

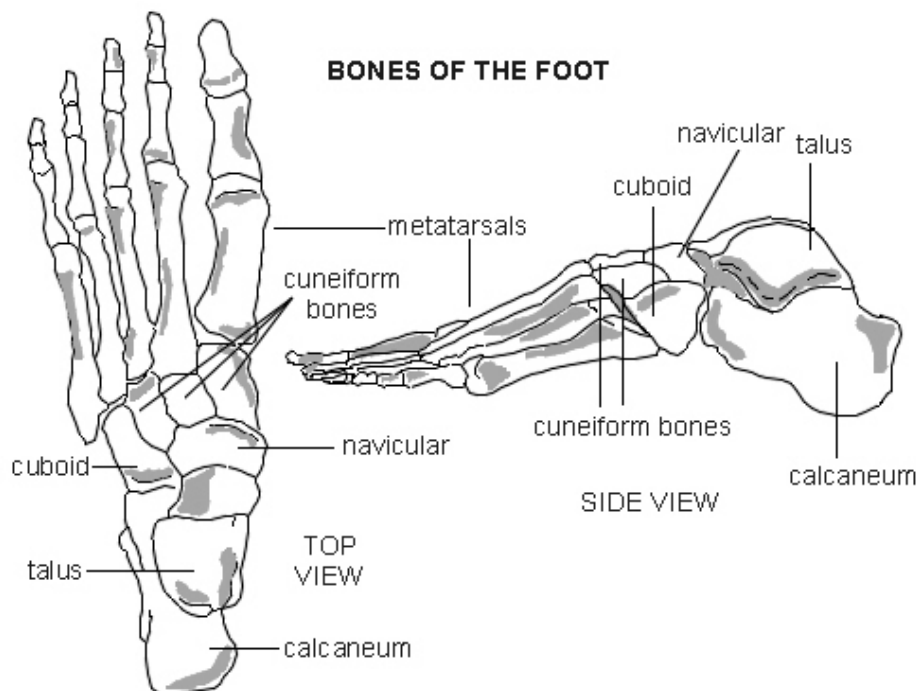
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Metatarsal fractures

A metatarsal fracture occurs when one of the long bones of the midfoot is cracked or broken. This may be due to sudden injury (an acute fracture), or due to repeated stress (stress fracture).

Where are the metatarsal bones?

The metatarsal bones are some of the most commonly broken (fractured) bones in the foot. There are five metatarsal bones in each foot. They are the long slim bones which run the length of the foot to the base of the toes. [For more information on foot anatomy, see the separate leaflet called Heel and Foot Pain \(Plantar Fasciitis\).](#)



A metatarsal fracture is a break in one of the five long bones which form the middle part of your foot.

Are there different types of metatarsal fracture?

Breaks (fractures) can be **acute**, or caused immediately by injury. They can also occur over a longer period of time, when they are called **stress** fractures.

Acute metatarsal fracture

Acute metatarsal fracture is usually caused by a sudden forceful injury to the foot, such as dropping a heavy object on to the foot, a fall, kicking against a hard object when tripping, or from a sporting injury.

This may be open or closed, and displaced or not displaced:

- **Open or closed:** an open fracture is one where the skin is broken over the fracture so that there is a route of possible infection from the outside into the broken bones. This is a more serious type of fracture, with more damage to the soft tissues around it making treatment and healing more complicated. Specialist assessment is needed.
- **Displaced or not displaced:** a displaced fracture is one where, following the break, the bones have slipped out of line. A displaced fracture needs specialist care, as the bones will need to be properly lined up and stabilised. This may involve an anaesthetic and some kind of metal pinning or plating to the bones.

5th metatarsal fracture

The fifth metatarsal bone is the most common metatarsal bone to be fractured in sudden (acute) injury to the foot. It may be broken at various points along its length, depending on the mechanism of injury. The other metatarsal bones can also be broken. The first, second and fifth metatarsals are the most commonly injured in sport. Several well-known footballers have had metatarsal fractures in recent years.

Stress fracture

A stress fracture is a hairline break in a bone, caused by repetitive stress. This is cracking which goes only partway through the bone. There may be a single split in the bone, or multiple small splits. The hairline break or breaks do not go through the full thickness of the bone, so stress fractures are not generally displaced. However, several small stress fractures can develop around the same area, over time.

What causes metatarsal fractures?

Acute metatarsal fractures

- These can be caused by direct injury to the foot. This may happen, for example, through someone stepping on or kicking the foot, by dropping something on to the foot or by falling on to the foot.
- Twisting of the foot or the ankle can also cause fractures of the base of the fifth metatarsal. In this injury, the twisting mechanism pulls on a strong ligament that attaches to the base of the fifth metatarsal which then pulls off a fragment of bone.
- The shaft of the metatarsal is commonly injured because of twisting of the foot on landing from a jump. This is a common problem in ballet dancers.

Stress fractures

This type of metatarsal fracture generally occurs due to:

- Repeated stress to the bone, which is also termed overuse.
- Marching or running for long distances, especially if carrying heavy packs (which is why they used to be called 'march fractures'). Therefore they are often found in athletes and sportspeople, although they can affect any runners, even those who only run a little. They are commonly seen in the military during training exercises.

Stress fractures are common in runners who:

- Suddenly increase their running mileage or intensity.
- Run in poor footwear that doesn't suit their feet.
- Have a sudden change in footwear.
- Have just changed their running shoes and not 'broken them in' carefully.
- Continue to exercise despite having foot pain.

People's choices and needs for running shoes vary. However, before choosing something unusual such as barefoot shoes or corrective shoes, make sure you take advice. For example, for barefoot running you need to be taught the right technique.

It's advised to break in new running shoes gradually - many injuries result from a sudden change in running shoes. They are also frequently seen in ballet dancers and gymnasts.

Abnormalities of the structure of the foot, and abnormalities of the bones and joints, such as [rheumatoid arthritis](#) or 'thinning' of the bones ([osteoporosis](#)), can make stress fractures more likely.

They can also occur in people who have lost nerve sensation in their feet due to neurological problems - for example, [diabetes](#) that has affected the feet.

Does osteoporosis cause metatarsal fractures?

Metatarsal fractures (of both types) occur more easily if the metatarsal bones are weakened due to 'thinning' of the bones (osteoporosis).

[See the separate leaflet called Osteoporosis for more detail.](#)

Does ageing make metatarsal fractures more likely?

Most metatarsal fractures occur in younger people, as they are more likely to be involved in the kinds of sports and marching activities that make them more likely. However, as we become older the 'springiness' and padding of our feet tend to reduce. This means that our feet absorb impact less well and it is easier to fracture bones. Supportive footwear will make this much less likely.

[See the separate leaflet called Ageing Feet for more detail.](#)

What are the symptoms of a metatarsal fracture?

Acute metatarsal fracture

- May make an audible sound at the time of the break and you will usually have immediate pain and tenderness around the area of the fracture.
- The pain is often called 'pinpoint pain' as it is quite well localised at the site of impact to the bone.
- Broken bones bleed, so bruising and swelling can develop and you may have difficulty putting weight on the affected foot.
- Movement of your foot may also be limited. Surprisingly, however, pain can settle within a few hours.

People sometimes say that it isn't possible to walk on a broken foot but this is not correct. Whether you can walk on a broken foot depends on which bone is broken (and whereabouts along its length), whether the fracture is displaced, how supportive your shoes are, and your personal tolerance to pain. It is, therefore, possible to walk on a broken foot, although it is likely to be very uncomfortable to do so and it may well make matters worse if you do.

Stress fractures

- Similar symptoms to acute metatarsal fractures (above), although there is usually no bruising and no cracking sound.
- At first, the main symptom may just be pain in the foot during exercise that is relieved by rest. The pain tends to be widespread and diffuse in the foot.
- After a while, the pain may become continuous, so that it is not relieved by resting. The sore area tends to become more localised to the area of the fracture, and the pain gradually increases.
- Typically the stress fracture causes a tender area along the line of the second or third metatarsal bone.
- There may be some swelling but there is usually no bruising.

People who have stress fractures may continue to walk for some time. Eventually this becomes increasingly painful, as the splits in the bone tend to worsen and the bone itself starts to react and become inflamed, and it can become impossible to weight bear. A metatarsal stress fracture can progress to become a full-thickness fracture.

Will the pain increase?

Metatarsal stress fractures can begin as very small injuries which do not cause severe pain. However, if you carry on stressing the bone, the crack will often deepen and widen, becoming gradually more painful. Eventually, in the worst case scenario, the stress fracture may progress to become a full fracture.

If you have an acute fracture and you continue to stress the bone, the pain will increase further as the broken ends of bone will start to rub slightly against one another, and the area will become inflamed. In the worst case scenario the fracture may become displaced.

Do I need any investigations?

Your doctor is likely to suggest an X-ray of your foot if they suspect a metatarsal fracture.

Acute metatarsal fractures

- Most can be seen easily on [X-ray](#). Initially doctors can see the crack in the bone, and after a few days they can also see irregularities in the bone as it starts to heal and remodel itself.
- [Computerised tomography \(CT\) scanning](#) or [magnetic resonance imaging \(MRI\) scanning](#) is occasionally needed.
- The doctors will need to determine if the fracture is displaced, which may mean that the bones need to be re-aligned and held in place. This is quite common in acute metatarsal fractures, as the weight of your body tends to push down on the broken bone and this can force the two broken ends slightly apart.

Stress fractures

- Do not show up as easily on X-ray, particularly not at first. Half of them never show up on a normal X-ray.
- There can be multiple, very tiny fractures and splits in the bone, or just one fine crack which doesn't go right through the bone. Because they have formed very gradually, the bone may not have 'reacted' very much to the injury.

- A specialised [ultrasound scan](#) may show a fracture that can't be seen on X-ray.
- Metatarsal stress fractures can usually be seen by using [a bone scan](#).
- [MRI scanning](#) is also sometimes used to find stress fractures.

Do I need to see a doctor if I suspect metatarsal fracture?

You should seek medical advice if you suspect that you have a metatarsal fracture. A doctor is able to do tests, including imaging, which will suggest the best course of action – not only to make things better as quickly as possible, but also to prevent making things worse.

How to treat a metatarsal fracture

This depends on:

- Which metatarsal bone is broken (fractured).
- Which part of the metatarsal bone is broken.
- How severe the damage is.
- Whether it is an acute fracture or a stress fracture.

It also depends on:

- Whether the fractured bone is displaced or non-displaced (see above).
- Whether the tissues of the foot around the break are also badly injured causing the fracture to be an open fracture.

The basic principles of treating metatarsal fractures are as follows.

Simple painkillers

Painkillers such as [paracetamol](#) and [non-steroidal anti-inflammatory painkillers](#) such as [ibuprofen](#) which may help to relieve pain.

Ice

Applying ice to your foot can also be helpful as pain relief. Ice should be applied as soon as possible after injury, for 10–30 minutes. (Less than 10 minutes has little effect. More than 30 minutes may damage the skin.) Make an ice pack by wrapping ice cubes in a plastic bag or towel, or by using a bag of frozen peas.

Do not put ice directly next to skin, as it may cause ice burn. Gently press the ice pack on to the injured part. The cold is thought to reduce blood flow to the damaged area. This may limit pain, inflammation and bruising.

Some doctors recommend re-applying for 15 minutes every two hours (during daytime) for the first 48–72 hours. Do not leave ice on while asleep.

[See the separate leaflet called Heat and Ice Treatment for Pain for more details.](#)

Rest and elevate

Elevation initially aims to limit and reduce any swelling. For example, keep the foot up on a chair to at least hip level when you are sitting. When you are in bed, put your foot on a pillow. Sometimes rest is the only treatment that is needed, even in traumatic fracture.

Stop stressing the foot

If you've been diagnosed with a stress fracture, avoiding the activity that caused it is important for healing. This may mean using crutches, a short leg walking cast or even a wheelchair.

Immobilisation

Some fractures just need support to help healing. For example, a supportive elastic tubular bandage with a supportive, rigid shoe or boot. If needed, special shoes are available to help to immobilise the fracture and support the foot so that you are able to walk.

Progressive weight bearing on the foot can then follow as pain allows. Other fractures may need treatment with a below-the-knee plaster cast.

Surgery

Very occasionally, surgery may be necessary – for example, to re-align any part of the bone that has moved out of position. Surgery is not needed for stress fractures.

Follow-up care

Physiotherapy and a gradual return to exercise are a part of good follow-up care.

How long does a metatarsal fracture take to heal?

Acute metatarsal fractures

These generally take around six to eight weeks to heal. However, it may be longer than this before a sportsperson is fully back in action.

Stress fractures

These will normally heal without any complications and, in time, people are able to return to their previous activities fully. You can return to your activities when you can perform them without pain. This will typically take six to twelve weeks.

When you do start exercising again, you should gradually build up your activity levels. A sudden return to high-intensity exercise after a break may cause a repeat or a new stress fracture, or other injury.

What if the pain gets again worse?

If the pain gets worse then you should seek medical advice. The expected pattern of healing, in bony injuries of any kind, is that they should gradually hurt less as healing occurs, and that any gradual worsening of pain suggests that the injury is also getting worse, or that you have a fresh injury.

If your foot pain is increasing over time then your activity may be making an existing problem worse. In the case of a stress fracture this may mean progression to an acute fracture.

In the case of an acute fracture it may be worsening displacement of the bones and preventing the two ends of the bone from knitting together. Always return to your doctor or health professional for further advice if you have gradually worsening symptoms.

What are the complications of metatarsal fractures?

If properly treated then metatarsal fractures should heal without long-term consequences. If not recognised and treated then some of these problems can occur:

- A metatarsal stress fracture can become gradually worse if repeated stress to the bone continues. It can eventually **become a full-thickness metatarsal fracture**.
- A fracture of the first metatarsal bone can **lead to later arthritis** of the big toe joint.
- A fracture at the base of the fifth metatarsal bone is often mistaken for an ankle sprain and therefore not rested or supported enough. This can lead to **problems in healing** and continuing pain.
- A full-thickness fracture which is displaced and not 'put back' into line can **heal 'out of shape'**, leading to deformity of the foot, sometimes making shoe fitting difficult. The foot may be painful.
- Acute metatarsal fracture can also, occasionally, **lead to 'non-union'**, which is when the two ends of broken bone stop trying to heal because movement between them makes this impossible. This may lead to reduced ability of the foot to cope with stresses and strains of walking and running and it may also lead to chronic pain in the foot.

How to prevent metatarsal stress fractures

There are a number of things that you can do to help prevent stress fractures:

- Exercise intensity and duration should be built up slowly and gradually.
- Rest time and recovery time need to be built in to any training schedule.
- Footwear should be well fitting and suit your running style. If changing - for example, from supportive training shoes to barefoot running shoes - you should be shown how to adapt your style. You should practise this gradually.

- You should be aware of the symptoms of stress fractures, and should not continue to run on a painful foot.

If stress fractures are recognised and treated quickly, this can reduce the amount of time that you need to stay away from activities.

Dr Mary Lowth is an author or the original author of this leaflet.

Further reading

- [Kiel J, Kaiser K](#); Stress Reaction and Fractures
- [Herterich V, Baumbach SF, Kaiser A, et al](#); Fifth Metatarsal Fracture–A Systematic Review of the Treatment of Fractures of the Base of the Fifth Metatarsal Bone. Dtsch Arztebl Int. 2021 Sep 6;118(35–36):587–594. doi: 10.3238/arztebl.m2021.0231. Epub 2021 Sep 6.
- [Smidt KP, Massey P](#); 5th Metatarsal Fracture.
- [Ficek K, Kedra N, Skowronek R, et al](#); The Fifth Metatarsal Bone Fracture in Athletes – Modalities of Treatment Related to Agility in Soccer Players. J Hum Kinet. 2021 Jul 28;79:101–110. doi: 10.2478/hukin-2020-0059. eCollection 2021 Jul.
- [Agrawal U, Tiwari V](#); Metatarsal Fractures.

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