SUBSPECIALTY PROCEDURES

ARTHROSCOPIC ILIOPSOAS FRACTIONAL LENGTHENING

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Abstract

Background: Iliopsoas fractional lengthening (IFL) is performed on patients with symptomatic internal snapping. This condition is defined as painful and sometimes audible snapping of the iliopsoas (IP) tendon over the femoral head or iliopectineal line. Arthroscopic IFL is performed if the snapping is unresponsive to conservative treatment^{1,2}.

Description: Hip arthroscopy is performed with the patient in the supine position on a traction table. The portals used to access the joint capsule include standard anterolateral, mid-anterior, and distal anterolateral accessory (DALA) portals³. With a 70° arthroscope, diagnostic arthroscopy is conducted to assess the quality of labral tissue, acetabular and femoral cartilage surfaces, and the ligamentum teres. When indicated, supplementary procedures, such as acetabuloplasty, labral repair, or labral reconstruction⁴, are performed prior to IFL. With traction still applied, IFL is then performed from the central compartment at the level of the joint line. Exposure of the IP tendon is achieved with the use of a curved blade to extend the capsulotomy medially over the 3 o'clock position (right hip). Once the tendon can be appropriately visualized, a progressive and complete transverse cut is made in the tendinous portion, taking care to avoid the muscular portion. During this process, the anterolateral and mid-anterior portals serve as visualization and working portals, respectively⁵.

Alternatives: Prior to arthroscopic IFL for painful internal snapping, non-surgical options^{6,7} may include (1) physical therapy programs, (2) activity modification, (3) nonsteroidal anti-inflammatory drugs (NSAIDs), or (4) ultrasound-guided cortisone injections.

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Introductory Statement

Treatment of painful internal snapping syndrome or iliopsoas (IP) impingement with arthroscopic iliopsoas fractional lengthening (IFL), in the setting of femoroacetabular impingement (FAI) and labral tear, is a safe procedure with good short to mid-term follow-up results and associated improvement in patient-reported outcome scores (PROs)^{1,4,5,8,9}. Surgical management of IP impingement is typically performed arthroscopically in 1 of 2 ways: transcapsular tenotomy from the central or peripheral compartment or extracapsular tenotomy at the tendon's insertion on the lesser trochanter^{1,8,10}. The advantage of accessing the IP tendon from the central compartment is twofold: it allows the surgeon to complete concomitant intra-articular procedures, and it leaves the muscular portion of the IP intact. This technique, therefore, preserves hip flexion strength^{1,5}. Arthroscopic IFL is a minimally invasive technique with a low rate of complications that is used to treat conditions such as painful internal snapping hip and IP impingement^{1,5,11}. (Video 1).

Video 1 Demonstration of the arthroscopic iliopsoas fractional lengthening procedure.

Indications and Contraindications

Indications

- Painful internal snapping—diagnosed clinically^{5,7,12}.
- IP impingement—diagnosed by clinical pain and/or tenderness around the IP and arthroscopic finding of an IP impingement lesion⁴.

Contraindications

- No IP impingement symptoms and/or nonpainful IP snapping^{5,10}.
- Athletes whose sport involves kicking or sprinting.

Step-by-Step Description of Procedure

Step 1: Patient Positioning and Portals

Place the patient in the supine position, and—after venting the hip joint and applying traction—create the standard anterolateral, mid-anterior, and distal anterolateral accessory (DALA) portals (Fig. 1).

- Arthroscopic IFL requires no modification of typical hip arthroscopy protocols for patient positioning or portal placement.
- Place the patient in the supine position on a traction table and perform a capsulotomy from the 2 o'clock to the 9 o'clock position (right hip), connecting the anterolateral and mid-anterior portals.
- It is important to ensure that a complete capsulotomy has been performed. Proper visualization, free movement of the instruments, and further capsular management can be compromised by capsular bands that are not addressed by the surgeon during the initial capsulotomy.

Fig. 1

Fig. 1 Hip arthroscopy portals in the right hip of a patient in the supine position. The patient's head is to the left. The asterisk indicates the anterior inferior iliac spine. AL = anterolateral portal, MA = mid-anterior portal, and DALA = distal anterolateral accessory portal.

Step 2: Diagnostic Arthroscopy

As painful internal snapping hip syndrome usually presents with other pathologies, such as FAI and labral tears, be systematic in checking for other lesions.

- In a systematic way, check for ligamentum teres tears, synovitis, loose bodies, labral tears, FAI findings, acetabular and femoral head articular cartilage damage, and other pathological lesions, as they often are seen in association with snapping hip syndrome¹³⁻¹⁶ (Fig. 1).
- Also, look for the “IP impingement sign,” which is defined as injury to the labrum at the approximately 2 o’clock to 3 o’clock zone (right hip) (Fig. 2).

Fig. 2

Fig. 2 View from the anterolateral portal in the right hip with a 70° arthroscope and the probe (P) coming from the mid-anterior portal. The asterisk indicates the iliopsoas impingement sign. L = labrum, and A = acetabulum.

Step 3: Capsular Management

If labral treatment is necessary and requires rim trimming or acetabuloplasty, it is important to preserve capsular tissue, especially in patients with borderline dysplasia and/or laxity.

- Use the shaver to expose the junction between the capsule and the labrum. The surgeon should aim to remove only synovial tissue, but no capsular tissue, particularly in patients with borderline dysplasia and/or laxity¹⁷⁻²⁰.
- Radiofrequency ablation is then used to create space between the capsule and labrum, thus exposing the acetabular rim (Fig. 3).
- To improve visualization and allow for better capsular protection, use at least 1 traction stitch to hold the capsule in place during bone preparation and labral treatment.

Fig. 3

Fig. 3 View from the anterolateral portal in the right hip with a 70° arthroscope with the probe (P) coming from the distal anterolateral accessory (DALA) portal. Preservation and elevation of the capsule (C) is shown, exposing the acetabular rim (AR). L = labrum, A = acetabulum, and FH = femoral head.

Step 4: During the Learning Curve, Perform the IFL at the End of the Case After All Concomitant Procedures Have Been Completed

Perform IFL at the end of the hip arthroscopy to minimize the risk of intra-abdominal fluid extravasation, which is always a concern.

- Concomitant procedures, such as acetabular rim trimming or acetabuloplasty, labral repair or reconstruction, and femoroplasty, should be performed prior to the IFL.
- Performing IFL at the very end of the arthroscopy minimizes the risk of intra-abdominal fluid extravasation^{21,22}.

Step 5: IP Tendon Visualization

As proper visualization is critical for this procedure, fractional lengthening of the IP tendon should be performed through the central compartment at the level of the joint line, where the IP tendon is approximately 50% tendon and 50% muscle.

- Traction must still be applied during this procedure.
- Perform the fractional lengthening of the IP tendon through the central compartment at the level of the joint line, where the IP tendon is approximately 50% tendon and 50% muscle⁵.
- With a curved Beaver Blade (Smith & Nephew), carefully extend the capsulotomy medially to the 3 o'clock position (right hip). Do not extend the capsulotomy past this position.
- While still using the anterolateral portal, advance the arthroscope medially over the 3 o'clock position (right hip).
- In some cases, the IP bursa can be debrided with a shaver to improve visualization of the IP tendon, always taking care to avoid the capsule.
- Once the IP tendon is identified, use the curved Beaver Blade under direct visualization to transversely incise the IP tendon while leaving the muscular portion intact (Fig. 4).

Fig. 4

Fig. 4 View from the anterolateral portal in the right hip with a 70° arthroscope, with the curved Beaver Blade (B), which is used to transversely incise the iliopsoas (IP) tendon while leaving the muscular portion (M) intact, coming from the mid-anterior portal. C = capsule.

Step 6: Be Sure to Address Anatomical Variants Like Bifid Tendon

As anatomical variants are more common than previously thought, it is imperative to be conscious of the possibility that ≥ 2 tendon slips may be present and acknowledging this fact is one of the most important ways to prevent the need for revision procedures.

- Typically, no other maneuvers or more medial capsular extension are required to locate additional tendon slips of the IP.
- Do not take anatomy for granted. Spend sufficient time searching for additional tendons as anatomical variants are more common than previously thought, and ≥ 2 tendon slips may be present. Awareness of this fact is one of the most important ways to prevent the need for revision procedures^{23,24}.

Step 7: Perform Capsular Closure or Plication

We believe that the restoration of capsular anatomy is critical for achieving good outcomes, so appropriate capsular preservation and management become even more important during cases indicated for IFL, as this condition often presents along with ligamentous laxity or borderline acetabular dysplasia.

- Close or plicate the capsule with the hip in approximately 30° to 40° of flexion.
- Place between 3 and 6 polyglactin resorbable sutures (Vicryl 1-0; Ethicon) starting medially and proceeding laterally.
- Do not begin tying until all sutures are placed.
- After tying, gently bring the hip into extension to ensure that there is no disruption of the capsular repair.
- Restoring capsular anatomy is critical for achieving a good outcome^{15,17,18,25}; therefore, appropriate capsular preservation and management are even more important in patients indicated for IFL, as the condition often is seen with ligamentous laxity or borderline acetabular dysplasia²⁰.

Results

The senior author (B.G.D.) reported the results of IFL for the treatment of patients with FAI and painful internal snapping first with a minimum follow-up of 1 year and then with a minimum follow-up of 2 years^{4,5}. In both studies, the results showed significant improvement in all PROs between the preoperative and latest follow-up evaluations. In addition, in the 2-year follow-up study, 81.8% of the patients reported good to excellent results and had resolution of the painful internal snapping.

More recently, the senior author also reported IFL results for competitive athletes²⁶. Forty-one competitive athletes who underwent hip arthroscopy and IFL were matched in a 1:1 ratio to competitive athletes who underwent hip arthroscopy without IFL. At a minimum 2-year follow-up, both groups showed significant improvement in PROs, had high satisfaction ratings, and had high resolution rates of their symptoms. Interestingly, there were no significant differences between groups in any of these measures. However, for patients involved in sports who engage in sprinting and kicking, caution is required before proceeding with IFL.

Overall clinical outcomes from this procedure were favorable, and we continue to make use of IFL as an adjunctive procedure for patients with painful internal snapping who undergo arthroscopic surgery for labral tears and FAI.

Pitfalls & Challenges

- Preservation of the capsule is vital. Capsulotomy is always preferred over capsulectomy, as the former procedure preserves capsular tissue for subsequent repair or plication.
- Avoid extending the medial edge of the capsulotomy beyond the 3 o'clock position (right hip). If needed, visualization of the IP tendon can be achieved by placing the arthroscope superficially to the joint capsule at this location (right hip).
- IFL should involve only the tendinous portion of the IP, and muscular fibers should remain intact. Doing so results in a slight "lengthening" of the IP muscle-tendon unit.
- Surgeons must be aware of anatomical variants, such as bifid or even triple-banded IP tendons. Failure to recognize these additional tendons can result in refractory internal snapping.
- Intra-abdominal fluid extravasation can be a catastrophic complication. To minimize this risk, we recommend performing IFL at the very end of the arthroscopy, especially during the early stages of the learning curve.

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