

# Ischiofemoral impingement in an 11-year-old girl

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## ABSTRACT

Ischiofemoral impingement (IFI) is the entrapment of the quadratus femoris muscle (QFM) between the trochanter minor of the femur and the ischium-hamstring tendon. Patients with IFI generally present with hip pain, which may radiate toward the knee. Although there is no specific diagnostic clinical test for this disorder, the presence of QFM edema/fatty replacement and narrowing of the ischiofemoral space and the quadratus femoris space on magnetic resonance imaging (MRI) are suggestive of IFI. The optimal treatment strategy of this syndrome remains obscure. Patients may benefit from a conservative treatment regimen that includes rest, activity restriction, nonsteroidal anti-inflammatory drugs, and rehabilitation procedures, just as with other impingement syndromes. Herein we report an 11-year-old girl with IFI who was successfully treated conservatively. To our knowledge, our case is the youngest patient reported in the English literature. MRI remains an important tool in the diagnosis of IFI, and radiologists should be aware of the specific features of this entity.

**Key words:** • ischiofemoral impingement • hip • pain  
• conservative treatment

Ischiofemoral impingement (IFI) is the entrapment of the quadratus femoris muscle (QFM) between the trochanter minor of the femur and the ischium-hamstring tendon (1–3). The QFM, a strong lateral rotator of the thigh that assists in adduction, arises from the upper external border of the ischial tuberosity and inserts onto the minor tubercle of the trochanteric crest of the femur (4). Abnormalities of the QFM may cause hip, buttock, and groin pain that can radiate distally from the posterior thigh, likely caused by irritation of the sciatic nerve, which lies next to the muscle (1, 3, 5–7). Patients with IFI generally present with hip pain, which may radiate toward the knee (7).

There is no specific diagnostic clinical test for this disorder; however, clinicians should consider IFI when there is an increase in pain during maneuvers that impinge the muscle (1, 7, 8). Patients may also experience a snapping sensation, crepitation, or locking of the joint (3, 6). Magnetic resonance imaging (MRI) has been used in diagnosis of impingement syndromes, leading to improved treatment protocols. We have previously reported that the presence of QFM edema/fatty replacement and narrowing of the ischiofemoral space (IFS) and the quadratus femoris space (QFS) on MRI may suggest IFI (9).

No definitive treatment has been recommended, other than excision of the lesser trochanter (10). The optimal treatment strategy of this syndrome remains obscure. Patients may benefit from a conservative treatment regimen including rest, activity restriction, nonsteroidal anti-inflammatory drugs, and rehabilitation procedures, just as with other forms of impingement syndromes. Computed tomography-guided infiltration of this space with a combination of local anesthetic and steroid has been useful. Surgical intervention to correct anatomical pathology is reserved for cases that do not respond to conservative therapy (1, 6, 10).

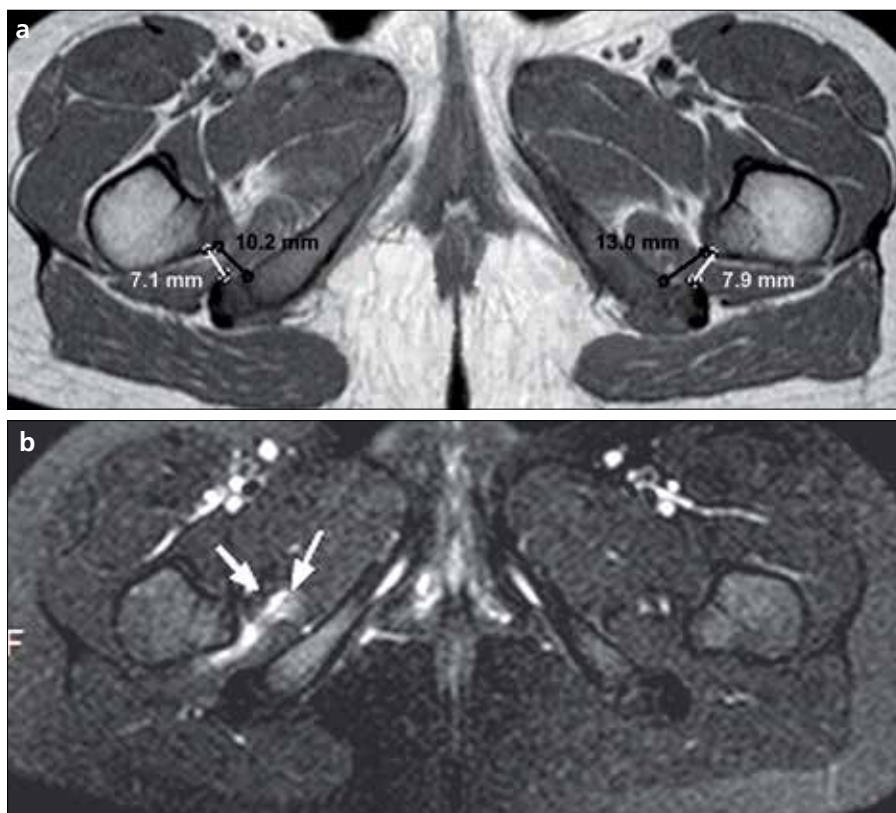
## Case report

An 11-year-old girl was admitted to our orthopedics outpatient clinic with the complaint of right hip and groin pain, which gradually increased during the last two months. The pain increased during hip movements and walking, and was relieved by rest. She reported a slight locking feeling. She had fallen on her right hip approximately one year ago. On physical examination, she had full and symmetric range of motion of both hips and had pain with passive hip internal rotation and flexion. Hip extension, adduction and external rotation also produced pain. Her radiographs were normal. Laboratory examinations including complete blood count, erythrocyte sedimentation rate, C-reactive protein levels, and blood chemistry were unremarkable. MRI demonstrated bilateral narrowing of the IFS and QFS, which was most prominent on the right side on the transverse T1-weighted sequence, and moderate

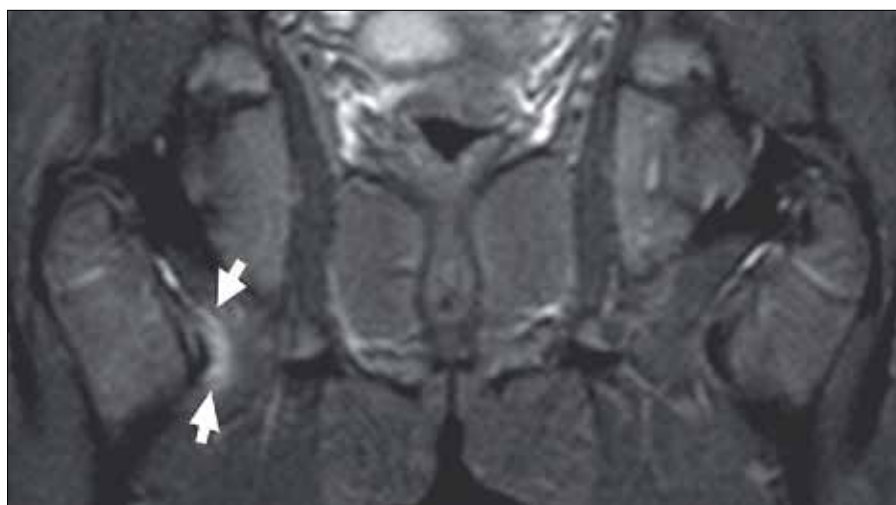
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**Figure 1. a, b.** Bilateral narrowing of the ischiofemoral space (*black lines*) and the quadratus femoris space (*white lines*), especially prominent on the right side, is observed on transverse T1-weighted MR image (**a**). Moderate edema in the right quadratus femoris muscle (*arrows*) is observed on fat-suppressed T2-weighted MR image (**b**).



**Figure 2.** Moderate edema in the right quadratus femoris muscle is observed on the coronal STIR MR image (*arrows*).

edema in the right QFM on the fat-suppressed T2-weighted sequence (Figs. 1 and 2). She was diagnosed with IFI based on the clinical and radiological findings. She was successfully treated with conservative methods including rest, activity restriction, and nonsteroidal anti-inflammatory drugs.

### Discussion

Impingement between the ischium and lesser trochanter was first reported as a potential cause for hip pain in 1977 by Johnson (1). He reported three patients with pain after hip surgery (two patients after total hip arthroplasty and one patient after

proximal femur osteotomy) in whom complete pain relief was achieved after resection of the lesser trochanter, supporting the hypothesis that abnormal contact with the ischium was responsible for the symptoms (1). The lesser trochanter and the ischial tuberosity are about 2.0 cm apart in adduction, external rotation, and extension of the hip, which allows the femur to rotate without contacting the ischial tuberosity or the proximal hamstring tendons (1, 3).

The quadratus femoris is a flat, quadrilateral muscle arising from the lateral border of the ischial tuberosity and inserting into the quadratus tubercle and linea quadrata of the femur; therefore, it is at risk of impingement if the IFS is narrowed. The cause of narrowing of the IFS remains unclear. In older patients, acquired causes such as intertrochanteric fractures with involvement of the lesser trochanter, valgus-producing intertrochanteric osteotomy, and osteoarthritis leading to superior and medial migration of the femur may be responsible (2). Enthesopathy of the proximal hamstring insertion represents a potential mechanism for narrowing of the QFS in the absence of any bony abnormality (11). Narrowing of the IFS may also be congenital or positional (6). The differential diagnoses include a snapping psoas tendon, sciatica, chronic hamstring injury, QFM tear, and adductor tendonitis (10).

There is no specific diagnostic clinical test for this disorder. The symptoms of IFI can be reproduced by a combination of extension, adduction, and external rotation of the hip (1, 10). However, our patient also had pain with flexion and internal rotation of the hip, as did most other patients in our previous study (9). We assume that the QFM is stretched with flexion and internal rotation of the hip, producing pain in these cases.

IFI was reported in several cases after Johnson's initial report. Patti et al. (7) reported a patient with chronic hip pain that radiated toward the knee in whom IFI diagnosis was established with radiography and MRI by showing severe IFS narrowing, edema of the QFM, and cystic changes of the ischium. They stated that the abnormal relationship between lesser trochanter and ischium was likely congenital.

Torriani et al. (3) reviewed MRI scans of 12 hips in nine patients with

hip pain and abnormal MRI signal intensity of the QFM, and they suggested that IFI may be the cause of hip pain and abnormalities of the QFM. Narrowing of the IFS was bilateral in 25% of the cases and was likely congenital (3).

Ali et al. (6) recently reported a case of persistent hip pain in a 17-year-old female who had a narrowed IFS and QFM edema following an acute hip abduction injury. Surgical resection of the lesser trochanter relieved the symptoms (6).

O'Brien and Bui-Mansfield (8) reported seven patients (six females, one male) who were experiencing hip pain (three patients), groin pain (one patient), and deep posterior thigh or gluteal pain (three patients). All seven patients were suspected of having a QFM tear, but Kassarian (12) suggested that although a QFM tear may have been present in some, perhaps some may have had impingement of the QFM or fat between the lesser trochanter and the ischial tuberosity instead. The study stressed the importance of MRI in reaching the correct diagnosis for the myriad causes of hip pain, even when a particular condition is unsuspected clinically. Kassarian (12) also reported three patients with posterior hip or buttock pain that was aggravated by internal or external rotation of the hip, a clinical scenario that did not suggest an acute muscle injury. These patients had edema in the QFM muscle belly without disruption of the myotendinous junction, and edema was also present in the adjacent fat.

All of the patients in recently published reports of QFM abnormalities

were females (1, 2, 6–8, 12). There is a potential correlation between IFS narrowing and the anatomy of the female pelvis: the female pelvis is wider and shallower than the male pelvis; females have an enlarged pelvic outlet and a wider and more circular pelvic inlet; and the angle between the pubic bones is much sharper in males, resulting in a more circular, narrower, almost heart-shaped pelvis. The prominence of the lesser trochanter in the female pelvis may explain why IFI is seen most commonly in women (3). Another explanation could involve projection of the ischial spines outward in the female pelvis. However, in our previous study, eight of 50 patients (16%) were male, which suggests that other factors can also cause narrowing of the IFS. Furthermore, bilateral involvement in a 14-year-old male patient strongly suggests a congenital narrowing of IFS (9).

To our knowledge, the case presented here is the youngest patient reported in the English-language literature. Young age and bilateral narrowing of the IFS highly supports congenital narrowing, although having a history of traumatic injury to the pelvis is likely relevant. The traumatic injury most likely aggravated the congenital abnormality, leading to the symptoms described. As demonstrated here, MRI remains an important tool in the diagnosis of IFI, and radiologists should be aware of the radiographic features of this entity.

#### Conflict of interest disclosure

The authors declared no conflicts of interest.

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