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Periarticular knee osteotomy

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Orthopaedics
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Knee joint

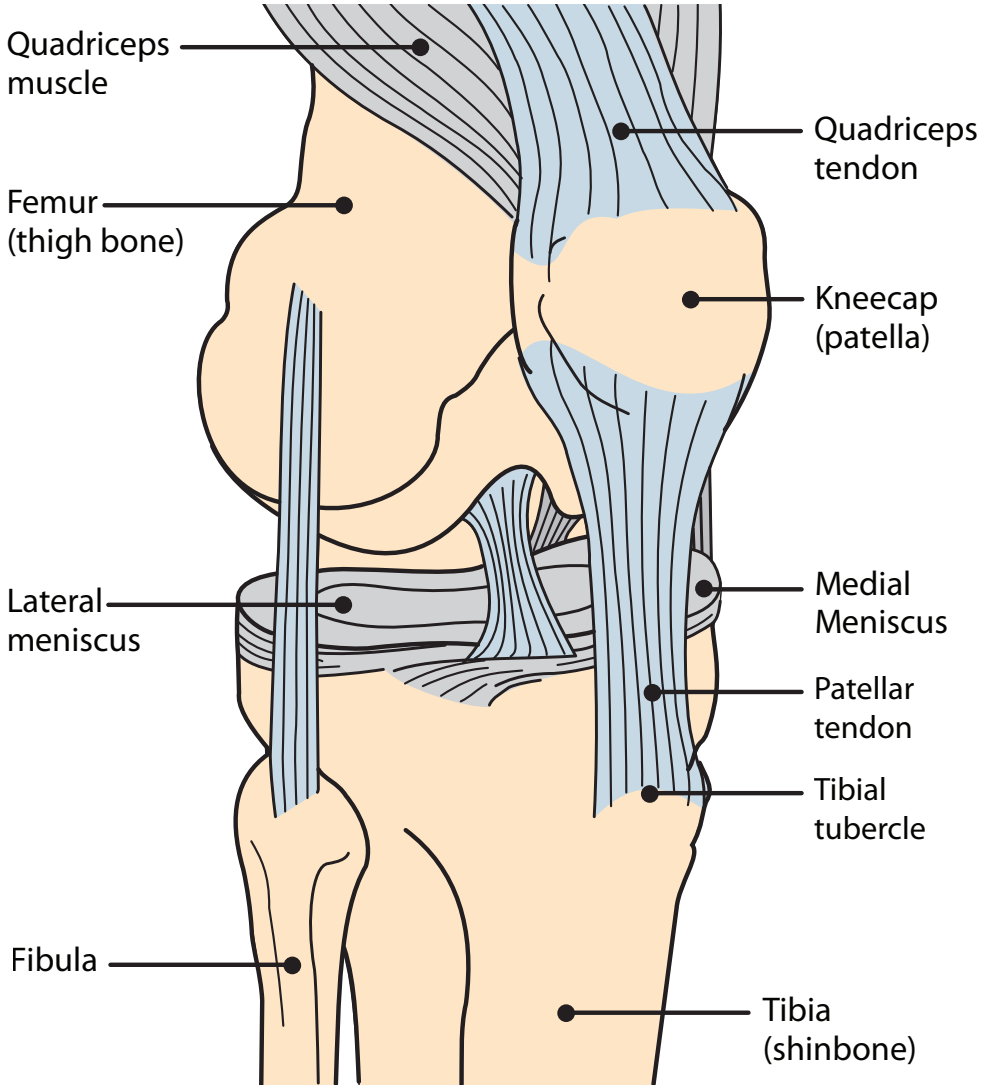
The knee consists of two joints which allow flexion (bending) and extension (straightening):

- Tibiofemoral joint (between the thigh bone and shin bone)
- Patellofemoral joint (between the thigh bone and patella)
- Arbitrarily divided into three compartments: medial, lateral and patellofemoral

The surfaces of bones in the joints are covered with articular cartilage which allows the joints to glide smoothly and allows supple movement.

The articular cushions between the tibia and femur are called the medial and lateral menisci.

The patella is secured in place in the femoral groove (trochlea) by the quadriceps muscle to the top and the patella tendon that attaches to tibial tubercle on the shin bone (tibia).



Osteoarthritis (OA)

The knee joint is vulnerable to wear and tear over time and this can develop into osteoarthritis.

The articular cartilage is damaged in osteoarthritis, which prevents the bones from gliding smoothly. This causes pain and joint stiffness.

Some people also experience swelling, tenderness and crackling sounds when moving the knee.

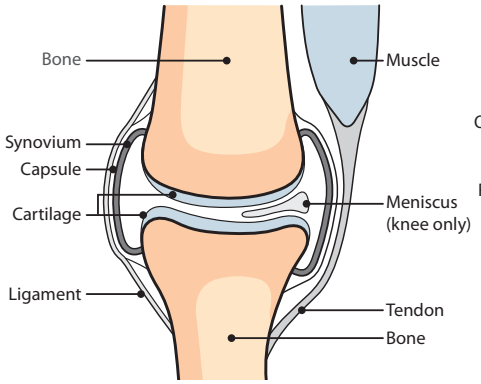
The symptoms can be in the medial or the lateral side of the knee depending on where the damage is. Pain can also be felt at the front (anterior) of the knee if the cartilage between the patella and femur is damaged.

Pain is usually exaggerated when going up and down stairs or sitting for a prolonged period of time.

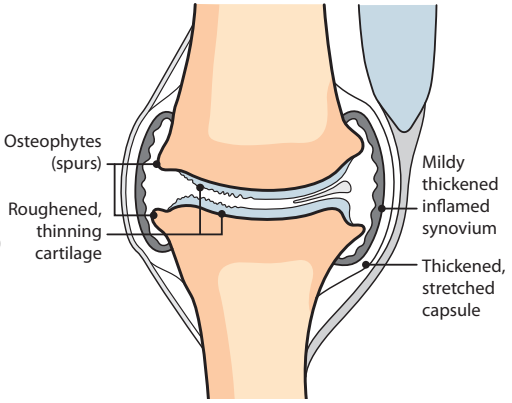
The severity of symptoms varies from person to person. Some people may have problems with carrying out daily activities because of osteoarthritis.

At early stages of the disease, symptoms can be controlled with physiotherapy and pain medication.

In mild to moderate osteoarthritis, knee osteotomy is an option before considering knee replacement surgery.

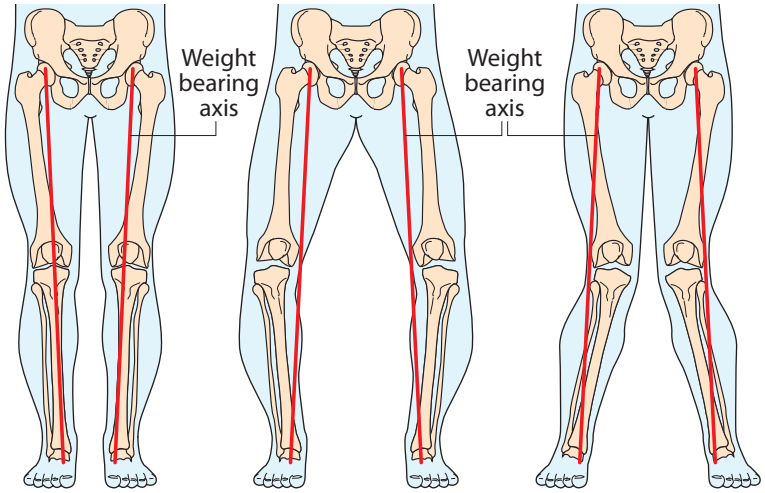


Normal joint



Osteoarthritis

Lower limb alignment



The weight of the body is transmitted from the hip to the ankle.

In the healthy knee, the line of gravity (weight bearing axis) passes through the middle of the knee joint in a straight line as shown in the picture above, this allows body weight to be distributed equally in each compartment.

Depending on which compartment of the knee is affected by arthritis, the alignment of the limb can change.

If the medial compartment is damaged, the result would be bowed legs (varus knees) and the majority of the load will lie in the medial compartment of the knee joint.

Conversely, if the lateral compartment is damaged, the result would be knocked knees (valgus knees) and the majority of load will lie in the lateral side of the knee.

On the other hand, some people may naturally have varus or valgus knees without having osteoarthritis to start with.

Limb malalignment can accelerate wear in the respective compartments of the knee, leading to cartilage wear. Lower limb alignment can be altered with knee osteotomy to redistribute weight in the knee joint, to relieve the pressure on the damaged cartilage and to prolong the life span of the knee joint.

Types of knee osteotomy

Osteotomy is a controlled surgical break of bone which allows bone realignment.

There are three common types of osteotomies which are performed dependent on the pattern of cartilage damage:

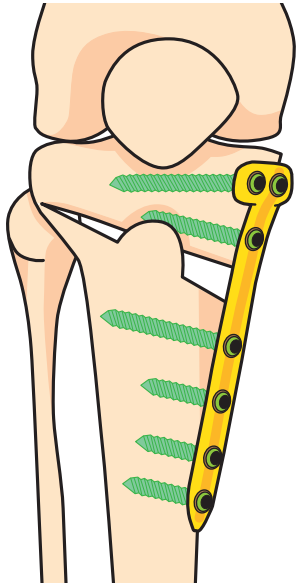
1. High tibial osteotomy
   Usually for medial compartment OA with varus alignment.
2. Distal femoral osteotomy
   Usually for lateral compartment OA with valgus alignment.
3. Tibial tubercle osteotomy
   Usually for patellofemoral compartment OA.

High tibial osteotomy (HTO)

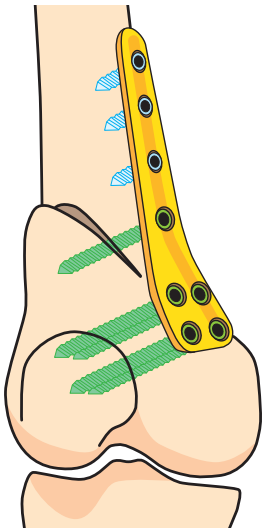
This is the most common form of knee osteotomy as most osteoarthritis occurs in the medial compartment.

It involves a cut in the medial aspect at the upper part of the tibia.

The cut is wedged open and a piece of bone graft is placed in the gap. The osteotomy is then secured with plate and screws.



Distal femoral osteotomy (DFO)

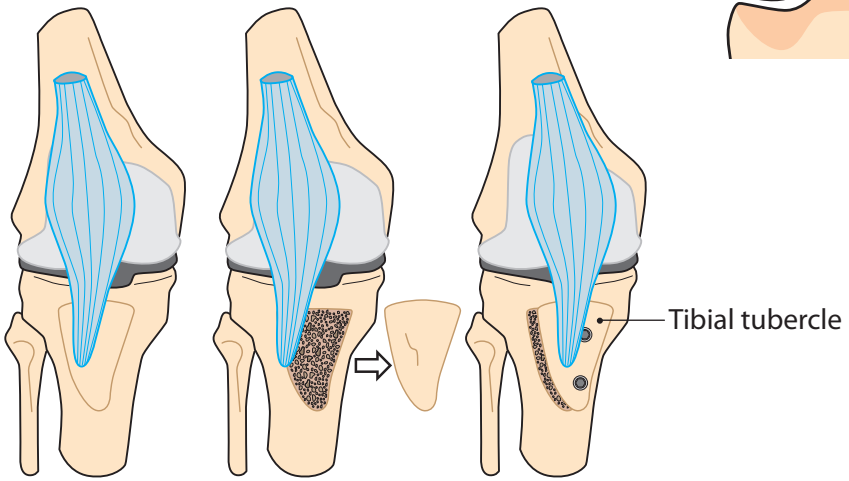


DFO is used to treat lateral compartment osteoarthritis.

It involves removing a small wedge of bone from the medial aspect of the lower part of the femur.

The gap is then closed and the osteotomy is secured with plate and screws.

Tibial tubercle osteotomy (TTO)



TTO is used to treat patients with osteoarthritis in the patellofemoral joint. This is most useful when the arthritis involves the lateral surface (facet) of the joint.

During the procedure, the patella will be realigned by moving the tibial tubercle with the patella tendon medially and anteriorly. The bone is then secured with screws.

Evidence, risks and benefits

Knee osteotomy is most commonly performed for younger individuals with early knee osteoarthritis or those with an active lifestyle, when compared to patients undergoing knee replacement.

The advantage of osteotomy is that there are no activity restrictions following full recovery.

In comparison, patients undergoing knee replacement will have reduced range of movement and more limitations on their activities.

Knee osteotomy can delay the need for a knee replacement and allows people to remain active.

The success rate of a knee osteotomy in providing good knee function and pain relief at five and ten years are 92% and 73% respectively.

Peri-articular knee osteotomies **share similar risks** with knee replacements which include; infection, venous thrombo-embolism, nerves and vessels injury, stiffness, persistence or recurrence of symptoms, revision surgery and amputation in rare cases due to complications. Knee replacement surgery is still possible following osteotomy.

As **osteotomy** involves creating a surgical break in the bone it has a small risk of mal-union (bone healing not in the desired position) or non-union (failure to achieve bone healing) which may require further surgery.

With a **knee replacement** the added risks involve; instability, development of fractures, wear and loosening of implants and implant malpositioning which may require further surgery.

Before surgery (pre-operative assessment)

Prior to undergoing surgery, an x-ray of your lower limb (from hip joint down to ankle joint) will be undertaken to assess the degree of osteoarthritis and the degree of malalignment. Your surgeon will use the x-ray images to determine the degree of realignment needed, and the thickness of wedge to be opened or closed.

Before considering surgery, you may be asked be wear a leg brace for a few weeks that mimics the knee alignment after an osteotomy. If you feel that the leg brace is beneficial, it is likely that you will benefit from knee osteotomy as well.

If you smoke, you are required to stop smoking at least two weeks prior to surgery, as smoking slows healing and increases the risk of complications after surgery.

If both legs are involved, it is common to treat one leg at a time till the operated leg is fully functionally rehabilitated.

Procedure

The surgery is usually done under general or spinal anaesthetic. You will lie on your back on the operating table in theatre.

Your skin around the operating site will be cleaned with anti-septic fluid. Short incisions will be utilised to carry out your surgery.

The image intensifier will be used intraoperatively to guide surgery as per the pre-operative plan. A wedge will be opened or closed depending on the type of osteotomy performed.

In open-wedge osteotomy, a piece of bone graft will be placed in the gap. Plate and screws will then be used to secure the osteotomy as well.

After the osteotomy is completed, surgical incisions will be closed with skin staples (metal clips), which will be removed in around two weeks when the wound has healed.

Post surgery

You may stay in hospital for a night or two. You will learn different leg exercises to help with recovery and rehabilitation with the physiotherapist.

Your first follow-up appointment with your surgeon will be at 2 weeks after surgery. This is to check your incision healing, assess the range of movement in your knee as well as to answer any questions you may have.

Further follow up appointments will be at 6 and 12 weeks then at 6, 12 and 18 months after surgery.

Most patients will be fully weight bearing 6 weeks following surgery and hence another whole lower limb radiograph is then taken to check the alignment after surgery.

The healing time for different types of osteotomy is different and the weight bearing status is as follows:

HTO

You can touch weight-bear in the first 2 weeks. You can then weight bear as pain allows. You are expected to be able to walk without walking aid after 6 weeks.

DFO

You can touch weight-bear in the first 2 weeks then partial weight-bear from 2 to 6 weeks. You can then weight bear as pain allows.

TTO

You can full weight-bear after the surgery as pain allows but you will need to wear a brace that keeps your leg straight whilst walking for 6 weeks.

Help

Should you have any questions please do not hesitate to contact:

Outpatient Clinic

☎ **0161 206 4803**

or email

@ ***joanne.hubert@srft.nhs.uk***

Or your consultant's secretary.

Notes

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Arabic
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Chinese
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Farsi
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