Distal Femoral Osteotomy

Distal femoral osteotomies are performed to correct a deformity known as knock-knees. The surgery might be undertaken to slow the progression of osteoarthritis, in some cases, to try and avoid it all together.

Knock Knees

A 'knock knee' has increased forces passing through the lateral (outer) compartment that may gradually destroy the joint surface. Early on it may can pain, wear of the joint surface, and contribute to tearing the cartilage. Later, it may develop obvious arthritis. If the knee is not particularly stiff and the patient young, realignment may be best option.

What causes arthritis?

Arthritis is a general term for pain and stiffness of a joint. It can be caused by old injury, inflammatory conditions like rheumatoid arthritis, but most commonly overloading the joint surfaces causes it.

Realignment surgery aims to slow the progression of arthritis. A knee without wear, with a perfect correction, the risk of arthritis can be dramatically reduced.

Realignment Osteotomy

If the pain originates from only one part of the knee, the leg can be realigned. Typically this is the only option in people under 50, and would be considered in patients in their 50s. By the time people are in their 60s, joint replacement surgery is more seriously considered. The amount the alignment is corrected depends on the how much wear has occurred. In a patient with no wear but pain, the aim is to achieve a straight leg. The more wear that has occurred, the more the deformity is overcorrected. For marked wear, we aim to make the leg somewhat "bowed".

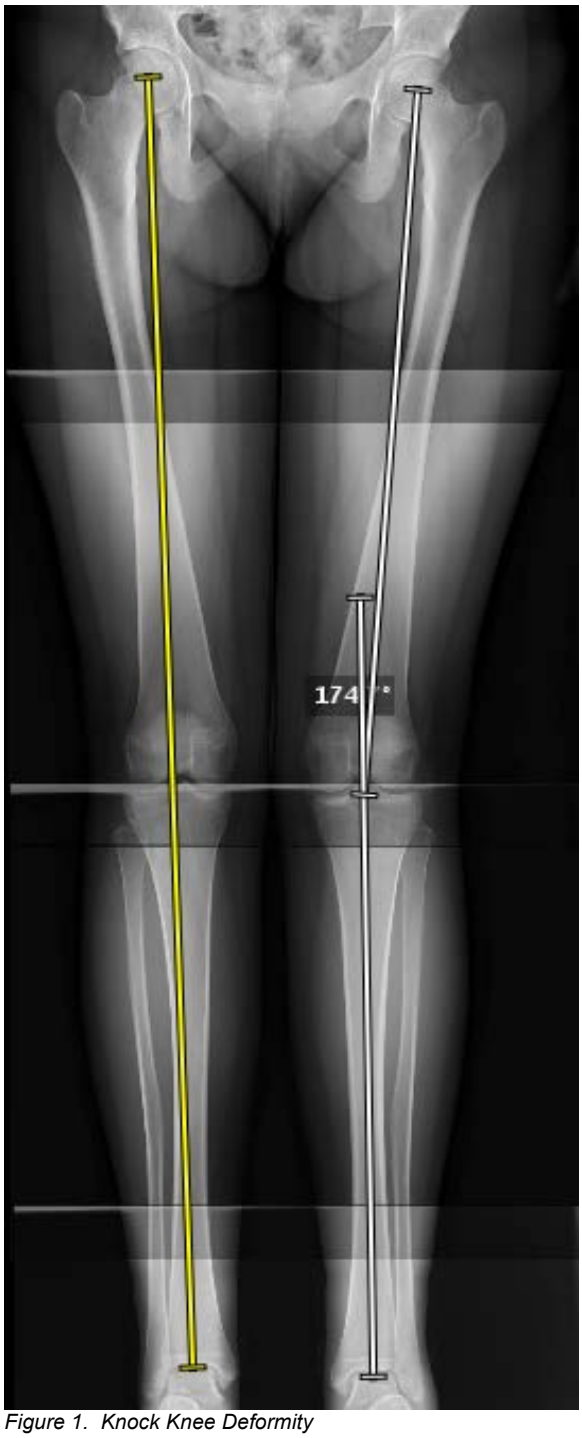

Figure 1. Knock Knee Deformity
Normally a straight line should pass from the centre of the hip, through the centre of the knee, to the centre of the ankle.

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Distal Femoral Osteotomy

The deformity can be done from either side of the knee, either inserting an opening wedge on the outside, or closing down a wedge of bone on the inner aspect of the leg. Our preference to do medial closing wedge osteotomies is based on years of experience. I previously did lateral opening wedges, but found problems such as the correction being unpredictable, the plate caused pain by rubbing under the ITB, patients could damage the correction with a fall in the first three months, during which time they needed crutches. Advantages of closing wedge:

- Rapid healing
- Six weeks of crutches suffices
- The plate probably can stay
- More reliable correction

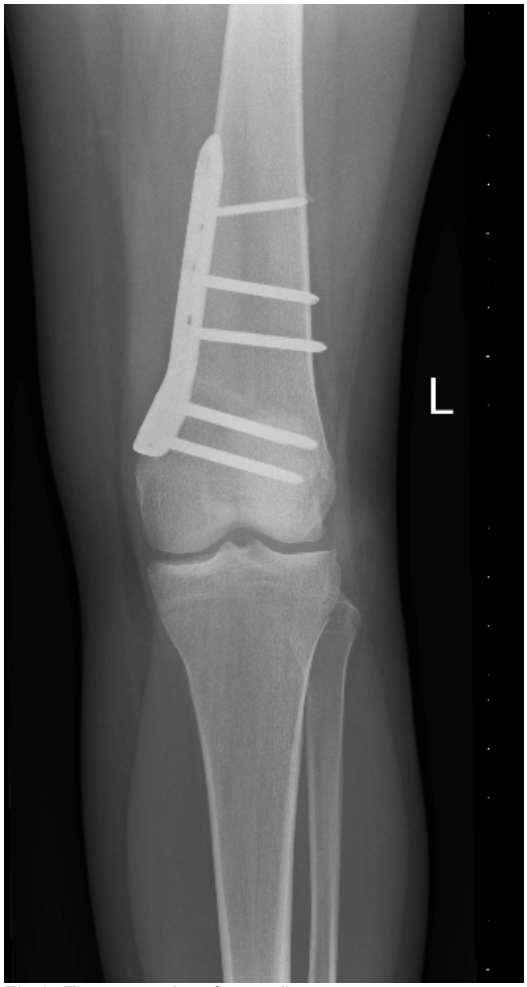

Fig 3. Three months after realignment.

Disadvantages of realignment osteotomy

The list of complications is long. It is relatively rare to have a major complication. The subsequent removal of the plate is the most common.

In some cases, the knee can't have a subsequent partial knee replacement, although it can still have a total knee replacement. It can somewhat complicate any further operation, either through the presence of the plate needing removal prior to, or at the time, of the knee replacement. Knee replacements are generally designed assuming patients have never had a realignment operation. The proposed femoral osteotomy however does not seem to change the ligament balance or shape of the knee in a way that creates a risk.

In older patients, it may be better to consider directly going to knee replacement surgery, so over 60 it is quite uncommon to recommend realignment surgery except if there was relatively minor wear in the knee.

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What other treatments are available for arthritis?

Weight loss
A significant number of Australians are overweight. Adults should have a body mass index (BMI) of 20 to 25. Being overweight, will overload your joints. The knee for example carries 9 times your body weight when climbing stairs. Many patients blame their weight on their arthritic joint, but then don't loose weight after the joint is fixed. Your weight reflects both how much you eat and exercise – speak to your GP.

Impact reduction
Different sporting pursuits alter how much the joints are loaded. Sports like tennis place high impacts and twisting motions on your joints. Swimming and cycling, on the other hand, generally reduce arthritic pains. Walking can make arthritic pains worse if you have poor quality shoe wear.

Muscle strengthening
Strength is improved with activity such as walking, swimming and cycling. Some people should consider gymnasium training.

Improve suppleness
Stiff joints hurt more, and the natural response is to avoid activities pushing the joints but the opposite approach is probably better. Western society avoids pushing joints to their full range of movement by sitting on chairs. Your physiotherapist can demonstrate stretching exercises. Other options include yoga classes.

Glucosamine tablets
50% of patients report these are useful. If they work for you, that is great, it certainly seems a safe alternative to NSAIDs. If the cost exceeds the benefit, move on.

Paracetamol
Panadol ® and Panamax ® are quite safe in normal doses and do not cause stomach irritation. Some patients feel it is just as useful as NSAIDs without the side effects. It makes good sense to try this first! It can be used on an intermittent basis such as when pain is present, or even prior to predicted painful activities.

Anti-inflammatory tablets(NSAIDs)
There are hundreds of different anti-inflammatory tablets. Nurofen can be bought "over the counter" at a pharmacy without a prescription. Prescriptions from your GP could be for Voltaren or Naprosyn. Modern ones such as Celebrex and Mobic are felt to reduce the stomach ulceration side effects. These tablets can be used either before or after activity, or on a regular basis. This class of tablets has been associated with an increase risk of heart attacks, but the serious risks of these tablets is probably lower than the risk of surgery. It is usually advised the tablets are taken with you meal.

Physiotherapy
A physiotherapist is likely to be of help with strength and suppleness exercises, which is useful at any stage of arthritis. They also have a specific value prior to and immediately after surgery as a constant source of information and coaching.

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Shoe wedge
Patients with a knock-knee overload the outer part of their knee. This deformity can be partly compensated by an orthotic with a large arch support. Alternatively, a wedge can be put under the inner side of the heel. A cobbler or orthotist can build up the medial heel by 5mm, or some physiotherapist's stock wedges that can be put inside the shoe.

Knee brace
A standard elastic knee brace from a chemist shop or sports store can help control swelling, and give some additional comfort. A "Poly Farmer" brace has a metal hinge in each side, and can give further support. The ultimate brace is an "Unloader brace", which has a hinge and a strap that holds the arthritic surfaces apart somewhat. It is useful if the arthritis is in a single area, in active people, and costs around $1000.

Cortisone injections
Cortisone is a naturally occurring substance that reduces inflammation. It can be injected into the knee joint quite easily in the consulting rooms. It is very useful to control an acute flare up of arthritic pain. Surgeons typically limit how many injections are given to an area to minimize the risk of joint deterioration, and infection either before or after joint replacements.

Synvisc Injections
Joints have a natural lubricating fluid – synovial fluid that contains "hyaluronic acid". In some circumstances, injecting the knee with a commercial version of this can provide relief. Eighty percent of patients claim a benefit for 6 months or more. The PBS does not fund Synvisc. The cost (around $475) cannot be claimed from Medicare or any private health insurance policy we are aware of.

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Walking stick
A walking stick can be extremely useful to reduce arthritic pains. Collapsible walking poles are convenient, and easily carried in your handbag or coat pocket.

Raised chairs / toilet seats / bed
Difficulty getting out of a low chair is a characteristic problem with knee arthritis. Some people find the use of higher chairs/seats to be beneficial.

Surgical Options

Knee arthroscopy
Knee arthroscopy is a relatively minor operation placing a camera in the knee, allowing the surgeon to rectify a variety of problems such as torn cartilage, and smoothing damaged joint surfaces.

If the knee has arthritis, the arthroscopy may not make much difference. This is even more common in people who have an aching pain on the inside of the knee, and the knee has a "bowed" deformity. If x-rays prior to the arthroscopy do not demonstrate any features of arthritis, it seems reasonable to "have a look" to see if minor arthroscopic surgery will help. If the x-ray shows signs of arthritis, it may be reasonable to do an arthroscopy, or to do both the arthroscopy and osteotomy at the same time.

Chondrocyte grafting & micro fracturing
This technique aims to restore the damaged joint surface to normal. They may be use alone, or in combination with realignment osteotomies. Chondrocyte grafting involves molecular biology techniques, and a good number of cases have been done in Ballarat. The long recovery make it hard to prove it is better than other techniques, 12 months are required before doing squats or stairs. It tends to be used only

if the damaged joint area is very large, and the patient young. Strictly speaking it works better for joints that have had a single serious injury than joints that are developing arthritis.

Currently, chondrocyte grafting is not supported by your private health insurance, the out of pocket expense might be $7000 additional to the surgeon, anaesthetist & hospital fees.

Ligament reconstruction

Some knees have a giving way sensation caused by a previous injury to a ligament in the knee. Typically the knee gives way on twisting. It is possible to correct this problem at the same time as realigning the leg. It does not seem to add to the recovery time, although return to twisting / pivoting sports would be prevented until 12 months from the surgery.

Partial knee replacement

If the arthritis is limited to a single area, a partial replacement may be the best option. The Oxford & Unix each have good long-term results, equivalent to TKR.

Requirements for this surgery are the range of movement is good, and preferably the cruciate ligament is intact. A disadvantage is the scar may cause more numbness, but this seems to be offset by the otherwise more normal function than after total replacement.

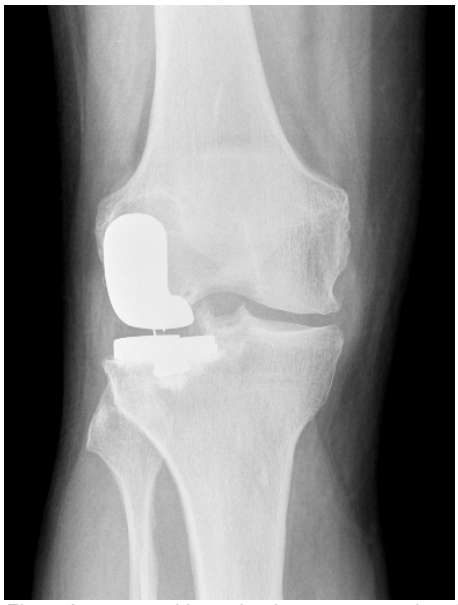

Fig 4. A cemented lateral unicompartmental replacement.

Total knee replacement

Total knee replacement replaces all the joint surfaces, and removes the anterior cruciate ligament. Designs keep improving, but the knee never feels normal and is suitable only for sedentary activity. As a rule, we don't do it for patients under fifty, and infrequently in patients under sixty years of age. The risk of failure in well selected (older patients) is approximately 1% per year through a variety of mechanisms. The failure rate in patients under 55 is more like 2% per year.

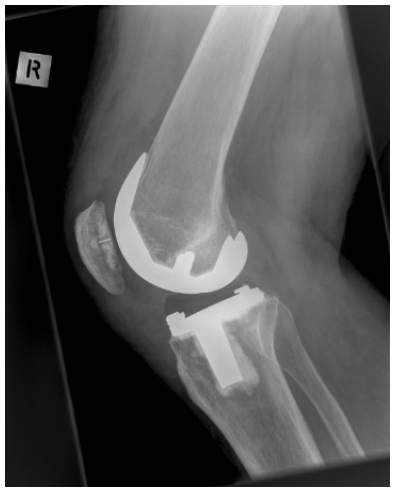

Figure 5. An x-ray taken from the side of a total knee replacement showing the three new surfaces.

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The Process of having a femoral osteotomy.

Preoperative planning
The degree of deformity is measured either using a CT scan, or a long leg standing XR or both. The required amount of correction depends on the deformity, the amount of wear, and to a lesser degree, whether the other leg also has the same trouble. Any previous arthroscopies done by other surgeons may have useful information, so previous intra-operative photos and previous operation reports are usually sort. An MRI scan might sometimes be helpful.

Preadmission clinic
At St John of God Hospital, many patients attend the preadmission clinic to ensure all the required tests have been done and that you are familiar with the hospital, and where to go. Often for osteotomies this is arranged by telephone alone.

Admission to hospital
Typically patients are admitted on the day of surgery to the hospital through the Surgical Admission Unit. Pack a small suitcase; this will be transferred with you to the main orthopaedic ward after surgery. You will be advised when to “fast” from prior to admission, it is important to have an empty stomach for safe anaesthesia.

Anaesthesia
Surgery can be done under general or regional anaesthetic. The anaesthetist will meet you before you go to the operating theatre to discuss any concerns. If you are a high-risk patient, it may be appropriate to meet the anaesthetist some weeks prior to surgery.

Recovery room
Typically you will wake up in the recovery room, adjacent to the operating theatre. The nurses there closely monitor you while the anaesthetic wears off. They may ask you how much pain you have (scored out of 10).

Physiotherapy
Both hospitals in Ballarat have their own physiotherapy service paid for by your insurance. Typically our intention is to have you out of bed on the day of surgery to minimize the risk of chest infection and blood clots. Walking aids may start with a frame, and changed to using two crutches as soon as possible.

What will the knee be like?
The knee will be swollen and bruised for the first week after the surgery. This can make bending the knee difficult, and the thigh muscle feel weak. A knee brace may be used for the first few days, or sometimes a hinged brace for eight weeks.

Activities after osteotomies
As you will need crutches to walk, TAC regulations prevent you from driving except if the surgery is to your left leg and you drive an automatic. Even then, driving in the first two weeks would not be advisable, as you may be still using strong painkillers.

At 4-6 weeks I usually review your progress, and advise stretching the joint to minimize stiffness. In thin people, I allow “partial weight bearing” (50% of your weight) to be put through the operated leg for the first two weeks. Crutches MUST be used until you can lift your leg straight & walk around the house with confidence. It often takes 6 weeks from surgery to discard the crutches. This plan may be modified if a chondrocyte graft has also been done.

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Exercise bike work can start once you have 90 degrees of knee flexion, typically 1 week. Light jogging may be possible at 4months. Swimming could commence at 3 weeks. Kneeling exercises should commence at six weeks, but is not always possible.

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Complications following femoral osteotomy

An osteotomy is a major surgical procedure with some risk. This list cannot be complete, but does deal with more common problems. Accepting and minimizing these risks is a responsibility of both the patient and the surgeon.

Failure

A small number of patients do not achieve the result required, young patients may have had severe arthritis, and are improved but not cured, and some older patients may still end up having a knee replacement.

Numbness

The osteotomy involves cutting a number of layers to do the surgery. It is common for an area "lateral" the scar to be numb. The area may become smaller with time (years) but it is usually permanent. We minimize the numbness by keeping the scar as short as possible.

Scar tenderness & kneeling

The scar will be tender for three months. A small number of my patients have had a grating pain caused by the hamstring tendons rubbing over the plate. Removing the plate has successfully treated this. Rarely patient state they can't kneel.

Stiffness

A knee that was stiff before the surgery will still be stiff after the surgery, although the intention is that with time it improves. For knees with a good range of movement before the surgery, the surgery will have causes bruising and swelling which will gradually resolved.

Fracture & bracing requirement

The operation involves a controlled, incomplete break of the leg at the best location. Sometimes it "propagates" and cracks right through. This requires a brace for 8 weeks. Rarely, it cracks up into the joint – this requires a larger plate, large incision, and more numbness.

Neurovascular injury

Passing around the knee are nerves and arteries supplying the lower leg and they can be injured. Injury can result in permanent loss of function or viability of the limb.

Compartment syndrome

Excessive swelling of the leg after the surgery can permanently damage the muscles of the leg. The opening wedge osteotomy has a lower risk than traditional lateral closing wedges. If it does occur, urgent surgery to reduce the pressure would be undertaken. I have not had any cases of this complication after this surgery to date.

Thrombosis & pulmonary embolism

Clots can occur within the veins of the leg and pelvis before, during or after surgery. They are associated with a risk of dislodging and moving up to the lung. It can be fatal. Even if they remain in the leg, a "post phlebitic syndrome" can leave permanent swelling of the leg and can causes ulcers to develop. Taking Aspirin 100mg daily, and early mobilization reduces the risk of thrombosis.

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Infection

Infections can occur directly after an operation. To minimize the risk of infection, we prepare the operation site with antiseptics, use antiseptic impregnated drapes, and use intravenous antibiotics at the time of and after surgery.

Complex Regional Pain Syndrome

This rare diagnosis (previously know as Reflex Sympathetic Dystrophy) contributes to poor outcomes with pain and stiffness. If you have ever had this condition diagnosed in you, tell your surgeon so additional steps can be undertaken to minimize the risk.

Other

It is not possible to provide a full list of complications. Extremely rare occurrences eventually happen to somebody. If you have a specific question, please ask your surgeon.

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