



Pre - Operative Rehabilitation Program for High Tibial Osteotomy

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



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THE HIGH TIBIAL OSTEOTOMY PROCEDURE:



High Tibial Osteotomy (HTO) is a common procedure for managing medial osteoarthritis (OA) of the knee. In a knee osteotomy the surgeon adds a wedge of bone to your upper tibia. This helps shift your body weight off the damaged or worn out area of your knee joint onto healthier bone. An osteotomy can decrease pain, improve knee function, slow damage in the knee, and delay the need for partial or total knee replacement surgery. Studies have shown that an HTO can delay knee replacement for up to 15 years.

HTO can also be performed to decrease the load on pre-arthritic lesions in the knee, to correct knee alignment, or to treat certain knee ligament instabilities by changing the slope and alignment of the knee to increase stability.

THE IMPORTANCE OF PRE-SURGERY EXERCISES:

The surgeons at Banff Sport Medicine recommend an exercise program or ‘pre-habilitation’ before surgery. Regaining the strength and movement in your knee before surgery will improve your recovery after HTO surgery. Muscles play a very important role in knee stabilization and they react to the amount of stress placed on them. With a decreased amount of stress (e.g. immobilization, instability, decreased weight-bearing), the muscles weaken and atrophy (waste away). For this reason, the exercises in this program are extremely important to help you to prepare for surgery.

This exercise program has several important benefits:

- Return range of motion to normal and decrease the risk of post-operative stiffness
- Increase muscle strength in your legs and core
- Improve balance
- Maintain fitness in preparation for surgery
- Decrease the time to full recovery after surgery
- Decrease the risk of post-operative complications such as deep vein thrombosis

The following exercise program is a guideline. Other exercises that strengthen the same muscle groups can be substituted or added if desired. Some exercises may cause pain or flare-up your knee; if this happens the exercise should be avoided and an easier exercise included instead. These exercises range in difficulty from easiest to more challenging and you should slowly build up your number of repetitions and progress to the more difficult exercises over 6-8 weeks. All exercises should be completed with control and proper form. Ideally, some kind of exercise should be performed daily, as recommended below.

EXERCISES:

- 20-30 minutes of cardio exercises **at least** 3 times and ideally 5 times per week. These should be low-impact, straight-line activities, i.e. elliptical trainer, cross-country skiing, biking, swimming, walking, hiking or skating
- 15-20 minutes of strengthening exercises 3-5 times/week (please see below for some recommended exercises)
- An Electric Muscle Stimulator (EMS) is recommended on the injured leg for many of the strengthening exercises

IMPORTANT: If you have increased knee pain or swelling after these exercises, decrease the number of times you do each exercise, or choose an exercise that works better for you. After you exercise apply an ice pack, a compression bandage and elevate your leg for 20-30 minutes, to reduce any pain and swelling. If you have difficulty completing your pre-operative exercise program please see your physiotherapist.

1. Strengthening Exercises:

Quadriceps Contraction - In sitting with your knee straight and leg supported, tighten the thigh muscle to hold the knee straight. Avoid lifting your leg from the hip. Perform 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 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 3-5 cm. 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.



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 seconds. Progress to 30 times, holding each contraction for 10-15 secs, resting for 5 secs between reps.



□ **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, 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.



□ **Calf Raises - Single leg:** Start on one leg with toes pointed straight ahead, and raise up onto your toes. Start with one set of 10, 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



□ **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 sec each, progress to single leg bridges.



□ **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. Bend your knee backwards slowly against the resistance of the band using the muscles under your thigh. Start with 1 set of 10 reps and increase to 3 sets of 15 reps.



□ **Squats (Quadriceps)** - 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. Start with one set of 10, 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 can be used with this exercise with the 'contraction' time at least double the 'rest' time.



Single leg squats - 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, holding each squat for 5 secs and increase the number of reps as your strength increases, up to 30 reps x 15 secs hold.



2. Balance and Proprioception Exercises:

Single leg stance (eyes open, eyes closed)

Double leg squats on an unstable surface (thick carpet, foam block, camping mattress)

Single leg stance on an unstable surface (thick carpet, foam block, camping mattress)



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, holding each squat for 5 secs and increase the number of reps as your strength increases, up to 30 reps x 15 secs hold.



Squats on a BOSU - 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. Start with one set of 10, holding each squat for 5 secs and increase the number of reps as your strength increases, up to 30 reps x 15 secs hold.



Lunges on a BOSU – Step forward/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, holding each lunge for 5 secs. Increase the number of reps as your strength increases up to 3 sets of 10.



3. Stretching Exercises:

Calf Stretch - Standing in front of a wall in the position 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.

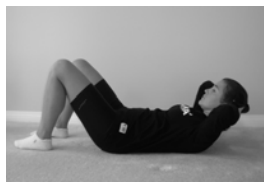


Hamstring Stretch - In lying, place a towel or belt around your foot and bring your leg up until a stretch is felt at the back of the thigh. Hold each stretch for at least 30 seconds and repeat 4 times.



4. Core Strengthening Exercises:

Abdominal and core - some exercise ideas include planks, crunches, extensions and also bridging with **legs** on physio ball and bridging with **back** on physio ball.



5. Upper body Strengthening

You will be using crutches for at least a portion of your recovery. Strengthening will help you be more mobile, with less discomfort to your upper body. Some exercise ideas include: push ups, dips, triceps curls, seated rows and chest press. We suggest you review these exercises with your physiotherapist or a trainer to make sure you are doing them correctly.