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External coxa saltans (snapping hip) treated with active release techniques®: a case report

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Background: *The presence of painful coxa saltans (snapping hip) can be a debilitating injury for a competitive athlete, hindering both training, and performance. Considering the various potential etiologies, it often poses a diagnostic and management dilemma for health care practitioners and the success of treatment is often dependent on the practitioner's precise understanding of the cause. Although it is suggested by various authors that conservative therapy should be attempted before considering surgical management, little is known in terms of the most effective modes of manual therapy that should be attempted.*

Case Presentation*: A case of chronic, external coxa saltans in a 16 year old competitive dancer treated with Active Release Techniques® is presented. The clinical presentation, differential diagnosis, management and rehabilitation of the case are discussed.*

Conclusion: *Active Release Techniques®, or ART, is a soft tissue treatment method that focuses on relieving tissue tension via the removal of fibrosis/adhesion that develops in tissue that is overloaded with repetitive use. In this case of external coxa saltans, the underlying cause of the condition was increased tissue tension leading to increased friction of the proximal Iliotibial band (ITB) complex over the greater trochanter. Utilizing ART resulted in a complete resolution of this athlete's symptoms and may be a good treatment option for external coax saltans.*
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Historique : Avoir des hanches à ressort (coxa saltans) peut s'avérer une expérience douloureuse et une lésion débilitante pour un athlète de compétition, nuisant tant à son entraînement qu'à sa performance. Tenant compte des diverses étiologies possibles, cette condition souvent pose un problème de diagnostic et un dilemme de gestion pour les professionnels de la santé et la réussite d'un traitement dépend souvent de la connaissance précise du médecin traitant cette affection. Bien que plusieurs auteurs suggèrent qu'on procède en premier lieu à une thérapie conventionnelle avant d'envisager une chirurgie, on en sait très peu sur les traitements manuels les plus efficaces qui pourraient être expérimentés.

Présentation du cas : On présente le cas d'une jeune danseuse de compétition, âgée de 16 ans, souffrant d'un problème chronique de hanches à ressort externes, traitée avec la méthode Active Release Technique®. On discute de la présentation clinique, d'un diagnostic différentiel, de la gestion du cas et du rétablissement.
Conclusion : Active Release Technique® ou ART est une méthode de traitement des tissus mous qui est axée sur le soulagement de la tension exercée sur les tissus en procédant à l'élimination de la fibrose/adhésion qui se développe dans les tissus en raison de l'accumulation de mouvements répétitifs. Dans le cas des hanches à ressort externes, la cause sous-jacente de la condition était l'accroissement de la tension des tissus menant à l'augmentation de la friction du système de la bandelette de Maissiat proximal sur le grand trochanter. Le recours

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à l'ART a permis de résoudre complètement les symptômes de l'athlète et pourrait s'avérer un bon traitement pour les hanches à ressort externes.
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KEY WORDS: coxa saltans, hip, Active Release Technique.

MOTS CLÉS : coxa saltans, hanche, Active Release Technique.

Introduction

Injuries to the hip and pelvis represent approximately 5% to 6% of adult athletic injuries. The most common athletes to be affected are ballet dancers, runners, and soccer players.[1] The specific prevalence of Coxa Saltans has not been reported relative to other hip disorders, and is it not considered a common cause of hip problems.[2] Coxa Saltans, or snapping hip syndrome is an entity that describes an audible and/or palpable snap about the hip that is sometimes accompanied by pain.[2] The painful, snapping hip often presents as a diagnostic dilemma for practitioners due to the many potential etiologies. As a result, the success of treatment is dependent on the practitioners understanding of the precise cause.

The multiple potential etiologies for this group of conditions can be simplified into three main categories; internal, intraarticular, or external causes.[2,3,4,5] Pathology related to the iliopsoas tendon is most often implicated as the source of the internal snapping hip. The snapping is as a result of the iliopsoas tendon snapping over structures just deep to it that may include the femoral head, iliopectineal eminence, and lesser trochanter.[5] Another suggested possibility is the iliofemoral ligaments moving over the anterior hip capsule.[6] Intra-articular snapping can occur as a result of synovial chondromatosis, labral tears, fracture fragments or loose bodies, and idiopathic hip instability.[2,3,4,5] It has been reported that the most common of the three categories is the external snapping hip, which involves structures external to the hip joint.[7] Possibilities include snapping of the proximal hamstring tendon over the ischial tuberosity, or more commonly, snapping of the iliotibial band, fascia latae, gluteus maximus, or a combination of the aforementioned, over the greater trochanter.[5,8,9,10] The later situation alludes to a derangement in the functional relationship between the posterior iliotibial band (ITB), or the anterior aspect of the gluteus maximus muscle as it travels over the greater trochanter during flexion and extension of the hip joint.[5,6]

The low prevalence and variable causes of snapping hip syndrome can lead to difficulties in creating optimal treatment plans.[2] Several authors suggest that non-operative management be attempted first. These conservative treatments include rest, avoiding movements that provoke snapping, oral nonsteroidal anti-inflammatory medication, stretching, and injections into the trochanteric bursa.[2,4,7] Still little guidance can be found in the literature regarding an optimum conservative plan of management, or the most effective treatment methods.

A case is presented to illustrate the diagnosis, and treatment of external Coxa Saltans in an elite dancer using Active Release Techniques® soft tissue management system.

Case Report

A 16-year-old elite dancer presented with a two-year complaint of an audible "snapping noise" that was accompanied by right lateral hip pain. The noise and discomfort were noticed both during training sessions and competition. She rated the pain as 4/10 on the numeric pain scale where "0" represents no pain, and 10 represents severe incapacitating pain.[11] However she was more concerned of being limited in her ability to train and perform. The patient had no recollection of any specific initiating event and attributed the pain to her heavy training regimen. Past treatments have included 1 year of chiropractic manipulation directed at the hip and low back (approximately 2–3 times per week), as well as some general stretching (hip flexors, ITB, hamstring) and strengthening exercises. The patient described the treatments as having little to no benefit. Just prior to the time of her presentation her medical doctor had ordered radiographs, which were read as unremarkable.

Observation revealed bilateral genu valgum accompa-

Figure 1a *Starting position for the side lying test for external coxa saltans. Lying with the unaffected side down, the affected hip is passively adducted, then moved from full extension, to 90 degrees of flexion.*

Figure 1b *Ending position. As the ITB complex travels over the greater trochanter, the practitioner palpates for a click/snapping.*

nied by bilateral subtalar over-pronation. Examination of ranges of motion of the lumbar spine, hip, knee and ankle joints was pain free and symmetrical. Assessment for a possible labral tear was performed with the patient supine. The hip was passively flexed to its extreme range with the knee bent combined with rotation in both directions. No painful clicking or locking was discovered. Manual muscle testing revealed decreased strength in abduction in the symptomatic leg when compared to the contra-lateral side. When asked to passively abduct the right leg from a side lying position, the patient's hip rotated posteriorly as the tensor fascia lata (TFL) appeared to substitute for the abductors in performing the movement. While side lying with the unaffected side down, the affected hip was passively adducted, then moved from full extension, to 90 degrees of flexion, and then returned [see figure 1]. As the ITB complex traveled over the greater trochanter, an audible and palpable click was discovered. The patient reported that her symptoms were reproduced while performing this maneuver.

Palpation of the soft tissues structures in the pelvis revealed tender areas of nodular consistency in the posterior fibers of the right gluteus medius. Tenderness was also found over the greater trochanter. Palpable tissue tension was discovered in the complex of the tensor fascia latae, iliotibial band, lateral aspect of gluteus maximus, as well as the fascia latae along the lateral aspect of the right femur. On the medial side of the right thigh, pain on palpation of the adductor longus, brevis, magnus, and gracilis was also noted.

Video analysis of both walking and jogging gait was performed on a treadmill. This revealed an increased amount of hip adduction during the stance phase of the involved leg along with a lowering of the contralateral pelvis. This caused the ipsilateral hip to adduct past the midline on heel strike. Analysis also demonstrated an increased valgus posture of the ipsilateral knee during weight bearing.

The diagnosis of external coxa saltans (external snapping hip) due to snapping of the gluteus maximus and ITB over the greater trochanter was made. The patient was treated with Active Release Techniques® applied to the lateral hip complex including the TFL, gluteus medius and maximus, the entire ITB, and fascia latae. The adductors of the ipsilateral limb were also treated including the adductor longus, brevis, and magnus, as well as the gracilis. The intended purpose of this treatment was to decrease tissue tension as well as to normalize tissue function. The patient reported a pain reduction of 50% upon her return after the first visit. After her fourth visit

Figure 2a *Start position for hip hiking exercise.*

Figure 2b *Ending position for hip hiking exercise.*

(separated by a day in between each), the patient reported a 100% resolution of pain. The non-painful snapping was still present at this time; however the patient felt that the number of occurrences was noticeably reduced.

At this time a lateral pelvic stability program was initiated in order to correct the findings of decreased abduction strength, and faulty pelvic abduction firing pattern (TFL substitution). These findings were believed to be perpetuating the development of fibrosis by increasing friction between the lateral ITB complex and the greater trochanter. This was based on the hypothesis that decreased hip abductor strength/dysfunction was leading to an increase in hip adduction and internal rotation during weight bearing activity placing the ITB complex under increased tension. The patient was placed on a supervised lateral pelvic stability program that included a total of 4 training sessions once per week, as well as a daily exercise regimen. The in-house sessions included Russian stim (EMS) of the gluteus medius during resisted abduction, as well as straight leg abduction with manual biofeedback. The biofeedback was accomplished by the practitioner manually palpating the gluteus group while prompting the patient to contract the designated muscles. The intent was to facilitate the activation of the lateral gluteus musculature to provide some proprioceptive neuromuscular feed back to the central nervous system in attempts to recreate proper cortical motor programs. Lateral wobble board training was also used progressing from double leg to single leg stances while being manually challenged by pushing the pelvis in random directions. Home exercises included resisted lateral walking with Theraband, and hip hiking using the symptomatic side [see figure 2].

Upon completion of the described rehabilitation, the patient reported a complete resolution of the snapping. The athlete's hip had remained asymptomatic at a one year follow-up.

Discussion

The ITB is a long, non-elastic collagen (fascial) structure that crosses both the hip and knee joints on the lateral thigh.[12] The structure originates proximally from the iliac crest; it is then joined by the collective fascia of the gluteus maximus posteriorly, the tensor fascia latae anteriorly, and indirectly from the fascia of the gluteus medius (see figure 3).[7,8,9,10,12] Deeply, this structure inserts to the linea aspera of the femur and into the lateral aspect of the tibia at Gerdy's tubercle, with some anterior fibers attaching to the lateral retinaculum and patella. The complex origin and insertion of this structure allows it to be taut during all motions of the hip. Any increase in this tension combined with repetitive motion can result in increased friction over the greater trochanter that may result in irritation and inflammation of the trochanteric bursa, as well as chronic degenerative changes with associated fibrosis.[7,9] Chronic fibrosis can lead to an increased thicken-

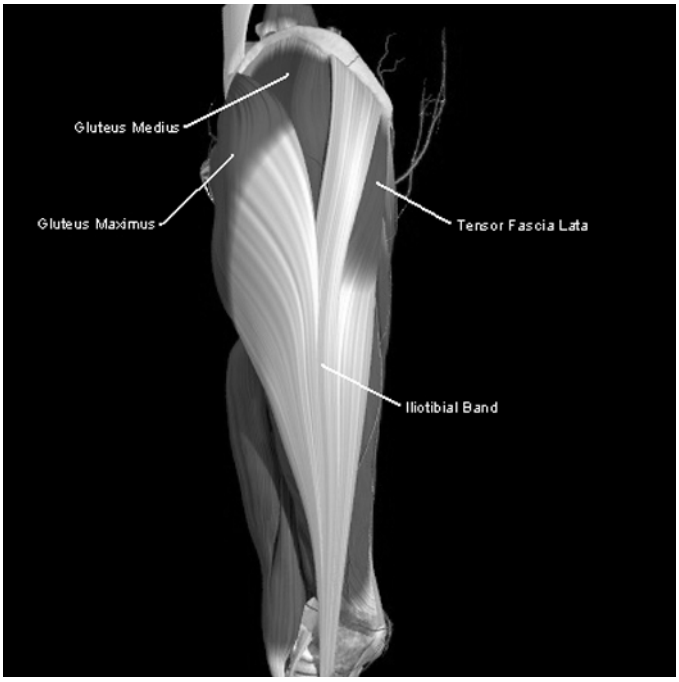

Figure 3 ITB *complex – published with permission – Primal Pictures © www.primalpictures.com*

ing of the fascia, which in turn may cause the gluteus maximus, TFL, ITB, fascia latae "complex" to snap over the greater trochanter during certain movements thus leading to the development of external coxa saltans.[4,6,8] There are various biomechanical causes that can lead to this increased tension, some of which include femoral retro or anteversion, internal tibial torsion (which can be the result of over pronation), excessive foot pronation, and an ipsilateral long leg.[12]

The biomechanics of the ITB's pull becomes even more complicated when locomotion is involved. Investigators have examined the effects of weak lateral hip muscles on this complex. Trendelenberg was the first to describe contra lateral hip drop upon weight bearing (and during gait) which indicated an ipsilateral gluteus medius weakness. He concluded that the lateral leg stability was solely maintained by the tensile strength of the ITB with its multiple origins and attachments.[13] While the gluteus medius and tensor fascia latae are both hip abductors, the gluteus medius (especially the posterior aspect) is also an external rotator of the hip.[14] It is felt that weakness in the gluteus medius leads to decreased control of hip abduction and internal rotation. Subsequently, while running the patient will demonstrate increased hip adduction and internal rotation with an increased valgus vector at the knee.[15] Recall that in our patient this increased hip abduction (along with lateral deviation of the pelvis) was noticed during ipsilateral stance phase. It is postulated that this places the ITB complex under increased tension and makes it more prone to impingement and increased friction on both the greater trochanter of the femur as well as the lateral epicondyle of the femur.[15]

In order to correct this increased lateral friction, many surgical techniques have been proposed. Each of these procedures has had varying degrees of success and differs in terms of degrees of difficulty.[2,7,9] Previously described operative techniques include Z-plasty, diagonal osteotomy of trochanter, anchoring of the iliotibial tract to the trochanter, cruciate incision with sutured flaps to the tract, resection of the posterior half of the tract at the gluteus maximus insertion, and ellipsoid resection of tract over the trochanter.[2] Most of the above procedures attempt to decrease the tension of the ITB complex over the greater trochanter. Still, authors agree that the initial course of therapy should be conservative.[2,4,7] Although various treatment options have been suggested, there is no evidence that any one therapy is more beneficial than others.

Active Release Technique® (ART) is a method of addressing soft tissue lesions and dysfunction acquired through the repetitive physical activity. Leahy proposed a mechanism to explain increased tissue stiffness, or tension, called the cumulative injury cycle.[16] In this cycle, repetitive micro-injury in tight muscles leads to an increase in the friction and tension within the myofascial structures. This tension leads either to decreased circulation to the tissue in what is termed the "chronic cycle", or it leads to the "inflammation cycle" whereby a tear or crush injury ensues, followed by inflammation. Both of these cycles lead to the same result: an accumulation of adhesions and fibrosis within the tissue. These adhesions then act to increase the tension and stiffness of the tissue. As such, the cumulative injury cycle is self-perpetuating and as this downward spiral continues, the symptoms and syndromes of cumulative injury disorder are produced. It is the goal of ART® to remove these "adhesions" thereby decreasing tissue tension, and thus stopping the cumulative injury cycle.

The involved tissue is taken from a shortened position to a fully lengthened position while a contact hand holds tension longitudinally along the soft tissue fibers and the lesion. The effectiveness of this treatment method has been described in a variety of case reports and is utilized by many practitioners for the treatment of a variety of conditions involving soft tissue dysfunction.[17,18,19,20,21,22,23] As well, a preliminary report on the use of ART® for a variety of upper extremity overuse syndromes found a 71% efficacy rate.[24] It should be noted that the best management techniques will fall short if the evaluation is not thorough enough to delineate the exact deficits.[12] In our case, while the pain symptoms were eliminated, and the soft tissue dysfunction corrected using the technique, complete resolution necessitated a comprehensive rehabilitation protocol aimed at correcting the deficiencies in pelvic stability.

Conclusion

When compared to other hip conditions, coxa saltans is considered an uncommon cause of hip pain and dysfunction.[2] However in athletes who perform repetitive motions such as competitive dancers, the snapping may become symptomatic leading to debilitating pain and weakness.[4] In the case of internal, intraarticular, or the most common external snapping hip, little guidance is provided in the scientific literature with regards to the optimal treatment aside from the suggestion that "conservative therapy" should be attempted before the surgical route is considered. Often the manual practitioner is left to experiment with various treatment modalities to attempt to resolve the patient's condition. Active Release Techniques® is one such modality. It focuses on relieving tissue tension via the removal of fibrosis/adhesion that develops in tissue that is overloaded via repetitive use. In this case of external coxa saltans, the underlying cause of the condition was increased tissue tension leading to increased friction of the proximal ITB complex over the greater trochanter. An attempt at resolving the condition using ART®, in conjunction with a specific rehabilitation protocol aimed at correcting the contributing pelvic muscle imbalance findings made sense from both a biomechanical and histological perspective. Clearly more research in ART® is needed in order to demonstrate its pathophysiologic and histological mechanisms, as well as its clinical usefulness.

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