The page is decorated with several faint, light-colored maple leaves scattered across the background. The main title is centered and reads: 

# Pre - Operative Rehabilitation Program

for  
Anterior Cruciate Ligament  
Reconstruction

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



**Covenant Health**  
Banff Mineral Springs

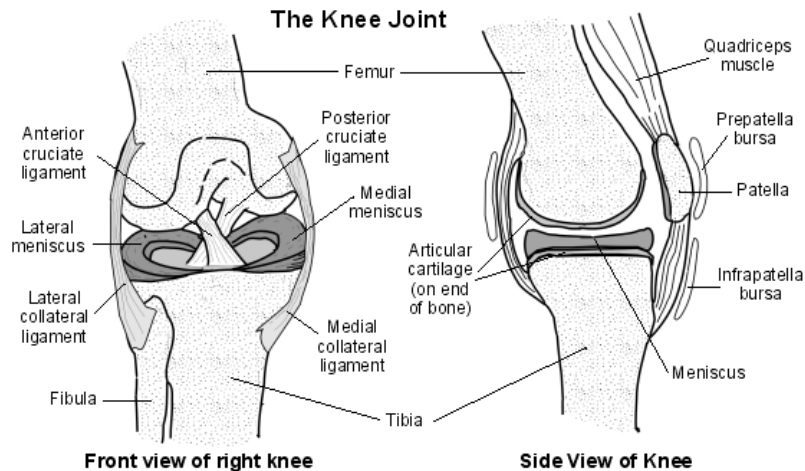
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**Banff Sport Medicine**

## **OVERVIEW OF THE KNEE:**

The ACL is one of the four major ligaments of the knee that connect the tibia (shin bone) to the femur (thigh bone). Ligaments are “cords” which join one bone to another, helping to form a joint. They guide, control and limit the motion of the bones. The other bone involved with the knee joint is the patella (kneecap), which glides on the front of the knee as it bends. The ACL forms an X in conjunction with the Posterior Cruciate Ligament (PCL) in the middle of the knee joint. The other two main ligaments of the knee are the Medial Collateral Ligament (MCL) and the Lateral Collateral Ligament (LCL).



## **ACL INJURY:**

The role of the Anterior Cruciate Ligament (ACL) is to prevent forward movement and rotation of the tibia (shin bone) on the femur (thigh bone). A torn ACL has serious implications for the stability and function of the knee joint, causing the knee to buckle and give way. Most ACL injuries occur through a twisting force being applied to the knee while the foot is firmly planted on the ground, (for example with landing on one leg or a sudden change in direction). In many cases contact with another athlete is not necessary to cause an ACL injury.

The menisci, commonly known as ‘knee cartilage’, are a pair of crescent-shaped discs of white fibrous tissue that act as shock absorbers inside the knee. The menisci increase the contact area between the bones, contributing to stability. Articular cartilage is the other type of cartilage that covers the ends of the bones. After you tear your ACL, if you have further episodes of giving way, you risk damaging your menisci and/or articular cartilage. Damage to the menisci and articular cartilage is associated with degenerative arthritis.

Muscles also play a very important role in knee stabilization. They react to the amount of stress placed on them. With a decreased amount of stress (e.g. immobilization, protection, non-weight bearing), the muscles weaken and atrophy (waste away). For this reason, the exercises in this program are extremely important to help you recover from the initial injury and to prepare you for surgery.

## **MANAGING AN ACL INJURY:**

After an ACL tear the knee will usually be swollen, painful, weak and have limited movement. All inflamed joints benefit from RICE: rest, ice, compression and elevation. Apply an ice pack (wrapped in a towel to protect your skin), for 20 minutes every 2 hours until your swelling has reduced. If you have a tensor bandage, use it for compression during the day. Rest with your leg elevated so that gravity can help to reduce the swelling.

As the pain and swelling decrease, gentle exercise and stretching will encourage a return to normal movement. It is **very important** to regain full range of motion, particularly full extension (straightening) prior to ACL reconstruction surgery.

The pain and swelling from an ACL injury causes decreased strength in the muscles close to the injured joint. Research also shows strength decreases in both legs following an ACL injury so it is important to exercise both legs. The stronger your muscles are before surgery, the faster you will recover post operatively.

## **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 ACL reconstruction 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

Ideally, these exercises should be performed **daily**, as recommended below.

## **EXERCISES:**

- 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)
- 15-20 minutes of strength training, as presented below.
- An Electric Muscle Stimulator (EMS) is recommended on the injured leg for most of the exercises.

*IMPORTANT:* If you have increased knee pain or swelling after these exercises please use rest, ice, compression and elevation, and see your physiotherapist

## 1. Strength 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.

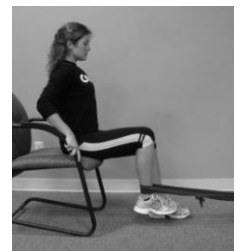


Single leg: Start on one leg with toes pointed straight ahead, and raise up onto your toes. Start with one set of 10, holding each raise for 5 secs. Increase the number of reps up to 30 with 5 sec hold. Start by using support at a wall or table and progress to no support as able.

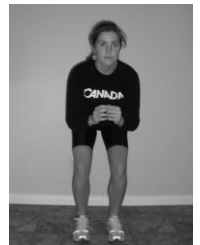
□ **Gluteals** – In lying with your knees bent and your arms by your sides, squeeze your buttocks and lift up to create a bridge. Keep equal weight on each leg and straight alignment from your shoulders to your knees. Be careful not to push down on your neck or shoulders – use your buttocks to do the 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, change 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.

