

Hips

Hip pain in sport

Adam Smith looks at one of the most common causes of hip pain – femoroacetabular impingement (FAI)...

Over the last 10 years, with the advent of MRI and hip arthroscopy, the reported incidence of hip labral and acetabular rim pathology has significantly increased⁽¹⁾. Hip pain is a common cause of loss of training/game time with up to 15% of all AFL injuries reported as hip pain⁽¹⁾.

What is FAI?

FAI occurs when the femur impinges on the acetabulum. This occurs due to an anatomical variation in either the femur or acetabulum and is present in up to 20% of the population.

FAI is categorised into three main types (see Figure 1):

1) **Cam impingement** – this is the most common type of FAI and is most often seen in young males⁽³⁾. It refers to a “bump” most frequently on the anterior and or superior part of the femoral neck. In a cam lesion, the normally concave head/neck junction of the femur appears flattened or even convex⁽²⁾ as the hip flexes, adducts and internally rotates this part of the femur then abuts against the acetabulum. Repetitive abutment applies shear stress to the articular cartilage causing delamination and labral tears can eventually occur⁽²⁾. The cause of these anatomical variations on the femoral neck is unknown but a couple of theories have been proposed. Cam lesions may have a genetic predisposition and/or they may occur due to over-activity of the epiphyseal plate (due to increased load) during adolescence^(2,3). Most likely it is a combination of both of these factors. Ganz (2003) proposed that cam lesions may predispose the athlete to early osteoarthritis of the hip with up to 40% of OA hips showing signs of a cam lesion⁽²⁾.

2) **Pincer impingement** – this refers to over-coverage of the acetabulum with a normal appearing femur. Acetabular abnormalities that may cause pincer impingement

include a retroverted acetabulum, protrusion acetabula or osteophytic growth. This type of impingement is commonly seen in middle-aged females.

3) **Mixed presentation of both cam and pincer impingement** – this describes the case where both cam and pincer impingement are present. It is important to understand that these are anatomical variations and are not in themselves the pathology but they may predispose the athlete to hip pathology both in the short and long term.

How is FAI diagnosed?

Subjective assessment

FAI is most commonly found in male athletes. They will often report a long history of hip tightness or groin pain. They may report that their hip pain started with a minor trauma but never resolved. They often report that their “hip flexors” have always been tight particularly after prolonged sitting and that they could never sit cross-legged. Labral tears should be suspected if the athlete describes a click or grating, giving way or locking feeling⁽¹⁾.

Objective assessment

FAI should be suspected in athletes who have restricted hip ROM especially into internal rotation in 90 degrees of hip flexion. This can be measured in either supine or sitting. These athletes will most likely also have a painful FADIR and restricted and painful FABER⁽⁴⁾. Several tests have been described as diagnostic for a labral lesion; these include: FADIR, FABER, impingement provocation test and Fitzgerald test. In Leibold’s systematic review they found that the current best evidence that a negative finding for these tests gives the clinician good evidence that there is no labral tear present; however, no test has sufficient specificity to confidently predict when a labral tear is present⁽⁵⁾.

Imaging

Imaging is needed to confirm the clinical diagnosis of FAI. Osseous abnormalities may be seen on x-ray (but can be missed). If a bony impingement is suspected then a CT scan has increased accuracy; however, you should be aware of the increased radiation dosage associated with CT scanning and a CT scan does not specifically identify labral or cartilage lesions.

MRI can be utilised to identify articular cartilage and labral pathologies; however, for imaging the labrum MR arthrography seems to produce superior results⁽⁴⁾.

Treatment

Conservative treatment

At this stage there is no clear evidence on when conservative or operative treatment are required. In cases where imaging shows minor signs of FAI and no other significant pathology of the hip, conservative treatment should be trialled.

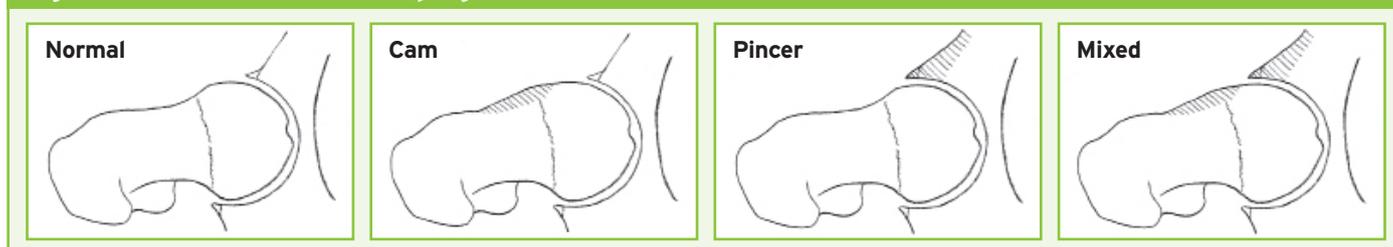
1) Education

These athletes should avoid positions and exercises that impinge the hip (hip F angle >90deg) *ie* deep squats, leg press especially in incline machine and high step-ups. Some common positions that should be avoided are sitting in low chairs where knees are higher than hips, sitting cross-legged and standing with a hip hitched to one side. These athletes, if they sleep on their side, should be encouraged to use a pillow between their knees and feet to help keep their hip out of flexion and adduction.

2) Soft tissue work and manual therapy

Soft tissue work through TFL, ITB and adductors can be very useful to decrease tone in these muscles. This can be done in a variety of different ways including trigger point work, massage, roller and dry needling. Manual therapy techniques to restore normal arthrokinematics of the hip are also very useful in decreasing symptoms.

Figure 1: Femoroacetabular impingement (viewed from above)



Normally as the hip flexes, the femur glides slightly posterior and conversely as the hip extends the femur should glide slightly anteriorly in the acetabulum.

Considering these arthrokinematics, manual therapy techniques that posteriorly glide the femur are very useful in athletes that have poor posterior glide of the femur during hip flexion (see Figure 2). Techniques that anteriorly glide the femur may be useful in athletes who lack hip extension. Lateral glides of the femur have also been shown to be quite useful to decrease symptoms and increase range in athletes with FAI.

Figure 2: Posterior glide of the femur



3) Exercise therapy

What are the best rehabilitation exercises to do?

In all cases of hip pain, exercise therapy is essential to ensure long-term effects of treatment. Particular focus should be given to the hip abductor and hip extensor muscles.

The hip abductor synergy comprises of glut medius, superior glut max and TFL. Often in athletes, TFL is overactive and the gluteal component of the abductor synergy is weak. Recently, Selkowitz and colleagues, using EMG, set out to identify which exercises specifically target the gluteal muscles whilst minimising activity of the TFL⁽⁷⁾. The results of their study identified the five exercises that showed strong activation of gluteus medius and superior glut max with the least activity of TFL (in healthy volunteers).

- 1) Clam – activation of glut med and glut max was maximised when the pelvis was in a neutral position (vs a reclined position) and the hip was flexed to 60deg⁽⁶⁾ (see Figure 3).
- 2) Side walking with band around thighs in a squatted position was also shown to have minimal TFL activity (see Figure 4).
- 3) Single-leg bridge (see Figure 5).
- 4) Quadruped hip extension – with short and long lever (see Figures 6 and 7).

Figure 3: Clam



Figure 4: Side walking with band round thighs



Figure 5: Single leg bridge



In humans the glut max works in two ways – one, it extends and abducts the hip; and secondly it controls flexion of the trunk in standing and walking. If this muscle is weak then it is important that we as clinicians consider including both actions when developing a rehabilitation exercise program. An example of an exercise that targets the component of the glut max that controls trunk flexion is the Romanian deadlift (see Figure 8).

The above exercises are very good for isolating gluteal activation and as the athlete progresses through their rehabilitation further load and multidirectional movement should be incorporated into the program. Some examples of exercises that strengthen both the abductor and extensor muscles of the hip include:

- 1) Split squat with band (see Figure 9);

Figure 6: Quadruped hip extension – short lever



Figure 7: Quadruped hip extension – long lever



Figure 8: Romanian dead lift



Figure 9: Split squat with band

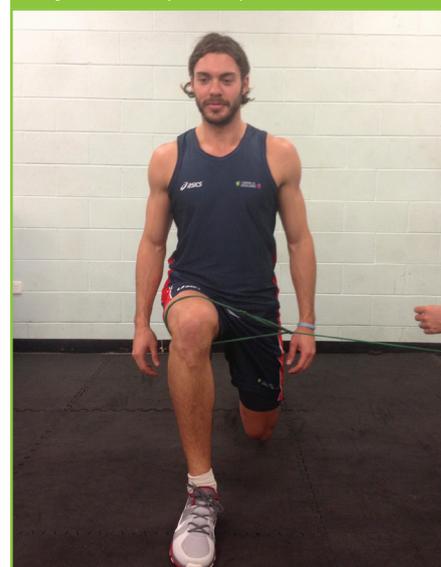


Figure 10: Split squat with rotation



2) Split squat with rotation (see Figure 10);
3) Wood chop high to low or low to high (see Figures 11 and 12).

The resistance band and pulleys are used in each of these drills to facilitate the hip abductor synergy muscles to work.

Operative treatment

If conservative treatment fails or if a significant bony lesion or labral tear is identified then surgery may be required. The goal of surgery would be to not only repair/treat the labral lesion or chondral pathology but also relieve any bony abutment. Historically this was done through an open procedure but most surgeons now are doing these procedures through arthroscopy. Chondral pathology may be seen and delaminated components will be trimmed/shaved and chondroplasty, drilling and microfracturing may be used to help stimulate fibrocartilage regrowth. Labral tears associated with FAI occur most commonly on the anterosuperior rim. Where possible these should be repaired rather than resected, as removing

Figure 11: Wood chop high to low



large parts of the labrum alter hip mechanics, which may lead to further damage. To restore the normal anatomy of the femoral head/neck junction if a cam lesion is present, a femoral osteoplasty/chielectomy should also be performed.

Conclusion

Hip pain is a common cause of loss of training and game time in a variety of different sports. This article has outlined the various types of FAI and possible conservative treatment options. Rehabilitation exercises are an essential part of the rehabilitation program of athletes with hip pain and a variety of exercises that specifically target the gluteal muscles have also been described.

References

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Figure 12: Wood chop low to high



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