



**Banff Sport Medicine**

**BANFF SPORT MEDICINE**  
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# Rehabilitation Principles

for  
Anterior Knee Pain

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These rehabilitation principles and exercise suggestions are designed to assist you with your injury recovery. It is recommended that you complete the exercises under the direction of a physiotherapist.

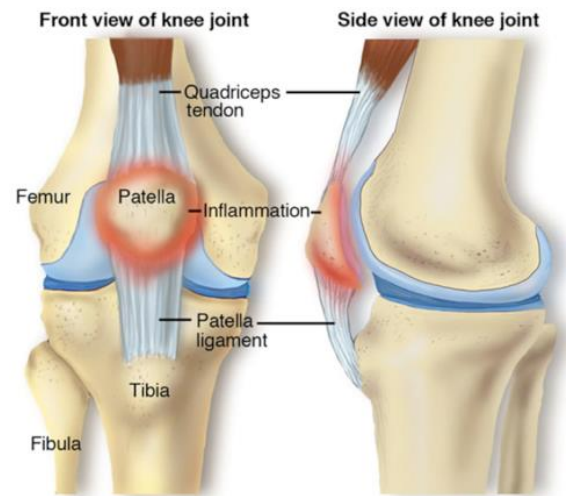


**Covenant Health**  
Banff Mineral Springs

# Anterior Knee Pain

Anterior knee pain (AKP) or aching under or around your kneecap (patella) in the front of your knee is a common injury. Sitting with your knees bent can aggravate AKP. Some sporting activities and daily movements such as kneeling, jumping, squatting, or going up and down stairs can make the pain worse.

The main treatment for AKP is physiotherapy to improve strength, neuromuscular control, muscle activation, and biomechanics during daily activities. It is very important not to aggravate your knee pain during treatment. Exercises should be progressed slowly to make sure strength, muscle activation and technique are correct before starting more advanced exercise and returning to sporting activities.



## REHABILITATION OF ANTERIOR KNEE PAIN:

Appropriate rehabilitation in AKP should address all identified strength and flexibility deficits in order to improve functional biomechanics and normalize altered body movement patterns during daily activities (e.g. walking, squatting, stair climbing).

The main role of physiotherapists is to identify any faulty movement patterns, dissect the underlying neuromuscular causes of these deficits, and to build an individualized rehabilitation program for the patient. Physical therapy should be customized to the patient's level of strength and fitness, and whenever possible, should be made challenging (and fun!) for the patient. The exercises should be increased in intensity and duration as the patient improves strength, endurance, and control in the activities. The patient's response to each intervention will help guide exercise progression and define the need for further treatments.

## WHAT CAN YOU DO TO HELP YOUR AKP?

1. Avoid activities that make your knee pain worse to allow your knee time to rest and recover. Reduce or eliminate impact activities such as running, jumping and landing.
2. Use an ice pack on your knee for 20 minutes after activity or exercises to reduce your knee pain and to help with recovery.
3. Be patient! It usually takes 6-12 weeks to gain the strength, flexibility and muscle coordination to recover from AKP.

## STRENGTHENING EXERCISES

Your physiotherapist will recommend which exercises you should do based on your muscle strength and endurance.

These exercises are suggested to help with the quadriceps, hip and core muscle strengthening that is often required during AKP rehabilitation. Each exercise should be done smoothly and slowly. Start with one set of each exercise. Be careful as you increase your exercise so that you do not aggravate your knee pain.

### **Note:**

You should avoid running, lunges, heavy squats, leg press and hip strengthening with weights or machines during the initial 4-6 weeks of your rehabilitation program.



### **Quadriceps strengthening - isometric contractions**

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 the exercise 5-10 times holding each contraction for 5 secs. Progress to 30 repetitions, holding each contraction for 10 secs, and resting for 5 secs in between repetitions.



### **Hip Adductor strengthening - ball squeeze**

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 repetitions, holding each contraction for 10 - 15 secs, and resting for 5 secs between repetitions.



### **Gluteal strengthening - bridges**

Start lying with your knees bent and your arms by your sides, then squeeze your buttocks and lift up to create a bridge. Keep equal weight on each leg and keep your body straight from your shoulders to your knees by contracting your core muscles too. 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 repetitions as your strength increases.



### **Calf strengthening - heel raises**

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





### **Quadriceps strengthening - straight-leg raise**

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 repetitions, holding each contraction for 5-10 secs.



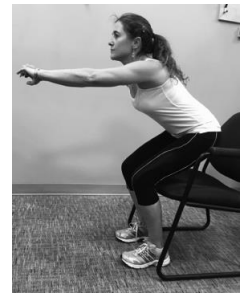
### **Hip abductor strengthening - clamshell with exercise band**

Lie on your side on the floor with your hips and knees bent 45 degrees. Your legs should be on top of each other with your heels together. Keeping your feet in contact with each other, raise your top knee as high as you can without moving your pelvis. Don't allow your lower leg to move off the floor. Pause, then return to the starting position. Start with one set of 10 repetitions, holding each lift for 5 secs. Increase the number of repetitions up to 20 on each leg.



### **Quadriceps strengthening - sit to stand**

Sit on the front half of a chair with your knees bent and feet flat on the floor. Lean forward with your hands together in front of you, and slowly stand with equal weight on each leg. Slowly lower yourself back to the starting position on the chair. Increase the number of repetitions as your strength increases, building up to 30 repetitions. To make the exercise more challenging, when you lower down to the chair only touch your buttocks to the surface before you stand again, as this will keep your muscles working the whole the time.



### **Core strengthening - planks**

Place your forearms on the ground with your elbows aligned below your shoulders, and your arms parallel to the body at about shoulder-width distance. Engage your core and gluteal muscles and lift your 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.



### **Quadriceps and hip strengthening - step ups**

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 thigh (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, holding at the top of the step-up for 5 secs. Increase up to 20 repetitions with 15 sec holds on each leg. Start with a 3" step and increase to 8" as you become stronger.





### Quadriceps and hip strengthening - side-step down

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 the floor. Keep all of your weight through the leg that is on the step. Start with one set of 10, holding at the bottom of the step-down for 5 secs. Increase the number of repetitions as your strength increases, up to 20 repetitions with 15 sec holds on each leg.



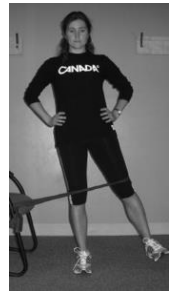
### Calf strengthening - heel raises

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



### Hip Abduction strengthening

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 repetitions and increase to 3 sets of 15 repetitions.



### Hip Extension strengthening

Stand with legs shoulder width apart with a resistance band around one of your thighs just above your knee. Extend your leg to place slight tension on the resistance band. Move the leg backwards slowly against the resistance of the band using the muscles in your buttock and the back of your thigh. Start with 1 set of 10 repetitions and increase to 3 sets of 15 repetitions.



### Core strengthening - Side Planks

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





### Quadriceps strengthening - squats with exercise 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 your kneecap is in line with your second toe the whole time. Start with one set of 10 repetitions, holding each squat for 5 secs and increase the number of repetitions as your strength increases, up to 30 repetitions for 15 sec hold.



### Combination Hip strengthening

Standing with legs hip-width apart and your feet pointing 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 pointing slightly out. Keep your pelvis straight and square, so that 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 repetitions as your strength increases.



### Gluteal Strengthening - single bridge

Single leg: 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 repetitions as your strength increases, building up to 15 repetitions with 10 sec holds for each leg.



## STRETCHING EXERCISES

Stretching your muscles is just as important as strengthening for the rehabilitation of AKP. The following muscle groups should be stretched at least 2-times each day. It is important that the stretches are completed slowly and these exercises should not cause pain.

### Hip flexor stretch

Stand about 2-feet away from a chair and place your left foot on the front edge of the chair. Both feet should be pointed straight ahead. Draw in your belly button using your abdominal muscles and tuck your tailbone in. Tighten your right buttock to push your right hip forward until you feel a stretch at the front of the right hip. Do not arch your back. Hold the stretch for 30 secs, and repeat 2-3 times on each leg. Repeat at least twice throughout the day.



### Hip internal rotators

Sit on the front half of a chair and cross your legs by placing the outside of one ankle on top of the other knee. Slowly let the top knee fall out to the side as far as comfortable. Bend forward at the waist slightly until you feel a stretch in the outside of this hip. Gently pushing the top knee down further with your hand will increase the stretch. Do not force the stretch or cause yourself any pain. Hold the stretch for 30 secs, and repeat 2-3 times on each leg. Repeat at least twice throughout the day.



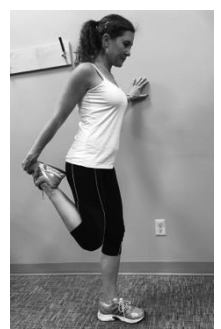
### Hip external rotators

Sit on the front half of a chair and cross your legs to place the outside of one ankle against the outside of your other knee. Use your hands to hold your top knee and gently pull it toward the opposite shoulder. You should feel the stretch in your buttocks and hips. Repeat with the other leg. Hold each stretch for at least 30 secs and repeat 3 times. Repeat at least twice throughout the day.



### Quadriceps stretch

Steady yourself using a wall and bend your right knee and hold your right ankle with your hand. Keep your back straight and tighten your stomach by drawing in your belly button. Now position your right knee just behind and touching your straight left knee (your right knee cap will be pointing just behind your left heel). A stretch should be felt in the front of the right thigh. Hold the stretch for 30 secs, and repeat 2-3 times on each leg. Repeat at least twice throughout the day.





### Hamstring stretch

Lying on your back, place a towel or belt around your foot and bring your leg up in the air until you feel a stretch at the back of your thigh. Hold the stretch for 30 secs, and repeat 2-3 times on each leg. Repeat at least twice throughout the day.



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