

## **Vol 4, 2008 CEC ARTICLE: Special Medical Conditions Part 3: Hip and Knee Replacement**

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Joint replacement surgery removes a damaged joint and replaces it with a prosthesis or artificial joint. The purpose of knee and hip replacement is to improve function and decrease pain in the two joints. Prior to being replaced, affected joints are usually treated with physical therapy, medication, and activity modification. If alternate treatments are insufficient, a total replacement of the joint, known as arthroplasty, is used. This procedure was first used for hip replacement in 1962 and is now given to over 760,000 Americans a year. Total knee replacements have been around since 1968 and over 400,000 a year are performed in the United States. According to the American Academy of Orthopedic Surgeons, 80% of hip and knee replacements go on to last 20 years.

One of the typical causes for joint replacement surgery is osteoarthritis or joint degeneration. Although there are no definite causes for the disease, it is typically characterized by intermittent or constant pain, pain that has progressed over time, stiffness or movement limitations in the joint, swelling, and possible creaking or crunching sounds with joint movement. As osteoarthritis progresses, the cartilage between the two bones that make up the joint starts to wear away causing the bones to rub against one another. Eventually, limited joint range of movement, pain and inflammation, decreased activity level, weakened lower body muscles, and body deconditioning or decrease in mobility can result from osteoarthritis.

Other than osteoarthritis, three other conditions may necessitate joint replacement surgery including: rheumatoid arthritis, hip fracture, and hip necrosis. Joint replacement should be considered when the pain is severe enough to interfere with daily activities, other forms of treatment like medication or physical therapy have failed, or the joint is deformed and range of motion is limited.

The Food and Drug Administration (FDA) regulates the prosthetic components used for replacement surgery. The FDA ensures that they are biocompatible and will not trigger a rejection response by the body. Additionally, the joint prosthesis must be designed to resist wear and tear and have characteristics similar to that of the joint they are replacing. In the case of a hip or knee replacement, the prosthesis must be flexible and strong enough to withstand the pressure of weight bearing loads.

Two techniques for joint replacement are available: cemented and cement-less prosthesis. Cemented joints use an acrylic polymer to adhere the bone to the prosthetic. Although a cemented joint typically requires a shorter rehabilitation period than the cement-less procedure, the cement does have the possibility of loosening over time. On the other hand, cement-less procedures require the bone to grow into the surface of the prosthesis. It may require 6 to 12 weeks of partial weight bearing on the affected limb before the bone fully fixes to the prosthetic.

The prosthetic for a hip replacement has three basic parts: the stem that fits into the long bone and provides stability; the ball, typically together with the stem in one piece; and the socket that fits into the hollow area on the side of the hip bone. The difference between the two main types of surgical approaches to hip replacement, the posterior and the lateral approaches, is the location of the incision and muscles which must be cut or separated to expose the hip joint.

A knee prosthesis also has three parts: the femoral component that wraps around the medial and lateral condyle; the tibial portion that connects to the upper portion of the tibia; and the patellar component that covers the underside of the kneecap. A 6 to 12 inch incision is made lengthwise down the front of the thigh and the quadriceps muscles are moved to expose the knee joint.

In both hip and knee replacements, special tools are used to remove the damaged ends of the bones that make up the joint. During the surgeries, the person's lower extremities are brought through the full range of motion while they are under anesthesia to make sure the components glide smoothly and ensure the patient has full joint mobility.

Minimally invasive surgeries that dramatically reduce the size of the incision made to expose the area are potential options for joint replacement. Reported benefits of this type of surgery include decreased bleeding from the incision, decreased trauma to the muscles and tendons, and decreased post-op pain that leads to improved rehabilitation capacity. However, these surgeries can require more time to perform, exposing the patient to an increased risk of infection.

Recovering from a hip or joint replacement can take anywhere from a few weeks to a few months. Once the patient is medically stable, they can begin a physical therapy regiment to prevent contracture or tightening of the muscles around the joint and to assist the client in increasing muscle strength for joint stability. A patient may be assisted by a walker, crutches, or a cane used on the opposite side of the surgery depending on how much weight the doctor decides they can bear on their leg.

Blood clots, infections, loosening of the prosthesis, joint dislocation, nerve injury, prosthetic breakage, leg-length discrepancy, and total joint revision are all possible complications following joint replacement surgery. To combat blood clotting, anticoagulants and/or compression garments like elastic stockings are used. Antibiotics are usually given before, during, and after the procedure to prevent infections. Overweight or very active patients are more likely to have prosthetic loosening caused by excessive wear in the cement and instability in the prosthetic stem. Dislocation of the hip joint is fairly common in hip replacement patients and the following precautions should be followed with any postoperative client: no crossing of the legs past the midline of the body, turning the leg too far inward or outward, sitting on low chairs or toilets, and bending greater than 90 degrees at the waist. Unequal leg lengths greater than a ¼ inch following surgery can cause pain in the feet, knees, hips and back due to the uneven pressure on the legs. This complication is treated with a shoe lift in most cases.

In joint revision surgery, any or all of the prosthetic components can be replaced. Other than dislocations, and fractures, joint revision surgery may be necessary if the body has an inflammatory response, or osteolysis to the prosthetic. In this case, microscopic particles are worn off of the replacement joint and an inflammatory response causes cells to remove bits of bone around the implant. Obesity, hypertension, and diabetes are three factors that can dramatically increase a patient's likelihood to have a postoperative joint replacement complication.

A fitness professional may only work with a joint replacement client after it has been recommended or cleared by a physician or physical therapist. The role of the trainer is to assist the client to regain lower body strength, design an exercise program with activities appropriate for a client with hip or knee replacement, to improve the client's gait, range of motion, and balance, to monitor precautions and contraindications, and to progress the client to full recovery and a life of physical activity. The trainer should ask the client what type of activity they are currently performing and how often, educate the client on the conditions that impact postoperative complications, and be aware of any weight bearing restrictions or activity limitations that the doctor has assigned to the client. Low impact activities like walking, swimming, golfing, bicycling on level surfaces, and ballroom dancing are the most appropriate for rehabilitation from joint replacement. Examples of high-risk activities that should be avoided are: jogging, skiing, racquet sports, high impact aerobics, and long periods of stepping or climbing stairs.

Some specific health screening questions that should be answered before beginning an exercise or rehabilitation regiment are:

1. When was the surgery?
2. What type of surgery was used?
3. Is it a cemented or cement-less prosthesis?
4. What type of rehabilitation was undergone following discharge from the hospital?
5. When was your last visit to an orthopedic surgeon?
6. When was the last time you worked with a physical therapist?
7. What type of exercises have you been performing on your own?
8. What specific restrictions has the doctor prescribed?
9. How long was it recommended you follow the hip precautions?

It is important to assess the joint replacement client to establish a baseline to measure their progress and to develop a safe and effective exercise program to improve their gait, range of motion, strength, and balance. Some postoperative clients may have an antalgic gait pattern or limp that is usually caused by quickly transferring weight off of the affected leg. A client with a Trendelenburg gait pattern has a weakened gluteus medius muscle causing their opposite hip to drop down while walking. The most important muscles to strengthen after a hip replacement are any that provide stability to the joint, specifically the gluteal muscles. No matter how long ago the client underwent total hip replacement, the trainer must be aware of the precautions and the doctor's orders regarding how long to keep them in place.

To assess a knee's recovery from replacement surgery, the trainer usually measures a client's range of motion while extending and bending their leg. The hamstring muscles that cross the knee joint may become inflexible due to the protective position they assume from postsurgical pain. Additionally, clients with full knee replacement surgery may never recover their full range of motion following surgery.

Open kinetic chain exercises that place less pressure on the limb and joints because they are performed without putting weight on the floor are ideal for emphasizing the client's overall strength during their recovery. Also, flexibility exercises should be part of any rehabilitation to ensure that range of motion is adequate to perform functional activities like getting up from a chair or climbing stairs. Exercise machines, elastic bands, and free weights are often incorporated into a client's recovery program. The trainer monitors the client's heart rate, perceived exertion, pain scale, and any other physical observations to ensure that the exercise program is being effectively utilized.

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1. Joint replacement involves a complete removal of the damaged joint? T or F
2. Name two goals of joint replacement?
3. What steps or treatment should be attempted before electing to have joint replacement surgery?



