Partial Knee Replacement

Knee arthritis causes pain, stiffness, swelling, and a variety of "mechanical" symptoms leading to disability. Arthritis in a single compartment often maintains a good movement, and the pain might be intermittently severe rather than continuous. If those symptoms make the knee unreliable, a partial knee replacement should be considered.

The design of the knee

The knee is a complex hinge joint. It has cruciate ligaments in the middle of the knee, dividing it into a medial and a lateral compartment. In addition, the quadriceps tendon has the "kneecap" (patella) within it, which rubs against the front of the femur (patello-femoral joint). When people develop arthritis, either a single area is involved, or many parts of the joint could be arthritic. About 20% of people will have the arthritis limited to one compartment, the ligaments normal, and the knee not stiff.

Fig 1. Medial arthritis. Note how the 'joint space' is reduced on the left (inner, or medial) side of the knee.

Partial Knee Replacement

It is possible to replace just the arthritic part of the knee. This keeps the knee feeling more like a normal knee, maintains the good range of movement, and the recovery seems faster. It is still major surgery, but often either one night in hospital or even day surgery is possible.

Figure 2. ZUK Medial unicompartmental replacement

Partial knee replacement is not an ideal solution if the patient is very heavy, the required components very small, or the knee cap (patella) is irritable.

Figure 3. Side on (lateral) x-ray of the ZUK showing the kneecap (patella) to still have its native surface.

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Other Compartments

The outer aspect of the knee (lateral compartment) can also develop arthritis, although it is less common – perhaps only 1 in ten is lateral. The best performing lateral compartment replacement is it ZUK, although the joint registry only has a 5 year result with 96.8% functioning, although the numbers are small, the statistical range is 89.8-99%). The patellofemoral joint is dealt with in a different document.

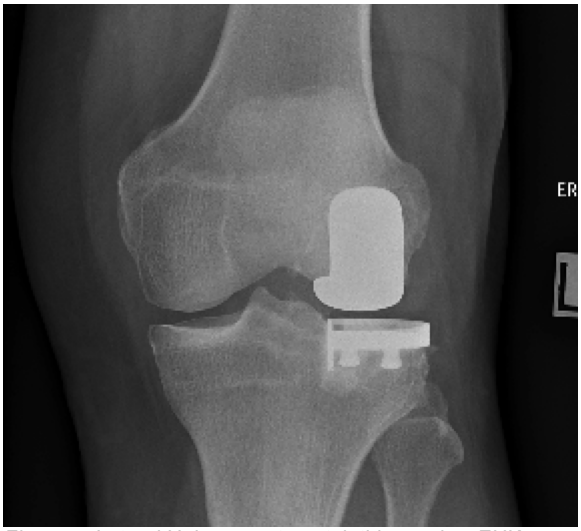

Figure 4. Lateral Uni-compartmental, this one is a ZUK.

Partial knee better than TKR

In a randomised study between UKA & TKR, the Oxford medial compartment replacement was demonstrated to have a better range of movement, faster recovery, and more "excellent" results at five years. JBJS Br, 1998 80(5): 862-5

Long Term Results

The National Joint Replacement Registry here in Australia has tracked all hip & knee replacements since 2000. As of the year 2016, there are just over 40,000 partial knee replacements that the registry is tracking. The ZUK (Zimmer Uni-compartmental Knee) is one of the best performing, with 92% of the implants still functioning at 10 years. The most common reason for failure is progression of disease – ie parts of the knee that were though to be good eventually become arthritic. It is possible to replace a second compartment (see figure 5) but the most common solution is to change to a total.

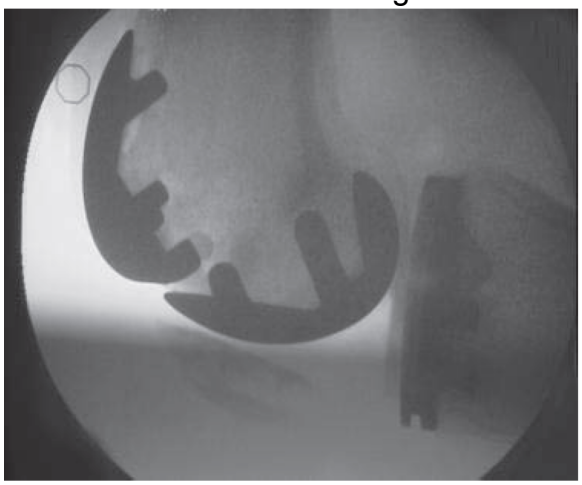

Figure 5. Patellofemoral & medial unicompartmental replacements ("bi-compartmental replacement).

Disadvantages

The failure rate for partial knee replacement seems slightly higher than for total knee replacement. Having said that, the best of the partial replacements have a failure rate of 8% at 10 years, with ALL comers. They are often used in younger, more active patients so this comparison may no be fair.

Total knee replacement after partial knee replacement is not easy. The failure rate for knee replacements revised from partial knee replacement is higher than that of primary knee replacement. Bone loss may need to be "augmented" with additional metal, and maybe a longer stemmed component. Most often standard implants are used.

Minimally invasive techniques

Minimally invasive technique involve using small incisions, protecting the quadriceps tendon and supra-patellar space, local anaesthetic mixtures, and "multimodal" analgesia. With these techniques, some patients may be reasonable to have the surgery done as day surgery. To do this, you need to be not too old, have someone at home, and live relatively close to the hospital.

Why is it better to be out of hospital as soon as possible?

When knee replacement was developed, the operations were painful, and the general consensus was that rest would be good for the patients. The old surgical approaches to the hip joint weren't great, and results might have been better by slowing down the patients. Patients were admitted to hospital often days prior to the surgery for tests and meeting other doctors involved in the care.

Two complications were particularly prominent: infections and blood clots. Antibiotics were added to the treatment, blood thinners also administered. Through the 1990's wound were more prone to bleed, more dressing changes required. Drain tubes were a routine part of surgery. To control pain morphine pumps were used, more recently "patient controlled analgesic systems". These required a drip to be running and oxygen administered. Urinary catheters were required in 80% of our patients in 2003, so it became routine to insert at the start of the operation. Patients were effectively tied to the bed.

Immobility adds to blood clots, chest infections, even pressure sores. Urinary catheters add to urinary infections. Bleeding from the wounds required dressing changes, exposing patients potentially to other patients bacteria, even in wards were single beds are available.

A new way of looking at it

If the surgery was not very painful, the patients could get up and move. We find the first time patients gets up they get dizzy, whether it is day three after surgery, or two hours. The next time they are usually fine. If they can get up and walk, they are less likely to get blood clots – in fact in the absence of a history or family history of blood clots, we virtually never see them. If the patient is comfortable, and only needs tablets for pain, there is no need for a morphine machine. No morphine machine means the patient need not be "tied to the bed", and probably won't have nausea or vomiting. We find patients are almost always independent the day after surgery and it is even possible to do partial knee replacements as day surgery.

If the patient is moving well, pain well controlled, not nauseated, and safe, why not go home? By getting out of hospital, the risk of being exposed to other patients' bacteria is dramatically reduced, and our lower infection rate reflects this. We do have a scoring system RAPT score to check it is plausible to go home. Scores of more than 9 will probably go home the day after surgery. Scores less than 5 probably need to go to rehabilitation.

Perversely, the funding systems discourage the hospitals from short stay. The hospital is paid less for short stays, and the patients and their family need to work harder. But it is in the interest of better results to go home. Some people feel that they are being "thrown out of hospital" – no one goes home if they don't pass the checklist. By going home – less infections, and less clots.

Going to the patients own home is usually best. At someone else's house, there is a lesser tendency for the patient to get up and do things. Getting up and doing things is what we need! It is hard to check both the temporary and permanent house are safe.

Where people live alone, we'd like a friend or relative to stay the first night or two at home with the patient. Where family live next door, or within 15minutes, even an empty house is often acceptable.

The Process of having a partial knee replacement

Pre-admission Clinic

At St John of God Hospital, most patients attend the pre-admission clinic to ensure all the required tests have been done (including a urine test) and that you are familiar with the hospital, and where to go. Sometimes 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. Clearly you will need to bring certain items with you, typically a small bag. This will be transferred with you to the main orthopaedic ward after surgery. Same day admission has reduced the risk of postoperative infections. It is important to have an empty stomach for safe anaesthesia, six hours of fasting is required.

Anaesthesia

Most patients have either a general or a spinal 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. Typically you will wake up in the recovery area, adjacent to the operating theatre.

Surgery

It may have been discussed with you to do an arthroscopy at the start of the operation to confirm the knee is suitable for a partial replacement.

Pain relief

Pain management is a crucial part of the plan. At the time of surgery, extensive local anaesthetic is placed around the knee-joint; this wears off after about 18 hours. A Norspan patch (a narcotic based pain-patch) is applied in recovery. A background of paracetamol and anti-inflammatories will minimize the need for strong painkillers. Ice packs can also help dramatically. It is unreasonable to have major surgery and expect no pain, but by using the background painkillers, patients find they do not need much in the way of strong painkillers.

Orthopaedic Ward

An iceypole is provided in the recovery ward. The key is to "Eat, Eat, Eat" - drinks and light food should be provided immediately. then get up for a walk.

Physiotherapy

Both hospitals in Ballarat have their own physiotherapy service paid for by your health insurance. Physiotherapy is aimed at helping you walk, bend and straighten the knee. Walking aids may start with a frame, then just a walking stick. Our intention is for walking to start two hours after returning from the operating theatre, and to walk 25m every two hours during waking hours. This reduces the incidence of blood clots and other complications.

What will the knee be like?

The knee will be swollen and bruised after the surgery. This can make bending the knee difficult, and the thigh muscle feel weak. Despite this, we need you to push the movement of the knee, and work on regaining the muscle strength.

*Dental and invasive procedures****

For six months after joint replacement surgery you carry an increased risk of infection of the joint replacement with dental procedures and other surgery. Ask your dentist to provide antibiotics prior to cleaning or infective procedures.

Driving

When you are able to walk unaided, and are not using strong pain killers, it is possible to drive. Most patients after a partial knee replacement are ready to drive at two weeks.

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Pain Management after Orthopaedic Surgery

Pain scores & Discomfort

Nurses in recovery and the ward will ask you whether you have any pain, and to score it out of ten. If you can get basically comfortable by moving yourself, the score is probably 2 or less.

It is important that you tell them if the pain is somewhere different than where the operation site!

Most patients look comfortable in recovery. But if you report pain at 5/10 you are likely to get morphine like injections, which might trade the pain for nausea. At 7/10 people are visibly in pain – teeth clenched, pale appearance, sweaty brow. 10/10 pain is rarely seen and described as "screaming pain"

Local Infiltration Analgesia

This is a key technique that we are expert with in Ballarat. Local anaesthetic mixed with anti-inflammatories – Torodol & dexamethasone is infiltrated around the wound by the surgeon. The surgeon leaves a wound catheter buried in the bandaging so that extra drugs can be injected around the joint replacement the following morning. It has a filter on it to avoid any contamination.

Pain Patch.

Norspan, a narcotic patch, is applied to the skin and gradually releases analgesia. If the patch is too hot, you may become nauseous or drowsy. If your joint is sore you can warm up the patch by giving it a rub, or put on a jumper. The Norspan patch is typically changed 6-7 days after surgery.

Background tablets

Mobic
Panadol
Somac

Top up medications

Tramal is the preferred drug. Typically 1-2 tablets, 4 hourly as required. Tramal is not always perfect, it can cause nausea or hallucinations, and can't be used with high doses of some anti-depressants. It seems more effective and less habit forming than Endone.

Swelling control reduces pain

Rest means not bending it too much in first two days. It is still permissible to walk and exercise your feet up and down.

Ice packs are first applied in recovery, or as soon as possible after the surgery. Be a little careful with areas that have local anaesthetic that you may not be able to feel how cold it is. Do NOT apply ice directly to the skin, and apply it only 20 minutes at a time.

Compression is initially a bulky bandage extending to the foot. This stays on for a minimum of one day. It is then replaced with Tubigrip, and a Venosan stocking.

Elevation. In the first two weeks, put your leg up when you can. Lying on the couch is much better than sitting.

Avoiding nausea and vomiting

Our aim is to have you drinking fluid and food as soon as possible after the surgery. We generally try to avoid fruit juices for the first day as these sweet & acidic drinks can make you vomit. Powerade is a sugar & salt drink – this can be used up to two hours before surgery, and when you are alert after surgery. If you feel sick tell the nursing staff. It is easier to control nausea early, rather than allowing vomiting.

Night pain & Chronic pain

If pain prevents sleeping it needs treatment to avoid becoming chronic. Amitriptyline 10mg at night, increasing to 20mg may suffice. It is described an anti-depressant, but in this instance it is prescribed in a comparatively small dose that helps with "neuropathic pain".

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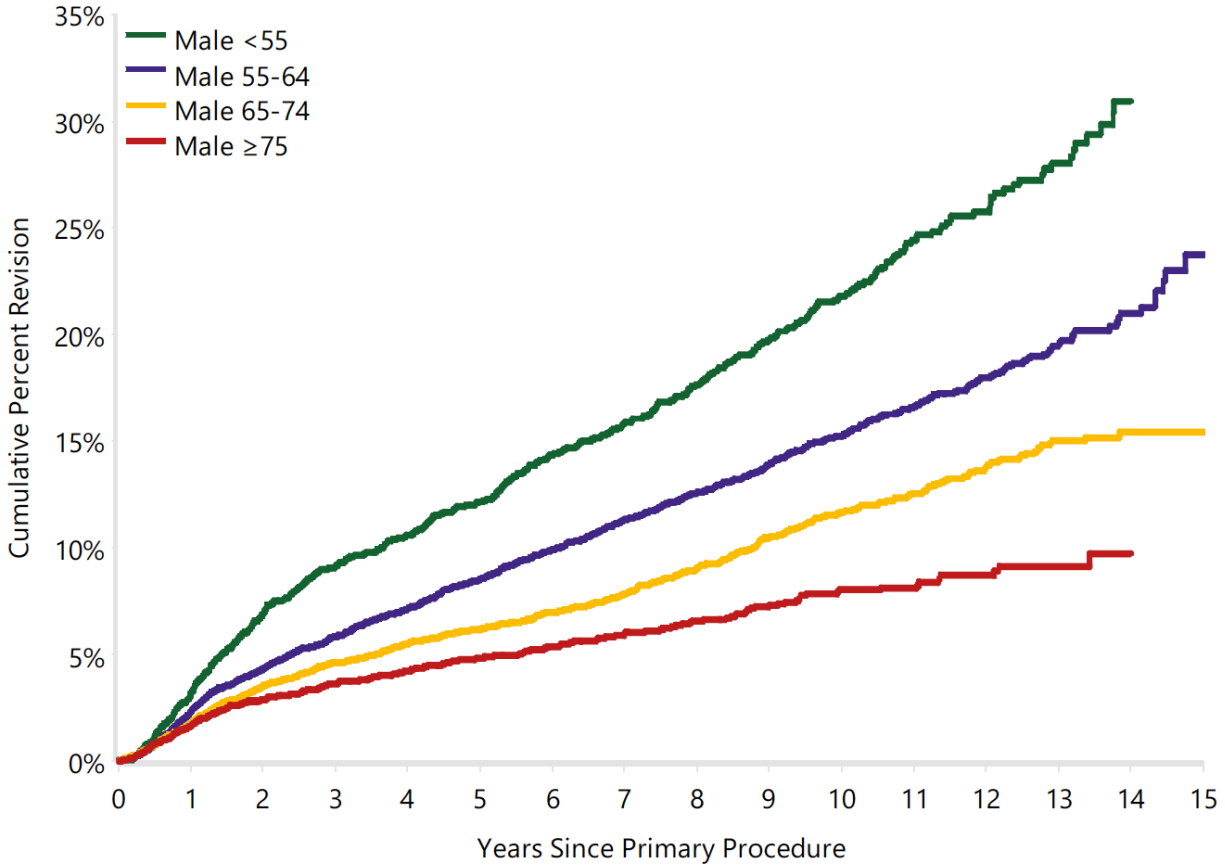
Survivorship of Partial Knee Replacement

Obviously we'd like all partial knee replacements to last as long as the patient wishes, have a better range of movement than total knee replacement, and feel more like a normal knee than total knee replacements do. We'd like them to be easier to get over than realignment osteotomy surgery. For the most part - all of those issues come down to patient selection. There are some patients that should have been advised to do non operative management (eg be slim, supple and strong, use tables, increase exercise).

For those that ultimately do have partial knee replacement - we have a problem that they have a HIGHER re-operation rate than regular knee replacements. There are many reasons for this, re-operating just because it's not perfect is not a great reason.

The graph below is provided by the Australian Orthopaedic Association, every partial knee replacement in Australia goes into a central registry. This graph has all the partial knee replacements in males; the survivorship is a bit better in women. What it shows is that males in the range of 65-74 years of age (yellow line) have about a 10% chance of needing a reoperation of the partial knee replacement by 10 years. It also shows that men over 75 years of age have only a 7% chance of further surgery by the age of 90.



We also know that people having a partial knee replacement removed and a total knee replacement inserted at whatever time after the initial operation do not have quite a good a result as someone having a total knee replacement as their first operation at that later date. Overall - it's more complex than saying "knee replacements last 10 years", for the majority of cases the result is better than that!

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Complications following partial knee replacement

A partial knee replacement is a major surgical procedure. It replaces an arthritic joint with an artificial one. This list of complications is not complete, but does deal with more common problems. Accepting and minimizing these risks is a responsibility of both the patient and the surgeon. If the patient doesn't accept that a joint replacement occasionally goes wrong, then they should not submit themselves to surgery.

Discovery that Total Knee Required

In the operating theatre, after the knee operation has been commenced, it is possible to find the partial replacement has a poor chance of success. If so, a total knee replacement is done. The same local anaesthetic tricks are used. The majority of patients still go home on the day after surgery. If it had been decided to use the Mini Medial incision, the scar will be substantially longer, and quite numb for some time (See below). If the anterolateral incision was to be used, the scar is slightly longer, but not very different.

Scar pain and numbness

The knee replacement involves cutting a number of layers to do the surgery. It is common for an area on the outer aspect of the scar to be numb. The area may become smaller with time (years) but it is usually permanent. I minimize the numbness by keeping the scar as short as possible. For total knee replacements, where a long incision is required anyway, I put the scar further towards the outside of the knee. It is possible to put the scar more on the outside of the knee for uni-compartmental replacements especially in younger patients and those who kneeling is very important.

Scar tenderness

The scar is expected to be tender for three months. A small number of Oxford patients have had a grating pain caused by a bone spur. This has been successfully treated with an arthroscopic operation to remove the spur.

Stiffness

Knee replacement does not guarantee a normal range of movement of the knee. This is typically most obvious when trying to put on a shoe or sock. A knee that doesn't bend 90 degrees will be very disappointing to both the surgeon and the patient.

Urinary catheterisation

Occasionally, the bladder doesn't function normally after an anaesthetic, especially spinal anaesthesia. A tube may need to be placed in the bladder to rectify this – it is usually left in for one or two nights.

Bowel obstruction

Pain relieving drugs such as morphine can slow the gut action. On occasions the gut gets worse, becomes distended and may require surgical treatment! This is usually a "pseudo-obstruction" and occurs in 0.5% of cases.

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 phlebetic syndrome" can leave permanent swelling of the leg and can cause ulcers to develop. It is my preference to use regional anaesthesia (as mutually agreed with the anaesthetist) allowing for early mobilisation. Aspirin (Cartia) is given daily and Venosan stockings are worn.

Neurovascular injury

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

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Revision to Total Knee Replacement
The revision rate for surgery is slightly higher for partial than total knee replacements. A little wear behind the kneecap can be tolerated if muscle strength is maintained. If the outer compartment of the knee wears out and is painful, revision to TKR may be required. If the partial knee is done at a young age, it is likely further surgery will be required at some stage.

Dislocation
This extremely rare complication most commonly refers to mobile bearings popping out (eg Oxford). If worn, a new bearing is surgically inserted. Revision to a total replacement is also an option.

Infection.
Infections can occur directly after an operation, or not become apparent for some years, or even occur out of the blue many years later. The infection rate is quoted as 0.2 to 2%. It is hard to put a precise figure on it because an infection may not be apparent for some years. Some patients may carry additional risk factors. The majority of infections occur through an infected tooth, or from damage to the skin (eg rose thorn) or a urinary infection.

Loosening
For a variety of reasons, the fixation between the knee replacement and the bone may fail. This loosening may cause pain and require re-operation. Infection is a cause of loosening but others causes do exist.

Wear
The plastic insert between the femur and tibia can wear. Typically the wear rate is in the vicinity of 0.04mm per year. Most people will never have a problem from this amount. Rare cases though may wear faster, and require further surgery.

Stroke
A stroke is said to occur in 0.2% of patients, possibly causing permanent weakness, and some even die.

Fracture
A fracture of the tibial shaft can occur at the time of surgery, or after an injury. Late post-operative fractures may require extensive surgery and result in a slower recovery. Fractures of the femur just above the knee replacement also require surgery and have a prolonged recovery period.

Surgical team
There might be 150 steps to getting an operation just right. The surgeon is responsible for every step. Some steps are delegated to nurses, administrative staff and the orthopaedic fellow. The fellow is a fully trained orthopaedic surgeon in his own right, but chooses to work with your surgeon to learn and copy his technique. All critical steps are performed under direct supervision by the surgeon, or performed by the surgeon.

Osteolysis
Osteolysis implies that bones (osteo...) develop holes (..lysis). The mechanism is open to scientific debate. What is known is that it is related to wear products, and access of this to the prosthesis - bone junction. This can cause a fracture or loosening around the joint replacement.

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. In short, having a knee replacement involves taking on an element of risk. If you have a specific question, ask your surgeon, and he will help clarify any queries.

Partial Knee 2.0 23/9/18

What is included in the cost of Joint Replacement?

Insurance generally pays for the “spare parts” and most of the hospital expense, but only covers a fraction of the doctors’ fees. This is because Medicare hasn't adjusted their schedule to match CPI since 1983, or at all since 2014, Medicare is now worth less than one third of the real value of 1983. So there will be out of pocket expenses for doctors.

Doctors involved in the operation are: the surgeon, anaesthetist, surgical assistant, and if any medical problems occur, or are anticipated, a physician. The surgical assistant is a skilled nurse, doctor, or surgeon or a combination of these working alongside your main surgeon. The surgical assistant's billing will occur through Ballarat OSM. Typically there will be an out of pocket expense, which contributes to paying the salaries of our nurses and our fellow. If a physician is required, please discuss his fees with him. The anaesthetist will arrange his/her own financial consent. Typical out of pocket expense after Medicare & private health insurance rebates (estimates) are $500 for hospital, $400 for anaesthetist, and $400 for surgical assistant.

Included in the **surgeon’s fee** is performing the surgery, follow-up in the hospital and consulting rooms for twelve months is usually bulk billed - ie no additional charge to you. The surgeon takes responsibility for the whole process, and to solve whatever problems occur. The surgeon takes personal responsibility for the post-operative pain control –including extensive local anaesthetic infiltration around the wounds. For patients off track, the surgeon intervenes, or supervises interventions. The surgeon takes personal responsibility for achieving a low infection rate. If an infection does occur, aggressive surgical and antibiotic treatment is required.

The AMA calculates annually the change in cost of medical practice, covering practice staff, insurance, rent etc, which roughly follows the CPI. Following the AMA fee suggestion, the surgeon’s fee for partial joint replacement & the reinjection technique is $3844 (item number 49517 & 18222). Insurers are only required by law to pay $311 towards the surgeon, Medicare pays $933, thus you're $2600 out of pocket, for the surgeon. Insurers require us to discount by 25-35% to allow "Gapcover" arrangements, even with moderate out of pocket expenses.

ESTIMATED COST	Insured patients	Medicare only insurance	No Medicare
Surgeon	$ 2,600	$ 2,900	$ 3,850
Total	$ 3,900	$ 13,500	$ 15,000

Included in the package of estimated fees are:

- Hospital, surgeon, assistants, anaesthetist, prosthetic implants
- post operative ward rounds, usual blood tests and XRs
- followup phone call(s) after discharge, access to Ballarat OSM nurses for advice
- 2 & 6 week appointment at rooms, and any other visits to the consulting rooms required.
- 12 months follow-up appointment related to the knee
- Long term surveillance of the knee replacement by XR & phone for younger patients

Excluded:

- Physician involvement
- Other orthopaedic or surgical problems

If you are experiencing personal financial hardship, please discuss this well prior to the surgery so an amicable arrangement can be made. Note that most our joint replacements patients are elderly and many have a part pension. The out of pocket expenses will be required to be paid two weeks prior to surgery to avoid cancellation.

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