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Ischiofemoral impingement syndrome: a case report and review of literature

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Abstract

Introduction: The etiology of ischiofemoral impingement (IFI) syndrome, an unusual and uncommon form of hip pain, remains uncertain. Some patients demonstrate narrowing of the space between the ischial tuberosity and lesser trochanter from trauma or abnormal morphology of the quadratus femoris muscle. Combined clinical and imaging aid in the diagnosis.

Case report: A 32-year-old female presented with a 3 years history of pain over the lower aspect of the right buttock, aggravated by movements of the right hip, and partially relieved with rest and medications. The right hip showed extreme restriction of abduction and external rotation. MRI of the right hip showed reduced ischiofemoral space and quadratus femoris space when compared to the left hip. The patient underwent endoscopic resection of the right lesser trochanter, with no recurrence of pain at 2 years.

Conclusion: An unusual cause of hip pain, IFI syndrome, should be suspected when hip pain at extremes of movement is associated with signal abnormality of quadratus femoris muscle. Management is tailored to address the inciting factors that precipitated the IFI syndrome.

Keywords: Ischiofemoral impingement, Quadratus femoris muscle, Arthroscopy, Lesser trochanter

Introduction

In ischiofemoral impingement (IFI) syndrome, an unusual and rare form of hip pain, there is narrowing of the space between the ischial tuberosity and lesser trochanter from trauma or abnormal morphology of the quadratus femoris muscle. IFI produces non-specific hip pain during repeated movements of the hip (extension, abduction, and external rotation) which may impair the action of the quadratus femoris muscle. IFI syndrome can be idiopathic, without any precipitating trauma, or prior hip

surgeries, or associated with abnormal morphology of the quadratus femoris muscle.

Clinical examination and imaging aid in diagnosing IFI syndrome. Narrowing of quadratus femoris space and ischiofemoral space with increased ischial angle and femoral neck angle is suggestive of IFI syndrome [1]. The reliability of magnetic resonance imaging (MRI) in determining the diagnosis of IFI syndrome is unclear, as similar findings can be found in asymptomatic individuals [2]. The management of IFI is dictated by the functional needs of the patients, and the management strategy is individualized. We report a patient with IFI syndrome without any history of trauma who underwent endoscopic resection of the lesser trochanter.

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Fig. 1 Radiograph of the pelvis with bilateral hips show the neck–shaft angle of 130.1° in right hip and 133.8° in the left hip

Case report

A 32-year-old woman presented with a 3 years history of pain over the lower aspect of the right buttock. With insidious onset, the dull ache radiated to the posterior aspect of the lower right thigh. The symptoms were aggravated on movements of the right hip and partially relieved with rest and medications. The patient reported no history of trauma or infection and noticed an audible and a painful clunk along with the grinding sensation in her right hip. On examination, there were no swelling, scars, or sinuses around the right hip. The patient demonstrated an audible and palpable snap in her right hip when moving the right hip. The Trendelenburg sign was negative. There were no neurovascular abnormalities. There was restriction of the terminal range of abduction and external rotation of the right hip.

Plain radiographs of both hips showed normal acetabula bilaterally, with no evidence of pincer or cam deformity, a 35° center-edge (CE) angle bilaterally, symmetrical hip joint spaces, and valgus hips with the femoral neck–shaft angle of 130° on the right hip and 134° on the left hip (Fig. 1). The axial T1W and PDFS MRI images showed reduction of the right ischiofemoral space (12.6 mm) compared to the left ischiofemoral space (22.6 mm) (Fig. 2). The axial T1W image showed subtle fatty atrophy of the right quadratus femoris muscle when compared to the left (Fig. 3). The patient was managed surgically by endoscopic resection of the right lesser trochanter (Fig. 4). Postoperative radiographs of the right hip (anteroposterior and lateral views) confirmed the wide resection of the lesser trochanter (Fig. 5).

The patient was advised to partially weight bear for 2 weeks followed by full weight-bearing of the right lower limb. The patient experienced no pain while performing her usual activities of daily living. No heterotopic bone formation was observed. At 2 years of follow-up, the patient reported an improvement of the International Hip Outcome Tool (iHOT) score from 49 to 89 points.

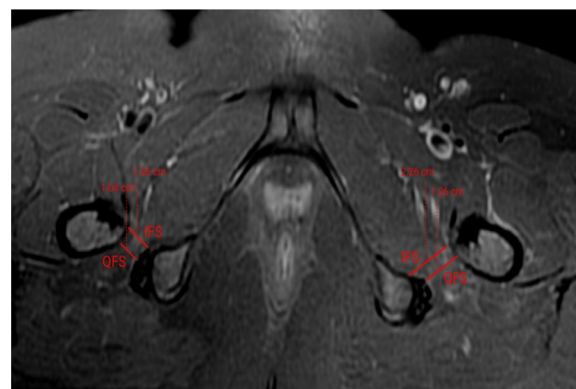


Fig. 2 Axial T1W and PDFS MRI images, showing reduction of the right ischiofemoral space compared to the left

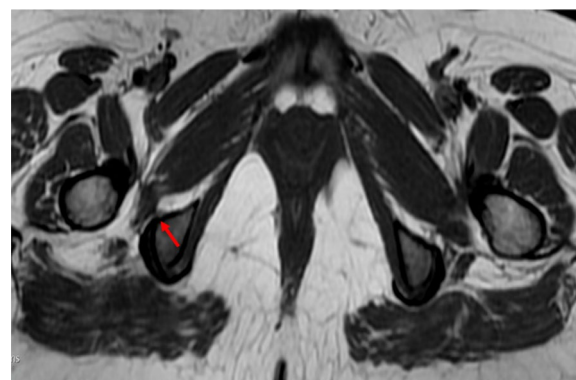


Fig. 3 Axial T1W image: subtle fatty atrophy of the right quadratus femoris muscle (red arrow)

Discussion

The temporal and spatial association between hip pain and trauma or abnormal morphological changes in the quadratus femoris muscle has been previously described. In 1977, Johnson described ischiofemoral narrowing in

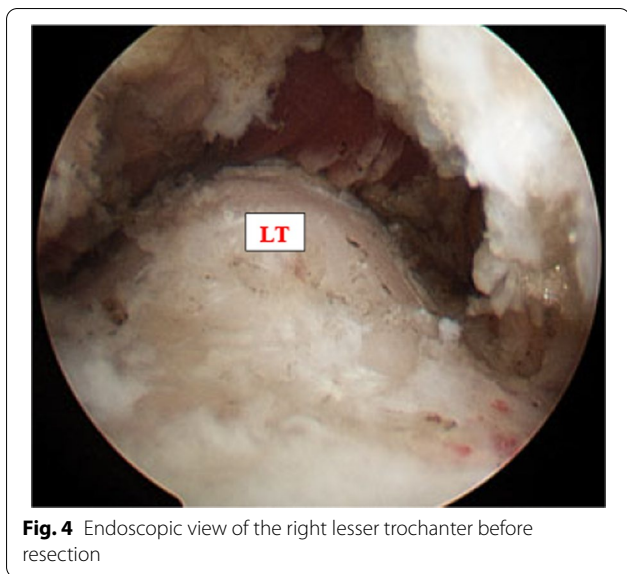


Fig. 4 Endoscopic view of the right lesser trochanter before resection

3 patients with unusual nature of hip pain following surgery (2 patients after total hip arthroplasty and 1 patient after proximal femoral osteotomy). In these 3 patients, symptoms were relieved by resection of the lesser trochanter [3]. An uncommon entity, IFI poses a diagnostic challenge.

IFI has been associated with the broad and shallow female pelvis, congenital posteromedial femoral position, osteochondromatosis of the hip, increased diameter of the femur at the lesser trochanter, coxa valga, coxarthrosis with superomedial migration, and malunited intertrochanteric fracture [4, 5]. IFI can result from narrowing of

the quadratus femoris space from hamstrings or gluteus medius enthesopathy [6]. Abnormalities of soft tissues may lead to narrowing of the ischiofemoral space [7], and IFI may be classified as congenital, positional, and acquired [7]. IFI syndrome may result from compression of the quadratus femoris muscle from decreased ischial space, or narrowing of the space between hamstring muscles and the posteromedial aspect of the femur [8].

In IFI syndrome, the space between the ischial tuberosity and the lesser trochanter is below 20 mm, with or without a history of trauma, previous hip surgeries, or abnormal morphology of the quadratus femoris muscle. IFI is more common in females, affecting patients from the first to the seventh decade. IFI syndrome has been hypothesized to be gender-related as the ischial tuberosities are further apart in females, by rendering the ischiofemoral distance narrower [9]. Sussman et al. found an increased inter-tuberosity diameter and changes in the ischial angulation in female cadavers, which account for the increased incidence of IFI syndrome in females [10]. Bilateral IFI syndrome is reported in 25% of patients [7].

Patients with IFI syndrome report non-specific posterior hip pain, with load-dependent pain on the lower buttock, with a diagnostic delay ranging from a few weeks to several years [6, 9, 11–13]. Some patients report snapping or locking sensation of the hip joint during walking: This is thought to result from the forceful bypassing of the ischium over the lesser trochanter [7, 11, 14, 15]. Ganz et al. reported a sense of instability from inadequate acetabular coverage, with hip subluxation when the lesser trochanter impinges on the ischium [16]. Patients with IFI syndrome exhibit a painless functional limb length

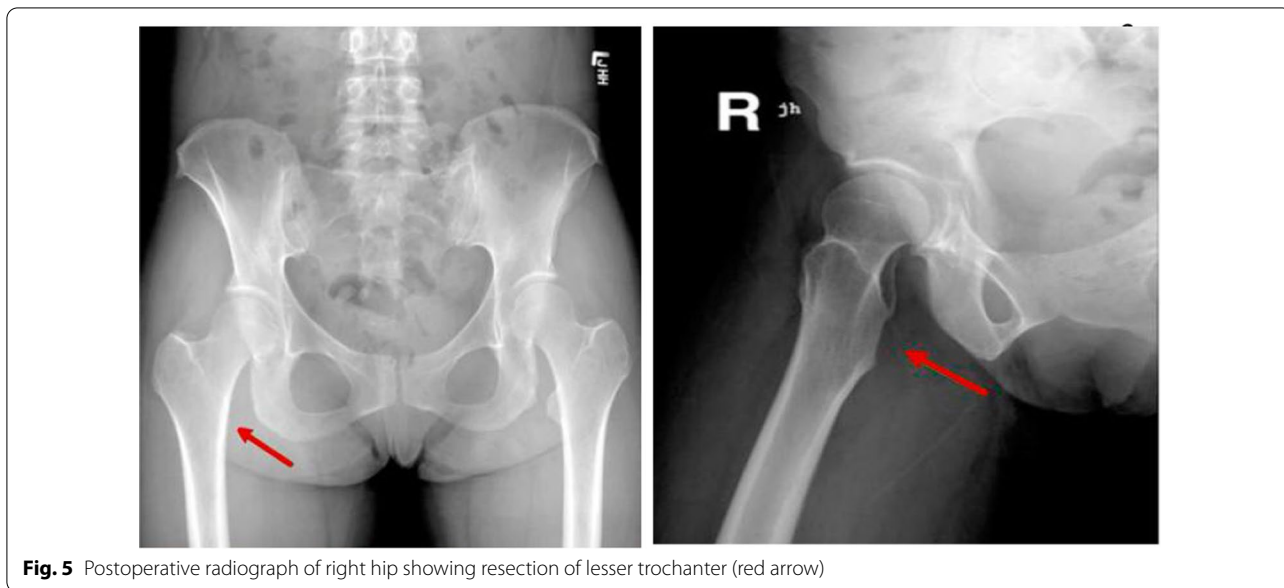


Fig. 5 Postoperative radiograph of right hip showing resection of lesser trochanter (red arrow)

discrepancy from compensatory abduction of the leg of the affected side to increase the distance between the lesser trochanter and the ischium [16].

At times, the pain may radiate to the knee and can be diagnosed as lumbosacral radiculopathy or sciatica. The passive motion of the affected hip to induce pain while palpating the ischium points toward IFI syndrome. Johnson described the provocative test for IFI syndrome by passively extending, adducting, and externally rotating the hip [3, 9, 17]. Passive flexion and internal rotation of the hip provokes pain by stretching the impaired quadratus femoris muscle [15]. Gómez-Hoyos et al. validated the long-stride walking test with 92% sensitivity and 82% specificity, and the passive extension and adduction test with 82% sensitivity and 85% specificity for diagnosing IFI syndrome [18]. At imaging, IFI syndrome can be diagnosed by measuring the ischiofemoral and quadratus femoris space [7].

As only few patients have been reported, there are no definitive diagnostic criteria for diagnosis, and formulating a diagnosis of IFI syndrome can be difficult [4, 19–21]. Imaging may depict heterogeneous sclerosis of the lesser trochanter and the ischium. The anteroposterior radiograph and axial proton density images may show a reduced distance between the ischium and the lesser trochanter to 0.3 cm and 0.4 cm, respectively [11]. On T2W fat-suppressed MRI, hyperintense signal from quadratus femoris muscle secondary to impingement between the ischium and prominent lesser trochanter can be evidenced [11]. Lu et al. obtained similar ischiofemoral space measurements with ultrasonography [92.0% sensitivity and 68.4% specificity] and MRI [96.0% sensitivity and 84.2% specificity] [22].

Torriani et al. observed abnormal morphology of quadratus femoris muscle in 12 IFI syndrome patients with edema in 12 (100%), partial tears in 4 (33%), and fatty infiltration in 1 (8%) [7]. Tendinopathy of the myotendinous junction of the quadratus femoris and degenerative changes in the quadratus femoris muscle have been reported [2]. In 4 patients, O'Brien et al. reported fluid collection, with either edema or hemorrhage at the myotendinous junction of the quadratus femoris muscle (1 patient with a full-thickness muscle tear and 3 patients with a partial-thickness muscle tear) [23]. Based on the literature and their own experience, Torriani et al. gave inconclusive validity for the association between the narrowing of the ischium and the lesser trochanter with the abnormal morphology of quadratus femoris muscle [7]. Singer et al. reported that the cutoff for ischiofemoral space is ≤ 15 mm (sensitivity 77%, specificity 81%, accuracy 74%) and quadratus femoris space is ≤ 10 mm (sensitivity 79%, specificity 74%, accuracy 77%) in T1W axial sequence. The STIR/T2W sequence may demonstrate

edema or tears of quadratus femoris, hamstrings, or iliopsoas muscles [24].

The differential diagnoses include lumbosacral radiculopathy, sciatica, femoroacetabular impingement (FAI), IFI, iliopsoas myositis, hamstrings and gluteus medius enthesopathy, piriformis syndrome, ankylosing spondylitis, and spinal stenosis; all have to be considered in patients with pain over the lower buttock radiating to the knee [25–28].

The optimal treatment strategy is unclear, but various treatment modalities have been attempted. Management of IFI syndrome ranges from conservative management in the form of rest, activity limitation, analgesics, physical therapy, CT/US-guided steroids, anesthetics, and prolotherapy into quadratus femoris muscle, and surgical management in the form of either open or endoscopic resection of the lesser trochanter, or ischioplasty [6, 13, 29–32]. Ali et al. treated IFI syndrome conservatively with excellent functional outcome [6]. Ultrasound-guided corticosteroid injections in the quadratus femoris muscle resulted in pain relief in 2 weeks [32]. Kim et al. reported excellent functional outcomes by ultrasound-guided injection of polydeoxyribonucleotide sodium in 2 patient, possibly from destruction of nerve fibers associated with pathological neovascularity, expression of VEGF, collagen production, and fibroblast proliferation [13].

Surgery has been advocated after failure of conservative management. Johnson et al. described open resection of the lesser trochanter, and some orthopedic surgeon performed endoscopic resection of the lesser trochanter [3, 9, 33–35]. Truog et al. demonstrated a complete resolution of symptoms with an open ischioplasty 3 months postoperatively [31]. In our patient, endoscopic resection of the lesser trochanter resulted in total resolution of pain lasting for the whole duration of follow-up.

Conclusion

An unusual cause of hip pain, IFI syndrome, should be suspected when hip pain at the extremes of movement with the signal abnormality of the quadratus femoris muscle is noted at MRI. The treatment modalities employed in these cases have to be tailored to address the inciting factors that precipitated the IFI syndrome.

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Author contributions

MJ designed the study. MJ, JM, NM, NJ, AGP, and AG wrote the original draft. MJ, NM, and AG reviewed and edited the manuscript. AG supervised the study. All authors have read and agreed to the published version of the manuscript.

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Availability of data and materials

All the data are contained within this manuscript.

Declarations**Ethics approval and consent to participate**

Informed consent was obtained from all subjects involved in the study.

Consent for publication

Consent for publication was obtained from the subject. No identifying information is used in this manuscript.

Competing interests

The authors declare that they have no competing interests.

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