Sports Medicine
University of Colorado

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HIP ARTHROSCOPY

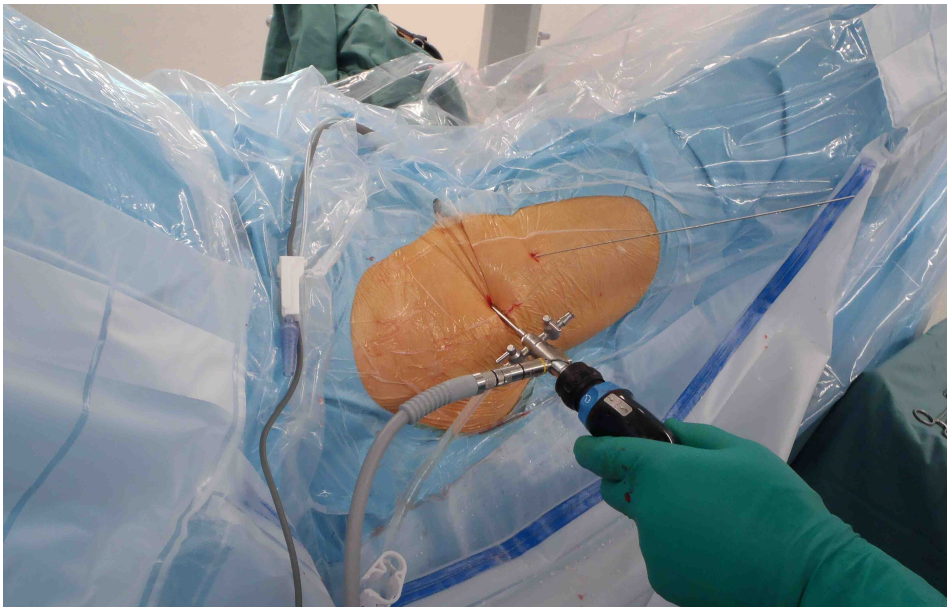
What is an arthroscope?
An arthroscope is a small telescope that allows the surgeon to investigate and treat a joint without making a large incision. The part of the telescope that is inserted into the joint is roughly the same size and length as a pencil. The telescope is attached to a small video camera that produces a high resolution image on a television screen.

Another small puncture incision is made to allow instruments to access the joint. Specialised instruments such as scissors, graspers and cutters are used as well as motorised shavers and burrs. More recently radiofrequency devices have been developed which can both cut and coagulate with minimal damage to the surrounding tissue.

How are instruments placed into the hip joint?
The patient can be positioned on the operating table either on their back or on their side with traction applied to the leg. A muscle relaxant is included in the anaesthetic to facilitate distraction of the hip joint. The traction device has a large padded bolster that protects the patient's groin and a traction boot that looks similar to a ski boot allowing traction to be applied the affected limb. In this way the hip joint can be distracted by 1-2 centimetres allowing the insertion of instruments to proceed without damage to the surrounding joint.

The two puncture holes are roughly 1cm in size and are located about 10cm apart around the bump of the hip bone.

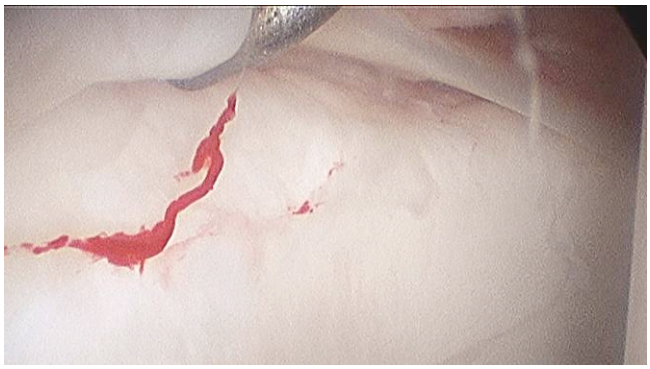
Patient positioned for surgery



The sterile drapes in place with instruments inserted

What is a labral tear?
The labrum is a lip or rim of fibrous cartilage attached to the edge of the acetabulum (hip socket). The exact function of the labrum is not fully clear but it does appear to act as a suction seal for the hip joint and helps spread the lubricating fluid evenly. It may also have a small weight bearing function.

The labrum maybe damaged with certain twisting movements of the hip which bring the neck of the femur (the part of the thigh bone attached to the ball of the hip joint) in to contact with the labrum. The labrum can be torn from its attachment to the edge of the socket.



The metal probe is opening the labral tear

A labrum tear can produce mechanical symptoms such as clicking and catching in the hip as well as pain which is frequently felt in the groin. The pain can be during activities such as walking or jogging but is also felt at rest with patients complaining of aching in the hip at night in bed or while sitting with the hip flexed such as while resting in a low chair.

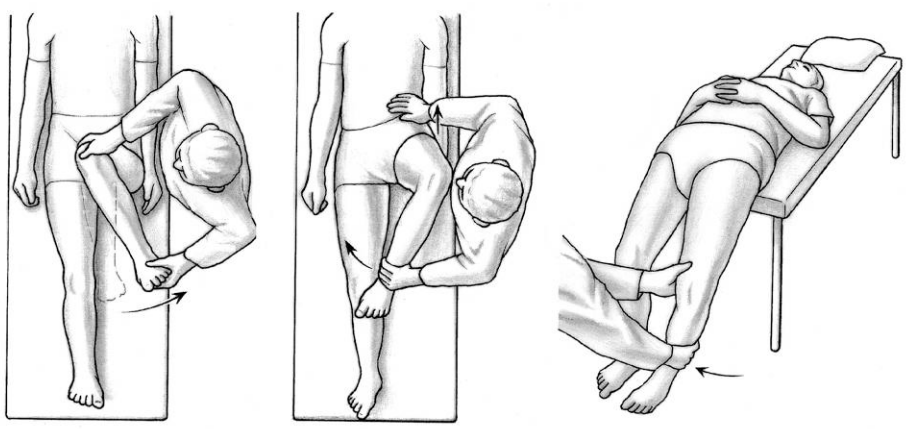
The labrum probably does have some healing potential and it is usual to wait three to six months to see if symptoms abate. Frequently however, by the time my patients come to see me the injury is at least six months old.

Labrum tears are more commonly seen in young athletes who participate in sports requiring a large range of hip motion. Examples of this would be gymnastics, dancing and martial arts. If the athlete is very flexible it is more easy to bring the femoral neck in to contact with the labrum at extreme ranges of flexion and internal rotation of the hip.

How do you diagnose a labral tear?
The history is usually one of a twisting injury followed by persistent groin pain that will not settle. Some times, an athlete such as a squash player or a soccer player will have a history of recurrent groin strains which fail to settle.

Examination often reveals a reduction in internal rotation and pain when the hip is flexed up, internally rotated and brought across the body.

Greater loss of motion in all directions often signifies the onset of more significant arthritis.



Impingement Tests like these often reproduce the pain

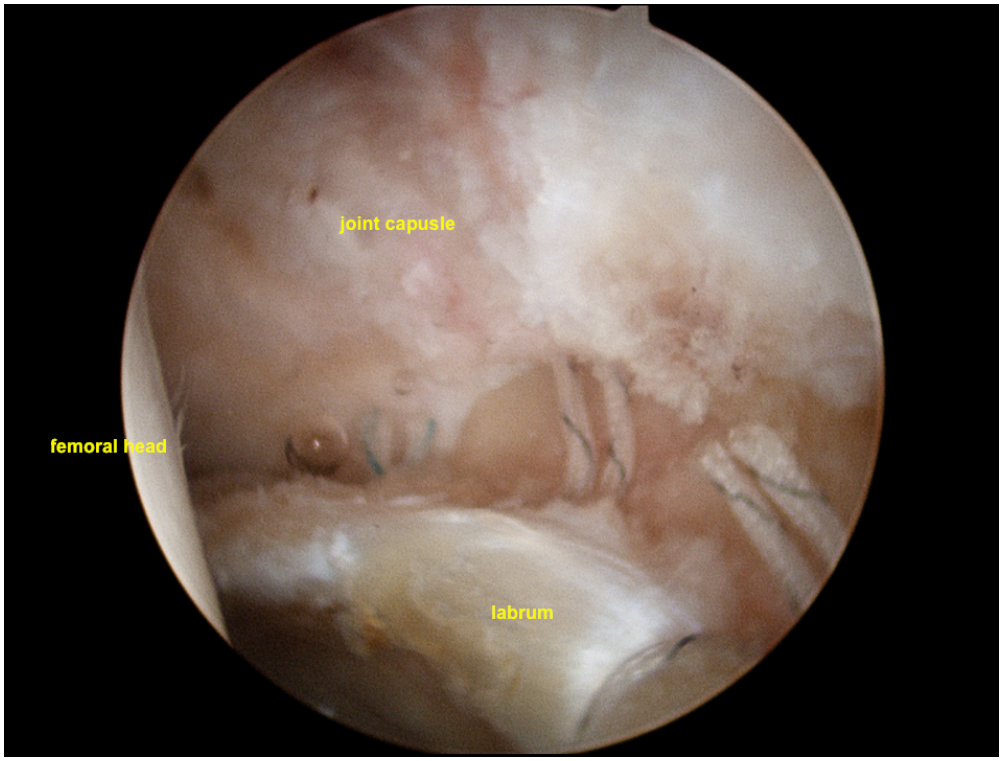
An xray may show the bony shape of the hip and predisposing factors, but will not show the labrum tear itself as the labrum is made of cartilage.

An MR arthrogram is the best test to show a labral tear if in doubt. An MRI scan uses strong magnets rather than xrays and shows the soft tissues such as cartilage and muscle very clearly. An MR arthrogram is an MRI scan taken after the injection of a contrast agent (Gadolinium) into the hip joint prior to the scan. The contrast agent is nontoxic and is excreted in the urine a short time after but can make the hip ache a little more over the next 24-48 hours. The Gadolinium fluid fills the gap between the edge of the socket and the torn labrum, thus outlining the tear.

The triangular labrum is separated from the edge of the socket on this MRA

The MR arthrogram may also demonstrate some of the predisposing bony factors. However, We also sometimes order a CT scan with three dimensional reconstructions which is the most accurate way to show any bony predisposing factors.

How do you treat a labral tear?
If a period of rest followed by rehabilitation and alteration of aggravating activities does not result in the pain settling then surgery can be considered. This type of surgery is now performed arthroscopically and can be done as a daystay or more commonly, an overnight procedure. The arthroscope is inserted through one puncture hole and the operating instruments through a second puncture hole. The edge of the labral tear is cleaned up and the edge of the bony socket is likewise cleaned ready for repair. A small 3mm absorbable anchor is inserted into the edge of the hip socket and a strong suture is placed around or through the labrum and tied firmly down.



The sutures firmly ties the labrum down to the edge of the socket

The number of anchors required depends on the size of the labrum tear, but is roughly equivalent to one anchor per 1cm of labral tear. The anchors are made from an absorbable material called poly-lactic acid. The sutures are very strong and are not absorbable.

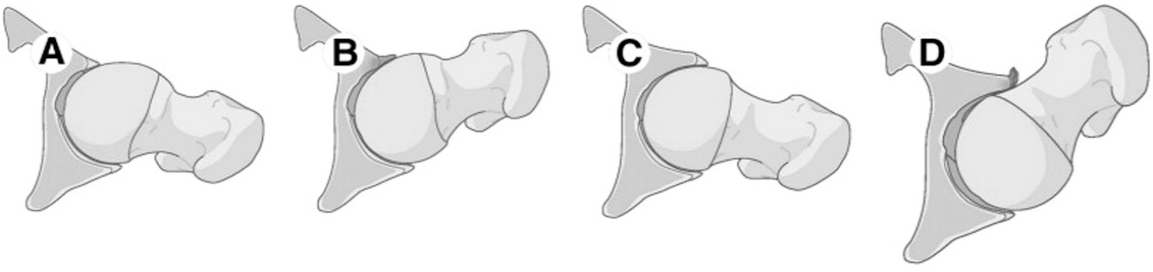
The patient is able to go home the next morning and can usually weight bear immediately. Nonetheless, patients use crutches for between 7-10 days until they can walk without a limp. Typically most people would need to take 7 days off work. If the job was very physical such as a construction worker or builder, two or three weeks may be required.

Using an exercycle or cycling is an excellent early rehabilitation and can be started as early as two or three days post-operatively. There will also be exercises to strengthen the hip muscles and the core muscles (abdominal and back muscles). A physiotherapist can often prove very helpful in helping with these exercises.

Time back to sport is more commonly three to four months.

Does the surgery work?
Success rates in the published literature with 80 or 90% of patients showing a substantial benefit and in most cases returning to their sport of choice. What we cannot say is how these patients will fare long term (10-20 years plus). As this technique is relatively new most published studies have two year follow-up and occasionally five year follow-up.

What is femoroacetabular impingement?
Femoroacetabular impingement or FAI simply describes the action of the femoral neck hitting the edge of the hip socket. We can use the simple example of a tennis ball pierced with a broom stick. If the tennis ball is placed inside a large teacup the broom stick can be moved through a range of motion before it hits the edge of the teacup. If we replace the broomstick with a vacuum cleaner pipe (much thicker) we will be able to move it through a smaller range of motion before the pipe will hit the edge of the teacup. This could be considered the equivalent of CAM impingement. If we return to using the broomstick, however place the tennis ball inside a deeper coffee mug, again we will be able to move it through a smaller range before the broomstick will hit the edge of the coffee mug. This could be considered the equivalent of Pincer impingement.



A and B: The cam lesion comes forward and hits the labrum
C and D: The normal femoral neck comes forward and strikes the “Pincer”

Returning to the human example, there is a wide range of normal anatomy. Some people have a narrow femoral neck and thus their hip has to move a long way before it will impinge. Others have a much thicker femoral neck, especially at the front and in these patients, they do not have to flex their hip very far before it will impinge. This thick bony bump at the junction of the femoral head and the femoral neck at the front is known as a CAM lesion. It simply gets this name from the same principle as a CAM shaft in a car engine representing an asymmetric bump. In the case of a Pincer lesion, it simply denotes a hip socket that is very deep or an isolated prominent rim at the front or back. In a normal pelvis the hip sockets face forward but in some patients, they face sideways or even slightly backwards (retroverted acetabulum). In these patients, the front rim of the socket is prominent and impinges relatively easily.

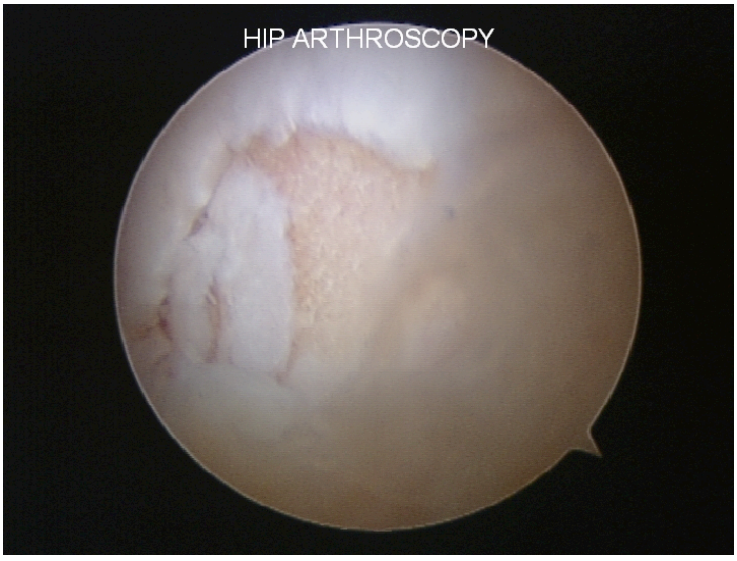
The bony cam lesion is easily seen on this 3D CT scan

Cam

Are there differences between men and women?
CAM type impingement is more common in men. Pincer impingement is more common in women. However, a significant number of patients have a mixture of both.

What gets damaged by the impingement?
This depends on the type of impingement. When a patient with a CAM lesion flexes up their hip too far, the bony bump must be accommodated with in the rigid hip socket. This is like trying to get an egg into an egg cup sideways. It just won't work. The bump pushes the labrum aside and then starts to shear the articular cartilage (gliding surface gristle of the hip). I use the analogy of pushing a heavy chair across a rug on the floor. The chair will catch the rug and push it

up off the floor in folds. The gliding surface of the hip is well fixed to the underlying bone but if the CAM lesion strikes with sufficient force the cartilage gliding surface is pushed away from the underlying bone and is thus permanently damaged. Unfortunately the human body has no way to repair damaged articular cartilage. The flap of damaged cartilage can become painful and the area of damaged cartilage can become larger and larger with time. This eventually leads to osteoarthrosis and for a number of patients, a total hip joint replacement. Eventually the labrum too becomes damaged. It is remarkable that some young men can have significant damage to the articular cartilage even before the hip becomes painful. I suspect that in some of these young men, the pain comes eventually when the labrum becomes damaged as it does contain plenty of pain nerve fibers.



Unfortunately the cam lesion has permanently damaged the white gliding surface (articular cartilage) The yellow is the underlying bone.

With a Pincer type of impingement (a deep cup or a prominent hip socket rim) the pattern is different. The labrum is often the first structure to be damaged and pain comes on very early in the process. When the femoral neck forcibly hits the labrum, it is torn from the edge of the socket and quickly becomes very painful. The patient develops nagging groin pain and sometimes clicking. The pain can be felt also at the side of the hip in the buttock and also sometimes down the leg.

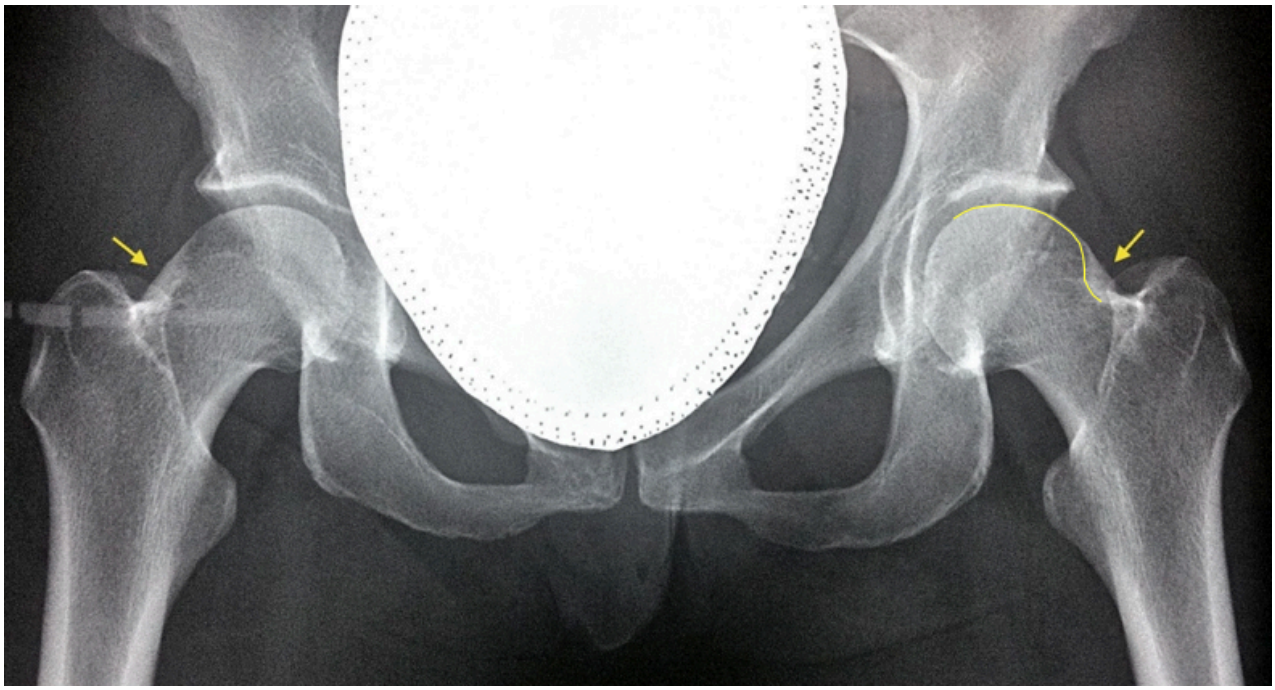
This type of impingement too can lead to osteoarthrosis. The pattern of osteoarthrosis is slightly different being more centrally located. Again, it is bad enough the only treatment remaining becomes total hip joint replacement.

At what age does FAI present?
Labral and cartilage tears can and do occur in the adolescent athlete. The most common age for a patient with CAM type impingement to present would be a young pro athlete in his 20's or a recreational athlete in his 30's. Kicking sports and sports such a squash where the athlete lunges onto the flexed hip are a common presenting feature. The most common age for the Pincer type impingement to present would be a woman in her 30's or early 40's.

Typically the older the patient and the longer the history, the worse the damage to the hip joint at presentation. Unfortunately a more damaged hip joint has a worse prognosis whether or not treatment is considered.

When is it too late?
If the joint space of the hip on xray has narrowed, it usually means the arthritic process is too advanced and the patient will not benefit from arthroscopic treatment. If I am unsure, I will sometimes order a CT scan which shows even tiny reductions in joint space.

If this is the case, we recommend non impact exercise such as cycling, weight loss (where appropriate), glucosamine, anti-inflammatory tablets and eventually total hip replacement may be required.

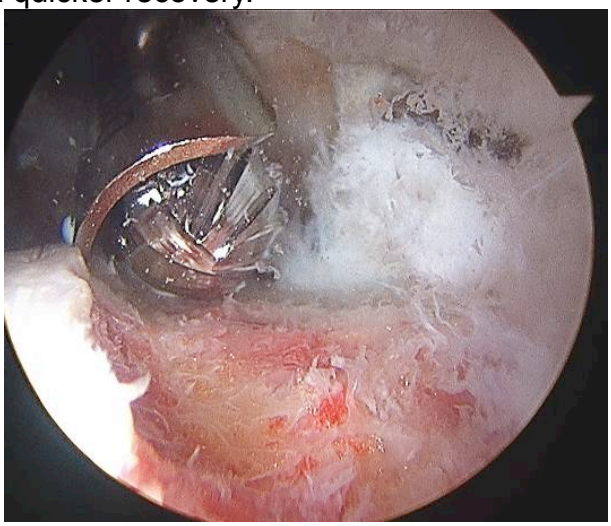


This young male athlete still has a good joint space, although having big cam lesions both sides.

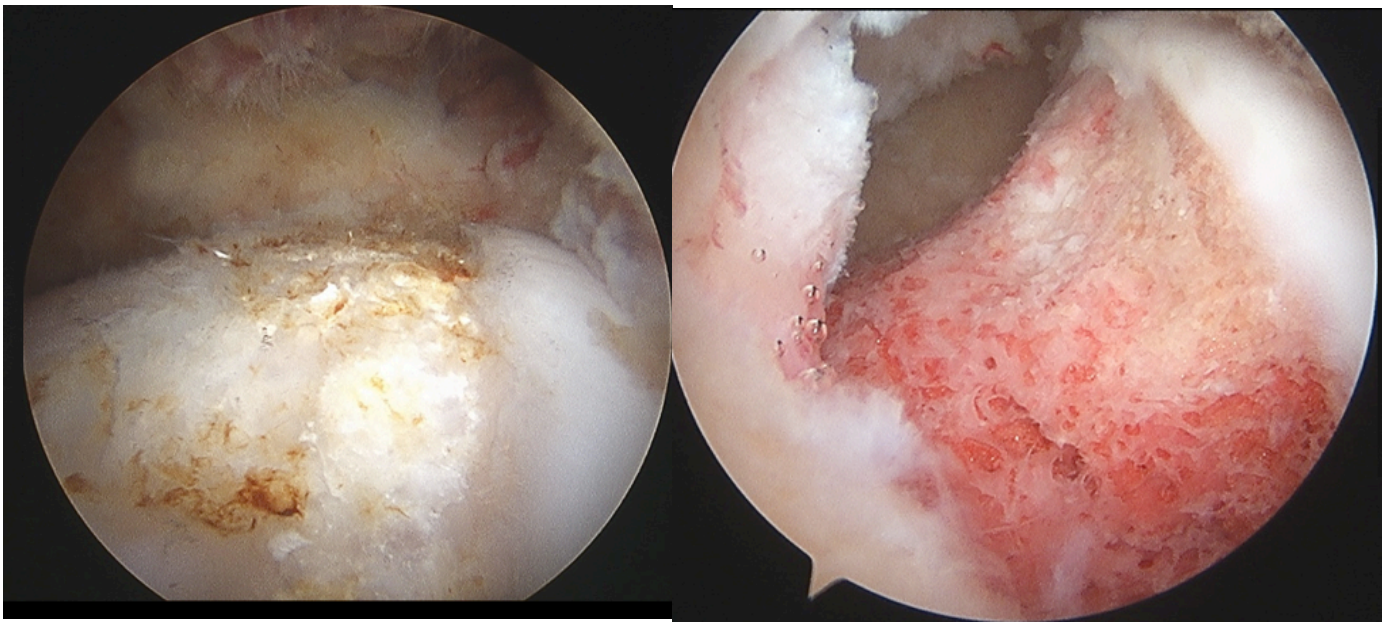
What treatment is available?

Reinhold Ganz is a Swiss surgeon who was one of the first to clearly understand the impingement mechanism. Surgeons before him had recognized that certain patterns of hip shape would predictably lead to arthritis but Ganz provided an eloquent explanation. He first described the CAM and Pincer type impingement and was also the first to outline a surgical treatment. Ganz and his colleagues figured out a way to dislocate the hip joint surgically without damage to the blood supply to the femoral head. Once the hip was dislocated they would have full access to the bony bump (CAM lesion) as well as the labrum and edge of the hip socket (removal of Pincer and repair of labrum). This was, however, a considerable operation with a similar surgical trauma to a total hip joint replacement. Nonetheless, he has published good results with this technique and it is still used in many centers today.

In the last ten years arthroscopic surgery of the hip has developed very rapidly to the stage where we are able to repair a labrum, remove a Pincer lesion or remove a CAM lesion. This has the major advantage of causing the patient less pain and allowing a quicker recovery.



An arthroscopic motorized burr removing the cam lesion
Below - before (left) and after (right) views



Typically the operation can take anywhere from 90 minutes to three hours and the patient will stay one night in hospital. Immediate weight bearing is usually allowed and crutches are used for between 7-10 days until the patient can walk without a limp.
Most patients can return to work after a quiet week at home. If the job is very physical such as manual labouring or a builder, it may be necessary to take 2-3 weeks off work. Time back to sport is anywhere from 3-6 months although fitness activities such as going to the gym or riding a bicycle can start almost immediately.

Does arthroscopic surgery work?
Short to medium term follow-up (two to five years) have been published with excellent results.

What kind of pain can I expect after the operation?
One important factor has now been researched and published is that men and women experience different amounts and types of pain. Men are often quite comfortable right from Day 1, especially if they are well muscled. Men report pain levels as low as 1-2/ 10 on Day 1 whereas female patients may report something closer to 3-5/10. Male patients tend to be fairly comfortable within one or two weeks whereas female patients may take anywhere from six to twelve weeks to feel really good. Often the progress can feel like two steps forward followed by one step backwards. Recovery is not a steady progression.

During the arthroscopic surgery the capsule (fibrous bag that contains the hip joint) must be cut open to gain access to the hip. This is not stitched closed at the end of the procedure but gradually heals over twelve weeks after the surgery. As the capsule finally heals, the hip can often feel more stiff and sore. This often happens somewhere between ten and twelve weeks post-op. One in five patients might get stiff and sore and would then benefit from a cortisone injection to reduce their stiffness and get them back on track.

We suspect that the sex differences may be due to the wider female pelvis having different force vectors and females also typically carrying less muscle around their hip. Nonetheless, with the passage of time the female results catch up to their male counterparts.

During the twelve week early healing phase the patient may be completely comfortable while walking, sitting or lying, but get a sharp jab of pain with a sudden twisting movement. This is likely stretching the healing capsule. An example would be trying to do a breaststroke kick in a swimming pool two weeks post-op would almost certainly be painful. Swimming freestyle, however, would likely be no problem.

Would I need strong pain relief?
It is most unlikely that you would need strong pain relief. Most of my patients go home with a prescription for simple Paracetamol and perhaps an anti-inflammatory such as Diclofenac (Voltaren). In the first 48 hours a stronger pain relief such as Tramadol is provided, but often it is not required.

Will I be able to run or play sport again?
In most cases the answer to this question is yes. The time that I voice a word of caution is when damage to the hip is already extensive and there are significant areas of the acetabular gliding surface already damaged. In these cases I suggest avoiding impact loading (running sport) for twelve months then repeating an xray and MRI scan to detect any advancing arthritis in the hip. Any damage to the hip is clearly documented with photographs during the operation.

Will this surgery stop osteoarthrosis and the future need for a hip replacement?
This is the huge question that we cannot yet answer. Simply put we do not have longer follow-up to make these claims. We certainly hope that by removing the mechanical damage we will prolong the life of the hip but clear proof will take at least another ten years before any such claim can be made.

We do know that extensive damage to the hip is a poor predictor of outcome with the magic number being around 30% of the gliding surface of the hip socket. If damage exceeds 30% of the area then it becomes likely that arthritis will progress no matter what we do. If the gliding surface is still in good shape or considerably less than 30% damaged, the outlook is a lot brighter long term.

Will the surgery need repeating later on?
Studies so far have shown that the bone removed does not appear to grow back. The commonest reason for having to repeat the surgery would be if the surgeon has taken insufficient bone and the hip continues to impinge.

What are the potential complications?
Fortunately complications are few but can be listed as follows:

Operation day complications:

Traction injuries: The traction boot can cause pressure areas on the ankle or the heel and also around the genital area in women and behind the scrotum in men (The perineum). Redness of the skin, if presented after the surgery, would resolve within an hour or so. The nerves to the genitals might also be compressed. Around 1 in 100 patients may get some genital numbness which usually lasts one to two days.

Anaesthetic complications: In a healthy person a modern general anaesthetic is exceedingly safe with rare and catastrophic problems such as very severe drug reactions being around 1 in 500,000.

Stress fracture: By removing bone from the femoral neck, theoretically the femoral neck is weakened. This is an extremely rare complication which was reported only once in the scientific literature. The message here is that we gradually increase loading on the hip over the first twelve weeks without doing too much too soon.

Avascular necrosis of the femoral head: This is perhaps the worst complication but fortunately is extremely rare. At the time of arthroscopic surgery we take great care to avoid the three or four blood vessels that supply blood to the femoral head. Theoretically if all four of these blood vessels are damaged the femoral head will gradually die and crumble over the next one to two years necessitating hip replacement. The four blood vessels are in a fairly constant location and this is clearly in our mind when we are removing bone to keep well away from them.

Adhesive capsulitis (Frozen Hip): This not uncommon complication usually manifests sometime between eight and twelve weeks post-op. The healing capsule becomes thick, tight and inflamed. The patient feels as though they are making good progress over the first six to eight weeks but then gradually the hip becomes more restricted and painful. In my experience this responds best to a cortisone injection which fairly quickly gets the patient back on track. As with frozen shoulder it is more common with women than men.

Removing too much or too little bone: In the early international arthroscopic experience frequently too little bone was removed as in the magnified setting of an arthroscopy it can be difficult to orientate and the amount of bone we remove looks enormous when often it is only be a few millimetres. To avoid this I perform an impingement test where the patient's hip is flexed to around 90° and internally rotated during the course of the operation as I watch the femoral neck come close to the labrum. I know my resection is adequate when impingement no longer occurs. We also use the xray machine during the operation to guide us.

Removing too much bone would be fairly uncommon. Studies have been performed to show 30% of the femoral neck can be removed without too much loss of strength. This would be a massive resection and it would be usual for us to remove considerably less than this.

This post-op CT scan no longer shows a cam lesion.