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Knee Joint Replacement Surgery Post-Operative Exercise Program

David F. Scott, MD

Weeks 1 through 6

The goal of knee replacement surgery is to return you to normal functional activities as soon as possible. Immediately after surgery, the focus of your exercise program should be on improving quadriceps muscle strength, control of knee swelling, safe ambulation, and active/passive stretching to restore normal knee range of motion. Getting out of bed and taking the first few steps after knee joint replacement surgery are challenging, but do get easier with time. Patients with knee joint replacement are urged to exercise the knee frequently throughout the day to restore normal joint range of motion. The first 3 weeks after surgery are the most important to prevent the development of scar tissue within the knee joint. Active and passive stretching are the best ways to avoid long-term complications with your joint replacement.

With that said, however, if you've had years of degenerative arthritis in the knee joint with progressive weakness and difficulty with normal functional activities prior to surgery, a period of outpatient physical therapy may be indicated to help best restore function in your new knee joint. The most important activity in your recovery process is walking! In most cases you will be able to put as much weight as you desire on the operative leg while walking. You will be instructed on any weight-bearing restrictions before leaving the hospital.

Most patients leave the hospital using a front-wheeled walker. You should continue to use your walker until your strength returns. Progression to a cane, held in the hand opposite to the replaced knee, is indicated once you feel strong enough to walk without the assistance of the walker. (See Walking Recommendations). In most cases, you should continue to use a walker or a cane for the first six weeks after surgery. However, some patients may require longer use of an assistive device than others. Exercises should be performed every day. You should allow 15 minutes, two to three times a day, to begin with. Progress to 30 minutes, two to three times a day, by the end of six weeks. Exercising more than what is recommended is completely safe for your knee replacement.

With knee replacement surgery, it is very important to **NEVER** position a pillow under your knees to rest or sleep. This position bends the knee into a comfortable position, but can quickly lead to the development of scar tissue around the new knee joint which may be difficult to resolve. To avoid developing a bad joint contracture, always rest the knee fully out straight (even if you have some tenderness in the back of the joint or calf). A flexion contracture of the knee can restrict normal walking and prolong rehabilitation needs after total joint replacement surgery. Occasionally, further medical treatment is warranted to fix a stiff knee joint. The best treatment for joint contractures is to prevent them from occurring by strictly following your post-operative exercise program as outlined.

It is very common for your new knee to stiffen and cause pain if sustained in a straight or bent position. You should avoid sitting for longer than one-half hour before standing, stretching, and walking. Prolonged sitting flexes (bends) the knee and can lead to a joint contracture making straightening difficult.

Phase 1: Immediate Post-operative Phase Day 1 through 2 weeks

You should time the use of your narcotic medications to help control symptoms during your exercise program as outlined here. Elevation and icing for 20 minutes after exercise helps to control swelling and reduce pain as well. Continue walking daily.

Quadriceps Setting Exercise

Lie on your back with the operative leg straight (no pillows or towels under your knee). Tighten the quadriceps muscle on top of the thigh by pressing the knee straight down into your bed, holding for a count of 5 seconds. This exercise can be repeated throughout the day. A towel roll **under the heel** helps to promote full straightening of the knee and is recommended. **Repeat for 20-30 repetitions with 5 second holds. Complete 3 to 5 times per day for the first 2 weeks after surgery OR, if able, complete as prescribed below.**



NOTE: You do not have to lie down in bed to do this exercise. This exercise can be done sitting in a chair and standing as well. **We recommend completing 10 repetitions every hour during the day for the first 2 weeks after surgery to help strengthen the quadriceps muscle and to promote full knee extension (straightening).**

Straight Leg Raising Exercise

Lie on your back with the operative leg straight (no pillows or towels under your knee). Your non-operative knee should be bent to reduce pressure on your lowback. Perform a quadriceps setting exercise to fully straighten the knee. Keep the leg completely straight and bend the hip so the operative leg raises from the bed to reach the level of the opposite knee. **Complete 2-3 sets of 10 repetitions each, 3-5 times daily. Hold for 3-5 seconds then slowly lower.**



The leg should feel very heavy if this exercise is done correctly. If you experience groin pain, stop and rest the leg before proceeding. If you are too weak to lift the leg by yourself, you should have a spouse or caregiver assist you with this exercise. Within 2 weeks after surgery, however, you should not require any assistance in elevating your operative leg into/out of bed for transfers.

Knee Joint Replacement Surgery Post-Operative Exercise Program

David F. Scott, MD

Standing Hip Abduction Exercise

Stand holding on to a solid object for balance and support. Raise the operative leg out to the side and slightly backwards. Hold for 3 seconds and slowly lower. NOTE: The movement should be to the side and BACK, not to the side and forward. It is normal for the toes to turn slightly outwards during this exercise.

Repeat 2-3 sets of 10-20 repetitions and then stand on your operative leg. You should stand with your replaced knee joint as straight as you can when bearing weight solely on your operative leg. Repeat 3 times daily.

Advanced Exercise: Add ankle weights to operative leg (2-5 lbs recommended - begin with light weight).



Sidelying Hip Adduction Exercise

Lie on your knee replacement side with the opposite foot placed on the bed either in front (or behind) your operative leg (your operative leg should be on the bottom; see picture). Tighten the muscles on your inner thigh and lift your operative leg off the bed towards the ceiling as high as you can.

Hold the position at the top of the exercise for 5 seconds. Relax and slowly lower.

Some patients with diagnosed hip/knee arthritis or previous joint replacements in the non-operative extremity, may be unable to complete this exercise.



Repeat 2-3 sets of 10-20 repetitions. Repeat 3 times daily.

If you have a pre-existing hip joint replacement on the same side as your knee replacement, you should receive medical clearance before beginning this exercise.

Knee Joint Replacement Surgery Post-Operative Exercise Program

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Ankle Pumps:

Lie on your back in bed or on the sofa and elevate the operative leg. Pump the ankle joint repeatedly, as shown, or trace the alphabet from letters A to Z with your foot and ankle.

Repeat for 3 to 4 minutes, 3 to 5 times per day.



Long-Arc Knee Extension Exercise:

Sit on the edge of your bed. With the knee bent at a right angle off the edge of the bed, straighten the operative knee as fully as you can and hold for 5 seconds.

Repeat 3 sets of 10-15 repetitions, 3 to 5 times per day.

If you have a lot of swelling and stiffness in your knee, you may not be able to fully straighten. The goal is for your knee to be as straight as your non-operative knee by 3 weeks after surgery during this exercise.



Knee Joint Replacement Surgery Post-Operative Exercise Program

David F. Scott, MD

Range of Motion (ROM) Exercises:

Passive Knee Extension Stretch

Sit in bed or on the edge of a sofa. Two kitchen chairs of the same height facing on another will also work for this exercise. Place a small rolled towel under your heel. Use a slow, sustained push with the hands downward on the thigh muscles above your incision and hold for 30 seconds. Lean forward at the hip and pull your toes and ankle back towards your head so that you feel a stretch down the back of the thigh and calf.

It is common to have some moderate pain with this exercise due to joint stiffness, swelling, and soreness from surgery. You will feel significant pressure in the back of the knee joint; this is normal and expected. You cannot hurt your new knee joint by straightening the knee to tolerance.

The goal with this exercise is to fully straighten the knee.

Repeat 10 repetitions for 30-45 seconds.

Again, it is common to have increased pain associated with bending the knee after sustained straightening. This will improve over time as flexibility increases and swelling subsides.

Repeat 3-5 times daily.

Crutch Stretch for Improving Knee Extension

Refer to crutch stretching instructions here ([SJRC website link](#))



Knee Joint Replacement Surgery Post-Operative Exercise Program

David F. Scott, MD

Wall Flexion (Heel) Slides

This exercise works best on a bed next to a wall or one that has no headboard. Lie on your back with your feet elevated in the air. You should try and slide your non-operative leg over the operative knee and elevate the limb with the heel against the wall. Slide your heel up the wall to straighten your knee; this is the resting position. Slide the heel down the wall to slowly bend the knee. Use the non-operative leg to bend the operative leg.

Hold this bent position for 30 seconds.
Repeat 10 times, 3 to 5 times daily.



Seated Heel Slides

Sit on a kitchen chair with the foot of your operative leg close to the base of the chair at the legs. Keep the heel of your operative leg back as far as you can to bend the knee. Once under stretch, scoot forward towards the edge of the chair as far as you can bending the knee further.

Hold for 30 seconds. Repeat 10 times, 3 to 5 times per day.



Patellar Mobilizations

Begin after staple removal, when your incision is stable. Grasp the kneecap with fingers resting on both the inside and outside border of the kneecap. Your incision may still be covered by steri-strip adhesive bandages to keep the incision closed. It will not open with pressure on the kneecap.

Gently slide the kneecap towards the inside of your knee and hold for 5 seconds. Push the opposite direction to stretch the kneecap towards the outside of your leg. You should feel the kneecap move more to the inside of your knee than the outside (this is normal). You should not experience any sharp pains with this exercise; stretch gently.



Repeat 20 repetitions in each direction. Repeat 3 to 5 times per day.

Phase 2: Motion Phase Week 2 through week 6

Criteria for Progression to Phase 2 exercises:

- Able to perform a straight leg raise exercise with the operative knee completely straight
- Active knee ROM from fully straight (0 degrees) to 90 degrees bend (right angle)
- Reduced swelling and pain
- Independent ambulation with assistive device

Continue Previous Phase 1 Exercises and Add...

Hip Extension Exercise

Lie on your stomach in bed. Raise the operative leg straight up towards the ceiling. You want to lift your leg just to the point you feel your kneecap leave the bed; no higher. NOTE: It is common for the toes to turn out during this exercise. To prevent low back pain, tighten your stomach muscles as the hip moves backwards to prevent your low back from bending inwards (arching). A pillow under your stomach can also help. If you have a history of low back pain, or feel increased low back symptoms that do not subside for longer than 30 minutes after completing this exercise, you may not be able to safely complete this exercise.



Repeat 2-3 sets of 10-20 repetitions. Repeat 3 times daily.

Advanced Exercise: Add ankle weights to operative leg (2-5 lbs recommended - begin with a light weight).

Standing Squat Exercise

Hold on to a chair for support. Slowly crouch bending both of your knees slowly into a squatting position and hold for 10 seconds. Keep your back straight and the heels firmly on the floor. Slowly raise yourself by straightening your knees; not by pushing yourself up with your arms. The chair back is for balance only. This exercise should strain the muscles on the front of your thigh. Make sure that your weight is equally balanced between your operative and non-operative legs.

Repeat 10 times, 2 to 3 times per day.

If this exercise is easy, increase your hold times to 20 seconds before arising.



Knee Joint Replacement Surgery Post-Operative Exercise Program

David F. Scott, MD

Short-Arc Quadriceps Exercise

Lie on your back in bed. Place a rolled pillow (or a towel wrapped around a coffee can) 6-8 inches in diameter under your operative knee. Tighten the muscles on the front of your thigh and fully straighten the knee, raising the heel from the bed. Hold for 5 seconds.

Advanced Exercise: Add ankle weights to the operative leg (2-5 lbs recommended - begin with a light weight). Remember, you are not to rest the knee over a pillow, or other support, for comfort when not completing this exercise.

Repeat 2 to 3 sets of 15 to 20 repetitions; repeat 2 to 3 times a day.



Gastrocnemius/Soleus Stretching Exercise

Place your hands against a wall and stand with your legs staggered in a lunge position as shown. Place the leg of your operative knee back. Keep the heel of the leg that is extended back flat on the floor. Point the toes slightly inwards on both feet. Lean forwards into the wall, keeping the heel flat on the ground and your operative knee straight until you feel a pulling sensation in the calf muscles. The stretch is for the leg that is extended back.

Hold for 30 seconds and repeat 8 times.

Do not bounce when stretching. Switch positions of your legs and repeat on the non-operative side.



In the same position, position your back leg closer to the front leg for this next stretch. The toes of your back leg should be roughly parallel to the heel of the front foot. Keeping the heels on the floor, bend both knees until you feel a stretch much lower in your calf (usually closer to the Achilles tendon). Lean forwards into the wall until you feel a good stretch.

Hold for 30 seconds and repeat 8 times.

Do not bounce when stretching. Switch positions of your legs and repeat.



Knee Joint Replacement Surgery Post-Operative Exercise Program

David F. Scott, MD

Hamstring Stretching Exercise

Place two kitchen chairs facing one another. Sit on one chair and prop the heel of your operative leg on the opposing chair. Keeping your low back straight, lean forwards bending at the hip. Bend the ankle back by pointing your toes towards your head. You should keep the knee fully straight as you lean forwards. It is normal to feel an intense stretching sensation from the back of your thigh down to your calf muscles. This stretch should be strong, but not painful. You can lessen the stretch by controlling the forward bend of your hip.



Hold for 30 seconds and repeat 8 times.

Do not bounce when stretching. Switch positions of your legs and repeat.

Stationary Biking

If you have a stationary bike at home, begin this activity at 2 weeks post-surgery. Raise the seat as high as possible. Most knee replacement patients find it easier to pedal backwards to stretch the knee until they can make a full revolution on the bike. You must have 105 degrees of bend in the knee to make a full revolution on a stationary bike. If you cannot pedal a full revolution, position the knee in the maximum amount of bend you can tolerate and hold for 30 seconds as a stretch.

It is common to feel increased knee symptoms on the bike for the first one to two minutes of cycling. These symptoms dissipate quickly and most patients report improved knee function and less knee pain for several hours after cycling.

RECOMMENDATION: Ride the bicycle with minimum tension for 5 minutes, 2-3 times per day. Gradually progress endurance on the bike to 20-35 minutes once daily, 3-5 times/week by 6 weeks. As tolerated, resistance to the pedals can be advanced.

No outdoor road cycling or mountain biking until you are released by Dr. Scott to do so.



Phase 3: Intermediate Stretching and Strengthening Phase Week 7 through week 12

Criteria for Progression to Phase 3 exercises:

- Range of Motion at the knee from 0 degrees extension (straight) to 110 degrees flexion (bend)
- Independent ambulation without assistive device
- Minimal pain and inflammation
- Ability to complete Phase 2 exercise program

Once your TED hose are discontinued at week 6, you can stop completing the following exercises from the Phase 1 program:

- 1) Ankle pumps with leg elevation
- 2) Wall Flexion (Heel) Slides
- 3) Passive Knee Extension stretches (only if knee is fully straight)
- 4) Seated Heel Slides (if able to cycle on a stationary bike OR bend knee to 110 degrees flexion)
- 5) Patellar Mobilizations

Continue Previous Phase 1 and 2 Exercises and Add...

Prone Quadriceps Stretch

Lie on your stomach in bed as shown; place 2-3 pillows under your abdomen. Place a belt or tie-down strap around the ankle of your operative knee. Place a small towel under your operative knee to raise the level of the knee above your hip joint. Tighten your stomach muscles. Bend your knee until you feel a stretch in the front of your thigh. Pull on the belt attached to your ankle until you feel an intense stretch and hold for 30 seconds. Remember to breathe as you stretch.



Your knee will not bend as far as usual when completing this exercise. The quadriceps muscle will be stretched in this position and you will be stretching both the knee joint capsule and the quadriceps muscle which limits the amount of knee bending you can achieve. This exercise helps to restore normal flexibility post-surgery.

Repeat 10 repetitions, holding for 30 seconds each, 2-3 times per day.

Knee Joint Replacement Surgery Post-Operative Exercise Program

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Front Lunges

Stand with feet shoulder width apart. Step forward on your operative leg while slowly bending the knee to a 45 degree bend. You may need to hold on to a countertop or chair back for balance. Hold for 5 seconds and then slowly straighten the knee back to a relaxed stance position. Repeat on the non-operative leg.

Repeat 20 repetitions each leg. Repeat twice. Repeat 2-3 times per day.



Single Leg Balancing

Stand with feet shoulder width apart. Bear full weight through your operative leg with the knee completely straight. Bring the opposite knee upwards towards the ceiling by bending at the hip to balance on the operative leg. Try and balance for 10 seconds. You should concentrate on limiting the amount of motion of your trunk and lower extremities while balancing. The trunk, pelvis, hip, knee, and ankle should be making subtle adjustments to maintain your balance. You should compare to your non-operative side to determine balance differences. If you've had previous lower extremity surgery or ankle injuries, your balance may not be normal.

Your goal should be to balance for 30 seconds each side.

If any loss of balance, two finger support at a countertop or chair back may be necessary to begin balance strengthening.



Knee Joint Replacement Surgery Post-Operative Exercise Program

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Front and Lateral Step Ups

Stand in front of a small (2 to 4 inch) step. Home stairs are usually 8 inches tall and will be too difficult to begin with. Some therapists advocate using a phone book, however, we discourage this activity due to the phone book being too flexible and prone to moving under your foot. If you cannot find a small step, a small hardbound book may be used. If you have the ability, a small step can be constructed out of 5/8" plywood and 2x4's for home use.

Stand in front of the step. Step up with the OPERATIVE LEG leading. Concentrate on bearing weight entirely on your operative leg and fully straightening the knee at the top of the movement. You should use a cane or external support (like a countertop) only if you are concerned with balance or safety. If you do use a support, try not to pull or use the arms to help you step up. The support should be available for safety and not used to help pull you up to the next step which would decrease the need for a strong thigh muscle.

Repeat 2-3 sets of 10-15 repetitions.

Advance to a 6-inch to 8-inch stair height as strength improves.



Advanced Exercise: Eccentric Step Downs

Begin again with a 2-inch or 4-inch step height and stand solely on your operative leg. Slowly lower yourself by bending the operative knee to 30 degrees - 45 degrees and gently tap the heel of your opposite foot on the ground. Return to starting position by straightening your operative knee. You should not shift your weight from the operative leg; keep weightbearing through that limb during the entire exercise without rest. Be careful when standing on the step; if you are too close to the front, the step may flip up causing a fall.

You should use a cane or external support (like a countertop) only if you are concerned with balance or safety. If you do use a support, try not to bear weight through the arms to help you step down. The support should be available for safety and not used to help control your stepping which would decrease the need for a strong thigh muscle. This is the single most important exercise to help you safely begin to walk up and down stairs with an alternating step pattern (different steps with each leg). The ability to walk upstairs, with an alternating step pattern, returns more quickly than walking downstairs in a reciprocal manner.

Repeat 2-3 sets of 10 repetitions.

Advance to a 6-inch to 8-inch stair height as strength improves.



Knee Joint Replacement Surgery Post-Operative Exercise Program

David F. Scott, MD

Wall Slides for Quadriceps Strengthening

Stand with back against the wall and feet shoulder width apart. You should keep a chair back (or other external support like a cane) next to you to help you rise if your quadricep muscles weaken. Keep feet 18 inches from the wall. Slowly slide down the wall, with equal weight-bearing on each leg, until the knees are in 45 degrees bend. You should not slide down into a "chair position" as this is more difficult to complete safely.

Hold for 10 seconds. Repeat 1 set of 10 repetitions only; complete 2 times per day.

As strength improves, increase your hold times to 20-30 seconds.



Phase 4: Advanced Activity Phase Weeks 14 through 24

Criteria for Progression to Phase 4 exercises:

- Full, non-painful range of motion (from 0 degrees extension to 115-120 degrees bend)
- Strength and balance comparable to non-operative extremity
- Minimal to no pain and swelling
- Satisfactory medical examination by Dr. Scott

Return to normal lifestyle

By now, you should be re-integrating back to your pre-surgery lifestyle. You should not, at this time, be limited by pain at the joint restricting you from activities you enjoy. Your total knee may not be painfree, however. It takes a full year to fully rehabilitate after total joint replacement surgery. Activity beyond normal levels may cause some temporary discomfort and soreness, but most total joint patients report that this pain is different and much less severe than compared to before surgery.

If you are having difficulty re-integrating back to normal activities, contact Dr. Scott for further evaluation.

Return to normal gym or aquatics/pool programs

At roughly 4 months post-joint replacement surgery, most patients are ready to return to normal gym and aquatics programs. You may be able to start earlier than 4 months (during the phase 3 program) if progressing well.

Always consult with Dr. Scott before beginning your normal gym program. Some modifications to your existing program may be necessary after joint replacement surgery. If you wish to speak to a physical therapist regarding safe exercises/activities, please contact Dr. Scott at the Orthopaedic Specialty Clinic office for a referral.

Return to Functional Activities - Long Term Activities after Total Joint Replacement.

Recreational sporting activities can be enjoyed again, or begun anew, after joint replacement surgery. Several recommended activities are safe for all total joint patients. Please refer to Recommended Long Term Exercise Activities after Total Joint Replacement Surgery for more information.

