



Patient Information Guide to Bone Fractures, Bone Reconstruction and Bone Fusion:

Hip

Disclaimer

This booklet is intended as general information only. Nothing in this leaflet should be construed as the giving of advice or the making of a recommendation and it should not be relied on as the basis for any decision or action from its use. We aim to make the information as up-to-date and accurate as possible, but please be warned that it is always subject to change and your treatment will be based on the preferred method of treatment of your doctor. Please therefore always check specific advice on the procedure or any concern you may have with your doctor.

What is a fracture?

A fracture means a broken bone. Whether you have a complete or a partial fracture, you have a broken bone. A bone may be completely fractured or partially fractured in any number of ways (cross-wise, lengthwise, in the middle).

How do fractures happen?

Fractures can happen in a variety of ways, but there are three common causes:

- Trauma accounts for most fractures. For example, a fall, a motor vehicle accident or a tackle during a football game can all result in a fracture.
- Osteoporosis also can contribute to fractures. Osteoporosis is a bone disease that results in the "thinning" of the bone. The bones become fragile and easily broken.
- Overuse sometimes results in stress fractures. These are common among athletes.



Diagnosing fractures

Usually, you will know immediately if you've broken a bone. You may hear a snap or cracking sound. The area around the fracture will be tender and swollen. A limb may be deformed, or a part of the bone may puncture through the skin. Doctors usually use an X-ray to verify the diagnosis. Stress fractures are more difficult to diagnose, because they may not immediately appear on an X-ray. However, there may be pain, tenderness and mild swelling.

Types of fractures

- **Closed or simple fracture.** The bone is broken, but the skin is not torn.
- **Open or compound fracture.** The skin may be pierced by the bone or by a blow that breaks the skin at the time of the fracture. The bone may or may not be visible in the wound.

Particular types of fractures are:

- **Transverse fracture.** The fracture is at right angles to the long axis of the bone.
- **Greenstick fracture.** Fracture on one side of the bone, causing a bend on the other side of the bone.
- **Comminuted fracture.** A fracture that results in three or more bone fragments.



Closed or simple fracture

Open or compound fracture

Transverse fracture

Greenstick fracture

Comminuted fracture

How do fractures heal?

As soon as a fracture occurs, the body acts to protect the injured area, forming a protective blood clot and callus or fibrous tissue. New "threads" of bone cells start to grow on both sides of the fracture line. These threads grow toward each other. The fracture is closed and the fibrous tissue is absorbed.



What are the treatment options for fractures?

Doctors use casts, splints, internal fixation by means of pins, plates, screws or other devices to hold a fracture in the correct position while the bone is healing.

External fixation methods, include plaster and fiberglass casts, cast-braces, splints and other devices.

Internal fixation methods, hold the broken pieces of bone in proper position with metal or biodegradable (implants that are not permanently in the body as they dissolve) plates, pins, or screws while the bone is healing.

The Orthopaedic trauma area deals with a wide range of very serious types of bone fractures that need immediate care. The most common conditions include fractures of the long bones (such as in the arms and legs) and the smaller bones (such as in the feet and hands). It also includes fractures to the joints (such as ankles, wrists and elbow). Treatment of these injuries is mainly done using fixation devices, which may be either internal (inside) or external (outside).

Over the past several years it has become increasingly popular surgeons to use biodegradable pins, screws and plates to stabilize fractures due to the significant advantage that these implants provide. Biodegradable implants will dissolve (degrade) over time, leaving no implant in the patients body therefore no second surgery is needed to remove the implant after the fracture has healed. A second surgery to remove implants is commonly seen when the surgeon uses metal implants.

What are biodegradable implants?

Medical implants that are biodegradable break down gradually by a series of natural processes in the body over a period of time. Biodegradable materials are also known as (bio)resorbable, and (bio)absorbable. These implants are metabolized by the body into carbon dioxide and water which is then exhaled and excreted.

What are the advantages of biodegradable implants over metal implants?

Biodegradable implants have many advantages over metal implants as they:

Hold the bone firmly while it heals and then gradually disappear. This means the patient benefits from:

- No need for another operation to remove a metal implant, which lessens the risk to the patient of another surgery and in some, cases another anaesthetic.
- Reduced overall rehabilitation time, as patients' often have to recommence physiotherapy or take special precautions after metal implants are removed
- Implants do not remain in the body long term so patients will not have to be concerned about feeling the implant through the skin or cold metal causing an 'aching' feeling in cold weather.
- Implants do not interfere with X-rays, scans or airport security checks as they are not made of metal.
- Do not interfere with movement like metal screws can in the ankle
- Reduced risk of damage to the bone, surrounding soft tissue or joint surface as after a period of time no implant is left.
- No risk of metal allergies being caused by metal implants.




What are the Inion® Biodegradable Implants made from?

All Inion OTPS™ implants are based on Inion Optima™ polymer blends (more plastic like, not metal) and have excellent handling properties, and strength and degradation characteristics that support a more natural healing process.

What is Inion Optima™?

Inion Optima™ materials are made by the blending of highly pure rigid and elastic polymers. The result of blending the polymers is a unique family of materials called Inion Optima™ that possess extraordinary combinations of strength, toughness (malleability) and biodegradation ability.

Type of injury and Inion® product that could be used to repair the injury:

Procedure	Inion Implant	Area of Injury	Product picture
Acetabulum reconstruction in conjunction with rigid metal fixation devices	Mesh – Inion OTPS™ Mesh & Screws	Hip	

Contraindications:

Contraindications can be infection. Limited blood supply, insufficient quality or quantity of bone, load bearing greater than indicated for the specific implant and when patient cooperation cannot be guaranteed (e.g. alcoholism, drug abuse).

Precautions:

Complications are similar to those encountered with any other method of internal fixation:

- Premature bending, loosening, fracture or migration of the devices may result from early stress, activity or load bearing.
- Premature discontinuation of the cast or other immobilization method may cause non-union or mal-union of the fracture or osteotomy.
- Infection can lead to failure of the procedure.
- Neurovascular injuries can occur due to surgical trauma.
- Implantation of foreign materials can result in an inflammatory response or allergic reaction. Transient local fluid accumulation may occur in sterile circumstances.

As with any surgical procedure, careful postoperative management is important for optimal healing. The surgeons will give you detailed instructions for postoperative care (e.g., regarding immobilization and hygiene maintenance).



Hip Fractures:

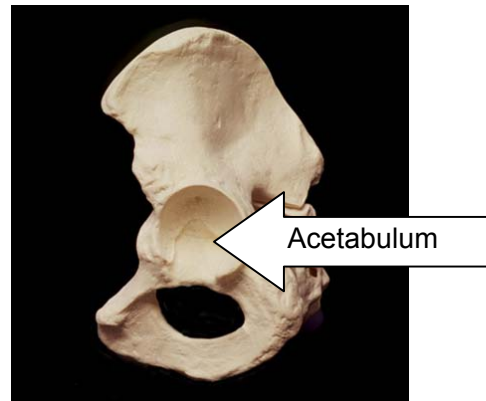
Acetabular fractures:

What is an acetabulum?

The cup-shaped cavity at the base of the hipbone into which the ball-shaped head of the femur fits.

What is a hip-acetabular fracture?

The hip bone, which is contained in the lower part of the trunk of the body or the pelvis, is comprised of three separate bones: the ilium (upper part), ischium (lower part) and the pubis (the central bone that unites with the ischium at either side. Fractures (a partial or complete break in the bone) can occur in any of these areas, near the top of the thighbone (femur) where it angles into the hip socket, or in the cup-shaped depression of the hipbone, called the acetabulum, which is the socket in which the thighbone rotates.



What causes hip-acetabular fractures?

Fractures occur when there is more force applied to the bone than the bone can absorb. Bones are weakest when they are twisted. Breaks in any bone can occur from falls, trauma or as a result of a direct blow to the body.

Acetabular fractures commonly occur after high-energy trauma to the pelvic girdle. Most commonly, acetabular fractures occur after car accidents and falls from significant heights. Because of the amount of energy usually involved in creating an acetabular fracture, a careful search must be made for associated injuries.

What are the symptoms of a hip-acetabulum fracture?

The following are the most common symptoms of a hip fracture. Each patient may experience symptoms differently. Symptoms may include:

- intense pain in the injured area
- swelling in the injured area
- obvious deformity in the injured area
- difficulty using or moving the injured area in a normal manner
- warmth, bruising or redness in the injured area



How is the problem diagnosed?



The diagnosis of a hip acetabular fracture is made initially by physical(hands on) examination and then if a hip fracture is suspected, your doctor will request an x-ray to determine if and what bone is broken. If a fracture is seen a decision will be made to determine appropriate method of treatment. This is very important because acetabular fractures are divided into 10 types: 5 elementary patterns and 5 complex patterns associated with very specific regions of the acetabulum so the doctor must know exactly what he is dealing with before he can commence the treatment. The doctor will also look for any injuries commonly associated with hip fractures. These can include injury to any of the structures housed by the pelvic bones, including the lower portion of the intestines and rectum, the urinary bladder and the internal organs of reproduction.

It is also common for the doctor to also request a Computerized Tomography Scan (also called a CT or CAT scan) this is a diagnostic imaging procedure that uses a combination of X-rays and computer technology to produce cross-sectional images both horizontally and vertically, of the body. A CT scan shows detailed images of any part of the body, including the bones, muscles, fat and organs. CT scans are more detailed than general X-rays and in the case of a serious injury inside the body such as a pelvis or spine it provides a much more detailed look at what is actually going on within your body.

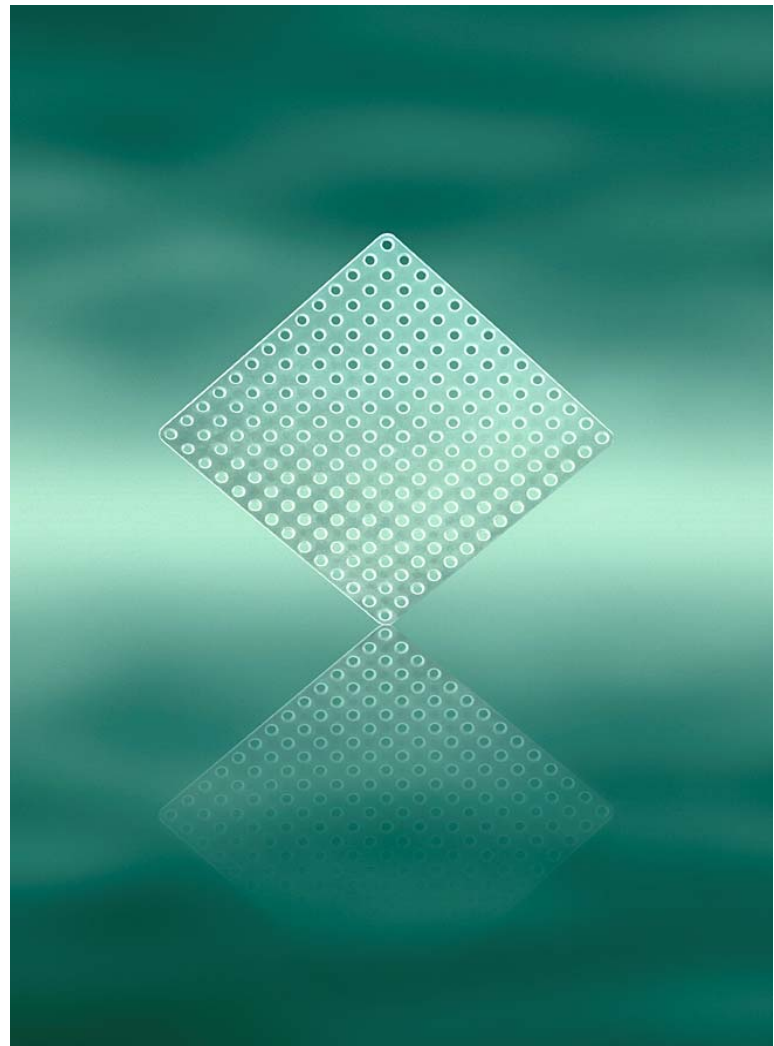
Treatment options?

The following is a general overview of the possible treatment options, your doctor might recommend for you.

- The treatment of acetabulum fractures depends on what area of the acetabulum is fractured and what kind of fracture you have.
- The goal of treatment is to control the pain, promote healing, prevent complications and restore normal use of the fractured area. Fractures that are stable, in which the bone is not at all displaced from its normal position, may be managed solely by a period of traction and not allowing the patient to place any weight on the area for sometime.



If the fracture involves a minimal displacement of the bone, the treatment may involve a more prolonged period of immobilization with surgically placed. Biodegradable mesh which is used to contain bone fragments or bone grafts. Another form of rigid fixation is also used in conjunction with the mesh(i.e.,metal implants). Screws are used to hold the mesh in position. As seen below:



More serious disruption to the bone of the acetabulum region due to severe trauma will require surgery so that the doctor can restore the surface of the acetabulum to its original form. These treatments can include:

Surgery — Required to put certain types of broken bones back into place. Occasionally, internal fixation (metal rods or biodegradable rods or mesh, screws located inside the bone) or external fixation devices (metal rods or pins located outside of the body) are used to hold the bone fragments in place to allow alignment and healing.



Reduction — Reduction involves realignment of the fractured bone. This can be done through an incision made into the fracture site (open reduction) or by external manipulation without an incision (closed reduction).

Traction — The application of a force to stretch certain parts of the body in a specific direction. Traction consists of pulleys, strings, weights and a metal frame attached over or on the bed. The purpose of traction is to stretch the muscles and tendons around the broken bone to allow the bone ends to align and heal.

Medication (for pain control).

Pelvic sling or cast — Immobilizes the injured area to promote bone alignment and healing to protect the injured area from motion or use.

A variety of surgical options exist for acetabular fractures. The specific operation is selected based on the patient and their specific fracture. Some fracture patterns are amenable to percutaneous (small wound) surgical techniques, while others require open surgical treatment.

Acetabular fractures are easier to repair when the surgery takes place within the first week after the injury. Early surgery also avoids prolonged bed rest for the patient. Delaying the operation complicates the surgical tactic.

What to expect after surgery?

Every doctor has their own method of management of their patient, but generally your doctor will prescribe medication for pain and pain management. Acetabular (hip socket) fracture surgery stabilizes the fracture fragments therefore all pain caused by the fractured bone fracture pain is stopped by the surgery. The surgical incisions made by the doctor to access the acetabulum will be painful for a few days and will require medication. Rehabilitation with physical therapy will be required.

