Coxa Saltans: The Snapping Hip Revisited

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Abstract

Coxa saltans, or "snapping hip," has several causes. These can be divided into three types: external, internal, and intra-articular. Snapping of the external type occurs when a thickened area of the posterior iliotibial band or the leading anterior edge of the gluteus maximus snaps forward over the greater trochanter with flexion of the hip. The internal type has a similar mechanism except that it is the musculotendinous iliopsoas that snaps over structures deep to it (usually the femoral head and the anterior capsule of the hip). Intra-articular snapping is due to lesions in the joint itself. Diagnosis of the external and internal types is usually made clinically. Radiography can be useful in confirming the diagnosis, particularly when bursography shows the iliopsoas tendon snapping with hip motion. Other radiologic modalities, such as computed tomography, magnetic resonance imaging, and arthrography, may also be helpful, especially when there is an intra-articular cause. Most cases of snapping hip are asymptomatic and can be treated conservatively. However, if the snapping becomes symptomatic, surgery may be necessary. There may also be a role for arthroscopy in the treatment of intra-articular lesions.

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Coxa saltans, or "snapping hip," is characterized by an audible snapping, usually with flexion and extension of the hip during exercise or simply with normal activities of daily living. It is often accompanied by pain. Most cases involve slipping of the gluteus maximus or the iliotibial tract over the greater trochanter. However, there are other causes, and confusion can arise when symptoms are due to one of these.

Causes

The causes of coxa saltans can be classified as external, internal, and intra-articular. The external type of snapping involves the greater trochanter and its overlying soft tissues. The internal type involves the musculotendinous iliopsoas as it snaps over the structures located behind it, the most common site being the femoral head.[1,2] Intra-articular lesions may be due to a variety of causes, such as synovial chondromatosis, loose bodies, fracture fragments, and labral tears, which may present a diagnostic problem for the clinician.

External Type

The external type of snapping is commonly caused by the iliotibial tract sliding over the greater trochanter. A thickening of the posterior part of the iliotibial tract or the anterior border of the gluteus maximus enhances the snapping.[1,3-6] The thickened band lies posterior to the trochanter when the hip is in extension and snaps forward over the greater trochanter with flexion, so that it comes to lie anterior to the greater trochanter.

The iliotibial tract has two major musculotendinous attachments proximally, the tensor fascia lata anteriorly and the gluteus maximus posteriorly. There is also an indirect attachment to the gluteus medius through its overlying aponeurosis.[7] These muscles pull on the iliotibial tract, making it taut whether the hip is flexed or extended. The iliotibial tract is firmly attached on its deep surface to the linea aspera and the posterior femur. Through this broad-based attachment, the three muscles gain an indirect insertion into the femur. Distally, the thickened posterior border of the iliotibial tract crosses the anterolateral aspect of the knee and inserts on the lateral tibia at Gerdy's tubercle. The anterior portion of the tract flares out into the lateral retinaculum, with some fibers attaching to the lateral patella.

Because the iliotibial tract remains taut throughout motion of the hip, not only does it act as a tension band on the lateral thigh, but

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any small anatomic change or swelling may precipitate snapping over the greater trochanter. The greater trochanteric bursa lies between the iliotibial tract and the greater trochanter, and it may become inflamed and cause pain when snapping occurs.

Internal Type

The internal type of coxa saltans was first reported from Argentina in a brief report of three cases.[6] It was postulated that the psoas tendon was slipping over the iliopectineal eminence. Following iliopsoas lengthening, good results were obtained in two of the three patients.

Studies reported from the University of Missouri pertaining to the internal type of snapping have shown that the iliacus and psoas muscles converge and fuse together as they pass through a groove between the iliopectineal eminence and the anterior inferior iliac spine.[4] The musculotendinous junction consistently occurs at the level of this osseous groove, with the bulk of the tendon being inferior to the bony pelvis. From its most lateral location, when the hip is in full flexion, abduction, and external rotation, to its most medial position, when the hip is in extension, adduction, and internal rotation, the major conjoined iliopsoas tendon remains in this groove.[1,4] However, it moves from the lateral to the medial side of the femoral head when the hip moves from flexion to extension, and it moves from the medial to the lateral side of the femoral head when the hip moves from extension to flexion (Fig. 1). In the majority of symptomatic cases of internal-type coxa saltans, it is this motion back and forth over the femoral head that causes the snapping.

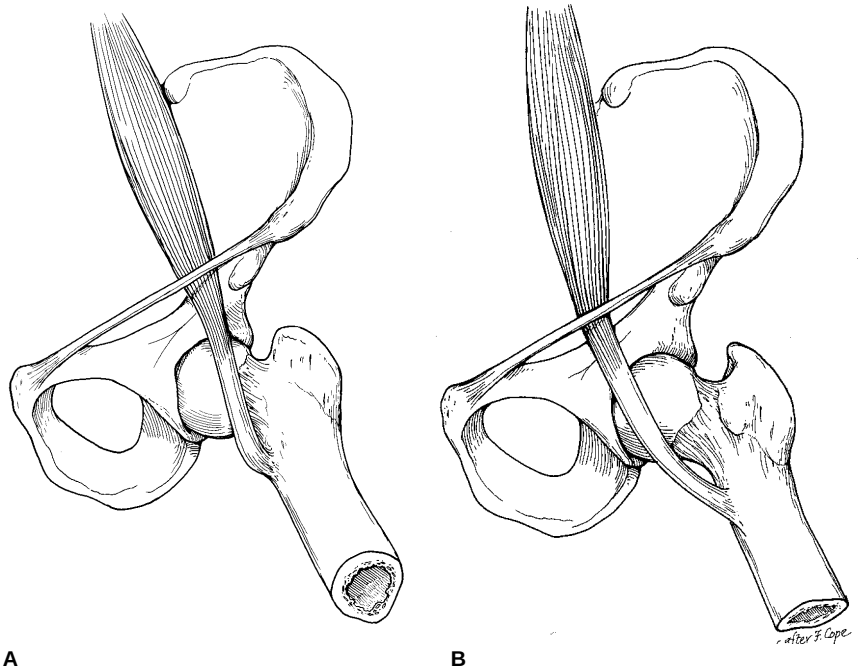

Fig. 1 **A,** With flexion of the hip, the iliopsoas tendon shifts laterally in relation to the center of the femoral head. **B,** With extension of the hip, the iliopsoas tendon shifts medially in relation to the center of the femoral head.

Other areas behind the iliopsoas that are known to cause snapping are a prominence of the iliopectineal ridge and exostoses of the lesser trochanter. In some patients, a discrete tendinous slip arises from a position superior to the bony pelvis,[4] and this slip may snap on the iliopectineal ridge.

Another cause of internal snapping is attributable to the iliopsoas bursa. The bursa has well-defined anatomic boundaries, with the musculotendinous part of the iliopsoas muscle lying anterior and the capsule of the hip joint and the iliopectineal eminence being posterior. The bursa extends medially to the iliopectineal line and laterally to the anterior inferior iliac spine. Proximally, it may extend up into the iliac fossa; distally, to the lesser trochanter. It is the largest synovial bursa in the body and can measure up to 7 cm in length and 4 cm in width.[8] The bursa and the hip joint communicate in approximately 15% of hips; this communication may be secondary to attritional changes.[4]

Intra-articular Type

If the snapping is caused by an intra-articular lesion, such as a loose body, it may occur intermittently if the loose body can lodge in the foveal area of the acetabulum or in a redundant synovial fold. Most of the intra-articular causes of snapping have a distinctive presentation and should not be confused with snapping of the external or internal type.

Tears of the acetabular labrum are included as a possible cause of snapping, but such tears far more often cause pain.[9-11] They are usually located in the posterosuperior portion of the labrum, which seems to be the most vulnerable to mechanical stress.[9] There is also an increased incidence of labral tears in dysplastic hips, which may be due to the constant increased pressure on the rim of the acetabulum.[10] In severe

trauma cases, such as a dislocation with a large tear of the labrum, actual locking may occur.

History and Physical Examination

In cases of coxa saltans of the internal and external types, the history is usually fairly diagnostic in itself. The patient will describe a snapping, painful sensation and will usually point to the area of the greater trochanter or the front of the hip. In addition, the patient will frequently volunteer to demonstrate the snapping. Questions regarding specific activities that produce the snapping will also generally guide the physician to the proper diagnosis.

Patients with intra-articular lesions usually complain of a clicking sensation rather than a snapping. Pain is generally their primary complaint. Tears of the labrum or small fracture fragments secondary to trauma are common causes. In such cases, the history will disclose that the pain was acute in onset and was associated with significant trauma. A history of trauma may also be a causative factor in the external and internal types of coxa saltans, but this is much less frequently the case. The trauma described is usually minor and may have occurred several years before the patient's presentation.

On physical examination when the internal type of coxa saltans is suspected, the examiner can frequently reproduce the snapping by having the patient lie in a supine position and then flex and extend the hip. Sometimes it helps to flex and then abduct the hip, followed by extension and adduction. If the snapping occurs with these motions, blocking the snapping by applying finger pressure over the iliopsoas tendon at the level of the femoral head will corroborate the diagnosis.

When the external type of coxa saltans is suspected, the patient is placed on his or her side with the affected leg up. The hip is then flexed actively by the patient as the examiner palpates the area of the greater trochanter so that the snapping can be felt. As in the internal type of coxa saltans, the diagnosis is corroborated if the snapping can be blocked by applying pressure at the level of the greater trochanter.

Both the internal and external types of snapping can sometimes be best reproduced by the patient when he or she is standing. This is particularly true of the external type. When this is the case, palpating the area of snapping and applying pressure just as one would do with the patient on his or her side should be done for corroboration of the diagnosis.

As noted previously, the most common form of coxa saltans involves slipping of either the anterior border of the gluteus maximus or the thickened posterior border of the iliotibial tract over the greater trochanter.[1,4,12] Patients are characteristically in their late teens or twenties at presentation; athletes and dancers[13] are frequently involved.[14] Most of the patients have pain, and if pain is present, it is invariably secondary to trochanteric bursitis.[12] This form of coxa saltans is considered to be external.

Other external causes of snapping have recently been reported. After total hip replacement, especially when a curved femoral stem has been used, snapping at the hip can occur if the placement of the femoral component is too far medial, with angulation of the stem in relation to the long axis of the femur.[15] A reduced femoral neck angle may also contribute to snapping. In both circumstances, slipping of the posterior iliotibial tract over the greater trochanter is thought to be responsible for the snapping.[15,16] Snapping has also been described after surgery for anterolateral knee instability, with the mechanism being related to alterations in the mechanics of the iliotibial tract in susceptible individuals.[17]

Other unusual causes of snapping include capsular and synovial folds, synovial chondromatosis, loose intra-articular bodies, exostoses,[12] and stenosing tenosynovitis of the iliopsoas tendon and sheath near its femoral insertion.[18,19] In children and teenagers, habitual hip dislocation may occasionally present as a snapping hip.[20,21] Slipping of the iliofemoral ligaments over the femoral head[19] and slipping of the long head of the biceps femoris tendon over the ischial tuberosity[22] have also been proposed as causes of snapping, but no pathologic or surgical basis has yet been identified.[4]

Radiologic Evaluation

There appears to be uncertainty among radiologists about how coxa saltans is best investigated. Only a single case report is available in the radiologic literature.[23] Researchers at the University of Missouri have not found plain radiographs to be useful in diagnosis, except to exclude conditions such as synovial chondromatosis and loose bodies.

A variety of plain-film measurements have been described.[16,24,25] It has been claimed that a smaller-than-normal bi-iliac width is associated with an increased degree of valgus angulation at the hip, which can lead to imbalance between hip abductors and adductors.[24,25] However, other studies have not confirmed this hypothesis and have found coxa vara to be more common in patients with snapping.[16]

Magnetic resonance imaging has not been used often. However, it may be of help in patients who have intra-articular lesions, particularly labral tears.

A diagnostic role has also been proposed for computed tomography, and comparisons of the two iliopectineal eminences have been said to provide the most valuable evidence in the internal type of snapping.[14] However, the iliopectineal eminence is involved in only a small percentage of such cases, and this study will therefore be of interest in only the occasional case. Computed tomography can be useful, however, in demonstrating the anatomy of the iliopsoas tendon.

There are a few anecdotal reports of ultrasonography being diagnostic in cases of internal snapping. Certainly, it would appear theoretically possible to demonstrate a tendinous snap with real-time ultrasound. However, allegedly successful results have not generally been reproducible, and there are, as yet, no reported cases of success with ultrasonography in this area.

Iliopsoas bursography is the definitive and single most useful procedure. It is easily performed[1,8] and, although invasive, is virtually free of complications in experienced hands.

The technique of iliopsoas bursography has been fully described.[4,8] After the usual patient preparation and draping, an 18-gauge spinal needle is placed under fluoroscopic control over the superomedial quadrant of the femoral head. With the patient under local anesthesia, the needle is advanced until bone contact is made and then is retracted 5 mm. Contrast material is then injected, defining a closed space extending from above the acetabulum and across the medial aspect of the femoral head toward the lesser trochanter.

The iliopsoas tendon is usually imaged as a filling defect seen adjacent to the opacified iliopsoas bursa (Fig. 2). If desired, the needle can be retracted further, and contrast medium can be injected directly into the iliopsoas tendon sheath. The hip should then be exercised or manipulated through a full range of movement; even better is for the patient to voluntarily snap the hip. A sudden jerking of the iliopsoas tendon, with a lateral to medial movement, is diagnostic of this form of internal snapping; this movement can be noted on the video monitor.

A B

Fig. 2 Iliopsoas bursography. **A,** A hip arthrogram was initially obtained. The spinal needle was then retracted approximately 5 mm, and the iliopsoas bursa (asterisk) was depicted. The iliopsoas tendon (arrow) was seen as a filling defect. **B,** Injection of more contrast material demonstrated the full extent of the iliopsoas bursa (asterisk). The iliopsoas tendon (arrow) was again visualized as a filling defect.

Treatment

Conservative Therapy

One should think of the snapping of the internal and external types as a normal occurrence. Many people experience benign, asymptomatic snapping on an infrequent basis, and no treatment is needed.

It is the rare individual who experiences symptomatic snapping. It usually develops over a long period of time and finally becomes painful enough for the patient to seek medical help. If the snapping is of recent onset (within the previous 6 months), is only intermittently present, and is of the external or internal variety, the best conservative treatment is rest and avoidance of those activities that produce the snapping. If the snapping has become present with routine activities and is painful, nonoperative treatment includes rest and the injection of hydrocortisone, followed by a careful exercise program that includes stretching of the involved muscles without having them snap. The vast majority of patients with a symptomatic snapping hip improve with conservative therapy.[1,12] Under a controlled program, it may be possible for the patient to regain normal use of the hip over a period of 6 to 12 months. Even after this, the patient must be careful to avoid repetitive snapping by modification of his or her exercise program or sport.

Surgical Treatment

External Type

For the exceedingly rare patient with external-type snapping who does not improve with conservative

therapy, surgery is required. In most cases, excision of the greater trochanteric bursa with Z-plasty of the iliotibial band should be performed. This procedure is explained in detail in the literature.[12,26] This form of surgery is also indicated when snapping develops after total hip replacement or an operation designed to correct knee instability.[15-17]

Internal Type

Painful internal-type snapping that is refractory to conservative, nonoperative treatment is also extremely rare. Lengthening of the posterolateral tendinous portion of the iliopsoas tendon will give good results in most cases. Postoperatively, many patients will continue to have some snapping, but almost always the pain has been eliminated and they are satisfied with the result. This procedure will be described in more detail, as it is not often found in the literature.

The surgery is done via a cosmetic groin incision extending from approximately l cm medial to the femoral pulse laterally along the inguinal crease for 8 to 10 cm. The incision crosses the femoral neurovascular bundle medially and the lateral femoral cutaneous nerve at the lateral end of the incision. The femoral artery and nerve are easily located because of the pulse. The lateral femoral cutaneous nerve, however, varies in its anatomic position somewhat as it crosses the sartorius muscle from medial to lateral approximately 2.5 cm distal to the anterior superior iliac spine. Careful dissection will allow identification of this nerve.

Starting at the medial border of the sartorius, after the nerve is found, the deep fascia is opened, paralleling the skin incision and extending medially to the femoral nerve. Care must be taken as one approaches the nerve; because it begins to arborize at this level and varies from person to person, there may be many smaller branches, which should be preserved. Because the femoral neurovascular bundle lies on the anteromedial side of the iliopsoas muscle, the tendinous portion, which is located under the muscle, should be approached from the lateral side of the muscle belly with the use of blunt dissection medial to the sartorius and then between the rectus femoris (straight head) and the muscle belly of the iliacus. The conjoint tendon of the iliopsoas is exposed by turning the iliacus medially. As the tendon is followed distally, the surgeon can feel the insertion of the tendon on the lesser tuberosity. If spurs or exostoses on the lesser tuberosity that could be causing the snapping are detected, they should be removed with an osteotome or a rongeur.

The tendon is then partially released about 2 cm proximal to the lesser tuberosity. In this distal tenotomy, approximately 50% of the tendon is cut through. Three or four transverse incisions, approximately 2 cm apart, are then made in the tendon. The most proximal tenotomy is at the level of the superior portion of the femoral head, which is easily felt in the base of the wound through its capsule. When the musculotendinous portion of the muscle is reached, as one moves proximally, the tendinous portion is entirely released so that continuity of the iliopsoas is through the muscle fibers and the investing structures anteriorly. The tendinous portion of the muscle-tendon unit lies posteriorly. The femoral nerve and vessels lie anterior to the muscle and are thus protected as long as just the tendinous portion is released.

After the tenotomies, small blood vessels are coagulated as needed, and the deep fascia is closed with interrupted sutures. A subcuticular closure is performed. No drains are used, and a compressive dressing is applied. The procedure is usually done with the patient under general anesthesia in an outpatient surgery unit, and the patient is discharged the day of surgery.

Intra-articular Type

For patients with intra-articular lesions, arthroscopy is being done to remove loose bodies or to resect tears of the labrum.[9,10] We have not had experience with hip arthroscopy because so few patients need this procedure. Large loose bodies or synovial chondromatosis may warrant an open approach to the hip to remove the mechanical impediment they produce.

Summary

The causes of coxa saltans can be classified as external, internal, and intra-articular. In the external variety, a thickened area of the posterior iliotibial band or the leading anterior edge of the gluteus maximus snaps forward over the greater trochanter with flexion of the hip. The mechanism of the internal variety is similar except that it is the musculotendinous iliopsoas that snaps over the structures deep to it (in most cases, the femoral head and the anterior capsule of the hip). Intra-articular conditions that can cause mechanical snaps in the joint include synovial chondromatosis, loose bodies, fracture fragments, and labral tears.

The diagnosis can usually be made clinically if coxa saltans is of the external or internal type. Radiography, particularly iliopsoas bursography, can be useful in confirming the diagnosis. Computed tomography, magnetic resonance imaging, and arthrography may also be helpful, particularly when there is an intra-articular cause.

The vast majority of patients with snapping hip can be treated conser-

vatively. However, surgery may be indicated if the condition becomes chronically symptomatic. Arthroscopy may prove useful in the treatment of intra-articular lesions that are causing discomfort.

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