DISEASES & CONDITIONS

Joint Replacement Infection

Knee and hip replacements are two of the most commonly performed elective operations. For the majority of patients, joint replacement surgery relieves pain and helps them to live fuller, more active lives.

No surgical procedure is without risks, however. A small percentage of patients undergoing hip or knee replacement (roughly about 1 in 100) may develop an infection after the operation.

Joint replacement infections may occur in the wound or deep around the artificial implants. An infection may develop during your hospital stay or after you go home. Joint replacement infections can even occur years after your surgery.

This article discusses why joint replacements may become infected, the signs and symptoms of infection, treatment for infections, and preventing infections.

Description

Any infection in your body can spread to your joint replacement.

Infections are caused by bacteria. Although bacteria are abundant in our gastrointestinal tract and on our skin, they are usually kept in check by our immune system. For example, if bacteria make it into our bloodstream, our immune system rapidly responds and kills the invading bacteria.

However, because joint replacements are made of metal and plastic, it is difficult for the immune system to attack bacteria that make it to these implants. If bacteria gain access to the implants, they may multiply and cause an infection.

Despite antibiotics and preventive treatments, patients with infected joint replacements often require surgery to cure the infection.

Examples of total knee implants. Joint replacement implants are typically made of metal alloys and strong, durable plastic called polyethylene.

Cause

A total joint may become infected during the time of surgery, or anywhere from weeks to years after the surgery.

The most common ways bacteria enter the body include:

- Through breaks or cuts in the skin
- During major dental procedures (such as a tooth extraction or root canal)
- Through wounds from other surgical procedures

Some people are at a higher risk for developing infections after a joint replacement procedure. Factors that increase the risk for infection include:

- Immune deficiencies (such as HIV or lymphoma)
- Diabetes mellitus
- Peripheral vascular disease (poor circulation to the hands and feet)
- Immunosuppressive treatments (such as chemotherapy or corticosteroids)
- Obesity

Symptoms

Signs and symptoms of an infected joint replacement include:

- Increased pain or stiffness in a previously well-functioning joint
- Swelling
- Warmth and redness around the wound
- Wound drainage
- Fevers, chills and night sweats
- Fatigue

Doctor Examination

When total joint infection is suspected, early diagnosis and proper treatment increase the chances that the implants can be retained. Your doctor will discuss your medical history and conduct a detailed physical examination.

Tests

Imaging tests. X-rays and bone scans can help your doctor determine whether there is an infection in the implants.

Laboratory tests. Specific blood tests can help identify an infection. For example, in addition to routine blood tests like a complete blood count (CBC), your surgeon will likely order two blood tests that measure inflammation in your body. These are the C-reactive Protein (CRP) and the Erythrocyte Sedimentation Rate (ESR). Although neither test will confirm the presence of infection, if either or both of them are elevated, it raises the suspicion that an infection may be present. If the results of these tests are normal, it is unlikely that your joint is infected.

Additionally, your doctor will analyze fluid from your joint to help identify an infection. To do this, he or she uses a needle to draw fluid from your hip or knee. The fluid is examined under a microscope for the presence of bacteria and is sent to a laboratory. There, it is monitored to see if bacteria or fungus grow from the fluid.

The fluid is also analyzed for the presence of white blood cells. In normal hip or knee fluid, there are a low number of white blood cells. The presence of a large number of white blood cells (particularly cells called neutrophils) indicates that the joint may be infected. The fluid may also be tested for specific proteins that are known to be present in the setting of an infection.

Treatment

Nonsurgical Treatment

In some cases, just the skin and soft tissues around the joint are infected, and the infection has not spread deep into the artificial joint itself. This is called a "superficial infection." If the infection is caught early, your doctor may prescribe intravenous (IV) or oral antibiotics.

This treatment has a good success rate for early superficial infections.

Surgical Treatment

Infections that go beyond the superficial tissues and gain deep access to the artificial joint almost always require surgical treatment.

Debridement. Deep infections that are caught early (within several days of their onset), and those that occur within weeks of the original surgery, may sometimes be cured with a surgical washout of the joint. During this procedure, called debridement, the surgeon removes all contaminated soft tissues. The implant is thoroughly cleaned, and plastic liners or spacers are replaced. After the procedure, intravenous (IV) antibiotics will be prescribed for approximately 6 weeks.

Staged surgery. In general, the longer the infection has been present, the harder it is to cure without removing the implant.

Late infections (those that occur months to years after the joint replacement surgery) and those infections that have been present for longer periods of time almost always require a staged surgery.

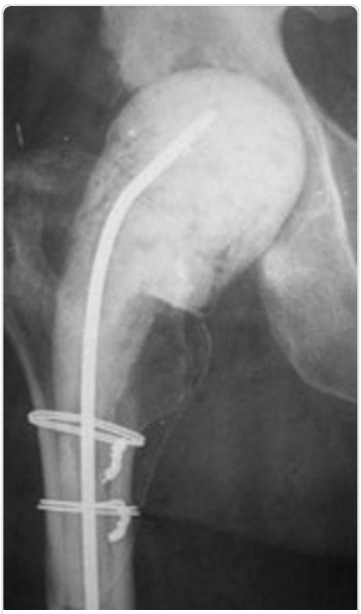
The first stage of this treatment includes:

- Removal of the implant
- Washout of the joint and soft tissues
- Placement of an antibiotic spacer
- Intravenous (IV) antibiotics

An antibiotic spacer is a device placed into the joint to maintain normal joint space and alignment. It also provides patient comfort and mobility while the infection is being treated.

(**Top**) These x-rays show an original knee replacement from the front and from the side. **(Bottom)** An antibiotic spacer has been placed in the joint during the first stage of treatment for joint replacement infection.

Spacers are made with bone cement that is loaded with antibiotics. The antibiotics flow into the joint and surrounding tissues and, over time, help to eliminate the infection.



An antibiotic spacer in a hip joint.

Patients who undergo staged surgery typically need at least 6 weeks of IV antibiotics, or possibly more, before a new joint replacement can be implanted. Orthopaedic surgeons work closely with other doctors who specialize in infectious disease. These infectious disease doctors help determine which antibiotic(s) you will be on, whether they will be intravenous (IV) or oral, and the duration of therapy. They will also obtain periodic blood work to evaluate the effectiveness of the antibiotic treatment.

Once your orthopaedic surgeon and the infectious disease doctor determine that the infection has been cured (this usually takes at least 6 weeks), you will be a candidate for a new total hip or knee implant (called a revision surgery). This second procedure is stage 2 of treatment for joint replacement infection.

During revision surgery, your surgeon will remove the antibiotic spacer, repeat the washout of the joint, and implant new total knee or hip components.

This x-ray shows knee components used in a revision surgery (stage 2). Note that the stems of the implants are longer to help support bone that has been compromised due to infection and removal of the previous implants.

Single-stage surgery. In this procedure, the implants are removed, the joint is washed out (debrided), and new implants are placed all in one stage. Single-stage surgery is not as popular as two-stage surgery, but is gaining wider acceptance as a method for treating infected total joints. Doctors continue to study the outcomes of single-stage surgery.

Prevention

At the time of original joint replacement surgery, there are several measures taken to minimize the risk of infection. Some of the steps have been proven to lower the risk of infection, and some are thought to help but have not been scientifically proven. The most important known measures to lower the risk of infection after total joint replacement include:

- **Antibiotics before and after surgery.** Antibiotics are given within one hour of the start of surgery (usually once in the operating room) and continued at intervals for 24 hours following the procedure.
- **Short operating time and minimal operating room traffic.** Efficiency in the operation by your surgeon helps to lower the risk of infection by limiting the time the joint is exposed. Limiting the number of

operating room personnel entering and leaving the room is thought to the decrease risk of infection.

- **Use of strict sterile technique and sterilization instruments.** Care is taken to ensure the operating site is sterile, the instruments have been autoclaved (sterilized) and not exposed to any contamination, and the implants are packaged to ensure their sterility.
- **Preoperative nasal screening for bacterial colonization.** There is some evidence that testing for the presence of bacteria (particularly the *Staphylococcus* species) in the nasal passages several weeks prior to surgery may help prevent joint infection. In institutions where this is performed, those patients that are found to have *Staphylococcus* in their nasal passages are given an intranasal antibacterial ointment prior to surgery. The type of bacteria that is found in the nasal passages may help your doctors determine which antibiotic you are given at the time of your surgery.
- **Preoperative chlorhexidine wash.** There is also evidence that home washing with a chlorhexidine solution (often in the form of soaked cloths) in the days leading up to surgery may help prevent infection. This may be particularly important if patients are known to have certain types of antibiotic-resistant bacteria on their skin or in their nasal passages (see above). Your surgeon will talk with you about this option.
- **Long-term prophylaxis**. Surgeons sometimes prescribe antibiotics for patients who have had joint replacements before they undergo dental work. This is done to protect the implants from bacteria that might enter the bloodstream during the dental procedure and cause infection. The American Academy of Orthopaedic Surgeons has developed recommendations for when antibiotics should be given before dental work and for which patients would benefit. In general, most people do not require antibiotics before dental procedures. There is little evidence that taking antibiotics before dental procedures is effective at preventing infection.

  Antibiotics may also be considered before major surgical procedures; however,

  most patients do not require this.

  Your orthopaedic surgeon will talk with you about the risks and benefits of prophylactic antibiotics in your specific situation.

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