Lesser Trochanter Osteoplasty for Ischiofemoral Impingement

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Abstract: Ischiofemoral impingement is a newly recognized cause of extra-articular hip pain, and is caused by contact between the lesser trochanter and ischium. Surgical intervention has been proven successful for patients with persistent pain and disability after failure of nonoperative management. This technique article provides a reliable method for endoscopic lesser trochanter osteoplasty using an anterior approach.

Ischiofemoral impingement (IFI) is a rare cause of hip pain. Congenital etiologies, intertrochanteric hip fractures, and degenerative arthritis are potential causes of IFI, and usually involve superior and medial migration of the femur.\(^1\)\(^-\)\(^3\) IFI may also occur after total hip arthroplasty.\(^2\)

Patients presenting with IFI generally have a history of trauma and are more frequently female.\(^1\)\(^,\)\(^3\) The associated “snapping hip” of IFI is thought to be secondary to bursitis or interposed soft tissue, including the quadratus femoris muscle, iliopsoas tendon, or hamstring tendon.\(^3\)\(^,\)\(^4\) Pain generally radiates from the anterior groin through the inner thigh to the buttock.\(^5\) The patient may also have tenderness to palpation of the ischiofemoral space and a positive IFI test or long-stride walking test.\(^5\) The long-stride walking test provokes impingement between the lesser trochanter and the ischium.\(^6\) A thorough physical examination may also include the IFI test, which is positive with hip adduction and extension.\(^6\)

Radiographic evaluation should assess for medialization of the femoral head in the acetabulum, an increased neck-shaft angle, coxa breva, and the femoral neck and lesser trochanter versions.\(^6\) Ultrasonography may help to define narrowing of the ischiofemoral space and allow for dynamic assessment of this impingement.\(^7\) Magnetic resonance imaging (MRI) is useful for evaluating abnormalities of quadratus femoris secondary to impingement.\(^3\)\(^,\)\(^5\) Specifically, MRI allows for measurement of the ischiofemoral space and quadratus femoris space and may reveal edema of quadratus femoris (Fig 1).\(^8\) Ischiofemoral space measurements less than 22 mm and quadratus femoris space measurements less than 13.5 mm on axial MRI have been associated with IFI.\(^8\)

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The authors report the following potential conflicts of interest or sources of funding: A.C. receives consultancy fees from Arthrex. D.E.H. receives consultancy fees from Arthrex. Full ICMJE author disclosure forms are available for this article online, as supplementary material.

Received February 14, 2017; accepted June 27, 2017.

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2212-6287/17/191
http://dx.doi.org/10.1016/j.eats.2017.06.047

Arthroscopy Techniques, Vol 6, No 5 (October), 2017: pp e1755-e1760 e1755

Fig 1. T2-weighted fat-suppressed axial MRI of the pelvis with right ischiofemoral impingement. The ischiofemoral space (red line) is the smallest space between the lesser trochanter (arrow) and the ischium (arrowhead). The quadratus femoris space (blue line) is the smallest space between the iliopsoas tendon and the hamstring tendons. Edema of the quadratus femoris muscle (star) is also evident. (MRI, magnetic resonance imaging.)
Morphologically, the ischiofemoral space is the smallest distance between the lateral cortex of the ischial tuberosity and the medial aspect of the lesser trochanter. When the hip is slightly adducted, externally rotated, and extended, the lesser trochanter and the ischium are separated by an average of 20 mm. It follows that structures separating the ischium and the lesser trochanter, including the quadratus femoris and proximal hamstring tendons, may be subject to injury.

Treatment should begin with conservative management, including activity modification, anti-inflammatory medications, physical therapy, and ischiofemoral injections. Surgical management with lesser trochanter osteoplasty has been established as a successful means of treating ischiofemoral impingement. Previously described surgical management of IFI has included some degree of lesser trochanter resection, or osteoplasty, with iliopsoas tenotomy, and resultant decompression of the ischiofemoral space.

The purpose of this technique article is to provide a reproducible method for ischiofemoral space decompression using an iliopsoas release and lesser trochanter osteoplasty.

**Surgical Technique**

**Setup**

The patient is positioned supine on a regular operating room table in traction boots (Video 1). Fluoroscopy should come in from the contralateral side.

| Table 1. Technical Pearls |
|---------------------------|
| **Technical Pearls**      |
| - Run arthroscopy pump as low as possible and efficiently perform surgery to prevent retroperitoneal extravasation. |
| - Keep proximal and distal portals at least 6 cm apart to prevent hand crowding while working. |
| - Make all portals and soft tissue tracts with blunt switching sticks with the leg in neutral to slight internal rotation. |
| - Use half-pipes any time switching out instruments to preserve the original soft tissue tract. |
| - Perform chopping block technique from distal-anterior to proximal-posterior to allow adequate posterior visualization. |
| - Place the hip and knee in 30° of flexion to relax the iliopsoas and rotate the hip as needed to see the lesser trochanter to allow adequate decompression. |
| - Switch working and visualization portals if needed for adequate lesser trochanter decompression. |
| - Judge lesser trochanteric osteoplasty with a combination of several arthroscopic views from each portal and fluoroscopy in varying degrees of hip rotation. |
perpendicular to the patient, and centered over the lesser trochanter with the leg in neutral to slight internal rotation. The fluoroscopic monitors are at the foot of the bed for easy visualization by the surgeon (Fig 2).

**Access**

The surgeon draws a line from the anterior superior iliac spine to the patella. No incisions are made medial to this line to minimize the risk of harming the lateral femoral cutaneous nerve and the femoral neurovascular bundle. The greater trochanter is palpated and drawn out as well. The first incision is usually approximately 2 to 3 cm lateral to the line from the anterior superior iliac spine to the patella, and 3 to 4 cm distal to the tip of the greater trochanter (Fig 3). Prior to making the incision, the switching sticks are aligned from this pre-drawn incision to the lesser trochanter. This should make an approximately 30° angle cephalad to a line perpendicular to the skin (Fig 4). The distal incision is approximately 6 cm distal to the first incision in the same medial to lateral plane. It also should form a 30° angle caudal to a line perpendicular to the skin on its route to the lesser trochanter. Separating these incisions by several inches allows for the surgeon’s hands to avoid crowding one another (Table 1).

A small 1-cm incision is made in only the skin, and the cephalad switching stick is bluntly brought into contact with the lesser trochanter under fluoroscopic guidance. This technique is repeated with the distal incision. Once these soft tissue planes have been safely developed deep to all neurovascular structures, then the hip and knee are flexed to approximately 30° and externally rotated approximately 45°. Doing the blunt dissection prior to externally rotating the leg ensures the vital structures stay medial to the switching sticks and future instruments (Fig 5). It is important that the surgeon use half-pipes to maintain the same soft tissue tracts throughout the case. Once the bone of the lesser trochanter is gently palpated, the 70° arthroscopy camera (Smith & Nephew, Andover, MA) is placed through the proximal portal and the 45° curved shaver (Smith & Nephew) is brought through the distal portal (Table 2). The arthroscopy pump is usually placed at 40 mm Hg for flow and pressure to minimize the risk of retroperitoneal extravasation. A thorough iliopsoas bursectomy is conducted and the iliopsoas tendon and lesser trochanter can now be visualized (Fig 6).

**Iliopsoas Tenotomy and Lesser Trochanter Osteoplasty**

Using a 45° ablater, the iliopsoas tendon is tenotomized (Fig 7) and the entirety of the lesser trochanter can be visualized. More posterior access to the lesser trochanter can be attained with maximal external rotation of the hip. If sufficient posterior access is still not possible, then using an E-flex ablater...
(Smith & Nephew) should allow the surgeon to get behind the trochanter easily. Once the entire lesser trochanter is visualized (Fig 8), the osteoplasty can be undertaken.

A 5.5-mm burr is then placed through the distal portal and a chopping block technique is used from anterior-distal to posterior-proximal on the lesser trochanter with the burr. By performing this in a chopping block fashion, the anterior lesser trochanter is leveled to cortical bone, allowing the surgeon to reach the more posterior bone from the lateral starting point on the skin. Using varying degrees of external rotation, and switching viewing and working portals, should permit access to all of the lesser trochanter (Fig 9). Maximizing external rotation of the leg should help in reaching the more posterior bone. In addition, fluoroscopy is used to ensure adequate decompression of the lesser trochanter in varying degrees of rotation (Fig 10).

**Discussion**

To date, a few case series have previously described successful outcomes of endoscopic decompression for IFI. A study by Hatem et al. describes a case series of 5 patients using the posterolateral portal for endoscopic partial lesser trochanter resection. Patients in their case series had improvement in average modified Harris Hip Score from 51.3 points preoperatively to 94.2 points postoperatively.6 Howse et al.9 also report success using a posterolateral technique.

Conversely, a few recent studies have described using an anterior approach to the lesser trochanter. Wilson and Keene described a case series of 7 patients with IFI treated with anterior lesser trochanter resection with iliopsoas tenotomy. The authors reported patient improvement using a modified Harris Hip Score, improving from 43 points preoperatively to 91 points postoperatively, on average.5 Safran and Ryu, and Jo and O’Donnell also report successful lesser trochanter

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**Fig 7.** Endoscopic image (A) and fluoroscopic image (B) of a right hip with correct placement of the ablater or shaver (arrow) on the lesser trochanter with the leg in slight flexion and external rotation. This ensures that the surgeon is at the correct level for iliopsoas release and then subsequent lesser trochanter osteoplasty.

**Fig 8.** Right hip endoscopic image showing the lesser trochanter (arrow) that is prepared for osteoplasty once an iliopsoas tenotomy is completed.
resection with iliopsoas tenotomy using distal anterolateral portals, or the anterior portal, respectively, for instrumentation. An advantage of using an anterior approach to the lesser trochanter is avoidance of violating the quadratus femoris muscle (Table 3). Consequently, the anterior approach minimizes risk to the medial femoral circumflex artery and the sciatic nerve. These structures are more at risk with the posterior approach.

A potential advantage to the posterior approach is the more direct access to the lesser trochanter, particularly the posterior aspect. However, the authors believe that sufficient hip external rotation and abduction in the anterior approach allows for sufficient access. The posterior approach does allow the surgeon to assess the sciatic nerve and the hamstring tendons for concomitant pathology, but this is not usually necessary for successful treatment, as revealed with large improvements in patient-reported outcomes in small case series.

Advocates of the posterior approach maintain that this technique potentially preserves the iliopsoas attachment, and therefore avoids postoperative hip flexor weakness. One study found that iliopsoas release for snapping hip and femoroacetabular impingement reduced seated hip flexion strength by 19%. However, recent studies using the anterior approach for lesser trochanter resection and psoas release did not find residual hip flexor weakness in follow-up as long as 1 year postoperatively.

In conclusion, IFI is an increasingly recognized cause of extra-articular hip pain that may benefit from surgical management when conservative treatment has been exhausted. The authors believe that the anterior approach to a lesser trochanter osteoplasty and iliopsoas release is ideal because of decreased threat to the sciatic nerve and blood supply to the femoral head. The technique described in this article provides a reproducible means for lesser trochanter osteoplasty and iliopsoas release for IFI.

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Fig 9. Right hip endoscopic images showing the lesser trochanter (A) before and (B) after osteoplasty. The lesser trochanter (arrowhead) should be resected to the level of the surrounding cortical bone (arrow).

Fig 10. Fluoroscopic images of the right hip showing adequate resection of the lesser trochanter (arrows) with the hip in (A) external rotation and (B) neutral rotation.
Table 3. Advantages and Disadvantages of an Anterior Approach to Lesser Trochanter Osteoplasty

| Advantages | Disadvantages |
|------------|---------------|
| - Low risk to neurovascular structures (sciatic nerve, bloody supply to femoral head) | - Inability to assess hamstrings and sciatic nerve |
| - Technically simple | - Lesser trochanter is a posterior structure, so the anterior approach requires externally rotating the hip |
| - Potential to address concomitant pain generators: intra-articular pathology, iliopsoas bursitis, and coxa saltans interna | - Risk to lateral femoral cutaneous nerve and femoral neurovascular structures |
| - Easy to obtain fluoroscopic images | |

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