



# TIBIAL SHAFT FRACTURE

## ■ ■ ■ Description

A tibial shaft fracture is a complete or incomplete break in the larger of the two leg bones (tibia), between the knee and ankle. This fracture is common due to the lack of soft tissue around the structure, yet a large amount of trauma is required to break this bone. The break can occur anywhere within the tibia, although this discussion is only about fractures that do not include the ankle or knee joints.

## ■ ■ ■ Common Signs and Symptoms

- Severe pain in the leg at the time of injury
- Tenderness and swelling in the leg or calf
- Bleeding and bruising in the leg
- Inability to bear weight on the injured extremity
- Visible deformity if the fracture is complete and the bone fragments separate enough to distort normal leg contours
- Numbness and coldness in the leg and foot beyond the fracture site if the blood supply is impaired

## ■ ■ ■ Causes

- Injury causing a force greater than the bone can withstand
- Usually due to a direct blow
- Possibly due to weakening of the bone from repeated stress, resulting in a stress fracture that progresses to a complete fracture; common in joggers, marathon runners, and walkers
- Indirect stress caused by twisting or violent muscle contraction

## ■ ■ ■ Risk Increases With

- Contact sports, such as football, soccer, or hockey
- Motor sports
- Bony abnormalities (including osteoporosis), tumors of bone
- Metabolic disorders, hormone problems, and nutritional deficiencies and disorders (anorexia or bulimia)
- Poor physical conditioning (strength and flexibility)

## ■ ■ ■ Preventive Measures

- Appropriately warm up and stretch before practice or competition.
- Maintain appropriate conditioning:
  - Leg muscle strength and endurance
  - Flexibility
- Wear proper protective equipment (such as shin guards for soccer).

## ■ ■ ■ Expected Outcome

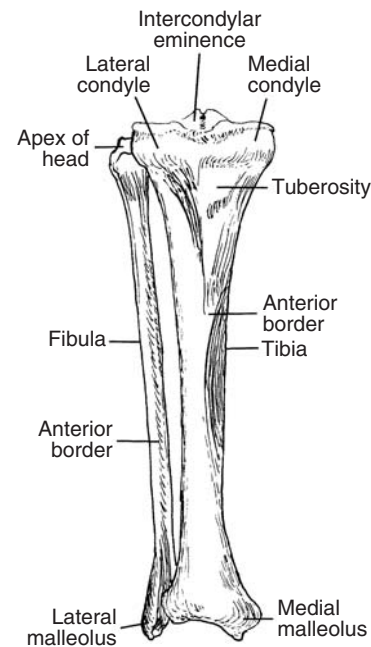
This condition is usually curable with appropriate treatment, although it may take 4 to 6 months to heal and return to sports may average 1 year from the onset of treatment.

## ■ ■ ■ Possible Complications

- Failure to heal (nonunion)
- Healing in a poor position (malunion)
- Compartment syndrome (excessive pressure within the leg, causing injury to the blood supply to the leg and foot and injuring the nerves and muscles to the leg and foot)
- Shortening of the injured bones
- Arrest of normal bone growth in children
- Risks of surgery, including infection, bleeding, injury to nerves (numbness, weakness, paralysis), and need for further surgery
- Infection in open fractures (skin is broken over the fracture site)
- Unstable or arthritic ankle or knee joint
- Prolonged healing time if activity is resumed too quickly
- Proneness to repeated leg injury
- Stiff ankle or knee

## ■ ■ ■ General Treatment Considerations

Initial treatment consists of medications, elevation of the leg, and ice to relieve pain and reduce swelling. Treatment requires cast or brace immobilization or surgery to place a rod, plate, or screws to fix the fracture. Occasionally, an external fixator, screws in the bone with a connecting frame outside the skin, is utilized to hold the fracture. Uncommonly, bone



**Figure 1**

From Nicholas JA, Hershman EB: *The Lower Extremity and Spine in Sports Medicine*. St. Louis, Mosby Year Book, 1995, p. 524.

stimulators, which provide electrical currents to the bone, may be recommended. After immobilization (with or without surgery), stretching and strengthening of the injured and weakened joint and surrounding muscles (due to the injury and the immobilization) are necessary. These may be done with or without the assistance of a physical therapist or athletic trainer. The rod, plate, or screws do not need to be removed.

### ■ ■ ■ Medication

- Nonsteroidal anti-inflammatory medications, such as aspirin and ibuprofen (do not take within 7 days before surgery), or other minor pain relievers, such as acetaminophen, are often recommended. Take these as directed by your physician. Contact your physician immediately if any bleeding, stomach upset, or signs of an allergic reaction occur.
- Narcotic pain relievers may be prescribed by your physician for severe pain. Use only as directed and only as much as you need.

### ■ ■ ■ Cold Therapy

Cold is used to relieve pain and reduce inflammation. Cold should be applied for 10 to 15 minutes every 2 to 3 hours for inflammation and pain and immediately after any activity that aggravates your symptoms. Use ice packs or an ice massage.

### ■ ■ ■ Notify Our Office If

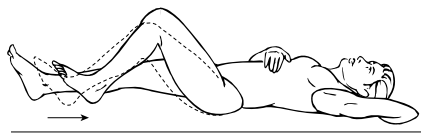
- Symptoms get worse or do not improve in 2 weeks despite treatment
- The following occur after immobilization or surgery (report any of these signs immediately):
  - Swelling above or below the fracture site
  - Severe, persistent pain
  - Blue or gray skin below the fracture site, especially under the nails, or numbness or loss of feeling below the fracture site
- New, unexplained symptoms develop (drugs used in treatment may produce side effects)

## EXERCISES

### ➤ RANGE OF MOTION AND STRETCHING EXERCISES • Tibial Shaft Fracture

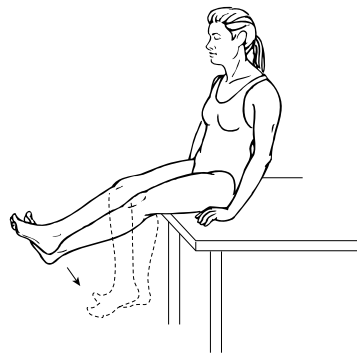
These are some of the *initial* exercises you may start your rehabilitation program with after you have been cleared to do so by your surgeon or physician. Continue these exercises until you see your physician, physical therapist, or athletic trainer again or until your symptoms are resolved. Please remember:

- Flexible tissue is more tolerant of the stresses placed on it during activities.
- Each stretch should be held for 20 to 30 seconds.
- A *gentle* stretching sensation should be felt.



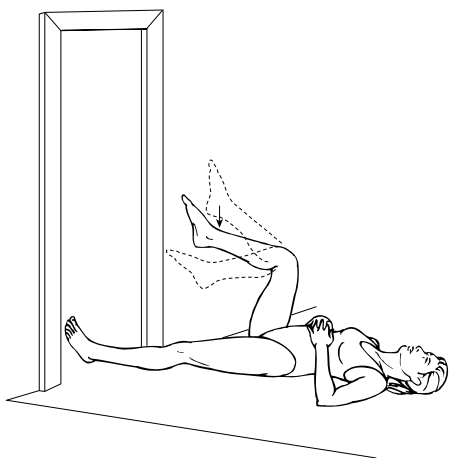
### RANGE OF MOTION • Knee Flexion

1. Lie on your back with your legs out straight.
2. Slowly slide your heel toward your buttocks. Bend your knee as far as is comfortable to get a stretching sensation.
3. Hold for \_\_\_\_\_ seconds.
4. Return your leg to the starting position.
5. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.



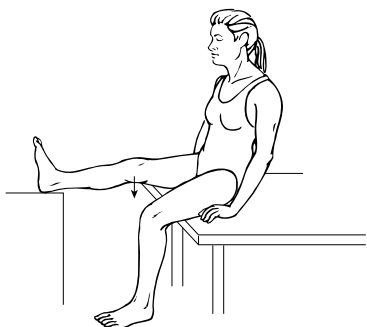
### RANGE OF MOTION • Knee Flexion and Extension

1. Sit on the edge of a table or chair.
2. Use the uninjured/unaffected leg to straighten (extend) and bend (flex) the injured/affected leg.
3. **Flexion**—Cross your ankles, placing the uninjured or unaffected leg on top of the injured/affected leg. Pull your heel(s) backward under the surface you are sitting on to increase the amount you can bend your knee.
4. **Extension**—Cross your ankles, placing the uninjured or unaffected leg under the injured/affected leg. Pull your heel(s) backward under the surface you are sitting on to increase the how much you can straighten your knee.
5. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.



**RANGE OF MOTION • Gravity Knee Flexion**

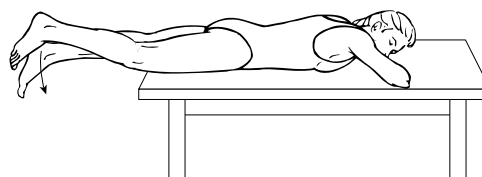
1. Lie on the floor as shown with your toes/foot lightly touching the wall.
2. Allow your toes/foot to slide down the wall, allowing gravity to bend your knee for you.
3. Obtain a “comfortable” stretching sensation.
4. Hold this position for \_\_\_\_\_ seconds. Then return the leg to the starting position.
5. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.



**RANGE OF MOTION • Knee Extension Sitting**

1. Sit with your leg/heel propped on another chair as shown. You may also prop your foot up on a rolled-up towel, a table, or a foot stool.
2. Relax, letting gravity straighten out your knee.
3. Hold this position for \_\_\_\_\_ seconds.
4. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.

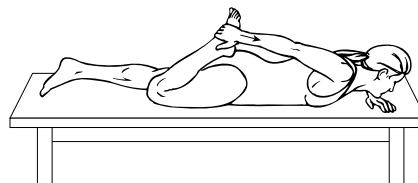
**Note:** *If authorized by your physician, physical therapist, or athletic trainer, you may place a \_\_\_\_\_ pound weight on your thigh just above your kneecap to obtain a more effective stretch.*



**RANGE OF MOTION • Knee Extension, Prone**

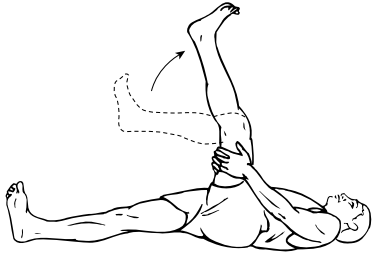
1. Lie on your stomach on a bed or sturdy table with your knee and leg off the table. The kneecap should be off the edge of the bed or table.
2. Allow gravity to straighten your knee for you.
3. Hold this position for \_\_\_\_\_ seconds.
4. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.

**Note:** *If authorized by your physician, physical therapist, or athletic trainer, you may place a \_\_\_\_\_ pound weight on your ankle to obtain a more effective stretch.*



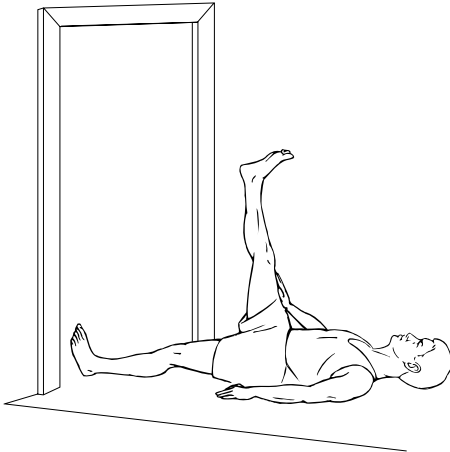
**STRETCH • Quadriceps, Prone**

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



### FLEXIBILITY • Hamstrings

1. Lie on your back with your leg bent and both hands holding on to it behind the thigh as shown.
2. Your hip should be bent to **90 degrees** and the thigh pointing straight at the ceiling.
3. Straighten out your knee as far as you can. Keep your thigh pointing straight toward the ceiling.
4. Keep the other leg flat on the floor.
5. Hold this position for \_\_\_\_\_ seconds.
6. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.



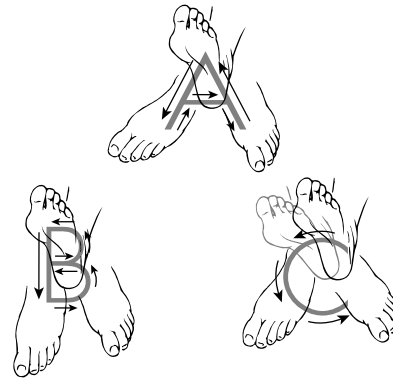
### FLEXIBILITY • Hamstrings, Doorway

1. Lie on your back near the edge of a doorway as shown.
2. Place the leg you are stretching up the wall keeping your knee straight.
3. Your buttock should be as close to the wall as possible and the other leg should be kept flat on the floor.
4. You should feel a stretch in the back of your thigh.
5. Hold this position for \_\_\_\_\_ seconds.
6. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.



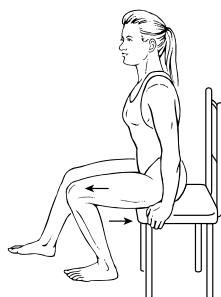
### RANGE OF MOTION • Active Dorsi/Plantar Flexion

1. Pull your toes and foot toward your body as far as possible, then point the foot and toes away from body as far as possible.
2. Perform this exercise with the knee straight and then with the knee bent.
3. Hold this position for \_\_\_\_\_ seconds.
4. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.



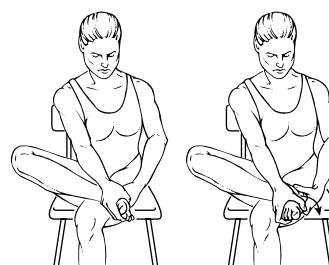
### RANGE OF MOTION • Ankle Alphabet

1. Write all the capital letters of the alphabet with your foot and ankle. The motion should come from your foot and ankle, not your hip or knee.
2. Move the foot and ankle slowly, writing the letters as large as possible/comfortable for you.
3. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.



**RANGE OF MOTION • Ankle Dorsiflexion**

1. Sit on the edge of a chair as shown.
2. Place your \_\_\_\_\_ foot closest to the chair
3. Keep your foot flat on the floor and move your knee forward over the foot.
4. Hold this position for \_\_\_\_\_ seconds.
5. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.



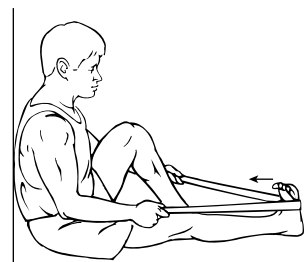
**RANGE OF MOTION • Ankle Eversion**

1. Sit with your \_\_\_\_\_ leg crossed over the other.
2. Grip the foot with your hands as shown and turn the sole of your foot upward and out so that you feel a stretch on the inside of the ankle.
3. Hold this position for \_\_\_\_\_ seconds.
4. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.



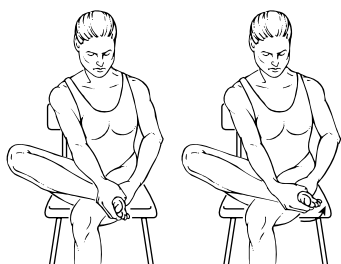
**RANGE OF MOTION • Ankle Plantar Flexion**

1. Sit in the position shown.
2. Using your hand, pull your toes and ankle down as shown so that you feel a gentle stretch.
3. Hold this position for \_\_\_\_\_ seconds.
4. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.



**STRETCH • Gastrocsoleus**

1. Sit with your leg straight out in front of you and loop a towel around the ball of your foot as shown in the diagram.
2. Pull your foot and ankle toward you using the towel.
3. Keep your knee straight while doing this. Do not let your knee bend.
4. Hold this position for \_\_\_\_\_ seconds.
5. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.



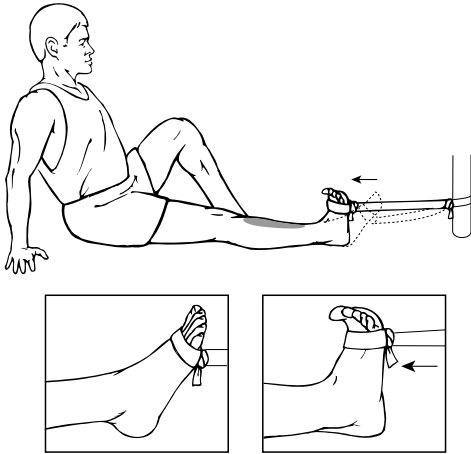
**RANGE OF MOTION • Ankle Inversion**

1. Sit with your \_\_\_\_\_ leg crossed over the other.
2. Grip the foot with your hands as shown and turn the sole of your foot upward and in so that you feel a stretch on the outside of the ankle.
3. Hold this position for \_\_\_\_\_ seconds.
4. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.

### > STRENGTHENING EXERCISES • Tibial Shaft Fracture

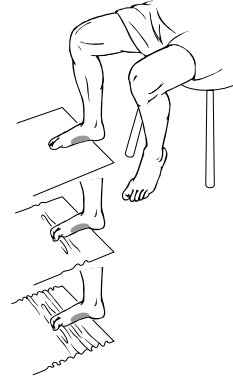
These are some of the *initial* exercises you may start your rehabilitation program with after you have been cleared to do so by your surgeon or physician. Continue these exercises until you see your physician, physical therapist, or athletic trainer again or until your symptoms are resolved. Please 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, gradually increasing the number of repetitions and weight used under their guidance.



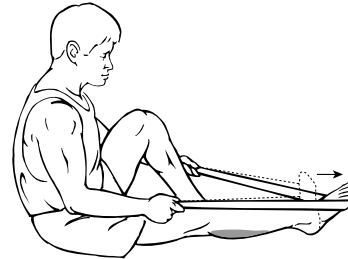
#### STRENGTH • Dorsiflexors

1. Attach one end of elastic band to fixed object or leg of table/desk. Loop the opposite end around your foot as shown.
2. Slowly pull the foot toward you. Hold this position for \_\_\_\_\_ seconds. Slowly return to starting position.
3. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.



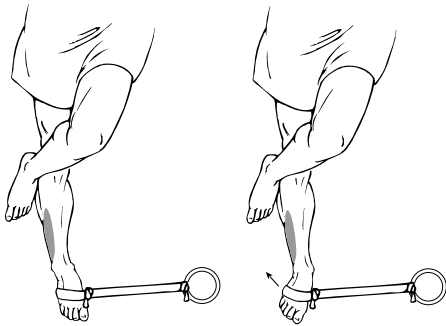
#### STRENGTH • Towel Curls

1. Sit in a chair and place a towel on a noncarpeted floor. Place your foot/toes on towel as shown. (You may also stand to do this exercise rather than sit.)
2. Curl/pull towel toward you with your toes while keeping your heel on the floor. Move towel with toes only. Do not move your knee or ankle.
3. If this is too easy, place a light weight (book, hand weight, etc.) at the far end of the towel.
4. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.



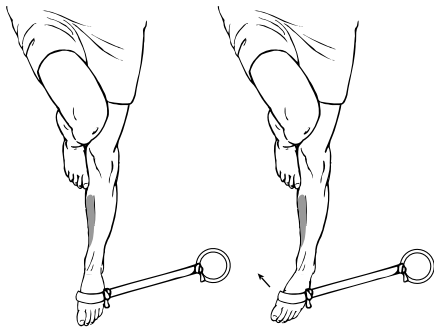
#### STRENGTH • Plantarflexors

1. Loop elastic band around foot as shown. Pull the band toward you with your hands.
2. Push your toes away from you slowly. Hold this position for \_\_\_\_\_ seconds. Slowly return to starting position.
3. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.



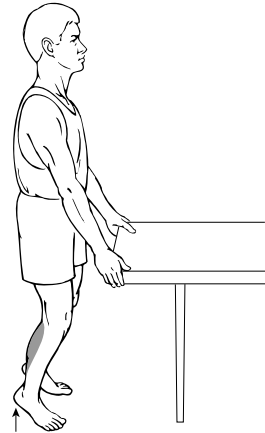
**STRENGTH • Ankle Eversion**

1. Attach one end of elastic band to fixed object or leg of table/desk. Loop the opposite end around your foot.
2. Turn your toes/foot outward as far as possible, attempting to pull your little toe up and outward. Hold this position for \_\_\_\_ seconds.
3. Slowly return to starting position.
4. Repeat exercise \_\_\_\_ times, \_\_\_\_ times per day.



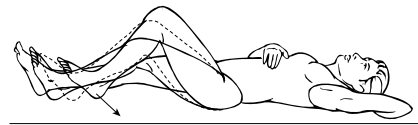
**STRENGTH • Ankle Inversion**

1. Attach one end of elastic band to fixed object or leg of table/desk. Loop the opposite end around your foot.
2. Turn your toes/foot inward as far as possible, attempting to push your little toe down and in. Hold this position for \_\_\_\_ seconds.
3. Slowly return to starting position.
4. Repeat exercise \_\_\_\_ times, \_\_\_\_ times per day.



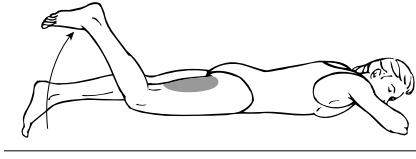
**STRENGTH • Plantarflexors**

1. Stand with feet shoulder-width apart. Hold on to counter or chair if necessary for balance.
2. Rise up on your toes as far as you can. Hold this position for \_\_\_\_ seconds.
3. Complete this exercise using only one leg if it is too easy using both legs.
4. Repeat exercise \_\_\_\_ times, \_\_\_\_ times per day.



**STRENGTH • Hamstring, Isometrics**

1. Lie on your back on the floor or a bed.
2. Bend your knee approximately \_\_\_\_ degrees.
3. Pull your heel into the floor or bed as much as you can.
4. Hold this position for \_\_\_\_ seconds. Rest for \_\_\_\_ seconds.
5. Repeat exercise \_\_\_\_ times, \_\_\_\_ times per day.

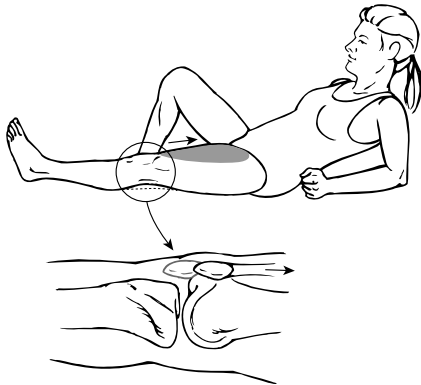


### STRENGTH • Hamstring, Curls

1. Lie on your stomach with your legs out straight.
2. Bend knee to 90 degrees. Hold this position for \_\_\_\_\_ seconds.
3. Slowly lower your leg back to the starting position.
4. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.

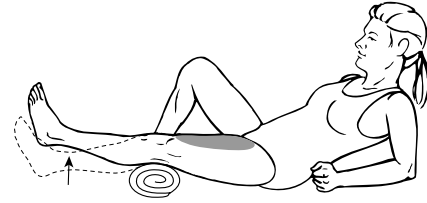
**Additional Weights: OK TO USE DO NOT USE!!!**

**If okay'd by your physician, physical therapist, or athletic trainer, a \_\_\_\_\_ pound weight may be placed around your ankle for additional weight.**



### STRENGTH • Quadriceps, Isometrics

1. Lie flat or sit 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.

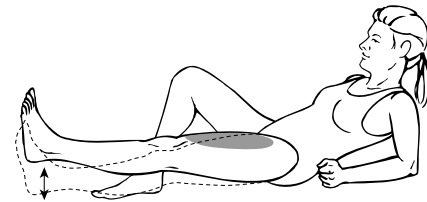


### STRENGTH • Quadriceps, Short Arcs

1. Lie flat or sit 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 knee as much as you can, and lift your heel off the floor.
4. Hold this position for \_\_\_\_\_ seconds.
5. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.

**Additional Weights: OK TO USE DO NOT USE!!!**

**If okay'd by your physician, physical therapist, or athletic trainer, a \_\_\_\_\_ pound weight may be placed around your ankle for additional weight.**

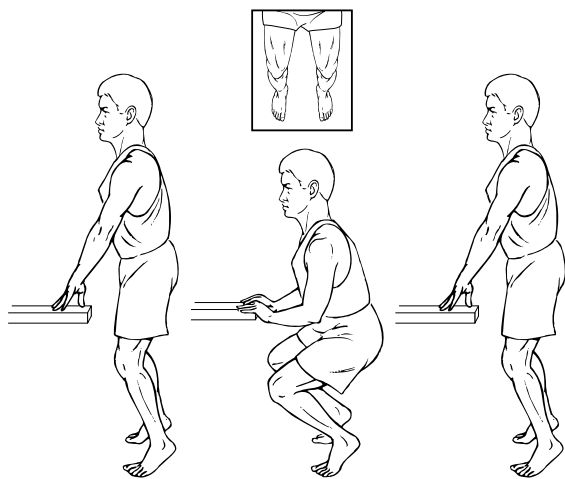


### STRENGTH • Quadriceps, 7 Count

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

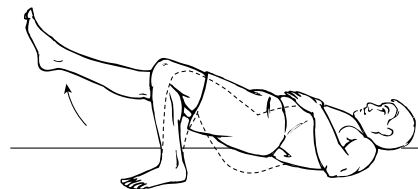
1. Tighten the muscle in front of your thigh as much as you can, pushing the back of your knee flat against the floor.
2. Tighten this muscle **harder**.
3. Lift your leg/heel 4 to 6 inches off the floor.
4. Tighten this muscle **harder again**.
5. Lower your leg/heel back to the floor. Keep the muscle in front of your thigh as tight as possible.
6. Tighten this muscle **harder again**.
7. Relax.
8. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.





**STRENGTH • Quads**

1. Stand with your feet shoulder-width apart and place equal weight on both legs.
2. Keep your kneecaps in line with your toes.
3. Slowly bend both knees, keeping *equal weight* on both legs, and return to a standing position.
4. **Do not bend your knees more than 90 degrees.**
5. You may use the edge of a table or counter for balance if needed.
6. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.



**STRENGTH • Hip Extension**

1. Lie on your back with your knees bent and feet flat on the floor.
2. Push down, raising your hips/buttocks off the floor.
3. Keep your pelvis level. Do not allow it to turn/rotate.
4. You may do this exercise with both legs together (which is easier) or with just one leg as shown (which is harder). Hold this position for \_\_\_\_\_ seconds.
5. Slowly lower to the starting position.
6. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.



**STRENGTH • Hip Abduction**

1. Lie on your side as shown with the injured/weak leg on top.
2. Bend the bottom knee slightly for balance. Roll your top hip slightly forward.
3. Lift your top leg straight up, leading with your heel. Do not let it come forward. Hold this position for \_\_\_\_\_ seconds.
4. Slowly lower your leg to the starting position.
5. Repeat exercise \_\_\_\_\_ times, \_\_\_\_\_ times per day.

Notes:

(Up to 4400 characters only)

Notes and suggestions