Femoroacetabular Impingement: A Retrospective Case Study With 8-Year Follow-Up

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Received in 7 November 2014; received in revised form 7 May 2015; accepted 24 May 2015

Key indexing terms:

Femoroacetabular
impingement;
Chiropractic;
Injuries, hip;
Athletic injuries;
Osteoarthritis, hip

Abstract

Objective: The purpose of this case report is to describe a patient with femoroacetabular impingement (FAI) who was initially misdiagnosed and treated for a hip flexor strain.

Clinical Features: A 36-year-old male patient presented with insidious onset of progressive anterior right hip and groin pain of 7 years' duration. He was diagnosed with a right-sided hip flexor muscle strain and was discharged from care 1 month later. The patient then returned to the office 8 years later for treatment of unrelated lower back pain. This time, the doctor of chiropractic learned that the patient was misdiagnosed years before. The patient's past radiographs in fact revealed FAI, including severe hip joint osteoarthritis on the right and mild osteoarthritis on the left. As a result, the patient had undergone right hip joint replacement surgery. Recent radiographs also revealed FAI in the contralateral hip.

Intervention and Outcome: After investigating for FAI, the doctor of chiropractic was able to identify through symptomatology, history, physical examination, and radiographs the presence of FAI in the patient's left hip. An "active surveillance" approach is being taken.

Conclusion: This case illustrates the importance of an increasing awareness of FAI, as doctors of chiropractic are frequently the primary contact for patients with this condition.

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Introduction

Hip and groin pain are clinical symptoms often encountered in chiropractic practice.¹ There are a variety of conditions that can cause pain in the hip

such as arthritis, bursitis, hip flexor strain, and sacroiliac joint dysfunction. Due to the similarities in the symptoms a thorough history and physical exam is critical to the correct diagnosis. Femoroacetabular impingement (FAI) is a condition resulting from shape abnormalities of the acetabular rim and proximal portion of the femur that can produce symptoms similar to the aforementioned hip conditions.¹ FAI is a relatively new diagnostic entity and is often misdiagnosed.²

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Three main types of FAI have been identified: cam, pincer, and a combination of both. The cam (or “pistol-grip”)-type impingement represents 65% to 75% of all cases of FAI.^{1,3} It is characterized by a non-existent or deficient offset between the femoral head and neck, morphologically resembling a pistol handle, and is usually seen in young active men, aged 20 to 30 years^{4–7} (Fig 1). The pincer type of FAI constitutes about 25% of all cases. It is caused by acetabular abnormalities (Fig 1) and is most often encountered in middle aged, active women.^{1–3,6,7} Fewer than 10% of patients have a combination of the 2 types.^{1,3,6}

FAI has been strongly linked to pain and premature degenerative changes in the hip joints of young adults.² It is estimated that the prevalence of FAI is as high as 14% in the general population.¹ FAI has only recently been identified as a diagnostic entity. It has been gaining recognition over the past 6 to 7 years, especially in the orthopedic literature.^{1–4}

While it has been observed that FAI may predispose to subsequent osteoarthritis (OA),⁶ the association of FAI morphology with the development of future OA remains poorly understood.⁶ However, early recognition of FAI may be of particular significance among Doctors of Chiropractic because early diagnosis and treatment may possibly delay or even prevent the development of OA.⁶ A lack of awareness of FAI has been shown to commonly lead to delays in diagnosis of an estimated 2 to 4 years.^{1,3,8} A study published in 2009 by Clohisy et al⁸ revealed that the mean time from the onset of symptoms to a definitive diagnosis of FAI was 3.1 years,^{1,8} and that patients were evaluated by an average of 4.2 healthcare providers before an accurate diagnosis was established.^{1,8}

The purpose of this case report is to describe a patient with FAI who was initially misdiagnosed and treated for a hip flexor strain. This case also illustrates the importance of increasing the awareness of FAI, as Doctors of Chiropractic are frequently the primary contact for patients with this condition.¹ The Medline, CINAHL, and Science Direct databases were searched using the terms, “femoroacetabular impingement syndrome,” in order to review the literature for this case.

Case Report

Initial Presentation

Initial History

A 36-year-old male truck driver presented for chiropractic treatment. His complaint was insidious

Fig 1. Types of FAI. Diagram showing a normal hip with unrestricted range of motion (top), a cam (or pistol-grip) deformity jamming into the acetabulum (middle), and a deepened acetabular fossa with impingement in the pincer-type (bottom). The osseous “bump” and acetabular over-coverage are highlighted (in dark grey) in the cam and pincer hip joints, respectively.

onset of progressive anterior right hip and groin pain of 7 years’ duration. The right hip and groin ached constantly, but was sharp and graded as 8/10, where 0 equals no pain and 10 equals the worst possible pain, particularly during sports activities (eg, ice hockey and running), walking upstairs, or after prolonged sitting. Over-the-counter non-steroidal anti-inflammatory medication (Ibuprofen, Motrin) self-prescribed by the patient was palliative. Dejerine’s Triad (ie, coughing, sneezing, or bearing down for a bowel movement) was negative. The patient participated in contact sports such as ice hockey and football throughout childhood, but reported no major hip injuries during that time or since. His medical, family, and social history were unremarkable.

Initial Physical Examination

Initial orthopedic examination, beginning with the Thomas and Nachlas’ tests,⁹ revealed a tight right

Table 1 Relevant Orthopedic Tests of the Hip

Name of Test	Description of Test	Positive Test Findings	Relevance of Positive Finding
Thomas ⁹	Patient lies supine. Knee is bent and thigh is flexed toward the abdomen.	If the spine does not flatten or flex and the contralateral hip does not extend as normal, it indicates a shortened iliopsoas muscle on the extended hip side.	Presence of a flexion contracture of the hip.
Nachlas ⁹	Patient lies prone. Patient's knee is flexed to 90° and then fully flexed approximating the heel to the buttock.	Pain is noted in the SI area or lumbosacral area; pain may also radiate down the thigh or leg.	SI or lumbosacral disorder.
Hibb's ⁹	Patient lies prone. Patient's pelvis is stabilized while the opposite knee is flexed 90°. Clinician then pushes the leg laterally, causing internal rotation of the femoral head.	Pelvic and/or hip joint pain.	Sacroiliac and/or hip joint lesion.
Yeoman's ⁹	Patient lies prone. Pressure is applied over the patient's SI joint. The patient's leg is then flexed and the SI joint hyperextended as the clinician lifts under the patient's knee.	Pain in the SI area.	Sacroiliac lesion.
Hip Impingement ¹⁹	Patient lies supine. Hip is internally rotated and adducted during passive flexion to 90°.	Reproduction of patient's symptoms (ie, groin and/or lateral trochanteric pain).	Impingement in the femoroacetabular/hip joint.
Fabere ⁹	Patient lies supine. Clinician holds the patient's ankle and flexes the patient's lower extremity at the knee. The patient's thigh is then flexed, abducted, externally rotated, and extended while the clinician stabilizes the patient's contralateral pelvis.	Pain in hip during maneuver, especially on abduction and external rotation.	Hip pathology.
Trendelenberg ⁹	Patient is standing and weight-bears through the symptomatic lower extremity.	Hip joint will adduct and pelvis will shift to the ipsilateral side if muscle weakness/hip joint pathology is present.	Gluteus medius weakness and/or hip joint pathology.

SI, sacroiliac.

iliopsoas muscle. Hibb's test provoked the anterior right hip pain. Yeoman's test was negative, but motion palpation revealed restricted sacroiliac joints. Lower limb neurologic exam was unremarkable, except for right hip flexor weakness graded as 4/5¹⁰ because of the hip/groin pain. Table 1 presents a list of orthopedic test descriptions.

Initial Diagnosis

Based on history, age, and examination findings, the Doctor of Chiropractic diagnosed the patient with a right-sided hip flexor muscle strain and sacroiliac joint dysfunction. The doctor was unfamiliar with FAI at this time.

Conservative treatment included chiropractic diversified (ie, "side-posture") high-velocity, low-amplitude sacroiliac joint manipulation, as well as Active Release Techniques procedures to stretch the right iliopsoas muscle. With this second method, the patient was placed in a left side-lying position with his right hip

flexed to 90°. Manual contact was then made and maintained through the patient's abdomen, over the right iliopsoas muscle belly, while he slowly extended his hip and knee to end-range. This active stretch procedure was repeated 3 to 5 times on each office visit. Home-based hip flexor and quadriceps stretches (each held for 15-30 seconds; 2-3 repetitions, 1-2 times per day) were prescribed. Outcome measures used were numeric rating scale for pain, visual estimation for range of motion (ROM), and orthopedic examination, including the aforementioned provocative tests.

Seven visits (over 8 weeks) provided only mild, short-term relief. Daily activities requiring forced and/or repetitive hip flexion (eg, ice hockey, yard work, or putting on socks) all remained provocative. In addition, orthopedic reassessment using the Nachlas' and Hibb's tests continued to provoke anterior right hip pain. On further follow-up 1 month later, however, and possibly through its natural course, the patient's hip was noted as "pain-free" resulting in subsequent discharge from care.

Fig 2. Cam impingement with severe unilateral hip degeneration and subsequent arthroplasty. (A) Pre-surgical AP pelvis and (B) right frog-leg radiographs showing severe right hip joint OA in this, now 38-year-old, man. Note the severe anterosuperior hip joint space narrowing on the right, along with mild narrowing of the contralateral joint space on the left (arrows). There is also a large osteophyte-like osseous projection extending from the posteroinferior margin of the right epiphysis (arrowhead). (C) Post-surgical AP hip and (D) frog-leg radiographs showing a total right hip arthroplasty.

Subsequent 8-Year Follow-Up

History

The patient returned 8 years later for treatment of an unrelated lower back injury. Upon reviewing the past right hip history with the patient, it was revealed that in 2006 (within 2 years of the first episode of hip and groin pain) the hip and groin problem eventually flared up again, resulting eventually in continued 80% loss of right hip ROM. This painful lack of mobility progressed to a point where the patient was unable to play recreational ice hockey. Radiographs ordered by his physician revealed severe right hip joint OA and mild left hip joint OA. As a result, the patient underwent a right hip arthroplasty procedure (Fig 2).

At this point in time, the patient's Doctor of Chiropractic had learned, through continuing educa-

tion, about the existence of FAI; and in retrospect, it became clear that the initial diagnosis 8 years earlier was in fact cam-type FAI with progressive and premature OA, erroneously diagnosed as a hip flexor strain.

Since recovering from arthroplasty, the patient's right hip has been "pain-free;" and despite experiencing an occasional ache in his left groin, he has returned to playing recreational ice hockey.

Physical Examination

On subsequent physical re-examination, the patient's right hip ROM was normal. His left hip ROM was mildly restricted (by 10%) in flexion, internal rotation, and adduction. The hip impingement test² was negative for anterior groin pain on the right, but was mildly painful when performed on the left.

Fig 3. Six years post-surgery. AP pelvis radiograph, taken 6 years after those in Fig 2, shows no change in the right hip prosthesis. Note also the unchanged appearance (i.e. lack of progressive OA) of the left hip joint (arrow), despite radiographic evidence of cam impingement.

New radiographs revealed no further progression of the left hip joint OA, despite radiographic evidence of cam impingement (Fig 3). At this point, therefore, joint-preserving FAI surgery¹³ has not been recommended for the patient's left hip. Rather, he has consented to an "active surveillance" approach; with advice to return to the Doctor of Chiropractic for re-evaluation should the left hip worsen.

Discussion

FAI usually presents in young adults aged 20 to 50 years, with a higher incidence in men.^{1,3,8} These patients are usually physically active and are involved in sports activities such as ballet, martial arts, soccer, ice hockey, and gymnastics—sports that involve movements of extreme ROM, especially repetitive hip hyperflexion, hyperextension, and internal and external rotation.^{1-3,8} Patients may also have a history of femoral neck fractures, slipped capital femoral epiphysis, or Legg-Calve-Perthes disease, disorders known to be associated with cam-type FAI.^{1,2} A typical patient with FAI experiences a gradual onset of intermittent groin pain and/or lateral trochanteric pain.^{3,8} Pain can also refer to the lower back, gluteal region, or knee.^{1,4} Pain symptoms often gradually worsen owing to progressive degeneration of the labrum and articular cartilage of the hip joint and can be aggravated by athletic activity, lengthy sitting, or walking.^{2,3} Patients often report having a catching, clicking, or locking feeling especially with sitting for long periods of time.^{1-3,6} The report of a dull ache or

Fig 4. Impingement test.¹⁹ The impingement test is performed with the patient supine. The patient's involved hip is flexed to at least 90° and is then passively maneuvered into adduction. The hip is then rotated internally which typically causes groin pain in patients with FAI as the femoral neck comes into proximity with the acetabular rim. (Color version of figure appears online.)

sharp pain with clicking and a feeling of "giving way" has a sensitivity of 1.0 and a specificity of 0.85 for diagnosing FAI.^{12,13} As in the current case however, a lack of knowledge about this relatively new diagnostic entity can result in patients with FAI being misdiagnosed and treated for other conditions with similar presenting symptoms (eg, groin strain, early OA, hernia, or a low back condition).^{11,14}

Physical examination and a detailed history are often helpful in the diagnosis of FAI. According to Byrd, identifying a hip joint problem through clinical assessment can be 98% reliable, however the examination procedures are poor for defining the exact nature of the disorder.¹⁵ In FAI, patients may exhibit a positive Trendelenburg sign.¹ In addition, the passive ROM of the involved hip is usually painful and restricted in flexion, internal rotation, and adduction.² Many orthopedic tests such as the FABERE test and the log roll test may be provocative but are nonspecific for FAI.¹ However, a positive impingement test is a very important finding indicative of FAI,¹ and is positive in up to 95% of FAI patients (Fig 4).

Radiographs including an anteroposterior (AP) pelvic projection and bilateral individual frog-leg hip projections usually reveal the presence of FAI.¹ The lateral projections can be used to look for inadequate head-neck offset (cam-type FAI) using the alpha angle.²⁰ Magnetic resonance imaging arthrography is nevertheless considered the best diagnostic tool in imaging studies for the diagnosis of FAI.¹ Notably, however, radiographic findings of FAI have been found in asymptomatic populations suggesting that not all cases will progress to OA and require surgery.²¹ Therefore, symptoms, clinical examination findings,

and imaging findings should all be considered in establishing the diagnosis (and subsequent management) of a patient suspected of having FAI.¹

Both conservative and surgical methods are available for the treatment of FAI; however, the initial management approach should be conservative therapy.^{4,17} Three recent publications have reported success with conservative management.^{18,20,22} Emara et al documented positive results in the conservative management of patients with mild FAI.¹⁸ In this study all patients underwent 4 stages of conservative treatment including the avoidance of excessive physical activity, the use of anti-inflammatory drugs, finding a safe range of movement and adapting to it, and modification of certain provocative activities of daily living (ie, avoiding the combination of flexion, adduction, and internal rotation of the hip).¹⁸ The observed improvement in function and symptoms with conservative treatment in this study remained as long as the patients could modify activities of daily living to adapt to their hip disorder.¹⁸ Conservative therapy is mainly palliative, however, and cannot correct the actual morphology of the underlying bone. Furthermore, chiropractic treatment focusing on high-velocity, low-amplitude manipulation of the FAI hip to improve passive ROM would be counterproductive and could exacerbate the condition.^{2,16} In instances where there is significant progression of FAI, joint preservation surgery may be warranted to remove the mechanical obstruction of bone to preserve the joint and prevent end stage OA,¹⁸ and to repair labral injuries and other internal joint derangements. In some cases of hip OA, however, conservative therapy including chiropractic hip joint manipulation can be beneficial, particularly in those patients who do not require and/or who are wishing to avoid joint replacement surgery.²³

This case is of importance because it illustrates a patient with FAI who was initially misdiagnosed and treated for another condition to little or no avail for the primary FAI condition. The patient went on to develop severe debilitating OA of the right hip and ultimately underwent a total hip arthroplasty. He also eventually developed a milder form of FAI and OA involving the contralateral hip. Over a follow-up period spanning 6 years, however, repeat radiographs failed to demonstrate any progression of OA in the contralateral hip despite evidence of cam impingement. This observation is consistent with the findings of other studies in which a substantial proportion of hips exhibiting radiographic signs of FAI did not go on to develop progressive OA over the long-term.^{24,25} This suggests that a conservative “active surveillance” approach is

warranted in the current case rather than a more invasive surgical preservation procedure for the patient’s contralateral hip. This case further demonstrates the importance of increasing the awareness of FAI among Doctors of Chiropractic as they are frequently the primary contact for patients with this condition.¹ This study is also unique in that it is the first single case report of a patient with FAI to be published in the chiropractic literature, as other chiropractic publications on this topic to date have been scarce.^{1,2,5}

Limitations

As this was a single retrospective case study, it is impossible to generalize the results in this patient to the general population of FAI patients. The paucity and disparity of literature on optimal conservative treatment and management protocols, including long term prognosis of FAI further limits the value of this case report. More research in the FAI literature is necessary to develop evidence-informed clinical practice guidelines for the conservative management of patients in the early stages of this condition. Further studies including randomized controlled and clinical trials, in conjunction with observational and clinical studies with long-term follow up are also necessary.

Conclusion

Hip and groin pain are common symptoms of patients seeking chiropractic care. These complaints may be associated with FAI, therefore it is crucial that Doctors of Chiropractic become familiar with this disorder in order to accurately diagnose and effectively manage patients with this condition. A prompt diagnosis may improve management of FAI and possibly delay the future development of hip joint OA.

Funding Sources and Conflicts of Interest

No funding sources or conflicts of interest were reported for this study.

Acknowledgment

The authors thank Scott Kish, of Kish Studio in Toronto, for artistic design and creation of the hip impingement illustrations used in this manuscript.

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