

## ISCHIOFEMORAL IMPINGEMENT DUE TO A SOLITARY EXOSTOSIS

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**Ischiofemoral impingement is a rare cause of hip pain related to narrowing of the space between the ischial tuberosity and the lesser trochanter. It is usually seen in middle-aged women. We report a rare case of a young male patient presenting with ischiofemoral impingement due to a solitary exostosis at the lesser trochanter. Imaging, especially Magnetic Resonance Imaging (MRI), is an excellent tool to confirm the diagnosis by demonstrating narrowing of the ischiofemoral space and soft tissue edema in the muscle belly of the quadratus femoris muscle.**

**Key-word:** Bones, osteochondrodysplasias.

Ischiofemoral impingement (IFI) was first described in 1977 by Johnson in three patients with persistent hip pain after hip surgery, two after total hip arthroplasty and one after proximal femoral osteotomy (1). More recently, other cases of IFI were reported in patients without history of surgery or trauma (2, 3, 4). The aim of this paper is to report the imaging features of a case of IFI, secondary to a solitary cartilaginous exostosis at the lesser trochanter in a young patient.

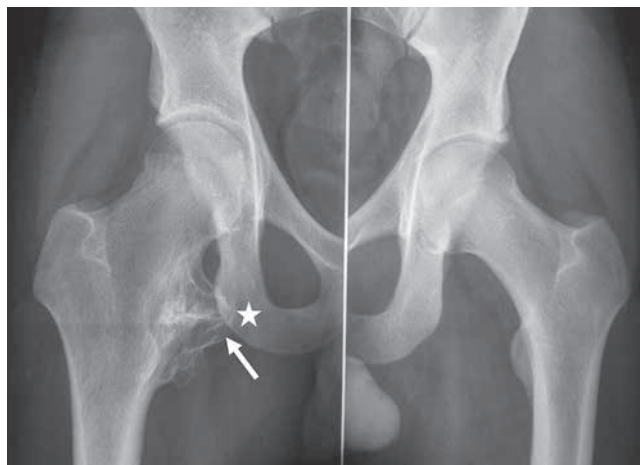
### Case report

A 22-year old male was referred to the radiology department because of right groin pain, aggravating by external rotation of the hip.

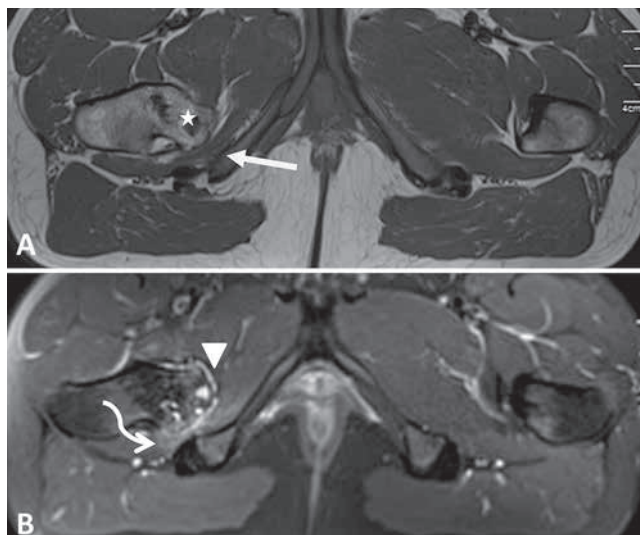
Standard radiographs (Fig. 1) of the right hip revealed a large sessile exostosis at the medial aspect of the lesser trochanter, resulting in narrowing of the distance between the lesser trochanter and the ischial tuberosity.

On magnetic resonance imaging (MRI) (Fig. 2), a marked narrowing of the ischiofemoral space with accompanying edema of the quadratus femoris muscle (QFM) was seen. There also was a thin overlying layer of cartilage at the surface of the exostosis, as well as some foci of hyaline cartilage protruding into the exostosis. After administration of intravenous gadolinium contrast, a faint enhancement of the surface cartilage and the cartilaginous changes was observed. There were no signs of malignancy.

Based on the imaging findings, the diagnosis of ischiofemoral impingement due to a benign



**Fig. 1.** — Initial anteroposterior radiography of both hips. A large exostosis is seen on the medial aspect of the right femoral neck (arrow), resulting in narrowing of the distance between the ischial tuberosity (star) and the lesser trochanter.



**Fig. 2.** — MRI of the pelvis. Axial T1-weighted images (WI) (A) show a significant narrowing of the ischiofemoral space (straight arrow) due to the exostosis (star), in comparison with the normal left side. On axial fat-suppressed T2-WI (B) focal edema of the muscle belly of the QFM (curved arrow) is seen, caused by impingement between the surface of the exostosis and the ischial tuberosity. Note the presence of a thin layer of cartilage at the surface of the exostosis (arrowhead).

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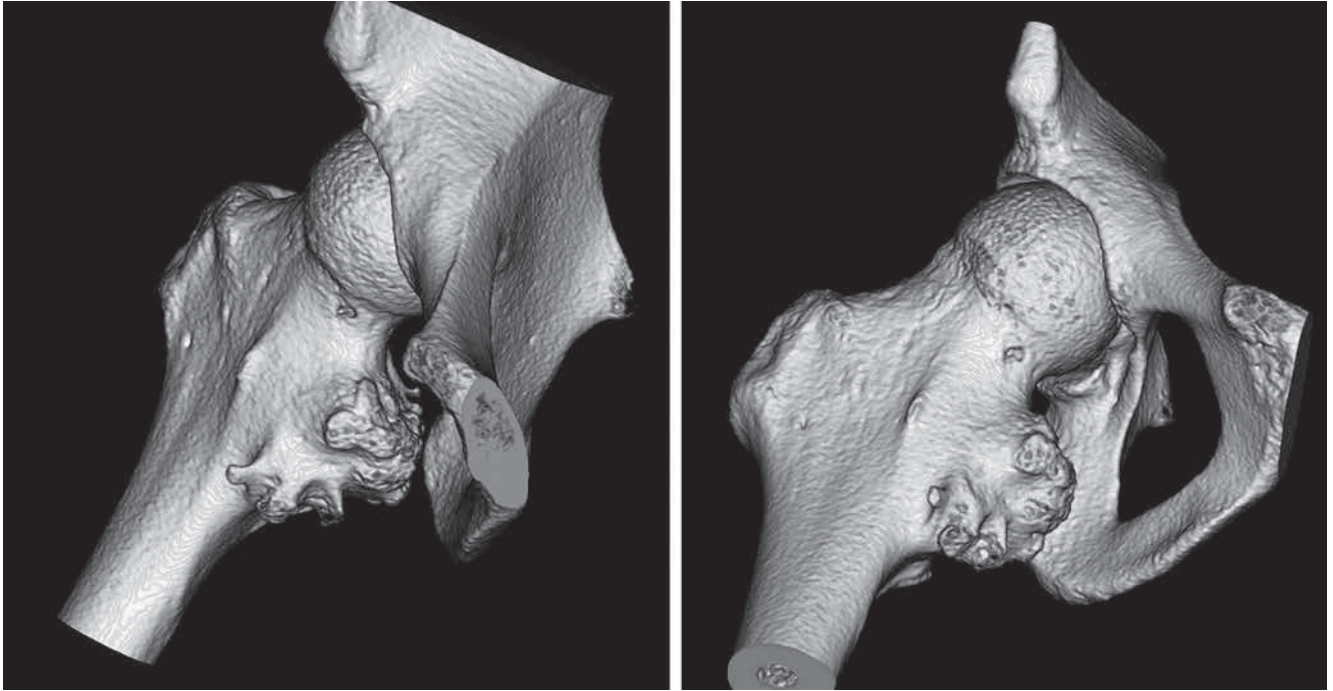


Fig. 3. — Three-dimensional (3D) CT provides a more accurate evaluation of the narrowing of the bony ischiofemoral tunnel

exostosis at the femoral neck was made. Because of failure of the initial conservative treatment, a resection of the exostosis was planned. In order to evaluate the exact narrowing of the bony ischiofemoral space, computed tomography (CT) was performed (Fig. 3), which confirmed a marked narrowing of the right IFS compared to the contralateral left side.

Histological examination of the resection specimen confirmed the diagnosis of a benign cartilaginous exostosis. The immediate postoperative recovery was uneventful.

## Discussion

Ischiofemoral impingement consists of a rare cause of hip pain related to narrowing of the space between the ischial tuberosity and the lesser trochanter. This results in mechanical impingement of the intervening soft tissues, most frequently the quadratus femoris muscle (2, 5). Both bony and soft tissue landmarks have been described to evaluate IFI. The ischiofemoral space (IFS) is the narrowest osseous distance between the lateral cortex of the ischial tuberosity and the medial cortex of the lesser trochanter. In normal circumstances, this distance should be larger than 23 mm, whereas a distance of less than 13 mm is abnormal. The quadratus femoris space (QFS) measures the distance between the soft tissue landmarks of the superolateral

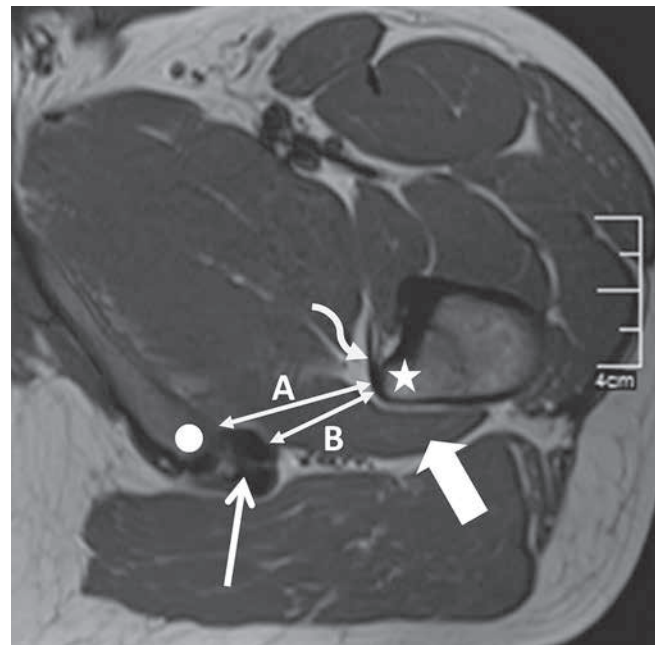


Fig. 4. — Normal axial T1-WI of the left hip. A normal QFM (thick arrow) is seen. The ischiofemoral space (line A) is defined by the narrowest distance between the lateral cortex of the ischial tuberosity (sphere) and the medial cortex of the lesser trochanter (star). The quadratus femoris space (line B) is delineated by the superolateral surface of the hamstring tendons (thin arrow) and the posteromedial surface of the distal iliopsoas tendon (curved arrow).

surface of the hamstring tendons and the posteromedial surface of the distal iliopsoas tendon (6, 7). A distance of less than 7 mm is abnormal, with 12 mm being a normal value (Fig. 4).

The etiology of narrowing of the IFS can be divided into three main categories: congenital, acquired and positional (Table I). Most often, IFI is acquired and is seen in middle-aged or older women after valgus

Table I. — Pathogenetic factors causing ischiofemoral impingement.

Congenital	Acquired		Positional
	Bone lesions	Soft tissue lesions	
Posteromedial position of the femur <sup>1</sup>	Expansile bone lesions	Chronic bursitis	Extension, adduction and exorotation
Larger cross-section of the proximal femur <sup>1</sup>	Degenerative hip disease <sup>3</sup>	Expansile soft tissue lesions	Hip stretching <sup>4</sup>
Prominence of the lesser trochanter	Valgus-producing osteotomy		
Low position of the ischiopubic ramus	Posttraumatic		
Female pelvic configuration <sup>2</sup>			

<sup>1</sup>causing narrowing of the distance between the lesser trochanter and the ischial tuberosity.

<sup>2</sup>wider pelvis, with greater distance between the ischial tuberosities in comparison to the male pelvis.

<sup>3</sup>causing cranial and medial migration of the femur.

<sup>4</sup>with hip held in flexion, abduction and endorotation.

osteotomy or hip arthroplasty (1). Secondary IFI due to a solitary or bilateral exostosis (in patients with Hereditary Multiple Exostosis Syndrome) is a rare cause (3). In 20% to 45% of the patients, IFI is bilateral or occurs in young people, supporting the hypothesis of predisposing congenital narrowing.

Clinically, IFI usually presents as chronic, non-traumatic groin or buttock pain in middle-aged women. This pain may radiate from the posterior side of the upper leg to the knee (ischialgia), caused by the pressure effect of an edematous QFM on the sciatic nerve. Other symptoms described in IFI are snapping, crepitation and locking (2, 5).

There is no specific clinical test to diagnose IFI. However, pain can be

provoked by exorotation of the hip, extension and adduction and stretching with the hip held in endorotation, flexion and abduction. Focal pressure at the ischial tuberosity can be painful (2, 5).

The differential diagnosis of IFI includes a wide variety of intra- and extra-articular causes of hip or groin pain, such as degenerative hip disease, labral tear or adductor tendinopathy. When pain irradiates to the lower leg, IFI may even mimic lumbar discopathy, spinal stenosis and hamstring tendinopathy. Further potential differential diagnoses are summarized in Table II and are beyond the scope of this case report (2, 5).

Because clinical findings and symptoms of IFI are rather nonspe-

cific, imaging plays a pivotal role in the diagnosis. Plain radiographs of the hip are usually normal in IFI. Nonetheless, for evaluation of an expansile bone lesion as underlying cause, plain radiography can be helpful. In longstanding IFI, secondary osseous changes such as sclerosis and cystic changes of the lesser trochanter and ischium can occur as a consequence of chronic bony impingement (5). However, the preferred imaging technique to confirm IFI is MRI, allowing direct measurement of the IFS and QFS and assessing edema of the QFM. Whereas acute posttraumatic edema caused by tear or strain is typically seen at the myotendinous junction, edema due to IFI is more likely to be located at the site of maximal impingement,

Table II. — Main differential diagnosis of ischiofemoral impingement.

Intra-articular	Extra-articular
Degenerative hip disease	Ischiofemoral impingement
Labral tear	Strain/tear QFM without narrowing of the IFS
Femoroacetabular impingement	Adductor-, hamstring- or iliopsoas tendinopathy/bursitis
	Spinal stenosis
	Lumbar discopathy
	Pathology of the sacro-iliacal joints
	Piriformis syndrome
	Inguinal hernias/mass lesions
	Urinary tract problems

Abbreviations: QFS: Quadratus femoris muscle; IFS: Ischiofemoral space.

i.e. the muscle belly. Additional imaging findings are edema adjacent to the hamstring- and iliopsoas tendons and formation of an intervening bursa along the medial aspect of the lesser trochanter. Long-standing IFI may lead to muscle atrophy and fatty infiltration (2, 5). CT imaging may be useful to document narrowing of the bony ischiofemoral tunnel in the preoperative setting, but is usually not recommended due to radiation restraints. In patients with large bony protuberances, such as an exostosis in our patient, it may allow a precise preoperative mapping for the surgeon, in cases where surgery is considered.

In most cases of IFI treatment is initially conservative, consisting of rest, nonsteroidal anti-inflammatory drugs, steroid injections and physiotherapy. Surgical treatment is restricted for patients in whom conservative treatment fails or with a marked narrowing of the IFS, such as in our patient.

### Conclusion

Ischiofemoral impingement should be considered in the differential diagnosis of hip pain. As symptoms and clinical findings are often non-specific, imaging plays a crucial role in the diagnosis, evaluation of the predisposing anatomy and treatment planning. Although plain radiography may be useful to demonstrate predisposing bony abnormalities (e.g. exostosis), causing narrowing of the ischiofemoral space, evaluation of secondary effect on the intervening soft tissue is not possible. MRI is the preferential tool for direct assessment of both narrowing of the ischiofemoral space and associated soft tissue edema in the quadratus femoris muscle.

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