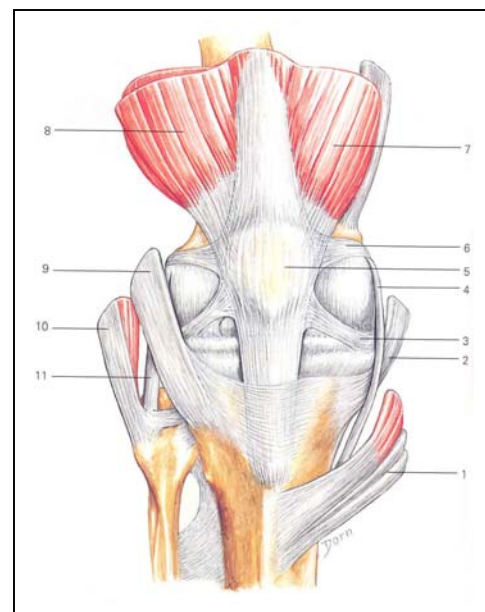


REHABILITATION AFTER REPAIR OF THE PATELLAR AND QUADRICEPS TENDON

The **patellar tendon** attaches to the tibial tubercle on the front of the tibia (shin bone) just below the front of the knee. It also is attached to the bottom of the patella (kneecap). At the top of the patella, the **quadriceps tendon** is attached. Attaching to the quadriceps tendon is the quadriceps muscle. The quadriceps muscle is the large muscle on the front of the thigh. As the quadriceps muscle contracts (shortens), it pulls on the quadriceps tendon, the patella, the patellar tendon, and the tibia to move the knee from a flexed (bent) position to an extended (straight) position. Conversely, when the quadriceps muscle relaxes, it lengthens. This allows the knee to move from a position of extension (straight) to a position of flexion (bent). When the patellar tendon ruptures, the patella loses its anchoring support to the tibia. Without this anchoring effect of the intact patellar tendon, the patella tends to move upward (towards the hip) as the quadriceps muscle contracts. Without the intact patellar tendon, the patient is unable to straighten the knee. If a rupture of the patellar tendon occurs, and the patient tries to stand up, the knee will usually buckle and give way because the quadriceps muscle is no longer able to hold the knee in a position of extension (straight). When the quadriceps tendon ruptures, the patella loses its anchoring support in the thigh. Without this anchoring effect of the intact quadriceps tendon, the patella tends to move inferiorly (towards the foot). Without the intact quadriceps tendon, the patient is unable to straighten the knee. If a rupture of the quadriceps tendon occurs, and the patient tries to stand up, the knee will also usually buckle and give way, again, because the quadriceps muscle is no longer able to hold the knee in a position of extension (straight). The office examination consists of palpating the quadriceps and patellar tendons and the patella. Usually, when these tendons rupture, the patella moves upwards on the thigh for patellar tendon ruptures and slips downward for quadriceps tendon ruptures. At the same time, the gap between the ends of the ruptured tendon is palpable on the front of the knee. X-rays of the knee usually reveal the abnormal position of the patella, indicating a rupture of the patellar/quadriceps tendon. This is an injury that must be treated surgically. Since the tendon is outside of the joint, it cannot be repaired arthroscopically. Usually, the repair is done as an outpatient or overnight stay. An incision is made on the front of the knee, over the tendon. The site of the tendon rupture is identified. The tendon ends are identified and then sewn together. Afterwards, a knee immobilizer or hinged brace is often used to protect the repair. The length of time required for bracing is usually a minimum of 6 weeks followed by several weeks of rehabilitation. The usual risks of surgery are involved including: infection, stiffness, suture reaction, failure of satisfactory healing, risks of anesthesia, phlebitis, pulmonary embolus (blood clot in the lungs), and persistent pain or weakness after the injury and repair.



Rehabilitation after Repair of the Quadriceps and Patellar Tendons

Phase One: The first week after surgery

Goals:

1. Control pain and swelling
2. Initiate knee motion
3. Activate the quadriceps muscles

Guidelines and Activities:

Knee Range of Motion:

There are no knee range-of-motion exercises at this time. Keep the knee in the post-op brace, locked in full extension (fully straight).

Brace and Crutches:

You will go home with crutches and a knee brace locked in full extension (straight). Unless otherwise instructed by the doctor, use crutches when walking and **bear weight as tolerated** (with brace-on and your knee locked straight) on the operated leg. When walking with the crutches, follow the instructions below:

Walking (weight bearing as tolerated):

- Put the crutches forward about one step's length.
- Put the injured leg forward; level with the crutch tips.
- Touch the foot of the involved leg to the floor and bear weight as tolerated (brace-on).
- While bearing weight (on the crutches if there is pain in the knee) on the involved leg, take a step through with the uninjured leg.

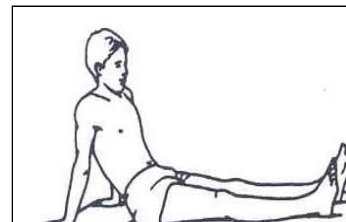
Elastic Stockings

Wear an elastic stocking (TED) below the knee when out of bed until your first post-operative office visit. Do at least 10 ankle pump exercises each hour to help prevent phlebitis (blood clots in the veins).

Exercise Program:

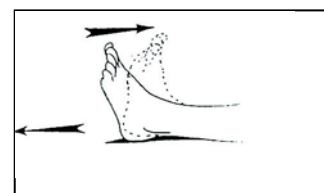
QUADRICEPS SETTING - to maintain muscle tone in the thigh muscles and straighten the knee.

Lie or sit with the knee extended fully straight as in figure. Tighten and hold the front thigh muscle making the knee flat and straight. If done correctly, the kneecap will slide slightly upward toward the thigh muscle. The tightening action of the Quadriceps should make your knee straighten and be pushed flat against the bed or floor. Hold 5 seconds for each contraction. Do 20 repetitions three times a day.



ANKLE PUMPS - to stimulate circulation in the leg.

You should do at least 10 ankle pump exercises each hour.



OFFICE VISIT

Please return to see the doctor approximately **10-14 days** after your surgery. At this time, your sutures will be removed and your progress will be checked. You will see the physical therapist for exercise instruction.

If you have any questions regarding the exercise program, call **617-725-7500**.

Rehabilitation after Repair of the Patellar and Quadriceps Tendon

Phase Two: 2 to 6 weeks after surgery

Goals:

1. Protect the tendon repair from overstress and allow healing
2. Regain knee motion, begin Continuous passive motion machine
3. Begin muscle strengthening

Knee Range of Motion:

You can fully extend (straighten the knee). To avoid placing excess stress on the tendon repair, do not bend your knee beyond 90 degrees (bent to a right angle). Your doctor will give you instructions if this limit will be different than outlined here.

Brace and Crutches:

Unless otherwise instructed by the doctor, use crutches when walking and **bear weight as tolerated** on the operated leg. Wear the post-operative brace for walking. Lock the brace with the knee fully straight when walking to protect the knee in case of a fall. You can unlock the brace to sit or move the knee when not walking if the doctor allows you to. When walking with the crutches, follow the instructions below:

Walking (Weight bearing as tolerated), brace locked in full extension:

- Put the crutches forward about one step's length.
- Put the injured leg forward; level with the crutch tips.
- Touch the foot of the involved leg to the floor and bear as much weight as you can without pain
- If you cannot bear full weight without pain, place some of your weight on the crutches so that there is no pain with weight bearing
- If you are able to bear full weight without pain, you can taper to one crutch, held on the opposite side of your affected knee.
- If you continue to have no pain with weight bearing, you can discontinue the crutch and walk with the brace only locked in full extension.

Continuous Passive Motion (CPM)

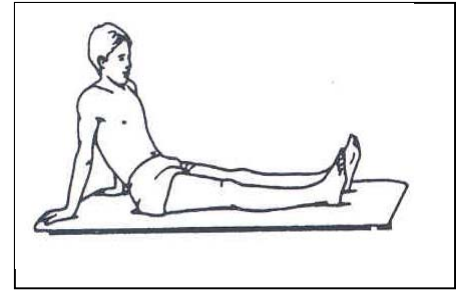
Begin the CPM machine at home. Do not wear the brace when in the CPM machine. You should use the machine at least 10 hours per day. You may move the machine to a sofa, the floor or onto a bed as you change positions and locations. You can use the machine at night while sleeping; slow down the machine at night to facilitate sleeping. Extension (knee straight) on the machine should be set at minus five degrees at all times to help your knee extend. It is very important that you straighten the knee completely! The machine

should be programmed to include an extension pause of 5 seconds (in other words, when the knee is straightened out, it pauses in the straight position to allow you to stretch it out straight). Your doctor will give you instructions about how much flexion or bend you should set for your knee in the CPM (typically the range recommended is 0 to 40°).

Exercise Program

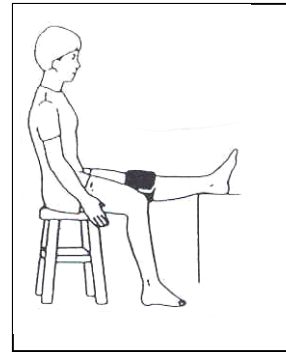
The following exercise program should be followed as directed by the doctor or the physical therapist. Do the exercises daily unless otherwise noted.

QUADRICEPS SETTING - to maintain muscle tone in the quadriceps (thigh) muscles and (extend) straighten the knee. Lie on your back with the knee extended fully straight as illustrated. Tighten (contract) and hold the front thigh muscle (quadriceps) making the knee flat and straight. If done correctly, the kneecap will slide slightly upward toward the thigh muscles. The tightening action of the quadriceps muscles should make your knee straighten and be pushed flat against the bed or floor. Hold five seconds for each contraction. Do 20 repetitions at least three times a day.

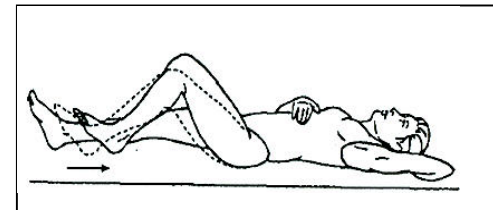


HEEL PROP - to straighten (extend) the knee. See figure in phase 1. Lie on your back with a rolled up towel under your heel or sit in a chair with the heel on a stool as shown in. Let the knee relax into extension (straight). If the knee will not straighten fully, you can place a weight (2 to 5 pounds) on the thigh, just above the kneecap.

Try to hold this position for **5 minutes, three times a day. While maintaining this extended position, practice quadriceps setting.**



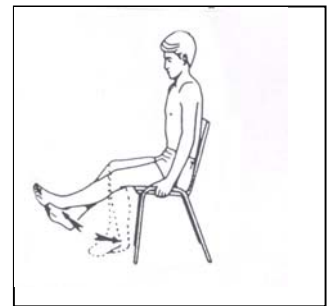
HEEL SLIDES - to regain the bend (flexion) of your knee. While lying on your back, use your muscles to slide your heel backward to bend the knee. Keep bending the knee until you feel a stretch in the front of the knee to **a limit or maximum of 90°**. Hold this bent position for five seconds and then slowly relieve the stretch and straighten the knee. While the knee is straight, you may repeat the quadriceps setting exercise. Repeat 20 times, 3 times a day.



SITTING KNEE FLEXION -

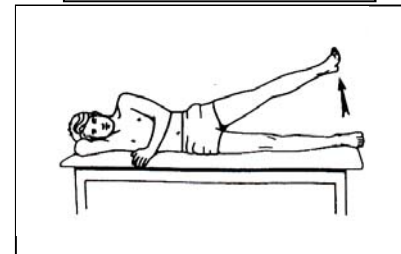
to regain the bend (flexion of the knee). While sitting in a chair or over the edge of your bed, support the operated leg with the uninvolved leg. Lower the operated leg, with the unoperated leg controlling, allowing the knee to bend to **a limit or maximum of 90°**. Hold five seconds and slowly relieve the stretch by lifting the foot upward, with the uninvolved leg, to the straight position (passive assist).

Repeat exercise 20 times, three times a day.



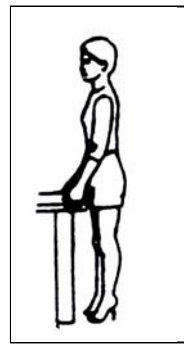
HIP ABDUCTION - lie on your unoperated side. Keep the knees fully extended. Raise the operated limb upward to a 45 degree angle as illustrated.

Hold one second, then lower slowly. Repeat 20 times, once or twice a day

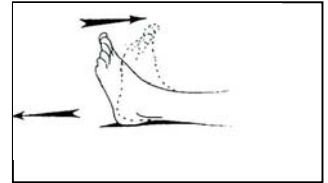


STANDING TOE RAISES

With the knee brace on, use a table for support and balance. Tighten the quadriceps to hold the knee fully straight. Raise up on 'tip-toes' while maintaining the knees in full extension. Hold for one second, then lower slowly to the starting position.



ANKLE PUMPS - move your foot up and down at the ankle to stimulate circulation in the leg. You should do at least 10 ankle pump exercises each hour.



OFFICE VISIT

Please make an appointment with the doctor at 6 weeks after surgery. If you have questions about the exercise program, call 617-726-7500.

Rehabilitation after Repair of the Patellar and Quadriceps tendon

Phase Three: Six to Twelve weeks after Surgery

Goals:

1. Walk normally
2. Regain and improve range of motion
3. Start muscle strengthening exercises

Activities:

The repaired tendon is still weak and subject to injury if you overload it. You should be careful walking up and down steps or inclined surfaces.

1. You may begin to wean from the knee immobilizer as instructed by your doctor. It is recommended that if walking without the immobilizer, you use one crutch on the side opposite your injured knee, in case you slip or stumble.
2. Avoid squatting, deep knee bends, and lunging movements and do not try to step up or down stairs.
Bear full weight on level surfaces and try to avoid limping, and walk slowly but normally.
3. Continue to ice the knee if there is pain and swelling. Place a towel or cloth between the skin and the ice to prevent skin injury.

Brace and Crutches:

Unless otherwise instructed by the doctor, you can gradually discontinue crutches when walking and **bear full weight** on the operated leg. Wear the post-operative brace for walking. Your doctor may make an adjustment to the brace so that you can bend your knee when you walk. Be sure that you get specific instructions from the doctor before making any changes to your support when walking.

Exercise Program:

The following exercise program will help you regain knee motion and strength. If the exercises can be performed easily after the first week, then an ankle weight may be used to increase the resistance of the exercise and to build strength. Start with one pound and add one pound per week until you reach five pounds.

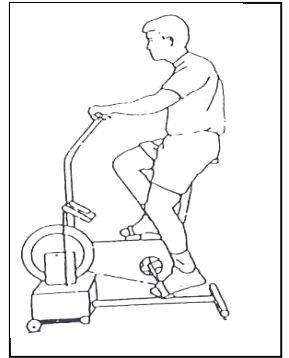
Do the exercises daily for the first week, then decrease to every other day when using ankle weights.

You may ride the stationary bicycle daily for 10 to 20 minutes.

Avoid using stair-stepper machines, doing deep knee bends and squats or any exercise that causes crunching, clicking or pain at the kneecap.

STATIONARY BICYCLE

Utilize a stationary bicycle to move the knee joint and increase knee flexion. If you cannot pedal all the way around, then keep the foot of your operated leg on the pedal, and pedal back and forth until your knee will bend far enough to allow a full cycle. Most people are able to achieve a full cycle revolution backwards first, followed by forward. You may ride the cycle with no resistance for 10 to 20 minutes a day. Set the seat height so that when you are sitting on the bicycle seat, your knee is fully extended with the heel resting on the pedal in the fully bottom position. You should then ride the bicycle with your forefoot resting on the pedal.



QUADRICEPS SETTING - to maintain muscle tone in the thigh muscles and straighten the knee. See figure in phase 1.

Lie on your back with the knee extended fully straight. Tighten and hold the front thigh muscle making the knee flat and straight. If done correctly, the kneecap will slide slightly upward toward the thigh muscle. The tightening action of the quadriceps should make your knee straighten and be pushed flat against the bed or floor. Hold 5 seconds for each contraction. Do 20 repetitions three times a day until you can fully straighten your knee equal to the unoperated side.

HEEL PROP - to straighten (extend) the knee. See figure in phase 1.

Lie on your back with a rolled up towel under your heel or sit in a chair with the heel on a stool as shown in. Let the knee relax into extension (straight). If the knee will not straighten fully, you can place a weight (2 to 5 pounds) on the thigh, just above the kneecap. Try to hold this position for **5 minutes, three times a day. While maintaining this extended position, practice quadriceps setting.**

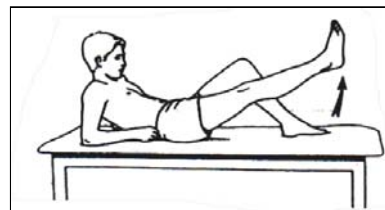
SITTING HEEL SLIDES - to regain the bend (flexion of the knee). See figure in phase 1.

While sitting in a chair or over the edge of your bed, support the operated leg with the uninvolved leg. Lower the operated leg, with the unoperated leg controlling, allowing the knee to bend but **DO NOT** exceed 90 degrees of bend at the knee. Hold five seconds and slowly relieve the stretch by lifting the foot upward, helping with the uninvolved leg, to the straight position (passive assist). Repeat exercise 20 times, three times a day.

STRAIGHT LEG LIFT

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

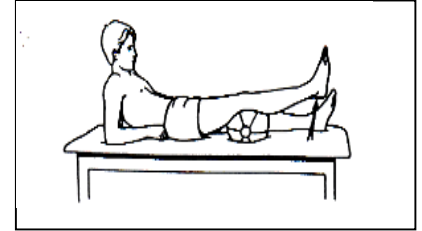
1. Tighten the quadriceps (quadriceps setting) as much as you can, push the back of the knee against the floor.
2. Tighten this muscle **harder!**
3. Lift your heel 4 to 6 inches off the floor
4. Tighten the quadriceps **harder again.**
5. Lower your leg and heel back to the floor. Keep the quadriceps as tight as possible.
6. Tighten this muscle **harder again.**
7. Relax and repeat .



If the knee bends when you attempt to lift the limb off of the bed, do not do this exercise. Keep trying to do the quadriceps setting exercise until you can lift the limb without letting the knee bend.

SHORT ARC LIFT

With the knee bent over a rolled up towel or blanket of a height of 4-5 inches (the knee should be bent only 20-25 degrees), lift the foot so that the knee fully straightens. Hold the knee locked in extension for 5 seconds, then slowly lower. Repeat 20 times.

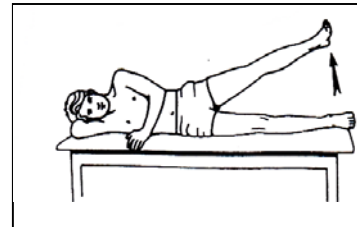


ANKLE PUMPS - to stimulate circulation in the leg. See figure in phase 1.

You should do at least 10 ankle pump exercises each hour.

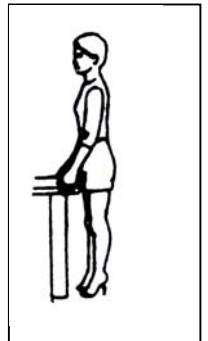
HIP ABDUCTION

Lie on your unoperated side. Keep the knees fully extended. Raise the operated limb upward to a 45 degree angle as illustrated. Hold one second, and then lower slowly. Repeat 20 times.



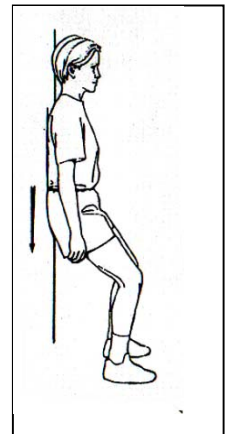
STANDING TOE RAISE

Stand facing a wall, hands on the wall for support and balance. Keep the knees extended fully. Tighten the quadriceps to hold the knee fully straight. Raise up on 'tip-toes' while maintaining the knees in full extension. Hold for one second, then lower slowly to the starting position. Repeat 20 times.



WALL SLIDES

Stand upright with your back and buttocks touching a wall. Place the feet about 12 inches apart and about 6 inches from the wall. You will be bearing 50% of your weight (or less on the affected side) on each leg. Slowly lower your hips by bending the knees and slide down the wall until the knees are flexed about 45 degrees (illustration). Pause five seconds and then slowly slide back up to the upright starting position. When doing a wall slide, you should position your thighs so that your kneecaps are in line with the tips of your shoes, or your second toe, and try to keep equal weight on both feet. Do 20 repetitions.



OFFICE VISIT

Please make an appointment with the doctor at 12 weeks after surgery. If you have questions about the exercise program, call MGH Sports Physical Therapy at 617-726-7500.

Rehabilitation after Patellar Tendon and Quadriceps Tendon Repair

Phase 4: Twelve weeks after surgery onward

ACTIVITIES

1. Walking/Stairs

You should be walking without the aid of a brace or crutches. If you feel confident walking on the operated limb and have good strength and knee motion, you can begin attempting to walk up-stairs on the operated limb. It is not recommended that you lower yourself down-stairs on the operated limb until you complete the enclosed 'Step up-down progression'.

2. Knee Support – for excess activities

Buy an elastic knee sleeve (made of neoprene rubber) at a sporting goods store. It should have an opening for the kneecap and velcro straps but does not need hinges on the sides. Use this support if you are on your feet for a prolonged period of time.

3. Stationary Bicycle – good exercise

Utilize a stationary bicycle to both strengthen the thigh muscles and increase knee flexion. If you cannot yet pedal all the way around, then keep the foot of your operated leg on the pedal, and pedal back and forth until your knee will bend far enough to allow a full cycle. You may ride the cycle with mild resistance for up to 10 minutes a day. Set the seat height so that when you are sitting on the bicycle seat, your knee is fully extended with the heel resting on the pedal in the fully bottom position. You should then actually ride the bicycle with your forefoot resting on the pedal.

4. Swimming –good exercise

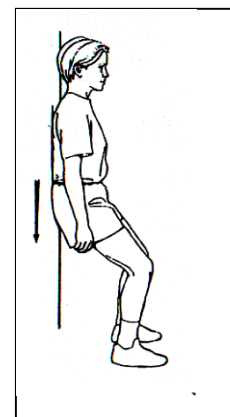
Swimming is good exercise at this time, if available.

5. Exercises

You should add the following exercises, every other day, as instructed by the physical therapist:

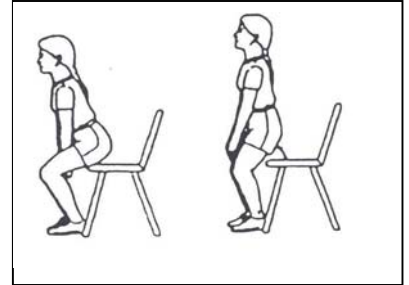
WALL SLIDES

Stand upright with your back and buttocks touching a wall.
Place the feet about 12 inches apart and about 6 inches from the wall.
Slowly lower your hips by bending the knees and slide down the wall until the knees are flexed about 45 degrees (illustration). Pause five seconds and then slowly slide back up to the upright starting position. When doing a wall slide, you should position your thighs so that your kneecaps are in line with the tips of your shoes, or your second toe. This exercise is illustrated in phase 2.



SQUAT TO CHAIR

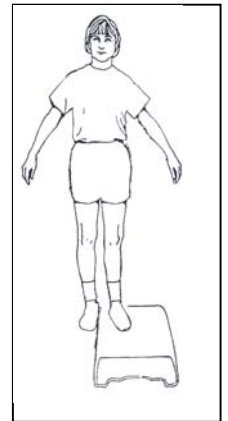
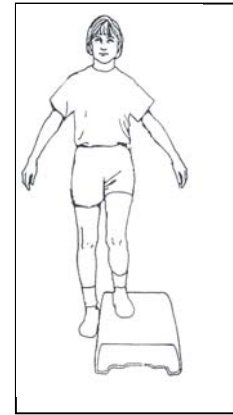
In the chair squat exercise, you lower your buttocks toward the chair until your buttocks touch the chair. Do not sit or rest at the chair, but instead immediately and slowly return to the standing and starting position. Remember to keep your head over your feet and bend at the waist as you descend. When doing a squat, you should position your thighs so that your kneecaps are in line with the tips of your shoes, or your second toe. After the first week, you may hold dumbbells while performing this exercise and the wall slide. Start with 3 to 5 pounds each hand. You may add 2 to 3 pounds per week until you reach 10 pounds in each hand.



STEP-UP-DOWN EXERCISE

At this time, it is important to begin the development of single-leg strength. Begin to follow the “Step-up-down Strengthening progression” outlined below, if you are able to do the exercises without pain. The instructions estimate a time period of 6 to 8 weeks for you to progress through the whole program. This time line will vary for different people and knees, depending upon the presence of other knee problems.

Place the foot of the operated limb on the stool. Maintain balance, if necessary, by holding onto the wall or chair. Standing **sideways** to the step, slowly step up onto the stool and slowly straighten the knee using the quadriceps muscles. Slowly lower the opposite foot to touch the floor. Do not land on the floor, just touch gently and repeat the step up



Step Up-Down exercise Progression (12-20 weeks after surgery)

Start with a step of 3 inches in height

Start with 3 sets of 5 repetitions for the first 2 weeks. If pain free, add one repetition per set, per workout, until you can do 3 sets of 10 (about 2 weeks)

If pain free, progress to a step of 6 inches in height

Repeat progression starting with 3 sets of 5 repetitions for 2 weeks.

After that, if pain free,

Add one repetition per set until you can do 3 set of 10 (about 2 weeks)

If pain free, progress to a step of 9 inches in height (the height of a standard stair).

Repeat progression starting with 3 sets of 5 repetitions for 2 weeks. After that,

if pain free, Add one repetition per set until you can do 3 set of 10 (about 2 weeks)

Do not continue to raise the height of the step if there is pain or crepitus at the kneecap.

ONE LEGGED TOE RAISES

Continue the toe-raises from phase 2, but now try to raise up and down slowly on just the operated side. Hold the unoperated foot off the floor and hold the wall or a chair or table for balance and support. Build to 3 sets of 15 repetitions.

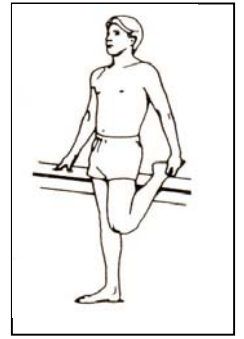


HAMSTRING STRETCH

Perform this stretch in the position illustrated. Bend slowly forward at the hips, keeping the knee fully extended until you feel gentle stretch in the back of your thigh and knee. Hold the stretch for 15 to 20 seconds and repeat 3 to 5 times.

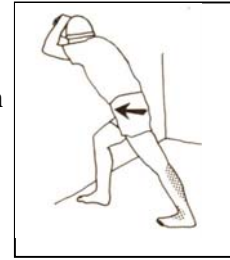
QUADRICEPS STRETCH

This stretch is performed in the position illustrated. Lean gently backward as if bringing you heel toward the buttock. When a stretch is felt in the front of the thigh and knee, hold 15 to 20 seconds for 3 to 5 repetitions.



CALF STRETCH

In the position illustrated, keep the heel flat on the floor and the knee fully extended. Lean forward at the hips with the arms supporting your weight. When you feel a gentle stretch in the back of your calf and knee, hold for 15 to 20 seconds for 3 to 5 repetitions.

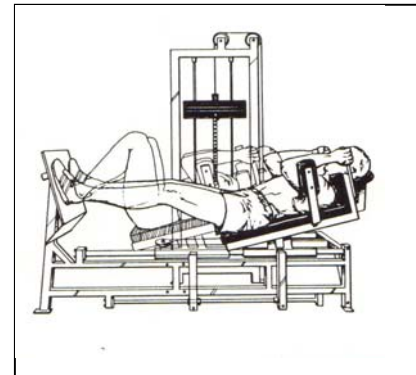


OPTIONAL ADDITIONAL EXERCISES

The following exercises may be added to your exercise program at 16weeks after surgery:

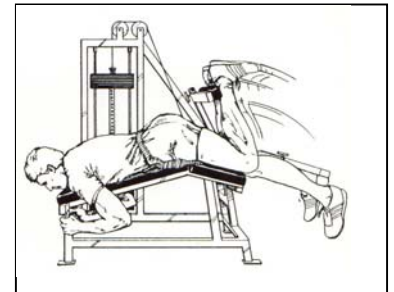
SEATED LEG PRESS

If you are using a leg press machine for strengthening, use an amount of weight that feels easy enough to perform 20 repetitions as the starting weight for this exercise. Use this weight for the first week before raising the weight. The weight may be increased by about 5 pounds every 7 to 10 days thereafter, as long as you can perform 20 repetitions per set for 3 sets, and as long as the weight used does not exceed body-weight when using both legs, or ½ body weight when using the one leg. In this exercise, avoid letting the knees **snap** or drop suddenly into extension when reaching the fully straightened position. Avoid starting the exercise with the knees bent past 90 degrees. Adjust the seat position to limit the excursion of the machine



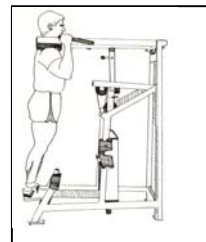
RESISTED HAMSTRING CURLS

If you have access to a hamstring curl machine (illustration), you may start using it. As with the leg press, start with a reasonable weight and use that weight for the first week. You may increase the weight by 3 to 5 pounds every 10 days as long as you can perform 3 sets of 20 repetitions slowly, with good form. If you do not have access to a hamstring machine, continue doing the standing hamstring curl adding an ankle weight for resistance. Start with 3 to 5 pounds and add 1 pound per week until you build to 10 pounds for 3 sets of 15 repetitions.



Additional Weight Training

Hip Abductor/Adductor machine
Roman Chair
Calf Raise Machine



Phase 4 Exercise Program Summary:

Frequency: 3 times a week

Sets and repetitions: 3 sets of 15 repetitions

- Leg Press
- Hamstring Curl
- Wall Slides
- Roman Chair
- Chair Squat
- Calf Raises or Calf Raise machine
- Hip Abductor/Adductor machine
- Step-up-down strengthening progression
- Hamstring, Calf and Quadriceps stretching
- Quadriceps setting 20 repetitions, 3 times a day

If you do not have access to gym equipment, the following exercises from phase 3 should be continued using ankle weights. In general, start with 1 lb and add 1 lb per week:

- Straight leg raise
- Side lying abduction
- Standing hamstring curl
- Toe raises

Precautions When Exercising

- Avoid pain at the tendon repair site
- Avoid pain and/or crepitus at the patella
- Build up resistance and repetitions gradually
- Perform exercises slowly avoiding quick direction change and impact loading
- Exercise frequency should be 2 to 3 times a week for strength building
- Be consistent and regular with the exercise schedule

Principles of Strength Training

- Warm-up prior to exercising by stationary cycling or other means
- You are “warmed –up” when you have started sweating
- Gently stretch all muscle groups next
- Do exercises involving multiple muscle groups first and individual muscle groups last
- Do aerobic workouts *after* strength workouts
- Cool-down by stretching after finishing exercise

The following exercises are not recommended because they may overload the patella and the tendon repair:

1. Knee extension using a weight lifting machine
2. Lunges
3. Stairmaster
4. Step exercises with impact
5. Running
6. Jumping
7. Pivoting or cutting

Call **617-726-7500**, if you have any question regarding the exercise program.

Rehabilitation after Patellar and Quadriceps Tendon Repair Surgery

Post-op Phase	Weight bearing status	Use of brace	Passive ROM and Active ROM	Strength training	Return to running and sports	Recommended Restrictions
Phase One The first 2 weeks after surgery	WBAT crutches	Knee immobilizer or post-op brace locked in full extension	Quad sets, ankle pumps No Knee flexion	None	None	No weight bearing on flexed knee No stairs
Phase Two 2 to 6 weeks after surgery	WBAT Crutches Progressively wean	Continue knee immobilizer for walking	Quad sets, active knee flexion, side leg lifts, toe raises CPM 10 hours a day	None OK for non-involved limbs	None	No SLRs yet No active knee extension exercises antigravity No stairs. Limit flexion to 90° maximum
Phase Three 6 to 12 weeks after surgery	FWB	Wean immobilizer per MD	Progressive active and gradual passive knee flexion Active stretching all uninvolved muscle groups Stationary bike	Progressive leg lifts antigravity, progress to ankle weight PRE Wall slides Partial squats	Progressive walking on level surfaces	Continue to avoid bearing full weight on stairs Avoid patellofemoral overload Limit OC and CC knee extension arc to 0-30
Phase Four 12 to 16 weeks after surgery	FWB	Neoprene support as needed	Full ROM Stretch all muscle groups	Cautious use of weight training machines Step-up-down progression	Walking on level surfaces and gentle inclines	Step up stairs gradually Avoid jumping
Phase 4 16 to 20 weeks after surgery	FWB	Neoprene support	Same as phase 3	Progressive strengthening avoiding overload	Walk-to jog progression	Step down stairs gradually
Phase 5 20 to 24 weeks after surgery	FWB	Neoprene support	Same	Same	Progressive run/speed/agility Jump training after 24 weeks post-op	Proceed gradually with caution