

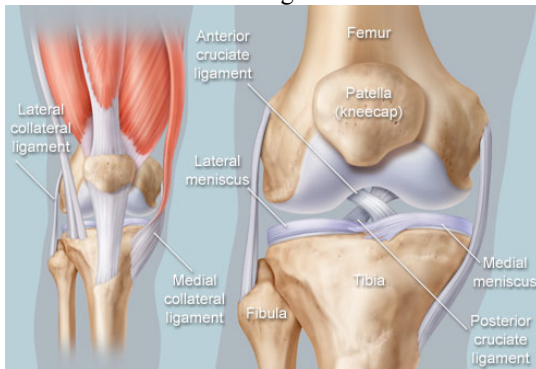
Knee Replacement

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Abstract—This paper will briefly address the anatomy as well as complications of the knee and how knee replacement surgery can increase the quality of a patient's life. In addition, the methods and devices associated with knee replacement surgery will be discussed.

I. INTRODUCTION

THE knee is the largest and arguably the most complex joint in the human body. It supports the majority of the body weight and has a complex design that demands all parts to be healthy in order to properly function. The main parts of the knee consist of the femur, tibia, fibula and patella bones. The quadriceps tendon, posterior cruciate ligament, anterior cruciate ligament, medial collateral ligament, lateral collateral ligament and the patellar tendon hold these bones together.

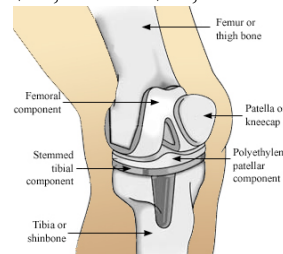


Knee replacement surgery was first performed in the 1960's with rather primitive designs that did not function well. As the design of knee replacement parts improved so did the surgical procedures. By the 1990's knee replacement surgery was accepted as a standard operation for patients with knee complications. There are many reasons why knee replacement surgery is necessary. The most common reasons are advanced osteoarthritis, knee joint or bone trauma. Genetics, developmental abnormalities, repetitive injuries and obesity also can lead to total knee replacement surgery. In addition, knee replacement is usually the final alternative if other treatments such as physical therapy and lubricating injections prove to be futile.

II. METHODS

There are four basic steps in a knee replacement surgery. After an incision is made exposing the front of the knee the damaged cartilage surfaces at the end of the femur and tibia are removed along with a small amount of underlying bone. Next, the metal components, typically made out of titanium or metal like cobalt chrome, recreate the surface of the joint. The metal parts are either joined with acrylic cement or pegs are drilled into the bone to fuse the metal to the bone. Depending on the case, the patella is usually then resurfaced with a plastic button. Finally, a plastic spacer, usually polyethylene, is then inserted to allow smooth gliding of the

two metal components on the femur and tibia. The whole procedure takes approximately 1 to 2 hours and costs between \$20,000 and \$60,000.



III. RESULTS

After surgery the complication rate for patients is relatively low. Knee joint infections, blood clots, problems with the implant and neurovascular damage have occurred however is extremely rare. Patients are usually kept under observation for 72 hours and can expect a recovery time of 8 to 12 weeks. In addition, physical therapy is necessary to regain full mobility. A small number of patients (.2% within 90 days and 3.7% within 18 months) require revisions that remove or repair the initial implant. On the other hand, 85% of implants last 20 years or more and this number is continually increasing due to advancements in the materials used as well as the surgical techniques used.

IV. DISCUSSION

More than 4.5 million Americans are currently living with at least one total knee replacement (5% of patients have both knees replaced at the same time). Nine out of ten patients who receive a total knee replacement experience dramatic pain relief and high success rates. This can largely be attributed to how well the patient respects the necessary steps in the post-op recovery process given to them by their doctor. Although knee replacement surgery has become very common and has enormous success rates there are some limitations to the lifestyle of the patient. These include a decrease in normal range of motion from 0-135 degrees to 0-110 degrees. In addition, activity that involves excessive impact such as running can have adverse affects on the implanted device. Swimming as well as biking is encouraged to help regain strength in the leg.

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