[Athletic Training]

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Lateral Hip Pain in an Athletic Population: Differential Diagnosis and Treatment Options

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Context: Historically, the term *greater trochanteric pain syndrome* has been used to describe a spectrum of conditions that cause lateral-sided hip pain, including greater trochanteric bursitis, snapping iliotibial band, and/or strains or tendinopathy of the abductor mechanism. Diagnosis of these conditions may be difficult because clinical presentations are variable and sometimes inconclusive. Especially difficult is differentiating intrinsic pain from pain referred to the greater trochanteric region. The purposes of this article are to review the relevant anatomy and pathophysiology of the lateral hip.

Evidence Acquisition: Data were collected through a thorough review of the literature conducted through a MEDLINE search of all relevant papers between 1980 and January 2010.

Results: Recent advances in imaging and an improved understanding of pathomechanics have helped to guide the evaluation, diagnosis, and appropriate treatment for patients presenting with lateral hip pain.

Conclusion: Various diagnostic tools and treatment modalities can be used to effectively manage the athletic patient presenting with lateral hip pain.

Keywords: lateral hip pain; greater trochanteric bursitis; coxa saltans; snapping iliotibial band; snapping hip; gluteus medius; gluteus minimus

Hip injuries create diagnostic and therapeutic challenges. Though not as common as injuries to the knee or shoulder, hip injuries in the athletic population have recently received much attention. Athletes—particularly, those participating in running, soccer, and dancing—are at risk for a hip injury.[42] Therefore, it is important for the entire health care team to recognize and appropriately treat these injuries. Advances in physical examination techniques and imaging[3,9,18,30,36,50] have improved our ability to understand the pathophysiology of hip disorders, which allows for a more disease-specific treatment regimen. Although many hip conditions may be adequately treated with conservative measures, recent advances in minimally invasive surgical techniques have allowed for reliable intervention and potentially quicker return to play in patients with conditions that have been refractory to conservative care.†

The recognition of hip injury in the athletic population is still advancing. As such, there is no clear classification system for the numerous hip pathologies. Therefore, hip pain can be classified in a variety of ways,[32,45] including overall location (anterior, posterior, lateral, medial/groin), location about the joint (intra-articular, extra-articular), or onset (acute/traumatic, insidious). These classification schemes may be confounded by associated pathology potentially referred to the hip joint, such as intra-abdominal, knee, or lumbar spine pain. The treating health care provider should be cognizant of these pathologies as a potential source for so-called hip pain.

Overall, improvements in the understanding of hip anatomy, pathophysiology, and treatment options have enabled the health care team to better diagnosis athletic hip injuries and select patients for appropriate treatment.[44]

STRUCTURAL AND FUNCTIONAL ANATOMY

The hip joint withstands loads up to 6 to 8 times body weight during normal walking or jogging.[46] The substantial force makes this joint prone to injury during athletic maneuvers. The hip joint is composed of a complex interaction of skeletal and soft connective tissue.[37] The acetabulum and femoral head articulate to form a spheroidal multiaxial ball-and-socket joint. The hip labrum[3] and

†References 8, 10, 16, 24, 27, 29, 33, 39, 43, 47, 51.

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One or more authors has declared a potential conflict of interest: Shane J. Nho and Charles A. Bush-Joseph have received research and institutional support from Arthrex, Smith & Nephew, Livatec, Miomed, Athletico, DJ Ortho.

DOI: 10.1177/1941738110366829

a group of ligaments[17] form a fibrous capsulolabral structure that supports the femoral-acetabular articulation. Similar to the shoulder, the hip joint has static ligamentous restraints, which include the iliofemoral and pubofemoral ligaments anteriorly and the ischiofemoral ligament posteriorly. These ligaments serve as a checkrein to joint motion and afford joint stability.

The muscles that surround the hip joint include the hip flexors, extensors, adductors, abductors, and external and internal rotators (see Table 1 from Frank et al,[12] see page 238 in this issue). The iliopsoas[36] is responsible for hip flexion, and the gluteal muscles[2,38] extend the hip (maximus) and are responsible for abduction (minimus and medius), internal rotation (minimus), and external rotation (maximus). The gluteal muscles are particularly important when assessing lateral hip pain because strain, tearing, or degeneration of these muscles or their respective tendons is often responsible for lateral-sided symptoms. The insertion and anatomy explain the pathomechanics of gluteus medius syndrome.[38,39] In brief, the tendon inserts on 2 greater trochanter sites—the lateral facet and the superoposterior facet—with the insertion onto the lateral facet having a larger area of insertion.[38] In addition, the tensor fascia lata muscle and associated iliotibial (IT) band form a large fibrous band that extends from the iliac crest and anterior superior iliac spine to the lateral knee, providing flexion, abduction, and internal rotation. The IT band moves anterior to the greater trochanter during hip flexion and posterior during hip extension but is taut throughout range of motion.

The hip is spheroidal and deepened by the labrum, which has a poor vascular supply, especially in zone II (articular side), and thus implications when selecting the appropriate treatment option for tears to this region.[26] Intra-articular pathology often manifests as anterior hip/groin pain owing to the innervation of the hip capsule.[31] The majority of the articular hip is innervated by the femoral and obturator nerves, both of which have anterior/medial innervation and radiation patterns. Therefore, most intra-articular conditions radiate to the anterior groin, whereas the majority of extra-articular conditions radiate to the lateral or posterior aspects of the hip.[28,31] Lateral hip pain from injuries is often chronic[20] (due to overuse) and may therefore be frustrating for the athlete.

An important anatomical feature of the hip joint is the various hip bursae—especially, the greater trochanteric bursa.[49] An extensive anatomical study performed by Woodley et al found that the average hip has 6 bursae and that 2 are typically found beneath the gluteus medius tendon (anterior subgluteus medius bursa, posterior subgluteus medius bursa), whereas a single bursa is usually found deep to the gluteus minimus tendon.[49] The hip bursae prevent excessive friction of soft tissue over bony prominences during normal ranges of motion. These bursae may become inflamed and are a cause for significant pain and disability.

HISTORY, PHYSICAL EXAMINATION, AND IMAGING STUDIES

History

A thorough history and complete physical examination are crucial to help guide the differential diagnosis and treatment of lateral hip pain. The history should include the character (clicking, stiffness, achy, sharp) and severity of the pain, location, radiation, and palliative and provocative factors.[6] Lateral pain in the abductor muscle belly can indicate abductor weakness. Lumbosacral disc herniation can be a cause of hip pain; it often presents with symptoms similar to those of hip pathology. Factors related to low back and hip pain should be assessed, including trauma, leg numbness, and radiating tingling below the knee. Insight into the patient's medical history, activity level, and expectations can also guide the management of the patient. Finally, a thorough history should include constitutional symptoms such as weight loss, fatigue, fevers, and immunocompromise to rule out infection, cancer, and inflammatory processes.[22]

Physical Examination

Physical examination is guided by the history and used to confirm the source of the pain. The examination should follow a stepwise approach, including inspection, palpation, range of motion, stability, and strength in all planes. Joints proximal and distal to the hip, including the knee, should always be examined. Gait should be observed, noting leg length discrepancy, weakness (Trendelenburg, foot drop), heel strike (gluteus maximus gait), and avoidance patterns (quadriceps avoidance). The patient's posture during sitting may be indicative of pathology (slouched to reduce flexion, listed to one side to reduce load), as may the manner in which the patient arises from a chair.

Each muscle group should be palpated. Bursal pain may be detected by palpation. Tendinopathy of the gluteus medius may present as tenderness along the posterior trochanter at the tendon insertion. Pain at the anterior aspect of the greater trochanter may be attributed to gluteus minimus pathology. Contractile (selective soft tissue) testing may distinguish between bursal and muscle pathology.

Range of motion testing should be checked on both the symptomatic hip and the contralateral hip. Passive and active internal rotation (35°), external rotation (45°), flexion (120°), extension (30°), abduction (45° to 50°), and adduction (20° to 30°) should be measured with a goniometer.[19] Strength in each of these planes should also be tested. Internal and external rotator testing and adduction are performed seated or prone; extension is tested with the patient standing; and flexion is tested in the seated and supine positions.

Special clinical tests include the Trendelenburg, Ober, FABER (flexion, abduction, and external rotation), Thomas, and Ely tests. The Trendelenburg test assesses the gluteus medius and is performed by having the patient stand unsupported on one leg. The test is positive for abductor weakness on the standing/supported leg if the pelvis tilts toward the opposite, or unsupported, leg. Patients with severe gluteus medius tendinopathy or tears may test positive on the Trendelenburg test. The Ober test is performed by having the patient lie on the unaffected hip. The symptomatic hip and knee are kept in a flexed position while the hip is abducted and extended to

center the IT band over the greater trochanter, then passively adducted. If the IT band is contractured, patients cannot adduct the affected limb to the exam table.[13] The FABER test can differentiate sacroiliac joint pathology from hip problems. The Thomas test evaluates hip flexion contractures. It is performed with the patient supine and holding the uninvolved leg in the knee-to-chest position (maximum flexion) while the affected leg is kept completely extended on the examination table. The test result is considered positive if the extended thigh elevates off the table.[1] Finally, the Ely test check for rectus femoris tightness in a prone position, with the examiner passively flexing the leg and bringing the heel toward the buttock. The test result is considered positive if the patient is unable to reach the buttock without raising the hip off the examination table.

Imaging

The radiographic series should include an anterior-posterior view of the pelvis, with the coccyx 1 to 3 cm above the pubic symphysis with concentric obturator foramen. The lateral view can be the cross-table lateral (highlights the acetabulum), frog-leg lateral (highlights the femoral head, neck, and upper shaft), Dunn lateral (elongated-neck lateral view), and the false profile (better for assessing the anterior femoral head).[47] Magnetic resonance imaging (MRI) may provide additional soft tissue information.[18]

DIFFERENTIAL DIAGNOSIS AND TREATMENT OPTIONS

Hip Pointer

The term *hip pointer* refers to a contusion of the iliac crest (Figure 1). This term has also been used to describe avulsions or fractures about the lateral hip. Radiographs are often necessary to rule out injuries in collision athletes after a direct blow to the bone leading to a subperiosteal hematoma and, often, significant disability and pain. Treatment is often symptomatic, including ice, compression, rest, and potentially protected ambulation. Avoiding vigorous activity for 48 hours may reduce recurrent bleeding. A corticosteroid injection may help facilitate a return to activity.[35]

Greater Trochanteric Bursitis

Trochanteric bursitis most commonly results from friction of the overlying IT band. Patients often exhibit tenderness over the greater trochanter that may be exacerbated by external rotation and abduction of the hip. Several factors have been associated with trochanteric bursitis in the athlete, including a wide pelvis, leg-length discrepancy, excessive foot pronation, and poor running surfaces.[35] Radicular back pain can present with pain in the trochanteric region.

Trochanteric bursitis is often self-limiting. Nonsteroidal anti-inflammatory medications in conjunction with rest and activity modification are the first line of therapy with good results.[40]

Figure 1. Image demonstrating ecchymosis associated with a hip pointer.

Physical therapy with a focus on gluteal strengthening in combination with IT band and fascia lata stretching may be helpful. In refractory cases, a corticosteroid injection or surgical debridement may be needed.[11,47]

IT Band Syndrome and Snapping Hip Syndrome

IT band syndrome most often presents in the teens and early 20s, when the gluteus maximus becomes thickened, causing an audible pop as the tendon moves over the trochanter (a video of a patient with snapping hip syndrome can be found as supplemental material at http://sph.sagepub.com/supplemental/).[41]

Treatment for external snapping hip is largely conservative and nonoperative. Patients often need reassurance that the condition will not limit their activities or deteriorate in the future. Patients are typically only mildly symptomatic and can avoid positions that cause snapping. Rare, disabling, or refractory cases may be treated with open or arthroscopic excision of the trochanteric bursa and lengthening of the IT band over the greater trochanter (Figure 2).[4,21]

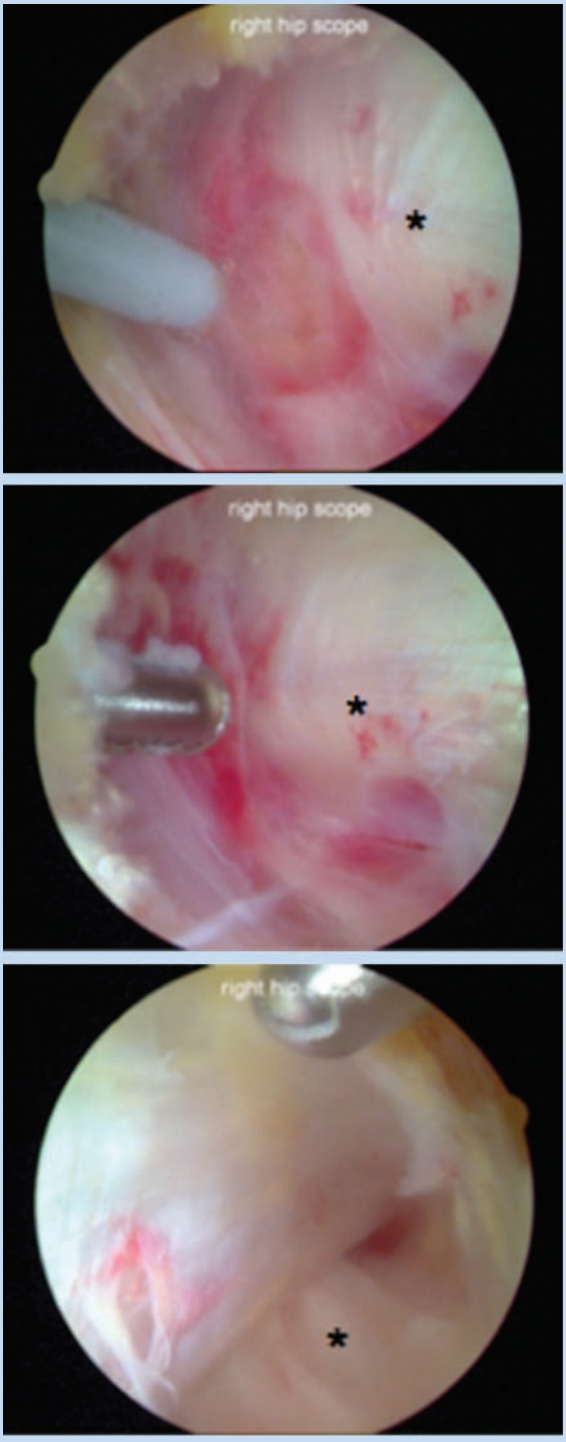

Figure 2. Arthroscopic images of the peritrochanteric space: A, abductor tendons with overlying bursa (asterisk denotes vastus lateralis tendon); B, arthroscopic shaver used to perform bursectomy overlying the greater trochanter (asterisk denotes vastus lateralis tendon); C, distal aspect of the vastus lateralis with insertion of the gluteus maximus tendon (asterisk denotes insertion of gluteus maximus tendon).

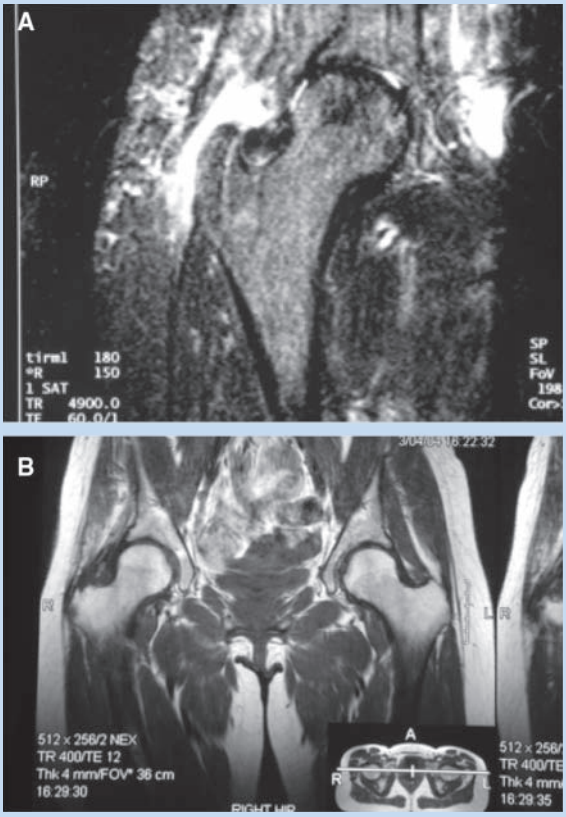

Figure 3. A, T2 MRI of the right hip demonstrating an avulsion of gluteus medius and gluteus minimus tendons; B, T1 MRI of the pelvis 2 years after open repair of the gluteus medius and minimus tendons.

Gluteus Medius Tendon Dysfunction and Tears

Symptomatic tendinosis and tears of the gluteus medius/minimus insertion on the greater trochanter is similar to a tear of the insertion of the rotator cuff.[5] Patients present with dull, achy lateral hip pain, which is frequently aggravated by weightbearing and resisted abduction.[25] Tears of the gluteus medius and minimus may be a common cause of recalcitrant lateral trochanteric pain. As with the rotator cuff, tears of the hip abductors may be interstitial or partial/full thickness.[7,23] Partial tears are most common[7]; however, a progression from a partial anterior tear to a full posterior tear has been described.[23] MRI or ultrasound may be useful to evaluate the integrity of the abductor tendon insertion on the greater trochanter (Figure 3).

Treatment of symptomatic degeneration or tears of the gluteus musculature is typically conservative. Activity modification, massage, ice, stretching, and corticosteroid injections may provide relief. Many patients are mistakenly diagnosed with greater trochanteric pain syndrome (bursitis, IT band, etc) and thus fail conservative efforts. Surgical treatment should be considered only in refractory cases.[39]

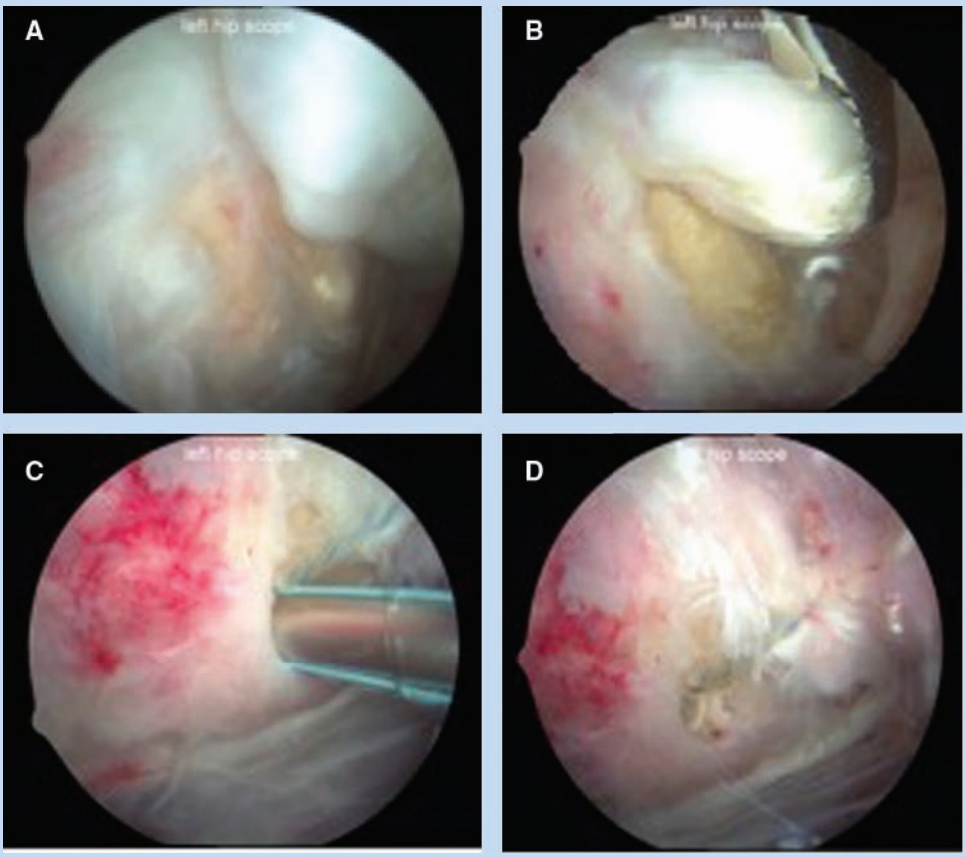

Figure 4. A, peritrochanteric space viewing the torn gluteus medius tendon; B, arthroscopic grasper to determine mobility of the tendon; C, insertion of lateral suture anchor; D, arthroscopic appearance of final fixation construct with medial row using a double-loaded suture anchor and lateral-row fixation.

Open techniques for tendon repair have provided excellent symptomatic relief,[23] whereas arthroscopic techniques (Figure 4) have provided pain relief and improvement in strength.[48]

Meralgia Paresthetica

Meralgia paresthetica is entrapment of the lateral femoral cutaneous nerve,[34] which provides innervation in the anterolateral thigh. This condition is associated with surgery (iliac crest bone graft); from wearing tight pants, belts, or girdles; and in diabetic or obese patients.

Patients will often experience numbness, paresthesias, and pain over the distribution of the nerve, which is 1 cm medial and inferior to the anterior superior iliac spine.[14] Nerve conduction studies may be diagnostic and may show prolonged latency or decreased velocity consistent with nerve compression.[15]

Conservative treatment may include oral anti-inflammatory medications or injections.[34] Surgical treatment for refractory cases may release the fascial bands at the inguinal ligament.[34] Transaction of the nerve may cause significant patient dissatisfaction owing to hypoesthesia and neuroma development.

CONCLUSIONS

A systemic approach must be used to assess the patient presenting with lateral hip pain so that proper treatment decisions can be determined. A thorough investigation of potential causes includes referred pain and constitutional and systemic illness.

MRI may be helpful to rule out soft tissue pathology, such as tears of the gluteus insertion on the greater trochanter. The majority of these conditions may be treated with conservative measures, including rest, anti-inflammatory medications, and physical therapy, and are generally self-limited. Patients with symptoms that are refractory to these conservative measures may warrant further investigation and possible surgical intervention.

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