



Banff Sport Medicine

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# Post Operative Rehabilitation Program

for  
Meniscal Allograft Transplantation (MAT)

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This protocol is designed to assist you with your rehabilitation after surgery and should be followed under the direction of a physiotherapist.



# PHASE 1: Early Post-operative Phase

This is the initial recovery phase and it normally lasts 4 - 6 weeks. In the first week you should rest and elevate your leg for a significant amount of the time.

## GOALS

1. Reduce inflammation and swelling
2. Range of Motion: 0° to 90° by the end of the 6th week post-operative
3. Quadriceps muscle activation

## WEIGHT BEARING

Use your crutches to help you walk. Your surgeon will tell you how much weight you can put through your operative leg. Your progression to full weight bearing will depend on advice from your surgeon as well as the amount of swelling, pain, and recovery of your quadriceps control. Increase to full weight bearing as instructed by your surgeon. With your crutches, try to walk using a normal “heel-toe” pattern.

## KNEE BRACE

During the first week following surgery, your knee will be locked in an extension knee brace **at all times** (including sleeping). The brace will protect your knee while it is swollen and your muscles are weak. You can take the brace off to do your exercises. After the first week the brace will be unlocked so that you can bend your knee but you will continue wearing it for the first 6-weeks.

## COLD THERAPY & ELEVATION

A Cold Therapy Unit or an ice pack should be applied immediately after surgery and used for at least 20 minutes every other hour while you are awake. Your operative leg should be elevated with the knee straight when applying cold therapy and/or when resting.



## EXERCISES

### 1. Ankle Pumps

- The foot and ankle should be actively “pumped” up and down 10-20 times every hour.

### 2. Range of Motion:

- **Flexion:** In lying, bend your knee by sliding your heel towards your buttocks. Use your other leg to help you if needed. Perform up to 20 times; repeat 2- 3 times daily.

**IMPORTANT:** you should not force flexion (bending) in the first 12 weeks. Goal = 90° active flexion by 6-weeks post-operative.



- **Extension:** In lying, place a roll beneath your ankle to passively (allow gravity), stretch your knee into extension. Start with 2 minutes at a time and increase as tolerated up to 5 minutes. Perform 2 or 3 times daily. It is very important in this phase to work on straightening your knee.



### 3. Strengthening:

- **Quadriceps Contraction:** In sitting with your knee straight and leg supported, tighten your thigh muscle by pushing your leg downwards. Focus on tightening the muscle and avoid lifting your leg from the hip. Perform exercise 5 - 10 times holding each contraction for 5 secs. Progress to 30 times holding each contraction for 10 secs, resting for 5 secs in between reps. The use of EMS (Electric Muscle Stimulation) is recommended for this exercise.
- **Straight Leg Raises:** In the position shown, tighten your thigh muscle while keeping your knee straight and lift your leg up 2 inches. Perform exercise 5 - 10 times holding each contraction for 5 secs. Progress to 30 times holding each contraction for 5-10 secs. The use of EMS is recommended for this exercise.



**IMPORTANT:** If you do not have full knee extension or have a significant quadriceps lag you should not perform this exercise

- **Hip Adduction:** In lying with your knees bent as shown, squeeze a soft ball or a pillow between your knees. Perform exercise 5 -10 times holding each contraction for 5 secs. Progress to 30 times holding each contraction for 10-15 secs, resting for 5 secs between reps.



### 4. Stretching:

- **Calf:** Sitting with your knee straight, wrap a towel around your foot and gently pull your toes and foot towards you. Hold each stretch for at least 30 secs and repeat 4 times.



**\*\* Perform all exercises 2-3 times per day to improve your strength and range of motion.**

**You should perform all of the exercises on both legs\*\***

### ALSO CONSIDER:

- Hip and ankle strengthening as tolerated
- Normalizing gait with crutches

## REQUIREMENTS FOR PROGRESSION TO PHASE 2

- ✓ Full knee extension and Knee flexion  $\geq 60^\circ$
- ✓ Ability to activate quadriceps and complete straight leg raise with minimal lag
- ✓ Able to fully weight-bear through operative limb
- ✓ Pain levels managed to enable exercise progression

## PHASE 2: Muscle Strength and Core Stability

This is the initial muscle strengthening phase and it normally lasts from 6-12 weeks. This phase emphasizes progressive strengthening of the quadriceps muscles along with core strengthening.

### GOALS

1. Manage pain and swelling
2. Active range of motion: 0°- 120° by 12-weeks post-operative
3. Able to perform functional quadriceps exercises
4. Full weight bearing with normalized gait
5. Using stationary bike in daily exercise program
6. Increase bilateral leg strength and core control

### WEIGHT BEARING

Before you stop using your crutches you need to be able to take full weight on the operative leg and walk with only a slight limp. If you still need support to walk normally, you may use one crutch or a cane, depending on the recommendation of your surgeon or therapist.

### COLD THERAPY & ELEVATION

Manage your swelling by continuing to use cold therapy and elevation, especially after exercise or physiotherapy sessions.

### EXERCISES

#### 1. Range of motion:

- Progress flexion using active exercises. Add prone hangs, active-assisted and passive range of motion if full extension has not been achieved.

**IMPORTANT:** you should not force flexion (bending) in the first 12 weeks post surgery. Goal = 120° active flexion by 12-weeks post-operative.

#### 2. Strengthening:

- **Quadriceps:** Slowly squat with equal weight on each leg. Bend your knees from 0° to a maximum of 80° of flexion, making sure your knees do not move beyond your toes. Start with one set of 10 reps, holding each squat for 5 secs and increase the number of reps as your strength increases, up to 30 reps x 15 secs hold. EMS is recommended for this exercise with the 'contraction' time at least double the 'rest' time.



- **Step-ups:** Do graduated heights, starting at 4" and increasing to 8".

Stand in front of a stair or stepping stool and place one foot on the step in front of you. Rise up onto the step by shifting all of your weight onto this leg and tighten your quadriceps muscles. Put all of your weight through this leg and do not step up onto the step with your other leg. Start with one set of 10 reps, holding at the top of the step-up for 5 secs. Increase the number of reps as your strength increases, up to 20 reps with 15 secs holds on each leg. EMS is recommended for this exercise with the 'contraction' time at least double the 'rest' time.



- **Step-downs:** Do graduated heights, starting at 4" and increasing to 8".

Start with one leg standing on the step and slowly bend your knee to lower your other leg to lightly touch floor. Keep all of your weight through the leg that is on the step. Start with one set of 10 reps, holding at the bottom of the step-down for 5 secs. Increase the number of reps as your strength increases, up to 20 reps with 15 secs holds on each leg. EMS is recommended for this exercise with the 'contraction' time at least double the 'rest' time.

- **Hip Abduction:** In the position shown, with a resistance band around your outside thigh just above your knee, lift your leg to place slight tension on the band. Move this leg sideways slowly against the resistance of the band using the muscles in your buttock and your hip. Start with 1 set of 10 reps and increase to 3 sets of 15 reps.



- **Hip Extension:** Stand with legs shoulder-width apart with a resistance band around one of your thighs just above your knee as shown. Extend your leg to place slight tension on the resistance band. Slowly move the leg backwards against the resistance of the band using the muscles in your buttock and the back of your thigh. Start with 1 set of 10 reps and increase to 3 sets of 15 reps.



- **Hamstrings:** Lying on your stomach, place a resistance band around your ankle and also have it attached to an anchor point as shown. Slowly bend your knee against the resistance of the band pulling your foot towards your buttock. Start with 1 set of 10 reps and increase to 3 sets of 15 reps.



- **Gluteals:** In lying with your knees bent and your arms by your sides, squeeze your buttocks and lift up to create a bridge. Keep equal weight on each leg and straight alignment from your shoulders to your knees. Be careful not to push down on your neck or shoulders – use your buttocks to do the work. Start with one set of 10, holding each lift for 5 secs. Increase the number of reps as your strength increases. Once you can complete 20 reps holding for 10 secs each, change to single leg bridges.



- **Planks:** Place the forearms on the ground with the elbows aligned below the shoulders, and arms parallel to the body at about shoulder-width distance. Engage your core and glute muscles and lift the hips up off the ground. Start with one set of 10, holding each lift for 15 secs. Increase the holding time as your strength increases.



- **Side Planks:** Lie on one side with the legs stacked on top of one another then prop the body up on the hand or elbow while keeping the feet stacked. Start with one set of 10 repetitions on each side, holding each lift for 15 secs. Increase the holding time as your strength increases.



- **Dead Bugs:** Lie flat on your back with your hands extended above you toward the ceiling. Bend your knees in a 90-degree angle and raise your thighs until they are perpendicular to the floor. Now deeply exhale and engage your abs to bring your ribcage down and flatten you back onto the floor. Slowly lower the right arm and the left leg down to the floor simultaneously. Lower them down until just before the lower back starts to arch off the ground. On your way down exhale. Then slowly return to the starting position while inhaling. Alternate sides. Start with one set of 10, holding each lift for 5 secs. Increase the number of reps as your strength increases.



- **Calf Raises:**

**Both legs:** Start with feet shoulder width apart and toes pointed straight ahead, and raise up onto your toes. Start with one set of 10 reps, holding each raise for 5 secs. Increase the number of reps up to 30 with 5 sec hold. Start by using support at a wall or table and progress to no support as able.



**Single leg:** Start on one leg with toes pointed straight ahead, and raise up onto your toes. Start with one set of 10 reps, holding each raise for 5 secs. Increase the number of reps up to 30 with 5 secs hold. Start by using support at a wall or table and progress to no support as able.



### 3. Proprioception:

- **Single leg stance** (eyes open → eyes closed)
- **Double leg squats on an unstable surface** (thick carpet → foam block → camping mattress → pillow → BOSU)
- **Single leg stance on an unstable surface** (thick carpet → foam block → camping mattress → pillow)



### 4. Stretching:

- **Calf:** Standing at a wall in the positions shown. Lean forward until you feel a stretch in your calf. Hold each stretch for at least 30 seconds and repeat 4 times. Do exercise with back leg straight and again with back leg slightly bent.



- **Hamstring stretch:** In lying, place a towel or belt around your foot and bring your leg up until a stretch is felt at the back of the thigh. Hold each stretch for at least 30 seconds and repeat 4 times.



**\*\* Perform all exercises once per day, 4-5 days per week, including cardio and resistance training, to improve your strength and range of motion.**

**You should perform all of the exercises on both legs\*\***

#### **ALSO CONSIDER:**

- Wall squats (with/without ball squeeze)
- Double leg squats with ball squeeze
- Abdominal and core strengthening (i.e. curl-ups, obliques, isometric holds, transversus abdominis, planks and Pilates)

### **REQUIREMENTS FOR PROGRESSION TO PHASE 3**

- ✓ **Active range of motion 0-120 degrees**
- ✓ **Double leg squat with good motor control**
- ✓ **Single leg calf raise**
- ✓ **Good control and alignment during hip and core strengthening exercises**

## PHASE 3: Muscle Strength and Control

This phase normally lasts from 12 weeks to 6 months post-operatively, but may last up to 9 months. This phase focuses on improving muscle bulk, muscle control, balance and proprioception.

### GOALS

1. Increase quadriceps, hamstrings, gluteal and core strength using advanced dynamic exercises
2. Achieve full active knee range of motion
3. Improve proprioception and balance
4. Low impact Aerobic activity for 20-30 minutes per day, 3-4 times per week

### WEIGHT BEARING

You should be full weight bearing with a normal gait pattern without using walking aids.

### COLD THERAPY & ELEVATION

Manage your swelling by continuing to use cold therapy and elevation, especially after exercise or physiotherapy sessions.

### EXERCISES

1. **Range of motion:** Continue active range of motion exercises to ensure full range of motion.

*IMPORTANT: you should not force flexion (bending) in the first 12 weeks.*

2. **Strengthening:**

- **Single leg squats:** Standing on one leg, slowly squat bending your knee from 0° to a maximum of 80°, making sure your knee does not move beyond your toes. Start with one set of 10 reps, holding each squat for 5 secs and increase the number of reps as your strength increases, up to 30 reps x 15 sec holds on each leg.



- **Squats with rubber band:** Stand with legs shoulder width apart with a resistance band around your thighs just above your knees. Slowly squat with equal weight on each leg. Bend your knees from 0° to a maximum of 90° of flexion, making sure your knees do not move beyond your toes. The rubber band will push your knees into internal rotation (inwards), so make sure the patella (knee cap) is aligned with the second toe the whole time.

Start with one set of 10 reps, holding each squat for 5 secs and increase the number of reps as your strength increases, up to 30 reps x 15 secs hold. EMS is recommended for this exercise with the 'contraction' time at least double the 'rest' time.



- **Lunges:** Standing with feet as pictured, squat down to lunge as shown. Control the descent ensuring your knee that is forward does not move beyond your toes or past 90°. Start with 1 set of 10, holding each lunge for 5 secs. Increase the number of reps as your strength increases, up to 3 sets of 10 on each leg. **Do not** perform lunges until you are at least 12-weeks post-operative.



- **Hamstrings:** In sitting place a resistance band around your ankle and also have it attached to a chair or table leg in front of you as shown. Slowly bend your knee backwards pulling against the resistance band using the muscles under your thigh. Start with 1 set of 10 reps and increase to 3 sets of 15 reps.



- **Hip abduction:** In standing with legs hip width apart and feet pointing forwards, tie a resistance band around your thighs as shown. Take a sideways step against the resistance of the band and then step back to the starting position with your other leg. Start with 10 steps to the left and right, and increase to 3 sets of 15 steps to the left and right.



- **Gluteals:** Single leg: In lying with your knees bent and your arms by your sides, squeeze your buttocks and lift up to create a bridge. Straighten one knee and hold that leg in the air. Keep straight alignment from your shoulders to your knees. Be careful not to push down on your neck or shoulders - use your buttocks to do the work. Start with one set of 10, holding each lift for 5 secs. Increase the number of reps as your strength increases, building up to 15 reps with 10 sec holds for each leg.



- **Combination: Hip extension + external rotation + abduction:** In standing with legs hip width apart and feet straight forwards, tie a resistance band around your thighs as shown. Move your leg outwards and backwards in a **45-degree** angle with your toes slightly pointing out. Keep your pelvis square and still, so you don't compensate with your back muscles. Engage your "back pocket muscles" as you perform the movement. Start with one set of 10, holding each movement for 5 secs. Increase the number of reps as your strength increases.



- **Single leg dead lift with pole:** Stand on your non-operated leg first and hold the pole behind your back to keep it in a neutral position. Keep the supporting knee still. Flex forward from the hips, allowing the opposite hip to extend while keeping the spine neutral and the hips facing forward. The foot that goes up should be pointed down to help prevent hip rotation. Hinge forward through the hips only as far as you are able to maintain a neutral spine, keeping the shoulders and hips parallel to the floor.



- **Reverse bridge:** Place your palms, with fingers spread wide, on the floor slightly behind and outside your hips in a sitting position. Press into your palms, and lift your hips and torso toward the ceiling, trying to keep a straight line from head to knees, which will be bent at 90 degrees. Hold for 10 seconds and slowly lower the hips back down. Start with one set of 10. Increase the number of reps as your strength increases, up to 20 reps with 15 sec hold.



- **Other core:** Increase core strength. Some exercise ideas include bridging with legs on physio ball, bridging with back on physio ball, sit ups on physio ball, side sit ups on physio ball, “dead bug” on a BOSU and Pilates core exercises.

### 3. Proprioception:

- **Single leg stance with ball toss:** Standing on one leg on a BOSU or other unstable surface (i.e. foam), toss and catch a light ball against a wall. Start with 2 sets of 10 tosses on each leg and increase as strength and balance improve.



### 4. Cardio:

Maintain or improve aerobic fitness by doing 3 - 4 low impact, 30-minute workouts per week. Some ideas include walking, gentle/easy hiking, cycling and using an elliptical trainer.

***\*\* Perform all exercises once per day, 4-5 days per week, including cardio and resistance training, to improve your strength and range of motion.***

***You should perform all of the exercises on both legs\*\****

### ALSO CONSIDER:

- Hamstring curls in supine lying with a physio ball
- Hip adduction: bridging with ball squeeze
- Stretching: stretch after exercising (quadriceps, hamstrings, calves, hip flexors, gluteals)
- Pool: easy jogging in waist deep water or running in deep water with an aquabelt can be commenced around 3 months post-operative.
- Ice skating and cross-country skiing on even, flat surfaces can be commenced around 4 months post-operative.

## REQUIREMENTS FOR PROGRESSION TO PHASE 4

- ✓ **Single leg squat with good motor control to 70° flexion**
- ✓ **Through-range hamstrings contraction against medium resistance**
- ✓ **Ability to demonstrate good core control and posture in strength exercises**
- ✓ **Evidence of improvement in strength (hamstrings, hip abductors, hip extensors, hip rotators)**

## PHASE 4: Strength and Agility

This phase begins as early as 6-months and may continue beyond 12-months postoperative to ensure that you maintain the strength needed to gain the most from your knee surgery and to avoid another injury.

### GOALS

1. Maximize quadriceps, hamstrings, hip and core strength with functional exercises
2. Able to perform agility exercises with good motor and core control
3. Return to recreational activities

### COLD THERAPY & ELEVATION

Manage your swelling by continuing to use cold therapy and elevation, especially after exercise or physiotherapy sessions.

### EXERCISES

1. **Strengthening:** progressive strengthening program ensuring all muscle groups are included using functional exercises

- Quadriceps (stair descent)
- Hamstrings (reverse lunge)
- Hips (side shuttles with resistance band)
- Calves (heel raises on unstable surface)
- Core (plank, side planks, sit ups with physio ball, bridging with physio ball, Pilates)

2. **Dynamic Core:**

- **Mountain climber:** Assume a press up position so your hands are directly under your chest at shoulder width apart with straight arms. Your body should form a straight line from your shoulders to your ankles. Lift your right foot off the floor and slowly raise your knee as close to your chest as you can. Return to the starting position and repeat with your left leg. Start with 1 set of 10. Increase the number of reps as your strength increases up to 3 sets of 15.
- **Ups and downs:** Assume a press up position so your hands are directly under your chest at shoulder width apart with straight arms. Your body should form a straight line from your shoulders to your ankles. Lift your left hand off the ground and then place your left forearm on the ground where your hand just was. Do the same with your right arm. Now pick your right forearm off the ground and put your palm back on the ground. Follow again with your left arm. This completes one repetition. Start with 1 set of 10. Increase the number of reps as your strength increases up to 3 sets of 10.



### 3. Proprioception

- **Squats on a BOSU:** Slowly squat with equal weight on each leg. Bend your knees from 0° to a maximum of 80° of flexion, making sure your knees do not move beyond your toes. Start with one set of 10 reps, holding each squat for 5 secs and increase the number of reps as your strength increases, up to 20 reps x 15 sec holds on each leg. Progress to single-leg squats starting with 10 reps x 5 sec holds, increasing to 20 reps x 15 sec holds on each leg.



- **Single leg squats on trampoline:** Standing on one leg, slowly squat bending your knee from 0° to a maximum of 90°, making sure your knee does not move beyond your toes. Start with one set of 10 reps, holding each squat for 5 secs and increase the number of reps as your strength increases, up to 20 reps x 15 sec holds for each leg



- **Lunges on a BOSU:** Step forward or back and lunge as shown. Control the descent ensuring your knee that is forward does not move beyond your toes. Start with 1 set of 10 reps, holding each lunge for 5 secs. Increase the number of reps as your strength increases up to 3 sets of 10 on each leg.



- ### 4. Agility exercises:
- Patient must be able to perform a very well controlled single leg squat before commencing any agility exercises.

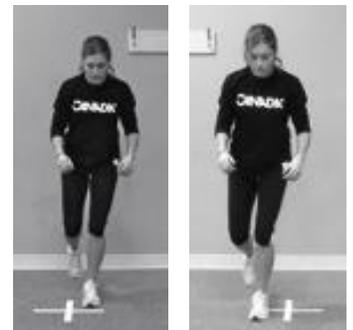
**IMPORTANT:** You should **not** begin agility training exercises any sooner than 6-months post-operative. You **must** be cleared by your surgeon before starting these exercises.

- **Agility crosses:** start with straight-line jumping, backward/forward/side-to-side and progress to diagonals and combined patterns. Once speed and agility are good with jumping, progress through activities using single-leg hopping on each leg.

Agility jumping



Agility hopping



- **Side to side steps on the BOSU:** Perform quick steps in both directions over BOSU. Start with 1 set of 10 steps in both directions and progress to 3 sets of 15 steps in both directions as your strength increases.



**\*\* Perform all exercises once per day, 4-5 days per week, including cardio and resistance training, to improve your strength and range of motion.**

**You should perform all of the exercises on both legs\*\***

**ALSO CONSIDER:**

- Wobble-board balance activities
- Flutter kick at the side of the pool or with flutter board (**not before 6 months**)
- Ice skating and cross-country skiing on even, flat surfaces may be commenced around 5-months post-operative **with approval from your surgeon**
- Mountain biking on easy trails may be commenced after your 6-month post-operative assessment **with approval from your surgeon**

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