Total Knee Replacement

A Guide for Patients

Produced by the British Association for Surgery of the Knee and The British Orthopaedic Association (adapted)
If your knee is affected by severe arthritis or injury it may be difficult to perform simple activities such as walking, climbing stairs or sitting comfortably for prolonged periods. You may even feel the pain lying down. In Britain one in five patients over the age of 65 has some form of arthritis and in one in 20 patients the knee is the most severely affected joint.

Osteoarthritis can develop for the following reasons:

- age degenerative
- rheumatoid arthritis or other inflammatory joint disease
- trauma which can damage the joint surfaces
- after some birth defects and growth disorders.
HOW THE NORMAL KNEE WORKS

The knee is the largest joint in the body and each knee carries half the body weight. It is the articulation between the lower part of the thigh bone (femur) and the upper part of the shin bone (tibia). These are covered by a smooth layer of cartilage called articular cartilage. There is rotation and hinge activity between these two bones. In addition the kneecap or patella is covered by articular cartilage on its under surface and slides in the groove on the front of the femur. There are two large ligaments joining the two bones together, reinforced by strong muscles and tendons at the back and the front of the joint (see appendix).

Injury can damage the joint surfaces and the destruction of the cartilage covering the ends of the bone is what we term arthritis. These surfaces become rough and uneven and the joint cannot move smoothly.

NON-SURGICAL TREATMENT

The initial treatment includes drugs to reduce pain and inflammation, changing activity levels, using walking supports and physiotherapy, and reducing weight. Occasionally keyhole surgery is advised to clean out any damaged areas. However, if these are not successful in curing the symptoms, a total knee replacement may be considered. This operation resurfaces the knee joint removing diseased bone and cartilage from the lower end of the thigh bone, the upper end of the shin bone and the
back of the kneecap (patella). These surfaces are replaced with metal and plastic implants which allow natural knee motion and function and at the same time relieve pain and correct any deformity, enabling you to resume a greater scope of normal activities.

KNEE REPLACEMENT

Knee replacement was developed following the success of hip replacement and much of the pioneering work was done in Britain. The early knee replacements in the 1960s and 1970s were fairly basic and the results were mixed. Improvements in surgical materials and techniques have greatly increased the effectiveness so that knee replacement surgery today has a high rate of success in relieving pain and restoring mobility, approximately 95 out of every 100 procedures can be expected to be successful and, even at 10 to 15 years after the operation, will still be giving good service; some knee replacements have lasted 25 years.

If the replacement becomes loose, breaks or gets infected another operation is necessary; this is called a revision knee replacement. The replacement will last longer in lighter people and in older people who put less demand on the materials.

IS TOTAL KNEE REPLACEMENT RIGHT FOR YOU?

Your General Practitioner and Orthopaedic Surgeon may advise knee replacement surgery in the following cases:

- Severe chronic pain in the knee that limits everyday activities such as walking, going up and down stairs, getting out of a chair, as well as pain at rest, especially at night. The knee may be stiff and swollen and X-ray confirms arthritis.
- Failure to obtain relief from non-steroidal anti-inflammatory drugs and injections or physiotherapy. Most patients who undergo knee replacement are aged between 60 and 80 but patients younger or older than this may be advised that this is the best treatment for them.

THE DECISION TO HAVE TREATMENT

This should only be made after discussion with the orthopaedic surgeon whose team is going to carry out the operation. The surgeon will discuss benefits and risks of treatment, and will emphasise that surgery cannot be guaranteed to meet all expectations and that there are risks associated with surgery. There must be a realistic expectation by the patient about what the operation can achieve and, whilst over 90% of patients have dramatic reduction in pain, the operation will not allow a high level of athletic activities and in particular some high impact sports will be excluded from normal activities. In addition, many patients find kneeling and crouching difficult after a knee replacement due to some residual stiffness in the knee.
WHAT CAN YOU EXPECT FROM YOUR KNEE REPLACEMENT?

Two out of three patients can expect good relief of pain and satisfactory function of their knee after a knee replacement. One third of patients experience some degree of pain and a variable level of stiffness in the knee which can affect activities. It is important to understand that the knee heals slowly after a knee replacement and it takes at least three months for the swelling and skin discolouration to settle. The knee will continue to improve as pain lessens and movement recovers, for up to one year after the operation.

With regard to activities, you will be independent to look after yourself at home when you leave hospital. You will be encouraged to do your exercises regularly and to take a walk at least once a day. Gradually, your walking distance will improve as your knee recovers and you should be able to consider shopping for yourself and returning to non-manual work within two months. The length of time before returning to driving depends on which knee has been replaced. If you have an automatic car and have a LEFT knee replacement, you can consider driving as soon as you can comfortably get into and out of a car and sit comfortably at the wheel. For a RIGHT knee and for all manual gear change cars (whether you have had a right or left knee replacement), it is recommended that you should not return to driving for two months.

Finally, for leisure activities such as golf, bowling, swimming, cycling etc, it is recommended that you gradually increase the time spent at these activities, usually starting at about 10 to 12 weeks after your operation. Everybody is different and you should plan your return to a normal lifestyle at your own pace; do not compare yourself with other people!
THE ORTHOPAEDIC ASSESSMENT

This consists of several components:

• A medical history, when the surgeon gathers information about your general health.

• Physical examination with assessment of knee movement, stability and strength, followed by an X-ray.

• Occasionally blood tests and magnetic resonance imaging (MRI) may be required to clarify the diagnosis.

The orthopaedic surgeon will assess the results of these and, after discussion, may advise other treatments, leaving total knee replacement as the last resort of a treatment plan. Knee arthroplasty is not usually recommended for patients who are severely overweight, have severe arterial disease in the legs, an infection in the knee, in the lower leg or in the skin, any nerve disorder affecting the knee and severe neurological problems, such as Parkinson’s disease.

MEDICAL HISTORY

You must disclose all health problems and any medication, in particular the following need to be highlighted:

• allergic reaction to antibiotics, anaesthetics or other drugs

• prolonged bleeding or excessive bruising

• previous problems with blood clots in the legs or lungs

• recent or long-term illnesses

• gout

• diabetes

• psychological or psychiatric illnesses

• poor healing and scar formation.

Drugs such as anti-inflammatory medication, Aspirin, anticoagulants, the contraceptive pill and regular medication. Insulin may be stopped or modified prior to surgery and the surgical team need to know these details.

SMOKING

Smoking increases surgical and anaesthetic risk and impairs healing. Patients are advised to stop smoking at least two weeks before surgery.

PREADMISSION CLINIC

You will be seen in a preadmission clinic at the Royal Infirmary of Edinburgh approximately one week before your operation. A pre-operative evaluation will be carried out by with nurses and often the surgeon and anaesthetist will see you on that occasion. This is a good opportunity to ask questions about the operation, risks of surgery and your recovery after a knee replacement.
**THE ANAESTHETIC**

Knee replacement can be performed under a general or spinal anaesthesia, which numbs the lower limbs but you remain awake. Modern anaesthesia is safe but you should discuss this with the anaesthetist. Occasionally there are side effects and a full list of your existing medications and allergies must be given to the anaesthetist.

**THE OPERATION**

Most patients are admitted on the day of surgery through the Day of Surgery Admission unit, on level 1 of the Royal Infirmary of Edinburgh.

The operation usually takes place with a tourniquet around the thigh to reduce the amount of bleeding and enable the components to be fitted accurately into position. The incision can be anything from 10 to 20cm in length depending on the type of approach and the size of the leg. All the blood vessels, muscles and nerves are protected during surgery and special tools are used to remove the surface of the bone. The components are implanted by shaping the bone to form a tight fit with the prosthesis, which is coated with a special material which allows bone to grow on to the surface and provide fixation (uncemented prosthesis); alternatively bone cement may be used to hold the prosthesis in place (cemented). The wound is closed with internal stitches to keep all the ligaments and muscles securely together, and clips, sutures or special tape on the skin.

**RECOVERY**

Following the total knee replacement you will be transferred from the operating theatre into the Recovery Area where there may be several other patients. You will be here for up to two hours while most of the anaesthetic wears off. If you have had a spinal anaesthetic you may not be able to feel your legs when you wake up. You will be given oxygen and pain killing medication, usually through an intravenous line or drip. Very occasionally a special catheter may be introduced into the bladder to drain off the urine if you are unable to feel or pass urine yourself or if you have no feeling due to the spinal anaesthetic.

The pain and discomfort might be quite severe in the first few days but the nurses and anaesthetic team will usually be able to administer sufficient pain killers to reduce the pain to acceptable levels.

**PHYSIOTHERAPY**

Your physiotherapist will see you the day after your operation. You will be helped to sit out of bed using a walking frame. You will be shown a few exercises to begin moving and strengthening your knee. Once you are confident with the walking frame you will usually then be progressed to sticks and then finally will practise going up and down some stairs. Sticks may be needed for up to six weeks and older patients may have to continue the use of a walking aid for longer periods.

Not all patients require out-patient physiotherapy after having
a knee replacement. If you have a good knee bend and good muscle control, out-patient physiotherapy is not necessary. You should, however, continue doing exercises at home for at least three months.

During the first few weeks stretching and strengthening the muscles remain goals of treatment. As strength and motion improves you may be instructed on other activities such as distance walking, cycling and swimming. These should restore your feeling of well-being. You may take up to between six and 12 weeks off from work depending on the job and it is useful to discuss this before surgery.

Following total knee replacement patients are encouraged to resume an active lifestyle but are strongly advised against activities that produce high impact such as running and jumping. Sports such as golf, cycling, swimming and walking are encouraged. Other acceptable activities include bowling, croquet, doubles tennis, table tennis and dancing – ballroom and line dancing.

The following exercises are suitable for most people. It is recommended that you try to do your exercises three times a day.
To maintain or increase range of movement:

1. Lying on your back with a sliding board under your leg and a “do-nut” under your heel, bend and straighten your knee by sliding your foot up and down. Go as far as you can each way, pushing the back of your knee down into the board as you straighten and stretching the front of your knee at the limit of your bend.

2. Sit on a chair with your foot on a board and “do-nut” on the floor. Slide your foot backwards and forwards on the board to bend and straighten your knee. As you bend keep your hip down on the chair.

3. Rest your ankle on top of a rolled up towel and allow the back of your knee to stretch out.

4. Sitting on a chair, with the leg to be exercised supported on a chair or footstool as shown. Let your leg straighten in this position. You may find this uncomfortable at the back of your knee. Try to gradually increase the length of time you are able to hold this stretch. Build up to 10 minutes if you can.

It is important to fully straighten the knee. Sometimes people with arthritic knees develop a “flexion contracture”. This is because the most comfortable position for the painful knee is holding it slightly bent. Over a prolonged period the soft tissues around the back of the knee contract and it becomes impossible to straighten it. Your new knee should be aligned by the surgeon so that it can fully straighten but you may need to stretch the soft tissues to achieve a straight knee.

If when doing Exercise No 1 you are unable to straighten the knee fully making the back of the knee touch the board, you should do the following exercises.

Exercises to Strengthen Muscles:

It is very important to strengthen the muscles around the knee so that any movement is well controlled and so the knee is protected from injury. The two main muscle groups to strengthen are:

- The quadriceps which make up the bulk on the front of your knee. They work to straighten your knee.
- The hamstrings which make up the back of your thigh and work to bend the knee.
**Quadriceps exercises:**

5. Lying on your back or reclining. Press the back of your knee down onto the bed tensing the muscles at the front of your thigh. At the same time pull your toes up and you should feel the pressure come off your heel. Hold the muscle contraction for about 10 seconds then relax.

6. Position as for Exercise 5. Place a block under the back of your knee - a towel is ideal. Press the back of your knee down into the block until your foot lifts. Bring it up as high as you can without lifting your knee and hold for 10 seconds, before lowering slowly.

7. Sit on an upright chair with your thigh supported to the knee. Straighten your knee and hold for 10 seconds. Lower slowly.

**Hamstring Exercises:**

8. Stand upright, holding onto a worktop or chair to help you balance. Stand on the non-operated leg and bend the operated knee bringing your foot up behind you. Hold for 10 seconds, then lower your foot.

9. If you are able to tolerate lying on your tummy, this is useful for working your hamstrings and helping straighten the knee. Lie face down with your feet off the end of the mattress. Slowly bend and straighten your knee.

As your recovery progresses it is good to introduce more functional exercises as these encourage co-ordination of muscle control.
10. Sit in a firm chair in front of a wall placing your hands on the wall for balance. Stand up and sit down slowly, keeping your weight evenly between both feet.

11. After 6-8 weeks stand in front of a step. Step up and down backwards leading with the un-operated leg.

**Stairs:**

If a handrail is present use it (if no handrail, use both sticks).

**Going up:**

1) First take a step up with your healthy leg.
2) Then take a step up with your affected leg.
3) Then bring your stick up onto the same step.

Always go one step at a time.

**Going down:**

1) First take your stick down onto the step below.
2) Then take a step down with your affected leg.
3) Then take a step down with your healthy leg onto the same step.

**Use of Gym Equipment:**

- **Static bike:** You may not be able to pedal properly at first but start with the seat high and rock the pedals back and forth. Once you can pedal you may gradually lower the seat and increase resistance as comfort allows.

- **Step machine and leg press:** It is safe to use these provided your knee is not forced and resistance is increased gradually as comfort allows.

  **Caution:** *If you also have a hip replacement the leg press is unsuitable as is any equipment with a very low seat.*

The stitches or clips are removed after 0 to 14 days. You will be reviewed, either in the nurse/physiotherapy clinic or by the surgeon, and X-rays will be taken in the post-operative period to ensure that everything is progressing well.
OCCUPATIONAL THERAPY

The occupational therapist will see you on the ward prior to going home and discuss your home circumstances with you. If there are problems at home, or connected with your rehabilitation, they will advise you and make arrangements as required. They will also carry out an assessment of your function and make sure that you can manage all everyday activities independently. The occupational therapist will offer you practical advice to help you cope at home when you are discharged from hospital.

COMPLICATIONS OF KNEE REPLACEMENT SURGERY

There are risks following knee replacement surgery despite high standards of practice. Complications can occur that may have permanent effects which is why the operation is only undertaken when all other methods of treatment have failed. Surgeons do not usually outline every single complication but they do point out to you the most serious ones. Serious complications occur in no more than one or two in every 100 patients, but less serious complications can occur more frequently and generally get better.

1. General risks of surgery

Possible complications include:

- Pain around the incision
- Nausea – often from the anaesthetic
- Heavy bleeding from the surgical site. A blood transfusion may be required if bleeding is particularly heavy. Sometimes systems are used which collect the blood that has leaked into the wound drain and this is then re-transfused
- Keloid or thickened, raised scars – these can be very unpleasant, itchy and unsightly in the early stages but usually will settle down and are not a serious threat to the wound healing
- Separation of the wound edges – sometimes the stitches or clips come adrift and this can cause opening of the wound
• Allergies to anaesthetic agents, antiseptic solutions, suture materials or dressings
• Very rarely there may be any complication of anaesthesia and surgery such as heart attack, heart failure, stroke, kidney failure, and other serious problems.

2. Specific Risks of Knee Replacement

• Infection
Infection around a knee replacement occurs in about one in every 100 patients and is very serious. Infection can develop immediately or many months after the operation. Occasionally, infection can spread in the bloodstream from another part of the body and infect the knee. To reduce the risk of infection, antibiotics are given before and after surgery. If you develop an infection after you have had a knee replacement (for example bladder/kidney infection; a skin or dental abscess) you must consult your general practitioner, who will prescribe appropriate treatment to prevent this complication.

Occasionally the infection in your knee may be resistant to treatment and a second operation may be needed to remove the components of the knee replacement. Once all the infection has been effectively treated a third operation is performed to insert new components.

You may develop other infections after your operation, including chest and urine.

• Thrombosis and pulmonary embolism
Blood clots can form in the deep veins of either leg. This can be life-threatening if they break away from the vein wall and travel in the bloodstream to block the arteries to the lung. Prevention in the form of injections, tablets or special leg pumps is used, depending upon your individual circumstances. If you have ever had a leg thrombosis before it is essential that you tell the medical staff as treatment with Warfarin may be required for three months after the operation.

• Loosening/breakage
The prosthesis may become loose where the metal or cement meets the bone. This can cause pain and eventually another operation may be needed. This is the most common long-term problem affecting knee replacements and requires the worn implant to be removed and a new knee replacement inserted (a revision knee replacement).

• Scarring, Stiffness and Swelling
Heavy scarring after surgery may restrict bending of the knee. To release the scars and improve movement the Surgeon may need to manipulate the knee. If the joint was extremely stiff before surgery, there is likely to be quite a lot of stiffness afterwards. Swelling is common after surgery and may take several months to settle.
• Nerve and Artery Injury
A major nerve may be damaged, leading to poor or no leg movements. Most nerve injuries recover well, often completely. Uncommonly, nerve damage may be permanent, leading to permanent numbness and/or weakness of the foot. One of the major arteries near the knee may be injured and require further surgery but this is a very rare complication.

• Skin
It is common for the knee to feel “hot” for many weeks after the operation wound has healed. You may notice this at night time in particular. This hot sensation is a normal part of the healing process and gradually improves, and rarely lasts longer than six months.

There will be an area of numbness on the outer side of the wound. This area will become less noticeable with time and will not interfere with the function of your knee.

• Amputation
Rarely, complications due to a severely impaired blood supply, arterial damage or overwhelming infection may lead to amputation of the leg above the knee. The risk is greater for patients who are elderly or in poor general health. The overall risk is one patient in 6,000.

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**RE-OPERATION**
The prosthesis may become loose requiring revision surgery (as described above) and this can be done in one operation. If the looseness is due to infection, this will usually require two operations with a period of six weeks to six months between them to allow the infection to settle.

**FINALLY**
Report to your doctor or the Arthroplasty Nurse Practitioner (telephone number in Appendix) any of the following:

- Temperatures higher than 38.5° centigrade/102° Fahrenheit, fever, sweating, shivering or chills
- Severe pain or tenderness
- Heavy bleeding from the incision
- Redness around the incision that is spreading
- Worsening pain or stiffness of the knee
- Loss of mobility after a fall with increased pain
- Swelling and pain in the calf of either leg.
FREQUENTLY ASKED QUESTIONS

• Why have I still got swelling?
Healing tissues are more swollen than normal tissues. This swelling may last for several months. Ankle swelling is due to the fact that each time we take a step the calf muscles contract and help pump blood back to the heart. If you are not putting full weight on the leg, the pump is not as effective and fluid builds up around the ankle. By the end of the day lots of people complain their ankle is more swollen.

• What can I do about it?
When sitting, the ankle pump exercises work the calf muscles and help pump the fluid away. Try to put equal weight through each leg and “push off” from your toes on each step. Have a rest on the bed after lunch for an hour. You can put one or two pillows lengthways under your leg whilst resting but do not use them at night.

• Why is my scar warm?
Even when the scar has healed there is still healing going on deep inside. This healing process creates heat, which can be felt on the surface. This may continue for up to six months. This is different warmth to that of an infection.

• Why do I get pain lower down my leg?
The tissues take time to settle and referred pain into the shin or behind the knee is quite common.

• Why do I stiffen up?
Most people notice that whilst they are moving around they feel quite mobile. After sitting down, the knee feels stiff when they stand and they need to take three or four steps before it loosens up. This is because those healing tissues are still swollen and are slower to respond than normal tissue.

• Is it normal to have disturbed nights?
Yes, very few people are sleeping through the night at six weeks after the operation. As with sitting, you stiffen up and the discomfort then wakes you up. Also, many people are still sleeping on their backs, which is not their normal sleeping position so sleep patterns are disturbed. You may sleep on your side when you feel comfortable. Most people find it helpful to have a pillow between their legs.

• I have a numb patch – is this okay?
Numbness around the incision is due to small superficial nerves being disrupted during surgery. The patch usually gets smaller but there may be a permanent small area of numbness.

• Why does my joint click?
This is normal and it is usually a sign that those swollen tissues are moving over each other differently than before. You should not let this worry you, as again this should improve as healing continues.
• **When should I stop using a stick?**
Stop using a stick when you can walk as well without it as with it. It is better to use a stick you still have a limp so that you do not get into bad habits that are hard to lose. Limping puts extra stain on your other joints, especially your back and other leg. Use the stick in the opposite hand to your operated knee. Many people take a stick out with them for three to four months after the operation as they find they limp more when they get tired.

• **How far should I walk?**
This varies on your fitness and what your home situation is. You should feel tired, not exhausted when you get home, so gradually build up distance, remembering you have to get back.

• **When can I put my socks on?**
When you are able to reach your foot. This may take some time. It is different for everyone, so it is when it feels right which is when you are not forcing the bend.

• **Can I go swimming?**
You can go in a pool with steps as soon as the scar has healed and do gentle exercises. Serious swimming can be started after three months but make sure you are on sure footing (i.e. not in the sea). Breast stroke can be done if it feels comfortable, but start off gently.

• **Will I set off the security scanner alarm at the airport?**
BAA’s advice (May 2005) is that there should be no problem if your joint is made of titanium. Some joints are made of stainless steel and these may set off the alarm. If this happens, have a word with security staff and explain the situation. If you have metal walking sticks or crutches, they will be X-rayed and then can be used on the aircraft.

• **Will I get better?**
Yes – do not despair. It can take up to 12 months to fully recover. You will get there!
APPENDIX

USEFUL CONTACT TELEPHONE NUMBERS

Preadmission Unit: 0131 242 3460
Day of Surgery Unit: 0131 242 3460
Ward 208: 0132 242 2081
Ward 209: 0131 242 2091
Physiotherapy: 0131 242 3464
Occupational Therapy: 0131 242 3464
Appointments: 0131 536 3725
Arthroplasty Advice Line: 0131 536 3724

USEFUL WEBSITES FOR MORE INFORMATION

www.nhs.uk/conditions (knee replacement)
www.arc.org.uk (information)
www.rcoa.ac.uk
www.nlm.nih.gov/medlineplus (knee replacement)
www.orthoinfo.aaos.org