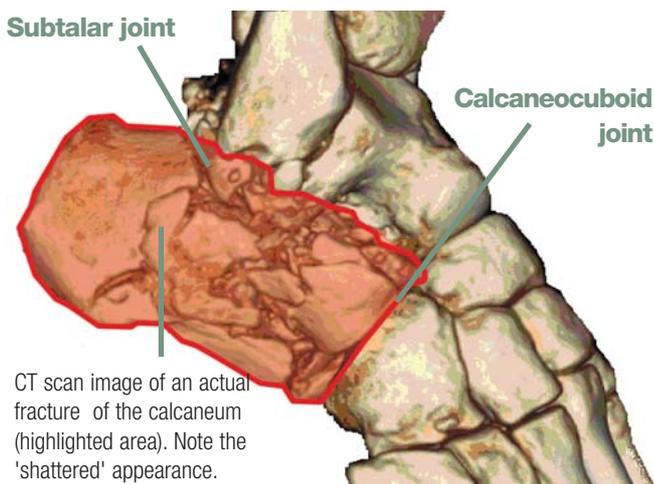
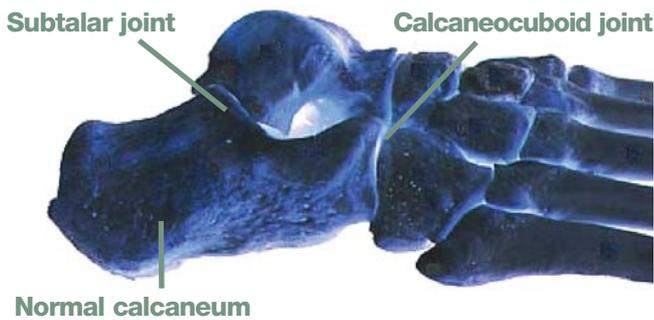


Fracture of the Calcaneus: Open Reduction & Internal Fixation



CT scan image of an actual fracture of the calcaneus (highlighted area). Note the 'shattered' appearance.



Xray image of an actual fracture of the calcaneus after reconstruction using a specialised plate and screws). Note the reconstruction of height and shape of the bone and subtalar joint.



Further axial xray view showing accurate reconstruction of the shape of the calcaneus following fracture.

Fractures of the calcaneus (heel bone) can be very debilitating injuries. When the heel bone is fractured (broken), it is usually caused by tremendous forces impacting on the heel such as with falls from a height, or motor vehicle accidents. You can imagine what happens if you stand on an orange, and this is in effect what happens to the calcaneus in such injuries. The calcaneus is essentially squashed flat, tilts inwards and widens.

The joint between the calcaneus and the talus is called the subtalar joint (see diagrams). This joint is responsible for the inward and outward movements of the foot (inversion and eversion). When the calcaneus is fractured, this movement is commonly reduced or lost completely. The upward and downward movement of the ankle (dorsiflexion and plantarflexion) is not usually substantially affected by fractures of the calcaneus.

What Happens After A Fracture Of The Calcaneus?

There are numerous problems associated with and caused by fractures of the calcaneus. These include widening and deformity of the bone itself, irregularity of the subtalar joint which leads to arthritis, and injuries to the heel cushion (the heel pad), as well as the nerves and tendons surrounding the heel. Many of these problems can result in painful symptoms and loss of function.

Type of Procedure:	In-patient, one to two day hospital stay
Length of Procedure:	2 hour
Anaesthesia:	General anaesthesia and nerve block

Treatment of the Calcaneus Fracture

Over the years there has been a lot of debate regarding the best way to treat these fractures and in particular whether surgery is beneficial.

The ideal goal of treatment is to restore the dimensions of the heel as accurately as possible. This is always difficult because of the multiple fragments of bone that are commonly present. It is almost like trying to piece together a jigsaw puzzle. However, surgery can be performed and for the majority of patients surgery is the correct form of treatment. The goal of surgery is to restore the anatomic dimensions and structure of the heel, and this is performed by what is called an open reduction and internal fixation of the fracture with a plate and screws. This improves the shape of the heel, decreases the likelihood of arthritis developing, and maximises the potential for inward and outward movement of the foot. There are times however when the bone is so severely smashed and fractured, that although surgery is indicated, in addition to the open reduction and internal fixation, the heel joint (the subtalar joint) is fused. This is performed when the joint is so badly damaged that arthritis would otherwise be inevitable. Although the inversion and eversion movement is lost after a subtalar fusion, there is more rapid return to activities and functions after this type of surgery.

Surgery: General Facts

The ideal time to perform surgery is when there is minimal swelling of the skin, and frequently, surgery will have to be delayed for more than one week in order to perform the surgery more safely. Sometimes we will be able to perform the surgery more quickly by admitting the patient, elevating the leg and using a special foot pump (looks like a swimming arm band which is worn on the foot). Surgery is performed under general anaesthetic, and including the anaesthetic time takes approximately two hours to perform. The surgical procedure is called an open reduction and internal fixation. The surgery is performed through an incision on the outside of the heel which exposes the side of the heel and the fracture. The bone is put together and held in place with a metal plate and multiple screws. A large bandage is applied to the leg with plaster incorporated into the dressing to prevent movement of the ankle, and decrease pain.

Calcaneus Fracture General Recovery Facts

- There will be a hard plaster bandage applied to the leg for two weeks after surgery
- In order to stay off your cast / boot, you will need to use crutches, a walker, a wheelchair or a scooter type device called a roll-about
- Your first follow up visit will be at approximately 2 weeks to check the incision healing
- The stitches are usually removed at about 2 weeks following surgery
- We will usually apply a removable boot for you to wear at this time, but occasionally we use a short leg below the knee cast for a short period of time
- If the surgery is on your left ankle, you should be able to drive an automatic vehicle at two weeks. If the surgery is on your right ankle, you will not be able to drive until 2 months from surgery
- Exercises and range of movement of the foot and ankle are to be encouraged at about 2-3 weeks after surgery
- You will not be allowed to take weight through the operated foot until 8 weeks after surgery and then only partial body weight (still using crutches) until 12 weeks from surgery - but during this period you can be fairly mobile with crutches or a walker device
- If you have access to a swimming pool, we encourage you to use this as soon as the incisions are completely dry and healed, which will be at about 3 weeks. Swimming will significantly improve your recovery and allow you to begin bearing some weight on the leg in the pool
- You should remove the boot for twenty minutes three times a day to exercise
- You may begin to walk without the boot at about 10 weeks, depending on your level of discomfort
- You should plan to use a Physiotherapist for about 1-2 months
- Physiotherapy is helpful to regain strength and movement of the subtalar joint and ankle
- There will be moderate swelling of the ankle and leg for about 6-9 months
- Stiffness in the subtalar joint is common (the joint that moves the foot in and out or called inversion and eversion)
- You will continue to improve your strength and movement for about one year after the surgery
- You can expect to have some soreness, aching and stiffness for about 6-9 months after surgery

Exercise, Work And Activity After Your Calcaneus Fracture

Following calcaneal fracture, there is always some stiffness in the subtalar joint (ie heel stiffness). Whilst there is no doubt that some patients make an excellent recovery, some people find returning to a very active lifestyle difficult after these fractures. Employment involving walking and climbing may be difficult to return to in the same capacity.

Triple Fusion (Arthrodesis)

Main risks of Surgery

Swelling - initially the foot will be very swollen and need elevating. The swelling will disperse over the following weeks and months but will remain evident for up to 6-9 months.

Infection - The risk of deep infection occurring is approximately 1%. You will be given intravenous antibiotics to help prevent this. It is important to keep the foot elevated over the first 10 days to reduce the swelling and risk of infection. If there is an infection, it may resolve with a course of antibiotics but may result in failure of the fusion.

Mal position - ideally, the fusions are performed in a position that also optimum function and gives the best appearance. I take great efforts to judge the best position at surgery, but as you are asleep and lying down, it is not always possible to achieve this "best" position. If the position is not optimal following surgery, this can usually be accommodated by custom insoles and footwear. Rarely is further surgery required.

Non-union - this is when the joint fails to fuse and bone has not grown across the joint. We won't know whether this is the case for 6-12 months. The risk of this is approximately 5%. Smoking increases this risk 16 times. If a non-union does occur and is painful, then further surgery is usually needed.

Nerve damage - alongside the incisions are three nerves; the superficial peroneal, sural and saphenous nerves. They supply sensation to the sides and the top of the foot and toes. They may be damaged during the surgery and this may leave a patch of numbness, either at the side of the foot or over the top of the foot and toes. This numbness may be temporary or permanent. There is approximately a 10% risk of this happening.

CRPS - This stands for complex regional pain syndrome. It occurs rarely (1%) in a severe form and is not properly understood. It is thought to be inflammation of the nerves in the foot and it can also follow an injury. We do not know why it occurs. It causes swelling, sensitivity of the skin, stiffness and pain. It is treatable but in its more severe form can take many months to recover.

Deep Vein Thrombosis (DVT) - This is a clot of blood in the deep veins of the leg. The risk of a clot occurring is reported as less than 1% after foot and ankle surgery which is generally substantially lower than after hip or knee surgery. Suspicion of DVT is raised if the leg becomes very swollen and painful. There are tests that can be performed to confirm / exclude the presence of a DVT. If confirmed, you will probably require treatment with a blood thinning agent (heparin preparation and / or warfarin). The main concern with regards a DVT is that rarely (<1:1000 chance with foot and ankle surgery) a piece of clot can break away in the leg and travel to the lungs which is much more serious and can be life-threatening. This is called a pulmonary embolus and signs of this include chest pain and shortness of breath.

Whilst in hospital following surgery it is likely that you will be treated with a blood thinning agent (LMWH - low molecular weight heparin injections) to minimise the risk of DVT/PE but this does not afford total protection and exercises to keep the toes and knee moving are advised, as well as remaining generally mobile. You are also likely to be fitted for a compression stocking to be worn on the unoperated leg after surgery.

If you are concerned that the leg has become more swollen and painful (some swelling always occurs after surgery), or if you experience chest pain/shortness of breath, then you should contact the hospital, general practitioner, or accident and emergency department immediately.

Post-operative Course:

Calcaneus Fracture

Day 1

- Foot is wrapped in bulky bandage and splint
- Elevate leg, take pain medication
- Expect numbness in foot 12-24 hours
- Bloody drainage through bandage is expected
- Do not bear any weight

1 Week

- Use crutches, walker, wheelchair or roll-a-bout
- Do not change dressing/splint
- Do not get the leg wet
- Important to elevate the leg in the first 2 weeks

2 Weeks

- First follow-up in Out-patient Department
- Dressing changed
- Sutures may be removed
- A removable boot is applied
- Start motion out of the boot as instructed
- Can shower, provided the incision is clean and dry
- Do not soak the foot until the incision is completely dry
- Can soak in bath when incision is completely dry, usually about 3 weeks

3 Weeks

- Start swimming in a pool using a flipper to help movement of the ankle
- You can bear some weight in the pool if there is no discomfort or pain
- Start physiotherapy

8 Weeks

- Start exercise bicycle. No resistance
- Begin partial weightbearing

10-12 Weeks

- Full weight bearing without boot
- Continue Physiotherapy
- X-rays taken in Out-patient Department

Driving

IF have an AUTOMATIC VEHICLE and ONLY LEFT leg surgery then it is likely you will be allowed to drive after your outpatient review at 2 weeks post surgery.

IF you have a MANUAL VEHICLE or RIGHT leg surgery then you will NOT be able to drive until 3 months post surgery.

These notes are intended as a guide and some of the details may vary according to your individual surgery or because of special instructions from your surgeon.

sussexfoot&anklecentre

The Sussex Foot & Ankle Centre was founded in 2005 by two orthopaedic surgeons, David Redfern and Stephen Bendall, with the aim of providing a high quality specialist service for the diagnosis and treatment of all foot and ankle problems. Both orthopaedic surgeons are specialists in problems affecting the foot and ankle and have many years of experience. They operate the service with outpatient clinics at the Brighton and Haywards Heath Nuffield Hospitals.

The sussex foot and ankle center strives to provide the best advice and treatment for all foot and ankle problems. This includes sports injuries and trauma, bunions, metatarsalgia, and arthritis. Both surgeons have particular interests in minimally invasive surgery and are at the forefront of developing such techniques in this country.

Both surgeons are also academically very active and have appointments within the national (BOFAS) and international (EFAS) professional foot and ankle surgery societies.

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