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## TOTAL KNEE REPLACEMENT

If your knee is severely damaged by arthritis or injury, it may be hard for you to perform simple activities such as walking or climbing stairs. You may begin to feel pain even while you're sitting or lying down.

If medications, changing your activity level, and using walking supports are no longer helpful, you may want to consider total knee replacement surgery. By resurfacing damaged and worn surfaces, total knee replacement surgery can relieve your pain, correct your leg deformity, and help you resume your normal activities.

One of the most important orthopaedic surgical advances of the century, knee replacement was first performed in 1968. Improvements in surgical materials and techniques since then have greatly increased its effectiveness.

### How the Normal Knee Works

The knee is the largest joint in the body. Nearly normal knee function is needed to perform routine everyday activities. The knee is made up of the lower end of the thigh bone (femur) which rotates on the upper end of the shin bone (tibia) and the knee cap (patella) which slides in a groove on the end of the femur. Large ligaments attach to the femur and tibia to provide stability. The long thigh muscles give the knee strength.

The joint surfaces where these three bones touch are covered with articular cartilage, a smooth substance that cushions the bones and enables them to move easily.

All remaining surfaces of the knee are covered by a thin, smooth tissue liner called the synovial membrane. This membrane releases a special fluid that lubricates the knee which reduces friction to nearly zero in a healthy knee.

Normally, all of these components work in harmony. But disease or injury can disrupt this harmony, resulting in pain, muscle weakness and less function.

### **Common causes of Knee Pain and Loss of Knee Function**

The most common cause of chronic knee pain and disability is arthritis. Osteoarthritis, rheumatoid arthritis and traumatic arthritis are the most common forms

Osteoarthritis usually occurs after the age of 50 and often in an individual with a family history of arthritis. The cartilage that cushions the bones of the knee softens and wears away. The bones then rub against one another causing knee pain and stiffness.

Rheumatoid Arthritis is a disease in which the synovial membrane becomes thickened and inflamed, producing too much synovial fluid which over-fills the joint space. This chronic inflammation can damage the cartilage and eventually cause cartilage loss, pain and stiffness.

Post-traumatic Arthritis can follow a serious knee injury. A knee fracture or severe tears of the knee's ligaments may damage the articular cartilage over time, causing knee pain and limiting knee function.

### Is Total Knee Replacement for you?

The decision whether to have total knee replacement surgery should be made after discussion between you, your family, your family physician and your orthopaedic surgeon.

Reasons that you may benefit from total knee replacement commonly include:

- Severe knee pain that limits your everyday activities, including walking, going up and down stairs, and getting in and out of chairs. You may find it hard to walk more than a few blocks without significant pain and you may need to use a cane or walker.
- Moderate or severe knee pain while resting, either day or night
- Chronic knee inflammation and swelling that doesn't improve with rest or medications
- Knee deformity - a bowing in or out of your knee
- Knee stiffness – inability to bend and straighten your knee
- Failure to obtain pain relief from non-steroidal anti-inflammatory drugs. These medications, including aspirin or Panadol Osteo, are often most effective in the early stages of the disease. Their ineffectiveness in controlling knee pain greatly differs from person to person.
- Inability to tolerate or complications due to pain medications
- Failure to substantially improve with other treatments such as cortisone injections, physical therapy or other surgeries.

Most patients who undergo total knee replacement are aged 60 to 80 but orthopaedic surgeons evaluate patients individually. Recommendations for surgery are based on a patient's pain and disability, not age.

### The Initial Consultation:

The orthopaedic evaluation consists of several components:

- A medical history, in which your orthopaedic surgeon gathers information about your general health and asks you about the extent of your knee pain and your ability to function.
- A physical examination to assess your knee motion, stability, and strength and overall leg alignment
- X-rays to determine the extent of damage and deformity in your knee
- Occasionally blood tests, an MRI or a bone scan is needed to determine the condition of the bone and soft tissues of your knee

Dr Ellis will consider all factors of your history and health, and discuss whether total knee replacement would be the best method to relieve your pain and improve your function. Other treatment options are possible, such as medications, injections, physiotherapy or other types of surgery.

At this time he will also explain the potential risks and complications of knee replacement, including those related to the surgery itself and those that can occur over time after your surgery.

### Realistic Expectations:

An important factor in deciding whether to have total knee replacement surgery is understanding what the procedure can and cannot do.

More than 90% of individuals who undergo total knee replacement experience a dramatic reduction of knee pain and a significant improvement in the ability to perform common activities of daily living. But total knee replacement won't make you a super-athlete or allow you to do more than you could before you developed arthritis.

Following surgery, you will be advised to avoid some types of activity for the rest of your life, including jogging and high impact sports.

With normal use and activity, every knee replacement develops some wear in its plastic cushion. Excessive activity may accelerate this normal wear and cause the knee replacement to loosen and become painful. With appropriate activity modification, knee replacements can last for many years. However, after being in situ for many years, occasionally revision is required to replace worn materials, such as the polyethylene liner.

## PREPARING FOR SURGERY

### *Preadmission Consultation*

If you decided to have a total knee replacement, you will be asked to attend a Pre-Admission Clinic at North Shore Private Hospital to assess your health and to rule out any conditions that could interfere with your surgery. This will include several tests (such as blood tests, urinary samples to check for infection and x-rays of your chest).

### *Preparing your Skin and Leg*

Your knee and leg should not have any skin infections or irritation. Your lower leg should not have any chronic swelling. Please be aware of your skin condition and avoid gardening with thorny and scratchy plants or other possible risks to the integrity of your skin, such as cat scratches etcetera.

### *Medications*

Tell your orthopaedic surgeon about the medications you are taking. He will tell you which medications you should cease and which you should continue before surgery. In particular, cessation of anti-inflammatories and blood thinners such as Warfarin or Plavix is usually required and determined on a patient-by-patient basis determined by your unique health conditions.

### *Dental Evaluation*

Although the incidence of infection after knee replacement is very low, an infection can occur if bacteria enter your blood stream. Treatment of significant dental diseases should be considered WELL before your total knee replacement surgery.

### *Discharge Planning*

Though you should be able to walk on crutches or a walker soon after surgery, you will most likely need help for several weeks with such tasks as cooking, shopping, bathing and doing laundry. If you live alone, a discharge planner at the hospital can help you make advance arrangements to have someone assist you at home. Usually, Dr Ellis recommends a ten to twelve day admission to a rehabilitation hospital after discharge to attend inpatient physiotherapy and help manage your return home.

### *Home Planning*

Several suggestions can make your home easier to navigate during your recovery. Consider:

- Safety bars or secure handrails in the bathroom and along stairways
- A stable chair for your early recovery with a firm cushion and back with two arms, and a footstool for leg elevation.
- A toilet seat riser with arms and a stable shower chair for bathing
- Removing all loose carpets and cords
- A temporary living space on the same floor, to avoid climbing staircases.

## **THE SURGERY**

You will most likely be admitted to the hospital on the day of your surgery. Before surgery, you will have a chat with Dr Ellis and his anaesthetist, during which anaesthesia options and pain management post-operatively will be discussed, along with any other concerns that you might have.

The procedure will take approximately two hours. Dr Ellis will remove the damaged cartilage and bone, and then position the new joint surfaces to restore alignment and function of your knee.

Many different types of designs and materials are currently used in total knee replacement surgery. Nearly all of them consist of three components: *the femoral component* (made of a highly polished strong metal), *the tibial component* (made of a durable plastic held in a metal tray) and *the patellar component* (polyethylene).

## **YOUR TIME IN HOSPITAL**

You will most likely stay in the hospital for five to seven days. After surgery, you will feel some pain, but medication will be given to make you feel as comfortable as possible. Walking and knee movement are important to your recovery and will begin immediately after your surgery.

To avoid lung congestion after surgery, you should breathe deeply and cough frequently to clear your lungs. Physiotherapists will visit you on the ward to assist with this and with your early mobilisation.

## ORTHONORTH – KNEE REPLACEMENT – INFORMATION SHEETS

Your orthopaedic surgeon may prescribe one or more measures to prevent blood clots and decrease leg swelling, such as special support hose, compression boots and blood thinners. You will have an ultrasound just before discharge from hospital to ensure that a deep vein thrombosis has not occurred.

Foot and ankle movement is encouraged immediately following surgery to also increase blood flow in your leg muscles to help prevent leg swelling and blood clots. Most patients begin exercising their knee the day of or day after surgery. The physiotherapist will teach you specific exercises to strengthen your leg and restore knee movement to allow walking and other normal daily activities soon after your surgery.

### POSSIBLE COMPLICATIONS AFTER SURGERY

The complication rate following total knee replacement is low. Serious complications, such as a knee joint infection, occur in less than 2% of patients. Major medical complications, such as heart attack or stroke, occur even less frequently. Chronic illness may increase the potential for complications. Although uncommon, when these complications occur, they can prolong or limit your recovery.

Blood clots in the leg veins are the most common complication of knee surgery. Your surgeon will inform you of some easy methods of preventing blood clots including:

- Periodic elevation of your legs
- Lower leg exercises to increase circulation
- Support stockings, to be worn for SIX WEEKS post-operatively
- Medications to thin your blood (Usually Clexane or Aspirin)

Please discuss all your concerns thoroughly with your orthopaedic surgeon before surgery.

### RECOVERY AT REHABILITATION OR HOME

The success of your surgery will also depend on how well you follow your orthopaedic surgeon and physiotherapist's instructions during the first few weeks after surgery. If you choose to go to a rehabilitation hospital, expect your inpatient stay to last for ten to twelve days. Further outpatient physio may be arranged following this.

#### *Wound Care*

You will have either stiches or staples running along your wound or a suture beneath your skin on the front of you knee. The stiches or staples will be removed several weeks after surgery, either at rehab or by your GP. A suture beneath your skin will not require removal.

Avoid soaking the wound in water until the wound has thoroughly sealed and dried. A bandage may be placed over the wound to prevent irritation from clothing or support stockings.

#### *Diet*

Some loss of appetite is common for several weeks after surgery. A balanced diet is important to promote proper tissue healing and restore muscle strength.

#### *Activity*

Exercise is a critical component of rehabilitation, particularly during the first few weeks after surgery. You should be able to resume most normal activities of daily living within three to six weeks following surgery. Some pain with activity and at night is common for several weeks after surgery. Your activity program should include:

- A slowly increasing walking program to improve your mobility, initially at home and later outside.
- Resuming other normal daily activities, such as sitting and standing, and walking up and down stairs
- Specific exercises several times a day to restore movement and strengthen your knee. You probably will be able to perform the exercises without help, but you may visit a physiotherapist as recommended by your surgeon.

Most individuals resume driving at six weeks post-surgery, following your post-op review with Dr Ellis. Driving can only be recommenced when your knee bends sufficiently so you can enter and sit comfortably in your car and when your muscle control provides adequate reaction time for braking.

**CARE OF YOUR LIMB AFTER SURGERY**

*Blood Clot Prevention*

Follow your orthopaedic surgeon's instructions carefully to minimise the potential of blood clots which can occur during the first several weeks of your recovery.

Be mindful of:

- Increasing pain in your calf
- Tenderness or redness above or below your ankle
- Increasing swelling in your calf, ankle and foot

Warning signs of a clot in the lungs include:

- Sudden shortness of breath
- Sudden onset of chest pain
- Localised chest pain with coughing

Notify Dr Ellis immediately if you develop any of these signs.

*Preventing Infection*

The most common causes of infection following total knee replacement surgery are from bacteria that enter the blood stream during dental procedures, urinary tract infections, or skin infections (e.g. from cat scratches). These bacteria can lodge around your knee replacement and cause an infection.

Warning signs of a possible knee replacement infection are:

- Persistent raised temperature and/or shaking chills
- Increasing redness, tenderness or swelling of the knee wound
- Seepage from the wound
- Increasing knee pain with both activity and rest

*Avoiding Falls*

A fall during the first few weeks after surgery can damage your new knee and may result in a need for further surgery. Stairs are a particular hazard until your knee is strong and mobile. You should use a cane, crutches, a walker, hand rails or someone to help you until you have improved your balance, flexibility and strength.

**HOW YOUR NEW KNEE IS DIFFERENT**

You may feel some numbness in the skin around your incision. You may also feel some stiffness, particularly with excessive bending activities. Improvement of knee motion is a goal of total knee replacement, but restoration of full motion is uncommon. The motion of your knee replacement after surgery is predicted by the motion of your knee prior to surgery. Most patients can expect to nearly fully straighten the knee and to bend the knee sufficiently to go up and down stairs and get in and out of a car. Kneeling is usually uncomfortable, but is not harmful.

Occasionally, you may feel some soft clicking of the metal and plastic with knee bending or walking. These differences often diminish with time and most patients find these are minor, compared to the pain and limited function they experienced prior to surgery.

Your new knee may activate metal detectors required for security in airports and some buildings. You will be given a card with information about your implant to present to security staff if necessary.

After surgery, make sure you also do the following

- Participate in regular light exercise programs to maintain proper strength and mobility of your new knee.
- Take special precautions to avoid fall and injuries. Individuals who have undergone total knee replacement surgery and suffer a fracture may require more surgery.
- Notify your dentist that you had a knee replacement. Specific antibiotic protocols are required for some dental procedures, and your dentist can contact our rooms for further information if necessary. If you require significant dental work less than three months following surgery, antibiotic cover is usually required.
- See your orthopaedic surgeon periodically for a routine follow-up examination and x-rays usually once every five years.

## KNEE IMPLANTS

More joint replacement surgeries are performed on the knee than any other joint. In a total knee replacement (TKR), the diseased cartilage surfaces of the femur, tibia and the patella are replaced by prostheses made of metal alloys, high-grade plastics and polymeric materials. Most of the other structures of the knee, such as the connecting ligaments, remain intact.

### IMPLANT DESIGN

For simplicity, the knee can be considered as a hinge joint because of its ability to bend and straighten like a hinged door. In reality, the knee is much more complex because the surfaces actually roll and glide as the knee bends. The first implant designs used the hinge concept and literally included a connecting hinge between the components! Since then, newer designs have been developed which recognise the complexity of the joint, attempt to replicate the more complicated motions and to take advantage of the posterior cruciate ligament (PCL) and collateral ligaments for support.

Up to three bone surfaces may be replaced in a TKR:

1. The lower ends of the femur (condyles)
2. The top surface of the tibia
3. The back of the patella

Components are designed so that metal always articulates against polyethylene, which provides smooth movement and results in minimal wear.

#### *Femoral Component*

The femoral component curves around the end of the femur and has an interior groove so the kneecap can move up and down smoothly against the bone as the knee bends and straightens. Usually, one large piece is used to resurface the end of the bone. If only one side of the thighbone is damaged a smaller piece may be used (unicompartmental knee replacement) to resurface just that part of the bone.

#### *Tibial Component*

The tibial component is a flat metal platform with a polyethylene cushion. The cushion may be part of the platform (fixed) or separate (mobile) with either a flat surface (PCL-retaining) or a raised, sloping surface (PCL-subsisting)

#### *Patellar Component*

The patellar component is a dome-shaped piece of polyethylene that duplicates the shape of the kneecap anchored to a flat metal surface.

There are more than 150 knee replacement designs on the market today. The brand and designs used depend on many factors, including your needs (based on age, weight, activity levels and general health) and the cost and performance record of the implant. The National Joint Replacement Registry is a government body which monitors the long term performance of all replacement designs in Australia.

### IMPLANT INSERTION

During a TKR, the knee is placed in a bent position so that all the surfaces to be replaced can be exposed.

After taking several measurements to ensure the prostheses will fit properly, the surgeon will smooth the rough edges of the bones. Special jigs are used to accurately trim the damaged surfaces at the end of the thighbone. The devices shape the end of the femur so it configures to the inside of the prosthesis. The tibia is cut flat across the bone and a portion of the bone's centre is drilled out. The surgeon removes just enough bone so that the prosthesis on insertion recreates the joint line at the same level prior to surgery. If any ligaments have contract due to pain or deformity before surgery, the surgeon carefully releases them so that they are as close to normal state as possible. Dr Ellis uses assisted navigation to ensure that alignment and position is as close to neutral as possible.

The total knee replacement may be "cemented", "uncemented" or "hybrid" depending on the type of fixation used to hold the implant in place. Although there are certain general guidelines, each case is individual and your surgeon will evaluate your case before making any decisions.