



[Athletic Training]

Extra-articular Snapping Hip: A Literature Review

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Context: *Snapping hip*, or *coxa saltans*, is a vague term used to describe palpable or auditory snapping with hip movements. As increasing attention is paid to intra-articular hip pathologies such as acetabular labral tears, it is important to be able to identify and understand the extra-articular causes of snapping hip.

Evidence Acquisition: The search terms *snapping hip* and *coxa saltans* were used in PubMed to locate suitable studies of any publication date (ending date, November 2008).

Results: Extra-articular snapping may be caused laterally by the iliotibial band or anteriorly by the iliopsoas tendon. Snapping of the iliopsoas tendon usually requires contraction of the hip flexors and may be difficult to differentiate from intra-articular causes of snapping. Dynamic ultrasound can help detect abrupt tendon translation during movement, noninvasively supporting the diagnosis of extra-articular snapping hip. The majority of cases of snapping hip resolve with conservative treatment, which includes avoidance of aggravating activities, stretching, and anti-inflammatory medication. In recalcitrant cases, surgery to lengthen the iliotibial band or the iliopsoas tendon has produced symptom relief but may result in prolonged weakness.

Conclusions: In treating active patients with snapping soft tissues around the hip, clinicians should recognize that the majority of cases resolve without surgical intervention, while being mindful of the potential for concomitant intra-articular and internal snapping hips.

Keywords: hip pain; snapping hip; coxa saltans

Snapping hip, or *coxa saltans*, is a nondescript term that includes multiple distinct disorders. A snapping hip is one that has an audible or palpable snap during movement with or without associated pain. Although snapping hip is estimated to occur in 5% to 10% of the general population,⁹ the incidence may be higher and the symptoms more limiting in dancers, soccer players, weight lifters, and runners.*

The causes of snapping hip are generally divided into 2 categories: intra-articular and extra-articular. As increasing attention is being paid to intra-articular hip pathologies such as acetabular labral tears, it is important for the clinician to be able to recognize extra-articular causes of snapping hip. Recent advances in imaging techniques, including fluoroscopy and sonography, allow for a more complete investigation of the involved structures during movement and so provide an improved understanding of snapping hip.

*References 18, 19, 21, 24, 25, 32, 37, 40, 43, 45.

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CLASSIFICATION OF SNAPPING HIP AND THE ASSOCIATED STRUCTURES

Intra-articular

Many pathologies may cause intra-articular snapping, including acetabular labral tears, cartilage defects, loose bodies, and fracture fragments.^{10,31,47} Whereas snapping, clicking, or popping may occur, patients with intra-articular pathologies are more likely to describe a catching, locking, painful clicking, or sharp stabbing sensation.^{9,18,29,46}

Extra-articular

There are 2 generally accepted forms of extra-articular snapping hip: external and internal. In the external form, the snapping occurs lateral to the hip joint, over the region of the greater trochanter, and is usually attributed to movement of the iliotibial band (ITB) over the greater trochanter.^{34,37,39}

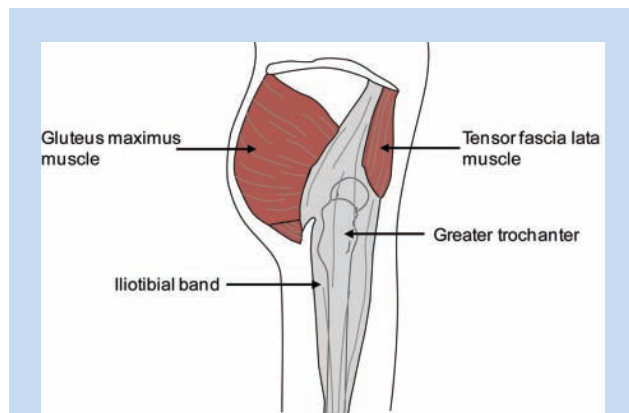


Figure 1. External snapping hip occurs lateral to the hip joint and is attributed to the abrupt movement of the iliotibial band across the greater trochanter.

The ITB has 2 major muscular components: the tensor fascia lata and the gluteus maximus (Figure 1). The tensor fascia lata originates anteriorly from the outer lip of the iliac crest, the anterior border of the ilium, and the outer surface of the anterior superior iliac spine and inserts on the ITB. The gluteus maximus originates posteriorly from the gluteal line of the ilium, the sacrospinalis tendon, and the dorsal surface of the sacrum, coccyx, and sacrotuberous ligament, and inserts on the ITB and the gluteal tuberosity of the femur. Whereas external snapping hip is usually due to the ITB, snapping of the gluteus maximus muscle itself has been noted.^{5,7,23} Thickening of the posterior aspect of the ITB or the anterior aspect of the gluteus maximus further accentuates the snapping sound.

In the internal form of snapping hip, the snap occurs in the anterior region of the hip joint and is attributed to movement of the iliopsoas tendon.⁹ Similar to the ITB, the iliopsoas tendon is the union of 2 muscles: the iliacus and the psoas major (Figure 2). The iliacus originates laterally from the superior two-thirds of the iliac fossa, the internal border of the iliac crest, and the anterior sacroiliac, lumbosacral, and iliolumbar ligaments. The psoas major originates medially from the anterior surface of transverse processes, lateral border of vertebral bodies, and corresponding intervertebral discs of T12 through L5. Whereas the psoas major inserts on the lesser trochanter solely through the iliopsoas tendon, the muscle fibers of the iliacus insert through the iliopsoas tendon and directly to the femur below the lesser trochanter.^{33,36,41} Two bony structures are commonly implicated in internal snapping hip: the anterior aspect of the femoral head and associated joint capsule and the iliopectineal eminence of the pelvic brim.^{2,9} The iliopectineal eminence, also known as the iliopectineal eminence, is the rounded elevation on the superior surface of the pelvis where the iliac and pubic bones join. Other implicated structures include the lesser trochanter¹⁹ as well as a paralabral cyst.¹⁴ A recent imaging study suggests that the snap is caused by movement of the iliacus muscle itself^{14,45} and not that

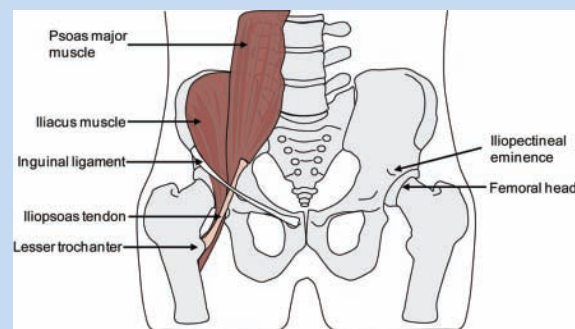


Figure 2. Internal snapping hip occurs anteriorly by abrupt movement of the iliopsoas tendon. The iliopsoas tendon, composed of the psoas major and some fibers of the iliacus muscle, inserts on the lesser trochanter. The remaining muscular fibers of the iliacus insert directly to the femur below the lesser trochanter. The 2 bony structures commonly implicated in internal snapping hip are the anterior aspect of the femoral head and joint capsule and the iliopectineal eminence of the pelvic brim.

of the iliopsoas tendon across bony structures. Using dynamic sonography, Deslandes et al observed abnormal movement of the iliacus muscle between the pubic bone and the iliopsoas tendon resulting in snapping of the tendon against the bone, when compared to the nonsnapping hip.¹⁴ Winston et al observed that the iliopsoas tendon became embedded within the muscle belly and then returned to its normal position deep to the muscle, producing a snap.⁴⁵ Deslandes et al further noted an anatomic variant that may contribute to snapping. Partial or complete bifurcation of the iliopsoas tendon was noted in 4 of 24 cadaveric hips.⁴¹ In 3 hips, a bifurcated tendon caused the snapping, with the medial head flipping over the lateral head and contacting the pubic bone.¹⁴

CLINICAL CHARACTERISTICS

Prevalence and Risk Factors

Asymptomatic snapping hip occurs in 5% to 10% of the population.⁹ However, there may be a higher incidence of snapping hip, especially painful snapping, in those who participate in activities requiring the extremes of hip motion. For example, in a survey of elite ballet dancers, more than 90% reported snaps, cracks, clicks, or dislocations, 80% of which were bilateral.⁴⁵ The specific dance moves that commonly cause snapping involve hip external rotation and abduction near or beyond 90°. This extreme range of motion may predispose to the development of snapping hip. Wahl and colleagues⁴⁴ presented 3 cases of internal snapping hip in professional athletes: 2 male football players and 1 female soccer player. In each case, the snapping developed following initiation of repetitive activities involving hip flexion beyond 90°. Snapping hip has also been reported in a number

of competitive and recreational athletes, including soccer players,^{18,21,32,43} weight lifters,¹⁸ and runners.^{19,24,25,37,40}

Snapping hip may also be related to physical trauma. Initial cases comprised patients who had a traumatic injury to the hip joint.^{5,23} In a more recent study, 3 of 11 patients with snapping hip reported a traumatic event that preceded the onset of the symptoms.¹⁸ However, the symptoms may have been present but unnoticed before the traumatic event.⁹ Snapping following trauma to the gluteus maximus from an intramuscular injection has also been reported.⁷

Larsen and Johansen²⁷ reported that patients with external snapping hip had a smaller median femoral neck angle than did controls of a similar mean age. The decreased neck angle, or coxa vara, results in shorter moment arms for the gluteus medius and minimus, making those muscles less efficient abductors. Coxa vara may therefore increase stress on the ITB and lead to external snapping.

Prior surgery has also been identified as a factor in the development of snapping hip. External snapping hip has been linked to knee reconstruction procedures that use a portion of the ITB.^{9,39} External snapping has been reported following total hip arthroplasty and has been linked to prominence of the greater trochanter, lateral placement of the prosthetic cup, or reduction in the femoral neck angle.²⁶

Sex

According to a review of case series of surgical correction for snapping hip, sex is not a significant risk factor for external snapping hip; however, more cases of internal snapping hip are reported in women than in men as early as adolescence.^{3,15,17,18,20,34,42} In a review of adolescents with internal snapping hip at 2 facilities, 12 girls were diagnosed, compared with only 3 boys.¹⁵ In the largest case series of adults, women composed 62.5% of the sample and accounted for 10 of the 12 bilateral cases.²⁰ Smaller case series report an even higher prevalence in women, ranging from 73% to 86%.^{3,17,34,42} The high number of females may be confounded by the increased prevalence of intra-articular pathologies such as acetabular labral tears and hip dysplasia in women.²⁹

DIAGNOSIS

Provocative Tests

One of the most important diagnostic indicators of snapping hip is the reproduction of the audible or palpable snap and its concurrence with pain. The movement to reproduce the symptom is somewhat dependent on the type of snapping hip. Provocation tests for external snapping hip typically include femoral rotation and/or flexion. The first descriptions of snapping were “while standing on one leg and leaning away”⁵ and “rotating.”²³ Movement tests for snapping include internally and externally rotating the extended and adducted hip,³⁷ flexing the extended hip,²¹ and extending the flexed hip.³⁴ When snapping is present during walking, externally rotating the limb may eliminate the snapping.⁴

Provocation tests for internal snapping hip generally require contraction of the iliopsoas.^{3,15,17,18,20,22,43} Interestingly, the movement that most often elicits the snap—extending the flexed hip—should not require contraction of the iliopsoas. However, because the movement is performed supine, the iliopsoas may be eccentrically contracting to control hip extension. In addition to extending the flexed hip, the provocative movement may include moving from abduction to adduction^{15,24} and/or external to internal rotation.^{24,32} One of the most commonly described tests uses a combination of all 3 movements. In this test, the leg is moved from flexion, abduction, and external rotation to extension, adduction, and internal rotation while the patient actively supports the leg.^{20,43} Snapping usually occurs between 30° and 45° of hip flexion^{4,38} and may be decreased when manual pressure is applied to the iliopsoas tendon over the pelvic brim.¹⁸

Aside from reporting the snap, patients with external snapping hip often describe a sensation of the hip subluxing or dislocating. This sensation has been termed *pseudosubluxation*⁹ and may be visually appreciated as a slight jerking movement.³⁸ Patients with external snapping hip may report difficulty climbing stairs, running, backpacking, carrying heavy loads, or playing golf.³⁷ With internal snapping hip, patients report difficulty with running, standing up from a seated position, and getting in and/or out of the car.^{18,24,42}

Imaging

The diagnosis of snapping hip is usually made from clinical examination; however, imaging has been used to rule out other pathologies, to confirm the involved structures, and to investigate tissue changes. In patients with extra-articular snapping hip, results from plain radiographs are most often normal but are helpful to rule out other pathologies.²⁹ A small femoral neck angle (coxa vara)²⁷ or developmental dysplasia^{22,37} may contribute to snapping hip.

Magnetic resonance imaging has been used to detect pathologic soft tissue changes in the involved tendon and bursa. In patients with internal snapping hip, signal hyperintensity has been noted along the iliopsoas tendon and at the musculotendinous junction.⁴³ Magnetic resonance imaging combined with arthrography is also beneficial in detecting labral pathology.^{13,28,35}

Dynamic fluoroscopic examination with contrast of the iliopsoas bursa, or iliopsoas bursography, may help detect the internal snapping hip. The contrast-filled bursa outlines the iliopsoas, allowing visualization of the tendon during hip movements.

Ultrasound has become one of the most commonly used tools for snapping hip. Ultrasound can detect bursitis, tendinitis, and synovitis.³⁴ Dynamic ultrasound can detect abrupt movement of the involved tendon. With external snapping hip, abrupt anterior movement of the ITB or gluteus maximus may occur as the hip is moved from extension to flexion¹² or flexion to extension.³⁴ With internal snapping hip, the iliopsoas tendon may move abnormally when the hip is extended from flexion, with or without abduction and external rotation.^{3,17,43,45}

Response to Anesthetic Injection

A patient's response to the injection of an anesthetic into the iliopsoas bursa or the hip joint can help identify the painful structure and distinguish between the different forms of snapping hip. The diagnosis of internal snapping hip is supported when an injection of the iliopsoas bursa provides temporary pain relief.^{1,6} Conversely, pain relief following anesthetic injection into the hip joint itself may indicate intra-articular pathology.^{10,11,16}

TREATMENT

Medical Management

Conservative medical management includes rest, avoidance of aggravating activities, and antiinflammatory medications.⁹ Injection of a local anesthetic with a corticosteroid into the involved bursa¹ or around the tendon sheath⁴⁴ has also been used.^{21,22,39,40} Flanum et al reported that 15 of 23 patients with internal snapping hip had some pain relief with an injection into the iliopsoas bursa.¹⁷ Seven of these 15 patients became symptom-free following physical therapy.

Therapeutic Intervention

The most consistent intervention is that of stretching the ITB for external snapping hip and the iliopsoas for internal snapping hip.^{15,24,37,40} Therapeutic modalities include ultrasound,⁴² ultrasound with topical corticosteroid,⁴⁰ iontophoresis,³ heat and ice,¹⁸ deep massage,¹⁸ digital pressure,²⁵ myofascial release,²⁵ and neuromuscular reeducation.²⁵ Because snapping of the iliopsoas tendon usually occurs midrange and requires active contraction of the iliopsoas, modification of muscle activity may be particularly important.^{4,38}

Surgery

Although it is difficult to precisely quantify the number of symptomatic snapping hips, the majority resolve without surgical intervention. Between 36% and 67% of patients diagnosed with snapping hip had reduction or resolution of symptoms with conservative measures.^{1,15,17,18,22,42}

External snapping. For external snapping hip, the goal of surgical intervention is usually that of lengthening the ITB. A Z-plasty of the ITB transects, transposes, and reattaches the ITB.^{8,37} Although the results of this procedure have been favorable, with resolution of snapping and complete pain relief in the majority of patients,^{8,37} a mild to moderate Trendelenburg gait is a reported complication.³⁷ For an athlete or dancer, the persistence of hip abduction weakness or Trendelenburg gait would be a significant impairment.

Ilizaliturri and colleagues²¹ recently described an endoscopic ITB release that results in a diamond-shaped defect in the band at the level of the greater trochanter. Ten of 11 patients had complete resolution of symptoms. One patient had mild snapping but no pain at the 2-year follow-up. The hip should be moved through

the motion that elicits the snap both at the beginning of the surgical procedure, to confirm the diagnosis, and at the end of the procedure, to confirm adequate lengthening or resection.^{7,21}

Internal snapping. The goal of surgical intervention for internal snapping hip is to relax the iliopsoas tendon by fractional lengthening or by complete release.^{2,20,32} Complete release of the iliopsoas tendon is performed at the level of the iliopectineal eminence, pelvic brim,^{15,18,19} or femoral head⁴⁵ or at the tendon's insertion on the lesser trochanter,^{3,9,17,19,22,42} leaving the muscular portion of the iliacus intact.^{18,19,42}

In the largest study of internal snapping, 85 patients (97 hips) underwent open fractional lengthening of the iliopsoas tendon.²⁰ Eleven continued to snap at 3 months postoperatively, and 9 had snapping return after 3 months. Other groups have reported success rates as high as 100%.^{3,9,17-19,22}

Recent studies promote the use of endoscopic or arthroscopic techniques to address internal snapping hip.^{3,6,9,17,22,44} Case series using arthroscopic techniques report a high percentage of acetabular labral tears at the time of iliopsoas release.^{3,17} In one series of 15 athletes,³ 12 had a labral tear. Abrupt movement of the iliopsoas tendon was observed sonographically in 7 of the 12 cases (58%). Similarly high rates of concurrent intra-articular and internal snapping hip have been reported in other case series.^{17,22} Dysfunction of the iliopsoas may put the hip at greater risk for a labral tear; conversely, a labral tear may increase the risk for iliopsoas dysfunction. Iliopsoas weakness increases the anteriorly directed force from the femur to the acetabulum, thereby increasing the risk of a labral tear.³⁰ Unlike external snapping hip, internal snapping is rarely reproducible at surgery. Complications reported with iliopsoas lengthening or release include persistent hip pain, anterior thigh paresthesias, partial femoral nerve palsy, hip flexor weakness, bursa formation over the lesser trochanter, heterotopic ossification, and wound infection.^{1,15,17,18,20,22,32,42,44} Of these, hip flexor weakness is the most commonly reported complication.^{17,18,22,42,44}

SUMMARY

Audible or palpable snapping of the hip may have intra- or extra-articular causes or both. Extra-articular snapping may be caused laterally by the ITB or anteriorly by the iliopsoas tendon. Snapping of the iliopsoas tendon may be difficult to differentiate from intra-articular causes of snapping, but it usually requires contraction of the iliopsoas muscle, which may be painful. Dynamic ultrasound can help detect abrupt tendon translation during hip movement. The majority of cases of snapping hip resolve with conservative treatment. In recalcitrant cases, surgery to lengthen the ITB or the iliopsoas tendon has produced symptom relief but can result in muscle weakness.

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