate to minimize neurovascular risk	• While creating portals, blunt dissection in the medial-lateral plane with the cannula should be avoided to minimize risk to the neurovascular structures
• First portal (proximal) should be aimed approximately 1 cm above the lesser trochanter, and the second distal portal right at the top of the lesser trochanter	• Avoid external rotation of the femur before creating the proper soft tissue tracts to minimize risk to the neurovascular structures
• When portals are created, the leg is externally rotated and the hip flexed	• If the posterior iliopsoas is left intact, symptoms can continue. Ensure entire release by maximal external rotation and use of a flexible cautery
• Use the cannula to gently sweep away some of the bursal tissues for easier identification of the tendon	
• Use a cautery device and always cut toward the femur to avoid iatrogenic damage to the surrounding structure; if the most posterior area is difficult to access, use a flexible cautery	
• Assess belly pressures before turning on inflow and at the end of the case to monitor for abdominal compartment syndrome	

Table 3. Advantages and Disadvantages for Release Off the Lesser Trochanter

Advantages	Disadvantages
• More complete release. At the level of the lesser trochanter, the iliopsoas is 60% tendon, compared with 40% in the central compartment. Release of a larger portion of the tendon will allow more lengthening of the tendon and result in a lower chance of continued tendinitis • Surgically unaltered area, minimal scar tissue, so tendon identification and lengthening is simple • No disruption of static stabilizers to the hip joint, which may decrease the risk of subsequent hip instability • Does not violate the hip joint, which may decrease the risk of subsequent hip joint infection due to direct inoculation	• Approach is less familiar to hip arthroscopists as most lengthen the psoas in non-THA patients in the central or peripheral compartment • Instrumentation heading toward the neurovascular bundle, which if unfamiliar may lead to damage • More complete release, theoretically will lead to more postoperative weakness

THA, total hip arthroplasty.

Theoretically, this decreases the risk of periprosthetic joint infection and minimizes any possible iatrogenic instability from capsular penetration and release. Finally, there is a higher proportion of tendon as opposed to muscle at this level (60% tendon, 40% muscle), compared with the central compartment (40% tendon, 60% muscle), therefore allowing for a more complete release. Conversely, the central compartment may not require as much of a release because the central compartment is where the tendon is being impinged on in most cases, and so this release may be all that is required. There are possible disadvantages of this procedure: (1) it is less familiar to arthroscopists than traditional central and peripheral compartment arthroscopy, (2) a higher percentage of tendon is released, which theoretically could lead to more postoperative weakness, and (3) the risk of neurovascular compromise is theoretically higher. For a list of advantages and disadvantages of this technique of release, see Table 3.

Arthroscopic release of the iliopsoas tendon at the lesser trochanter is a safe, reproducible procedure that provides advantages compared with a release at the central compartment.

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