



**Royal National
Orthopaedic Hospital**
NHS Trust

Patient Information on
Ankle Arthritis



At a Glance

Ankle arthritis causes pain and stiffness of the ankle and has a major effect on quality of life. It affects up to 30,000 patients a year in the UK.

What treatment options are available?

Most patients with ankle arthritis respond to non-surgical treatments such as changing activity levels, painkillers, anti-inflammatory drugs and ankle supports. Where these have been tried and failed, then ankle bone fusion (arthrodesis) and ankle replacement are the main surgical options.

Ankle arthrodesis

The worn-out arthritic joint is “fused” meaning that the two bones are made into one. Although no motion can then occur in this part of the ankle, the foot has many other joints, which remain mobile, and so about half of the up and down motion of the foot is retained. Approximately 2,000 ankle arthrodeses take place each year in the UK.

Total ankle replacement

The worn-out arthritic ankle joint is resurfaced with metal components and a plastic insert is placed in between them to allow gliding motion. Approximately 900 ankle replacements take place each year in the UK.

What are the benefits of surgery?

Both ankle arthrodesis and ankle replacement aim to provide:

- Long-lasting pain relief
- Improved function and mobility
- Improved quality of life

What are the disadvantages of surgery?

- Failure to meet your expectations
- Risks associated with the surgery
- Need for further surgery in the future

What questions can I ask my hospital team?

- What results can I expect from surgery?
- What can I expect if I don't have surgery?
- What treatment options are available?
- What are the alternatives?
- What are the risks?
- How long will I be in hospital?
- How will I cope after surgery?
- When will I get back to normal?

The answers to these questions can be found within this booklet

If you have been diagnosed with end-stage ankle arthritis and are considering surgery, you'll probably have lots of questions.

What do I need to know about surgery?

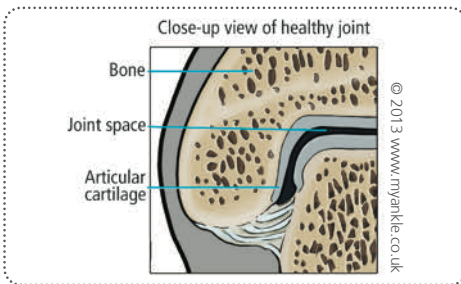
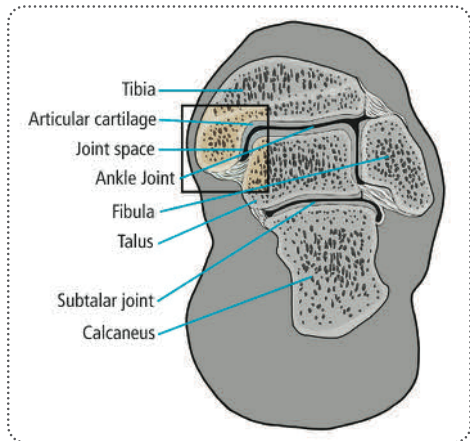
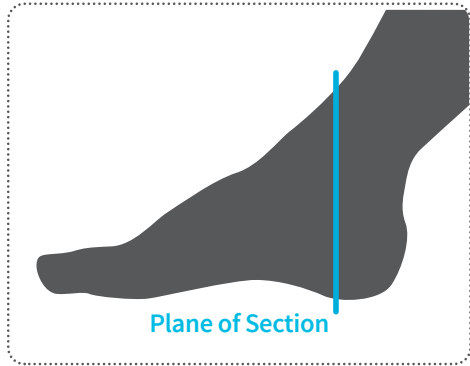
In this factsheet we'll explain what options are available and what you can expect. If you choose to have surgery, then we'll also look at what happens before and after surgery and tell you where you can find more information.



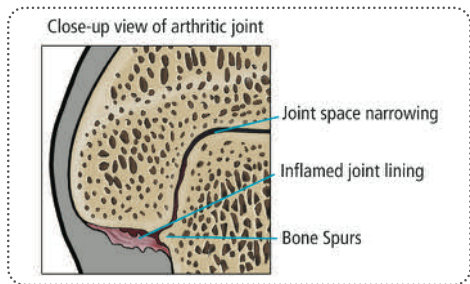
What is ankle arthritis?

The ankle joint is formed by the lower end of the tibia (shin bone) and the talus (ankle bone), also known as the tibiotalar joint.

In normal joints there is a layer of cartilage (or gristle), which acts as a shock absorber and allows smooth gliding motion. In osteoarthritis the cartilage is worn and bone starts to rub on bone, causing pain. Often extra bits of bones form osteophytes which, together with scarring of the joint lining, are responsible for joint stiffness. Pain and stiffness are the two main symptoms of ankle arthritis.



Close-up view of healthy joint



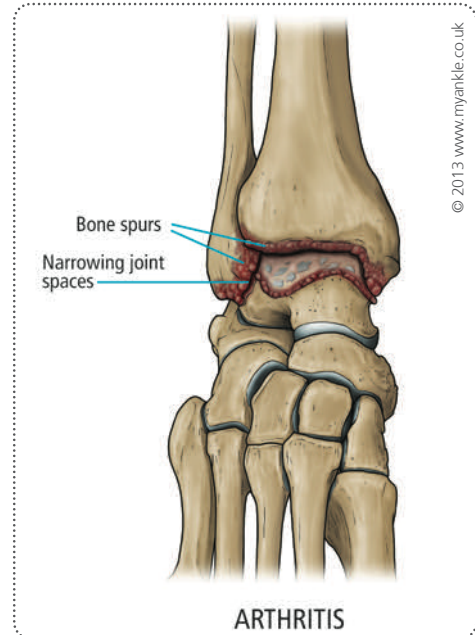
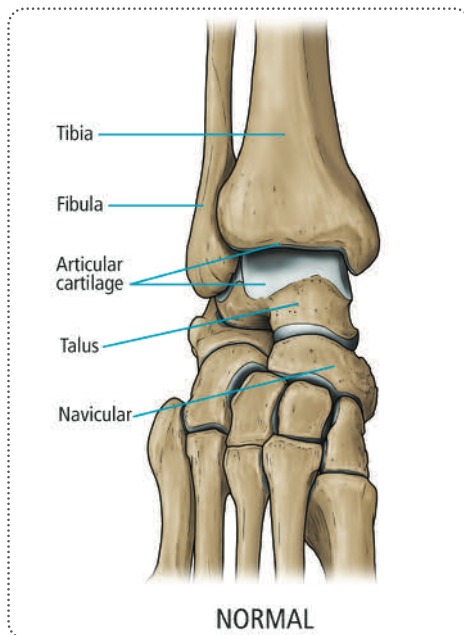
Close-up view of arthritic joint

What causes ankle arthritis?

Most cases of ankle arthritis are secondary to injury, for example, occurring years after an ankle fracture or even several severe sprains.

It can also be caused by rheumatic conditions such as rheumatoid arthritis or gout which can lead to damage and destruction of joints.

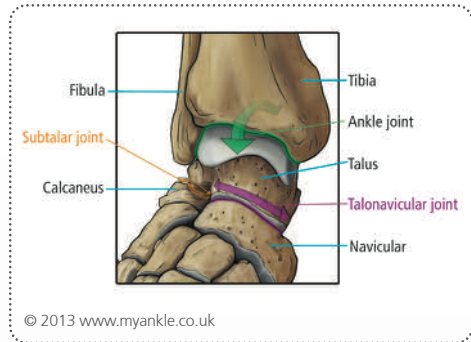
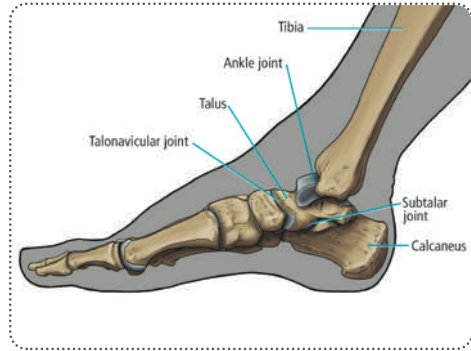
In some cases of ankle osteoarthritis there is no known cause (other than genetic) and it is known as primary osteoarthritis. In this situation, other joints may be affected such as your hands, knees, or hips and there may be a family history of similar issues.



Why does my foot still move if the ankle is stiff?

Our feet are made up of 26 bones and more than 33 joints, so even when the ankle joint is stiff, the other joints can compensate, allowing much of the movement to be retained.

The ankle joint is often thought of as a hinge joint allowing upwards and downwards motion. In addition, movement takes place in the joints close to the ankle. The joint below the ankle (the subtalar joint) is responsible for side-to-side movements, such as walking on uneven surfaces. The joint in front of the ankle (talonavicular joint) is involved in the twisting movements of the arch of your foot, which occur when walking, especially on uneven surfaces.



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Diagnosis

Diagnosis is usually made by a specialist orthopaedic foot and ankle surgeon, based on a history of your condition as well as a careful examination, and a series of standing (weight bearing) X-rays. The X-rays may show a loss of the normal joint space as well as other signs of arthritis (see below).

In most cases a standing X-ray of the affected foot is all that is needed to determine the severity of the arthritis but sometimes it is necessary to carry out further tests such as MRI (Magnetic Resonance Imaging) or CT (Computerised

Tomography) scan to look for arthritis of the adjacent (surrounding) joints.

Your surgeon may also recommend image-guided injections into one or more joints in order to localise the symptoms and judge the effect that numbing a joint has on your pain.

If you have not previously been diagnosed with a rheumatic condition, your specialist may also order some additional blood tests (to look for conditions such as rheumatoid arthritis or gout).



When should I consider surgery?

The decision to have surgery is based on a number of factors including:

- Your symptoms - are your symptoms affecting your quality of life?
- Are your activities of daily living affected? For example going up and down stairs or walking to the shops?
- Is your ability to carry out your work affected?
- Can you no longer enjoy recreational activities?
- Is your sleep affected because of pain?
- Your response to non-surgical treatments (see page 10)
- Your needs and expectations (it is important that you discuss these with your surgeon)
- If you have worsening deformity or cannot wear your normal shoes (Note: If you have worsening deformity you must seek a surgical opinion early)

“I’ve been in pain for 13 years and felt it was time to get my life back”



Non-surgical treatments

There are many non-surgical treatments that **should** be tried before surgery. These include:

Diet

Losing weight will reduce the strain on your ankles.

Medication

Painkillers such as paracetamol or ibuprofen can reduce the pain. Ice packs can help reduce swelling.

Exercise

Physiotherapy helps build the strength of the muscles, which can take the strain off the joint.

We understand that exercise can be painful but you can choose from many non-impact activities such as swimming or cycling.

Activity modification

Avoid running, squatting and carrying heavy loads. If you are still working, consider changing your role at work.

Ankle Supports

There are many different types of ankle braces and your physiotherapist can help you find the best option for you.

Footwear adjustment

Supportive boots, modified shoes or corrective insoles may help.

Walking aids

A walking stick or cane can be very helpful.

You will only be offered surgical treatment if most or all of the above non-surgical measures have failed to control your symptoms, at which point you are considered to have 'end-stage ankle arthritis'.

You will always be the person to make the final decision as to whether or not to have surgery.



What are the possible advantages of ankle surgery?

The main advantages of ankle surgery can be:

- Long-lasting pain relief
- Better function and mobility and improved quality of life
- A greater choice of comfortable, and sometimes more fashionable footwear

Types of ankle surgery

Keyhole surgery (arthroscopy) may be helpful in the earlier stages of ankle arthritis, but when the disease becomes "end stage" there are two main surgical options; ankle arthrodesis (fusion) and ankle replacement.

We will discuss the benefits and risks of both procedures and whether any additional procedures will be needed at the time of the operation. For example, some people may also require ligament or tendon surgery.



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Photo by Jan Letocha

Ankle arthrodesis

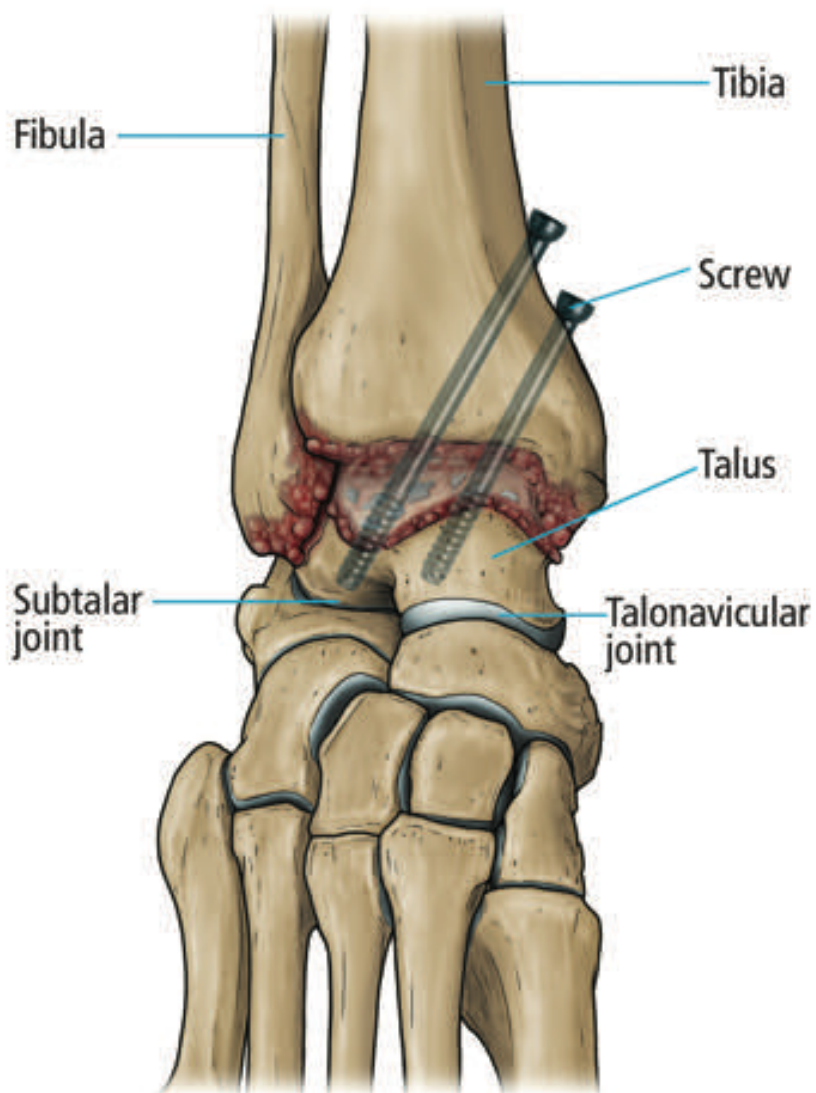
Ankle arthrodesis is an operation to “fuse” or stiffen the ankle joint. It involves removing the surfaces of the damaged ankle joint and fusing the tibia to the talus bone, so that your foot is under your body and flat to the floor. This procedure can be performed as keyhole surgery (also referred to as arthroscopic surgery) or open surgery. In keyhole surgery a number of small incisions are made, whereas in open surgery, a larger incision is made.

The damaged joint surfaces are removed and the bones are held together using screws to maintain the position while bone healing occurs and the bones “fuse” together to become one. This converts a stiff, painful joint into a stiff but pain-free one.

The surgery takes between one and two hours and you will have a tourniquet applied around your thigh during the surgery, to reduce bleeding.



When you wake from surgery you will have a below-knee partial cast, which may later be changed into a full below-knee plaster or synthetic cast. You will have to wear a cast for up to 12 weeks. You will need crutches or a frame to help you move around during this time.



Ankle arthrodesis

Depending on your situation, your surgeon will allow you to put weight on your ankle after about six weeks and sometimes sooner. You should discuss your post-operative care with your surgeon.

Because you are immobilised after surgery, it is usually recommended that you have blood-thinning medication to prevent blood clots whilst in the cast, as well as a special stocking on the other leg to improve blood flow.

After the plaster cast is removed, you may require an ankle brace or a walking boot for a few more weeks. You will then be able to wear your normal shoes. Sometimes changes are made to the sole of the shoe to give you a normal stride length despite the stiffened joint.



In some circumstances where there is major deformity or where the arthritis affects more than one joint, your surgeon may recommend fusion of more than one joint. There are lots of surgical options including a tibiotalocalcaneal fusion or a pantalar fusion. These may involve a rod or a large metal nail inserted up to the middle of the shinbone through the heel.

What can I expect after ankle arthrodesis?

Ankle arthrodesis provides excellent pain relief and good function, and has a 90% success rate, as measured by patient satisfaction in the short to medium term.

Some patients express concerns regarding the level of mobility they will have following surgery. Ankle arthrodesis removes ankle movement completely; however, as much as 50% of the up and down movement of the foot is maintained (see page 7).

Walking

In most cases, walking will return towards normal, so that others may not notice that you have had an ankle arthrodesis. If you walked with a limp prior to surgery because of pain, after the surgery your walking is likely to improve. Because the stride length is shorter, a limp may be noticeable if you start to run. Some female

patients comment that it is uncomfortable or not possible to wear high-heeled shoes after ankle arthrodesis.

Sports

Most patients with a successful ankle arthrodesis are able to walk without a limp, cycle and do certain sports such as golf. Although more vigorous activities such as squash, tennis or football may be possible after an ankle arthrodesis, we do not recommend them, as they put a lot of stress across the adjacent joints, which will wear with time, and pain may return. Similarly, walking or hiking on rough ground is possible but will put more stress on the adjacent joints. You can protect the adjacent joints by wearing a sturdy above-ankle walking boot.

“Before, my ankle would ache and swell every day and I was popping pills to get through a day. Surgery has given me a new lease of life, I’m back on the golf course and I don’t think anyone can tell I’ve had surgery”



Photo by Jan Letocha

Are there any major risks with ankle arthrodesis?

In addition to the general risks of ankle surgery (page 26), the specific risks of ankle arthrodesis relate to problems with union and stress being transferred to the adjacent joints.

- Research has shown that five to 10% of fusions do not heal in the exact position intended. This may either be due to the fact that the position was not achieved at the time of surgery or that the bones have shifted while in plaster. This does not usually cause any major problems but, rarely, further surgery may be required to correct this.
- Because the ankle joint has been stiffened, more stress will be absorbed by adjacent joints, which, with time, are at risk. Signs of arthritis in the adjacent joints are common on X-rays after 10 years, but many patients do not require treatment for this.
- Sometimes the screws become prominent under the skin. If this happens, they can be removed but only about one in 10 patients need the screws to be taken out. If screws need removing, we usually advise you to wait at least a year after surgery to give the bones time to become strong.

It is important to read the general risks of ankle surgery (page 26) as well.

Total Ankle Replacement (TAR)

Total ankle replacement is an operation to replace a worn-out ankle joint by resurfacing the ends of your tibia and talus with metal components with a plastic insert in between them to allow gliding motion.

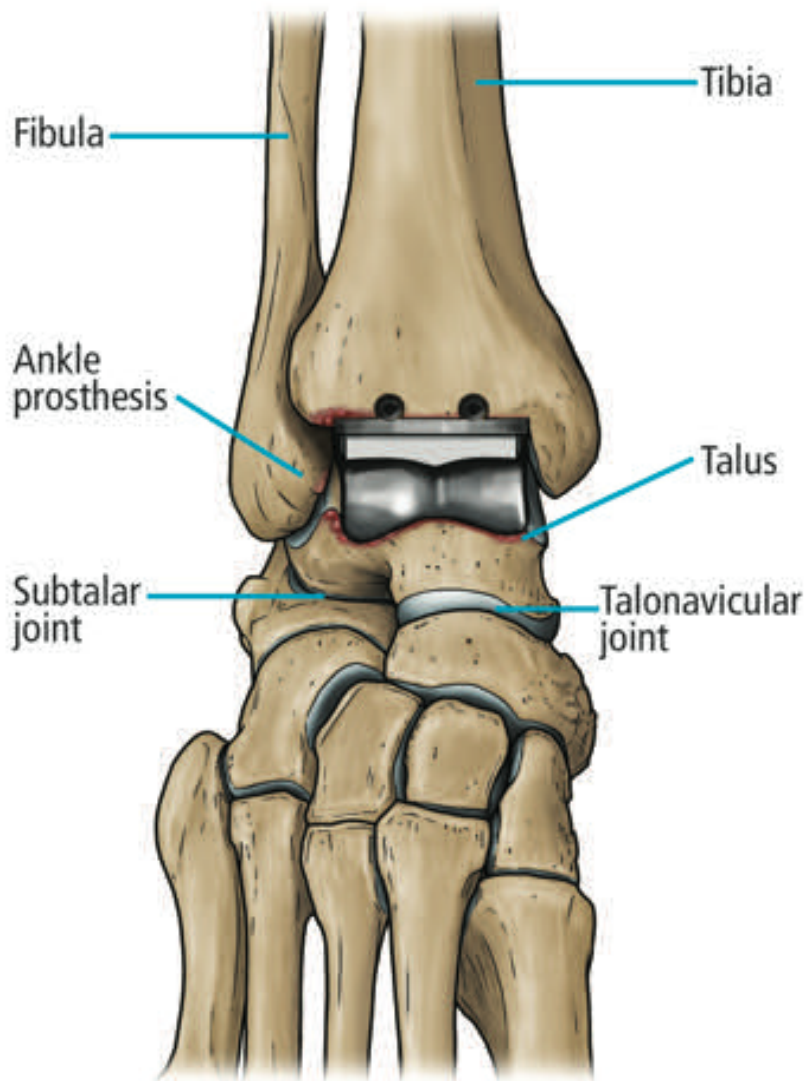
The metal components are fixed into bones using pegs or stems and have a special coating to encourage the patient's bone to grow into them.

In the UK, most ankle replacements have a mobile component, made of ultrahigh molecular weight polyethylene (hard wearing plastic), which sits freely between the talar and tibial components and moves forwards and backwards slightly during ankle motion. In some ankle replacements the plastic is fixed to the tibial component, and this is known as a two-component or fixed bearing ankle replacement.

No one knows whether a fixed bearing or mobile bearing implant is better, and the choice of implant should be discussed with your surgeon.

An ankle replacement is performed through an incision over the front of the ankle. The surgery takes between one and two hours and you will have a tourniquet applied around your thigh during the surgery, to reduce bleeding.





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Total Ankle Replacement (TAR)

When you wake from surgery you will have a below-knee partial cast, which may later be changed into a full below-knee plaster or synthetic cast. You may have to wear a cast for a period of up to six weeks. In some circumstances your surgeon may choose not to use a cast but may use a walker boot instead.

You are likely to need crutches or a frame to help you walk.

Depending on your situation, your surgeon may allow you to fully weight bear immediately in the cast or walker boot.

One of the main reasons for a cast after this surgery relates to the healing of the wound. The blood supply to the skin at the front of the ankle is poor and motion of the tendons under the skin sometimes slows healing. Where your skin condition is a concern or if you have had more complicated surgery, you may be advised not to

put weight on your ankle for up to six weeks.

Because of the immobility, it is usually recommended that you have blood-thinning medication to prevent blood clots whilst in a cast, as well as wearing a special stocking on the other leg to improve blood flow.

After your boot or cast is removed you should be able to wear normal shoes. In some cases you may require an ankle brace or a walking boot for a short period as guided by your surgeon.

What can I expect after total ankle replacement?

Total ankle replacement provides excellent pain relief and good function, and has a greater than 90% success rate, as measured by patient satisfaction in the short term, but like all joint replacements is prone to wear and failure with time. This appears more likely to occur in ankle replacement than in hip or knee replacements.

In most cases the range of motion after a replacement is better than before, but in some patients this is not the case, largely due to stiffness and scarring of the soft tissues. It is important that you discuss the likely range of movement you should expect with your surgeon before having your surgery, as this helps you to have realistic expectations.

Walking

In most cases, walking will be normal, so that others may not notice that you have had an ankle replacement. If you walked with a limp prior to surgery because of pain, after the surgery your walking is likely to improve.

Sports

You should be able to return to long walks, hiking, cycling and certain sports such as golf, although it might take up to 18 months before you find it comfortable to do so.

Although there are cases where patients have returned to more vigorous activities such as squash, tennis or jogging, we do not recommend them, as they put a lot of stress on the replaced joint which is likely to wear and fail more quickly. There is also a risk of putting stress across the adjacent joints which might wear, even in the presence of an ankle replacement.

Are there any major risks with an ankle replacement?

In addition to the general risks of ankle surgery (page 26), the main risks of ankle replacements are due to them being a new technology with uncertain long-term results.

- Research suggests that ankle replacements are not yet as reliable as hip or knee replacements. Approximately 80-90% of ankle replacements will still be in place 10 years after surgery, while some ankle replacements will loosen early (within 1-2 years) and require surgery sooner rather than later. The most common reason for an ankle replacement to fail is loosening of the metal components. This might be accompanied by cysts that have formed due to wear of the plastic component.
- If the ankle does wear out, becomes loose or “fails”, then it can be removed and revised. Revision can either be to another ankle replacement or conversion to an ankle arthrodesis (fusion). An arthrodesis following ankle replacement is usually successful, but is a bigger operation than if it was done in the first place.
- In up to 10% of patients with ankle replacement, there remains some pain in the ankle, which is not easily explained, as the X-rays look fine. Although in most cases these symptoms disappear after 12-18 months, a small proportion continue to have pain and require either reoperation or revision surgery.

Are some patients more suitable for one type of surgery?

In some cases, your surgeon would recommend one treatment over the other as being more suitable for you. However, in many patients the choice between ankle replacement and ankle arthrodesis comes down to your personal preference.

When is an arthrodesis more suitable than a replacement?

- **If you are less than 50 years old and active**, most surgeons would recommend an ankle arthrodesis and not a replacement as the longer-term results of replacement in younger patients are unknown.
- **If you have severe deformity or instability** an ankle replacement is usually not recommended.

- **If you have muscle weakness or neurological disease** (for example polio or muscular dystrophy), an ankle replacement is not recommended.

When is a replacement more suitable than an arthrodesis?

In cases where there is significant arthritis affecting several joints in the foot or previous surgery where other joints have been fused, it is logical to think that an ankle replacement, which retains some movement, might afford an advantage. This is often the case in patients suffering from rheumatoid arthritis.

General risks of ankle surgery:

Every care is taken to prevent complications but there is no such thing as surgery without risk. If you are healthy the risk of a serious complication from an operation nowadays is small. The general risks relate mainly to having an anaesthetic, such as allergic reactions, or heart or lung problems. It is important that you make your surgeon and anaesthetist aware of any pre-existing conditions and treatments.

Specific complications following ankle surgery:

Swelling

You should expect some swelling for up to one year after surgery. Elevation of the limb above heart level for the first two weeks helps to reduce swelling and aids wound healing. If swelling persists and you are concerned, seek medical advice.

Bleeding

All wounds bleed after surgery and, rarely, this can be excessive causing wound problems or requiring further surgery.

Painful scar

Any type of surgery will leave a scar. Some people develop larger scars than others. Occasionally this can cause pain and irritation. If you suspect you are prone to scar problems please discuss this with your surgeon prior to surgery.

Infection

Superficial wound infection (redness around the wound) occurs in up to 5% of cases. Much rarer (less than 1%) is a deep infection where the metalwork or bone is infected. Minor infections usually clear up with a course of antibiotics. More serious infections may require further surgery and involve complex and lengthy treatment.

If you suffer severe pain, massive swelling, excessive numbness or pins and needles seek urgent medical advice.

Nerve injury

Numbness or tingling at the surgical site is common and is usually temporary, but up to 50% of patients who have an ankle replacement or open ankle fusion will get some numbness on the top of their foot. This is not usually a problem. If a key nerve is injured (up to 1.5% of cases) then it can cause permanent numbness and shooting pains requiring medication or further specialist input. Rarely, the sympathetic nerves (also known as fight or flight nerves) react badly after the surgery, and cause temperature and colour changes to the skin – this is known as complex regional pain syndrome (less than 3%) and can take up to 12-18 months to settle. Occasionally it does not settle and causes long-term pain.

Problems with union

Occasionally in arthrodesis bones fail to unite (fuse) and in the case of a replacement, the bones may not knit to the implant. This can happen in up to 10% of patients. If you smoke, your risk of such a complication is greatly increased. You will be advised to stop smoking before surgery.

Blood clots

Deep vein thrombosis (DVT) is uncommon (5%), and pulmonary embolus (PE) is very rare (less than 0.5%) and occur due to blood clots. We do everything to minimise these risks but they can occur and can be serious causing prolonged leg swelling or chest problems. Blood-thinning medication may be given to prevent blood clots whilst in a cast as well as a special stocking on the other leg to improve venous circulation.

Pre-admission clinic

The pre-admission clinic enables you to speak to the team to gain a clear understanding of the planned surgery, the hospital stay, the expected recovery pathway and any family support or discharge plans that may need to be prepared.

Pre-admission screening is important in ensuring you are fit for the operation and that all the appropriate pre-operative tests and investigations required by the surgeon and anaesthetist are carried out. These may include a blood test, ECG (tracing of your heart rate and rhythm), a nose swab and a urine test.

We will discuss whether you should stop taking any of your medications or make alterations to when or how often you take them, the timing of your operation, and when you should stop eating and drinking before the surgery.

You will be asked to complete various questionnaires including patient reported outcome measures (PROMs) which are designed to help your surgeon assess the effects of treatment. They also serve as a measure to help you track your own progress. If you are going to have a total ankle replacement you will be asked for permission (consent) to have your details recorded on the National Joint Registry, which collects details of every ankle replacement performed in England and Wales and helps to record success rates.

Your team will discuss the proposed length of stay with you and your family before you are admitted to hospital so that you can plan for your discharge and make sure your home is ready. If you require support from community and social services, you will be referred appropriately.

An occupational therapist (or physiotherapist) will be able to advise you on any concerns about coping when you return home. This is particularly important if you think you might have difficulty getting around on crutches, or your home needs modifications such as supports, seat raises or stair-lifts.

You'll be asked to sign an informed consent form that gives your surgeon permission to carry out the surgery. Ask the doctor, nurse or therapist to explain anything you or your family are unsure about.

If you have any dental problems we advise a dental check up before your surgery

**Smoking Cessation:
You will be advised to stop smoking**



Before the operation

Ankle surgery usually requires between one to three days stay in hospital (sometimes longer if you have other medical problems).

You will have an assessment by a physiotherapist to check that you can move around safely using crutches or a frame.

Please ensure that you have a flat, sturdy shoe to wear on the un-operated foot following surgery. If you use a walking stick or crutches, please ensure you bring these with you.

Before your surgery you will meet the anaesthetist who will be responsible for your anaesthetic.

An anaesthetic is a drug that's used during surgery to stop you feeling pain. The type of anaesthetic used will depend on the operation type, your personal preference, as well as your general health.

You may also be offered a local anaesthetic injection into your leg at the time of surgery, to reduce the pain after the operation. This is known as a nerve block and usually wears off 12-24 hours after surgery. Your surgeon and anaesthetist will discuss any risks or potential side-effects of the anaesthetic.

Painkillers and anti-sickness medication will be given to you if necessary.



It is quite normal to feel nervous, stressed or scared if you've been offered surgery. Finding out as much as you can about the operation and understanding the process will help you feel more relaxed and more in control.

Photo by Jan Letocha



After the operation

When you wake from the surgery, your foot is likely to be elevated on pillows or a special frame. Depending on the type of anaesthetic you have had, you may not be able to feel your toes for 12-24 hours (which happens with spinal anaesthetic or leg nerve blocks). You should not be in pain, but the nursing team will have painkillers and anti-sickness medication available should you need it or if the block is not effective (this happens approximately 5% of the time).

Your post-operative plan will depend on what was agreed with your doctors prior to your surgery and the type of surgery that is carried out, but in general it involves getting out of bed, with assistance, initially to get you to sit in a chair, but after a day or so to walk around the ward, using crutches or a frame, as required. If

you have other joint or mobility problems, such as rheumatoid arthritis, your recovery may be much slower than this and it is best that you set your own pace in discussion with your doctors. If you are taking medication before your surgery, it's very important to talk to your treating team about restarting.

When can I go home?

In general you can be discharged once your pain is well controlled, you are safe to walk, and your home is ready.

Your first outpatient appointment will usually be two weeks following your surgery to check the surgical incisions and to remove stitches, but in some centres this is dealt with by your GP or district nurse.

Getting back to normal

We recommend that you make preparations before the operation - simple things like choosing clothes that are easy to put on, stocking up the freezer or arranging to have some help in the home will all make it easier to manage.

It's a good idea to arrange help with transport because you'll probably have to attend hospital regularly to see your surgeon, nurse or therapist. Make sure that you do not have any major commitments, including long haul travel, for at least three months after the surgery.

It will take up to a year and sometimes longer before you are completely satisfied with your ankle and all of the swelling has settled.

Keeping up your exercises will make a big difference to your recovery time, especially of your

upper body and unaffected leg. Once the team have removed your cast, you can start to build up your levels of activity, but remember that gravity means swelling often settles in the affected foot and that elevation of your leg to the level of your heart is the only way to reduce this (which is why the swelling is least when you wake in the morning).

Walking

Once you are out of the cast or boot, you will be encouraged to walk for as long as is comfortable without problem. This distance will gradually increase. Make sure you wear comfortable, well fitting, supportive shoes or boots.

Getting back to normal

Going up and down stairs

When going upstairs, put the unoperated foot on the stairs first followed by the operated foot (the saying the physiotherapist may use is that “the good leg goes to heaven”). When you go down stairs use the operated leg first.

Sleeping

When you have a cast on you may find it more comfortable to pad the bed with extra pillows to elevate the leg and prevent the cast from digging into the other leg whilst sleeping. Once the cast is off, you can sleep in any position without concern.

Returning to work

If you have an office or sedentary job and there are provisions for you to elevate the affected limb, you may be able to return to restricted work four to six weeks following surgery. However, if your employment is physically

demanding and usually involves long periods on your feet then it is advisable not to return to work for four to six months. If you are unsure, you should discuss this with your surgeon and family doctor (GP).

Driving

If your surgery is on the left ankle and you drive an automatic car you can usually drive four weeks after your operation. If your surgery is on the right ankle or the car is a manual then you are usually advised to wait for two weeks after the cast or boot has been removed before driving. You must be able to perform an emergency stop safely and it is your responsibility to check this. Your insurance company must be notified regarding the type of operation that you have undergone to ensure that your cover is valid.

Where can I find more information?

Arthritis Care

Offers self-help support, a helpline service and a range of leaflets on arthritis.

Phone: **020 7380 6500**

Helpline: **0808 800 4050**

Email: info@arthritiscare.org.uk
www.arthritiscare.org.uk

The Disabled Living Foundation (DLF)

Provides impartial advice, information and training on independent living.

Helpline: **0300 999 0004**

Email: info@dlf.org.uk
www.livingmadeeasy.org.uk

Arthritis Research UK

Offers a selection of self-help booklets, which can be downloaded on the Internet.

Phone: **0300 790 0400**

www.arthritisresearchuk.org

National Rheumatoid Arthritis Society (NRAS)

Offers full support for people with rheumatoid arthritis, including website, helpline, and peer to peer support.

Phone: **0845 458 3969**

Helpline: **0800 298 7650**

Email: enquiries@nras.org.uk
www.nras.org.uk

British Orthopaedic Foot & Ankle Society (BOFAS)

Offers a list of all surgeons carrying out specialist ankle surgery across the UK.

www.bofas.org.uk



Royal National Orthopaedic Hospital NHS Trust
Brockley Hill
Stanmore
Middlesex
HA7 4LP

www.rnoh.nhs.uk

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