



Arthroscopic Technique for Iliopsoas Fractional Lengthening for Symptomatic Internal Snapping of the Hip, Iliopsoas Impingement Lesion, or Both

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Abstract: Pathology of the iliopsoas may cause painful internal snapping of the hip or labral damage from soft impingement. Favorable outcomes have been reported after arthroscopic release or fractional lengthening of the iliopsoas. In patients with risk factors for instability, restoration of other soft-tissue constraints such as the labrum and capsule should be performed if iliopsoas fractional lengthening is undertaken. The purpose of this article is to detail the step-by-step surgical technique of arthroscopic iliopsoas fractional lengthening, in addition to the indications, pearls, and pitfalls of the technique.

Internal type coxa saltans or “internal snapping hip syndrome” describes snapping of the iliopsoas tendon (IT) over deeper structures within the pelvis.¹ It has been recognized as both an asymptomatic condition and a cause of debilitating mechanical groin pain.²⁻⁵ The pathophysiology of internal snapping hip syndrome is multifactorial and involves a complex interaction of the tendon with anterior structures of the hip joint, including the femoral head, iliopectineal ridge, the iliopsoas bursa, and the iliofemoral ligament.^{2,4,5} In addition, a specific pattern of labral pathologic abnormalities has been implicated as a

source of potential obstruction and generator of hip pain.⁶

Clinical features of iliopsoas impingement include groin pain and painful snapping when the hip is moved from flexion and abduction to extension and internal rotation.⁷⁻¹⁰ Nonsurgical treatments aim to lengthen the tendon through stretching routines or alleviate the pain through corticosteroid injections or anti-inflammatory medications.^{2,11-13} Surgical treatment may be necessary when nonoperative modalities fail to alleviate symptoms. Arthroscopic release of the IT performed in conjunction with other procedures treating labral tears and femoroacetabular impingement has emerged as a useful minimally invasive surgical modality in treating painful internal snapping of the hip.^{4,6-10} Complete tenotomy has been performed at the insertion site on the lesser trochanter,¹⁴ or alternatively, fractional lengthening has also been described through the central or peripheral compartments.⁹ Despite reported results of moderate success with release of the IT, there have also been reports of recurrence of symptoms¹⁰ and development of hip instability.¹⁵

The purpose of this article is to describe the surgical technique for arthroscopic fractional lengthening of the IT. The iliopsoas is an important soft-tissue stabilizer, and therefore other soft-tissue stabilizers, such as the labrum and capsule, should be restored if the iliopsoas is lengthened in patients with risk factors for hip instability (Table 1).

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Table 1. Advantages and Disadvantages

Advantages	Disadvantages/Risks/Limitations
<ul style="list-style-type: none"> • Spares anterior capsule • Avoids collateral damage to the rectus femoris muscle • Avoids collateral damage to the muscle belly of iliopsoas which may help to retain strength of hip flexion • Ability to identify and lengthen a bifid iliopsoas tendon • Relative ease of performing procedure through extension of capsulotomy medially 	<ul style="list-style-type: none"> • Potential damage to anterior hip stabilisers • Weakness of hip flexion • Increase in hip traction time • Fluid accumulation within the extraperitoneal compartment with potential for intra-abdominal compartment syndrome

Technique

Patient Setup, Portal Establishment, Arthroscopic Access to the Hip Joint, and Diagnostic Arthroscopy

The patient is placed supine on a hip traction table (Smith & Nephew Inc.) with the feet secured in well-padded boots and a large well-padded perineal post abutting the medial thigh. The operative extremity is placed in neutral abduction and slight flexion, with 15° of internal rotation of the foot. The operative extremity is prepared and draped in standard fashion. Safe access to the hip joint to minimize damage to the labrum and femoral head is performed as previously described by Domb et al.¹⁶ Anterolateral and modified anterior portals are established. A distal lateral anterior portal is established 2 cm distal to the midanterior portal to allow for suture management. A capsulotomy is performed with a beaver blade (Smith & Nephew Inc.), incising the capsule parallel to the acetabular rim from the 12 to 3 o'clock position, connecting the 2 portals. A diagnostic arthroscopy is performed consisting of a circumferential examination of the entire labrum and central compartment. Particular attention is given to patterns of injury suggestive of instability. These may include easy joint distraction with minimal force, a positive intraoperative vacuum sign, labral or ligamentum teres hypertrophy, capsular redundancy or laxity on manual probing, a weakened, thin capsule, or associated ligament tears or insufficiency.¹⁷ Intra-articular procedures to treat labral tears, ligamentum teres tears, femoroacetabular impingement, and cartilage damage are performed as indicated. At the end of the procedure, the capsule is closed or tightened through a plication as previously described by Chandrasekaran et al.¹⁸

Indications for Iliopsoas Fractional Lengthening

Indications for an iliopsoas fractional lengthening (IPFL) include painful internal snapping of the hip and/or the presence of an iliopsoas impingement lesion (IIL).²⁻⁵ An IIL is defined as a labral tear at the 3 o'clock position associated with hyperemia at the capsulolabral or chondrolabral junction (Fig 1).⁶

Technique for arthroscopic IPFL

With traction still applied, IPFL is performed through the central compartment at the level of the joint line,

where the iliopsoas is approximately 50% tendon and 50% muscle (Video 1). To expose the IT at the joint level, medial extension of capsulotomy is performed. Next, using a shaver (5-mm full radius of curvature Dyonics shaver, Smith & Nephew Inc.), the medial and lateral borders of the IT are exposed. A beaver blade (Smith & Nephew Inc.) is then used to transversely incise the IT, while leaving the muscular portion intact (Fig 2 and 3). This results in recession-type fractional lengthening of the IT. The advantage of this approach is the ease of access to the IT while performing hip arthroscopic surgery, in addition to preserving the muscular portion of the iliopsoas at the level of the joint, which would theoretically preserve hip flexion strength.

Rehabilitation

Postoperative rehabilitation for patients undergoing arthroscopic IT fractional lengthening follows the same protocol as that for all the patients undergoing hip arthroscopic surgery. The goals are to protect the repaired tissues, restore range of motion, prevent muscular inhibition or gait abnormalities, and diminish any pain or inflammation. This is done by first placing

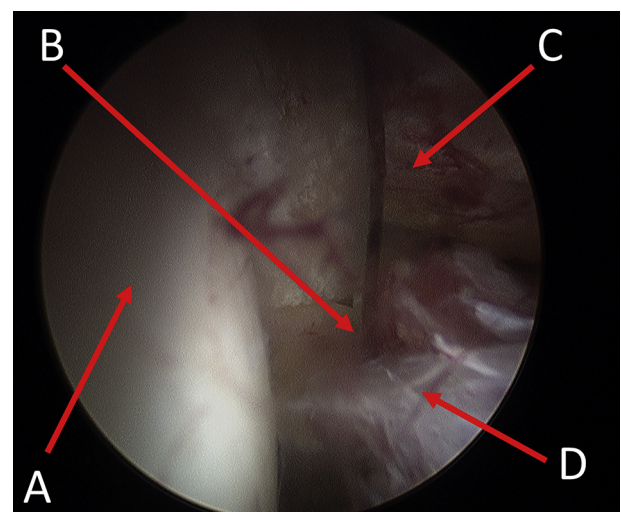


Fig 1. This is a left hip of a patient in a supine position viewing through the anterolateral portal. Iliopsoas impingement lesion at the 3 o'clock position. (A) Femoral head; (B) iliopsoas impingement lesion; (C) iliopsoas tendon; (D) labrum.

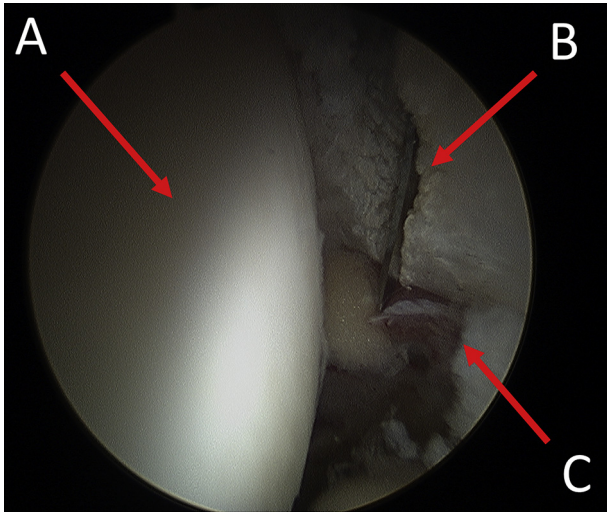


Fig 2. This is a left hip of a patient in a supine position viewing through the anterolateral portal. Identification of the iliopsoas through extension of the medial capsulotomy and debridement of the medial and lateral borders of the iliopsoas bursa with a shaver. (A) Femoral head; (B) extension of medial capsulotomy to identify iliopsoas; (C) labrum.

patients in a hip brace (DJO Global) for a minimum of 2 weeks after surgery. Patients are restricted to 20 lb of foot-flat weightbearing activity for 2 to 4 weeks. The protocol includes continuous passive motion for the first 6 weeks. Starting the first day after surgery, patients began stationary biking with a high seat (to avoid pinching) for 2 to 4 hours a day. A slow progression to full strength and activity occurred over a 3- to 4-month period.

Pearls and Pitfalls

There are technical pearls that may help prevent complications associated with fractional lengthening of the IT (Table 2). The first is to perform the IPFL at the end of central and peripheral compartment procedures. This usually requires reapplication of traction after completion of peripheral compartment procedures. This minimizes the amount of fluid extravasation from the hip joint into the peritoneal compartment. Communication between the anatomic spaces occurs with debridement of the iliopsoas bursa and is minimized if the IPFL is performed just before capsular closure or plication. Excessive fluid extravasation into the peritoneal cavity can potentially lead to an abdominal compartment syndrome.¹⁹ Second, there have been suggestions that an iliopsoas release in patients with instability may further destabilize soft-tissue constraints of the hip.^{15,20} However, in these patients, a pathologic iliopsoas may be a pain generator, and inadequate treatment of the tendon may lead to poorer outcomes. In these patients, iliopsoas release associated with minimal acetabular resection and capsular plication has been shown to provide good/excellent outcomes.²¹ An iliopsoas

release at the level of joint over as the tendon courses over the iliopectineal eminence involves a fractional lengthening of the tendon and addresses tendon dysfunction at the site of the impingement lesion.

Discussion

One of the relative indications for an iliopsoas release is painful internal snapping of the hip or coxa saltans.^{2,4,5,7-10,12} The pathomechanics of painful snapping of the hip may be explained by a combination of intrinsic changes within the iliopsoas muscle tendon unit²² and biomechanical abnormalities as the tendon crosses the iliopectineal eminence and inserts into the lesser trochanter of the femur.^{6,8,9} Intrinsic changes may involve variations in collagen and elastin structure associated with ligamentous laxity.²³ Joint disorders associated with ligamentous laxity are commonly associated with women and younger age.²³ Biomechanical abnormalities may relate to increased excursion of tendon as it passes over the iliopectineal eminence or femoral head to insert on the lesser trochanter.²⁴ The excursion may be increased with a retroverted acetabulum or increased asphericity of the femoral head.

Another relative indication for an iliopsoas release is an IIL.⁶ An IIL is characterized by labral tears and labrochondral hyperemia located at the 3-o'clock position on the acetabular clockface.⁶ Possible explanations for the pathoanatomy include a tight or inflamed IT impinging on the anterior labrum in hip extension or the IT becoming scarred or adherent to the anterior

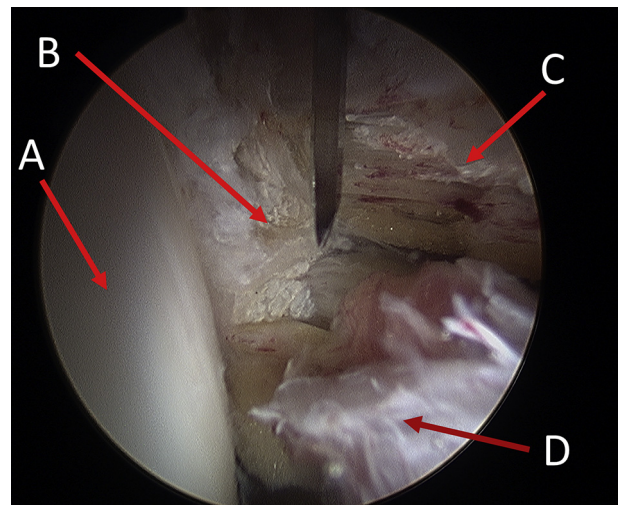


Fig 3. This is a left hip of a patient in a supine position viewing through the anterolateral portal. Iliopsoas fractional lengthening at the level of the joint line where there is 40% tendon and 60% muscle. The fractional lengthening only divides the tendinous portion leaving the muscular portion intact. (A) Femoral head; (B) tendinous portion of iliopsoas; (C) muscular portion of iliopsoas; (D) labrum.

Table 2. Pearls and Pitfalls

Pearls	Pitfalls
<ul style="list-style-type: none"> • Perform through the extension of the medial capsulotomy with the hip in traction at the musculotendinous junction of iliopsoas • Perform towards the end of the procedure to minimize fluid accumulation within the extraperitoneal space. • Repair the capsule to prevent anterior hip instability • Prevent extension and external rotation exercises for the first six weeks 	<ul style="list-style-type: none"> • Can lead to fluid accumulation within the extraperitoneal space with potential intra-abdominal compartment syndrome with prolonged traction and operative time. • Can lead to anterior instability if anterior capsule not repaired

capsulolabral complex, leading to a repetitive traction injury.⁶ The traction phenomenon at the anterior capsule labral complex may be a possible explanation for increased incidence of discontinuity at the labral articular junction. A third possible explanation for the IIL is a hyperactive iliocapsularis muscle causing labral injury by a traction phenomenon.²⁵ With respect to the last explanation, Ward et al.²⁵ first described the iliocapsularis in patients with dysplasia and theorized that the muscle acts as an anterior stabilizer by tightening the capsule, implying that it might be hypertrophied in dysplastic or unstable hips.

Patients requiring an iliopsoas release have a similar clinical profile to those presenting with atraumatic instability of the hip.²⁶⁻²⁸ This clinical entity is characterized by female sex, younger age, ligamentous laxity, increased range of motion, increased femoral anteversion, and reduced acetabular coverage.²⁶⁻²⁸ Appropriate capsular management is pivotal to restore soft-tissue stability to the hip joint²⁶ and avoid catastrophic complications.^{15,20} Capsular management may entail plication and inferior shift with sutures²⁶ or electrothermal shrinkage.²⁹

An arthroscopic IPFL at the level of the hip joint is achieved through extension of the medial capsulotomy. Theoretically, it should not reduce hip flexion strength as much as a complete tenotomy more distally. IP lengthening creates a communication between the hip joint and peritoneal cavity and fluid extravasation needs to be monitored. Restoration of labral and capsular function is important to minimize complications in patients with instability.

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