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## Rehabilitation After Your Total Knee Replacement

If your knee is severely damaged by arthritis or injury, it may be hard for you to perform simple activities such as walking or climbing stairs. You may even begin to feel pain while you're sitting or lying down.

If medications, changing your activity level, and using walking supports are no longer helpful, you may want to consider total knee replacement surgery. By resurfacing your knee's damaged and worn surfaces, total knee replacement surgery can relieve your pain, correct your leg deformity, and help you resume your normal activities.

One of the most important orthopaedic surgical advances of this century, knee replacement was first performed in 1968. Improvements in surgical materials and techniques since then have greatly increased its effectiveness. About 267,000 total knee replacements are performed each year in the United States. Whether you have just begun exploring treatment options or have already decided with your orthopaedic surgeon to have total knee replacement surgery, this booklet will help you understand more about this valuable procedure.

### How the Normal Knee Works

The knee is the largest joint in the body. Nearly normal knee function is needed to perform routine everyday activities. The knee is made up of the lower end of the thigh

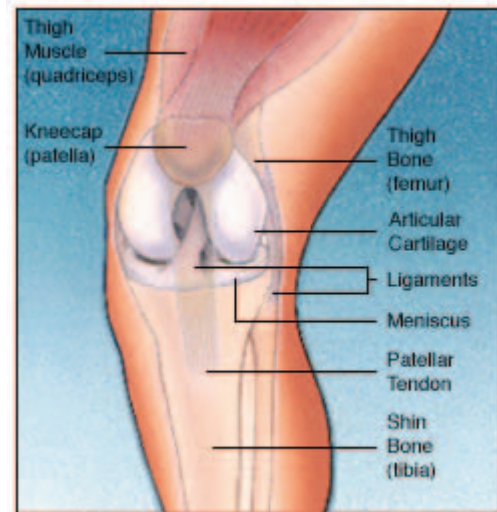


bone (*femur*), which rotates on the upper end of the shin bone (*tibia*), and the knee cap (*patella*), which slides in a groove on the end of the femur. Large ligaments attach to the femur and tibia to provide stability. The long thigh muscles give the knee strength.

The joint surfaces where these three bones touch are covered with *articular cartilage*, a smooth substance that cushions the bones and enables them to move easily.

All remaining surfaces of the knee are covered by a thin, smooth tissue liner called the *synovial membrane*. This membrane releases a special fluid that lubricates the knee which reduces friction to nearly zero in a healthy knee.

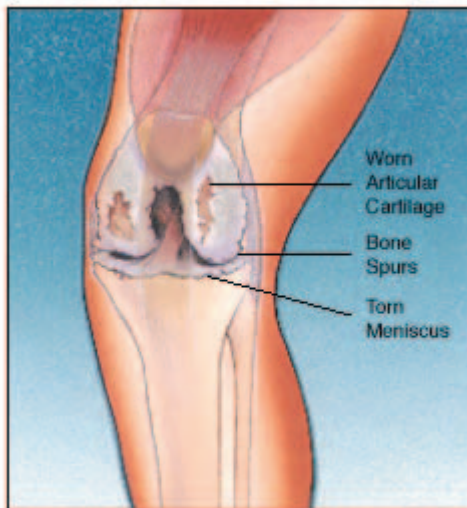
Normally, all of these components work in harmony. But disease or injury can disrupt this harmony, resulting in pain, muscle weakness, and less function.



Normal Knee Anatomy

## Common Causes of Knee Pain and Loss of Knee Function

The most common cause of chronic knee pain and disability is *arthritis*. Osteoarthritis, rheumatoid arthritis, and traumatic arthritis are the most common forms.



Knee with Arthritis

**Osteoarthritis** usually occurs after the age of 50 and often in an individual with a family history of arthritis. The cartilage that cushions the bones of the knee softens and wears away. The bones then rub against one another causing knee pain and stiffness.

**Rheumatoid Arthritis** is a disease in which the synovial membrane becomes thickened and inflamed, producing too much synovial fluid which over-fills the joint space. This chronic inflammation can damage the cartilage and eventually cause cartilage loss, pain and stiffness.

**Post Traumatic Arthritis** can follow a serious knee injury. A knee fracture or severe tears of the knee's ligaments may damage the articular cartilage over time, causing knee pain and limiting knee function.

## **Is Total Knee Replacement for You?**

The decision whether to have total knee replacement surgery should be a cooperative one between you, your family, your family physician, and your orthopaedic surgeon. Your physician may refer you to an orthopaedic surgeon for a thorough evaluation to determine if you could benefit from this surgery.

Reasons that you may benefit from total knee replacement commonly include:

- Severe knee pain that limits your everyday activities, including walking, going up and down stairs, and getting in and out of chairs. You may find it hard to walk more than a few blocks without significant pain and you may need to use a cane or walker.
- Moderate or severe knee pain while resting, either day or night.
- Chronic knee inflammation and swelling that doesn't improve with rest or medications.
- Knee deformity—a bowing in or out of your knee.
- Knee stiffness—inability to bend and straighten your knee.
- Failure to obtain pain relief from non-steroidal anti-inflammatory drugs. These medications, including aspirin and ibuprofen, often are most effective in the early stages of arthritis. Their effectiveness in controlling knee pain varies greatly from person to person. These drugs may become less effective for patients with severe arthritis.
- Inability to tolerate or complications from pain medications.
- Failure to substantially improve with other treatments such as cortisone injections, physical therapy, or other surgeries.

Most patients who undergo total knee replacement are age 60 to 80, but orthopaedic surgeons evaluate patients individually. Recommendations for surgery are based on a patient's pain and disability, not age. Patients as young as 16 and older than 90 have undergone successful total knee replacement.

## **Realistic Expectations About Knee Replacement Surgery**

An important factor in deciding whether to have total knee replacement surgery is understanding what the procedure can and can't do.

More than 90 percent of individuals who undergo total knee replacement experience a dramatic reduction of knee pain and a significant improvement in the ability to perform common activities of daily living. But total knee replacement won't make you a super-athlete or allow you to do more than you could before you developed arthritis.

Following surgery, you will be advised to avoid some types of activity for the rest of your life, including jogging and high impact sports.

<p><b>Dangerous Activity After Surgery</b> jogging or running • contact sports jumping sports • high impact aerobics</p>
<p><b>Activity Exceeding Usual Recommendations After Surgery</b> vigorous walking or hiking • skiing tennis • repetitive lifting exceeding 50 lbs. repetitive aerobic stair climbing</p>
<p><b>Expected Activity After Surgery</b> recreational walking • swimming golf • driving • light hiking recreational biking • ballroom dancing normal stair climbing</p>

With normal use and activity, every knee replacement develops some wear in its plastic cushion. Excessive activity or weight may accelerate this normal wear and cause the knee replacement to loosen and become painful. With appropriate activity modification, knee replacements can last for many years.

## Preparing for Surgery

**Medical Evaluation** If you decide to have total knee replacement surgery, you may be asked to have a complete physical by your family physician several weeks before surgery to assess your health and to rule out any conditions that could interfere with your surgery.



**Tests** Several tests, such as blood samples, a cardiogram, and a urine sample may be needed to help your orthopaedic surgeon plan your surgery.

**Preparing Your Skin and Leg** Your knee and leg should not have any skin infections or irritation. Your lower leg should not have any chronic swelling. Contact your orthopaedic surgeon prior to surgery if either is present for a program to best prepare your skin for surgery.

**Blood Donation** You may be advised to donate your own blood prior to the surgery. It will be stored in the event you need blood after your surgery.

**Medications** Tell your orthopaedic surgeon about the medications you are taking. He or she will tell you which medications you should stop taking and which you should continue to take before surgery.

**Dental Evaluation** Although the incidence of infection after knee replacement is very low, an infection can occur if bacteria enter your bloodstream. Treatment of significant dental diseases (including tooth extractions and periodontal work) should be considered before your total knee replacement surgery.

**Urinary Evaluations** A preoperative urological evaluation should be considered for individuals with a history of recent or frequent urinary infections. For older men with prostate disease, required treatment should be considered prior to knee replacement surgery.

**Social Planning** Though you will be able to walk on crutches or a walker soon after surgery, you will need help for several weeks with such tasks as cooking, shopping, bathing, and doing laundry. If you live alone, your surgeon's office and a social worker or a discharge planner at the hospital can help you make advance arrangements to have someone assist you at home. They also can help you arrange for a short stay in an extended care facility during your recovery, if this option works best for you.

**Home Planning** Several suggestions can make your home easier to navigate during your recovery. Consider:



- Safety bars or a secure handrail in your shower or bath.
- Secure handrails along your stairways.
- A stable chair for your early recovery with a firm seat cushion (height of 18-20 inches), a firm back, two arms, and a footstool for intermittent leg elevation.
- A toilet seat riser with arms, if you have a low toilet.
- A stable shower bench or chair for bathing.
- Removing all loose carpets and cords.
- A temporary living space on the same floor, because walking up or down stairs will be more difficult during your early recovery.

## Your Surgery

You will most likely be admitted to the hospital on the day of your surgery. After admission, you will be evaluated by a member of the anesthesia team. The most common types of anesthesia are general anesthesia, in which you are asleep throughout the procedure, and spinal or epidural anesthesia, in which you are awake but your legs are anesthetized. The anesthesia team with your input will determine which type of anesthesia will be best for you.

After surgery, you will be moved to the recovery room, where you will remain for one to two hours while your recovery from anesthesia is monitored. After you awaken, you will be taken to your hospital room.

## Your Stay in the Hospital

You will most likely stay in the hospital for several days. After surgery, you will feel some pain, but medication will be given to you to make you feel as comfortable as possible. Walking and knee movement are important to your recovery and will begin immediately after your surgery.

To avoid lung congestion after surgery, you should breathe deeply and cough frequently to clear your lungs.

Your orthopaedic surgeon may prescribe one or more measures to prevent blood clots and decrease leg swelling, such as special support hose, inflatable leg coverings (compression boots), and blood thinners.

To restore movement in your knee and leg, your surgeon may use a knee support that slowly moves your knee while you are in bed. The device, called a continuous passive motion (CPM) machine, decreases leg swelling by elevating your leg and improves your venous circulation by moving the muscles of your leg.

Foot and ankle movement is encouraged immediately following surgery to also increase blood flow in your leg muscles to help prevent leg swelling and blood clots. Most patients begin exercising their knee the day after surgery. A physical therapist will teach you specific exercises to strengthen your leg and restore knee movement to allow walking and other normal



daily activities soon after your surgery.

## **Summary of Hospital Stay**

### Day One Post-operative

- Begin using Continuous Passive Motion Machine (CPM)
- Discontinue pain pump and begin using injections for pain
- Routine use of ice therapy
- No pillow under your knee
- Get up with Physical Therapy

### Day Two or Day Three

- Up to walk with Physical Therapy
- Discontinue Drain in Knee
- Dressing Change

### Day Three or Four

- Discharge to home with the assistance of Home Health or discharge to inpatient

Rehabilitation.

## **Possible Complications After Surgery**

The complication rate following total knee replacement is low. Serious complications such as a knee joint infection occur in less than 2 percent of patients. Major medical complications such as heart attack or stroke occur even less frequently. Chronic illnesses may increase the potential for complications. Although uncommon, when these complications occur they can prolong or limit your full recovery.

Blood clots in the leg veins are the most common complication of knee replacement surgery. Your orthopaedic surgeon will outline a prevention program which may include periodic elevation of your legs, lower leg exercises to increase circulation, support stockings, and medication to thin your blood.

Discuss your concerns thoroughly with your orthopaedic surgeon prior to surgery.

## **Your Recovery at Home**

The success of your surgery also will depend on how well you follow your orthopaedic surgeon's instructions at home during the first few weeks after surgery.

**Wound Care** You will have stitches or staples running along your wound or a suture beneath your skin on the front of your knee. The stitches or staples will be removed several weeks after surgery. A suture beneath your skin will not require removal.

Avoid soaking the wound in water until the wound has thoroughly sealed and dried. A bandage may be placed over the wound to prevent irritation from clothing or support stockings.

**Diet** Some loss of appetite is common for several weeks after surgery. A balanced diet, often with an iron supplement, is important to promote proper tissue healing and restore muscle strength.

**Activity** Exercise is a critical component of home care, particularly during the first few weeks after surgery. You should be able to resume most normal activities of daily living within three to six weeks following surgery. Some pain with activity and at night is common for several weeks after surgery. Your activity program should include:

- A graduated walking program to slowly increase your mobility, initially in your home and later outside.
- Resuming other normal household activities, such as sitting and standing and walking up and down stairs.
- Specific exercises several times a day to restore movement and strengthen your knee. You probably will be able to perform the exercises without help, but you may have a physical therapist help you at home or in a therapy center the first few weeks after surgery.

Driving usually begins when your knee bends sufficiently so you can enter and sit comfortably in your car and when your muscle control provides adequate reaction time for braking and acceleration. Most individuals resume driving about four to six weeks after surgery.

## **Avoiding Problems after Surgery**

**Blood Clot Prevention** Follow your orthopaedic surgeon's instructions carefully to minimize the potential of blood clots which can occur during the first several weeks of your recovery.

Warning signs of possible blood clots in your leg include:

- Increasing pain in your calf.
- Tenderness or redness above or below your knee.
- Increasing swelling in your calf, ankle, and foot.

Warning signs that a blood clot has traveled to your lung include:

- Sudden increased shortness of breath.
- Sudden onset of chest pain.
- Localized chest pain with coughing.

Notify your doctor immediately if you develop any of these signs.

***Preventing Infection*** The most common causes of infection following total knee replacement surgery are from bacteria that enter the bloodstream during dental procedures, urinary tract infections, or skin infections. These bacteria can lodge around your knee replacement and cause an infection.

***Following your surgery, you should take antibiotics prior to dental work or any surgical procedure that could allow bacteria to enter your bloodstream.***

Warning signs of a possible knee replacement infection are:

- Persistent fever (higher than 100 degrees orally).
- Shaking chills.
- Increasing redness, tenderness, or swelling of the knee wound.
- Drainage from the knee wound.
- Increasing knee pain with both activity and rest.

Notify your doctor immediately if you develop any of these signs.



***Avoiding Falls*** A fall during the first few weeks after surgery can damage your new knee and may result in a need for further surgery. Stairs are a particular hazard until your knee

is strong and mobile. You should use a cane, crutches, a walker, hand rails, or someone to help you until you have improved your balance, flexibility, and strength.

Your surgeon and physical therapist will help you decide what assistive aides will be required following surgery and when those aides can safely be discontinued.

### **How Your New Knee is Different**

You may feel some numbness in the skin around your incision. You also may feel some stiffness, particularly with excessive bending activities. Improvement of knee motion is a goal of total knee replacement, but restoration of full motion is uncommon. The motion of your knee replacement after surgery is predicted by the motion of your knee prior to surgery. Most patients can expect to nearly fully straighten the replaced knee and to bend the knee sufficiently to go up and down stairs and get in and out of a car. Kneeling is usually uncomfortable, but it is not harmful. Occasionally, you may feel some soft clicking of the metal and plastic with knee bending or walking. These differences often diminish with time and most patients find these are minor, compared to the pain and limited function they experienced prior to surgery.

Your new knee may activate metal detectors required for security in airports and some buildings. Tell the security agent about your knee replacement if the alarm is activated.



After surgery, make sure you also do the following:

- Participate in regular light exercise programs to maintain proper strength and mobility of your new knee.
- Take special precautions to avoid falls and injuries. Individuals who have undergone total knee replacement surgery and suffer a fracture may require more surgery.

- Notify your dentist that you had a knee replacement. You should be given antibiotics before all dental surgery for the rest of your life.
- See your orthopaedic surgeon periodically for a routine follow-up examination and X-rays, usually once a year.



# Knee Replacement Exercise Guide

*Regular exercise to restore your knee mobility and strength and a gradual return to everyday activities are important for your full recovery. Your orthopaedic surgeon and physical therapist may recommend that you exercise approximately 20 to 30 minutes two or three times a day and walk 30 minutes, two or three times a day during your early recovery. Your orthopaedist may suggest some of the following exercises. The following guide can help you better understand your exercise/activity program, supervised by your therapist and orthopaedic surgeon.*

## Early Post-operative Exercises

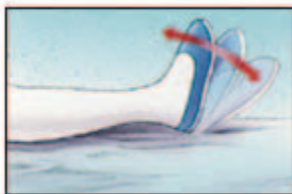
*Start the following exercises as soon as you are able. You can begin these in the recovery room shortly after surgery. You may feel uncomfortable at first, but these exercises will speed your recovery and actually diminish your post-operative pain.*

**Quad Sets** - Tighten your thigh muscle. Try to straighten your knee. Hold for 5 to 10 seconds. Repeat this exercise approximately 10 times during a two minute period, rest one minute and repeat. Continue until your thigh feels fatigued.

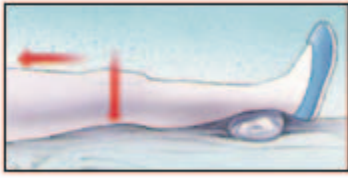


**Straight Leg Raises** - Tighten the thigh muscle with your knee fully straightened on the bed, as with the Quad set. Lift your leg several inches. Hold for five to 10 seconds. Slowly lower. Repeat until your thigh feels fatigued.

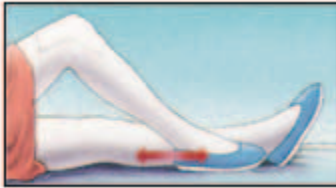
You also can do leg raises while sitting. Fully tighten your thigh muscle and hold your knee fully straightened with your leg unsupported. Repeat as above. Continue these exercises periodically until full strength returns to your thigh.



**Ankle Pumps** - Move your foot up and down rhythmically by contracting the calf and shin muscles. Perform this exercise periodically for two to three minutes, two or three times an hour in the recovery room. Continue this exercise until you are fully recovered and all ankle and lower-leg swelling has subsided.



***Knee Straightening Exercises*** - Place a small rolled towel just above your heel so that it is not touching the bed. Tighten your thigh. Try to fully straighten your knee and to touch the back of your knee to the bed. Hold fully straightened for five to 10 seconds. Repeat until your thigh feels fatigued.



***Bed-Supported Knee Bends*** - Bend your knee as much as possible while sliding your foot on the bed. Hold your knee in a maximally bent position for 5 to 10 seconds and then straighten. Repeat several times until your leg feels fatigued or until you can completely bend your knee.



***Sitting Supported Knee Bends*** - While sitting at bedside or in a chair with your thigh supported, place your foot behind the heel of your operated knee for support. Slowly bend your knee as far as you can. Hold your knee in this position for 5 to 10 seconds. Repeat several times until your leg feels fatigued or until you can completely bend your knee.

***Sitting Unsupported Knee Bends*** - While sitting at bedside or in a chair with your thigh supported, bend your knee as far as you can until your foot rests on the floor. With your foot lightly resting on the floor, slide your upper body forward in the chair to increase your knee bend. Hold for 5 to 10 seconds. Straighten your knee fully. Repeat several times until your leg feels fatigued or until you can completely bend your knee.

## **Early Activity**

*Soon after your surgery, you will begin to walk short distances in your hospital room and perform everyday activities. This early activity aids your recovery and helps your knee regain its strength and movement.*

***Walking*** - Proper walking is the best way to help your knee recover. At first, you will walk with a walker or crutches. Your surgeon or therapist will tell you how much weight to put on your leg.

Stand comfortably and erect with your weight evenly balanced on your walker or crutches. Advance your walker or crutches a short distance; then reach forward with your operated leg with your knee straightened so the heel of your foot touches

the floor first. As you move forward, your knee and ankle will bend and your entire foot will rest evenly on the floor. As you complete the step, your toe will lift off the floor and your knee and hip will bend so that you can reach forward for your next step. Remember, touch your heel first, then flatten your foot, then lift your toes off the floor.

Walk as rhythmically and smooth as you can. Don't hurry. Adjust the length of your step and speed as necessary to walk with an even pattern. As your muscle strength and endurance improve, you may spend more time walking. You will gradually put more weight on your leg. You may use a cane in the hand opposite your surgery and eventually walk without an aid.

When you can walk and stand for more than 10 minutes and your knee is strong enough so that you are not carrying any weight on your walker or crutches (often about two to three weeks after your surgery), you can begin using a single crutch or cane. Hold the aid in the hand opposite the side of your surgery. You should not limp or lean away from your operated knee.



## Advanced Exercises and Activities

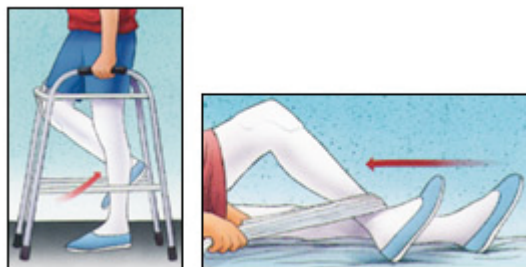
Once you have regained independence for short distances and a few steps, you may increase your activity. The pain of your knee problems before surgery and the pain and swelling after surgery have weakened your knee. A full recovery will take many months. The following exercises and activities will help you recover fully.



**Stair Climbing and Descending** - The ability to go up and down stairs requires strength and flexibility. At first, you will need a handrail for support and will be able to go only one step at a time. Always lead up the stairs with your good knee and down the stairs with your operated knee. Remember, "up with the good" and "down with the bad." You may want to have someone help you until you have regained most of your strength and mobility.



Stair climbing is an excellent strengthening and endurance activity. Do not try to climb steps higher than the standard height (7 inches) and always use a handrail for balance. As you become stronger and more mobile, you can begin to climb stairs foot over foot.



**Standing Knee Bends** - Standing erect with the aid of a walker or crutches, lift your thigh and bend your knee as much as you can. Hold for 5 to 10 seconds. Then straighten your knee, touching the floor with your heel first. Repeat several times until fatigued.

**Assisted Knee Bends** - Lying on your back, place a folded towel over your operated knee and drop the towel to your foot. Bend your knee and apply gentle pressure through the towel to increase the bend. Hold for 5 to 10 seconds; repeat several times until fatigued.

***Knee Exercises with Resistance*** - You can place light weights around your ankle and repeat any of the above exercises. These resistance exercises usually can begin four to six weeks after your surgery. Use one- to two-pound weights at first; gradually increase the weight as your strength returns. (Inexpensive wrap-around ankle weights with Velcro straps can be purchased at most sporting goods stores.)



***Exercycling*** - Exercycling is an excellent activity to help you regain muscle strength and knee mobility. At first, adjust the seat height so that the bottom of your foot just touches the pedal with your knee almost straight. Peddle backward at first. Ride forward only after a comfortable cycling motion is possible backwards.

As you become stronger (at about four to six weeks) slowly increase the tension on the exercycle. Exercycle for 10 to 15 minutes twice a day, gradually build up to 20 to 30 minutes, three or four times a week.

***Pain or Swelling after Exercise*** - You may experience knee pain or swelling after exercise or activity. You can relieve this by elevating your leg and applying ice wrapped in a towel. Exercise and activity should consistently improve your strength and mobility. If you have any questions or problems, contact your orthopaedic surgeon or physical therapist.

## Summary of Rehabilitation Following Total Knee Replacement

### Day 1-5

*GOALS FOR THE PERIOD:* Control pain, manage edema, prevent postoperative infection, provide passive range of motion to the knee, improve muscle contraction, promote independence with bed mobility and transfers, restore independence in activity of daily living.

1. Isometric quadriceps sets
2. Isometric gluteal sets
3. Isometric hamstring sets
4. Ankle dorsiflexion, plantar flexion and ankle circles
5. Proper positioning for edema reduction
6. Patient education for purpose and use of continuous passive motion machine
7. Breathing exercises

### Day 6-14

8. Straight leg raising
9. Terminal knee extension with overpressure
10. Knee flexion-heel slides (supine or on your back)
11. Knee flexion-heel slides (seated)

### Week 3-8

*GOALS FOR THE PERIOD:* Normalize walking, reduce reliance on assistive devices, increase range of motion, improve weight bearing, balance, strength and endurance.

1. Knee flexion-passive
  - a. Prone Position
  - b. Standing open-chain
  - c. Standing closed-chain
2. Hip exercises
  - a. Straight-leg raises
  - b. Abduction in side-lying
  - c. Prone extension
  - d. Adduction in side-lying
3. Bilateral heel raises
4. Sit-to stand exercises
5. Bilateral quarter to half squats
6. Step progression
  - a. Step up
  - b. Step down

7. Leg curls
  - a. Prone
  - b. Standing
8. Hip lateral rotation exercise
9. Contralateral standing lower extremity hip exercises
10. Bridging
11. Stationary bicycling
12. Walking program
13. Balance activities
  - a. Bilateral to single-leg