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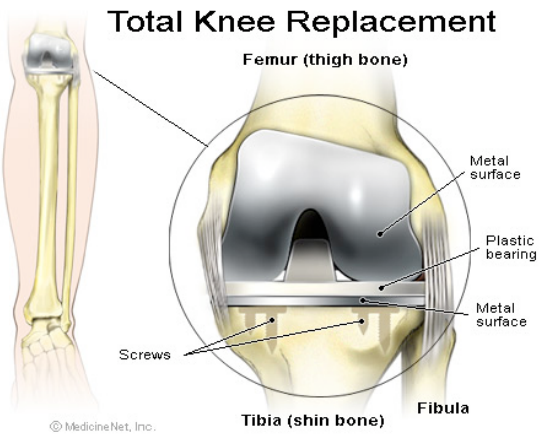
Total Knee Replacements



Each year about 150,000 Americans undergo total knee replacement. Fortunately, 95% of patients report a successful operation thanks to recent improvements. A relatively new surgery, knee replacements have been around for a little over a century.

The first knee surgeries were performed by the German surgeon Thophilus Gluck in 1891. He experimented with different materials in an effort to cushion the knee joint and relieve pain. Some of these materials include muscle, fat, nylon and even pig bladder. He also carved ivory and inserted it into knees as replacements.

Next came metal spacers, which were placed inside the knee to stop the tibia and femur from rubbing. These spacers were developed by McKeever and MacIntosh in the mid 1900's. Unfortunately this method of knee replacement did not always lead to complete pain relief and was a hard surgery to perform.

In 1968, Frank Gunston of Sir John Charnley's Hip Center in Canada developed a metal on plastic knee replacement. This was secured to the bone with cement and was considered the first total knee arthroplasty, or replacement. The down side to this operation was that it uses a 7-8 inch incision that cuts across large muscle groups. The recovery period is 1 to 3 months.

Another pioneer of knee replacement surgery was Dr. John Nevil Insall. He helped to design four models of widely used prosthesis. His first one, the Total Condor, was introduced in 1974 and his last, NexGen Legacy, in 1995. An advantage to his latest design is that doctors choose specially sized femur and tibia parts to fit the bones of each patient. This allows the patient to bend his/her leg more without dislocation.

Current knee prosthesis also use a special "micro-finish" which consists of ultra-high density polyethylene. This polymer of ethylene, (C2H4) is radiated in nitrogen that is not chemically active to make it very stable and less likely to break apart.

A special development in knee arthroplasty includes a cementless fixation of the prosthesis to the bone. The prosthesis is made of porous material that the bone encouraged to grow into, and consequently secure the prosthesis to the bone. Before bone can grow, screws or pegs are inserted into the prosthesis to secure it to the bone. A special porous trabecular metal was developed for cementless fixation. It is made of tantalum that is connected in a three dimensional lattice structure. It is 80% porous, which leaves plenty of room for the bone to grow in.

Cementless fixation was developed in response to osteolysis, a condition that occurs in patients with cemented knee replacements that have begun to wear out. Basically if the bone begins to break down underneath the prosthesis, the polyethylene begins to break down, causing bits to be absorbed by surrounding cells. These cells recognize the polyethylene as a foreign substance and cause the knee to inflame in self defense. This causes a lot of pain in the patient and as the cells attack the prosthesis, the artificial knee is further broken down.

Unfortunately, this method of knee replacement is still relatively new and research is still being done to determine whether this method is any more durable than cemented fixation. So far, scientists have decided is that it is at least as effective as cemented fixation.

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