

Your Practice Online

P R E S E N T S

TOTAL KNEE REPLACEMENT

Multimedia Health Education

Disclaimer

This information is an educational resource only and should not be used to make a decision on Knee replacement or arthritis management. All decisions about Knee replacement and management of arthritis must be made in conjunction with your surgeon or a licensed healthcare provider.

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MULTIMEDIA HEALTH EDUCATION MANUAL

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INTRODUCTION

The knee is essentially made up of four bones. The femur or thighbone is the bone connecting the hip to the knee. The tibia or shinbone connects the knee to the ankle. The patella (kneecap) is the small bone in front of the knee and rides on the knee joint as the knee bends. The fibula is a shorter and thinner bone running parallel to the tibia on its outside. The joint acts like a hinge but with some rotation.

The knee is a synovial joint, which means it is lined by synovium. The synovium produces fluid lubricating and nourishing the inside of the joint.

Articular cartilage is the smooth surfaces at the end of the femur and tibia. It is the damage to this surface which causes arthritis.

Section: 1

NORMAL KNEE

a. Knee Anatomy

Femur

The femur (thighbone) is the largest and the strongest bone in the body. It is the weight bearing bone of the thigh. It provides attachment to most of the muscles of the knee.

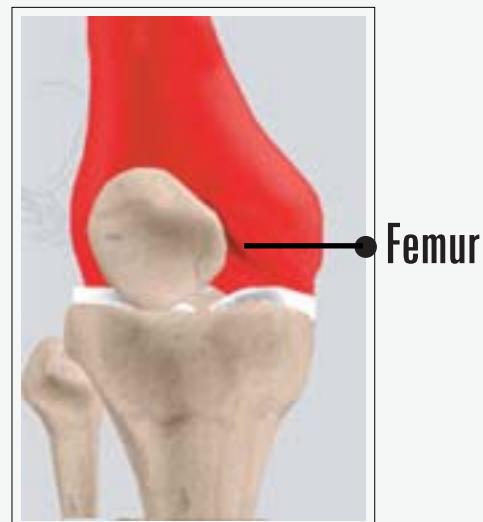
(Refer fig. 1)

Condyle

The two femoral condyles make up for the rounded end of the femur. Its smooth articular surface allows the femur to move easily over the tibial (shinbone) meniscus. (Refer fig. 2)

Tibia

The tibia (shinbone), the second largest bone in the body, is the weight bearing bone of the leg. The menisci incompletely cover the superior surface of the tibia where it articulates with the femur. The menisci act as shock absorbers, protecting the articular surface of the tibia as well as assisting in rotation of the knee. (Refer fig. 3)



(Fig. 1)



(Fig. 2)



(Fig. 3)

Fibula

The fibula, although not a weight bearing bone, provides attachment sites for the Lateral collateral ligaments (LCL) and the biceps femoris tendon.

The articulation of the tibia and fibula also allows a slight degree of movement, providing an element of flexibility in response to the actions of muscles attaching to the fibula.

(Refer fig. 4)

Patella

The patella (kneecap), attached to the quadriceps tendon above and the patellar ligament below, rests against the anterior articular surface of the lower end of the femur and protects the knee joint. The patella acts as a fulcrum for the quadriceps by holding the quadriceps tendon off the lower end of the femur.

(Refer fig. 5)



(Fig. 4)



(Fig. 5)

Menisci

The medial and the lateral meniscus are thin C-shaped layers of fibrocartilage, incompletely covering the surface of the tibia where it articulates with the femur. The majority of the meniscus has no blood supply and for that reason, when damaged, the meniscus is unable to undergo the normal healing process that occurs in the rest of the body.

In addition, a meniscus begins to deteriorate with age, often developing degenerative tears. Typically, when the meniscus is damaged, the torn pieces begin to move in an abnormal fashion inside the joint.

The menisci act as shock absorbers protecting the articular surface of the tibia as well as assisting in rotation of the knee. As secondary stabilizers, the intact menisci interact with the stabilizing function of the ligaments and are most effective when the surrounding ligaments are intact. *(Refer fig. 6)*



(Fig. 6)

a. Arthritis

Arthritis is a general term covering numerous conditions where the joint surface or cartilage wears out. The joint surface is covered by a smooth articular surface that allows pain free movement in the joint. This surface can wear out for a number of reasons; often the definite cause is not known.

When the articular cartilage wears out the bone ends rub on one another and cause pain. There are numerous conditions that can cause arthritis and often the exact cause is never known. In general, but not always, it affects people as they get older (Osteoarthritis).

Other causes include

- Trauma (fracture)
- Increased stress e.g., overuse, overweight, etc.
- Infection
- Connective tissue disorders
- Inactive lifestyle- Obesity (overweight); Your weight is the single most important link between diet and arthritis as being overweight puts an additional burden on your hips, knees, ankles and feet.
- Inflammation (Rheumatoid arthritis)

Now compare a normal knee with an arthritic knee.

In the arthritic knee there is an absent joint space. In the normal knee there is a normal joint space. (Refer fig. 7 and 8)



(Fig. 7)

Absent joint space

Arthritic Knee



(Fig. 8)

Normal joint space

Normal Knee

b. In an arthritic knee

- The cartilage lining is thinner than normal or completely absent. The degree of cartilage damage and inflammation varies with the type and stage of arthritis.
- The capsule of the arthritic knee is swollen.
- The joint space is narrowed and irregular in outline; this can be seen in an X-ray image.
- Bone spurs or excessive bone can also build up around the edges of the joint.

The combinations of these factors make the arthritic knee stiff and limit activities due to pain or fatigue. (Refer fig. 9 and 10)

c. Diagnosis

- The diagnosis of osteoarthritis is made on history, physical examination & X-rays.
- There is no blood test to diagnose Osteoarthritis (wear & tear arthritis).

Normal Knee



(Fig. 9)

Arthritic Knee



(Fig. 10)

Section: 3

TOTAL KNEE REPLACEMENT

a. Surgical procedure

Surgery is performed under sterile conditions in the operating theatre under spinal or general anesthesia. You will be lying on your back and a tourniquet applied to your upper thigh to reduce blood loss.

- The surgeon makes an incision along the affected knee exposing the knee joint. (Refer fig. 11)
- The surgeon first concentrates on the femur (thighbone). The damaged portions of the femur are then cut at the appropriate angles using specialized jigs. (Refer fig. 12 and 13)
- The femoral component is attached to the end of the femur with or without bone cement. (Refer fig. 14)



(Fig. 11)



(Fig. 12)



(Fig. 13)

Section: 3/cont. TOTAL KNEE REPLACEMENT

- The damaged area of the tibia (shinbone) and the cartilage are cut or shaved. This removes the deformed part of the bone and bony growth, as well as allows for a smooth surface for which to attach the implants.

(Refer fig. 15 and 16)

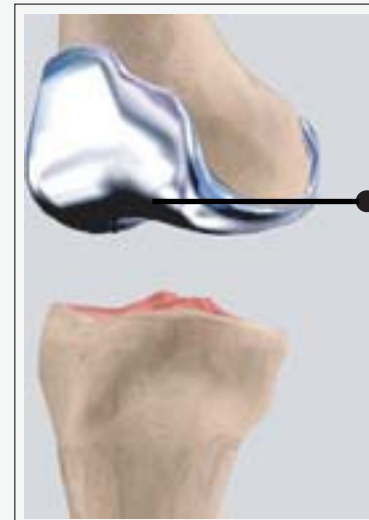
- The tibial component is secured to the end of the bone with bone cement or screws depending on a number of factors and on surgeons choice.

(Refer fig. 17)

- The surgeon will place a plastic piece called an articular surface between the implants to assure a smooth gliding movement. This plastic insert will support the body's weight and allow the femur to move over the tibia similar to the original cartilage (meniscus). *(Refer fig. 18)*

- The femur and the tibia with the new components are put together to form the new knee joint.

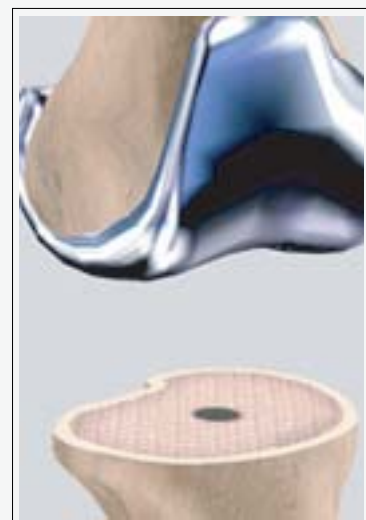
(Refer fig. 19)



(Fig. 14)



(Fig. 15)



(Fig. 16)

Femoral
Component

Section: 3/cont. TOTAL KNEE REPLACEMENT

- To make sure the patella (knee cap) glides smoothly over the new artificial knee, its rear surface is prepared to receive a plastic component.
- With all the new components the knee joint is tested through its range of motion.
- All excess cement will be removed. The entire joint will be irrigated or cleaned with a sterile saline solution. The knee is then carefully closed and drains usually inserted and the knee dressed and bandaged.



(Fig. 17)

Tibial Component



(Fig. 18)

Articular Surface



(Fig. 19)

b. Risks and complications

- As with any major surgery there are potential risks involved. The decision to proceed with the surgery is made because the advantages of surgery outweigh the potential disadvantages.
- It is important that you are informed of these risks before the surgery takes place.

Complications can be medical (general) or local complications specific to the knee.

Medical complications include those of the anesthetic and your general well being. Almost any medical condition can occur so this list is not complete. Complications include

- Allergic reactions to medications
- Blood loss requiring transfusion with its low risk of disease transmission
- Heart attacks, strokes, kidney failure, pneumonia, bladder infections
- Complications from nerve blocks such as infection or nerve damage
- Serious medical problems can lead to ongoing health concerns, prolonged hospitalization or rarely death.

Local complications

- **Stiffness in the knee**
Ideally your knee should bend beyond 100 degrees but on occasion the knee may not bend as well as expected. Sometimes manipulations are required; this means going to theatre and under anesthetic the knee is bent for you.

- **Wound irritation or breakdown**

The operation will always cut some skin nerves so you will inevitably have some numbness around the wound. This does not affect the function of your joint. You can also get some aching around the scar. Vitamin E cream and massaging can help reduce this.

Occasionally you can get reactions to the sutures or a wound breakdown which may require antibiotics or rarely further surgery.

- **Infection**

Infection can occur with any operation. In the knee this can be superficial or deep. Infection rates are approximately 1%. If it occurs, it can be treated with antibiotics but may require further surgery. Very rarely your knee prosthesis may need to be removed to eradicate the infection.

- **Blood clots (Deep Venous Thrombosis)**

These can form in the calf muscles and can travel to the lung (Pulmonary embolism). These can occasionally be serious and even life threatening. If you get calf pain or shortness of breath at any stage you should notify your surgeon.

- **Damage to nerves or blood vessels**

Also rare but can lead to weakness and loss of sensation in part of the leg. Damage to blood vessels may require further surgery if bleeding is ongoing.

- **Wear**

The plastic liner eventually wears out over time, usually 10 to 15 years, and may need to be changed.

- **Cosmetic Appearance**

The knee may look different than it was because it is put into the correct alignment to allow proper function.

- **Dislocation**
An extremely rare condition where the ends of the knee joint lose contact with each other or the plastic insert can lose contact with the tibia (shinbone) or the femur (thigh bone).
- **Patella problems**
Patella (knee cap) can dislocate. That is, it moves out of place and it can break or loosen.
- **Ligament injuries**
There are a number of ligaments surrounding the knee. These ligaments can be torn during surgery or break or stretch out any time afterwards. Surgery may be required to correct this problem.
- **Fractures** or breaks in the bone can occur during surgery or afterwards if you fall. To fix these you may require surgery.

Although every effort has been made to explain the complications there will be complications that may not have been specifically mentioned. A good knowledge of this operation will make the stress of undertaking the operation easier for you to bear.

The decision to proceed with the surgery is made because the advantages of surgery outweigh the potential disadvantages. It is important that you are informed of these risks before the surgery.

You must not proceed until you are confident that you understand this procedure, particularly the complications.

Conclusion

We hope that you have found this information helpful. We also trust you will know that if any of the material mentioned in this booklet is confusing or hard to understand, your surgeon will be glad to address your concerns either by phone or on your next visit to the clinic.

Thank you for taking the time to read this material. We understand that this manual contains a great deal of information. We also know that the best results come from the most informed patients and those motivated to see themselves in their best condition as quickly as possible.

Surgery exists as a method of correcting a problem and improving a patient's condition which is everyone's goal. Please be assured that your surgeon and the medical team are more than willing at any time to answer any questions or to review any material before and after surgery. The best results are obtained when people are provided the right information to become informed, motivated, and confident.

Your TOTAL KNEE REPLACEMENT Team