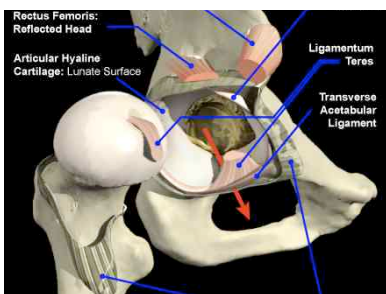




Peri-Acetabular Osteotomy (PAO)

Periacetabular Osteotomy is a hip preserving procedure performed on young adults to correct a congenital deficiency of the acetabulum: acetabular dysplasia

The Normal Hip Joint



The hip joint consists of 2 main parts: a ball on the upper end of the thigh bone (femur), called the head of the femur, and a socket in the pelvis

known as the acetabulum. The hip joint is made up of precisely fitting moving parts that work in harmony to ensure a long life without wear. The head of the femur rotates freely within the smooth, concentric surface of the acetabulum. An extremely low friction tissue, hyaline cartilage, lines this joint as well as others in the human body. The friction between two hyaline cartilage surfaces is much less than the best man-made bearing.

A normal acetabulum "covers" the upper (superior) portion of the head of the femur as well as a partial portion of the front (anterior) and back (posterior) of the femoral head.

Younger adults with hip pain commonly have abnormalities in the shape of the femoral head or abnormal coverage of the femoral head by the acetabulum.

Acetabular Dysplasia

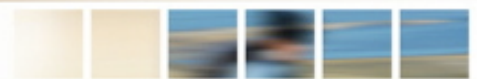
Acetabular dysplasia is a condition caused by inadequate development of an individual's acetabulum. The resulting acetabulum is shallow and "bowl shaped" rather than "cup shaped".



The supporting roof of the acetabulum slopes steeply upward and outward rather than having its normal horizontal position.

Because of these abnormalities, the upper part (and often the front part) of the femoral head is incompletely covered by the shallow acetabulum.

Individuals with acetabular dysplasia usually develop through childhood and adolescence without symptoms or knowledge of their abnormality. By the age of 30 however the patient typically experiences pain from their hip and they often seek medical evaluation and an X-ray discloses the abnormality (acetabular dysplasia). Other patients may have been treated for hip problems as an infant or child.





Acetabular dysplasia is often associated with abnormalities in the shape of the upper femur which may contribute to the patient's hip symptoms.

Acetabular dysplasia is associated with an abnormally high stress on the outer edge (rim) of the acetabulum which leads to degeneration of the articular cartilage (arthritis). It is also possible for breakdown of the acetabular labrum (rim cartilage of the acetabulum) or a fatigue fracture of the rim of the acetabulum to occur as a result of this rim overload. Any one or a combination of these conditions can cause hip pain sufficient for the patient to seek medical evaluation and treatment.

When the diagnosis of acetabular dysplasia is made, the X-ray often shows a sign of early arthritis (most commonly an acetabular cyst though increased bone density, a femoral head cyst, osteophytes (bone spurs), and/or cartilage thinning may also be present). If the dysplasia is left uncorrected the arthritis always gets worse and often becomes severe within a few months or years.

For the patient, this means increasing hip pain, progressive loss of hip motion, and reduced functional capabilities.

Peri-Acetabular Osteotomy

Periacetabular Osteotomy (PAO) is a surgical treatment for acetabular dysplasia that preserves and improves the patient's own hip joint rather than replacing it with an artificial part. The goal is to relieve pain, restore function, and maximize the functional life of their dysplastic hip.

PAO is a procedure that was developed and first performed in 1984 in Bern, Switzerland by Professor Reinhold Ganz

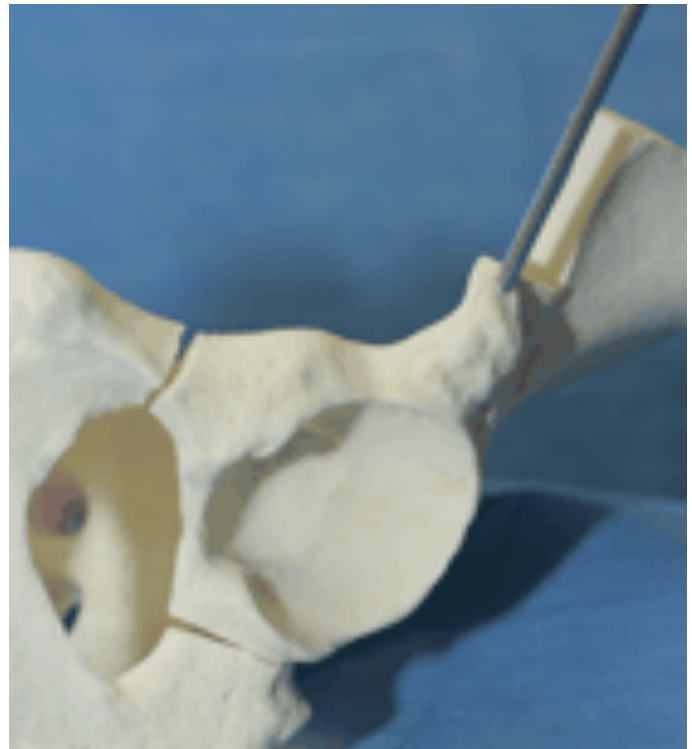
"Periacetabular" means around the acetabulum.

"Osteotomy" means to cut bone.

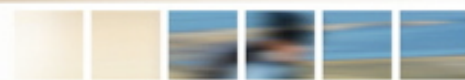
Simply put, the PAO cuts the bone around the acetabulum that joins the acetabulum to the pelvis.

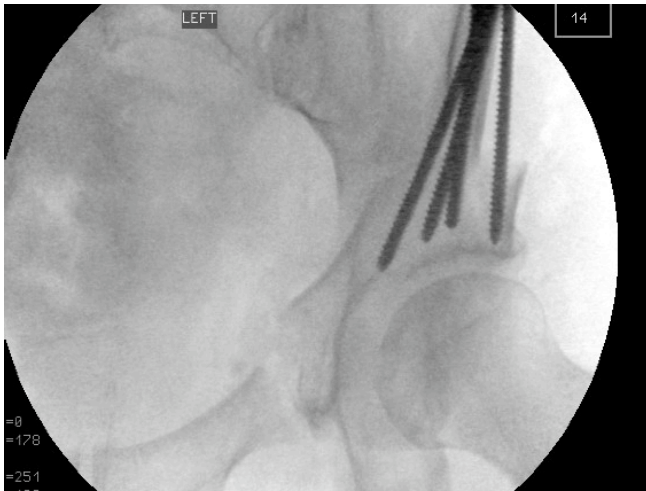


Once the acetabulum is detached from the rest of the pelvis by a series of carefully controlled cuts, it is rotated to the best position as dictated by the specific acetabulum's unique anatomy.



The dysplastic roof that incompletely covers the femoral head is brought over the head of the femur to give the head a normal coverage and also brings the roof from an oblique to a horizontal position. Other subtle changes typically also occur. Coverage at the front of the hip may increase and it is often possible to correct shortening of the leg which is often a problem linked with acetabular dysplasia.





X-rays taken during surgery confirm the correct position of the acetabulum and screws are inserted into the bone to maintain the acetabulum's new corrected position during bone healing.

X-rays will be taken at 2 or 3 days after surgery for a final assessment of the result.

Potential Surgical Complications

As with any other major hip surgery, there is a risk of complications. Surgical wound infection and injury to major nerves or arteries is possible. Non-union (lack of healing) of the bone following the osteotomy is also possible. In experienced hands, PAO is a relatively safe operation.

Post-operative Care

Patients spend about two hours following surgery in the recovery room where nurses closely monitor them. The first night after surgery is sometimes spent in the High Dependency Unit to facilitate close monitoring and after that the patient is returned to the normal ward. Often, patients are well enough to return to the ward directly from the recovery unit.

The medical and nursing team's post-surgical priorities are pain management, preventing infection, and the prevention of deep vein thrombosis (blood clots in large veins), and pulmonary embolus (blood clots traveling through veins to the lungs).

A urinary catheter will empty the bladder during and after surgery and is used to help monitor important bodily functions.

Patients begin physiotherapy as soon as possible to improve hip motion and muscle function and to learn to use crutches or a walking frame. For six weeks after surgery the patients needs to keep the weight bearing load on the hip to no more than 10 kg (about 25lbs). Placing full weight on the operated side prior to bone healing can cause the screws to bend or break and the osteotomy to lose its position. Regaining movement is important after surgery; it is important to have assistance with hip exercises for the first few weeks after surgery. Too vigorous exercise such as resistive exercise against weights can also cause failure. If failure occurs, re-operation may be necessary and the chance of developing arthritis is greatly increased.

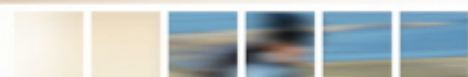
After Discharge

The usual hospital stay is 5 to 7 days and depends on progress with physiotherapy how the level of comfort. At discharge pain medication is prescribed. Some degree of pain after discharge is natural and may increase or decrease on different days but the general trend should be toward decreasing pain. Anti DVT stockings should be worn for 6 weeks after surgery to reduce the risk of blood clots.

Some patients may sense an occasional "clunk" or "pop" in or around the hip. Numbness and a tingling sensation is common around the incision area. Numbness on the outer side of the thigh is almost always present, and is often permanent.

Patients however experiencing severe or consistent pain or having redness, swelling and/or wound drainage should consult with their GP or contact the hospital.

Follow-up outpatient visits are necessary to monitor progress by X-ray and physical examination. The first follow-up visit is usually scheduled about 4-5 weeks after surgery and progressive increase in weight-bearing is allowed (subject to satisfactory X-ray appearance)



At 8-10 weeks after the surgery most patients can put full weight through their leg and work toward reducing their dependence on crutches. Muscle strengthening exercises guided by a physiotherapist are also started. Progress in walking depends on return of muscle strength. The majority of patients are walking without support by 4 months after the surgery.

Subsequent follow-up visits are at 6 months, 1 year and 2 years after surgery and then usually at 2 year intervals.

What happens if the hip pain comes back?

The commonest reason for increasing pain some time after PAO surgery is typically advancing hip arthritis. Under such circumstances patients are almost always best treated by total hip replacement surgery. We have found that the previous PAO enhanced the acetabular bone with increased femoral head coverage. This improvement in the natural hip position contributes to the success of a later total hip replacement by making the stability of the artificial hip more reliable.

Why not just have a hip replacement in the first place?

During the past 15 years there has been a renewed and growing interest in adult hip osteotomy. Osteotomy was used more frequently as a treatment for adult hip problems before the advent of Charnley's low friction arthroplasty (the first successful artificial hip joint) in the 1960's.

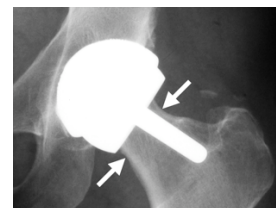
The encouraging early good results regarding function and pain relief after Charnley total hip replacement in young patients led many surgeons to abandon osteotomy. Osteotomy was considered to be difficult and have results that were less predictable and less satisfactory to the patient.

Despite the good initial results of total hip replacement, the long-term follow up of these patients has shown increasing problems, especially in the young active population.

Osteolysis (bone loss and weakness) plagues those patients who outlive the longevity of their artificial hip.

Hip revision surgery for the failed total hip can present significant problems particularly for the patient with osteolysis. These failures of Charnley's hip prosthesis have stimulated the production of hundreds of new hip prosthesis designs to solve the problems of loosening and osteolysis. Unfortunately, none have (as yet) proven better in long term follow of young patients.

Hip resurfacing procedures may offer a better solution for younger adults with hip arthritis, although hip fracture, failure due to loosening of the components and concerns about the long-term safety of large metal implants are issues that continue to be of concern.



The often poor results of hip replacement in active young to middle aged adults have underscored the importance of preserving the hip rather than replacing it.

Osteotomy should not be thought of as an inferior second choice to total hip replacement that the young patient with early arthritis must undergo because he or she is too young for total hip replacement. The results after PAO, which preserves the patient's own hip, justify its use and the long term results can be better than what the patient could have obtained from a hip replacement. The patient's own hip is a living tissue with self-maintenance capabilities, whereas deterioration with time is inevitable for an artificial part. The sensory capabilities of the joint are preserved and the patient can continue to remain as active as symptoms or their lack of permits. The patient with a total hip replacement, however, always must be cautioned regarding possible hip dislocation and be restricted from vigorous activity.

