

Having a frame fitted to treat your leg injury

Trauma Orthopaedics

Information for Patients

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“A frame for a setback, to make a comeback”

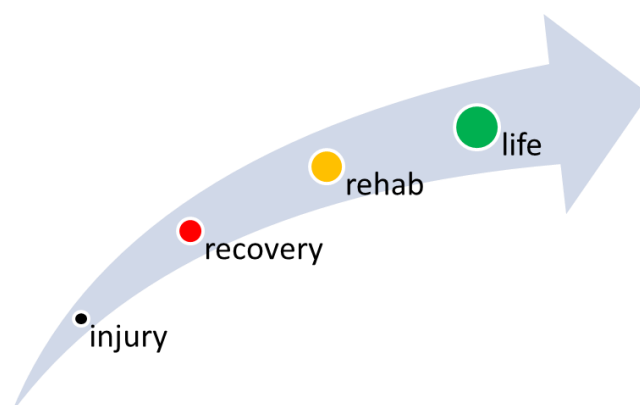
Introduction

You have had a leg injury. A “frame” or “cage” has been recommended as treatment for your condition. It may be in place for many months.

A frame is like a scaffold for the leg which can hold and control the bone to help with the repair.

The frame is made of metal rings attached to pins or fine-wires that insert into the bone. It is measured up and fitted to your leg in theatre by the trauma and orthopaedic surgeons.

You will be helped through this process by the Limb Reconstruction Team who are made up of doctors, nurses and physiotherapists.



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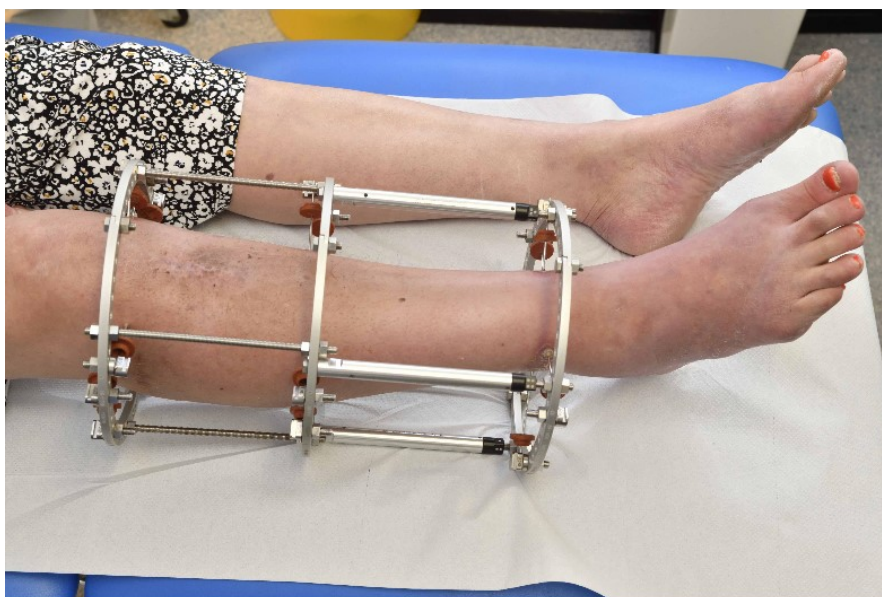
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There are 2 types of frames that can be used:

- **Picture 1:** Hexapod frame (hexagonal rings)



- **Picture 2:** Ilizarov frame (circular rings)



What are the different parts of a frame?

Imagine the wheels of a bicycle, especially the rim and the spokes. A frame is shaped a bit like that (picture 3):

- **Rings:**

Rings can either be hexagonal (hexapod frame - picture 1) or circular (Ilizarov frame - picture 2). They are different sizes depending on the width of your leg, from very small to very large.

The number of rings will depend on the length of the bone that needs support. The minimum number of rings used is usually 3.

- **Foot plate:**

If your foot needs a frame, we use a U-shaped foot plate.

- **Ring connectors:**

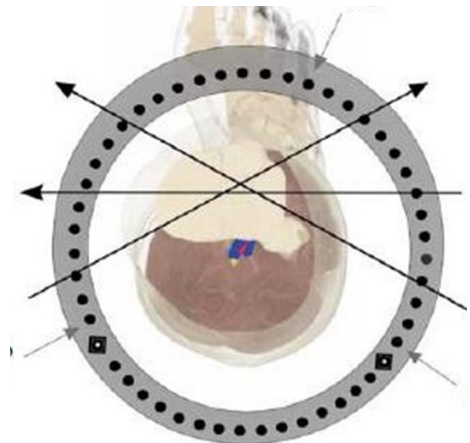
Allows rings to be stacked one on top of the other. These are usually rods with a thread on them with fastening nuts. The rods can be made longer in order to increase the length of your bone. The ring connectors can also be diagonal telescopic struts (used in the hexapod frame - picture 2) that can be shortened or lengthened, allowing the surgeon to tweak the length and the angles of the bone.

- **Fine wires:**

These are “kebab” wires (thin but stiff metal wires) that go through the soft tissue and bone (picture 3). These are clamped on each side to the rings providing stability. The wires are very strong even though they are very fine.

An ‘olive’ fine wire has a bead which pulls on the bone.

Picture 3: fine wires with an Ilizarov frame and an example of an ‘olive’ wire.



- **Half pins:**

These are “bone bolts” screwed into the bone when you are asleep under an anaesthetic and bolted to the ring.

The most common bones that need a frame are the shin bone (tibia) or thigh bone (femur).

Why do I need a frame?

If a fracture is fixed with plates and screws, the surgeon has to cut the skin to open the leg. The main advantage with a frame is that the surgeon can get your fracture lined up, fixed and begin the healing process without having to open up your leg. A frame is also used if a fracture is not suitable for other types of fixation (plates and screws or rod down the bone).

By not opening up the skin, the body can direct all the blood flow to the bone that needs healing instead of having to heal up a wound as well.

Frames are adjustable allowing us to correct any bone defect or deformity in your recovery phase.

The most common reasons for needing a frame are given below:

Complex fractures:

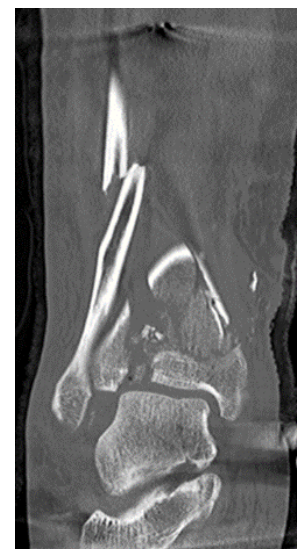
Some fractures around the knee, at the top of the shin bone are called 'tibial plateau' fractures. Simple tibial plateau fractures can be treated with a plate on the bone, but if you have had a very bad break with several broken fragments these are best treated with a frame (picture 4).

Picture 4: an example of a bad tibial plateau fracture (shown by the star).



Some fractures around the ankle at the bottom of the shin bone are called 'tibial pilon' fractures. Many of these can be treated with plates and screws, but really complex ones (picture 5) are best treated with a frame.

Picture 5: a tibial pilon fracture with lots of fragments that we would struggle to fix with plates and screws.



If there is bone, skin and/or muscle loss:

Sometimes a really traumatic fracture can result in bone, skin and muscle loss (picture 6). We see these injuries in patients who have fallen from a height or been involved in road traffic accidents. These are often open and dirty injuries (e.g. with mud or grit). Using an adjustable frame allows the surgeon to properly clean the wound, remove dirty tissue, and let healthy bone grow and the soft tissue (skin/ muscle) heal.

We often work with the Plastic Surgery Department to repair the skin and/ or muscle loss.



Picture 6: this is an open fracture of the shin bone (tibia). There will be a lot of tissue and bone loss after the initial cleaning operation. This kind of injury may need an adjustable frame.

Other situations of when a frame may be needed:

- When a fracture has failed to heal (non-union). The plates and screws might have to be removed, tests carried out for an infection and a frame applied.
- When a fracture has healed, but in the wrong position or at the wrong angle (mal-union). To protect your joints, it is often advisable to re-break (osteotomise) and re-fix the fracture. A frame is a good option, especially a hexapod frame (picture 1) because it allows the surgeon to correct the wrong angles.
- To lengthen a leg or correct a deformity. A leg may be shorter or deformed due to a condition from childhood. A frame can be used to lengthen and correct the deformity, making it easier to walk and also helps to protect your joints from arthritis.
- Infection in the bone (osteomyelitis) usually occurs at the place of an old injury or surgery. It usually needs the dead and infected bone to be removed. This leaves a defect which a frame can help fill. The surgeon uses a technique called “bone transport”. Healthy bone can be taken from above the injury and used lower down to fill in a gap. Treatment of osteomyelitis usually needs treatment done in at least 3 steps and not all at once. This can make a hospital stay quite lengthy. It is often combined with plastic surgery to repair any skin defect.

Preparing for your frame surgery

Tell us about your health:

The more details you can give us, the more likely we will be able to spot potential complications. Frame surgery may involve 1 or more anaesthetic procedures. We need to make sure that your heart, lungs, kidneys and others are in the best possible condition.

Tell us about all your medications in detail:

We will need to know about any blood thinning, heart and diabetes medication that you take. It is also important to tell us about any over-the-counter, topical (patches/ drops/ ointments and creams) and herbal medications. We will ask you to stop taking any non-steroidal anti-inflammatory tablets such as diclofenac (Voltarol) or ibuprofen as they can affect the bone healing process.

Stop smoking:

Smoking slows down the bone healing process so you should try to stop smoking as soon as you know you need surgery. We can help you get advice and support for this.

Your diet:

It is important to get the right nutrition to help your body to heal itself:

- Calcium and vitamin D strengthens your bones. Foods rich in calcium and vitamin D are milk, eggs, yoghurt and cheese.
- Vitamin C (found in fruit, fruit juices and green vegetables) can boost your immune system and speed up wound healing.
- Protein helps to form new healing tissue including bone and muscle.
- Limit the fizzy drinks and caffeine you consume because they can reduce your calcium levels.

Deciding what type of anaesthetic is best for you:

A doctor who is trained in giving anaesthetic (anaesthetist) will talk to you about the choices. There are 2 types of anaesthetic that can be used which are:

- general (where you go to sleep).
- spinal (where the lower half of your body and legs are numbed).

Common problems after frame surgery

Problems you may have after surgery include:

- **pain** - we usually try to numb the leg with a nerve block. This continues to give you pain relief after surgery, so that you are as comfortable as possible. You will be given the maximum amount of pain medication possible to keep you comfortable. The first day after the surgery is often the most painful but it does start to improve after that.
- **anaesthetic problems** – sickness and vomiting are rare complaints.
- **constipation** – drink plenty of water and eat the right food.

Your mobility after the frame is fitted

You will be encouraged to move soon after surgery by a physiotherapist. Often you are allowed to put as much weight as your pain allows with crutches.

You will not be allowed to go home until you can safely use your crutches or a zimmer frame. You will be given some exercises to do at home to prevent your joints from getting stiff.

Aftercare

Swelling:

It is normal for your leg to swell up now and again. It is important to rest and keep your leg raised (elevated) when this happens.

Joint or muscle stiffness:

This can be avoided by putting weight through your leg and moving your joints. The physiotherapist will teach you exercises to keep you as supple as possible. **The physiotherapy is very important** for getting near normal movement so you must do your daily exercises at home.

Pin-site infection:

This is a common problem. Symptoms of a pin-site infection include pain around the wire such that you cannot walk on your leg, redness, feeling unwell or increased oozing from the pin. If you are worried that you might have a pin-site infection you should contact the Fracture Clinic (see back page for contact details), your consultant or your GP. You may need to take a course of antibiotic tablets. Very rarely, a pin-site infection can cause a deep infection and will need urgent surgery to protect the leg.

Preventing blood clots:

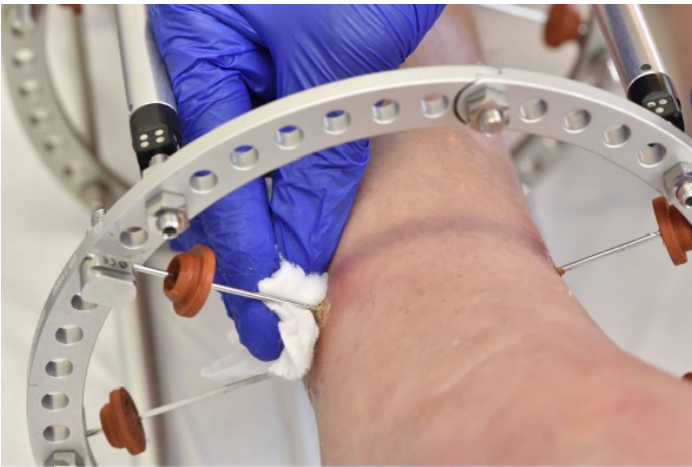
The nature of the surgery means you are at risk of having blood clots (venous thrombosis). We will use tight stockings and give you blood thinning medication to prevent this.

Broken pins or wires:

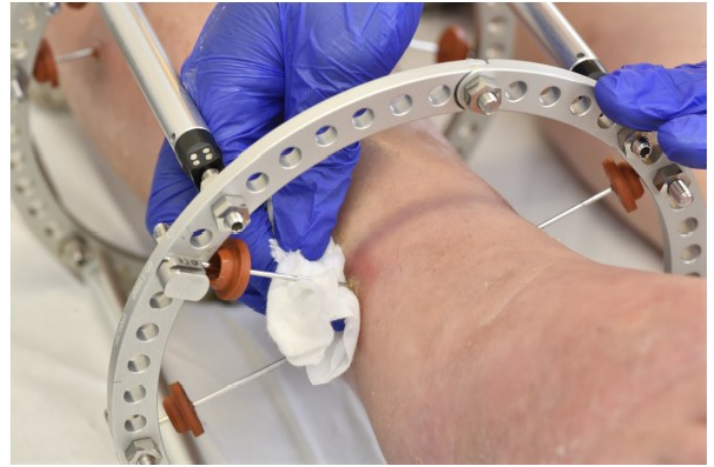
Broken pins or wires can be removed or repaired. You may need to come into hospital to have the pin or wire replaced.

Taking care of the pin-sites:

Pin-sites are the areas where the pins or wires come through your skin. It is very important to keep these clean. Pin-site care will be done on the 2nd, 3rd and 4th day after surgery. After that it needs to be done weekly by yourself or the district nurse. It is best to watch how pin-site care is done from this YouTube video: <https://www.youtube.com/watch?v=7c1Tfmble6U&t=46s>



Picture 7: wash your hands, put on some gloves and get your cleaning equipment ready (sterile swab and chlorhexidine solution). Pull back the 'bung'. Dip the sterile swab in the cleaning solution and tend to the pin-site first. Remove crust and dried ooze but leave any scabs that have formed.



Picture 8: then, work your way up the pin and clean the bung. Throw away this swab and use a new swab for each pin-site to reduce cross-contamination.

Skin care:

You are encouraged to shower daily for 14 days after the operation and as often as you wish after that. Your pin-sites should be cleaned weekly (see above). The frame can be showered too but needs to be dried thoroughly with a clean towel. Some people use a hair drier after a shower to dry the frame.

Adjusting the frame:

In some cases a bone-cut (corticotomy) is carried out during surgery. This allows bone lengthening, deformity correction or bone transport (shuffled along to fill a gap). The consultant or specialist nurse will teach you (and your family or carer if needed) how to adjust the frame after surgery. This is done by turning specific nuts with a pair of spanners.

On a hexapod frame the adjustment is made by adjusting the length of the diagonal telescopic struts.

Your follow-up appointments

There is a monthly outpatient follow-up clinic for frames patients on a Wednesday afternoon. This happens in the Fracture Clinic on Level 1 of the Balmoral Building at the Leicester Royal Infirmary.

You will be seen in the Fracture Clinic 2 weeks after your discharge from hospital, and every 2 to 6 weeks after that. If at any time you think you need to be seen sooner than your next appointment, you can contact the Fracture Clinic for advice.

Physiotherapy

As you get more comfortable after the surgery and once all your adjustments are done you can look forward to the bone fully healing and your frame coming off. Physiotherapy will be arranged for you after you have been discharged.

You must aim to:

- maximize weight bearing as this helps strong bone to reform.
- keep your thigh muscles (quadriceps or quads) strong by doing leg raises.
- keep your knee moving; bend it as much as the frame allows.
- get your foot flat on the ground and keep your ankle flexible.

What happens when the frame is ready to be removed?

Once the consultants are happy with how much the bone has healed, the frame is usually loosened around the fracture or some struts removed. This gives the Limb Reconstruction Team a chance to test how strong the bone is for a few weeks by taking parts of the frame off, getting you to walk, and taking X-rays. As more weight is put through the bone it can strengthen the new bone and encourage the last stages of healing.

When the frame is removed in the clinic, you will be given gas and air (entonox or laughing gas) and advised to take your own painkillers before the procedure. The pin-sites and wires are all cleaned, the frame is loosened and the wires removed from the frame rings before being cut and gently pulled out of your leg. Many people do not feel the smooth wires being removed although the thicker half pins or wires with the small metal 'olive' on them (picture 3) are sometimes uncomfortable to remove. Most people can cope well but each patient is different and some feel less pain than others.

Dressings are put on the old pin-sites which usually dry and heal within a few days. Sometimes a cast, brace or splint is needed once the frame has been removed; your consultant will talk to you about this and see if it is needed.

Advice from staff and former patients

"The frame can be temperature sensitive. Heat and cold are transferred quickly through the frame and into the bone. This was a really painful experience."

Patients have reported this with heat when sitting next to a fire and with cold when heading out for a walk on a brisk morning.

So be careful. Avoid exposing the metal work to heat sources. Wrap up your frame when heading out into the cold.

"The frame is quite heavy and when you stop, the frame's momentum can topple you off balance! So be wary of this."

"That awful twang!"

The wires are tensioned during surgery like a circus tight rope. This is what gives the cage strength and stability. If you hear a "twang", it means a particular wire has lost its tension and you will need to come into the Fracture Clinic to have it tightened again.

"Pain from your frame may be due to the swelling. I found raising it helpful."

"I wrap my frame in a blanket or a couple of pillows at night which helps me get comfortable."

"Pin-site infections are painful. Try to keep the pin-sites clean. I make sure all my pin-sites are cleaned well. The nurses during clinic appointments are extremely helpful and will show you how to look after them properly."

If you have any other useful advice for patients please let your consultant know and we can add it to this leaflet!

Further information

The websites below give personal experiences of people who have had leg frames:

- <http://www.stuffsandthings.co.uk/my-knackered-ankle-ilizarov-frame-pt-i/>
- <https://ramblingsofa20.wordpress.com/2018/04/06/learning-to-live-with-an-ilizarov-frame/>

Contact details

- **Leicester Royal Infirmary Fracture Clinic:** 0116 258 5430
Monday to Friday - 9am to 8pm
Weekends - 9am to 5pm
Outside of these times, you may be asked to leave a message on the answerphone so someone can get back to you.
- **Hospital switchboard:** 0300 303 1573 (ask for Wards 32, 17 or 18 - these are usually the wards you would be admitted to during your treatment).
- **Physiotherapy Department:** 0116 258 5816 or 0116 258 5113 (Monday to Friday, 9am to 4pm).

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