
Knee Replacement

Knee Anatomy

A joint is a special structure in the body where the ends of two or more bones meet. The thigh bone (femur) and the shin bone (tibia) meet to form the knee joint. The knee cap (patella) covers and protects the knee joint. The joint lining (synovium) makes fluid that lubricates the joint cartilage covering the ends of the bones. This cartilage cushions the knee for smooth, easy movement. The knee is a major weight-bearing joint and is held together by muscles and ligaments that allow your leg to bend and straighten so that you can walk, run, kneel, climb stairs, etc. When a knee is arthritic, the cartilage wears away, causing the bones to grind together. This produces pain and loss of motion.

Total knee replacement surgery involves resurfacing the diseased portion of the knee joint. Many people think large portions of the distal femur and proximal tibia are removed and a large mechanical device is put in place during knee replacement. In fact, only small slices of bone are removed from the ends of the bones and then the total knee prosthesis is placed, which effectively resurfaces the knee. Patients retain their ligaments to balance the knee and their muscles still power the knee after surgery. There are three parts to an artificial knee. The femoral part fits on the end of the thighbone, while the tibial part fits on top of and covers the shin bone. The patellar part covers the underside of the kneecap. These parts are made of metal and plastic. Special instruments are used to shape the bones to allow for an exact fit of the total knee replacement.

History of Knee Replacemnt

Knee arthritis is not a recent development, nor are attempts to treat the pain by replacing the knee. As far back as the 19th century, surgeons attempted to reconstruct the damaged surfaces of arthritic knees. In these early efforts, different tissues were used as a “spacer” between the arthritic ends of the knee joint. Such things as pig bladder, bursa tissue and even cellophane, were used in an attempt to relieve the suffering of knee arthritis. As one might expect now, the result of these interventions were disappointing. Subsequently, surgeons attempted to simply remove the arthritic bone from the knee. This improved motion, but left patients with an unstable knee.

Later, in the 1940's and 50's, with the relative success of early hip arthroplasty becoming apparent, surgeons developed a similar device for the knee. Unfortunately, results in the knee were worse than the hip and this was soon abandoned. For the next two decades or so, smaller metal implants were designed that were simply placed in the joint between the two arthritic surfaces. These little acrylic “disks” did help provide short term relief, but suffered dramatic longer term failures. This idea was carried forward, however, and the McKeever prosthesis, which had a metal on plastic articulation, fixed to bone with cement, had more success.

The first cemented knee replacement with widespread influence was the Freeman prosthesis, developed in 1973. Prior to that, simple knee hinge replacements were available as well. Hinges worked well early on, but longer follow-up demonstrated a unacceptably high percentage of catastrophic failures, infections and loosening.

Since Freeman's pioneering work on total knee replacement, many other total knee replacement designs have been developed. Fortunately for people today, surgeons now have a range of well designed implants to choose from. Drawing on the lessons learned from past failures, the designs available today have helped eliminate or at least greatly diminish some of those problems that caused earlier designs to fail. New technological advances in materials and production methods, as well as better testing of devices prior to release, have made these knee replacements much more durable. We believe that a well done total knee replacement can last 25 years or more. Surgical technique is still critical to the success of the operation, no matter what prosthesis is used for the surgery. Surgeons today have a better understanding and appreciation for the importance of ligament balance and surgical technique.

In addition to better surgical technique and improved implants, post operative care and rehabilitation is much different today than in the past. Not too long ago, patients were kept in bed for weeks after knee surgery. Today, patients are walking the day of surgery and our average patient length of stay after a total knee replacement is one to two days in the hospital. Early range of motion and return to function is encouraged.

Overall, total knee replacement is one of the most effective operations of any type developed during the 20th century. It is now safe, reliable and durable, and can provide many years of relatively pain free service to the vast majority of people who suffer from the pain of knee arthritis.