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OSTEOARTHRITIS of the KNEE

The knee is the largest joint in the body, and is also the joint most commonly affected by osteoarthritis.

There are many factors that contribute to the development of osteoarthritis. Such factors include family history, injury, obesity, overuse, malalignment, certain sporting activities, and occupational considerations.

Treatment for osteoarthritis of the knee depends on the stage and severity of the condition, and the age and physical requirements of the patient.

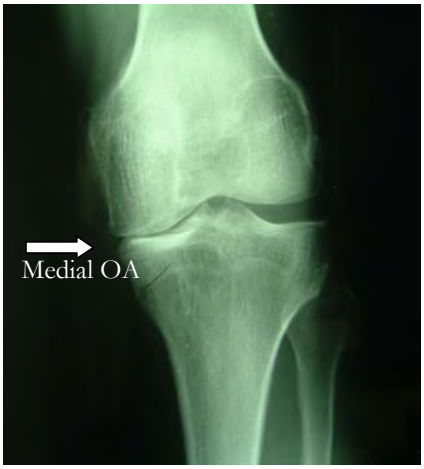
X-ray of a normal knee

In general, the initial treatment for early osteoarthritis is **non-operative**. As the condition progresses, and it usually does, surgical treatments may be required. Surgical treatments range from minor procedures such as arthroscopy to major operations involving total joint replacement.

The treatments that I employ and recommend in the management of the painful, arthritic knee are personally selected for each patient, according to their symptoms, needs and requirements, and are modified as required according to the individual patient's response.

Osteoarthritis of the Knee

Osteoarthritis often causes deformity and bowing of the legs .



X-ray of an arthritic knee Note the lack of joint space on the medial side.

TREATMENT of the ARTHRITIC KNEE

Treatments for the arthritic knee include the following:

Conservative (non-operative) Treatments

This is always a good place to start, and often leads to satisfactory results in the treatment of the early stages of osteoarthritis. Successful conservative treatment can put off the need for surgery.

Recommended treatments include the following;

Do regular **quadriceps** (thigh muscle) strengthening exercises. Leg raising or leg extension exercises using ankle weights to strengthen the quadriceps muscle group can help support the knee joint during load and lead to better function and reduced symptoms. 1 to 2 kg ankle weights will usually suffice. At least 100 repetitions per leg per day (25 at a time) are required.

Have a course of **physiotherapy**. A good physiotherapist can help with strengthening exercises and other physical techniques to help maximise knee function and mobility.

Take up a **low impact exercise programme**. Swimming, walking and stationary cycling are excellent ways to keep mobile and retain function of the knees. Joint surface cartilage is nourished by synovial fluid which requires movement for optimal

penetration to the cartilage cells in the deeper layers. Movement is vital for joint function. Join an exercise class.

Reduce your weight if you are overweight. More than half of Australian adults are overweight. Excess weight places enormous stress on the knees, and leads to early arthritis. Your body/mass index (BMI) is calculated by dividing your weight in kilograms by your height in metres squared and should ideally be below 25, for example if you weigh 85kg and are 1.75 metres in height your BMI will be 85/1.75x1.75 = 27.8 which is too high and needs attention. If you are overweight you should speak to your GP for advice on dieting, exercise, and possibly medication. It may be helpful to seek advice from a dietician. Remember, sensible weight reduction is definitely beneficial if you have osteoarthritis.

Try a course of **cartilage supplements**. Glucosamine Hydrochloride and Chondroitin Sulphate are cartilage building blocks that are available in tablet or powder form from chemists, health food stores and some supermarkets. There are many reports of patients benefiting from taking these compounds, and the chance of suffering side-effects appears to be very small. The exact mechanism of action of these compounds remains unknown.

Anti-inflammatory medications are very useful in treating the symptoms of arthritis although they do not appear to affect the underlying condition. It is reasonable to take anti-inflammatories as long as complications and side effects do not occur. Common side effects of non-steroidal anti-inflammatory drugs (NSAID's) include dyspepsia, reflux oesophagitis, stomach and duodenal ulcers, fluid retention, hypertension, and asthma in susceptible individuals. Some patients tolerate NSAID's for years without suffering complications.

Cox 2 inhibitors (Celebrex, Mobic) A class of drug that gives relief of pain and symptoms of arthritis. Gastro-intestinal side effects are less common with this class of drugs than with traditional NSAID's. Recent reports, however, have suggested a link between these medications and cardiac problems, so caution a cautious approach is warranted. These medications can also cause elevated blood pressure and should be avoided in patients with hypertension and renal disease.

Treatments delivered by injection

Cortisone injections into the arthritic knee may reduce inflammation and relieve symptoms for a while but do not affect the underlying disorder. Nevertheless cortisone injections are sometimes appropriate in patients who wish to delay surgery and those who are unfit for anaesthesia.

Visco-supplementation with **hyaluronic acid** based joint fluid substitutes (e.g. **Synvisc**) may give relief of symptoms of arthritis for several months and may put off the need for surgery in some patients.

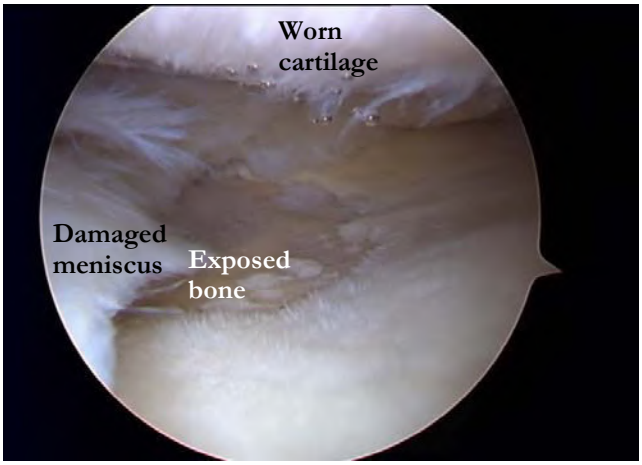
Surgery

As the arthritis in your knee progresses the treatments listed above are likely to become less effective in relieving symptoms. In such instances surgical treatments may be required.

Surgical options range from minor operations conducted on an outpatient basis to major procedures such as total knee replacement. The main surgical procedures used to treat osteoarthritis of the knee are as follows:

Arthroscopy

This operation involves the inspection of the interior of the joint with a fibre-optic telescope. It is usually done under general anaesthesia in hospital as an outpatient procedure. The aims of this procedure in the arthritic knee are to assess the specific location and severity of the arthritis, remove any loose bodies or floating cartilage, treat meniscal tears, remove excessive and inflamed synovium, and to wash out the knee. Satisfactory results from this procedure have been reported in up to 65% of cases under ideal circumstances. It should be noted, however, that the results of arthroscopy in the arthritic knee can be difficult to predict pre-operatively and can be disappointing. It is even possible for symptoms to increase following arthroscopy. Fortunately such deteriorations are usually only short lived. If a satisfactory result is not achieved further surgery may be required. Arthroscopy is very useful in assessing a patient's suitability for partial knee resurfacing, or interposition arthroplasty.



Arthroscopic view of an arthritic knee. Note the rough joint surfaces and the damaged medial meniscus.

Local Articular Resurfacing

Biological Resurfacing

Biological cartilage replacement techniques, such as autologous chondrocyte implantation (ACI), matrix induced ACI (MACI), and osteochondral autograft transfer (OATS) have been shown to work very poorly if at all in cases of osteoarthritis or when there is a mechanical imbalance in the joint, e.g. varus mal-alignment, ACL deficiency. Even in otherwise suitable knees, these techniques are unreliable in patients over 50-55 years.

Local Resurfacing With Implants

A recent development in the treatment of early osteoarthritis is the ability to resurface worn out areas of the joint surface with a contour matching implant.

This system is ideally suited to the treatment of large unstable articular defects with significant subchondral bone exposure on the femoral condylar surface. If left untreated these defects cause stress transfer to neighbouring articular cartilage, which subsequently breaks down under the increased load, causing the defect to enlarge. The end result of this process is widespread cartilage loss and osteoarthritis.

Such defects may be the result of injury or may represent the early stages of osteoarthritis. If the defect in the femoral condyle can be filled in and resurfaced, preserving the normal contour of the joint surface, then the joint mechanics are improved and stress transfer is less likely to occur.

Local resurfacing with contoured implants can provide immediate relief from the symptoms of focal cartilage defects that can be present in early osteoarthritis. This system is analogous to filling a hole in a tooth.

HemiCAP™ resurfacing implant
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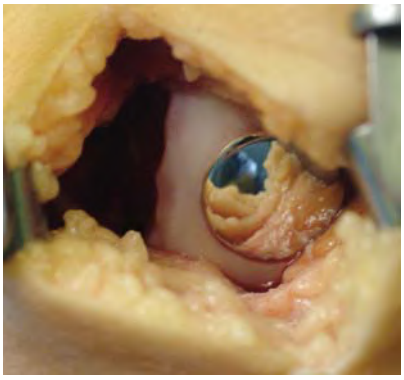


Femoral condyle defect resurfaced

Local Resurfacing of a Chondral Defect on the Femoral Condyle

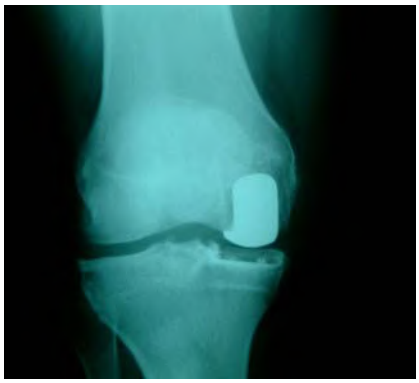
Large chondral defect on the medial femoral condyle is resurfaced with the hemiCAP™ implant

Post-operative X-rays show excellent joint congruity and a stable implant

Unicondylar Knee Resurfacing and Patellofemoral Replacement (Partial Knee Replacements)

These operations are suitable for patients who have moderately severe arthritis affecting one side of the knee joint or the patellofemoral joint. These procedures involve some bone removal and replacement of the damaged joint surfaces with metal and polyethylene implants which are usually attached to the bone using methyl-methacrylate bone cement. These operations are more conservative than total knee replacement and are associated with a shorter hospital stay (usually 1 to 3 days) and faster recovery than total knee replacement. Success rates of 90-95% have been reported with this type of surgery. The prosthesis may not last as long as a total knee replacement and may need to be revised to a full knee replacement after 8 to10 years.

Resurfacing patients usually report excellent function and a more naturally feeling knee than with a total knee replacement.



Front view

Side view

A partial or unicondylar replacement preserves the intact joint surfaces and only replaces the damaged area.

It needs to be noted that resurfacing unicondylar replacements are much more conservative in their bone resection than other types of unicondylar replacements.

High Tibial Osteotomy

This operation involves breaking the tibia below the knee and re-setting the bone into a better alignment to alter the mechanics of the joint. Some surgeons use this procedure as an alternative to partial knee replacement.

Opening wedge osteotomy

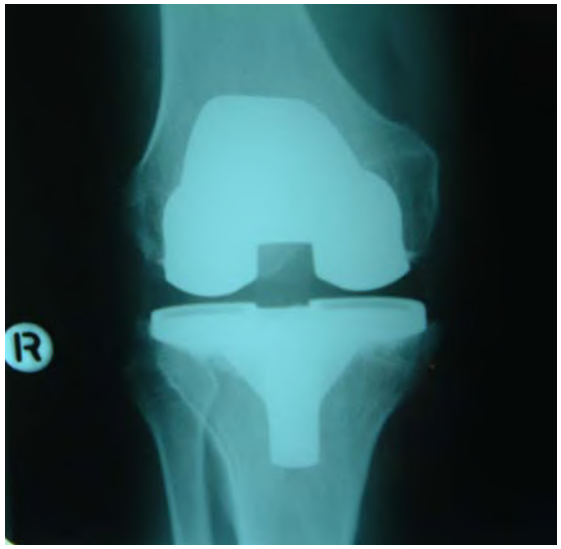
Closing wedge osteotomy

High tibial osteotomy. The tibia is cut and re-aligned. Bone graft may be used to fill the gap in the opening wedge technique.

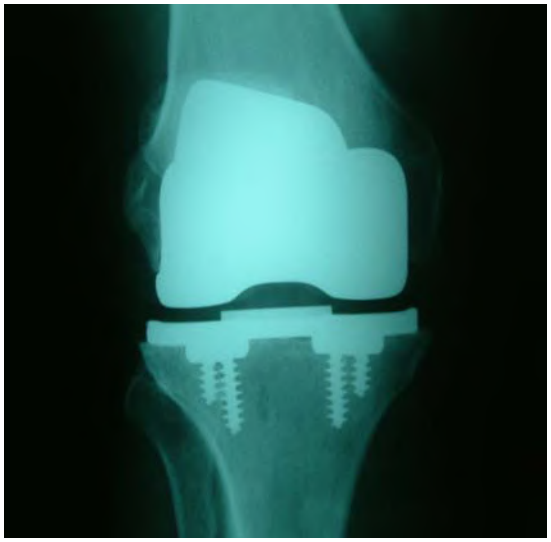
Total Knee Replacement

As the arthritis progresses and the entire joint becomes involved it may be necessary to consider a total knee replacement. This operation involves removal of about 1cm of bone from the end of the femur and a similar amount from the top of the tibia to allow implantation of the metal and polyethylene prosthesis. This procedure is a major operation and requires about a week in hospital and a fairly extensive programme of physiotherapy post-operatively to maximise the function of the joint. Post-operative rehabilitation in a specialist inpatient rehabilitation facility is often recommended. Satisfactory results following total knee replacement have been reported in 90-95% of cases. Knee replacements may not last a lifetime and in certain cases may need to be revised after 10 years or so. There are many reports in the literature of 15 years or more satisfactory function following total knee replacement.

Total knee replacements can be inserted with or without bone cement.



Cemented total knee replacement

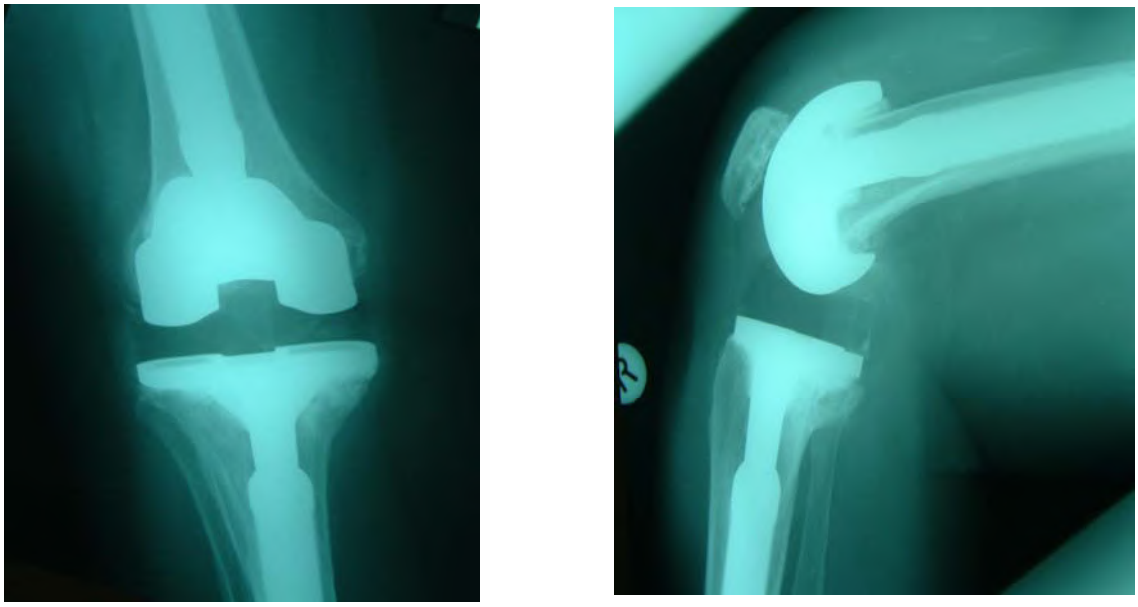


Cementless total knee replacement

In a total knee replacement all of the damaged joint surfaces are replaced with the metal and polyethylene prosthetic components.

Revision Total Knee Replacement

If a knee replacement wears out a revision replacement will be required. The operation involves removing the old prosthesis and replacement with a new knee and may require bone grafting or other specialised techniques to achieve a satisfactory result. This is a major surgical undertaking but with careful planning a successful result can be anticipated in over 90% of cases.



Revision knee replacements involve larger implants and require more bone resection.

SUMMARY of AVAILABLE TREATMENTS for OSTEOARTHRITIS of the KNEE

CONSERVATIVE (non-operative) TREATMENT

ARTHROSCOPIC SURGERY

LOCAL ARTICULAR RESURFACING

UNICONDYLAR RESURFACING AND PATELLOREMORAL REPLACEMENT

TOTAL KNEE REPLACEMENT

REVISION TOTAL KNEE REPLACEMENT

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