

What Are the Most Common Exercises Recommended for Strengthening the Knee?

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This is a follow-up to a previous article regarding patellar problems. [*Editor's note:* See "Patellar Instability" in the April 23, 2005 issue.] In this article, I will attempt to review what is generally recommended for rehabilitation and discuss the most commonly agreed-upon exercises for the knee.

Let's start with avoiding surgery if possible. One of the major causes of knee pain is degenerative joint disease. Often the patient has suffered previous injuries, and with age, he or she have become more sedentary. Overall strength has declined, including the muscles that stabilize the knee joint. If these muscles can be strengthened, the pain can often be reduced.

In reviewing the recommended exercises for knee strengthening, there is a consistent opinion that to keep the knee strong, the quadriceps must be strong; the hamstrings also should be strong, but they must be stretched to allow full extension of the knee.

Knee replacement surgery is a major operation that should be chosen as a last option for those patients suffering from knee pain. There are several steps that can be taken to help reduce and control the pain and inflammation, which is caused by arthritis, and perhaps avoid surgery entirely.

One of the most important ways of preventing or controlling damage to the knee joint is weight loss to reduce excessive stress on the joint. Low-impact exercise, such as bicycling or swimming, is highly recommended. There are many other forms of low-impact activities that can also strengthen the knees, such as yoga, Pilates, and *tai chi*. Of course, walking is always a good idea.

The following is a summary of the most popular exercises recommended to strengthen the leg muscles that support the knee. If, however, a knee replacement is what really is needed, exercise and strengthening the muscles may not help, but many forms of knee pain can be mitigated by exercise.

Exercises for Strengthening the Quadriceps

Leg Raises: Start by lying on the back with one leg straight (the working leg), and the opposite leg flexed, with the foot on the floor. Raise one leg at a time up to 45 degrees and hold. If this is easy, add weight. This can also be done with weights in the gym, sitting on a leg extension machine. The basic motion is to extension the leg against resistance, in order to engage contraction of the quadriceps without engaging the lower back muscles. There are many modifications of this exercise.

Wall Sit: This is a great exercise for strengthening the quadriceps muscles, hamstrings, gluteal muscles and abdominal muscles. It is an alternative to doing squats and lunges. Stand with the buttocks against the wall, with the feet together and the body erect. Slowly slide down the wall, bending the knees and keeping them together until the thighs are parallel to the floor. Hold for a five count, and then slide back up the wall. If this is too easy, hold for a longer count, until the

thighs feel like they are working. As with many exercises, there are several modifications to this exercise; it has also been called the "wall bench."

Exercises for Strengthening the Hamstrings

Bridge: This exercise strengthens mainly the glutes and hamstrings. Begin by lying on the back with arms by the side, feet flat on the floor with the knees bent. Slowly raise the hips off the floor, keeping the shoulders on the floor. Raise the hips as high as possible, and squeeze the buttocks and hamstrings. Be careful to keep the knees in line with the hips and ankles. To make the exercise more difficult, grasp the ankles, and then slowly raise the hips off the floor and hold for a 10 count.

Any exercise that flexes the knees with resistance will engage the hamstrings. For that reason, most gyms have some leg flexion machines.

In addition to exercises that address the major muscles responsible for flexing and extending the knee, there are many other exercises that address strengthening the muscles that adduct and abduct the leg; however, this discussion is beyond the scope of this article.

The other major muscle group that is critical to proper knee alignment is the calf muscles. They stabilize the ankle, which is important for coordination, balance and proper knee alignment.

Calf Raise: This is a simple exercise that can be performed on a staircase. Place the ball of one foot on the edge of a stair, allowing the heel to extend down off the stair. Make certain to hold on to something to keep balanced. Place the other foot next to or behind the ankle of the working leg. Raise up off the toe as high as possible and hold, flexing the calf muscle. Now repeat, allowing the heel to extend down. Of course, perform all of the exercises evenly on both sides.

Following the strengthening exercises, perform simple stretching. Hold each stretch gently; don't try to overstretch the muscle. Hold for 20-30 seconds without straining or bouncing.

There are many ways to stretch the leg muscles, but here are a few of the most common ones.

A good overall stretch for the posterior leg muscles involves standing with one leg on a step or curb and keeping the knees and back straight; bend over to touch the elevated foot. If it isn't possible to touch the foot, just flexion forward as far as possible.

The Hamstring Stretch is generally performed sitting on the floor, with one leg out straight and the other leg flexed, pressing the foot against the extended leg's inner thigh. Bend forward, keeping the back straight and touching the extended leg's toes. If the toes are not reachable, bend forward as far as possible and hold. Don't force the stretch.

The Quadriceps Stretch is commonly performed lying on the side, with the hips and shoulders aligned. Place the arm under the head, with the elbow bent, to help relax the neck and balance the position. Hold the top of the ankle of the top leg, and gently pull the leg behind and away from the bottom leg. Hold and do the opposite side.

One other very important aspect of regaining strength and flexibility in not just the knees, but also in the lower extremities, is to practice using a wobble board. This will help improve proprioception, which is very important in maintaining stability and agility.

Several Web sites provide a more descriptive explanation of these and other exercises for strengthening the knee. [*Editor's note:* Due to the transitive nature of the Internet, we cannot guarantee the accuracy of these links over time.]

- www.kneereplacementinfo.com/knee-rehabilitation.html
- www.thewalkingsite.com/knee_exercises.html
- www.sportsinjurybulletin.com/archive/1080-knee-joint-injury.htm
- www.med.umich.edu/1libr/sma/sma_ancrulg_rex.htm
- www.physsportsmed.com/issues/1997/07jul/dinub_pa.htm

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