

Pre-Surgery Rehabilitation Program

for
High Tibial Osteotomy (HTO)

October 2025

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



HTO Pre-Surgery Rehabilitation

Scan the QR code to
watch a short video
about the importance of
pre-surgery rehab.



Why are these exercises important?

- Your surgeon recommends that you complete this exercise program to prepare for your upcoming surgery and/or to get the best possible result from your injury rehabilitation.
- Strengthening the muscles at the front of your thigh and around your knee will make your knee more stable and will help with your recovery from surgery.
- You should also incorporate 20-30 minutes of cardio exercises at least 3x/week (all low-impact, straight-line activities, e.g. elliptical trainer, skating, cross-country skiing, biking or hiking).

How often should I do these exercises?

- All exercises should be done **1 - 2 times per day**.
- It is important that you do all of the exercises on both legs (however you will be using the electronic stimulation (EMS) unit on your affected/surgical leg only).
- Carefully follow the instructions for your **EMS unit**.
- Whenever you can, do your exercises in front of a mirror to make sure you are doing them correctly.

How many exercises should I do?

- Each exercise should be done smoothly and slowly.
- Start with one set for each exercise. Your therapist will recommend the number of exercises you should do based on your muscle strength and endurance.
- Once you can comfortably do one set of each exercise, progress to 2 sets and once you are strong enough, then 3 sets. Your physiotherapist might recommend for some exercises to be done until you fatigue or until you lose the form of the original exercise position.
- Aim to challenge yourself when doing your exercises to get the greatest strength and stability improvements.

What if I have increased pain or swelling?

- If you have increased pain that lasts longer than 1 or 2 hours after you have finished your exercises, decrease the amount you are exercising by 20% the next time.
- If you have increased swelling after these exercises please use rest, ice, compression and elevation.
- If symptoms do not improve, or swelling lasts longer than 48 hours, call your physiotherapist to review your program.

Notes for Physiotherapists:

Please teach your patient how to apply and use the EMS unit, and assess the number of sets/repetitions, ranges of motion and theraband for the exercises as applicable. Thank you.

***If you have any questions please contact Sarah Kerslake at:
sarah@banffsportmed.ca or 403 760 2897 ext 6***

Phase 1: Strength Basics

- **Quadriceps Contraction (Quad Sets)**

Tighten your quadriceps (front of thigh muscles) by pushing the back of your knee gently down into the floor or bed to hold the knee straight. If you can't yet straighten your leg enough to achieve this, add a small folded towel underneath and push into it.

Your kneecap should move slightly upward as the muscle tightens, avoiding lifting your leg from the hip.

Sets: 3 Reps: 10 Hold: 8 seconds



Note: The use of **EMS** is recommended for this exercise. Follow the guidelines provided in the EMS document for parameters and pad placement.

- **Straight Leg Raises**

Lying on your back, draw your toes towards you, and tighten your quadriceps (front of thigh) muscles while keeping your knee straight.

Slowly lift your leg off the ground maintaining control throughout.

Hold the leg elevated, focusing on maintaining full knee extension, core engagement, and controlled breathing. Slowly lower your leg back to the floor.

Perform on both legs.

Sets: 2 Reps: 10 Hold: 10 seconds



Note: The use of **EMS** is recommended for this exercise. Follow the guidelines provided in the EMS document for parameters and pad placement.

- **Glute Bridges**

Lie on your back with your knees bent and feet flat on the floor, hip-width apart.

Tighten your buttocks (glutes) and lift your hips off the ground by pushing through your heels. Throughout the movement, engage your core as if bracing for a punch to your abdomen or bearing down. When your knees, hips, and shoulders form a straight line, pause for 5 seconds and slowly lower.

Sets: 3 Reps: 10



- **Hip Adduction**

Lie on your side with your top leg bent and resting in front of the lower leg.

Lift your lower leg upward about 20 - 30 cm, keeping it straight and focusing on inner thigh activation. Hold this position for 10 seconds, relax for 5 seconds.

Sets: 2 Reps: 10



- **Two Legged Calf Raises with Straight Knees**

Hold onto a wall or stable surface for support if needed, with both feet flat on the ground, hip-width apart.

Slowly rise up onto your toes through your full ankle range of motion, lifting your heels off the ground. Slowly lower back to the starting position.

Sets: 3 Reps: 10



- **Squats**

Stand with your feet shoulder-width apart, toes pointing slightly outward.

Keep your chest lifted and your weight evenly distributed.

Tighten your core and slowly lower into a squat by bending at the hips and knees, as if sitting back into a chair.

Keep your knees in line with your toes; do not allow your knees to collapse inward. Descend only to a pain-free depth. Hold briefly at the bottom, then rise back to standing with control.

Sets: 2 Reps: 12



Note: The use of EMS is recommended for this exercise. Follow the guidelines provided in the EMS document for parameters and pad placement.

- **Single Leg Stance**

Hold onto a wall or stable surface for support if needed.

Shift your weight onto one leg by lifting your other leg slightly off the ground, and maintain balance. Focus on keeping your hips level and knee steady.

Sets: 3 Hold: 30 seconds

Note: This exercise should be done on both legs. For an additional challenge, perform this exercise unsupported and/or with your eyes closed.



- **Planks**

Place your elbows directly under shoulders, with your legs extended straight behind you. Make sure your body is lifted off the floor.

Maintain a straight line from shoulders to ankles and engage your core by gently drawing the belly button in toward the spine.

Squeeze your buttocks and lightly tuck the pelvis to prevent excessively arching your back.

Sets: 3 Hold: 20 seconds, increasing to 45 seconds as tolerated



- **Side Planks**

Lie on your side with the elbow of the side you are lying on directly beneath your shoulder. Bend your knees and have them stacked one on top of the other. Maintain a straight line from head to knees and do not let hips sag or rotate.

Engage the core and lift the hips off the ground, forming a straight line from your head to knees. Keep your shoulders and hips stacked vertically to avoid rotating forward or backward.

Sets: 3 Hold: 20 seconds, increasing to 45 seconds as tolerated



Phase 2: Progressive Conditioning

After you have completed 4 - 6 weeks of the first phase you should be reassessed by your physiotherapist and taught the second phase of exercises. Before you start the second phase you must be able to complete 3 sets of ≥ 10 repetitions of the phase one exercises with good control.

- **Single Leg Calf Raises with Straight Knee**

Hold onto a wall or stable surface for support if needed and shift your weight onto one leg. Rise up slowly onto your toes, through your full ankle range of motion, lifting your heel off the ground. Lower slowly with control.

Sets: 3 Reps: 10



- **Wall Sits**

Stand with your back against a solid wall, and place your feet with your heels approximately 30 cm away from the wall, and shoulder-width apart. Ensure your spine is upright and in a neutral position. With your kneecaps pointing straight ahead (in line with your feet and hips), slowly lower into a squat. Descend only to a pain-free depth, not going past a 90 degree angle. Engage your core, glutes, and quadriceps, and press gently into the floor with your feet.

Sets: 3 Hold: 30 seconds

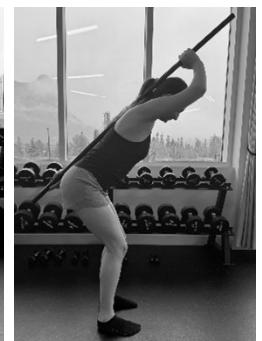


Note: The use of **EMS** is recommended for this exercise. Follow the guidelines provided in the EMS document for parameters and pad placement.

- **Two Leg Hip Hinge**

Stand upright with your feet shoulder-width apart. Keep your knees “soft” (with a slight bend). Hinge forward at the hip joints, keeping your back straight. Stop before you feel your back start to bend. Squeeze your buttocks (glutes) and hamstrings to return to standing.

Sets: 3 Reps: 12



Note: To practice the form, you may want to start by holding a broomstick or straight bar along your spine. It should touch the upper back and tailbone with a small gap where your lower back naturally curves.

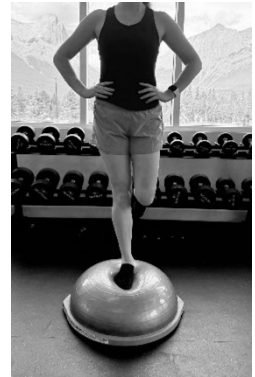
- **Single Leg Balance on BOSU**

Stand with one foot in the middle of a BOSU ball, balance pad, or slightly uneven ground. Hold onto a wall or stable surface for support if needed.

Shift your weight onto the BOSU ball or balance pad, and lift the other foot off the ground. Hold this position, keeping your hips level and knee steady.

Sets: 3

Hold: 30 seconds



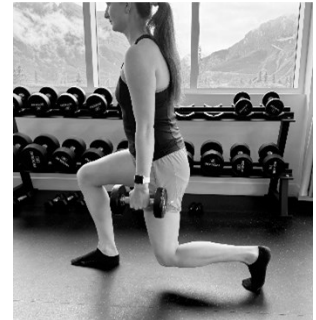
Note: This exercise should be done on both legs, and in both open and closed eyes conditions.

- **Weighted Forward Lunges**

Stand tall with a light dumbbell in each hand (or bodyweight if preferred) and your feet hip-width apart. Step forward into a lunge, lowering your back knee toward the ground while keeping your front knee aligned with your toes and your torso upright. Hold briefly in the lunge position with control, then rise back up to your starting position with control.

Sets: 3

Reps: 10



- **Hamstring Resistance Band Curls**

Anchor a resistance band securely in front of you (e.g., attached to a chair or table leg). In a seated position, wrap the loop of the resistance band around your ankle. Bend your knee against the band resistance, bringing your heel toward yourself. Slowly return to the starting position.

Sets: 3

Reps: 10



- **Knee Extension**

Anchor a resistance band securely behind you (e.g. attached to a heavy chair or table leg). In a seated position, wrap the loop of the resistance band around your ankle. Straighten your leg from the 90 degree position to straight, lifting your leg upwards. Slowly return to the starting position.

Sets: 3 Reps: 12



- **Side Lying Straight Leg Lifts**

Lie on your side with your bottom leg bent and top leg straight, your hips stacked, and pelvis slightly rolled forward. Engage your core. Keeping your top leg straight, slowly lift it upward, leading with your heel and keeping your toes pointing forward or slightly downward. Avoid rotating your hips or leaning backward during the movement. Lower your leg back to the starting position with control.

Sets: 3 Reps: 12



Note: To progress this exercise as your strength improves, use a looped resistance band around your thighs, just above your knees, to increase difficulty.

- **Single Leg Glute Bridge**

Lie on your back with one knee bent and the other leg straight. Press through the heel of the bent leg and lift your hips off the ground, keeping the opposite leg in line with your torso. Engage your glutes and core to maintain alignment. Hold at the top briefly, then lower with control.

Sets: 3 Reps: 10



Note: You can increase the difficulty by abducting and adducting the elevated leg in and out to the side.