



Quadriceps Strain

Exercises:
10 seconds
10 times
1 time per day

DESCRIPTION

Quadriceps strain is characterized by inflammation and pain in the front of the thigh along the quadriceps muscles. There are four muscles that comprise the quadriceps muscle group, going from the hip across the knee to the lower leg. This muscle group is important for straightening your knee and bending your hip, and it is used for running and jumping. Quadriceps strain is usually a grade 1 or 2 strain of the muscle-tendon unit. A *grade 1 strain* is a mild strain, a slight pull without obvious tearing (the tearing is microscopic), no loss of strength, and the muscle-tendon unit is the correct length. A *grade 2 strain* is a moderate strain with tearing of fibers within the substance of the muscle or tendon, or where the tendon meets the bone. The length of the muscle-tendon-bone unit is increased, and strength is decreased. A *grade 3 strain* is a complete rupture of the tendon.

COMMON SIGNS AND SYMPTOMS

- Pain, tenderness, swelling, warmth, or redness over the quadriceps muscles at the front of the thigh
- Pain that is worse during and after strenuous activity
- Muscle spasm in the thigh
- Pain or weakness with running, jumping, or straightening the knee against resistance
- Crepitation (a crackling sound) when the tendon is moved or touched
- Bruising in the thigh 48 hours after the injury
- Loss of fullness of the muscle or bulging within the muscle with complete rupture

CAUSES

- Strain from overuse of the lower extremity
- A sudden increase in the amount or intensity of activity
- A single, violent blow or force to the knee or the front of the thigh

FACTORS THAT INCREASE RISK

- Sports that require quick starts, such as sprinting or running races and other track events, racquetball, squash, and badminton
- Sports that require jumping, such as basketball and volleyball
- Contact sports such as soccer or football
- Poor physical conditioning (strength, flexibility)
- Inadequate warm-up before practice or play
- Previous quadriceps or knee injury

PREVENTIVE MEASURES

- Appropriately warm up and stretch before practice and competition.
- Maintain appropriate conditioning that includes hip and thigh flexibility, muscle strength and endurance, and cardiovascular fitness.
- Wear proper protective equipment (thigh pads).

EXPECTED OUTCOME

Quadriceps strain is usually curable within 6 weeks if treated appropriately.

POSSIBLE COMPLICATIONS

- Prolonged healing time if not appropriately treated or if not given adequate time to heal
- A chronically inflamed tendon, causing persistent pain with activity that may progress to constant pain, even at rest
- Recurrence of symptoms if activity is resumed too soon
- Susceptibility to repeated injury

GENERAL TREATMENT CONSIDERATIONS

Initial treatment consists of medication and ice to relieve pain; stretching and strengthening exercises, particularly bending the knee; and modification of the activity that initially caused the problem. These exercises can be carried out at home, although referral to a physical therapist or athletic trainer for further evaluation and treatment may be helpful. An elastic bandage or neoprene sleeve may help reduce swelling and reduce symptoms. If the strain is severe and you are limping, crutches may be recommended for the first 24 to 72 hours, until the pain and inflammation settle down. Rarely, surgery is necessary to reattach the muscle if it pulls off the bone (uncommon), or if constant pain persists for more than 3 months despite appropriate conservative treatment. Suturing or sewing torn muscle is usually not successful, although complete tendon rupture often requires surgical repair. Single muscle ruptures are not usually fixed surgically, because they rarely cause problems.

MEDICATION

- Nonsteroidal antiinflammatory medications, such as aspirin and ibuprofen, are often recommended. Do not take these for the first 3 days after injury or for 7 days

before surgery. Other minor pain relievers, such as acetaminophen, may also be recommended. Take these medications as directed by your physician, and contact your doctor immediately if any bleeding, stomach upset, or signs of an allergic reaction occur.

- Topical analgesic ointments may be of benefit.
- Pain relievers may be prescribed as necessary. Use these only as directed, and take only as much as you need.
- Injections of corticosteroids may be given to reduce inflammation, although they are not usually given for acute injuries.

HEAT AND COLD

- Cold is used to relieve pain and reduce inflammation. It should be applied for 10 to 15 minutes every 2 to 3 hours as needed and immediately after any activity that aggravates your symptoms. Use ice packs or an ice massage.
- Heat may be used before performing stretching and strengthening activities prescribed by your physician, physical therapist, or athletic trainer. Use a heat pack or a warm soak.

WHEN TO CALL YOUR DOCTOR

- Symptoms get worse or do not improve in 2 to 4 weeks despite treatment.
- New, unexplained symptoms develop. Drugs used in treatment may produce side effects.

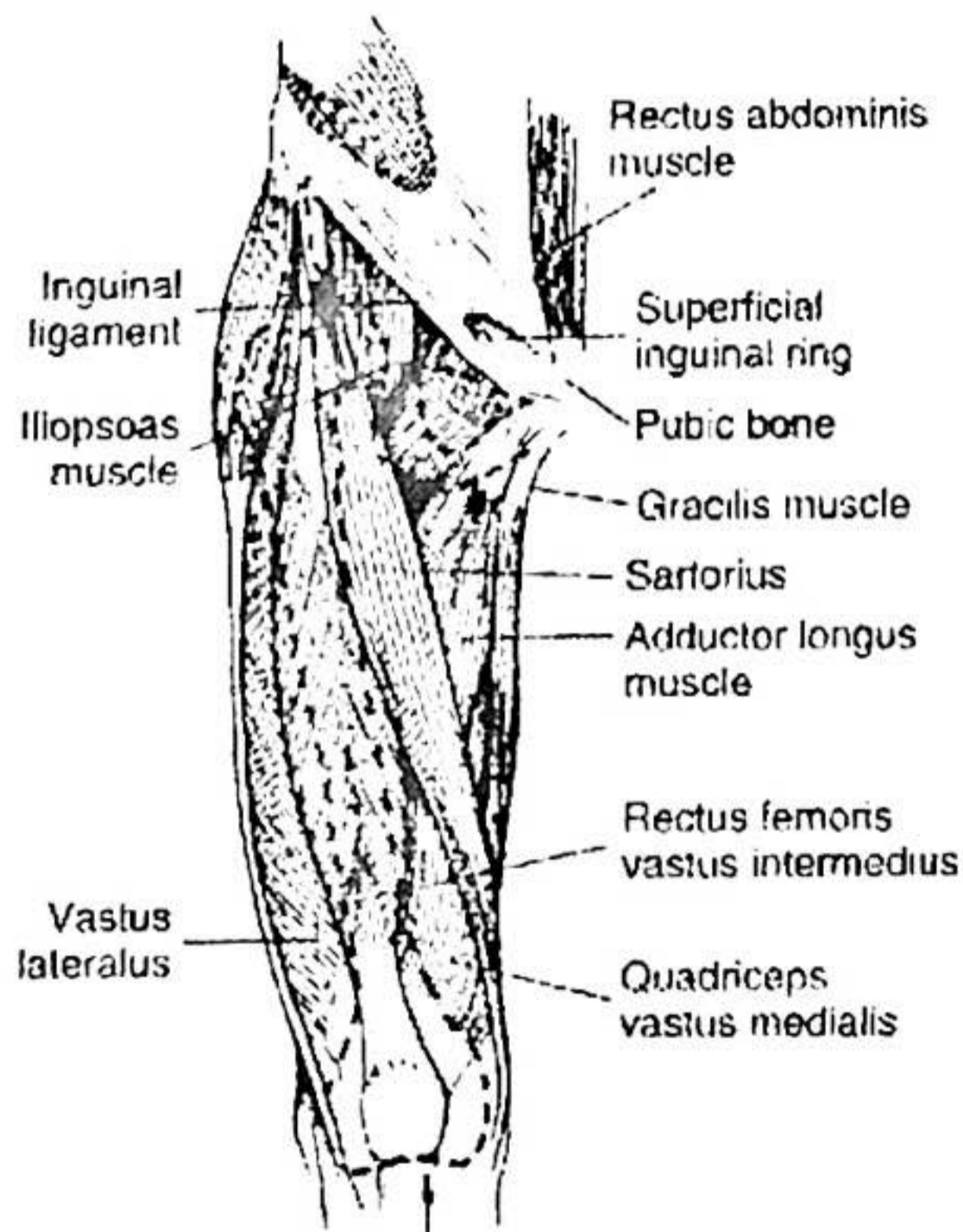
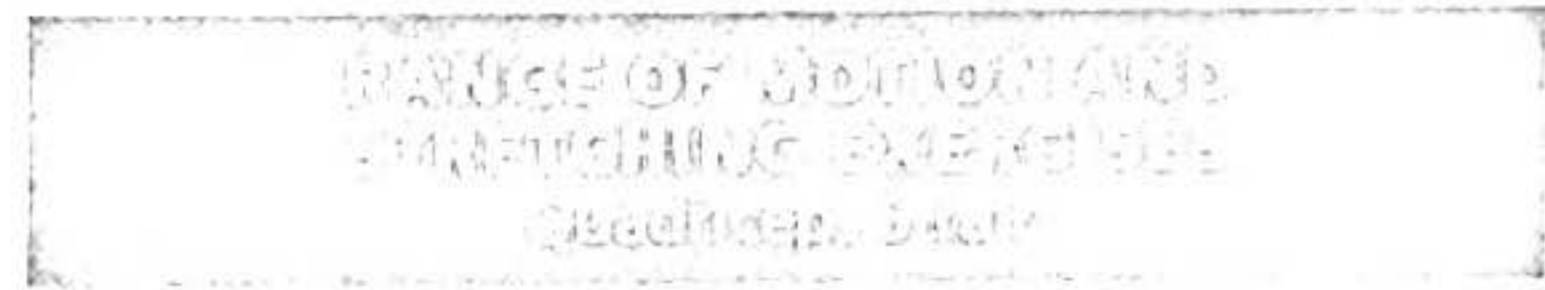
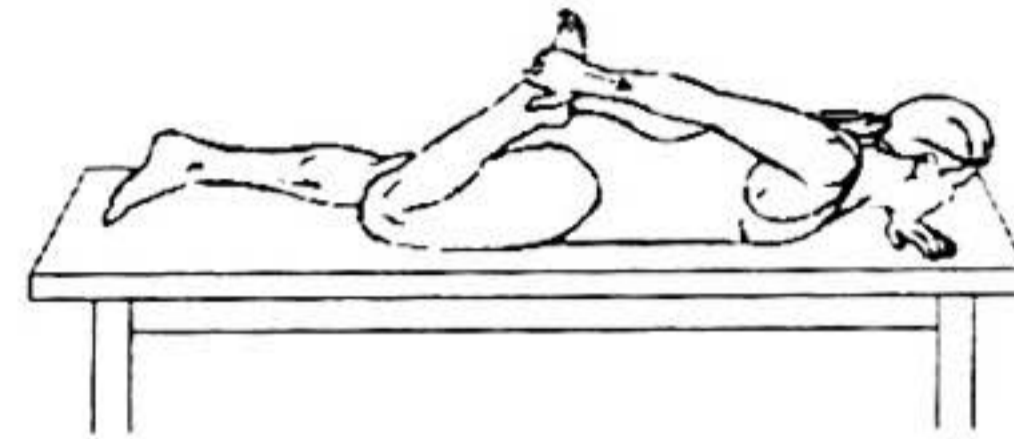


FIGURE 1 From DeLee JC, Drez D, Jr.: *Orthopedic sports medicine: principles and practice*, Philadelphia, 1994, W.B. Saunders, p 1103.



These are some of the *initial* exercises you may use to start your rehabilitation program, until you see your physician, physical therapist, or athletic trainer again, or until your symptoms resolve. Please remember:

- Flexible tissue is more tolerant of the stresses placed on it.
- A *gentle* stretching sensation should be felt.



FLEXIBILITY • Quadriceps Stretch

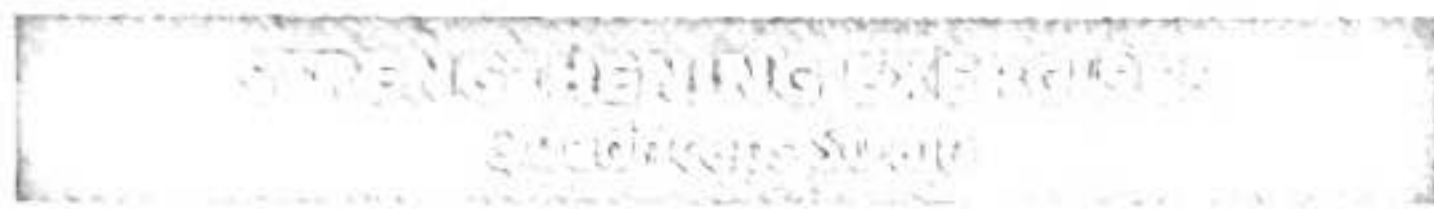
1. Lie on your stomach as shown.
2. Bend your knee and grasp your toes, foot, or ankle. If your leg feels too tight to do this, loop a belt or towel around your ankle and grasp that.
3. Pull your heel toward your buttocks, until you feel a stretching sensation in the front of your thigh.
4. Keep your knees together, and hold this position for ___ seconds.
5. Repeat this exercise ___ times, ___ times per day.



FLEXIBILITY • Hip Flexors, Lunge

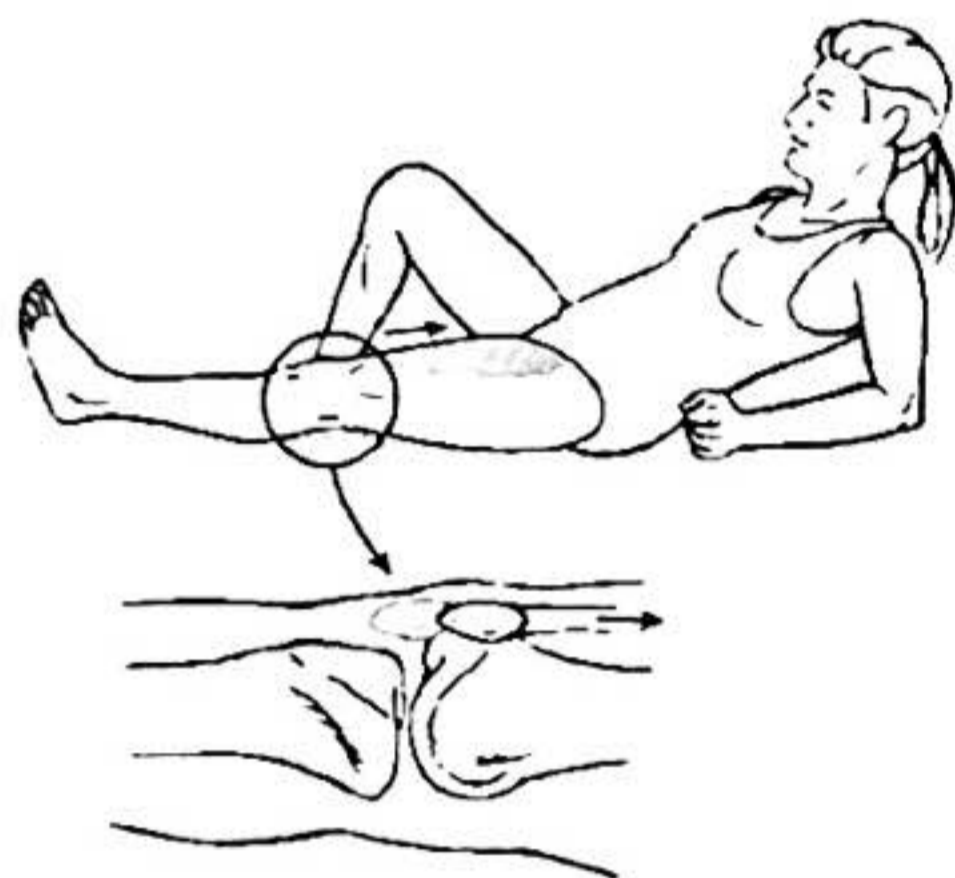
1. Assume the position shown in the diagram.
2. Lunge forward, leading with your hips. Do not bend forward at the waist, and keep your chest upright.
3. Hold this position for ___ seconds.
4. Repeat this exercise ___ times, ___ times per day.

878 QUADRICEPS STRAIN

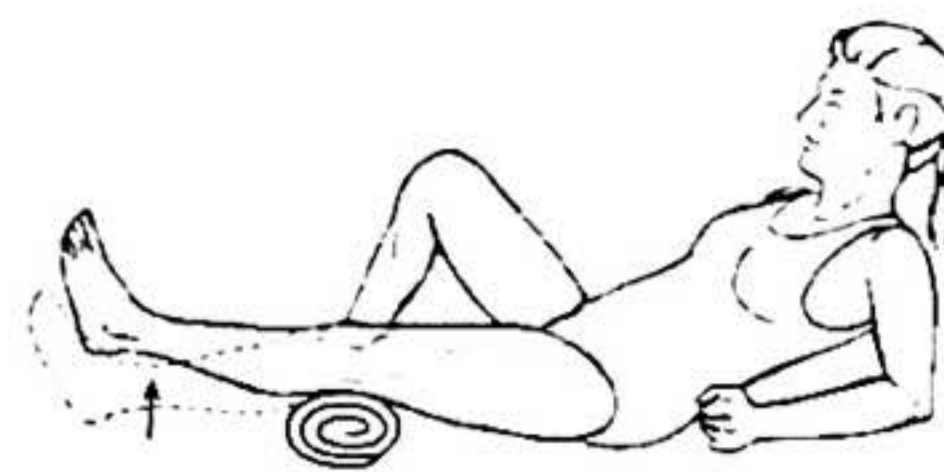


These are some of the *initial* exercises you may use to start your rehabilitation program, until you see your physician, physical therapist, or athletic trainer again, or until your symptoms resolve. Please remember:

- Strong muscles with good endurance tolerate stress better.
- Do the exercises as *initially* prescribed by your physician, physical therapist, or athletic trainer. Progress slowly with each exercise under their guidance, gradually increasing the number of repetitions and weight used.

**STRENGTH • Quadriceps, Isometric**

1. Lie flat or sit on the floor with your leg straight.
2. Tighten the muscle in the front of your thigh as much as you can, pushing the back of your knee flat against the floor. This will pull your kneecap up your thigh toward your hip.
3. Hold the muscle tight for ____ seconds.
4. Repeat this exercise ____ times, ____ times per day.

**STRENGTH • Quadriceps, Short Arcs**

1. Lie flat or sit on the floor with your leg straight.
2. Place a ____ inch roll under your knee, allowing it to bend.
3. Tighten the muscle in the front of your thigh as much as you can, and lift your heel off the floor.
4. Hold this position for ____ seconds.
5. Repeat this exercise ____ times, ____ times per day.

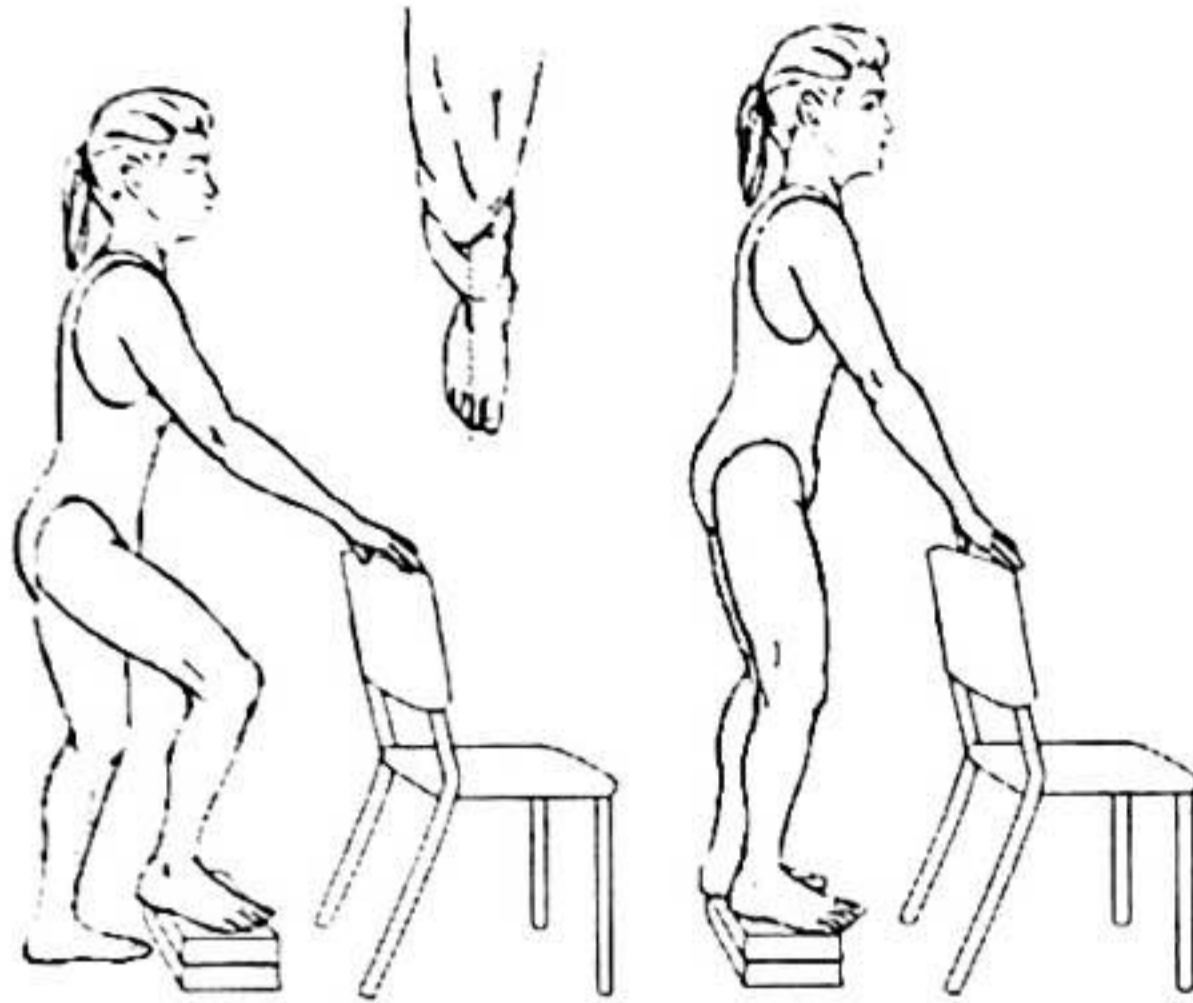
If allowed by your physician, physical therapist, or athletic trainer, a ____ pound weight may be placed around your ankle for additional resistance.

**STRENGTH • Quadriceps, Seven Count**

The quality of the muscle contraction in this exercise is what counts, not just your ability to lift the leg.

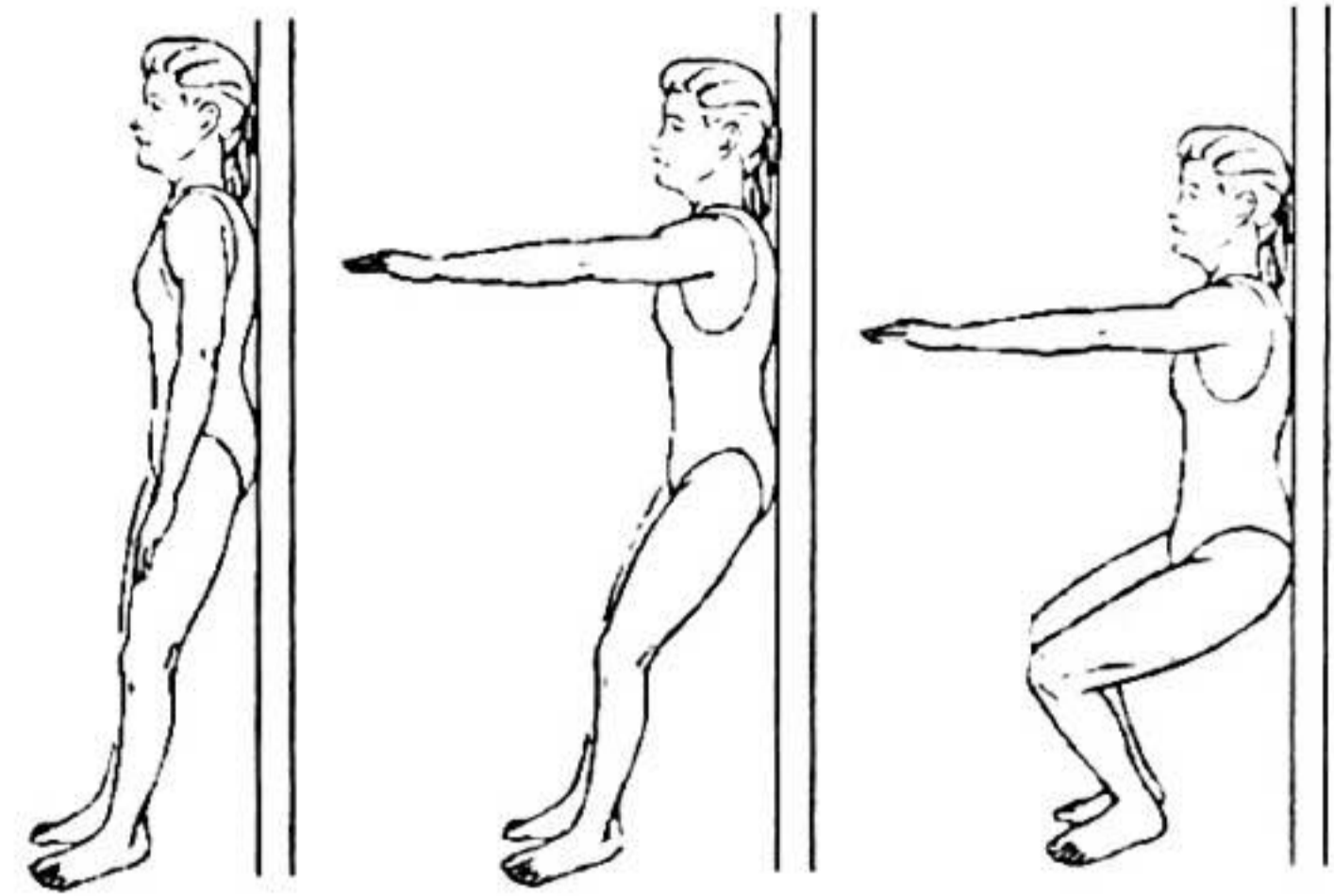
1. Lie on the floor with your leg straight out in front of you.
2. Tighten the muscle in the front of your thigh as much as you can, pushing the back of your knee flat against the floor.
3. Tighten this muscle *harder*.
4. Lift your heel 4 to 6 inches off the floor, and tighten this muscle *harder*.
5. Lower your heel back down to the floor. Keep the muscle in the front of your thigh as tight as possible.
6. Tighten this muscle *harder*.
7. Relax.
8. Repeat this exercise ____ times, ____ times per day.

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STRENGTH • Quadriceps, Step-ups

1. Use a step or books stacked about ____ inches high.
2. Place your foot on the step or books, making sure that your kneecap is in line with the tip of your shoe or your second toe. Hold on to a handrail, chair, wall, or another stable object for balance if needed.
3. *Slowly* step up and down. Make sure that your kneecap is always in line with the tip of your shoe or your second toe. Lightly touch the heel of your other leg to the floor, and return to the starting position.
4. Repeat this exercise ____ times, ____ times per day.



STRENGTH • Quadriceps, Wall Slide

1. Stand with your back against the wall. Your feet should be shoulder width apart and approximately 18 to 24 inches away from the wall. Your kneecaps should be in line with the tips of your shoes or your second toe.
2. Slowly slide down the wall so that there is a ____ degree bend in your knees. (Your physician, physical therapist, or athletic trainer will instruct you how to progress the amount of bend based on your symptoms and diagnosis.)
3. Hold this position for ____ seconds. Stand up and rest for ____ seconds.
4. Repeat this exercise ____ times, ____ times per day.