CE
1.5
ANCC
Contact
Hours

Femoroacetabular Impingement in Athletes

Joy A. Hessel

Besides professional sports, what do Alex Rodriguez, Michelle Kwan, and Greg Norman have in common? They all suffered from a condition called femoroacetabular impingement, or FAI. First identified by Dr. Reinhold Ganz, an orthopaedic surgeon in the mid-1990s, FAI has gained recognition in recent years as more professional athletes have been diagnosed with this condition. Characterized as a condition involving an abnormal morphological shape of the femoral head (cam type deformity) or acetabulum (pincer type deformity) of the hip joint, FAI is commonly diagnosed after the athlete complains of hip or groin pain and restricted range of motion (S. Anderson, K. Siebenrock, & M. Tannast, 2010, p. 8). Femoroacetabular impingement is often diagnosed in young, active individuals, such as athletes, and can be successfully managed and treated. In this article, types and diagnosis and management of FAI in athletes, as well as measures to successfully return athletes to participation in sports, are discussed.

Introduction

Femoroacetabular impingement (FAI) was first identified by Dr. Reinhold Ganz, an orthopaedic surgeon in the mid-1990s. Although a rather new diagnostic problem, FAI has been gaining recognition recently as professional athletes have been diagnosed and treated for this condition. Femoroacetabular impingement is described as a pathological condition caused by abutment between the proximal femur and acetabulum (Banerjee & Mclean, 2011, p. 23). Because of the physical demands on the hip joint in athletics and other activities, young, active persons are often diagnosed with FAI. In this article, types, diagnosis, and management of FAI in athletes and active persons, as well as measures to successfully return them to an active lifestyle, are discussed.

Types of FAI

First recognized in the mid-1990s, FAI is an osseous abnormality of the proximal femur or acetabulum of the hip joint (Philippon, Schenker, Briggs, & Kuppersmith, 2007, p. 908). Femoroacetabular impingement is classified as either a cam deformity, or hip impingement involving the femoral head, and/or pincer deformity, or abnormality of the acetabulum. A cam deformity is described as a nonspherical or prominent femoral head, which causes restricted motion as the femoral head is jammed into the acetabulum with hip flexion (Parvizi, Leunig, & Ganz, 2007, p. 562) (see Figure 1). For example, an athlete may experience hip or groin pain with flexion, such as a hockey goalie in a defensive stance, that is intermittent and exacerbated by increased demands on the hip joint. Cam deformities are commonly found in men aged 20–30 years and may result in damage and tearing of the labrum. A pincer deformity is an abnormality of the acetabulum and is characterized by focal or general overcoverage of the femoral head or acetabular retroversion (Tannast, Siebenrock, & Anderson, 2007, p. 1540). This type of hip impingement results in repeated abutment of the femoral neck into the rim of the acetabulum with flexion of the hip and may result in pain with athletic and everyday activities and restricted range of motion. Degeneration and damage of the labrum with further development of ganglion cyst formation and ossification of the rim may occur with this type of impingement (Parvizi et al., 2007, p. 562). Pincer deformities are more often found in physically active women aged 30–40 years. Cam and pincer impingement deformities may be found independent of each other or are commonly discovered together as mixed cam and pincer pathology. In fact, it is estimated that 86% of patients diagnosed with FAI have mixed cam and pincer impingement, with only 14% of patients diagnosed with either cam or pincer deformity (Tannast et al., 2007, p. 1540).

Clinical Manifestations and Diagnosis

Athletes with FAI will present to the healthcare setting with common complaints. The slow onset of groin pain may develop with hip flexion or mechanical overload of the hip (Schoenecker, Clohisy, Millis, & Wenger, 2011, p. 276). Symptoms may also be present during periods of sitting and may radiate to the knee and thigh on the affected side. Unfortunately, groin pain in athletes is commonly misdiagnosed as a groin strain or pull and the athlete is not properly treated and continues to be

Joy A. Hessel, APNP, FNP-BC, Family Nurse Practitioner, Marshfield Clinic- Cadott Center, Cadott, WI.

The authors and planners have disclosed no potential conflicts of interest, financial or otherwise.

DOI: 10.1097/NOR.0000000000000045

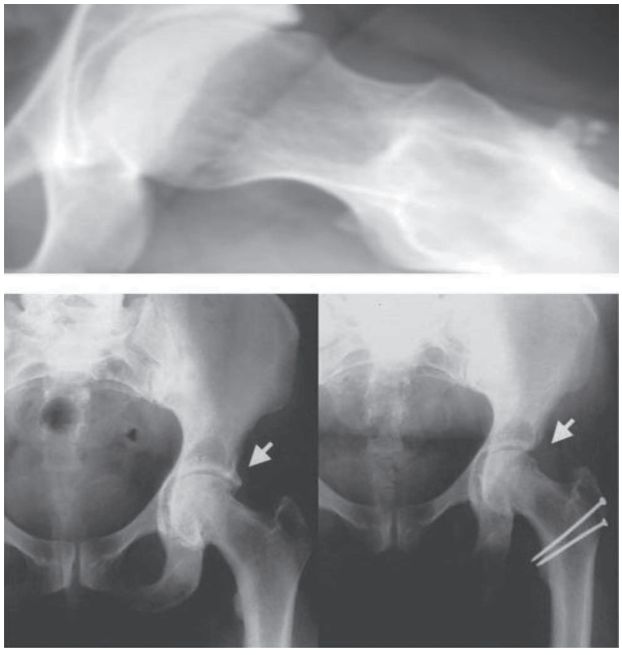

Figure 1. Clinical manifestations and diagnosis. From "Femoroacetabular Impingement," by J. Parvizi, M. Leunig, and R. Ganz, © 2007, *Journal of the American Academy of Orthopedic Surgeons, 15*(9), p. 563. Reprinted with permission.

symptomatic with activity. Symptoms of FAI are also frequently mistaken for knee or abdominal etiology, and patients have had unnecessary laparoscopy, knee arthroscopy, and inguinal hernia repairs, resulting in mistreatment and loss of play. Moreover, athletes with FAI may also have restricted range of motion of the hip and complain of limited flexibility despite stretching. Even everyday activities, such as sitting cross-legged, for example, may be challenging for athletes with FAI. Some patients may also complain of gluteal or trochanteric pain, often secondary to an abnormal gait pattern or hip morphology (Sierra, Trousdale, Ganz, & Leunig, 2008, p. 690). Athletes commonly diagnosed with FAI include those whose sport demands excessive flexion and demands on the hip, such as football, hockey, figure skating, golf, rugby, martial arts, tennis, baseball, and volleyball (Philippon et al., 2007, p. 908).

Diagnosing FAI includes a thorough patient history, examination, and radiographic imaging. Clinical examination of the hip often reveals restricted range of motion, notably internal rotation and flexion of the hip (Tannast et al., 2007, p. 1540). Impingement testing is often positive and is done with the patient supine on the examination table (see Table 1). With the hip positioned at 90° of flexion, maximum internal rotation and adduction of the hip are executed (Sierra et al., 2008, p. 691). If positive, impingement testing causes the patient groin discomfort as the femoral head makes abnormal contact with the acetabulum, and FAI is considered as a differential diagnosis. Furthermore, radiographic imaging is essential in diagnosing FAI in an athlete and helps the clinician assess for other hip etiology, such as osteoarthritis or hip dysplasia. Radiographs should include a standing true AP pelvis and axial cross-table image of the proximal femur (Tannast et al., 2007, p. 1541) (see Figure 1). A magnetic resonance imaging is needed to visualize and assess the labrum and acetabular cartilage. Higher magnetic field strengths (3-T magnetic resonance imaging), with increased spatial resolution and three-dimensional sequences, are often recommended for enhanced visualization of the labrum and hip anatomy (Anderson Siebenrock, & Tannast, 2010, p. 11). If FAI is suspected, a referral to an orthopaedic surgeon knowledgeable on this condition is recommended.

Management of FAI

Treatment goals with athletes diagnosed with FAI include minimizing or relieving symptoms, improving motion, and returning to play. Nonsurgical management includes modification of activities, avoidance of aggravating activities, and the use of nonsteroidal anti-inflammatory medications for symptomatic periods. Physical therapy may be prescribed to help improve range of motion; however, this is often not successful in improving motion and can exacerbate symptoms (Parvizi et al., 2007, p. 565). Duration of conservative management is individualized and depends on the level of activity and goals of the patient. Conservative measures, however, often fail with athletes because of the physical demands on their body and underlying bony deformity, and surgical intervention is often warranted

Table 1. Summary of Three Common Primary Physical Examination Tests/Signs Associated With Femoroacetabular Impingement

FADIR Test	This is the classic impingement test. With both hips initially extended while lying supine, the affected hip is then brought into a 90° flexed position and concurrently internally rotated and adducted. Reproduction of the patient's pain suggests the possibility of a labral tear and /or FAI.
FABER Test	This test is performed in the supine position. Both the unaffected and affected hips are sequentially brought into a flexed, abducted, and externally rotated position. A positive test is defined as asymmetry between the knee and the table of the affected and unaffected sides. Also called the Partick test. May be positive with intra-articular hip lesions, iliopsoas pain, and sacroiliac diseases.
McCarthy Sign	The examination starts with both hips in a flexed position. The affected extremity is then extended in external rotation followed by internal rotation. The sign is considered positive when the patient's pain is reproduced with the maneuver, suggesting the possibility of an acetabular labral tear.

Note. FABER = flexion abduction external rotation; FADIR = flexion adduction internal rotation; FAI = femoroacetabular impingement. From "Femoroacetabular Impingement and Acetabular Labral Tears," by L. Rylander, J. Froelich, W. Novicoff, & K. Saleh, 2010, *Orthopedica, 33*(5), p. 344. Reproduced with permission of SLACK Incorporated.

if they continue to be active in sports and other intense activities (Banerjee & Mclean, 2011, p. 30).

If conservative measures fail to manage symptoms, surgical intervention is recommended. Hip arthroscopy has been found to be both safe and effective in athletes with FAI with intra-articular injuries (Philippon et al., 2007, p. 912). Performed by a trained orthopaedic surgeon, hip arthroscopy involves reshaping the femoral head or acetabulum to correct the deformity and improve range of motion. Moreover, damage or degeneration of the labrum would be corrected at this time. A labral repair, resection, or debridement may be performed, and some patients may require a partial synovectomy, chondroplasty, microfracture (to stimulate cartilage growth), or debridement of the ligamentum teres (Schoenecker et al., 2011, p. 283). Recovery may be faster following arthroscopic intra-articular surgery than with open surgical approaches (Schoenecker et al., 2011, p. 283). A study conducted with 45 professional athletes with FAI following hip arthroscopy and decompression found that 42 athletes (93%) returned to professional competition after surgery (Philippon et al., 2007, p. 908). Likewise, a study found that arthroscopic labral tear repair combined with correction of FAI was effective in that 78% of athletes remained active at 1.5 years after surgery (Banerjee & Mclean, 2011, p. 31). Hip arthroscopy was developed to treat the physically active patient, such as athletes, and has been successful in treating these patients and returning them to an active lifestyle. In addition, hip arthroscopy has improved patient's pain postoperatively, compared to their preoperative status (Sierra et al., 2008, p. 701). For example, a study of 158 patients who underwent hip arthroscopy for FAI found that 50% of their pain was resolved by 3 months, 75% by 5 months, and 95% by 1 year after surgery (Parvizi et al., 2007, p. 568). The treatment goals in hip arthroscopy are aimed at symptom reduction or abatement, improved range of motion, and delaying further damage to the hip and postpone the need for prosthetic placement. The recovery time following surgery depends on the surgical procedure and the patient's condition and activity goals, and postoperative management often includes supervised physical therapy to help restore range of motion and monitor the athlete's progress.

Conclusion

Although a rather new diagnostic problem, FAI is gaining recognition among healthcare professionals caring for athletes and active persons. Treatment and management of this condition is often successful in returning athletes to play but requires healthcare professionals be knowledgeable on this condition and an accurate diagnosis be made. Additional research and education on FAI in athletes are necessary to inform healthcare professionals, coaches, athletic trainers, and others working with athletes on this condition so that a diagnosis and treatment plan are developed, and athletes can return to their active lifestyle.

References

Anderson, S., Siebenrock, K., & Tannast, M. (2010). Femoroacetabular impingement: Evidence of an established hip abnormality. *Radiology*, *257*(1), 8–13.

Banerjee, P., & Mclean, C. (2011). Femoroacetabular impingement: A review of diagnosis and management. *Current Review Musculoskeletal Medicine*, (4), 23–32.

Parvizi, J., Leunig, M., & Ganz, R. (2007). Femoroacetabular impingement. *Journal of the American Academy of Orthopedic Surgeons*, *15*(9), 561–570.

Philippon, M., Schenker, M., Briggs, K., & Kuppersmith, D. (2007). Femoroacetabular impingement in 45 professional athletes: Associated pathologies and return to sport following arthroscopic decompression. *Knee Surgery, Sports Traumatology, Arthroscopy*, *15*, 908–914.

Rylander, L., Froelich, J., Novicoff, W., & Saleh, K. (2010). Femoroacetabular impingement and acetabular labral tears. *Orthopedics*, *33*(5), 342–350.

Schoenecker, P., Clohisy, J., Millis, M., & Wenger, D. (2011). Surgical management of the problematic hip in adolescent and young adult patients. *Journal of the American Academy of Orthopedic Surgeons*, *19*(5), 275–286.

Sierra, R., Trousdale, R., Ganz, R., & Leunig, M. (2008). Hip disease in the young active patient: Evaluation and nonathroplasty surgical options. *Journal of the American Academy of Orthopedic Surgeons*, *16*(12), 689–703.

Tannast, M., Siebenrock, K., & Anderson, S. (2007). Femoroacetabular impingement: Radiographic diagnosis—what the radiologist should know. *Am J Roentgenol*, *188*, 1540–1552.