

Femoral Acetabular Impingement and Labral Tears of the Hip



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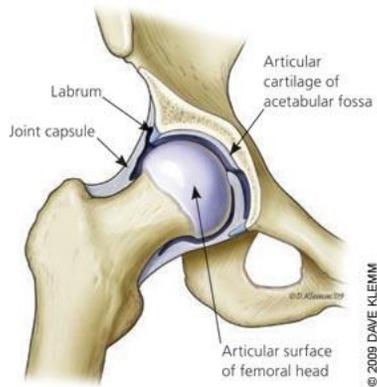
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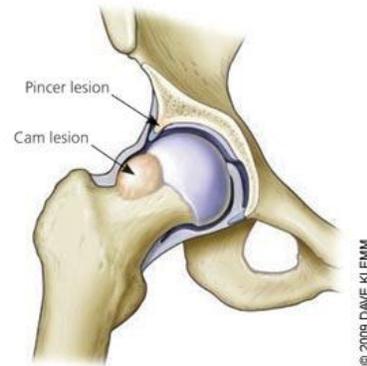
What is Femoral Acetabular Impingement (FAI)?

Impingement occurs when the ball shaped head of the femur rubs abnormally or pinches (impinges) the acetabular socket. Damage to the hip joint can occur to the articular or labral cartilage.

Normal Hip Anatomy

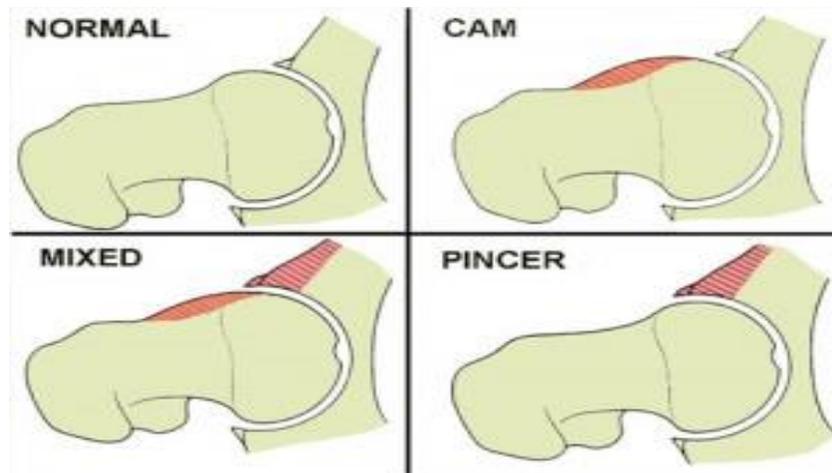


Lesions that occur with Impingement



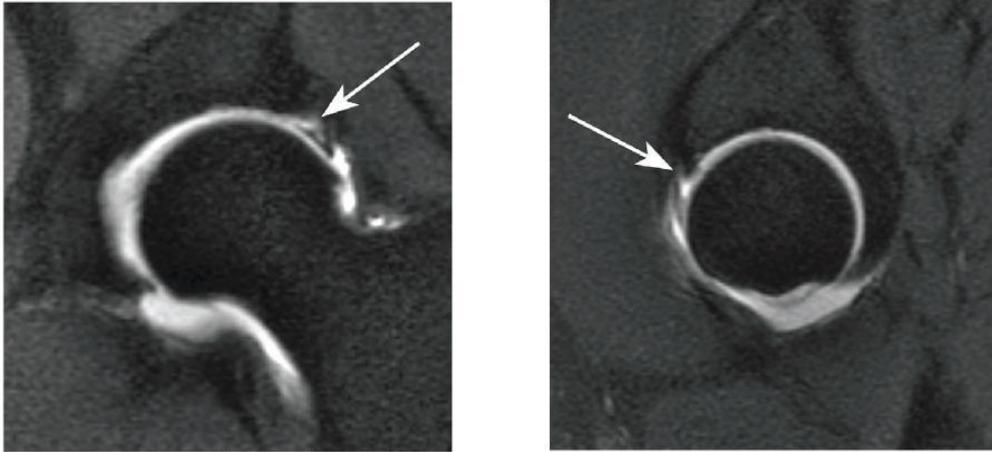
What types of FAI are there?

There are three types of FAI. The first involves an excess of bone along the neck of the proximal femur: this is known as a Cam deformity. The second is due an excessively deep socket or an abnormal tilt of the acetabular socket and is known as the Pincer deformity. The third is a mixture of the preceding two forms (most common scenario). The result of any of these deformities is increased friction between the acetabular cup and femoral head which may result in pain and loss/reduction of hip function.

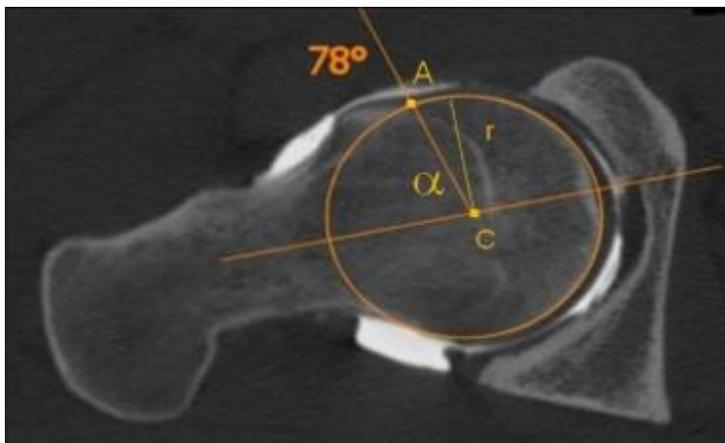


What is a labral tear?

The acetabular labrum is a fibrous structure which forms a gasket seal around the femoral head. The labrum may be damaged or torn as part of an underlying process such as FAI or may be injured directly by a traumatic event. Damage to the labrum can produce either groin pain or pain in the distribution of a "C" around the hip joint. If left untreated, both FAI and labral tears may progress to arthritis of the hip joint requiring a total hip replacement. The labrum is typically imaged with a MRI arthrogram, which includes an injection of contrast directly into the hip joint.

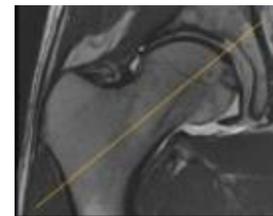


The arrows in the above picture highlight an anterior-superior labral tear. The bright white area in the images is the MRI contrast (or fluid) and the arrows indicate an area where contrast is flowing between the labrum and the acetabulum indicating a tear.



Notzli H.P., Wyss T.F., Stoecklin C. H., Schmid M. R., Treibef K., Hodler J.
The contour of the femoral head-neck junction as a predictor for the risk of anterior impingement.
J. Bone Joint Surg Br. 2002,84 556-560.

Acquisition in axial plane parallel to the neck-shaft.



C: center of the femoral head

r: radius of the femoral head

A: point where the distance $AC > r$

α: angle between the axis of the neck and AC

Normal: $>55^\circ$

An MRI may also be utilized to measure the severity of bony abnormalities in FAI. This defect is often described as the alpha angle of the hip. The alpha angle helps to determine the size of cam impingement; the larger the alpha angle, the larger the cam impingement lesion (generally >50-55 degrees indicates cam impingement).

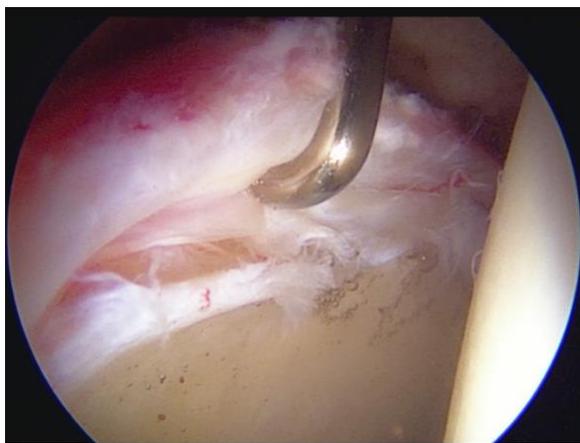
How are FAI and/or a labral tear treated?

There are non-operative treatment options available for FAI and labral tears: formal physical therapy, activity modification and often injections may lead to a decrease in pain and improved function.

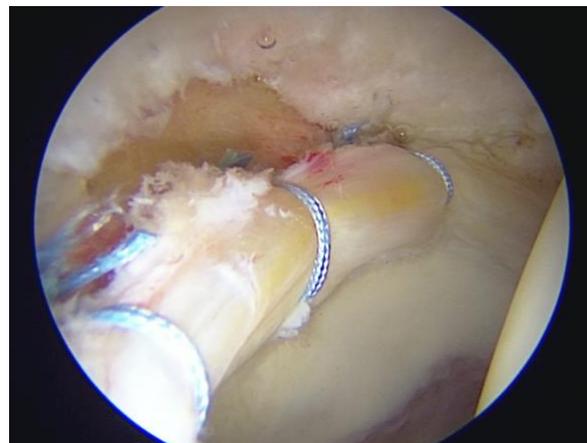
Surgical intervention may become necessary depending on the activity and lifestyle demands of the patient. In the past, FAI and labral repairs were performed in an open surgical fashion. Advancements in arthroscopic techniques have allowed the arthroscopic approach to FAI correction and labral repairs to become the standard of care at this time.

The use of intra-operative fluoroscopy (live x-ray) allows precise placement of arthroscopic portals as well a determination of the amount of bony resection necessary to fully treat the underlying condition of the hip. Using 2 portals, with and without traction on the hip joint, the surgeon can gain access to different regions of the hip joint to treat: both cam and pincer impingement, fix or even reconstruct labral tears, fully evaluate and treat conditions affecting the joint lining of the hip and even repair instability cases in the hip.

Labral Tear



Labral Repair



Case Example

Patient History:

A 22-year-old female collegiate soccer goalie dove to her left to make a save in the closing minutes of the championship game to preserve a 1-0 victory. As she got up to celebrate she noticed a sharp pain in her left groin and hip. Over the next few days, the acute pain slowly resolved but she continued to have a “popping” sensation with hip flexion activities and an underlying dull ache.

A weeks’ worth of post-injury rest and treatment with analgesics, ice packs and soothing heat proved ineffective. The athlete’s athletic trainer and primary care doctor both agreed she needed to be evaluated by an orthopedic specialist.

A history, physical examination, and x-rays were obtained which all pointed to an injury to the cartilage lip around the hip socket called the labrum. This diagnosis as well as a predisposing condition called femoral acetabular impingement (FAI) was confirmed using an MRI arthrogram. FAI is a bony incongruence of the ball (femur) and socket (acetabulum) where provocative positions of the hip can lead to pinching (impingement) of the hip labrum.

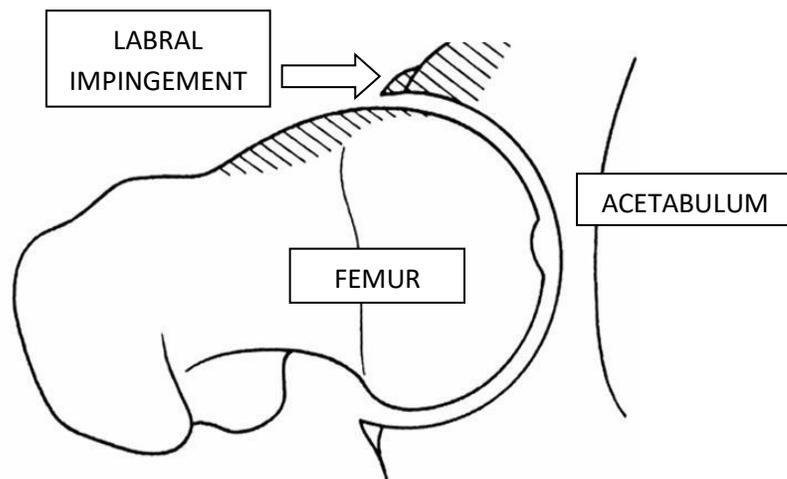


Figure 1

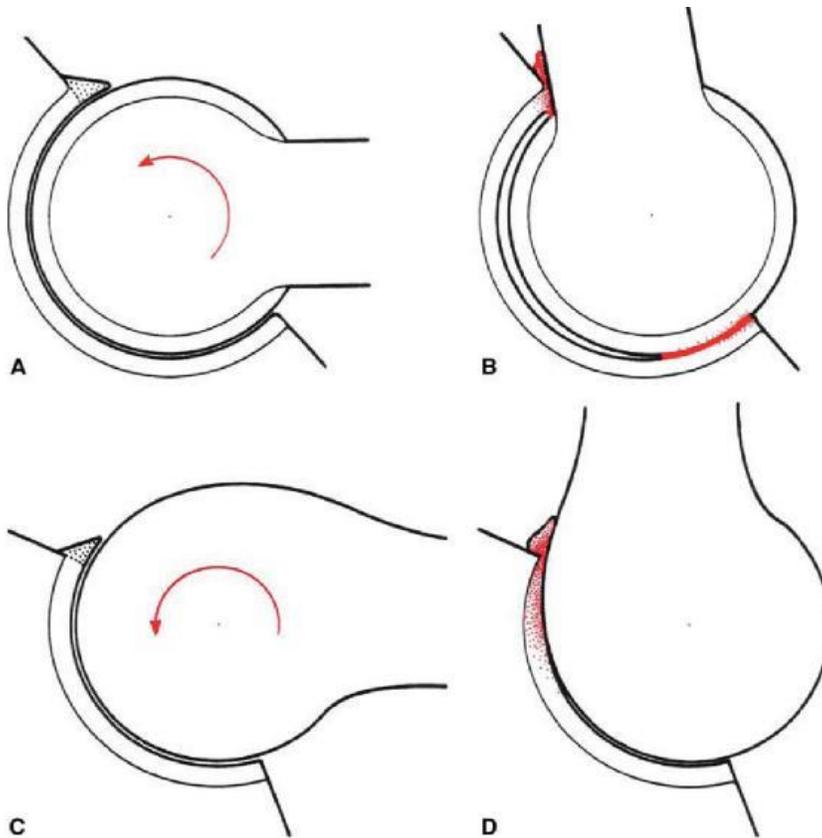


Figure 2

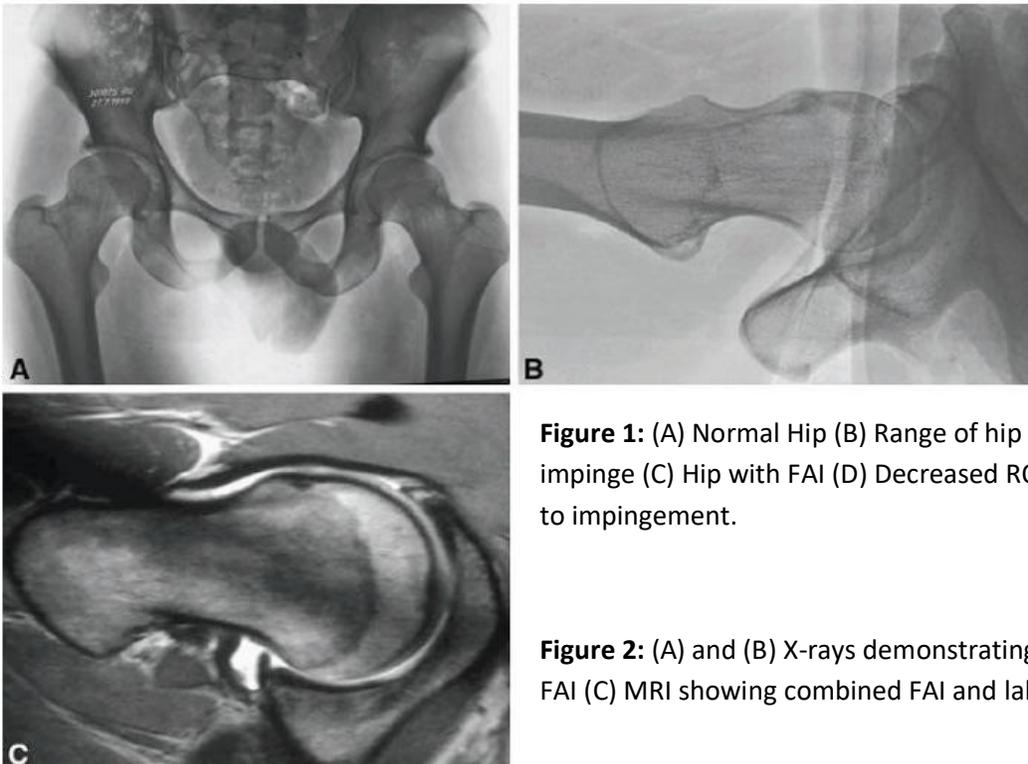


Figure 1: (A) Normal Hip (B) Range of hip motion to impinge (C) Hip with FAI (D) Decreased ROM required to impingement.

Figure 2: (A) and (B) X-rays demonstrating right hip FAI (C) MRI showing combined FAI and labral tear.

Treatment Plan:

After a course of non-operative treatment including formal supervised physical therapy was ineffective, the patient elected to proceed with a surgical intervention. Minimally invasive hip arthroscopy was offered to treat both the labral tear and the underlying bony femoral-acetabular impingement. The underlying bony impingement needed to be addressed simultaneously because its presence would leave the patient vulnerable to re-injury of the hip labrum, persistent pain, and potentially progression to hip arthritis. The two repairs were scheduled to be performed in a single 2-hour operation.

The patient was then brought to the operating room where she was positioned on a well padded table and then went to sleep. The hip arthroscopy was begun with distending the joint with gentle traction. Through a series of “poke” holes to allow a pencil sized camera and equipment to enter the hip joint, the labral tear was repaired, the bony overgrowth along both the rim of the socket and femoral head was removed and her normal anatomy was restored. She recovered from anesthesia without difficulty and was feeling well enough in the recovery area to be discharged home the same day following surgery.

Careful post-operative care including the use of crutches, early range of motion, and a closely supervised physical therapy regimen was essential to her recovery. By the next season she had returned to the field to lead her team on to the defense of their national title.

Post-operative Protocol:

The initial phase of rehab (first 6 weeks) protects the repair and works on improving range of motion. Patients will be placed on crutches with restricted weight bearing for approximately 3 weeks depending on what was performed during surgery. Stationary bike can be started as soon as the patient acquires adequate range of motion (typically within the first 2 weeks), swimming will be initiated as early as 4 weeks, and by 6 weeks, patients will usually have a normal gait without limp for intermediate distances.

The second phase of rehab will focus on regaining full range of motion and strength. By 3 months, patients will begin functional activities (early sport specific training and drills) with therapy supervision. By the 4-6 month mark, if the patients have regained full strength, endurance and motion, they are allowed to return to sport. However, patient outcomes may continue to improve over the first year after surgery.