

Acetabular Dysplasia and Hip Instability

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Definition: Acetabular Dysplasia

The hip joint is a ball-and-socket joint. The socket, or acetabulum, is part of the pelvis. A specialized cartilage structure, the labrum, surrounds the opening of the hip socket and is joined seamlessly to the articular cartilage lining the hip socket. The femoral head is attached to the upper end of the thighbone, or femur, by the neck of the femur.

Acetabular dysplasia, sometimes called hip dysplasia, is a shallow, abnormally shaped, or improperly oriented socket. This type of anatomic configuration may contribute to instability of the femoral head within the acetabulum. In addition, various alterations in the shape and orientation of the femur are now thought to contribute to hip instability. Instability permits excessive mobility within the joint that can tear the labral cartilage and lead to deterioration of the articular cartilage within the joint. Untreated, hip instability causes pain, difficulty walking, progressive deterioration of the hip joint, and arthritis.

Symptoms: Acetabular Dysplasia and Hip Instability

Most patients with acetabular dysplasia seek medical advice due to pain in the hip. Generally, the pain is located on the side of the hip and feels most like muscle fatigue; however, groin pain, thigh pain, and progressive limping are also common. The pain can worsen depending upon level and type of activity. Activities such as standing, walking, dancing or running may cause discomfort. Symptoms can begin in childhood or appear later in life. The development of symptoms depends upon the degree of instability, and patient factors such as weight, strength, occupation, and sport activities. The degree of shallowness usually correlates with the onset of symptoms with shallower sockets becoming symptomatic earlier.

Etiology: Acetabular Dysplasia and Femoral Anteversion

Acetabular dysplasia is a common congenital condition. It is more frequent in females than males, and there is often a family history of hip arthritis.

Certain birth factors such as breech positioning, insufficient amniotic fluid, and first born can be associated with hip dysplasia. Rarely, acetabular dysplasia can be caused by trauma to the acetabulum during childhood, or in association with Legg-Perthes disease. Only very unstable hips are detectable and treated during infancy. Stable hips with shallow sockets are not usually diagnosed until later in life, because the joint functions well and does not produce symptoms until either the patient becomes heavier or begins to develop tears in the labral cartilage that surrounds the acetabulum. Femoral anteversion is a very common anatomic configuration. While all human femurs are anteverted in the post-natal period, it does not always resolve with growth. Under specific circumstances, excessive anteversion may cause or aggravate hip instability.

Evaluation: Acetabular Dysplasia and Hip Instability

The evaluation of acetabular dysplasia begins with a careful history and physical examination. Patients are examined for evidence of instability and tears in the labrum. Other causes of hip pain such as associated impingement are evaluated. Specific pelvic and hip x-rays are obtained to measure the size, shape, and orientation of the acetabulum. Most patients will require an MRI-arthrogram of the hip in order to evaluate the labral cartilage, and the articular cartilage in the acetabulum and on the head of the femur. An MRI-arthrogram is a specialized MRI scan that involves injecting liquid into the hip joint prior to the MRI so that the cartilage structures within the hip joint can be outlined and more thoroughly evaluated. CT scans are frequently employed to carefully evaluate the shape and orientation of the hip socket and the femur.

Treatment: Acetabular Dysplasia

The treatment of acetabular dysplasia depends upon the extent of damage to the cartilage structures within the hip joint, and the age and activity level of the patient. Patients with severe damage to the cartilage structures of the hip joint are probably not good candidates for reconstruction, except in rare circumstances. Patients with limited cartilage damage and spherical hip joints are candidates for a periacetabular osteotomy.

The purpose of the periacetabular osteotomy (PAO) procedure is to permit the reorientation of the hip socket so that the femoral head can be stabilized within the acetabulum. Stabilizing the femoral head within the acetabulum normalizes the forces within the hip joint, prevents or dramatically slows

joint deterioration, and improves symptoms and function. The procedure is performed through an incision made in the front of the hip joint usually within the bikini line. The muscles in front of the hip joint are separated from each other, permitting access to the pelvic bone. The pelvic bone is then carefully cut in four places around the acetabulum. Once the pelvic bone is cut, the acetabulum is freely mobile, permitting the surgeon to position it properly relative to the head of the femur. X-rays are used intra-operatively to assist in the accurate positioning of the hip socket. Simultaneously, the hip joint is opened and inspected. It is often necessary to remove some bone from the front of the femoral head to improve mobility of the hip joint. In certain cases, a simultaneous osteotomy of the upper femur (intertrochanteric osteotomy) is required to position the head of the femur within the acetabulum. This is required when there is significant misalignment of the upper femur or the head of the femur is not spherical, and both the acetabulum and femur require reorientation to ensure joint stability.

Occasionally, hip arthroscopy is used in conjunction with the periacetabular osteotomy in order to address areas of cartilage damage that may be detected using the preoperative MRI-arthrogram.

Frequently Asked Questions

Will I need a blood transfusion?

Historically, prior to periacetabular osteotomy most patients were asked to donate 1 or 2 units of their own blood for use in case that a blood transfusion would become necessary following the procedure.

Currently, because of technical improvement in the surgical and anesthetic technique, patients are no longer asked to donate blood prior to surgery. In fact, the need for a blood transfusion following a PAO is rare. Instead, patients are asked to take iron supplements and vitamin C (to improve absorption of iron) prior to surgery in order to maximize their preoperative blood count.

How long will I stay in the hospital?

Most patients stay in the hospital for 2 nights.

What is specifically involved in the procedure?

Patients undergo general or epidural anesthesia and are lying on their backs for the entire procedure. Usually, a bikini type incision in the front of the hip is used. Dividing muscles in front of the hip exposes the pelvis. An x-ray machine is then used to assist in cutting the pelvic bone around the acetabulum. Four separate bone cuts are used to completely free the acetabulum from the pelvis. Once mobile, the acetabulum is accurately repositioned using x-ray guidance. If the position is satisfactory, then the acetabulum is held in position with screws. Drainage tubes are inserted to drain blood post-operatively, and the incision is closed. Patients are awakened from anesthesia, and taken to their room to recover.

Why is the hip joint opened at the time of surgery?

The hip joint is opened for two reasons. First, many patients have labral tears that may be addressed at the time of surgery in order to completely eliminate pain. Second, many patients with acetabular dysplasia have abnormally shaped femoral heads. In order to prevent impingement between the rim of the acetabulum and the head of the femur following periacetabular osteotomy, it is often necessary to recontour the bone located at the junction of the head and neck of the femur and along the femoral neck.

What will I use for pain relief?

Patients use a combination of oral pain medication supplemented with injected medication. Oral pain medicine that is continued at home until the pain from surgery resolves. Most patients use a decreasing amount of pain medicine for up to one month.

Will I have physical therapy?

Beginning in the hospital you will be instructed in the use of crutches. In order to allow the osteotomy to heal, limited weight bearing is required for approximately six weeks. The physical therapist in the hospital will also instruct the patient in exercises to help regain mobility. Outpatient therapy is used when the patient returns home in order to help restore strength and mobility.

What are the risks of surgery?

Bleeding is common when surgery is performed on the pelvic bones, because these bones are highly vascularized. Whereas in the past blood transfusions were necessary for 1 out of 5 patients, they are seldom necessary due to improvements in both the surgical and anesthetic techniques.

Infection can occur with any surgical procedure. To decrease the already low likelihood of this problem, intravenous antibiotics are routinely used for 24 hours. Infection is very uncommon following this procedure.

Heterotopic ossification is the formation of bone within muscles following either surgery or trauma. In advanced cases, heterotopic ossification can lead to loss of hip motion. Since no muscles are cut during surgical dislocation and great care is taken in the retraction of muscles, this complication is rare. Nevertheless, in order to decrease the risk of forming heterotopic ossification, most patients are prescribed Indomethacin for one week following surgery. This potent anti-inflammatory medication further decreases the risk of forming heterotopic bone. Specific patients with risk factors for heterotopic ossification are prescribed preventive medication for longer periods of time following surgery.

Deep Vein Thrombosis (DVT) is the formation of blood clots within lower extremity veins. These clots are potentially dangerous if they dislodge and obstruct blood flow to the lungs. DVT can occur in adults undergoing lower extremity orthopaedic surgery. Consequently, at-risk adults are prescribed blood thinners for several weeks following surgery in order to prevent the occurrence of DVT. Most patients do not require specific prophylaxis.

Nonunion, a failure of the osteotomy to heal, is very rare following periacetabular osteotomy, because the pelvic bones are highly vascularized and heal rapidly. The healing of the osteotomy is monitored carefully post-operatively so that patients do not begin bearing weight prior to sufficient healing.

Injuring major blood vessels and nerves (i.e., femoral nerve, sciatic nerve, femoral artery) can occur during a periacetabular osteotomy. This is an extremely rare occurrence that has never happened at William Beaumont Hospital.

Lateral femoral nerve palsy is common following the periacetabular osteotomy. The lateral femoral cutaneous nerve is a very small nerve that provides sensation to a small region of skin on the upper, outer thigh area. The nerve crosses perpendicular to the muscles that must be separated to access the pelvis. While the nerve is never cut during the operation, it is retracted in order to safely access the pelvis. Since the nerve is very small, the retraction can stretch the nerve in some patients. As such, patients may experience numbness in the upper, outer thigh region. Most patients recover nerve function and sensation within six months following surgery.

What do I do at home after discharge?

First 6 weeks: Use crutches as directed, perform prescribed exercises, take blood thinners, and use pain medicine as needed. You may be sent home with a CPM (continuous passive motion) machine. You will need assistance at home for the first week to help prepare food, dress, drive and other activities. Using an upright stationary bicycle is very helpful following surgery in order to help regain flexibility and strength.

Second 6 weeks: Wean from crutches, advance physical therapy, and begin strengthening the hip muscles. Transitioning to full weight bearing can often take several weeks.

3 months: Begin sports activity slowly over 2 to 3 months, and continue to strengthen hip muscles.

6 months: Return to full activities. Sometimes you are advised to not perform running or jumping activities if there was significant preexisting hip arthritis.

When can I drive?

Driving depends upon which hip has had surgery. Left hip patients may drive as soon as they are no longer using narcotics, and right hip patients may drive when they have regained sufficient strength and muscle coordination, usually 3 or 4 weeks.

When are my follow-up appointments?

You will return to the office 2 weeks, 6 weeks, 3 months, and 6 months following surgery, or any time if there are problems or concerns.

When can I return to work/school?

Patients who have a sitting occupation or attend school may return whenever they can comfortably sit for sufficient time. Usually patients begin returning to work or school 2-4 weeks following surgery. Patients who are required to stand while working may not be able to return to work for 2 or 3 months.