

## Knee Arthritis and Replacement

### What is Total Knee Replacement Surgery?

Total knee replacement surgery has been performed for more than forty years, providing relief for those with chronic, debilitating pain caused by degeneration of the cartilage in the knee, angular deformities or serious knee injuries. The surgery isn't even quite so radical as the name might imply. In truth, only a small portion of bone in the knee is removed and covered with a combination of metal and plastic components to form the new surfaces of the joint. With the new surfaces sliding together smoothly, the bone no longer rubs together and pain is relieved.

The knee is a complicated, marvelous structure, made up of a combination of bones, muscles, tendons, ligaments and other soft tissue. At the knee joint, your thigh and shinbones meet, and are connected by a complex set of muscles and ligaments, in which is contained the kneecap (patella) on the front side. Contrary to the image of the "hinge," these bones don't actually interlock with each other, but rather meet end-to-end, with the hinge-like range of motion controlled by those ligaments and muscles.

Your thighbone, called the femur, is slightly rounded at the end and forms what are called the condyles. It rests on the top of the shinbone, called the tibia, which similarly has, at its end, a sort of rounded, creased top. The bones are protected by a layer of cartilage, which in a normal knee prevents them from rubbing against each other. Also between the two bones lie two crescent-shaped pieces of cartilage called menisci. The menisci provide cushioning as well as a smooth, lubricated surface for the bones to slide against during movement. They also provide a more pocket-like surface on the top of the tibia for the femur to sit in, providing additional stability.

At this point, without any additional support, there would be nothing to prevent the condyles of the femur from just sliding right off the top of the tibia during activity. But a series of ligaments attached to various places on the bones prevent this from happening, and even restrict movement to particular directions. It is these ligaments that form the "hinge," by controlling the motion allowable.

Two ligaments, the medial collateral and lateral collateral, run from the tip of the femur to the tip of the tibia, along the inside and outside edges of the knee, respectively. Parts of these ligaments actually also attach to the meniscus that lies between the bones, providing additional stability. These ligaments control the motion of the bones laterally or side-to-side. They prevent the knee from collapsing to either side and are often injured when forces against the side of the knee are too powerful for the ligament to withstand, such as football injuries.

Another set of ligaments lie inside the joint, between the bones. They cross each other, one running from the front surface of the tibia to the back surface of the femur and the other lying opposite. These crossed ligaments are called the anterior and posterior cruciate ligaments. The word 'cruciate' means crossed. These ligaments provide front-to-back stability, keeping either bone from moving too far forwards or backwards, such as when kneeling or when the knee is straightened. They are often injured when forces against the front of the knee are too powerful for the ligaments to withstand.

Additional structures in the knee include the bursae, which are small slightly fluid-filled sacs that cushion the joint. There are several of these in various places in the knee.

The patella, or kneecap, is located in the tendonous attachments of the quadriceps tendon on the front of the knee. Because it is located anteriorly, it provides extra leverage needed for jumping, lifting or climbing stairs. The articular, or joint surface, is thicker than the rest of the knee so that it can better carry the load.

In a normal knee, these parts all work together to provide stability and very controlled motion during sports and other activities.

### **Reasons for Total Knee Replacement Surgery**

Degenerative changes or injury can cause damage to some of these structures in the knee, causing pain and discomfort and lessening the quality of life. One such condition, called osteoarthritis, can cause the cartilage that normally cushions the bones to wear down, leaving the bones to rub together and cause pain. The cartilage normally protects the bones from this wear, but as a result of aging and general wear and tear, the cartilage can break down. One side of the knee can wear at a faster rate and the angular deformities that are produced can cause more wear and pain. When the inside wears faster it is called genu varum or bowlegs. When the outside wears faster it is called genu valgum or knock-knees.

Other conditions, which cause similar damage and may lead to total knee replacement include rheumatoid arthritis and post-traumatic arthritis.

While Dr. Gudeman will likely try to control your condition with more conservative methods like anti-inflammatories, weight management and physical therapy, total knee replacement may ultimately be recommended if these are unsuccessful.

### **Surgical Procedure for Total Knee Replacement Surgery**

Some of the factors you and Dr. Gudeman should discuss in order to determine whether to have the surgery include:

- The degree to which Dr. Gudeman believes that a TKR can improve function in your knee
- Whether your age and physical condition (other than your knee) make you a good candidate for a successful surgery
- The likelihood that the joint will need to be replaced again at a later date, based on your age and activity level

In a total knee replacement, the ends of the femur and tibia are replaced with a combination of plastic and metal components. These components are attached to the bones, but not to each other. Existing ligaments and muscles are used to maintain joint stability between the components just as they did before the prosthesis. By replacing the ends of the bone, some friction and associated pain are eliminated, and the patient can regain a more normal activity level. The artificial joint will not give you a completely "normal" knee, but with up to 120 degrees of movement and reduced pain, it can significantly improve the quality of your life.

Approximately 85 to 90 percent of all total knee replacements performed are successful for up to ten years.

After you have been prepared for surgery and given a general anesthetic or regional block, Dr. Gudeman will first make a long incision along the front of your knee, from above to below the kneecap. Once open, the patella, which is attached by tendons above and below it, is turned completely over so that the

underside is exposed. This exposes the joint underneath as well. The knee is then bent sharply. This exposes the ends of both bones so that Dr. Gudeman can reach the areas he needs during the surgery.

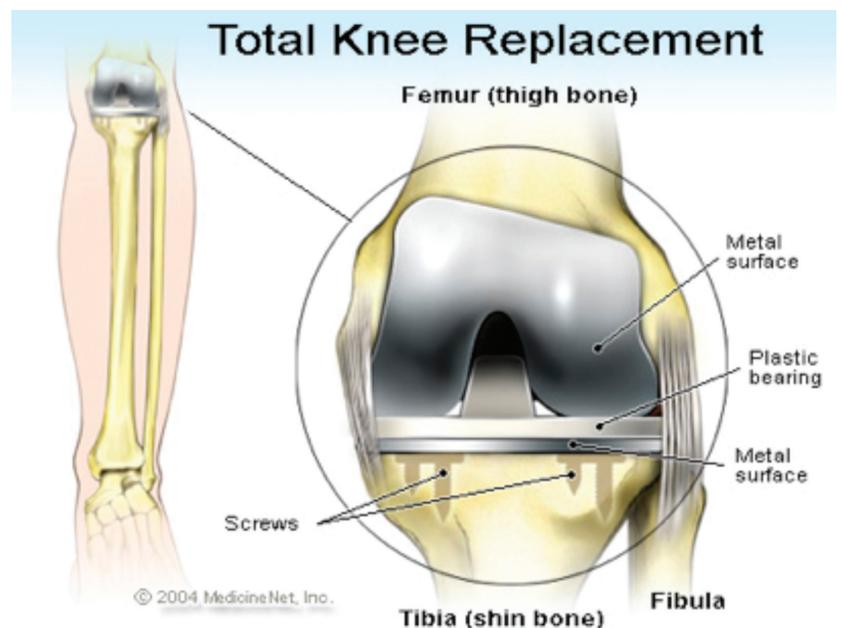
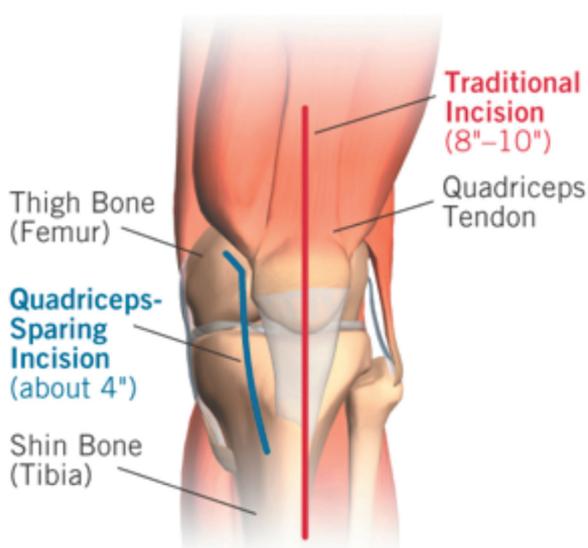
The ends of the femur and tibia are resurfaced and replaced with their new metal and plastic prosthetic pieces. The surgeon will first remove any diseased bone and then the portions of bone necessary to accept the prosthesis, using special instruments designed for this purpose. A metal or plastic "tray" is placed on the top surface of the tibia, generally set on a stem that is inserted into the tibial canal, or inside the bone. This will be fixed either with a special type of bone cement or with screws. A special kind of plastic piece, sized and fitted specifically for your knee, is placed on top of this tray, and secured. Next, a highly polished chrome steel cap, also sized for your knee, is placed over the end of the prepared femur and set in place. Finally, the patella is resurfaced and a small plastic piece is placed on the rear side, where it will cover the new joint.

Some total knee replacement surgeries are performed without using bone cement to secure the prosthetic pieces. In this instance, Dr. Gudeman would use a special kind of prosthesis that has a rough, porous surface for the bone to grow into. This is more commonly done with younger patients.

Some of the inside or cruciate ligaments that connect the bones together may need to be removed in order to implement the new prosthesis. Some techniques allow for some of these ligaments to be retained. In that case, Dr. Gudeman will realign the bones and connective tissues, so that they can adequately support the new joint. These prosthetic components are not otherwise attached to each other, and so stability is especially important. If the ligaments must be sacrificed, a special type of prosthesis will probably be chosen. This prosthesis has grooves for the pieces to slide in, to provide additional stability in the absence of the ligaments.

After the bones are realigned, the patella is turned back around so that it covers the joint. Dr. Gudeman will then close your knee, either with stitches or staples. The stitches will probably be removed approximately 10 to 14 days after your surgery. Your knee will then be packed with surgical dressings.

### Rehabilitation for Total Knee Replacement Surgery



Rehabilitation of the knee starts very soon. Dr. Gudeman will start standing you up so that ambulation can begin.

Before leaving the hospital, a physical therapist will set some goals for you to do while in the hospital and afterwards at home. They include: 1) Getting in and out of bed and going to the bathroom by yourself. 2) Walking, with support of a walker or crutches. 3) Bending your knee 90 degrees by yourself. Once at home, continue the exercises and slowly learn how to get up and down stairs and walk further distances.

While it may take six months to one year to recover, your knee will not be perfect, but it will be a lot better than it was before the surgery. After total knee replacement surgery, patients can walk every day, ride a bike and do nearly all of the activities they used to do before their knees started feeling painful. High-impact sports should be avoided.

If properly taken care of, an artificial knee can last upwards to 15 to 20 years, after which revision surgery may be recommended.

### **Possible Complications for Total Knee Replacement Surgery**

There are always risks involved in any surgery. They can be minimized, but they are always present. They include:

- **Death** – Anytime you are put under a general anesthetic or undergo a major operation, the risk of death is present.
- **Loss of the Leg** – If a blood clot or infection forms, it is possible that you might lose your leg.
- **Infection** – If you develop an infection in the artificial joint, it may have to be removed. If the infection heals, it may be possible to insert a new joint.
- **Neurovascular Damage**
- **Loosening of the Prosthesis** – If the cement wears, it can crack and the prosthesis can come loose.
- **Abnormal or Heavy Wear** – Sometimes the plastic components will wear over time and require replacement. Plastic wear particles may cause an irritation inside of the joint.
- **Stiffness** – If scar tissue forms, the knee may be stiff. If the knee will not bend to 90 degrees within two weeks of the surgery, manipulation may be required under anesthesia.
- **Complications** – These may involve the lungs, heart, gastrointestinal or neurological system, including venous thrombosis, or blood clots, that can travel to the lungs.

You should carefully consider these risks along with the possible advantages of the surgery, and weigh them carefully. Because the rehabilitation process requires so much effort on your part, it is important that you have a positive attitude if you decide to have the surgery. Therefore, the decision cannot be a reluctant one. Only you will live with the results.

A successful total knee replacement surgery can mean a return to activity that you may have given up because of pain.

### **Informative Websites**

[www.saveyourknee.org](http://www.saveyourknee.org)

[www.orthoinfo.org](http://www.orthoinfo.org)

[www.sportsmed.org](http://www.sportsmed.org)

[www.aana.org](http://www.aana.org)

Helping you achieve the  
optimal activity level for your  
lifestyle is my first priority.

- Scott Gudeman, MD



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