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Understanding and Treating the Snapping Hip

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Abstract

Snapping hip, or coxa saltans is a palpable or auditory snapping with movement of the hip joint. Extra-articular snapping is divided into external and internal types, and is caused laterally by the iliotibial band and anteriorly by the iliopsoas tendon. Snapping of the iliopsoas usually requires contraction of the hip flexors and may be difficult to distinguish from intra-articular coxa saltans. Ultrasound can be a useful modality to dynamically detect tendon translation during hip movement to support the diagnosis of extra-articular snapping. Coxa saltans is typically treated with conservative measures including anti-inflammatories, stretching and avoidance of inciting activities. Recalcitrant cases are treated with surgery to lengthen the iliopsoas or iliotibial band.

Coxa saltans

Coxa saltans refers to snapping hip and encompasses three main causes, extra-articular (either external or internal) or intra-articular. The most common form of coxa saltans is the external extra-articular variety which involves either the posterior iliotibial band or the anterior aspect of the gluteus maximus as they travel over the greater trochanter during hip flexion and extension or internal and external rotation. Usually, thickened portions of the posterior iliotibial band or anterior gluteus maximus tendons snap over the greater trochanter causing the catching or “giving way” sensation and inflammation of the trochanteric bursa eliciting pain (Figure 1). Due to the distinct anatomic location and often visible snapping, coxa saltans externa is often easier to diagnose. Coxa saltans externa can be one of the causes of greater trochanteric pain syndrome, which also includes greater trochanteric bursitis and strains or tendonopathy of the hip abductor mechanism. However, many patients can present with a snapping hip that does not cause pain¹.

Coxa saltans interna was originally attributed to snapping of the iliopsoas tendon over the iliopectineal eminence of the pelvis². Other mechanisms that have been proposed include accessory iliopsoas tendon slips, iliopsoas snapping over a ridge at the lesser trochanter, snapping of the iliofemoral ligament over the femoral head and subluxation of the long head of the biceps at the ischium, snapping at the anterior inferior iliac spine.^{3–6} Most commonly, it likely involves snapping of the iliopsoas tendon over the iliopectineal eminence or the

femoral head (Figure 2,3). The iliopsoas tendon can also snap over a total hip arthroplasty (THA) and may be the cause of pain after THA in up to 4.3% of patients^{7, 8}. This may be related to prominence or malposition of the acetabular component⁹.

Intra-articular causes of coxa saltans can be variable and can result in different clinical manifestations which can be intermittent. Causes include labral tears, ligamentum teres tears, loose bodies (from osteochondral or chondral fragments or conditions such as synovial chondromatosis) and even subtle instability of the joint. The sensation of snapping may be described as a clicking or catching and may reflect movement of the labral tear or loose body. Any derangement in the interior of the hip joint could theoretically cause coxa saltans.

History and Physical Examination

A careful history and physical examination will often elicit the correct diagnosis of coxa saltans and determine the correct anatomic region (external, internal or intra-articular). The patient's description of their snapping will often direct the examiner to the region of interest. Coxa saltans externa can manifest as a snapping, but often is described as a sensation that the hip dislocates. Internal snapping is described as a snapping or "getting stuck" or locking and patients often state that there is an audible component to the snapping. Intra-articular pathology is often communicated as a clicking or catching that is intermittent. Asking the patient to identify the area of snapping with one finger will almost undoubtedly indicate the anatomic region.

Evaluation of the patient's gait and muscular strength can give clues to stability and muscle imbalance. An abducted, externally rotated gait may indicate capsular laxity or instability¹⁰. Commonly weakness of the gluteus medius in conjunction with coxa saltans interna is found.

On physical examination of the snapping hip, palpation around the entire joint can often isolate the area of interest. The range of motion of the joint should be assessed, and the FAdIR (flexion, adduction and internal rotation or impingement) test can be used to assess for labral or intra-articular pathology. In the supine position, dynamic testing, starting in a position of FAbER (flexion, abduction and external rotation) to EAdIR (extension, adduction and internal rotation) will often elicit the snapping of the iliopsoas tendon. If the snapping is palpable over the anterior hip, this corroborates the diagnosis of coxa saltans interna. The Thomas test, which tests for psoas contracture is often positive, as well.

With the patient lying in the lateral position, with the affected leg up, an Ober test is used to evaluate iliotibial band tightness. Active flexion of the hip followed by passive extension and abduction can reproduce the snapping over the greater trochanter. Alternatively, having the patient stand and adduct the hip with circumduction often visibly reproduces the snapping over the greater trochanter (the authors term this as the hula-hoop test).

Radiographic Evaluation

Plain radiographs are an integral part of the assessment of hip pathology, but there is no typical radiograph findings indicative of coxa saltans interna. Evidence of femoroacetabular

impingement may exist on plain radiographs and if a cam deformity is quite large anteriorly, the iliopsoas can snap over the femoral head. Magnetic resonance imaging is rarely specific for involvement of the iliopsoas but may reveal indirect evidence of snapping with inflammation of the iliopsoas bursa or iliopsoas muscle.

Iliopsoas bursography can be conducted to confirm the diagnosis of internal snapping hip. As the bursa is filled with contrast, under fluoroscopy, the tendon can be visualized flipping back and forth. The symptoms of the snapping must be able to be reproduced while supine and under the fluoroscopy. Recently, ultrasonography has been utilized to visualize the dynamic motion of the iliopsoas tendon¹¹. The advantage of ultrasound is that it is noninvasive but it requires a skilled ultrasonographer.

The diagnosis of coxa saltans externa can be readily made clinically. The snapping of the IT band over the greater trochanter is visible and often demonstrated by the patient. If imaging is performed, a thickened IT band and focal thickening of the anterior edge of the gluteus maximus muscle could be seen on MR¹². Axial T1-weighted images best demonstrate the thickening. If the snapping is not clinically visible, dynamic sonography can be useful in detecting the movement of the IT band over the greater trochanter¹³.

Anatomy

The three muscles of the iliopsoas compartment are the iliacus, psoas major and psoas minor. The iliacus arises off of the iliac wing and inserts onto the psoas tendon and the lesser trochanter of the femur. The psoas major originates from the transverse processes of the lumbar vertebrae and the vertebral margins and tendinous arches of T12 to L5 and inserts onto the lesser trochanter of the femur. The psoas minor, which is present in about 60% of individuals arises from the bodies of T12 and L1 and inserts on the iliopectineal eminence. An additional insertion into the iliac fascia has recently been noted in 90% of hips with a psoas minor.¹⁴

The iliopsoas tendon is a musculotendinous complex made up of the main tendon arising from the psoas major, an accessory tendon from the iliacus muscle and muscular fibers of the iliacus¹⁵. The psoas tendon originates above the level of the inguinal ligament and hip joint and inserts directly onto the lesser trochanter. Occasionally, a bifid psoas tendon can be encountered^{16, 17}. The iliacus tendon has a more lateral position than the psoas major tendon and fuses progressively onto the psoas tendon. The most medial fibers of the iliacus fuse with the iliacus tendon, whereas the lateral fibers insert directly onto the lesser trochanter. Cross sectional analysis of the iliopsoas musculotendinous unit (MTU) demonstrate that at the level of the hip labrum, 40–44% of the MTU is tendon, at the level of a transcapsular release, the MTU is 53% tendon, and at the level of the lesser trochanter, the MTU is 60% tendon and 40% muscle belly¹⁸.

Lyons et al. consider the iliopectineal eminence and the anterior edge of the pelvis as a pulley for the iliopsoas muscle⁴. When the hip is extended, the increase in muscle tension causes displacement over the iliopectineal eminence. Yoshio et al. showed that the psoas tendon was in contact with the femoral head between 0–15 degrees of hip flexion and with

the iliopectineal eminence at approximately 50 degrees¹⁹. Recently, a study by El-shaar et al., demonstrated improved excursion of the iliopsoas tendon with resection of 10mm of the anterior inferior iliac spine suggesting another mechanism for snapping⁶.

The tensor fascia lata and the iliotibial band form a fibrous band that extends from the iliac crest and anterior superior iliac spine. This band extends down to the lateral knee and provides flexion, abduction, and internal rotation. The IT band moves anterior to the greater trochanter during hip flexion and posterior during hip extension.

Treatment

Conservative Therapy

The snapping hip should normally be treated conservatively. Many people experience benign, asymptomatic snapping on an infrequent basis, and for this, no treatment is necessary. If the snapping becomes symptomatic, a program of conservative management is attempted first. Physical therapy evaluation focuses on identifying the source of the muscle tightness that is causing the snapping. This tightness can be due to applying a stretch to a muscle which is too short or attempting to lengthen a muscle which is too active. If the muscle is too short, the intervention is directed at increasing muscle length through passive and active stretching. Gains with stretching are more likely to be maintained if the causes of the initial muscle shortness, such as posture and habitual movement patterns, are also addressed. If the problem is that excessive muscle activation is increasing the tension in the muscle, the intervention is directed at modifying neuromuscular control to allow muscle lengthening while still maintaining eccentric control. This failure to appropriately relax the muscle is commonly seen in patients with coxa saltans interna. In patients with coxa saltans externa, an imbalance between gluteus maximus activation and tensor fascia lata activation is often noted. Care must be taken to not exacerbate symptoms with the intervention. Rest, icing and anti-inflammatories can be helpful with inflammation of the bursal tissues.. Occasionally, injection of hydrocortisone into the bursal tissue can give symptomatic relief^{20, 21}. Under a controlled physical therapy program, it is possible to regain normal function of the hip without snapping over a period of 6 to 12 months. However, even after this, modification of movement patterns and consistent stretching are advocated to prevent recurrence.

Surgical Treatment

Painful snapping that is refractory to conservative treatment is rare. The goal of the surgery is to relax the tendon to eliminate the snapping. This can be accomplished by a fractional lengthening of the tendon or a complete release of the tendinous portion. In coxa saltans externa, various types of lengthening procedures have been described including Z-shaped release²², formal Z-lengthening²³, a cross-shaped release^{24, 25}, and release of the gluteus maximus tendon insertion to the femur²⁶. All techniques can be performed both open and arthroscopically (Figure 4).

Provencher, et al.²³ performed 9 open Z-lengthening procedure in 8 patients. All had complete resolution of their snapping hip and all but 1 returned to active military duty. A

less extensive surgical release procedure was described by White, et al.²⁵ where the IT band is lengthened by performing multiple step cuts through a 10 cm longitudinal incision through the IT band. 14 of 16 hips that were available for follow-up were asymptomatic. Two patients required a second release. Similar cross shaped release performed arthroscopically was described by Ilizaliturri et al.²⁴. They showed resolution of pain in all 11 hips with one patient having non-painful snapping.

An alternative approach was described by Polesello, et al.²⁶ where the gluteus maximus insertion onto the proximal femur was released arthroscopically. In nine hips with external snapping hip, pain and snapping resolved in 7 patients after the initial procedure and 8 patients had resolution of symptoms after a revision procedure. All eight patients returned to their previous level of activity.

In coxa saltans interna, various open and arthroscopic techniques have been described to treat snapping of the iliopsoas (Figure 5). These techniques are based upon where the tendon is believed to be snapping.

Jacobsen and Allen utilized an anterior approach to release the posteromedial tendinous portion of the iliopsoas leaving the anterior muscle intact effectively producing a lengthening of the musculotendinous unit²⁷. This is based upon the belief that the tendon was snapping anteriorly across the femoral head and capsule. The authors released 20 tendons in 18 patients yielding 85% subjective improvement, 75% of the patients had complete resolution of their snapping and 25% had some residual snapping. However, 15% of the patients had subjective weakness and 10% underwent another operation. Gruen et al. performed a fractional lengthening of the iliopsoas at the pelvic brim with 100% resolution of symptoms in 11 patients²⁸. Subjective weakness occurred in 45% of patients, however. Dobbs et al. performed a fractional lengthening of the iliopsoas at the iliopectinal eminence in 11 hips of 9 adolescent patients with only 1 recurrence and no subjective strength loss²⁹. Taylor and Clarke reported on release of the iliopsoas at the lesser trochanter using a medial approach on 16 hips in 14 patients³⁰. 57% experienced complete resolution but 14% has weakness with hip flexion above 90°.

Endoscopic release of the iliopsoas tendon has become more common. However, these results may be confounded by a concomitant hip arthroscopy. Ilizaliturri et al. reported on endoscopic release of the iliopsoas tendon in 6 patients with complete resolution of symptoms, but significant loss of flexion strength until 8 weeks after surgery³¹. Byrd also reported on endoscopic release at the lesser trochanter in 9 cases with 100% resolution of symptoms, but more than half had intra-articular hip pathology³². A small series of 6 patients by Flannum et al. showed similar results³³. Contreras et al. reported on seven patients that had endoscopic release of the psoas in the central compartment of the hip with no residual snapping or strength loss at two years postoperatively³⁴. Ilizaliturri et al. then conducted a prospective randomized study of endoscopic release of the tendon at the level of the lesser trochanter or at the level of the hip capsule and found no significant difference in either method^{35, 36}. Wettstein et al., released the psoas tendon in the peripheral compartment of the hip medial to the zona orbicularis with return of strength at 3 months³⁷. El-Bitar et al. recently showed in their series of 55 patients that 82% were improved³⁸. Fabricant et al. also

reported on the effect of femoral anteversion with anteversion greater than 25 degrees indicative of a poorer outcome following iliopsoas release³⁹. This may be due to loss of the iliopsoas as a stabilizer of the hip^{19, 39}.

Iliopsoas impingement has been described as labral injuries due to a tight iliopsoas tendon crossing the acetabular rim causing a distinct tear or bruising at the anteromedial labrum^{40–42}. Release of the tendon at this level and repair or debridement of the labrum has yielded good results at 1 year.

Complications

Persistent hip pain, continued snapping, sensory deficit of the lateral femoral cutaneous nerve, painful bursa and infection have been reported^{20, 29, 30, 33, 35, 37, 43}. Heterotopic ossification can occur and a massive case was reported by McCulloch after open iliopsoas lengthening⁴⁴. The most commonly reported complication was hip flexor weakness after iliopsoas release. A Trendelenburg gait was a reported complication following ITB lengthening²³.

Iliopsoas atrophy was seen by MRI evaluation of 20 patients who had underwent a psoas tenotomy at the level of the lesser trochanter⁴⁵. Iliacus and psoas muscle atrophy were present in 65% and 85% of the patients in the study. However, even in patients with grade 4 fatty infiltrate atrophy, clinical results were good, although discrete hip flexion strength was not tested. A discrete gap was noted on the MRI in 35% of patients, and 85% of the patients had distortion of the iliopsoas tendon more proximal to the release. More recently, Brandenburg et al. corroborated these results comparing a group of 18 patients undergoing arthroscopic psoas release and demonstrating that psoas volume by MRI and seated hip flexion strength were significantly lower at an average of 20 months post-operatively. However, other hip flexor muscles likely compensate for the psoas weakness as patient reported outcomes and function were equivalent to patients who did not undergo psoas release.

Summary

Snapping of the hip may have intra- or extra-articular causes or both. Coxa saltans externa is most commonly caused laterally by the ITB, while coxa saltans interna is caused by the iliopsoas tendon. Dynamic ultrasound may be the most useful imaging modality to detect tendon translation during hip movement. Most cases of coxa saltans resolve with conservative treatment. In recalcitrant cases, surgical lengthening or tenotomy of the tendon can provide symptomatic relief, but can have the negative consequence of muscle weakness.

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Figure 1.
Drawing of lateral anatomy. The iliotibial band, greater trochanter of the femur, gluteus maxiumus and tensor fascia lata are labelled.

Figure 2.
Drawing of anterior anatomy. The left side illustrates the muscle belly of the Iliacus and Psoas Major which form the conjoint iliopsoas tendon. The right side shows a bony prominence that may facilitate the snapping of the iliopsoas tendon during hip movement.

Figure 3.

Drawing of snapping of coxa saltans interna. As the hip moves from a position of hip flexion, abduction, and external rotation (left) to hip extension, adduction, and internal rotation (right), the iliopsoas tendon passes over the iliopectineal eminence, a potential site of coxa saltans interna.

Figure 4.

A) Intra-operative fluoroscopy with hip in internal rotation. Spinal needle is placed at the apex of the greater trochanter. Camera and arthroscopic radiofrequency device are seen at

the level of the iliotibial band. B) Arthroscopic view of a right side iliotibial band during release longitudinally with electrocautery device, Camera is in a proximal peritrochanteric portal and the electrocautery device is placed from a distal peritrochanteric portal. C) Longitudinal incision of the ITB with trochanteric bursa visible.

Figure 5.

A) Arthroscopic view a left hip with the medial labrum. Note the ecchymosis and bruising of the medial labrum. Camera is in the standard antero-lateral portal and instrument is in the mid-anterior portal. B) Medial exposure of the iliopsoas tendon at level of the rim of the acetabulum. C) Same view as Figure 5B following release of the iliopsoas