

Dr. Abigail R. Hamilton, M.D.

PHASE ONE: THE FINAL WEEK AFTER SURGERY

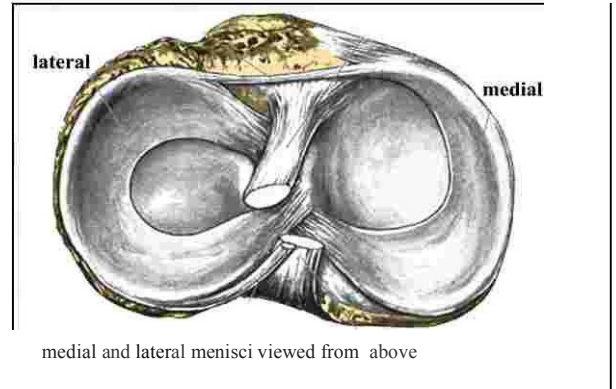
Goals:

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

Guidelines and Activities:

Knee Range of Motion:

You can fully extend (straighten the knee). To avoid placing stress on the meniscus repair, do not bend your knee beyond 90 degrees (bent to a right angle)



Brace and Crutches:

You will go home with crutches and a knee brace locked in full extension (straight).

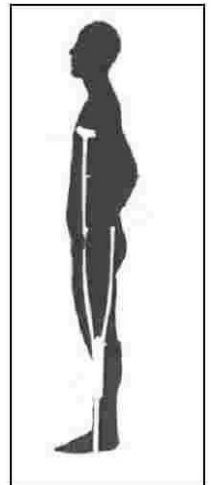
Unless otherwise instructed by the doctor, use crutches when walking and bear weight as tolerated on the operated leg. That is, you can bear as much weight as you can, even full weight, as long as there is no knee pain when you put your weight on the limb. Wear the post-operative brace for walking. Lock the brace 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. 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.
- 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).

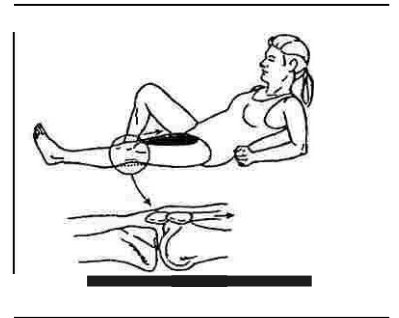


Exercise Program:

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.

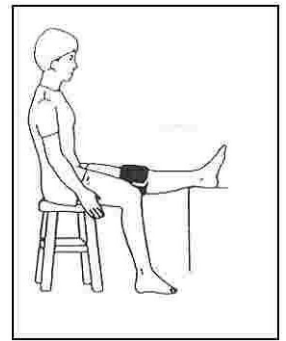
Hold 5 seconds for each contraction. Do 20 repetitions three times a day.



HEEL PROP- to straighten (extend) the knee.

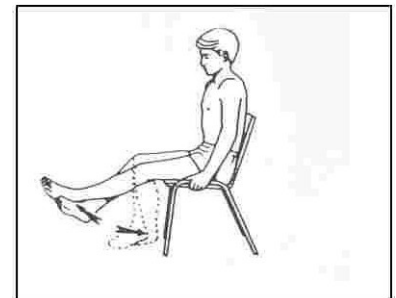
Lie on your back with a rolled up towel under your heel or sit in a chair with the heel on a stool as shown in the figure. Let the knee relax into extension (straight). If the knee will not straighten fully, you can place a weight (2 to 5 pounds) on the thigh, just above the kneecap.

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).

While sitting in a chair or over the edge of your bed, support the operated leg with the uninvolvement 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 uninvolvement leg, to the straight position (passive assist). Repeat exercise 20 times, three times a day.



ANKLE PUMPS - to stimulate circulation in the leg. You should do at least 10 ankle pump exercises each hour.

PHASE TWO: 2 TO 6 WEEKS AFTER SURGERY

Goals:

1. Protect the knee from overstress and allow healing
2. Regain knee motion, limiting knee flexion to 90 degrees
3. Begin muscle strengthening

Knee Range of Motion:

You can fully extend (straighten the knee). To avoid placing stress on the Meniscus repair, do not bend your knee beyond 90 degrees (bent to a right angle)

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. When walking with the crutches, follow the instructions below:

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

- Put the crutches forward at 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.

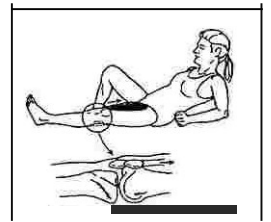
Exercise Program

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 thigh muscles and straighten the knee.

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.

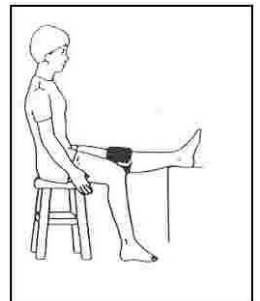
Hold 5 seconds for each contraction. Do 20 repetitions three times a day until you can fully straighten your knee equal to the unoperated side.



HEEL PROP - to straighten (extend) the knee.

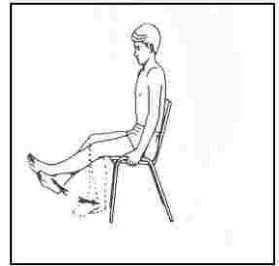
Lie on your back with a rolled up towel under your heel or sit in a chair with the heel on a stool as shown in. Let the knee relax into extension (straight). If the knee will not straighten fully, you can place a weight (2 to 5 pounds) on the thigh, just above the kneecap.

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.

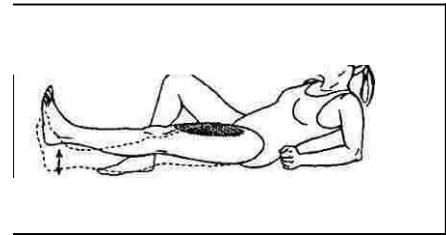
While sitting in a chair or over the edge of your bed, support the operated leg with the uninvolved leg. Lower the operated leg, with the unoperated leg controlling, allowing the knee to bend but **DO NOT** exceed 90 degrees of bend at the knee. Hold five seconds and slowly relieve the stretch by lifting 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!

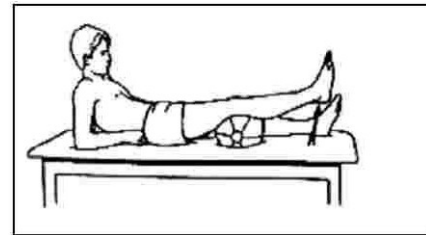
1. Tighten the quadriceps (quadriceps setting) as much as you can, push the back of the knee against the floor.
2. Tighten this muscle harder!
3. Lift your heel 4 to 6 inches off the floor
4. Tighten the quadriceps harder again.
5. Lower your leg and heel back to the floor. Keep the quadriceps as tight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

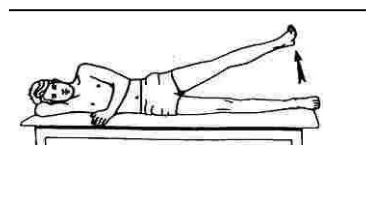


ANKLE PUMPS - to stimulate circulation in the leg. See figure in phase 1.

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

HIP ABDUCTION

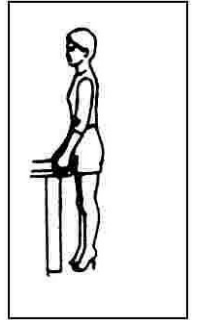
Lie on your unoperated side. Keep the knees fully extended. Raise the operated limb upward to a 45-degree angle as illustrated. Hold one second and then lower slowly. Repeat 20 times.



If the straight leg lift, short arc lift and side leg lift 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.

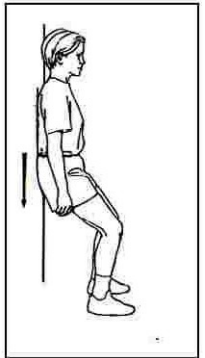
STANDING TOE RAISE

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.



PHASE THREE: 6 TO 12 WEEKS AFTER SURGERY

Goals:

1. Begin partial weight bearing
2. Regain full motion
3. Regain full muscle strength

Knee Range of Motion:

You can now begin to gradually regain normal range of motion of the knee.

Brace and Crutches:

If instructed by your doctor, you may discontinue the brace and begin to progressively walk nominally on the leg. Try to avoid limping and walk slowly but nominally. Avoid squatting or pivoting on the operated knee.

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.

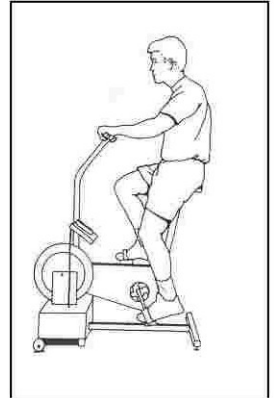
You may ride the stationary bicycle daily for 10 to 20 minutes.

Avoid using stair-stepper machines doing deep knee bends and squats. Avoid any exercise that causes crunching, clicking or pain at the kneecap. Do not pivot or twist on the knee.

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 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.



EXERCISE PROGRAM (see phase 2 for descriptions and illustrations)

QUADRICEPS SETTING

HEEL SLIDES

Do daily 20 repetitions

STRAIGHT LEG LIFT

SHORT ARC LIFT

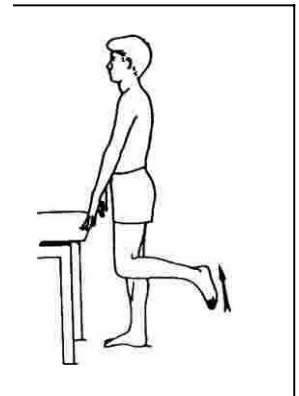
STANDING TOE

RAISES HIP

ABDUCTION

STANDING HAMSTRING CURL

Stand facing the wall, using the wall for balance and support. While standing on the unoperated limb bend the knee of the operated side and raise the heel toward the buttock. Hold this flexed position with the leg parallel to the floor for one second. Slowly lower the foot back to the floor. Keep the thighs aligned as illustrated. Repeat 20 times.

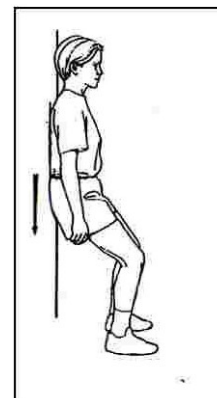


Do the above exercises every other day for 3 sets of 10 repetitions. Follow the outline on the first page of phase three where the ankle weight program is described.

Add the wall slide and chair squat exercises (every other day) as described below. Do not do these exercises if there is pain or grinding at the kneecap.

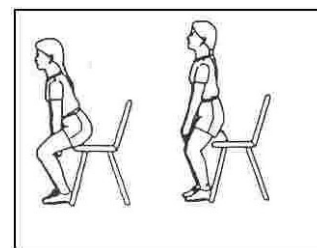
WALL SLIDES

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 inline with the tips of your shoes, or your second toe. This exercise is illustrated in phase 2.



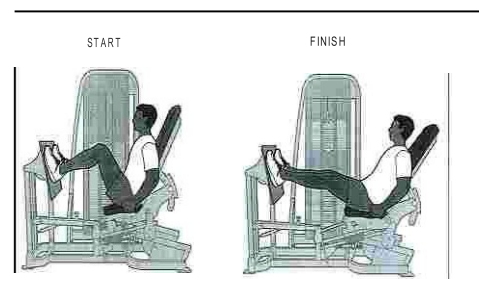
SQUAT TO CHAIR

In the chair squat exercise, you lower the 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.



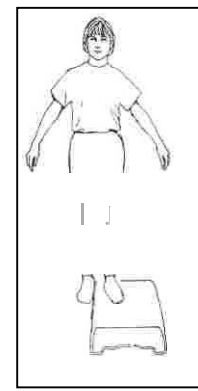
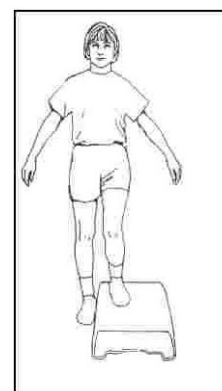
SEATED LEG PRESS

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 1/2 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.



Step Up- Down Exercise

Place the foot of the operated limb on a stool or step. Maintain balance, if necessary, by holding onto the wall or a chair (illustration). Standing sideways to the step, slowly lower the opposite foot to touch the floor. Do not land on the floor just touch gently and then step up onto the stool by straightening the knee using the quadriceps muscles. Try to keep an upright posture and avoid bending forward during the exercise. When doing a step up down, you should position your thigh so that your kneecap is in line with the tip of your shoe, or your second toe. Do 3 sets of 10 to 15 repetitions.



Progression for Step Up-Down Exercise

Start with a step of 3 inches in height. Start with 3 sets of 5 repetitions. 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 the above progression starting with 3 sets of 5 repetitions. 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 9 inches in height (the height of a standard stair).

Repeat this process of progression from 3 sets of 5, to 3 sets of 10 (about 2 weeks).

STRENGTHENING EXERCISES

Times per day: 1-2
Days per week: 5-7

Hamstring Stretch

3-5 reps holding for 15-30 sec

Quadriceps stretch

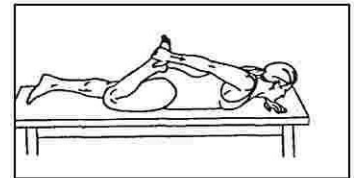
3-5 reps holding for 15-30 sec

Calf Stretch

3-5 reps holding for 15-30 sec

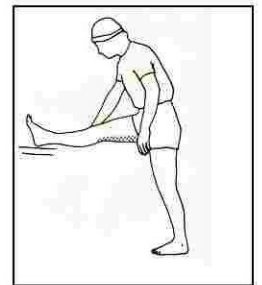
Quadriceps Stretch Prone

This stretch is performed in the position illustrated at the right. 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. Pull the 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.



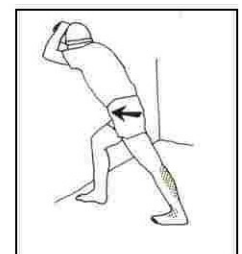
Hamstring Stretch

Perform this stretch in the position illustrated at the right. 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.



Calf/Achilles 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, 3 to 5 repetitions.



PHASE FOUR: 12 WEEKS AFTER SURGERY ONWARD

Goals:

1. Regain full muscle strength.
2. Work on cardiovascular conditioning.
3. Do sports-specific training.

ACTIVITIES

Muscle-Strengthening Exercises

You should continue muscle-strengthening exercises from phase 2 and 3 on a three times a week basis. At this time, you can decrease the number of repetitions per set from 15 to 10. This will allow you to work with more resistance. Remember to do all exercises slowly, with good form. Weights can be increased when you can do a particular weight easily, for 3 sets of 10 repetitions, for 3 consecutive workouts. At all times, be cautious of pain or crunching at the kneecap or patellar tendon while exercising. You may use resistance machines at your gym, DO NOT do Lunging or high impact drills or exercises *or* drills where you pivot on the fixed foot. Also avoid doing squats or leg press where the knee is allowed to bend past 90 degrees.

Cardiovascular Conditioning

You can use NordicTrack, stationary bicycle, elliptical trainer or swimming workouts to build cardiovascular fitness. Three to five times per week for 20 to 30 minutes is sufficient for improvement in this area. Please note that excessive long duration cardiovascular exercise can retard or delay muscular strength development when strength improvement and gains in muscle size are the programs primary goal.

Strengthening Program

Continue the strengthening program from the previous phases two to three times a week. The following exercises can be added at this time if there is no pain, swelling or noise under the kneecap:

Single-leg wall slide
Single leg squat

These additional exercises are described in the following pages.

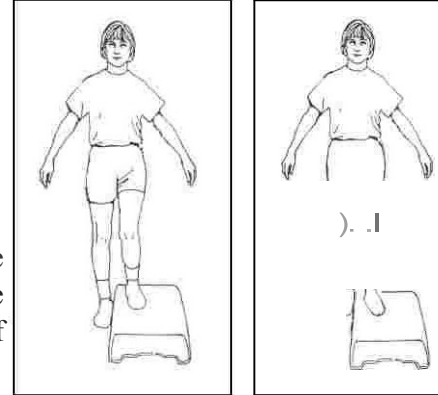
Instructions for Single Leg Exercises

Step Up- Down Exercise

Continue this exercise from Phase 3, 3 sets of 10 repetitions.

Single Leg Wall Slide Exercise

Stand on the single leg with your back and buttocks touching a wall. Place the foot about 6 inches from the wall. Slowly lower your body by bending the knee and slide down the wall until the knee is flexed about 45 degrees (illustration). Pause five seconds and then slowly slide back up to the upright starting position. Keep the hips level and be sure that you position your thigh so that your kneecap is in line with the tip of your shoe, or your second toe.

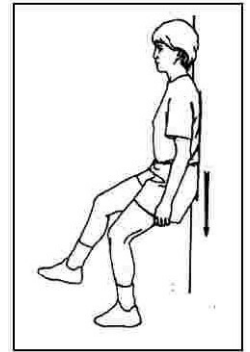


Single Leg Wall Slide Progression

Add this exercise after completing the step-up-down progression:

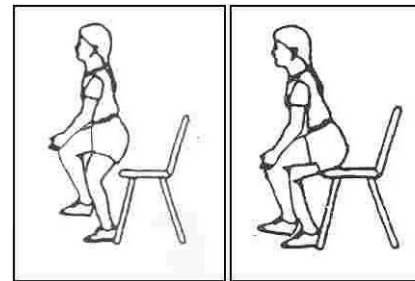
Start with 3 sets of 5 repetitions.

Add one repetition per set, per workout, until you can do 3 sets of 10 (about 2 weeks minimum). At this point, you can begin to add the single leg squat exercise.



Single Leg Squat Exercise

In the single leg squat exercise, you stand on the single leg and then lower your buttocks toward the chair. Slowly return to the standing and starting position. Remember to keep your head over your feet and bend at the waist as you descend. You do not have to squat all the way to the chair, instead, try to stay in a comfortable range of motion where there is no knee pain. As you gain strength try to do the exercise without holding on to anything. Again, be sure that you position your thigh so that your kneecap is in line with the tip of your shoe, or your second toe.



Single Leg Squat Progression

After attaining 3 sets of 10 repetitions on the single-leg wall slide:

Start with 3 sets of 5 repetitions

Add one repetition per set, per workout, until you can do 3 sets of 10 (about 2 weeks minimum).

The strength workouts should continue every other day at the most, with more time between workouts if the knee gets sore after a session. Continue doing the step-up exercise each workout. Alternate the workouts between the single leg wall slide and the single leg squat e.g.,

Monday Single leg squat
Wednesday Single leg wall slides
Friday Single *leg* squat

After working up to the point where you can do 3 sets of ten of all three drills, you can hold dumbbells to add resistance. Start with 3 pounds in each hand and add 1 to 2 pounds a week until you reach 10 pounds in each hand.

As you get stronger and gain better control of you leg muscles, try not to hold onto anything for balance.

When you return to sports or recreational activities, decrease the strength workouts to 2 times a week and do 1set of 10 of each of the three, drills only, as a maintenance workout.

PHASE FIVE: 16 WEEKS AFTER SURGERY ONWARD

At this time, light running on a soft level surface can begin if your surgeon advises. You need to have full range of motion, good strength and no swelling to run safely. **If** you run, 3 times per week for 10 minutes is advisable for the first 2 weeks. **If** there is no pain or swelling, you can increase your running time by 1minute per session for a maximum of 30 minutes. Walking and hiking on gentle trails can also be used for conditioning activity.

PHASE SIX: 20 WEEKS AFTER SURGERY ONWARD

Speed and agility running program for Return to Sports

Goals:

1. Safely recondition the injured area for the demands of sports activity.
2. Provide a logical sequence of progressive drills forpre-sports conditioning
3. Provide objective criteria for safe return to sports.

Sports Specific Training

<u>Phases of Training</u>	Straight-ahead running phase Direction change running phase Unrestricted direction change
<u>Prerequisites</u>	Full Range of Motion Symmetrical muscle flexibility Pain free all stretching and strengthening exercises

Warm-up, Stretch and Ice

Be careful to be sure that you warm-up well and stretch lightly before workouts, and stretch well again after workouts. Generally, you should do some walking, cycling or jogging so that you break a sweat before starting the running program. You should **then** stretch **before** beginning the running drills. Ice your knee for 20 minutes following workouts after stretching again as you are cooling down.

The criteria to progress

Do not progress to the next step in the progression until the present step is pain free, without swelling.

Frequency:

2 or 3 times per week. Repeat previous steps can be skipped if the running causes no problems.

Phase 1 Straight Ahead Running

- STEP 1 Run 1/2 speed 100 yards, 10 repetitions
- 2 Repeat previous step
 - 3 Run 3/4 speed 100 yards, 10 repetitions
 - 4 Repeat previous step
 - 5 Run 1/2 speed, 100 yards, 3 repetitions
Run 3/4 speed, 100 yards, 3 repetitions
Run full-speed, 50 yards, 4 repetitions
 - 6 Continue workout from Step 5, adding one 50-yard run each workout until you can do (10) 50-yard full speed runs.

Phase 2 Basic Direction Change Running

- STEP 7 Continue 100 yard run 1/2 speed, 2 repetitions; 3/4 speed, 2 repetitions; full speed, 2 repetitions
Start zigzag run, round corners, 50 yards, and 5 repetitions
- 8 Repeat previous step
 - 9 Repeat previous step, add backward run 25 to gradual stop, then forward run 25 yards to gradual stop, 5 repetitions
 - 10 Repeat previous step
 - 11 Repeat previous step, add circle run, 20 foot or greater diameter circle, 3 repetitions to left and 3 reps to right.
 - 12 Repeat previous step
 - 13 Repeat previous step, add figure of eight run, 20 foot or greater length, 5 repetition
 - 14 **Carioca**. 50 yards, 5 repetitions left, 5 repetitions right

Rehabilitation after Knee Meniscus Repair

Post-op Phase	Weight bearing status	Use of brace	Passive ROM and Active ROM	Strength training and proprioception exercises	Return to running and sports	Recommended Restrictions
Phase One First week after surgery	WBAT with crutch(s)	Postoperative Brace when ambulating Locked in full extension	Limit knee flexion to 90°	Quad sets, heel slides, ankle pumps	none	Avoid pivoting and varus/valgus stresses No flexion beyond 90°
Phase Two 2 to 6 weeks after surgery	FWB crutches	Postoperative Brace when ambulating Locked in full extension	Limit knee flexion to 90° Stretch calf and hamstring.	Quad sets , SLRs, wall slides, partial squats to 45° knee flexion, toe-raises. Ankle weight resistance	none	Continue restrictions from Phase 1
Phase Three 6 to 12 weeks after surgery	Full Crutches discontinued	Postoperative brace discontinued	Begin stationary cycle Stretch all muscle groups	Continue leg lifts with ankle weights, wall slides and squats (less than 90° knee flexion) Leg press Step up-down	none	Avoid patellofemoral overload Avoid squatting, Stair stepper machines. Avoid pivoting or twisting on knee
Phase 4 12-16 weeks after surgery	Full	Neoprene sleeve optional	No restrictions	Return to weight training Single leg strengthening	none	Continue above precautions
Phase 5 16 to 20 weeks after surgery	Full	Neoprene sleeve optional	No restrictions	Gradual and progressive	Progressive running straight ahead up to 30 minutes	Continue above
Phase 6 20 weeks after surgery onward	Full	Neoprene sleeve optional	No restrictions	Gradual and progressive	Speed and agility running program begins. Progressive return to sports, as tolerated, at 6 months post-surgery.	Continue above Progress to full activity as tolerated

Phase 3 Unrestricted Direction Change Running

Current workout:

100yd Yz speed, % speed and full speed each distance 2 repetitions

zig-zag mn 5 repetitions

forward backward run 5 repetitions

circle mn 6 repetitions

figure 8 mns 5 repetitions

carioca 5 repetitions each way

15 Continue Current Workout above and Add:

Shuttle run, 50 yards, direction change every 10 yards, 5 repetitions, alternate hands touching.

16 Repeat previous step

17 Repeat previous step

18 Repeat previous step and add **Box drill**, 20 yards square, 6 repetitions, alternate, starting side.

19 Repeat previous step

20 Repeat previous step

21 Repeat previous step and add **agility run**, 5 repetitions, alternate starting side.

22 Repeat previous step

23 Repeat previous step

24 Repeat previous step

Final workout:

100yd speed, 3/4 speed and full speed each distance 2 repetitions

zig-zag run 5 repetitions

forward backward run 5 repetitions

circle run 6 repetitions

figure 8 runs 5 repetitions

carioca 5 repetitions each way

Shuttle run 50 yards, direction change every 10 yards, 5 repetitions, alternate hands touching.

Box drill, 20 yards square, 6 repetitions, alternate starting side.

Agility run, 5 repetitions, alternate starting side

Phase 4 Return to Sports Practice. During phase 3

Do 1 to 2 repetitions of each drill of final workout to warm-up before practice.

Phase 5 Return to Sports Competition. At the end of phase

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