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Operative Techniques in

Sports Medicine

Extra-Articular Impingement: Ischiofemoral Impingement and Trochanteric-Pelvic

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Extra-articular impingement refers to abnormal contact that occurs outside the normal femoral head-neck junction and acetabulum that is classically described in femoroacetabular impingement. This article focuses on 2 causes of extra-articular impingement: ischiofemoral impingement (IFI) and greater trochanteric-pelvic impingement. IFI occurs between the ischium and lesser trochanter of the femur, whereas GTPI is an entity involving the ilium and greater trochanter of the femur. IFI compresses the quadratus femoris muscle and hamstring origin, leading to posterior-based hip pain in positions of adduction and external rotation. Magnetic resonance imaging may show a decreased ischiofemoral distance and increased signal within the quadratus femoris muscle. Treatment should initially be nonoperative, with injections providing both a diagnostic and therapeutic option. Surgery is reserved for those who fail conservative treatment and consists of either open or arthroscopic anterior or posterior osseous decompression or quadratus femoris muscle release. GTPI is typically seen because of Perthes disease or other morphologic abnormality in the hip. Patients demonstrate limited abduction in relative hip extension and plain radiographs can confirm the diagnosis. Treatment typically consists of open trochanteric advancement.
Oper Tech Sports Med 23:184-189 Published by Elsevier Inc.

KEYWORDS impingement, hip, ischiofemiral, trochanteric, pelvic, extra-articular

Background

Hip impingement can be broadly characterized into either intra-articular or extra-articular impingement. Classically, femoroacetabular impingement (FAI) occurs within the hip joint proper (femoral head-acetabulum articulation) because of an abnormally shaped femoral head-neck junction (cam type), an abnormally deep or over-covering acetabulum (pincer type), or both (combined-type FAI). In contrast, extra-articular impingement refers to the symptomatic impedance of hip range of motion due to structures that are outside the morphologic abnormalities described for classical FAI. This type of impingement is rare, occurring in only 4% of patients with hip pain.[1] The diagnosis can be challenging because extra-articular impingement may coexist with cam or pincer morphology as seen in classical FAI. Extra-articular impingement can be consequential to activities requiring extreme range of motion such as gymnastics or dance[2] but may also be experienced with activities of daily living. Patients with documented findings of extra-articular impingement are more likely to be young and female and have undergone previous surgery. Capsular laxity has been hypothesized to predispose patients to extra-articular impingement by increasing hip range of motion, which in turn enables bony impingement that is anatomically impossible with normal soft tissue restraints. It has been hypothesized that extra-articular impingement could create a potential fulcrum that exacerbates capsular stretching and pain via mechanoreceptors within the hip capsule.[3]

Extra-articular impingement can occur as psoas impingement, subspine impingement, ischiofemoral impingement (IFI), and greater trochanteric-pelvic impingement (GTPI). Subspine impingement, which is the most frequently reported in the literature,[4] occurs because of contact between the distal femoral neck and the anterior inferior iliac spine. Psoas impingement, first described by Heyworth et al,[5] results in a particular location of labral tears at the anterior aspect of the acetabulum (3 o'clock or 9 o'clock positions) caused by psoas tendon abrasion. This

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 http://dx.doi.org/10.1053/j.otsm.2015.06.001
1060-1872//Published by Elsevier Inc.

article focuses on impingement occurring between the ischium and lesser trochanter (LT) of the femur (IFI) as well as the greater trochanter of the femur and the pelvis (GTPI).

Ischiofemoral Impingement

Pathophysiology

IFI occurs when the quadratus femoris musculature is compressed between the lesser tuberosity and the ischium producing groin or posterior hip pain. The ischiofemoral space (IFS) and quadratus femoris space—the latter includes the soft tissue mass of the hamstring origin—have both been found to be statistically smaller in patients with a clinical diagnosis of IFI syndrome.[6] This narrowing can be congenital, positional, or acquired.

Women have a predilection toward congenital symptomatic IFI compared with men because they have a more prominent LT with wider ischial tuberosities.[7] Accordingly, most of the IFI cases have been identified in female patients.[8,9] Bilateral IFI is not uncommon and is estimated to occur in approximately 15%-30% of cases.[7,10] A history of hamstring avulsion fracture or multiple hereditary exostoses (MHE) can predispose to the acquired form of IFI by decreasing the IFS. In a study by Yoong et al,[11] in 62% of 21 hips in patients with MHE, the IFS was narrowed, and the quadratus femoris demonstrated changes consistent with IFI syndrome including edema or atrophy or both. Patients may also acquire IFI syndrome because of malunited proximal femur fractures, intertrochanteric osteotomies, degenerative arthritis causing medialization of the LT, or following total hip arthroplasty when offset is not fully restored.

History

Patients with IFI typically experience posterior hip or buttocks pain that begins without a precipitating event. Pain is experienced in positions of adduction and external rotation, which brings the LT toward the ischium and narrows the space immediately posterior to the quadratus femoris. Symptoms can be experienced during sport-related motions, especially in gymnastics and dance, as well as activities of daily living, including long-stride walking. In some cases, the pain radiates down the leg, likely from irritation to the sciatic nerve that is immediately superficial to the quadratus femoris muscle. Patients with radiating pain should be questioned about symptoms of low-back pain or other neurologic symptoms that could indicate primary spinal or nerve root pathology.

The differential diagnosis for IFI syndrome includes piriformis syndrome, quadratus femoris tear, adductor tendonitis, lumbar radiculopathy, sacroiliac joint pain, proximal hamstring tendinopathy, posterior labral tear, psoas bursitis, and capsular instability. There may be substantial overlap among these entities. Psoas bursitis and hamstrings tendinopathy can reduce the effective IFS through mass effect and have been associated as an inciting factor or consequence of IFI.

Physical Examination

No validated tests exist to confirm the diagnosis of IFI. Pain is usually reproduced on physical examination by extension, external rotation, and adduction. Snapping may rarely occur because of IFI during flexion or extension of the pelvis with weight-bearing activites.[9] If snapping is identified, more common sources of snapping around the hip should be investigated with provocative testing, as described by Byrd.[12] The snapping hip maneuver may elicit snapping of the psoas tendon as it courses to the LT (internal snapping hip), whereas the bicycle test elicits snapping of the iliotibial band over the greater trochanter (external snapping hip). The sciatic nerve can become irritated in cases of IFI, and thus a thorough neurologic evaluation is warranted when IFI is suspected. Provocative testing for lumbar radiculopathy helps rule out spinal pathology as the primary source of pain

Imaging

Plain radiography is often negative in IFI, but subtle findings include sclerosis or cystic changes within the LT or ischium. Plain radiographs may also reveal decreased femoral offset, or evidence of acquired bony prominences, as seen with previous ischial avulsion injury or MHE. Coxa valga with an increased femoral neck angle is associated with IFI syndrome and is independent of age and gender.[10]

Computed tomography (CT) and magnetic resonance imaging (MRI) imaging may help confirm the diagnosis of IFI, but should not be considered diagnostic without the expected clinical findings (Figs. 1 and 2). MRI often shows increased signal within and around the quadratus femoris on fluid-sensitive imaging without tearing of muscle fibrils (Fig. 2). Fatty atrophy of the quadratus muscle from repetitive

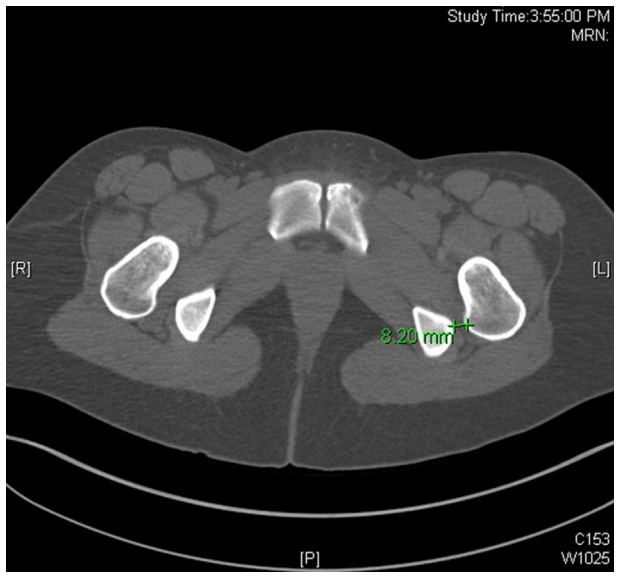

Figure 1 Axial CT scan of a pelvis with the legs in external rotation in a patient with left, posterior hip pain and symptoms consistent with IFI. The scan demonstrates a narrowed, ischiofemoral distance of 8 mm. (Photo courtesy of Marc R. Safran, MD.) (Color version of figure is available online.)