Knee replacement surgery has become a routine operation in the United States. Nearly 700,000 people each year receive this life-improving surgery and are able to enjoy richer, more active lives free of chronic knee pain. The recipients of this surgery are usually older than 50 and have arthritic joints. However, an increasing number of younger people are also replacing their knees because of injury from high-impact sports and activities that wear out their knees early.

As more advanced surgical procedures and a wider variety of medical devices become available, people have more choices for treatment. Computer-assisted surgeries and minimally invasive procedures increase the accuracy of the surgery and decrease recovery time. More advanced devices allow for improved joint function. However, in the rush to release new devices to keep up with growing demand, manufacturers may put products on the market that are poorly designed. This may lead to device failure and costly revision surgeries. While the benefits of knee replacement are well recognized, complications from the procedure or from implant failure are also well documented.

Loosening and Faulty Knee Implants

When a knee device fails — by not performing as designed — unsuspecting people are subjected to painful complications. Knee device failure can be the result of a patient being obese or performing excessive high-impact activities. Sometimes, the device fails because of the manufacturer’s faulty design. The Food and Drug Administration’s 510(k) premarket program allows manufacturers to release knee implants without testing as long as they are similar to products already on the market. Unfortunately, many patients and their doctors are unaware of device problems until...
after they have already been implanted. Complications resulting from a device are tracked by the FDA and labeled as “adverse events.” These complications often result in the need for revision surgery to replace the problematic device.

Some of these problems include:

- Loosening or fracture of the device components
- Joint instability and dislocation
- Component misalignment and breakdown
- Nerve damage
- Bone fracture
- Swelling and joint pain

Loosening is one of the most common complications resulting from a faulty device. This occurs when components of an implant begin to separate from the bone. Soft tissue instead of bone can grow in between the components and the bones, creating instability and pain in the joint. Loosening is natural over time, but it usually does not occur for several years. In poorly designed devices, it can occur in a year or less. Some manufacturers like Zimmer Holdings have blamed the device failure on the surgeons despite the fact that some of their models show higher than normal revision surgery rates regardless of the surgeon who implanted them. Thousands of people have had Zimmer’s NexGen Knee models implanted since 2002. According to the FDA, there have been hundreds of adverse events resulting from Zimmer’s devices.

Zimmer’s NexGen CR-Flex uncemented knee was designed to encourage the patient’s bone to grow and naturally fuse with the device. Instead, in just a year, the components can loosen and cause a patient severe discomfort and pain. One doctor reported that the loosening occurred in 36 percent of patients who had received the knee implant.
Infection after Knee Replacement

Not all knee replacement complications occur as a result of defective implants. One of the most serious complications of knee replacement surgery is infection. Fortunately, the chance of having an infected knee prosthesis is relatively low. In 2010, the rate of infection for knee replacements was less than 1 percent. People who undergo revision surgery — a second surgery to replace an implant — have a higher risk of developing infection.

Typically, when a microorganism enters a part of the body, the body’s defenses can travel to the site through the blood supply and any medicines can also circulate through the blood to kill bacteria. Because the knee implant does not have its own blood supply, it is easier for microorganisms to attach to the device and infect surrounding tissues. The surfaces of the implant components are ideal for organisms to adhere to and multiply. Once they multiply, they create a film that acts like a biological shield and protects them from antibiotics. Although rare, the risk of infection continues for as long as the prosthesis remains in the body.

Prosthetic joint infections are classified into three types based on the amount of time that has elapsed from the surgery to the onset of infection:

- **Early** infections occur within 3 months of surgery and are usually caused by microorganisms that enter the body during the operation. People with these infections may suffer from a leaking wound, fever, swelling and effusion around the implant.

- **Delayed** infections can occur from 3 months to 12 months after the surgery and are also caused by organisms entering the body during the surgery. The symptoms of these infections are usually the same as those seen in early infections.

- **Late** infections occur more than a year after surgery. These infections are usually haematogenous, meaning they are acquired from another location in the body. Bacteria from other infections such as a dental infection, pneumonia, skin infection or urinary tract infection can travel in the blood and adhere to the prosthesis. To prevent these types of infections, doctors recommend that patients with prostheses take
Doctors test for infections using blood tests, radiology tests, blood cultures and joint aspirations (removing fluid from a joint). The type of bacteria that is present in the infection is tested by culturing the tissue sample in a lab.

**Treatment for an Infected Knee Joint**

Most treatment strategies for infected knee joints are a combination of surgical procedures and antibiotic therapy. In severe cases, amputation, joint fusion or removal and a two-stage revision surgery may be necessary. Patients who are not candidates for a second surgery are usually treated with long term anti-biotic suppression.

Two-stage revision surgeries have good results in treating infections, though they can be extremely taxing on the body. In the first stage, the infected prosthetic is removed and cleaned. The wound is also treated with antibiotics. Cement spacers with antibiotics are placed where the infected joint was, and the wound is closed. The patient is immobile for a long length of time while the infection resolves. Once the infection has been eradicated, a second-stage surgery is used to re-implant the clean device. Extensive physical therapy usually follows this procedure.

In very rare cases, the infection cannot be treated by revision surgery or antibiotics and reoccurs. Doctors may be forced to amputate a limb in these instances. However, a procedure called intramedullary arthrodesis of the knee may prevent such a drastic measure. In this procedure, the femur and tibia are fused together by inserting a metal rod into the bones. While the patient avoids amputation, there is significant loss of motion and possible shortening of the leg.

**Osteolysis**
Osteolysis is a complication of knee replacement that occurs when particles are generated by the plastic pieces of the implant. These particles activate the body’s defenses, including white blood cells. The white blood cells digest these foreign particles, but they also can digest bone. The result is bone damage and implant loosening. This condition is more common in implants that are made of polyethylene. While this material allows for more natural joint function, it is also more susceptible to wear. When severe bone loss occurs, the implant loosens and revision surgery is required.

**Other Complications after Knee Replacement**

There are several other complications that can occur after knee replacement surgery.

*Some general complications that can arise as a result of the surgery include:*

- Stroke
- Cardiac arrhythmia
- Congestive heart failure
- Blood transfusion allergies
- Hyperglycemia
- Edema
- Hemorrhage
- Wound problems
- Limping
- Blood clots

In addition to general post-surgery complications, there are several that are specific to knee replacements.
Instability of Ligaments

When ligaments are cut, damaged or improperly balanced after surgery, the knee can become unstable. Since most knee implants are intended to work with a patient’s existing ligaments, if they are damaged, the implant may not move correctly. This can cause the knee to give way, usually from side to side. This typically improves over time after the ligaments heal, but occasionally a knee brace may be required to prevent buckling after surgery.

Arthrofibrosis (Joint Stiffness)

Patients who have knee replacement surgery are susceptible to significant joint stiffness. If the person is obese, has diabetes or is slow to mobilize after surgery, it can worsen this condition. This usually happens when excessive scar tissue builds up around the joint. Doctors treat this by anesthetizing the knee and manipulating it to break down the scar tissue. When the scar tissue is extensive, another surgery may be required to remove it.

Extensor Mechanism Disruption

Extensor mechanism disruption is one of the most serious mechanical complications that can occur after knee replacement. This occurs when the tendon attached to the patella moves away from the tibia during or after surgery. When this happens, the knee cannot extend. Surgery is required to repair the tendon, and a tendon graft may be required.
Patella Tracking Problems

A healthy patella glides up and down in a groove over the femur. Sometimes the patella dislocates after surgery. This is most commonly associated with patellas that have been resurfaced with a plastic button, which can cause the patella to track differently or catch and “clunk” as it passes over the metal flange of the knee. In some cases, the tracking problem is severe enough to warrant revision surgery.

Mortality

The risk of death from knee replacement is very low, but it does occur. A 2010 study published in the *Journal of Bone and Joint Surgery* estimated the risk of mortality to be 0.1 percent. The risk is highest during the first month after surgery.

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