

# KNEE REHABILITATION

Dr. Mahmoud Sous

Bhoomika Pathak & Priyanka Yadav



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A complete care guide for knee rehab

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Bhoomika Pathak  
Priyanka Yadav

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### **Dr. Mahmoud Sous – Ph.D.**

During the period of 1995-1999, I went to the medical school in Poland to research about the various methods of back pain treatment. After finishing my PhD, I took variety of courses including naturopath, acupuncture, and manual techniques. This gave me an idea that exercises, and massage could be helpful in treatment of chronic pain. But my findings didn't stop me here, I also worked as a naturopath practitioner in Canada where I got familiar about treatments with Chinese medicines, osteopath techniques and some other manual therapies which helps in pain management.

Fixing injuries requires an understanding of anatomy and biomechanics. That is why my research and treatment belong to the holistic approach of using different techniques and remedies for the treatment of back pain. In 1990, I realize that there are some complex spinal aspects and issues which leads to of back pain. So, from my case studies I formulated a guideline which is clear and easy to understand and will fix your issues.

My goal is to help people visualize how the body functions and what happens inside when you experience pain. Healing requires to focus on one's action because pain results due to faulty actions and movements. This thought motivated me to work on a book which will include all home remedies where people can treat themselves to fix their pain. I have included knowledge based on my clinical research using manual massage therapy, food habits, nutrition facts, heat, sauna, hydrotherapy, cold water treatments which overall helps in pain management. It gives me pleasure to introduce this book to the community where I have shared all my experienced treatment plans.



### **Priyanka Yadav (Physiotherapist)**

I started my career in 2011, since then I have worked as a Physiotherapist in several clinics and hospitals in India. Working mostly in the Outpatient department made me realize that Physio's role is extremely crucial in the rehabilitation and recovery process of a patient. My desire to reach out to more people motivated me to work for this book. Have worked with Dr. Mahmoud on several research books on self-pain management. We have been constantly working on curating the best suited protocol for various Musculoskeletal conditions. Additionally, we have also included approaches with alternative medicine.



### **Bhoomika Pathak (Physiotherapist)**

After graduating in 2014, I have been working with various clinical conditions like sports injury, musculoskeletal injury, and neurological disorders for more than 5 years. Along with Dr. Mahmoud & colleagues I have worked on treatment and pain management for various musculoskeletal injuries and pain population. With all the successful outcomes till now, we have designed this book with stagewise guide to treat your knee pain.

**We Believe in a Pain-Free Society!**



**Dr. Sous's Team who have contributed with their approaches in this book.**

- \* Priyanka Yadav - Physiotherapist
- \* Bhoomika Pathak - Physiotherapist
- \* Liming Nang - Acupuncturist
- \* Navjot Kaur - Physiotherapist
- \* Payal Vaghani - Physiotherapist
- \* Revathi Kandaswamy - Massage Therapist
- \* Mandeep Kaur - Physiotherapist
- \* Donaliza Mendoza - Massage Therapist
- \* Adla Hito - Herbalist & Nutritionist
- \* Haitham Ajoury - layout and design

This book will include a complete management of your knee pain starting with brief knowledge about anatomical structures involved in Knee joint. What are the common injuries and medical conditions that can cause knee pain? The injuries are described in detail with its rehabilitation process. Initial pain management, Positioning, Compression, heat and cold application, Stage wise Rehabilitation, self exercises for strengthening the muscles supporting the knee joint, Stretching, Plyometric exercises, Agility training, Balance & Co-ordination Exercises, Self-massage techniques are explained in this book with proper illustrations. Apart from the rehabilitation, a holistic approach is used to treat various knee conditions which includes incorporation of herbs to reduce inflammation and stiffness, hydrotherapy, food & Nutrition, use of Essential oil for massaging knee and a lot more. This book will be a go-to guide for yourself or people undergoing TKR (Total Knee Replacement) or Ligament or Meniscus reconstruction surgery, as it gives you an insight about the surgery and the complications that comes with it. With pictorial representation we have tried to make this book more interesting and easy to understand. Hopefully, this book will give you a glimpse of all the areas related to knee pain.

**We believe in a Pain-Free Society!**





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# KNEE JOINT AND ITS COMMON INJURIES

## Overview

Knee pain is a common complaint that affects people of all ages. It may start suddenly, often after an injury or exercise. Knee pain may be the result of an injury, such as a ruptured ligament or torn cartilage or it can be an overuse injury like bursitis or tendonitis. Medical conditions including arthritis, baker's cyst, Osgood-Schlatter disease, Infection in the knee joint can cause knee pain as well.



Knee pain is a common complaint among adults and most often associated with general wear and tear from daily activities like walking, bending, standing, and lifting. Athletes who run or play sports that involve jumping or quick pivoting are also more likely to experience knee pain and problems.

**Causes:** Knee pain can have different causes. Being overweight puts you at greater risk for knee problems. Overusing your knee can trigger knee problems that cause pain. If you have a history of arthritis, it could also cause knee pain.

Here are some common causes of knee pain:

## Medical conditions

- Arthritis: Including rheumatoid arthritis, osteoarthritis, lupus, and gout.
- Baker cyst: A fluid-filled swelling behind the knee that may occur with swelling (inflammation) from other causes, such as arthritis.
- Osgood-Schlatter disease.
- Infection in the bones of the knee.
- Infection in the knee joint.

## Injuries and Overuse:

- Bursitis -- Inflammation from repeated pressure on the knee, such as kneeling for a long time, overuse, or injury.
- Dislocation of the kneecap
- Fracture of the kneecap or other bones
- Iliotibial band syndrome: Injury to the thick band that runs from your hip to the outside of your knee
- Patellofemoral syndrome: Pain in the front of your knee around the kneecap
- Torn ligament: An anterior cruciate ligament (ACL) injury, or medial collateral ligament (MCL) injury may cause bleeding into your knee, swelling, or an unstable knee
- Torn cartilage (a meniscus tear): Pain felt on the inside or outside of the knee joint.

**Symptoms:** The location and severity of knee pain may vary, depending on the cause of the problem. Signs and symptoms that sometimes accompany knee pain include:

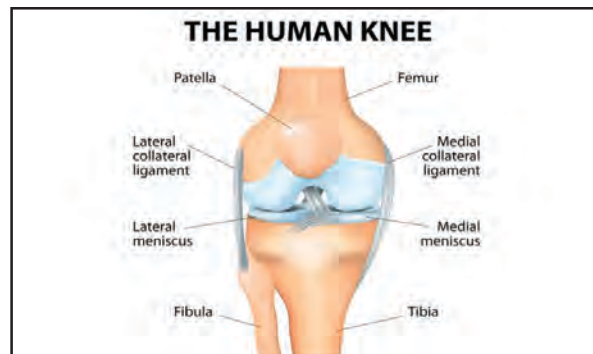
- Swelling and stiffness.
- Redness and warmth to the touch.
- Weakness or instability.

- Popping or crunching noises.
- Inability to fully straighten the knee.

**Risk factors:** Various factors can increase your risk of having knee problems, including:

- Excess weight. Being overweight or obese increases stress on your knee joints, even during ordinary activities such as walking or going up and down stairs. It also puts you at increased risk of osteoarthritis by accelerating the breakdown of joint cartilage.
- Lack of muscle flexibility or strength. A lack of strength and flexibility can increase the risk of knee injuries. Strong muscles help stabilize and protect your joints and muscle flexibility can help you achieve full range of motion.
- Certain sports or occupations. Some sports put greater stress on your knees than do others. Alpine skiing with its rigid ski boots and potential for falls, basketball's jumps and pivots, and the repeated pounding your knees take when you run, or jog all increase your risk of knee injury. Jobs that require repetitive stress on the knees such as construction or farming also can increase your risk.
- Previous injury. Having a previous knee injury makes it more likely that you'll injure your knee again.

**Knee Joint Anatomy:** The knee joint is a hinge type synovial joint, which mainly allows for flexion and extension (and a small degree of medial and lateral rotation). It is formed by articulations between the patella, femur and tibia.

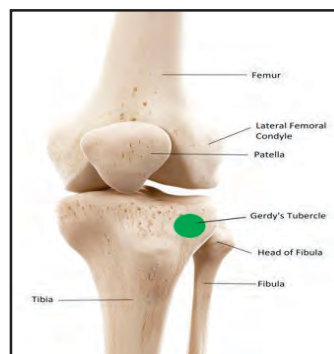
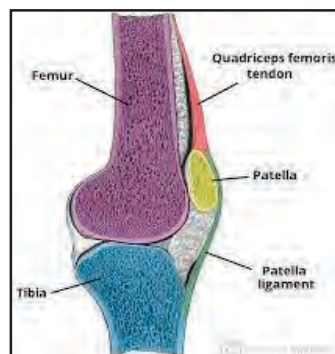


**Articulating Surfaces:** The knee joint consists of two articulations tibiofemoral and patellofemoral. The joint surfaces are lined with hyaline cartilage and are enclosed within a single joint cavity.

**Tibiofemoral:** medial and lateral condyles of the femur articulate with the tibial condyles. It is the weight-bearing component of the knee joint.

**Patellofemoral:** anterior aspect of the distal femur articulates with the patella. It allows the tendon of the quadriceps femoris (knee extensor) to be inserted directly over the knee increasing the efficiency of the muscle.

As the patella is both formed and resides within the quadriceps femoris tendon, it provides a fulcrum to increase power of the knee extensor and serves as a stabilizing structure that reduces frictional forces placed on femoral condyles.



## Joint capsule

The joint capsule of the knee joint is one of a composite nature, mainly formed by muscle tendons and their expansions, forming a thick ligamentous sheath around the joint. The capsule is relatively weak and attached to the margins of the femoral and tibial articular surfaces. The anterior portion of the capsule features an opening, whose margins attach to the borders of the patella. A second gap is also present in the latero-posterior portion of the capsule to give passage to the tendon of the popliteus muscle.

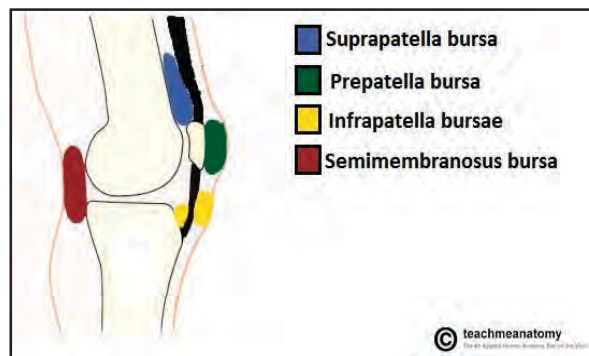
**Bursae:** A bursa is synovial fluid filled sac, found between moving structures in a joint – with the aim of reducing wear and tear on those structures. There are four bursae found in the knee joint:

**Suprapatellar bursa:** an extension of the synovial cavity of the knee, located between the quadriceps femoris and the femur.

Prepatellar bursa – found between the apex of the patella and the skin.

**Infrapatellar bursa:** split into deep and superficial. The deep bursa lies between the tibia and the patella ligament. The superficial lies between the patella ligament and the skin.

**Semimembranosus bursa:** located posteriorly in the knee joint, between the semimembranosus muscle and the medial head of the gastrocnemius.



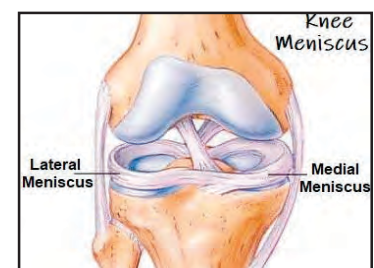
**Menisci:** The menisci are fibrocartilaginous crescent-shaped plates found between the articular surfaces of the femur and tibia and serve to provide their congruence and shock absorption.

The medial and lateral menisci are fibrocartilage structures in the knee that serve two functions:

- To deepen the articular surface of the tibia, thus increasing stability of the joint.
- To act as shock absorbers by increasing surface area to further dissipate forces.

**Medial meniscus:** A C-shaped, almost semicircular fibrocartilaginous plate that overlies the surface of the medial tibial plateau. Its anterior horn attaches on the anterior intercondylar area of tibia and blends with the anterior cruciate ligament. Its posterior horn is attached to the posterior intercondylar area of the tibia, between the attachments of the lateral meniscus and the posterior cruciate ligament.

**Lateral meniscus:** an almost circular fibrocartilaginous plate that overlies the surface of the lateral tibial plateau. Its anterior horn also attaches to the anterior intercondylar area of tibia and partially blends with the anterior cruciate ligament. Similarly, its posterior horn attaches to the posterior intercondylar areas anterior to the posterior horn of the medial meniscus.



## Ligaments

The major ligaments in the knee joint are:

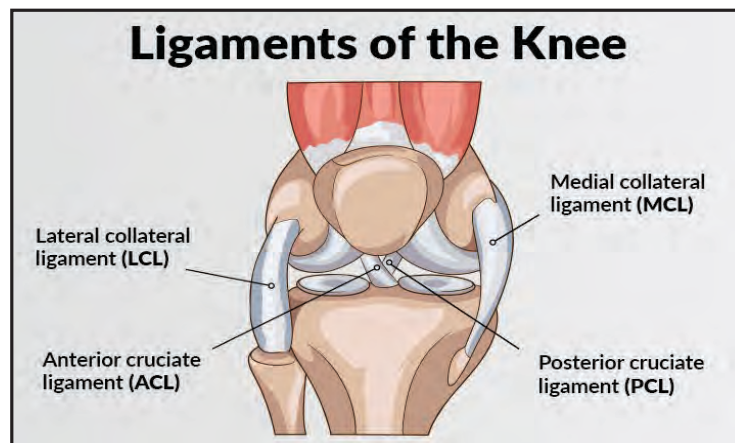
**Collateral ligaments:** two strap-like ligaments. They act to stabilize the hinge motion of the knee, preventing excessive medial or lateral movement.

1. Tibial (medial) collateral ligament – wide and flat ligament, found on the medial side of the joint. Proximally, it attaches to the medial epicondyle of the femur, distally it attaches to the medial condyle of the tibia.
2. Fibular (lateral) collateral ligament – thinner and rounder than the tibial collateral, this attaches proximally to the lateral epicondyle of the femur, distally it attaches to a depression on the lateral surface of the fibular head.

**Cruciate Ligaments:** these two ligaments connect the femur and the tibia. In doing so, they cross each other, hence the term 'cruciate' (Latin for like a cross)

1. Anterior cruciate ligament – attaches at the anterior intercondylar region of the tibia where it blends with the medial meniscus. It ascends posteriorly to attach to the femur in the intercondylar fossa. It prevents anterior dislocation of the tibia onto the femur.
2. Posterior cruciate ligament – attaches at the posterior intercondylar region of the tibia and ascends anteriorly to attach to the anteromedial femoral condyle. It prevents posterior dislocation of the tibia onto the femur.

**Patellar ligament:** a continuation of the quadriceps femoris tendon distal to the patella. It attaches to the tibial tuberosity.



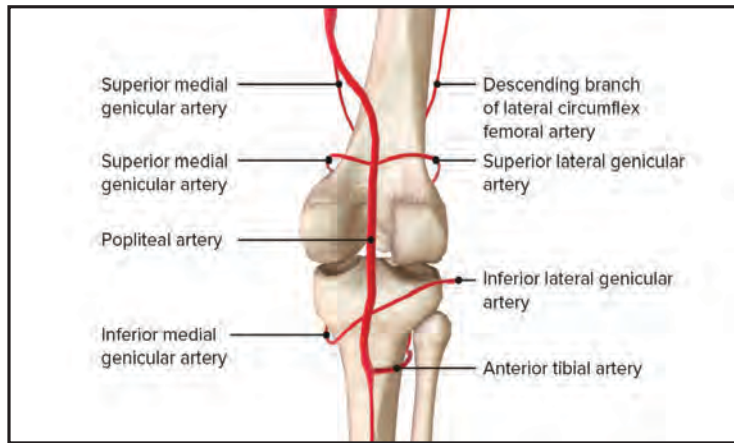
## Nerve supply

The knee joint receives innervation from the femoral nerve, via the saphenous nerve and muscular branches. The joint also receives contributions from the tibial and common fibular (peroneal) nerves, and the posterior division of the obturator nerve.

## Blood supply

The knee joint has a rich vascularization stemming from the genicular anastomosis formed by several arterial blood vessels. There are approximately ten arteries involved in the formation of the genicular anastomosis:

- Descending branches: Descending branch of the lateral circumflex femoral artery, descending genicular branch of the femoral artery.
- Ascending branches: circumflex fibular branch of the posterior tibial artery, anterior and posterior tibial recurrent branches of the anterior tibial artery.
- Branches of the popliteal artery: lateral superior and inferior genicular arteries, the medial superior and inferior genicular arteries, and the middle genicular arteries.



## Movements

There are four main movements that the knee joint permits:

- **Extension:** Produced by the quadriceps femoris, which inserts into the tibial tuberosity.
- **Flexion:** Produced by the hamstrings, gracilis, sartorius and popliteus.
- **Lateral rotation:** Produced by the biceps femoris.
- **Medial rotation:** Produced by five muscles; semimembranosus, semitendinosus, gracilis, sartorius and popliteus.

Note: Lateral and medial rotation can only occur when the knee is flexed (if the knee is not flexed, the medial/lateral rotation occurs at the hip joint).

## Muscles acting on the knee joint

### Flexors

The prime flexors of the knee joint are biceps femoris, semitendinosus and semimembranosus, whereas popliteus initiates flexion of the “locked knee” and gracilis and sartorius assist as weak flexors.

### Extensors

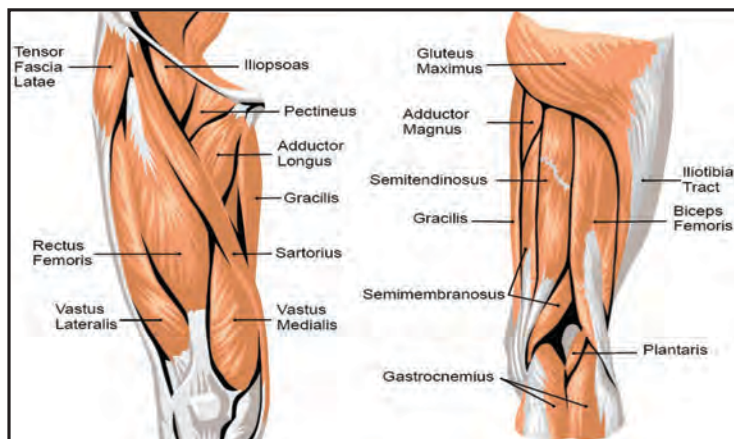
The primary extensor of the knee joint is quadriceps femoris, assisted by the tensor fasciae latae. Quadriceps femoris formed of four muscle bellies; rectus femoris, vastus lateralis, vastus medialis and vastus intermedius, all innervated by the femoral nerve.


### Medial Rotation

Medial rotation occurs when the knee is in the last stage of extension, with some also occurring when the knee is flexed. It is primarily produced by the actions of popliteus, semimembranosus and semitendinosus, which are assisted by sartorius and gracilis.

### Lateral Rotation

The biceps femoris long and short head muscles are the main contributors to lateral rotation.





**Home Care:** Simple causes of knee pain often clear up on their own while you take steps to manage your symptoms. If knee pain is caused by an accident or injury, you should contact your health care provider.

If your knee pain has just started and is not severe, you can:

- Rest and avoid activities that cause pain. Avoid putting weight on your knee.
- Apply ice. First, apply it every hour for up to 15 minutes. After the first day, apply it at least 4 times per day. Cover your knee with a towel before applying ice. DO NOT fall asleep while using ice. You can leave it on too long and get frostbite.
- Keep your knee raised as much as possible to bring down any swelling.
- Wear an elastic bandage or elastic sleeve, which you can buy at most pharmacies. This may reduce swelling and provide support.
- Take ibuprofen (Motrin) or naproxyn (Aleve) for pain and swelling.
- Sleep with a pillow underneath or between your knees.

### **When to Contact a Medical Professional**

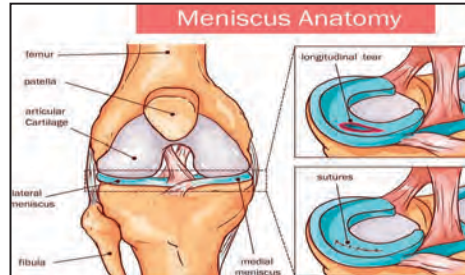
You should see your doctor if:

- You cannot bear weight on your knee.
- You have severe pain, even when not bearing weight.
- Your knee buckles, clicks, or locks.
- Your knee is deformed.
- You cannot flex your knee or have trouble straightening it all the way out.
- You have a fever, redness or warmth around the knee, or a lot of swelling.
- You have pain, swelling, numbness, tingling, or bluish discoloration in the calf below the sore knee.
- You still have pain after 3 days of home treatment.

# CHAPTER 1: MENISCUS INJURY AND ITS REHABILITATION

## What is the “meniscus” in our knee?

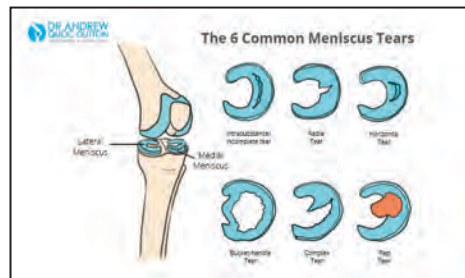
There are two types of cartilage in the knee, articular cartilage, and meniscus cartilage. The primary function of the articular cartilage is to provide a smooth gliding surface for joint motion. The meniscus cartilage in the knee includes a medial (inside) meniscus and a lateral (outside) meniscus.



## How does the meniscus get injured?

A meniscus tear is a common knee joint injury. There are two categories of meniscal tears: acute traumatic tears and degenerative tears. Degenerative tears most commonly occur in middle-aged people. They typically occur through repetitive stresses to the menisci over time, which severely weakens the tissue. Most often degenerative tears are surgically removed.

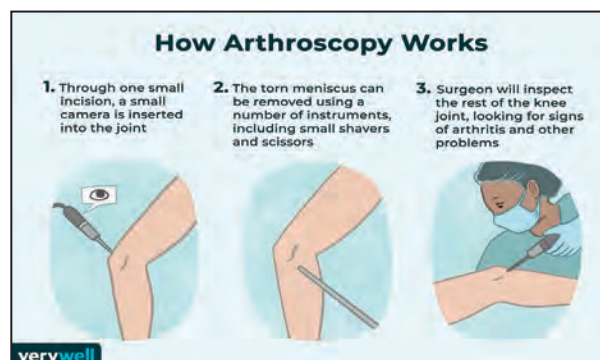
Acute traumatic tears occur most frequently in the athletic population because of a twisting injury to the knee when the foot is planted. There are six common types of meniscus tears, incomplete tear, radial tear, horizontal tear, flap tear, complex tear, and bucket-handle tear. Symptoms of an acute meniscus tear include swelling, pain along the joint line, catching, locking and a specific injury.



## How to treat a meniscus injury?

If an athlete suffers a meniscal tear, the three options for treatment include non-operative rehabilitation, surgery to trim out the area of torn meniscus, or surgery to repair (stitch together) the torn meniscus. After meniscus surgery, rehabilitation with a physical therapist or athletic trainer is needed to restore range of motion, strength, movement control and guide the athlete’s return to sport.

Meniscus repair is usually done with arthroscopic surgery. This procedure is used to diagnose and treat joint problems. The healthcare provider uses a small, lighted tube (arthroscope) put into the joint through a small cut (incision). Images of the inside of the joint can be seen on a screen. The procedure can assess joint problems, find bone diseases and tumors, and find the cause of bone pain and inflammation.



## REHABILITATION OF KNEE AFTER MENISCUS SURGERY

### PHASE 1 IMMEDIATE POST-OP (0-4 WEEKS AFTER SURGERY):

This phase involves the initial recovery from surgery and usually lasts 0-2 weeks. In the first week you should rest and elevate your leg for a significant amount of the time.

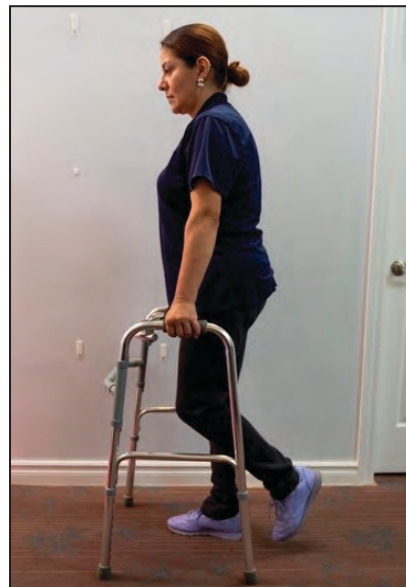


### Goals during phase 1 rehabilitation:

- Protect repair
- Reduce swelling, minimize pain
- Restore patellar mobility
- Restore full extension
- Flexion < 90 degrees

### Patient education

- Keep your knee straight and elevated when sitting or lying down. Do not rest with a towel placed under the knee.
- Do not actively bend your knee; support your surgical side when performing transfers (i.e., sitting to lying down).
- Do not pivot on your surgical side.
- Rest when you feel tired. Getting enough sleep will help you recover. Sleep with your knee raised, but not bent. Put a pillow under your foot. Keep your leg raised as much as possible for the first few days.
- You will be able to stand if you have a brace or use crutches or a walker. Do not put weight on your leg until your doctor says you can. You can move around the house to do daily tasks. If you have a brace, leave it on except when you exercise your knee or you shower. Be careful not to put the brace back on too tight.





## Cold Therapy & Elevation:

Cold packs 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.



## Massage:

Soft tissue treatments for edema / pain control and to posterior musculature, ITB, Adductors, Quadriceps, Calf. No direct palpation of surgical portals for 4 weeks. The steps to follow during massage are,

- Place a towel roll under the knees before starting.
- Start out with minimal pressure and do circular movements.
- You can increase the pressure as tolerated.
- Work the area behind the knees and upper thigh the longest.
- Massage the knee for about 10 minutes.



## Oils useful with massage:

**Recipe 1:** Cumin and Camphor oil

**Ingredients:** 5 spoons camphor  
3 tablespoons cumin  
3 tablespoons oatmeal  
2 teaspoons chia

**Method:** Mix the material and grind it well with the coffee grinder, mix it with oil, put it directly on the knee with massage, and

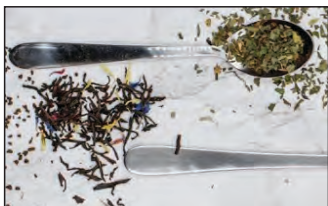
then cover with a hot towel. 2-3 times a day. Put the oil in an airtight container, away from the heat and sun, and in the refrigerator.



**Recipe 2: Cumin and Eucalyptus oil**

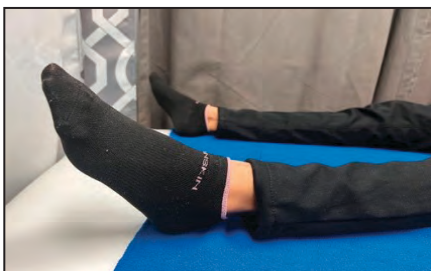
- Ingredients:** 3 teaspoons safflower  
3 teaspoons eucalyptus  
3 teaspoons black bean  
3 teaspoons cumin  
1/2 cup olive oil

**Method:** Mix them together and place them in an airtight container, away from the heat and sun and in the fridge. Apply only 2-3 times to the area with a light massage.



**Exercises:**

**Ankle pumps:** The foot and ankle should be actively “pumped” up and down 10-20 times every hour to promote circulation and decrease swelling.



**Patellar mobilization:** superior/inferior and medial/lateral- This exercise is done by simply pushing the patella up and down and side to side and holding that position.



**Seated Assisted knee flexion/ extension:** Sit at the edge of the bed or a firm surface. Support your operated leg with your

non-operated leg. Gently allow the operated knee to bend by supporting it with a non-operated leg. DO NOT bend the knee beyond 90 degrees.



Now straighten the operated knee passively using the supporting (non-operated) leg to do all the work.



**Heel slides with towel:** Use a towel or bed sheet or a TheraBand and loop it around your foot. Using your arms slowly pull your foot to your hip. It is important to keep your heel on the table /bed the entire time. Use a sock or other frictionless surface to help perform this exercise.



**Prone hangs:** Lie on the bed on your stomach. Slide down on the bed to the edge so your leg is hanging over the end. Your thigh should be supported on the bed, but your lower leg should be hanging off the bed. Place a small rolled-up towel underneath your thigh just above your knee cap. This helps to keep from placing too much pressure on your kneecap. Remain in this position for 30 to 60 seconds. Allow gravity to pull your lower leg down towards the floor so your knee straightens out.



**Heel props:** This is a passive movement, meaning gravity will do the movement for you. In a lying position, place the heel on a rolled towel (approximately 4-6 inches in diameter) or pillow making sure the heel is propped high enough to lift the thigh off the table. Allow the operated leg to relax into extension. Hold for 6 counts and relax for 3 counts, this is one repetition. 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.



**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.



**Straight Leg Raise to the front:** 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.



**Straight-Leg Raise to the Back:** These straight leg raises help you strengthen the muscles in your buttocks and in the back of your thigh. Do 8 to 12 repetitions. Lie on your stomach, lift your leg straight behind you (toward the ceiling). Lift your toes about 15 cm (6 in.) off the floor, hold for 5 seconds, then lower slowly.



**Hip Adduction:** In lying with your knees bent as shown, squeeze a soft ball or a towel roll 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.



Perform all exercises 2-3 times per day to build your strength and endurance. You should perform all the strengthening exercises on both legs.

**Also consider:**

- Other ROM exercises as tolerated (heel slides on wall, passive flexion in sitting using other leg to push, prone hangs and passive knee extension).
- Core strengthening as tolerated.
- Stationary bike – no resistance, start with arc’s (swinging) and progress range of motion as tolerated.
- Upper body exercises - weights and arm ergometer.

**Diet:** You can eat your normal diet. If your stomach is upset, try bland, low-fat foods like plain rice, broiled chicken, toast, and yogurt. Drink plenty of fluids. You may notice that your bowel movements are not regular right after your surgery. This is common. If you have not had a bowel movement after a couple of days, ask your doctor about taking a mild laxative. Here are some suggestions which

helps you to keep your gut healthy.

1. **Apple cider vinegar:** It helps relieve acute pain, inflammation and keeping the bowel movements smooth. It can be used as a combination by adding teaspoon of apple cider vinegar on a glass of water and drinking it two to three times a day.



2. **Ginger roots:** It contains anti-inflammatory properties and can be very useful in relieving pain and infections. Add half a teaspoon of ginger roots to one cup of well-boiled water and drink this mixture at least once a day.



### **Requirements for progression to Phase 2:**

- Knee Flexion 90° or the ROM instructed by your surgeon
- Straight leg raises with no lag
- Full Knee extension
- Pain and Swelling levels managed to enable exercise progression.
- Pain free gait without crutches.

### **PHASE 2 POST-OP (4 WEEKS AFTER SURGERY):**

This phase emphasizes progressive activation of the quadriceps muscles with significant core strengthening. This phase usually starts from 3 -5 weeks after your knee surgery.

### **Goals for phase 2 rehabilitation:**

- Continue to protect repair.
- Single leg stand control.
- Normalize gait.
- Flexion < 120 degrees.
- No pain with functional movements, including step up/ down, squat, partial lunges.

**Scar mobilization massage:** Massaging your scars is important. It keeps the tissue around the incision loose, so it doesn't "stick" to the tissue underneath. Always start massaging the scar after 4 weeks of surgery when the skin has healed with no gaps or drainage at the edges. Here are the steps to follow,

- Place your fingers below the scar. Move the skin and tissue under it upwards, towards the scar. Hold for a few seconds.

- Put the flat part of your fingers on the scar. Move the skin and tissue under the scar back and forth, holding for a few seconds. Make sure you press enough to feel the scar “move” under your fingertips.
- Move the skin and tissue under the scar in a small circle, holding for a few seconds. Make sure you press enough to feel the scar “move” under your fingertips.



## Massage for surrounding structures:



### NOTE:

You may feel some pulling or burning. Loosening the scar may be more comfortable to do while the skin is warm (e.g., after a shower). Keep doing these massages every day for 6 months to 1 year after surgery. Always combine anti-inflammatory oils to enhance faster recovery. Here are some recipes for home-made oils,

### Recipe 1: Lemon and Olive oil



**Ingredients:** 3 teaspoons of fennel, 5 teaspoons of chicory, 10 teaspoons lemon peel and dry orange peel, Half cup of olive oil

**Method:** Take all the dry ingredients and grind it in a coffee grinder until it becomes a coarse powder. Add virgin olive oil to it and mix well. Place it in an airtight container, away from heat and sun or store it in the refrigerator. Use 2-3 times a day with gentle pressure on the back. Make sure you stir the mixture before using.



### Recipe 2: Thyme and olive oil



**Ingredients:** 3 teaspoons ground dry olive leaves, 6 teaspoons of dried sour grapes, 3 teaspoons of dried wild thyme, Half a cup of drinking cups of extra-virgin olive oil

**Method:** Take the amount of dried olive leaves, thyme, and dried sour grapes, grind the dry ingredient until it becomes like powder. Then, add virgin olive oil and mix it well. And put in an airtight container, away from heat and sun or in the fridge. Take small amount of oil, massage on your upper back with gentle pressure, try working on the areas which are stiff. Use it 3 to four times a day with gentle pressure on back. After massage, you can take a hot compress and gently wipe off your skin





### Recipe 3: Sesame and Olive oil



**Ingredients:** A teaspoon of hot pepper, 5 spoons of green tea, 3 teaspoons of sesame seeds, 2 teaspoons of salt, A full cup of extra-virgin olive oil

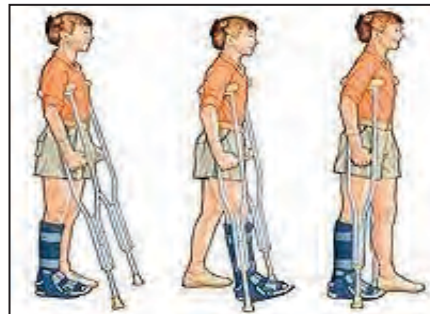
**Method:** Take all the dry ingredients and grind it in a coffee grinder until it becomes a fine powder. Add virgin olive oil to it and mix well. Place it in an airtight container, away from heat and sun and in the fridge. Use 3 times a day (morning, noon, and evening) with gentle pressure on the back. After massage, you can take a hot compress and gently wipe off your skin. Make sure you stir the mixture

before using.



### Weight Bearing:

Continue partial weight bearing



Consult with your surgeon regarding unlocking your brace.



**Exercises:** Continue increasing the difficulty of the exercises from phase 1 as well as adding the following new exercise into your program:

**Range of motion:** Progress flexion using active, active-assisted, and pain-free passive exercises.

**Hamstrings curls:** Lying on your stomach, place a resistance band around your ankle and also have it attached to an anchor point. Bend your knee slowly 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.



**Calf Raises – Both legs:** Start with feet shoulder width apart and toes pointed straight ahead, 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.



**Partial squats with chair:** Slowly squat with equal weight on each leg. Bend your knees from 0° to a maximum of 45° of flexion, making sure your knees do not move beyond your toes. You can start doing the squats using support from a chair or a wall and then progress to unsupported. Start with one set of 10 reps. Hold for 5-10 seconds. Slowly come back up. Relax. Increase the number of reps as your strength increases, up to 30 reps x 15 secs hold.

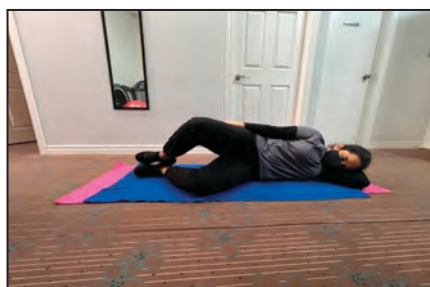
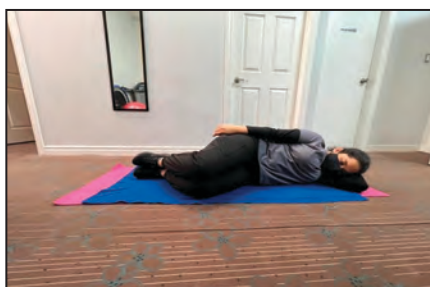


**Glutes:** Lying on your back with your knees bent and your arms by your sides. Squeeze your buttocks together and lift up to create a bridge. Keep equal weight on each leg with your pelvis straight. Be careful not to push down on your neck or shoulders – use your buttocks to do the work. Start with one set of 10, holding for 5 secs and increase the number of repetitions as you get stronger. Once you can complete 20 reps holding for 10 sec each, change to single leg bridges. Complete the single-leg bridges on each leg.



**Clamshell:** Lie on your side, with legs stacked and knees bent at a 45-degree angle. Rest your head on your lower arm, use your top arm to steady your frame. Be sure that your hip bones are stacked on top of one another, as there is a tendency for the top hip to rock backward. Engage your abdominals by pulling your belly button in, as this will help to stabilize your spine and pelvis.

Keeping your feet touching, raise your upper knee as high as you can without shifting your hips or pelvis. Don't move your lower leg off the floor. Pause, and then return your upper leg to the starting position on the ground. Do 20 reps on each side.

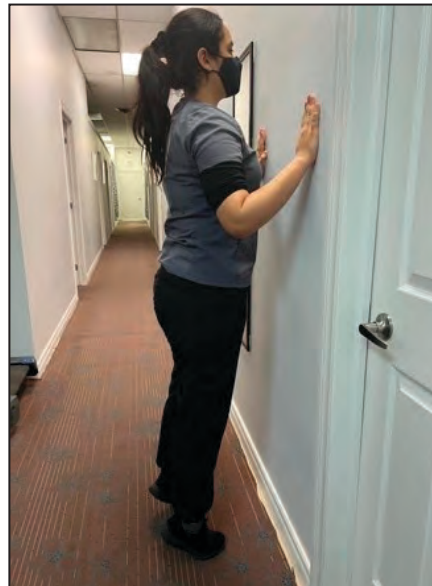


**Single leg stance:** Start using some support (i.e. railing or table) and progress to unsupported. Stand balancing on your non-operated leg. Then try standing on your operated leg. Hold for 15 seconds each leg. Perform that 3 times. Once it gets easy you may progress to doing that with your eyes closed.

**Hamstrings stretch (supine)**



**Calf Stretch (standing):**



**Ilio-tibial band (rolling):**





Quadriceps femoris (prone)



Hip flexors:

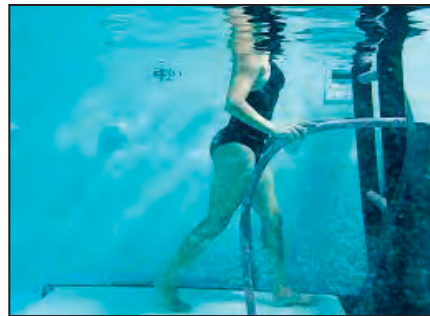


Hip rotators:

Abductor resistance band exercises



Abdominal strengthening (i.e., planks, isometrics, obliques, transverse abdominis)



Deep-water walking (only after surgery incisions are healed)



### Requirements for progression to Phase 3:

- Full range of motion
- Double leg squat with good motor control
- Good control and alignment during hip and core strengthening exercises.

### PHASE 3 Post OP- (6-8 WEEKS AFTER SURGERY):

This phase will usually start 6-8 weeks post-op and may continue until 3 months following surgery.

#### Goals for phase 3 rehabilitation:

- Range of motion: should be good except for the end range of knee flexion.
- Continue to protect repair.
- Maintain full extension.
- Normalize gait.
- Safely progress strengthening.
- Promote proper movement patterns.
- Avoid post exercise pain/swelling.

**NOTE:** For better recovery refer to the scar massage and surrounding structure massage techniques.

#### Stretching Exercises:

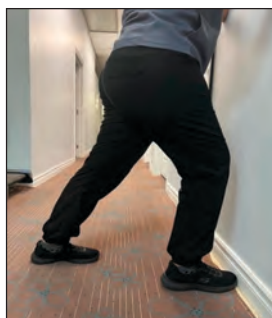
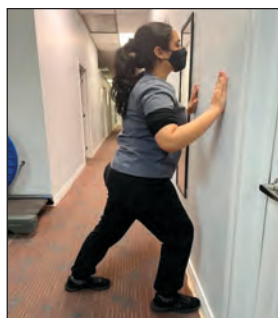
##### Supine Active Hamstrings stretch:

- Lie on your back. Bend your hip, grasping your thigh just above the knee. Slowly straighten your knee until you feel the tightness behind your knee. Hold for 5 seconds, then relax.
- Repeat 10 times.
- Repeat with the other leg.
- If you do not feel this stretch, bend your hip a little more, and repeat.
- No bouncing! Maintain a steady, prolonged stretch for the maximum benefit.



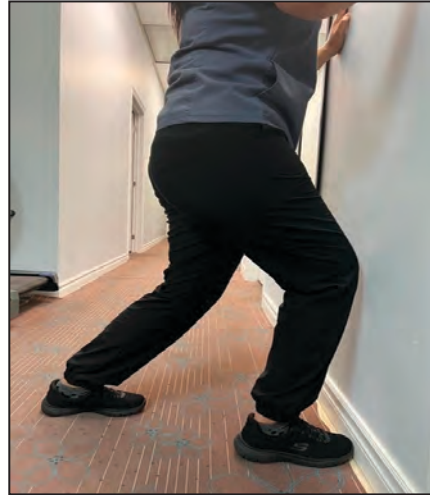
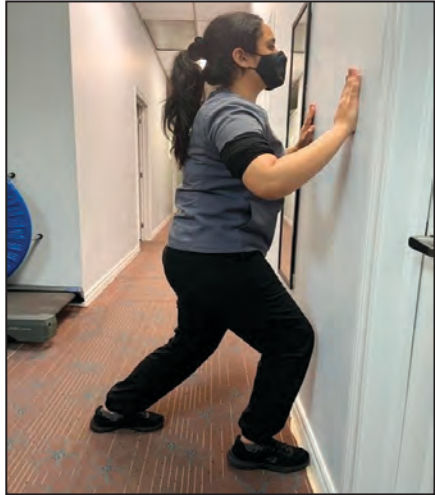
##### Standing gastrocnemius stretch:

- Stand about arm's-length from the wall.
- Lean forward and place both hands on the wall about shoulder-width apart.
- Extend one foot (the side to be stretched) behind you with one heel on the ground, and the other foot closer to the wall.
- Lean into the wall with your hips until you feel a stretch in the calf of the extended leg.
- Hold this stretch for about 30 seconds, and then change sides.
- For a deeper stretch, move your foot farther back.



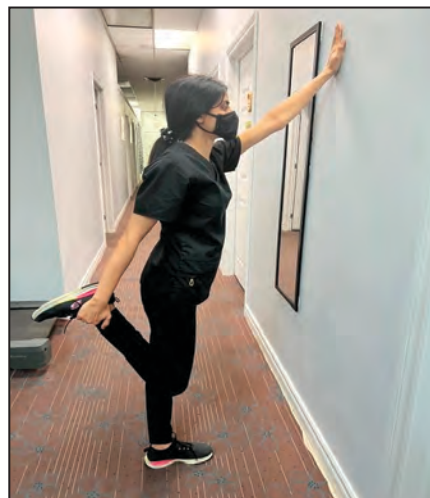
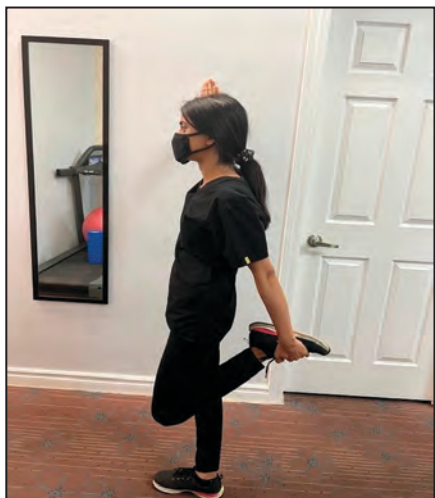
### Standing Soleus Stretch:

- Standing tall, take a half step forward.
- Keeping your weight evenly distributed on both feet and your heels on the ground, slowly bend your knees and sink down toward the ground.
- You should feel a stretch in the back leg, just above the heel.
- Continue to sink down slowly with your hips to deepen the stretch. Hold this stretch for about 30 seconds and change sides.



### Standing quads stretch:

- Standing with your involved knee bent, gently pull heel toward buttocks, feeling a stretch in the front of the leg.
- You can take the support of a wall with the opposite hand.
- Hold for 5 seconds.
- Repeat 10 times.

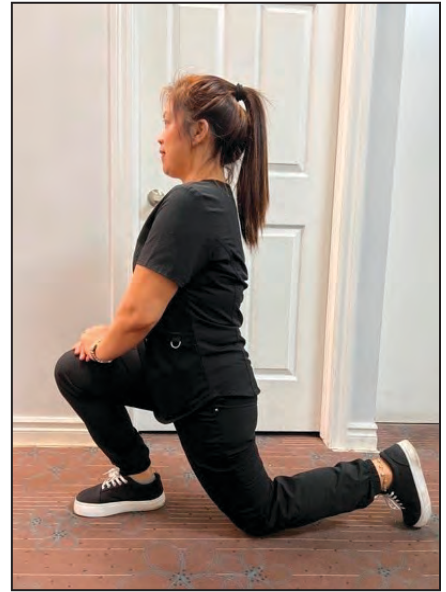
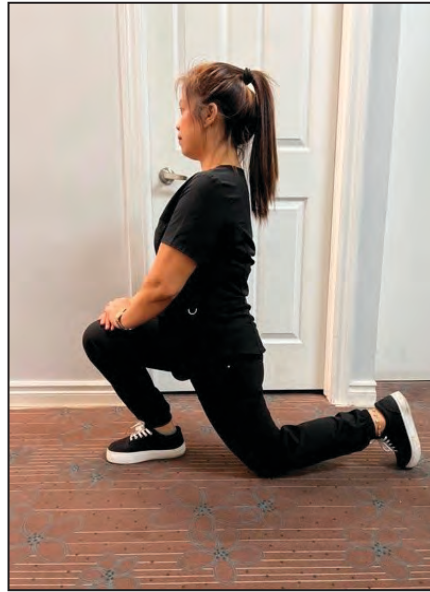
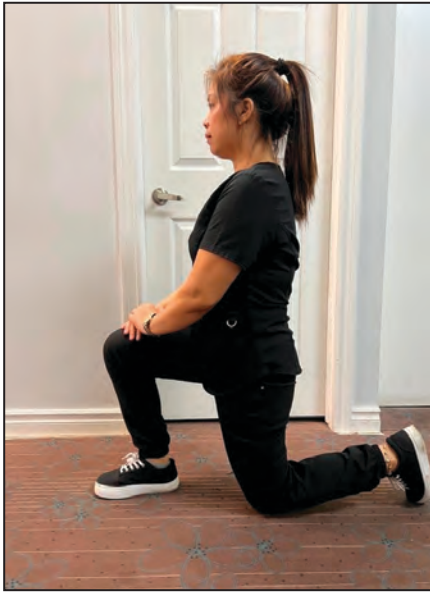


### Kneeling hip flexors stretch:

- This move will stretch and lengthen the psoas and iliacus (known as the iliopsoas) muscles:
- Begin by kneeling on the floor. Move the right leg in front of you, so that the right thigh is parallel to the floor and the knee is bent at a 90-degree angle. The left knee should remain on the floor, aligned underneath the left hip.
- Place your hands on your hips and, while keeping your back straight, shift your hips forward until you feel a stretch. You will feel it through the front of the left thigh and groin area.

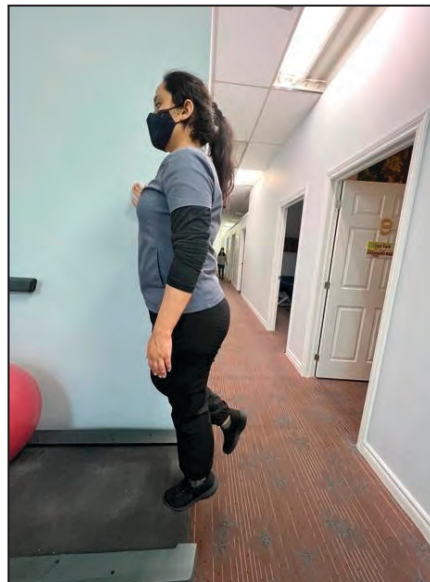


- Hold the stretch for 20 to 30 seconds.
- Switch legs and repeat until you feel adequately stretched.

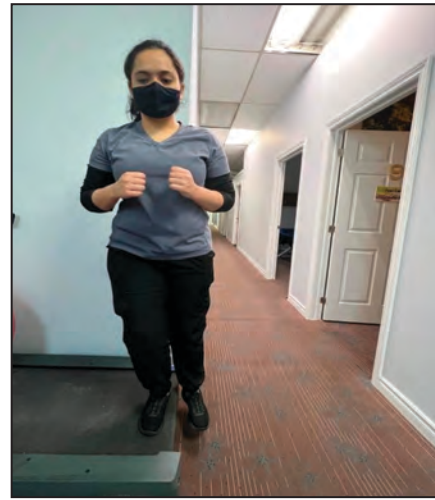
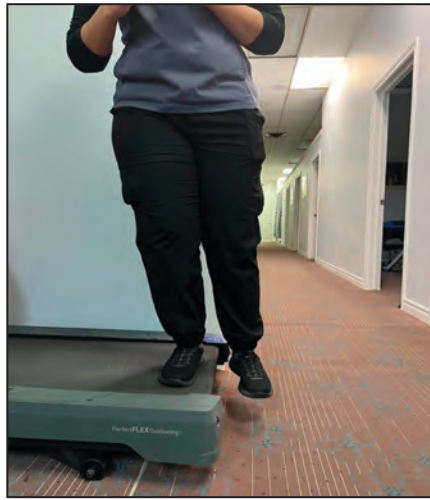


**Functional knee training:**

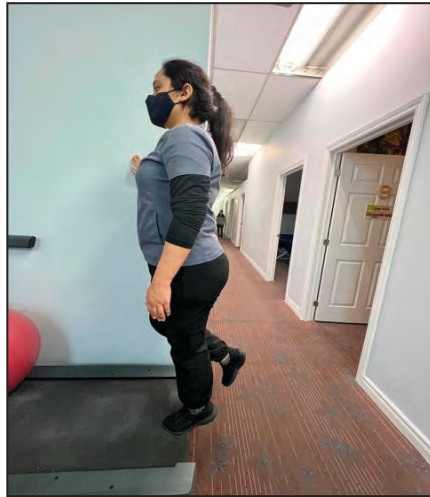
**Step ups:** Do graduated heights, starting at 4” and increasing to 8”. Stand in front of a stair or stepping stool and place one foot on the step, in front of you. Rise up onto the step by shifting all of your weight onto this leg and tighten your quadriceps muscles. Put all of your weight through 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.



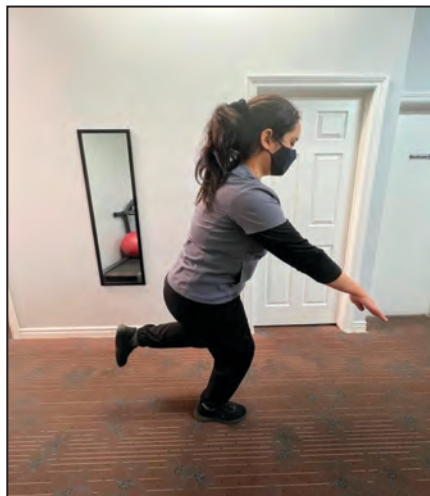
**Step downs:** Do graduated heights, starting at 4” and increasing to 8”. Start with one leg standing on the step and slowly bend your knee to lower your other leg to lightly touch floor. Keep all of your weight through the leg that is on the step. Start with one set of 10 reps, holding at the bottom 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.



**Single leg Calf Raises:** Start on one leg with toes pointed straight ahead, 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.



**Single leg Squats:** Initially use a chair or railing for support. Stand on one leg and slowly bend your knee to squat. Bend as far as you can while keeping control. Start with one set of 10, holding the squat for 5 secs; increase the number of repetitions as you get stronger. Work up to performing squats without support with 'contraction' time at least double the 'rest' time on the EMS. (Up to 20 reps x 15 secs each leg).



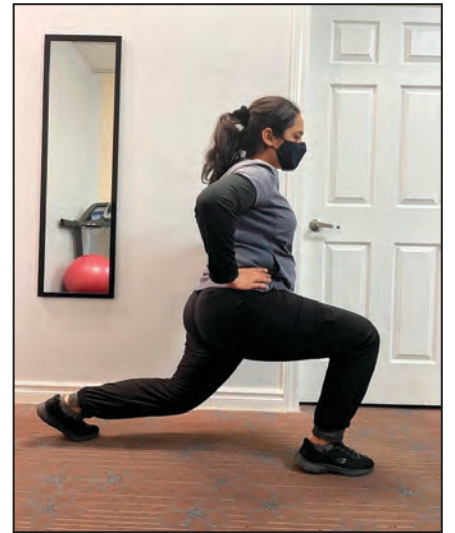
**Hip Abduction:** With a resistance band around your outside thigh just above your knee, lift your leg to place slight tension on the band. Move this leg sideways slowly against the resistance of the band using the muscles in your buttock and your hip. Start with 1 set of 10 reps and increase to 3 sets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



**Hip Extension:** Do not start this exercise until 6 weeks post op. 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 reps and increase to 3 sets of 15 reps.



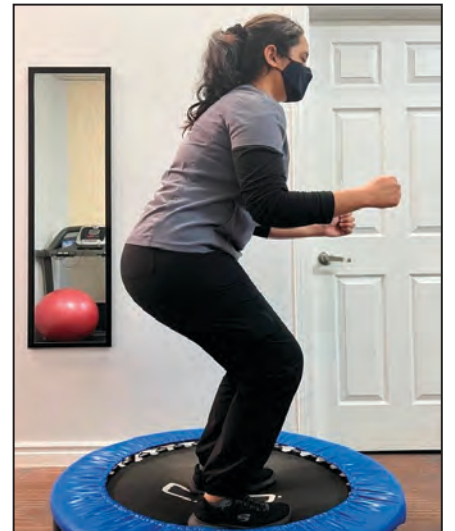
**Lunges:** Standing with feet as pictured, move down and lunge as shown. Control the descent ensuring your knee that is forward does not move beyond your toes. Start with 1 set of 10, holding each lunge for 5 secs. Increase the number of reps as your strength increases up to 3 sets of 10.



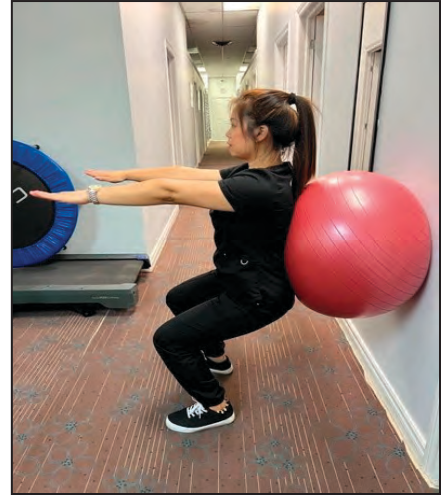
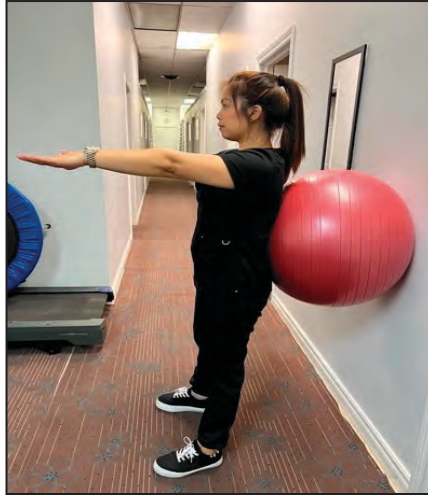
**Proprioception/Balance:** Single leg stance (eyes open, eyes closed):



Double leg squats on an unstable surface (thick carpet, foam block, camping mattress or a trampoline).  
Continue with stretches from phase 2.



Wall squats (with/without ball squeeze)  
Double leg squats with ball squeeze  
Core stability exercises (planks, physio ball exercises)

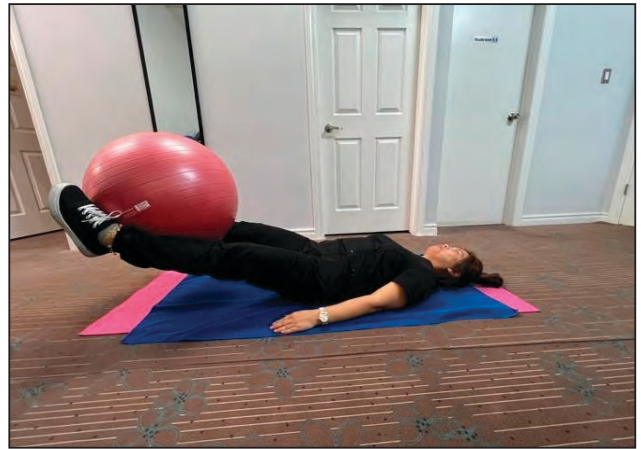


Wobble board balance and weight shift activities



Core stability exercises (planks, physio ball exercises)





Wobble board balance and weight shift activities



Swimming



Elliptical Trainer/X-country ski machine



### Requirements for Progression to Phase 4:

- Single leg squat with good motor control on an unstable surface to 70° flexion.
- Ability to demonstrate good core control and posture in single leg stance activities.
- Evidence of improvement in strength (hamstrings, hip abductors, hip extensors, hip rotator).

### PHASE 4 POST OP- (8-10 WEEKS):

Begins as early as 8- 10 weeks but may not start until 16 weeks postoperative. Depending on preoperative knee function this phase may not be completed by all patients. Realistic goals of what is attainable should be discussed with your surgeon.

### Goals for phase 4 rehabilitation:

- Maximize quadriceps, hamstrings, gluteal and core strength using functional exercises.
- Accurately perform plyometric drills.
- Training with sport specific drills.
- Increase aerobic endurance.

### Agility and dynamic strengthening:

Squats on a BOSU or a trampoline: 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 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.



### Lunges on a BOSU or a Trampoline:

- Step forward/back and lunge as shown in the picture.
- 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.



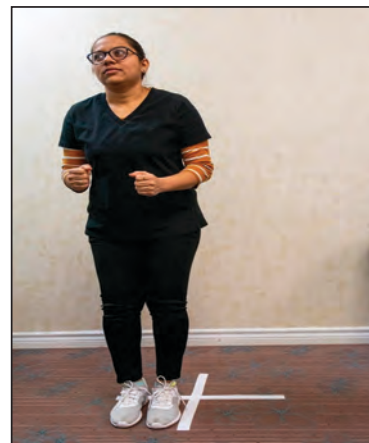
**Single leg squats on trampoline:** Standing on one leg, slowly squat bending your knee from 0° to a maximum of 90°, making sure your knee does not move beyond your toes. Start with one set of 10 reps, holding each squat for 5 secs and increase the number of reps as your strength increases, up to 30 reps x 15 secs hold.



**Cardio:** Maintain or improve aerobic fitness to complete 30 mins workouts per week. Some ideas include walking, hiking, cycling, skating, swimming, cross country skiing, and/or using an elliptical.

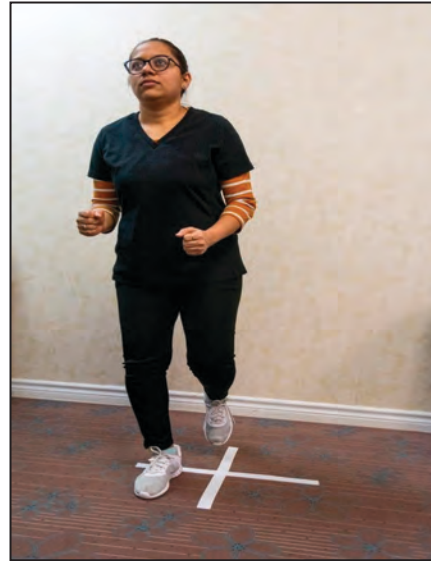
**Plyometrics:** Depending on goals and surgery results, some patients may not complete this series of exercises) Patient must be able to perform a controlled single leg squat before commencing plyometric exercises.

**Agility jumping:** backward/forward/side to side/diagonal.





Progress to single leg hop.

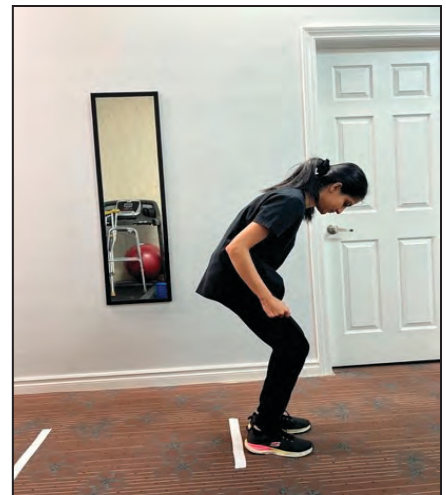


Side to side steps on the BOSU or a trampoline. Perform quick steps in both directions over the trampoline.



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.

Straight line jumping activities (shuttle jumps, standing long jumps).



**Jogging:** straight line activity, treadmill (walk to run) outdoor even ground, outdoor uneven ground/trails.

**Running:** shuttle runs, wide angle cutting, running and pivoting.

**Also consider:**

- Skipping rope – double and single leg.
- Cariocas.
- Box hop up/down (start at 6 inches).
- Tuck jumps.



Outdoor Jogging on even surface



Outdoor jogging on uneven surfaces



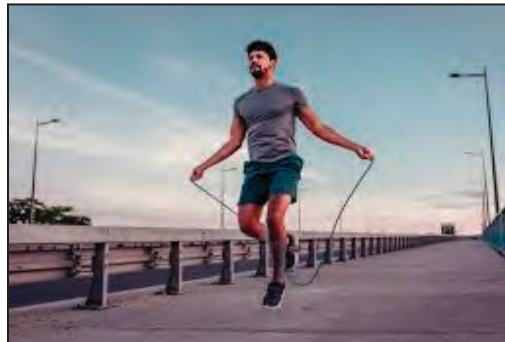
Shuttle running



Running



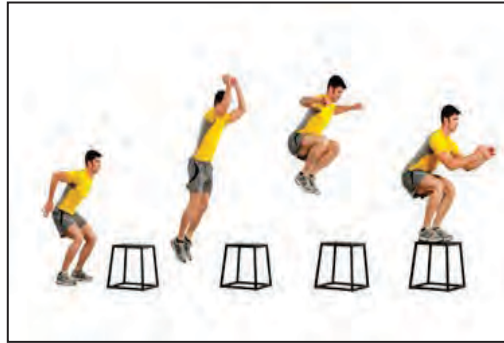
Rope jumps



Cariocas



## Box Jumps



## Tuck Jumps



## Nutritional Facts:

A healthy diet reduces the risk of developing symptoms like pain, swelling, muscle stiffness and inflammation. Below are some food suggestions help to enhance the recovery,

**Fatty fish:** Omega-3 fatty fish contains supplements such as fish oil supplements, flaxseed oil and chia seeds, Omega-3 works to combat infections, especially arthritis.



**Oils:** There are some types of oils that reduce inflammation in addition to fish oil such as virgin olive oil, which contains the substance “oleocanthal” that reduces cholesterol and reduces inflammation.



**Dairy products:** Milk, yogurt and various types of cheeses contain a large percentage of calcium and vitamin D that increases bone strength and reduce painful symptoms and infections.



**Dark leafy vegetables:** Cabbage, spinach and dark vegetables are rich in vitamin D and natural antioxidants enhancing the functioning of the immune system and resisting infections. Spinach from dark leafy vegetables rich in vitamin D and antioxidants enhances immune system functioning and resistance to infections.



**Broccoli:** Contains sulforaphane, which scientists have proven slows the progression of osteoporosis, as well as rich in vitamins C, K and calcium.



**Green Tea:** Contains high levels of polyphenols that are resistant to any inflammation present in the body, especially arthritis.



**Garlic:** Garlic is long known for its ability to reduce inflammation, as it contains a compound that also reduces cartilage inflammation.



**Nuts:** They also contain alpha-linolenic acid, which enhances the immune system's ability.



**Food Recipes to help reduce inflammation:**

**Recipe 1:** Tuna and Spinach Salad

**Ingredients:** 1 ½ tablespoons tahini, 1 ½ tablespoons lemon juice, 1 ½ tablespoons water, 1 5-ounce can chunk light tuna in water,



drained, 4 Kalamata olives, pitted and chopped, 2 tablespoons feta cheese, 2 tablespoons parsley, 2 cups baby spinach, 1 medium orange, peeled or sliced

**Method:** Whisk tahini, lemon juice and water together in a bowl. Add tuna, olives, feta, and parsley; stir to combine. Serve the tuna salad over 2 cups spinach, with the orange on the side.

### Recipe 2: Lentil Soup

**Ingredients:** 2 tablespoons extra-virgin olive oil, divided, 1 cup chopped yellow onion, 1 cup chopped carrots, 1 cup chopped turnip, 1 tablespoon chopped fresh thyme, 6 cups low-sodium vegetable broth, 2 cups brown lentils, rinsed,  $\frac{3}{4}$  teaspoon salt, 5 cups fresh baby spinach, 1  $\frac{1}{2}$  tablespoons balsamic vinegar, 3 radishes, cut into matchsticks,  $\frac{1}{4}$  cup packed fresh flat-leaf parsley leaves



**Method:** Select Sauté setting on a programmable pressure multicooker (such as an Instant Pot; times, instructions and settings may vary according to cooker brand or model). Select High temperature setting and allow to preheat. Add 1 tablespoon oil to the cooker; heat until shimmering. Add onion, carrots, turnip, and thyme; cook, stirring occasionally, until the onion is tender, about 5 minutes. Stir in broth, lentils, and salt. When cooking is complete, carefully turn the steam release handle to Venting position and let the steam fully escape (float valve will drop; this will take about 5 minutes) before removing the lid from the cooker. Stir in spinach and vinegar. Toss radishes and parsley with the remaining 1 tablespoon oil in a small bowl.

### Recipe 3: Berry almond smoothie bowl

**Ingredients:**  $\frac{2}{3}$  cup frozen raspberries,  $\frac{1}{2}$  cup frozen sliced banana,  $\frac{1}{2}$  cup plain unsweetened almond milk, 5 tablespoons sliced almonds, divided,  $\frac{1}{4}$  teaspoon ground cinnamon,  $\frac{1}{8}$  teaspoon ground cardamom,  $\frac{1}{8}$  teaspoon vanilla extract,  $\frac{1}{4}$  cup blueberries, 1 tablespoon unsweetened coconut flakes



**Method:** Blend raspberries, banana, almond milk, 3 tablespoons almonds, cinnamon, cardamom, and vanilla in a blender until very smooth. Pour the smoothie into a bowl and top with blueberries, the remaining 2 tablespoons almonds and coconut.

### Recipe 4: Chamomile Health Drink

**Ingredients:** 4 cups boiling water, 6 bags chamomile tea, 2 teaspoons grated fresh ginger, 4 slices lemon, 2-4 teaspoons honey, 2 sprigs rosemary, lightly bruised



**Method:** Stir boiling water, tea bags, ginger, lemon, honey, and rosemary together in large heatproof bowl. Steep, stirring occasionally, for 20 minutes. Strain the liquid through a fine-mesh sieve, pressing on the tea bags to get as much liquid out as possible.

**Recipe 5:** Turmeric latte

**Ingredients:** 1 cup unsweetened almond milk or coconut milk beverage, 1 tablespoon grated fresh turmeric, 2 teaspoons pure maple syrup or honey, 1 teaspoon grated fresh ginger, Pinch of ground pepper, 1 pinch Ground cinnamon for garnish.



**Method:** Combine milk, turmeric, maple syrup (or honey), ginger and pepper in a blender. Process on high until very smooth, about 1 minute. Pour into a small saucepan and heat over medium-high heat until steaming hot but not boiling. Transfer to a mug. Garnish with a sprinkle of cinnamon, if desired.

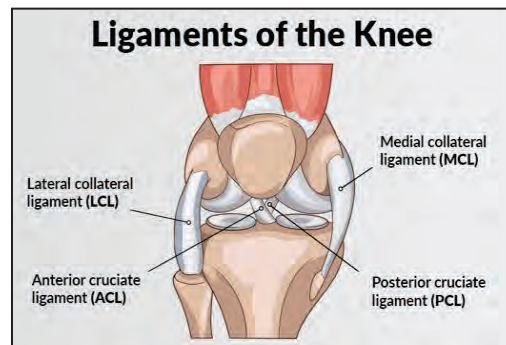


## CHAPTER 2: KNEE LIGAMENT INJURY AND ITS REHABILITATION

What ligaments do we have in knee?

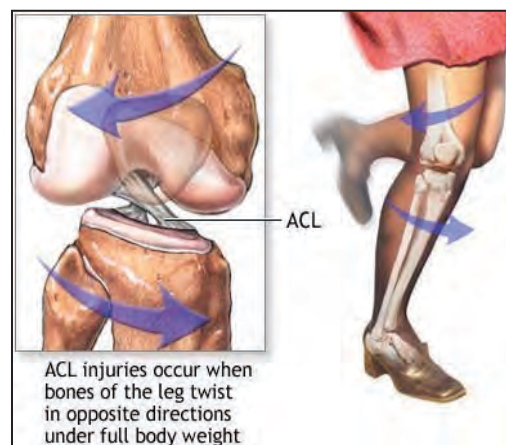
There are 4 major ligaments in the knee. Ligaments are elastic bands of tissue that connect bones to each other and provide stability and strength to the joint. The four main ligaments in the knee connect the femur (thighbone) to the tibia (shin bone), and include the following:

- Anterior cruciate ligament (ACL). The ligament, located in the center of the knee, controls rotation and forward movement of the tibia (shin bone).
- Posterior cruciate ligament (PCL). The ligament, located in the back of the knee, controls backward movement of the tibia (shin bone).
- Medial collateral ligament (MCL). The ligament that gives stability to the inner knee.
- Lateral collateral ligament (LCL). The ligament that gives stability to the outer knee.



### How are cruciate ligaments injured?

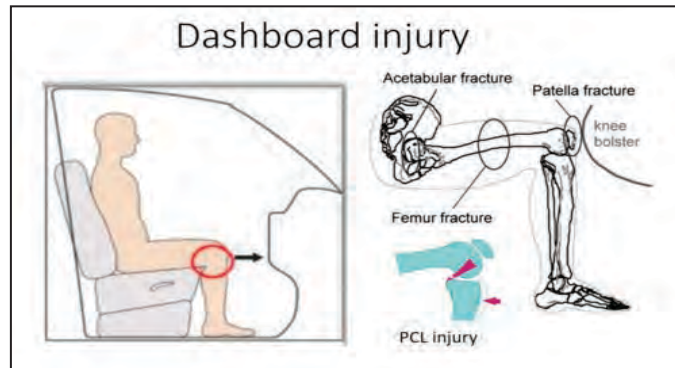
The anterior cruciate ligament (ACL) is one of the most common ligaments to be injured. The ACL is often stretched and/or torn during a sudden twisting motion (when the feet stay planted one way, but the knees turn the other way). Skiing, basketball, and football are sports that have a higher risk of ACL injuries.



Signs and symptoms of an ACL injury usually include:

- A loud pop or a “popping” sensation in the knee
- Severe pain and inability to continue activity
- Rapid swelling
- Loss of range of motion
- A feeling of instability or “giving way” with weight bearing

The posterior cruciate ligament (PCL) is also a common ligament to become injured in the knee. However, the PCL injury usually occurs with sudden, direct impact, such as in a car accident or during a football tackle.



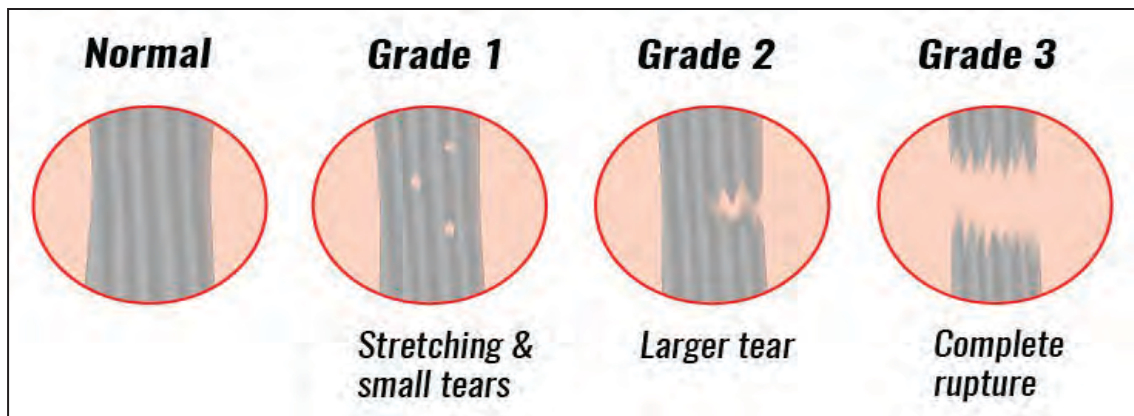
### What is the degree of injury?

About half of all injuries to the anterior cruciate ligament occur along with damage to other structures in the knee, such as articular cartilage, meniscus, or other ligaments. Injured ligaments are considered “sprains” and are graded on a severity scale.

**Grade 1 Sprains.** The ligament is mildly damaged in a Grade 1 Sprain. It has been slightly stretched but is still able to help keep the knee joint stable.

**Grade 2 Sprains.** A Grade 2 Sprain stretches the ligament to the point where it becomes loose. This is often referred to as a partial tear of the ligament.

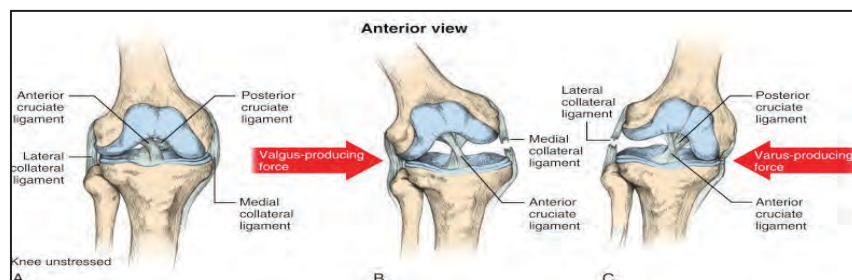
**Grade 3 Sprains.** This type of sprain is most commonly referred to as a complete tear of the ligament. The ligament has been split into two pieces, and the knee joint is unstable.



Partial tears of the anterior cruciate ligament are rare; most ACL injuries are complete or near complete tears.

### How are collateral ligaments injured?

The medial collateral ligament is injured more often than the lateral collateral ligament. Stretch and tear injuries to the collateral ligaments are usually caused by a blow to the outer side of the knee, such as when playing hockey or football.



## How is a knee ligament injury diagnosed?

Your healthcare provider will ask you to have your health history and do a physical exam. You may also need one or more of these tests:

- **X-ray.** This imaging test can rule out an injury to bone instead of a ligament injury. It uses energy beams to make images of internal tissues, bones, and organs on film.
- **MRI.** This test uses large magnets, radio waves, and a computer to make detailed images of organs and structures within the body. It can often find damage or disease in bones and a surrounding ligament, tendon, or muscle.
- **Arthroscopy.** This procedure is used to diagnose and treat joint problems. The healthcare provider uses a small, lighted tube (arthroscope) put into the joint through a small cut (incision). Images of the inside of the joint can be seen on a screen. The procedure can assess joint problems, find bone diseases and tumors, and find the cause of bone pain and inflammation.

Now, first let's talk about the rehabilitation process after anterior cruciate ligament (ACL) injury.

## ACL INJURY REHABILITATION

### First line of Action after ACL injury:

Prompt first-aid care can reduce pain and swelling immediately after an injury to your knee. Follow the R.I.C.E. model of self-care at home:

- **Rest.** General rest is necessary for healing and limits weight bearing on your knee.
- **Ice.** When you're awake, try to ice your knee at least every two hours for 20 minutes at a time.



- **Compression.** Wrap an elastic bandage or compression wrap around your knee. Place your leg in a natural position and allow for a slight bend in the knee. You may spray or apply some kind of ointment over the area. Hold one end of the bandage firmly against the kneecap and begin wrapping the bandage around. Make sure to cover above and below the cap. This provides maximum external support not just to the joint but also to the ligaments, muscles and connective tissue.





- **Elevation.** Lie down with your knee propped up on pillows.



### Conservative Management

A torn ACL will not heal without surgery. But nonsurgical treatment may be effective for patients who are elderly or have a very low activity level. If the overall stability of the knee is intact, your doctor may recommend simple, nonsurgical options.

- **Bracing.** Your doctor may recommend a brace to protect your knee from instability. To further protect your knee, you may be given crutches to keep you from putting weight on your leg.



- **Physical therapy.** As the swelling goes down, a careful rehabilitation program is started. Specific exercises will restore function to your knee and strengthen the leg muscles that support it.

### Surgical Management

Rebuilding the ligament. Most ACL tears cannot be sutured (stitched) back together. To surgically repair the ACL and restore knee stability, the ligament must be reconstructed. The surgeon will replace your torn ligament with a tissue graft. This graft acts as a scaffolding for a new ligament to grow on.

## Preoperative Goals:

- Control pain and swelling.
- Restore normal range of motion.
- Develop muscle strength sufficient for normal gait and ADL.
- Mentally prepare the patient for surgery.

**Immobilize the knee:** Following the acute injury, you should use a knee immobilizer and crutches until you regain good muscular control of the leg. Extended use of the knee immobilizer should be limited to avoid quadriceps atrophy (weakness). You are encouraged to bear as much weight on the leg as is comfortable unless otherwise directed by your physician.

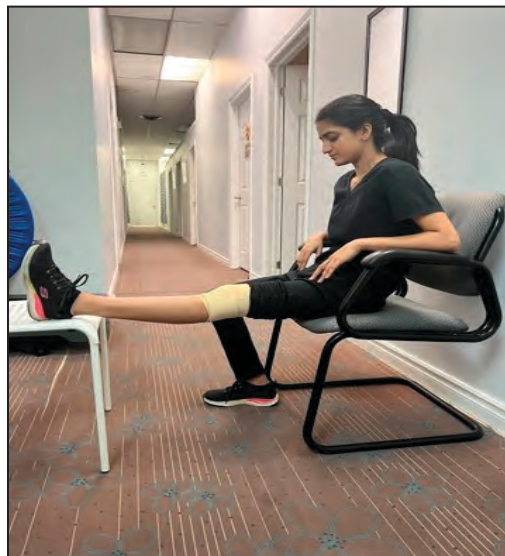
Before your surgery, you'll likely undergo several weeks of physical therapy. The goal before surgery is to reduce pain and swelling, restore your knee's full range of motion, and strengthen muscles. People who go into surgery with a stiff, swollen knee may not regain full range of motion after surgery.

**RICE and electrotherapy:** Can be applied during several weeks ahead of the surgery in order to obtain full range of motion and to decrease joint effusion.

**Restore normal range of motion:** You should attempt to achieve full range of motion as quickly as possible. Quadriceps isometrics exercises, straight leg raises, and range of motion exercises should be started immediately. Full extension is obtained by doing the following exercises:

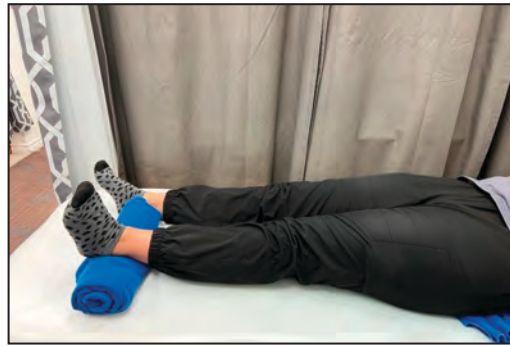
### 1. Passive knee extension.

- ★ Sit in a chair and place your heel on the edge of a stool or a chair.
- ★ Relax the thigh muscles.
- ★ Let the knee sag under its own weight until maximum extension is achieved.



### 2. Heel Props:

- ★ Place the heel on a rolled towel making sure the heel is propped high enough to lift the thigh off the table.
- ★ Allow the leg to relax into extension.
- ★ Do this 3-4 times a day for 10 - 15 minutes at a time.



### 3. Prone hang exercise.

- ★ Lie face down on a table with the legs hanging off the edge of the table.
- ★ Allow the legs to sag into full extension.



Bending (Flexion) is obtained by doing the following exercises:

- ★ Passive knee bend.  
Sit on the edge of a table and let the knee bend under the influence of gravity.



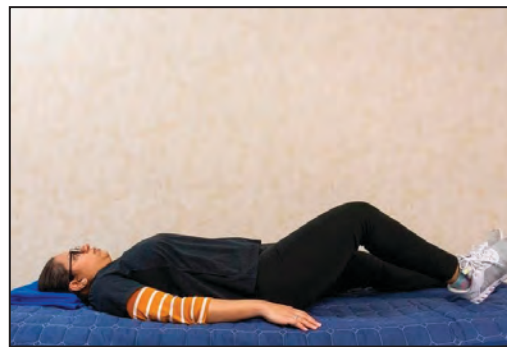
- ★ **Wall slides** are used to further increase bending.  
Lie on the back with the involved foot on the wall and allow the foot to slide down the wall by bending the knee. Use the other leg to apply pressure downwards.



★ **Heel slides:** are used to gain final degrees of flexion. Lie down on your back.

- Pull the heel toward the buttocks, flexing the knee. Hold for 5 seconds.

- Straighten the leg by sliding the heel downward and hold for 5 seconds.



You have to perform all these exercises mentioned above before your surgery at least 3 times a day to decrease the swelling followed by injury and regain full range of motion.

Surgical Procedure: Surgery to rebuild an anterior cruciate ligament is done with an arthroscope using small incisions. Arthroscopic surgery is less invasive. The benefits of less invasive techniques include less pain from surgery, less time spent in the hospital, and quicker recovery times.

### Post-Surgery Guidelines- “R.I.C.E.”

★ **Rest:** When resting your leg make sure your knee is straight. DO NOT rest the back of your knee over a pillow.

★ **Ice:** To reduce swelling and aid pain relief apply ice, contained in a pillowcase, around your knee for periods of 15-20 minutes.



- ★ **Compression:** If your knee is swollen keep your tube-grip or ACE bandage in place whilst mobilizing.



- ★ **Elevation:** When resting your leg, elevate it above your heart level but make sure the whole leg is supported.



**Crutches:** Following the surgery, you are allowed to place as much weight as is comfortable through your leg. The crutches are there for pain relief only.

**Points to note when using crutches:**

- ★ Place your crutches in front of you.
- ★ Step your operated leg to the level of the crutches.
- ★ Step through with your good leg.







### **Within the first 2 weeks aim to progress off your crutches:**

- ★ Initially go down to one elbow crutch in the opposite arm to your operated leg to use when stepping forwards on your operated leg
- ★ Progress to walking unaided.
- ★ Weight bearing status- This applies to all ACL reconstruction unless otherwise specified.
  - Day 1-7 = 50% body weight (2 crutches).
  - Day 8-14 = 50-75% body weight (1 crutch).
  - End of week 2 = full weight bearing.
  - It is important to keep the incisions dry until the stitches are removed.

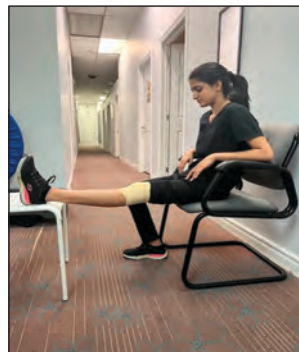
### **REHABILITATION PHASE 1 (week 1-2 post-op)**

The goal for this phase is to be able to bend and straighten your knee as far as the uninjured leg. You should also concentrate on regaining as much strength as possible in your quadriceps muscle which straightens your knee and your hamstring muscles which bend your knee.

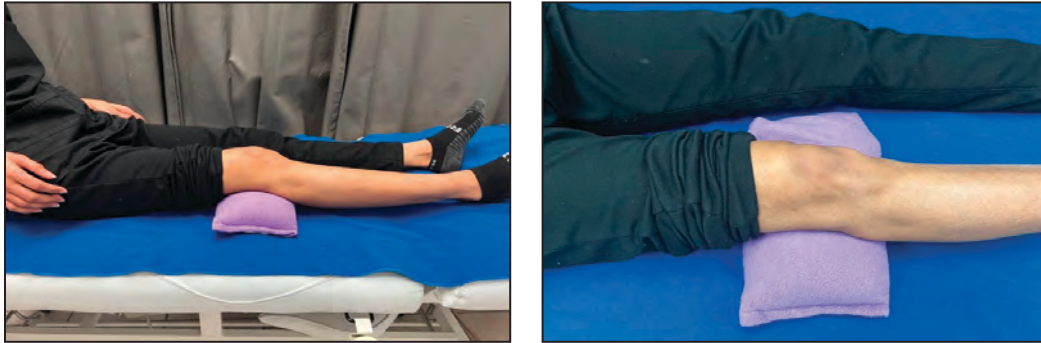
You may remove the knee immobilizer while doing exercises or if you are in a safe, protected environment. However, the knee immobilizer should be worn while sleeping for the first 2 weeks, and while you walk until you regain muscle control of the leg. Let's discuss some strengthening exercises which you need to perform in following manner.

#### **Knee extensions**

- Sit in a chair and place your heel on the edge of a stool or chair.
- Relax the thigh muscles.
- Let the knee sag under its own weight until maximum extension is achieved.



**Static quadriceps:** With your leg in extension and without lifting your heel up in the air, tighten your quadriceps (front of the thigh) muscle as hard as you can by pushing down with the back of your knee, for ten seconds. Then relax for ten seconds before tightening your muscle again. Repeat this exercise This helps to maintain quadriceps strength.



**Heel slides:**

Start with your injured leg stretched out. Gradually bend your knee by sliding your heel towards your buttock. Bend your knee until it becomes slightly uncomfortable and you can feel some pressure inside it. Hold this position for ten seconds. Then straighten your knee out again and relax for ten seconds. Repeat this exercise ten times. This exercise will help you to maintain range of movement.



**Active-assisted extension** is performed by using the opposite leg and your quadriceps muscles to straighten the knee from the 90degree position to 0 degrees. Sit on the edge of the bed and using the opposite leg try to extend the knee. Hyperextension should be avoided during this exercise.



### Passive flexion (bending) of the knee to 90 degrees.

- Sit on the edge of a bed or table and let gravity gently bend the knee.
- The opposite leg is used to support and control the amount of bending.
- This exercise should be performed 4 to 6 times a day for 10 minutes.



### Quadriceps strengthening:

- You should start quadriceps isometric contractions with the knee in the fully extended position as soon as possible.
- Do 3 sets of 10 repetitions 3 times a day.
- Each contraction should be held for a count of 6 sec.
- This exercise helps to prevent shut down of the quadriceps muscle and decreases swelling by squeezing fluid out of the knee joint.



**Straight leg raises (SLR)** with the knee immobilizer on 3 sets of 10 repetitions 3 times a day. Start by doing these exercises while lying down. This exercise is performed by first performing a quadriceps contraction with the leg in full extension. The quadriceps contraction “locks” the knee and prevents excessive stress from being applied to the healing ACL graft. The leg is then kept straight and lifted to about 45-60 degrees and held for a count of six. The leg is then slowly lowered back on the bed. Relax the muscles.



This exercise can be performed out of the brace when the leg can be held straight without sagging (quad lag). Once you have gained strength, straight leg exercises can be performed while seated.



### Hamstring Exercises

- For patients who have had ACL reconstruction using the hamstring tendons it is important to avoid excessive stretching of the hamstring muscles during the first 6 weeks after surgery.
- The hamstring muscles need about 6 weeks to heal, and excessive hamstring stretching during this period can result in a “pulled” hamstring muscle and increased pain.
- Unintentional hamstring stretching commonly occurs when attempting to lean forward and put on your socks and shoes, or when leaning forward to pick an object off the floor.
- To avoid re-injuring the hamstring muscles, bend your knee during the activities described below, thus relaxing the hamstring muscles.
- The hamstring muscles are exercised by pulling your heel back producing a hamstring contraction.
- This exercise should be performed only if your own patellar tendon graft was used to reconstruct the ACL or if an allograft was used.
- If a hamstring tendon graft from your knee was used to reconstruct the ACL, this exercise should be avoided for the first 4 - 6 weeks, as previously mentioned.

**Note:** Remember that it is extremely important to continue to remove your leg from the knee immobilizer 4 to 6 times a day for 10 – 15 minutes at a time to maintain full extension.

**Massage techniques:** When scar tissue is broken down through massage, you can help your body heal faster, and possibly reduce the appearance of your scar. Here’s how we recommend you massage your scar tissue at home:

- In early healing phases, try and massage your scar for 10-15 minutes a day (2-3 times a day for 5 mins).
- Using the pad of your thumb or finger, firmly massage in a circular motion. You should be pressing hard enough that your fingernail turns from pink to white, but it should not be painful.
- First go up the scar clockwise, work your way up and around your scar slowly but maintaining a firm pressure. Switch it up by massaging counterclockwise. This will help to drain excess fluid from the area.
- Next, stretch the skin apart around your scar, and repeat your massaging with a firm circular motion using your thumb or finger.
- With pressure, slowly slide your finger up the scar while apply pressure. Change direction by slowly sliding down.
- Repeat the process several times for 5 minutes or so.



**Massage oils:** There are specific oil recipes when used with massage enhance the results and promotes faster recovery. Here are few recipes below,

### Recipe 1: Cumin and Aloe vera oil



**Ingredients** - Aloe vera (3 teaspoon), cumin seeds (3 teaspoon), black seed, 1/2 cup celery oil

#### Method:

Grind all the dry herbs using a grinder and mix them together with olive oil. Put them in an airtight container, away from the heat and sun preferably in the fridge. Apply only 2-3 times to the area with a light massage. These are the most common prescriptions used in the treatment for knee pain.



### Recipe 2: Mustard and ginger oil

**Ingredients:** 3 teaspoons mustard, 3 teaspoons watercress, 3 teaspoons ginger

**Method:** Grind all the dry herbs using a grinder and mix them together with olive oil. Put them in an airtight container, away from the heat and sun preferably in the fridge. Apply only 2-3 wet wipes to the area with a light massage.

### Recipe 3: Honey and Castor oil

**Ingredients:** 3 teaspoons mustard, 3 Teaspoons of watercress, 3 teaspoons ginger, 1/2 cup vinegar, 1/2 cup olive oil



**Method:** Grind all the dry herbs using a grinder and mix them together with olive oil. Put them in an airtight container, away from the heat and sun preferably in the fridge. Apply only 2-3 times to the area with a light massage.

#### Recipe 4: Avocado Oil

**Ingredients:** 3 teaspoons cumin, 3 teaspoons apple peel, 3 teaspoons avocado, 3 teaspoons dried cherries, 1/2 cup vinegar, 1/2 cup olive oil



**Method:** Boil the apples and mash it along with avocados, gring the dry cheries and mix everything. Put them in an airtight container, away from the heat and sun preferably in the fridge. Apply only 2-3 times to the area with a light massage.

**Note:** You can use these recipes to massage around the knee as well as your whole leg from the thigh to your ankle. As the muscles and soft tissues around any joint has a tendency to become stiff following any kind of surgery so its always a good idea to massage the whole leg to enhance its flexibility and mobility.

#### REHABILITATION PHASE 2 (Postoperative Week 2-4)

Use the guidelines in this section during the second week after your surgery:

**Goals:**

- Maintain full extension.
- Achieve 100 - 120 degrees of flexion

- Develop enough muscular control to wean off knee immobilizer.
- Control swelling in the knee.

**Partial Squats:** Place feet at shoulder width in a slightly externally rotated position. Use a table or a chair for stability, and gently lower the buttocks backward and downward. Hold for 6 seconds and repeat. Do 3 sets of 10 repetitions each day.

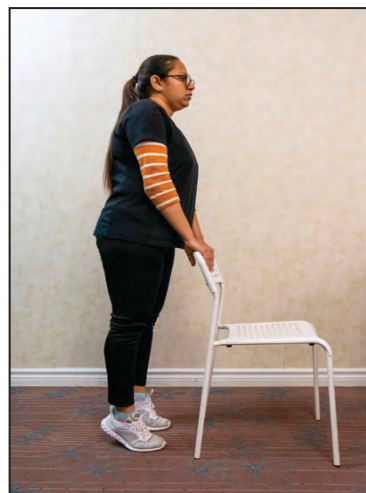


**Toe Raises:** Using a table or a chair for stabilization, gently raise the heel off the floor and balance on the ball of the feet. Hold for 6 seconds and ease slowly back down. Do 3 sets of 10 repetitions each day.

Start to wean off the knee immobilizer if you have good muscle control of the leg (straight leg raise without the leg sagging).

Once you have weaned off the immobilizer you should continue to use the crutches until you can put full weight on the leg and walk with a normal heel to toe gait and no limp.

You can start using a stationary bike when you can bend your knee at least 100 degrees. Cycling is an excellent conditioning and building exercise for the quadriceps.



### REHABILITATION PHASE 3 (Post -operative week 4-6)

Before you start the following exercises, you must:

- Be OFF crutches
- Have gained full range of movement

At this stage everyone progresses at different rates. Progress through the following exercises. They tend to get harder as you work



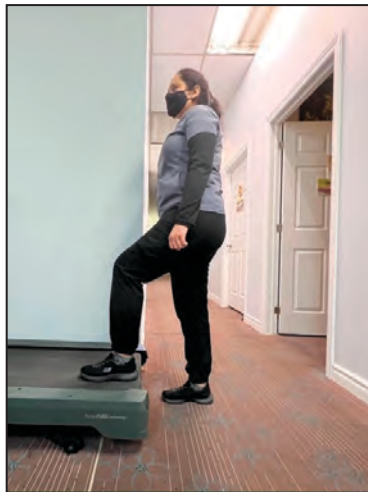
through them, so make sure you are happy with the level you are at before you move on. Your physiotherapist should be able to advise you further at this stage.

### Quadriceps Strengthening Exercises:

Double leg squats: Standing squats with a ball squeezed between your knees. (This may be easier if you slide your back down a wall)  
Hold at 45° for 5 sec Repeat x 10 times.



**Step ups:** Lead up with your operated leg and then step down again. Repeat x 20 times.



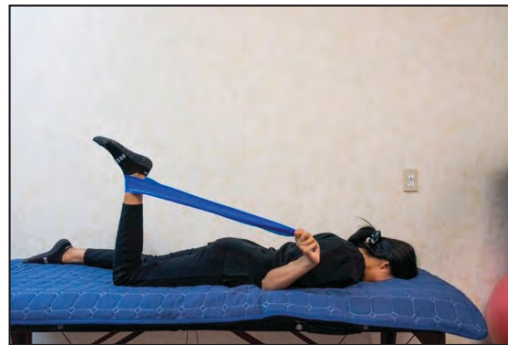
**Other suggested activities:** Cycling is also a very good way of strengthening the knee at this stage. Begin with a static bike at the gym, starting with 5 minutes on a low resistance and progressing sensibly.



**Hamstring curls (In standing):** Bend and straighten your knee between 0-30° stopping abruptly at the end of each range. Repeat x 20. Repeat the above exercise between 30-90° and 90-140°. You can progress these exercises with hamstring curls, adding weights at the gym at 6-12 weeks.



**Hamstring curls (In lying):** Lying on your front, bend your knee, bringing your heel towards your buttock. Return to start position. Repeat 15 times. You can progress this exercise by adding some weight at 6-12 weeks.



**Hamstring stretches:** Place your operated leg straight out in front of you with your heel on the floor. Lean forwards bending from the hips and rest your hands on your bent un-operated leg. Make sure you keep your back straight. Hold each stretch for 20-30 seconds for maximum effect.



You can do this same hamstring stretch in standing Position.



**Calf raises on stool:** In standing rise up onto your toes, lifting your heels. You can take support from a wall. Return to standing Repeat x 20 times.



**Calf stretches:** Make sure your feet are facing forwards. Take your operated leg out behind you with your knee straight and your heel down. Lean in towards the wall so that you can feel the stretch in the back of your calf. Hold each stretch for 20-30 seconds for maximum effect.



**Proprioception:** This is regaining awareness of your joint position by re-educating the leg with balance exercises.

**Single-leg Stance:** Stand on your operated leg. Try to maintain your balance for one minute. Keep your upper body, hips and arms still and in alignment.



**Progress to:** Do the above exercise with your eyes closed standing on an uneven surface like a mat or a pillow.

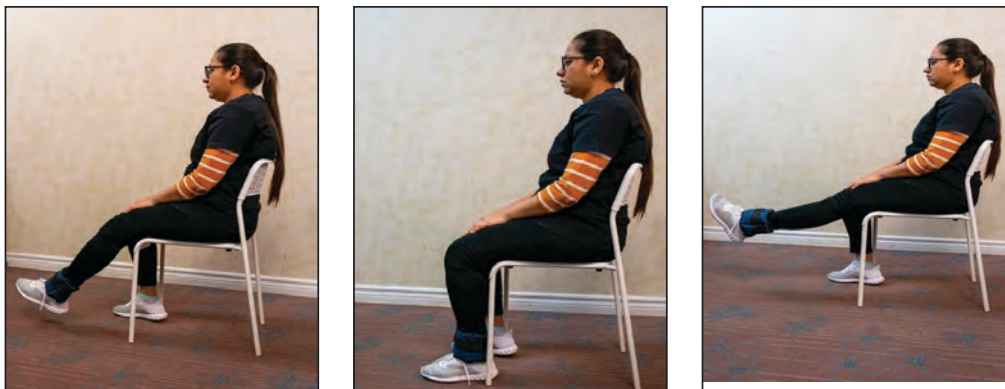


#### REHABILITATION PHASE 4 (Post- Operative week 6-12)

Before you start the following exercises, you should have:

- Full knee range of movement.
- Minimal to no swelling of your affected knee.
- Be able to balance on the affected leg for greater than 20 seconds.

**Single knee extensions in sitting:** Hold a straight leg for 5 sec. Return to start position. Repeat it 15 times.



## Single-leg squats

You can also start with following exercises if you have accessibility to a gym or any fitness facility.

1- Start by standing on your right foot. Lift your left leg and bend your knee and keep your left leg elevated to start. Your arms can be by your side or out in front of you for balance.



2- Keep your core engaged and your torso up throughout the movement. Start to push your hips back as you lower into a squat position. Aim to get low enough that your hips are parallel to the ground.

3- Squeeze your glutes as you push into the right foot to stand back up. Try to keep your left leg up between reps.

4- Perform 5 to 10 reps on this side before switching to the left.

5- Perform 3 sets.

**Stationary bike:** Set the seat position to regular height to avoid too much bending or straightening of the knee. Increase resistance as tolerated. Try to work up to 15- 20 minutes a day.



**Elliptical cross-trainer** 15 - 20 minutes a day.



**Inclined leg-press** machine for the quadriceps muscles. 70 -0-degree range.



**Swimming:** pool walking, flutter kick (from the hip), water bicycle, water jogging. No diving, or whip kicks.



## REHABILITATION PHASE 5 (Postoperative Weeks 6-12)

By week 6, your range of motion should be full extension to at least 135 degrees of flexion.

### Goals:

- 135 degrees of flexion.
- Continued strength.
- Introduce treadmill.

Continue quad sets, straight leg raises, partial squats, toe raises, stationary bike, elliptical machine, leg presses, and leg curls.

Hamstring reconstruction patients can start leg curls in a sitting position. If you develop hamstring pain then decrease the amount of weight that you are lifting, otherwise you can increase the weight as tolerated.

### Note:

It is important to avoid use of a leg curl machine that requires you to lie on your stomach. This machine puts too much strain on the healing hamstring muscles and can result in you “pulling” the hamstring muscle.

You can start doing tilt boards and balance boards for balance training.

Continue the swimming program.

Start on the treadmill (flat only).

You may begin outdoor bike riding on flat roads.

**Note:** No mountain biking or hill climbing!

## REHABILITATION PHASE 6 (Postoperative Weeks 12 – 20)

### Goals:

- Continued strength.
  - Introduce jogging and light running.
  - Introduce agility drills.
  - Determine need for ACL functional brace.
- 
- » Continue all of week 6 -12 strengthening exercises.
  - » Start straight, forward, and straight, backward jogging and light running programs.
  - » Start a functional running program after the jogging program is completed.
  - » Optional fitting for ACL functional brace.
  - » Start agility drills, zigzags and cross over drills.

## 24 WEEKS POSTOPERATIVE (6 MONTHS):

This is the earliest you should plan on returning to full sports. The aim of this phase is to prepare you for a safe return to your chosen sport or activity at 6 months +. This part of your rehabilitation will be focused on sports specific drills including high level balance and plyometric exercises. An individual exercise program will be set for you at this stage of your rehabilitation.

### To return to sports you should have:

- » Quadriceps strength at least 80% of the normal leg
- » Hamstring strength at least 80% of the normal leg
- » Full motion
- » No swelling
- » Good stability
- » Ability to complete a running program

### Nutrition & Food:

A healthy diet reduces the risk of developing symptoms such as pain, swelling, muscle stiffness. While there are foods that help fight inflammation and some harm it such as:

**Fatty fish:** Omega-3 fatty fish contains supplements such as fish oil supplements, flaxseed oil and chia seeds, Omega-3 works to combat inflammation, especially arthritis.



**Oils:** There are some types of oils that reduce inflammation in addition to fish oil such as virgin olive oil, which contains the substance “oleocanthal” that reduces cholesterol and reduces inflammation.



**Dairy products:** Milk, yogurt and various types of cheeses contain a large percentage of calcium and vitamin D that increases bone strength and reduce painful symptoms and infections.



**Dark leafy vegetables:** Cabbage, spinach and dark vegetables are rich in vitamin D and natural antioxidants enhancing the functioning of the immune system and resisting infections. Spinach from dark leafy vegetables rich in vitamin D and antioxidants enhances immune system functioning and resistance to infections.



**Broccoli:** Contains sulforaphane, which scientists have proven slows the progression of osteoporosis, as well as rich in vitamins C, K and calcium.



**Green Tea:** Contains high levels of polyphenols that are resistant to any inflammation present in the body, especially arthritis.





**Garlic:** Garlic is long known for its ability to reduce inflammation, as it contains a compound that also reduces cartilage inflammation.



**Nuts:** They also contain alpha-linolenic acid, which enhances the immune system's ability.



### Recipe 1: Wheat and greens salad

#### Ingredients:

2 cups of finely chopped parsley, 1 onion, finely chopped, 2 tablespoons of groats of wheat soaked in water,  $\frac{1}{4}$  cup of pure olive oil,  $\frac{1}{2}$  cup of finely chopped tomatoes, 2 tablespoon of squeezed lemon,  $\frac{1}{4}$  cup of finely chopped hot pepper - to taste,  $\frac{1}{2}$  cup of washed lettuce or any green leaves of your choice.



**Method:** Put the soaked wheat, tomatoes, onions, mint, parsley and hot pepper and green leaves in a bowl and mix. Add lemon, salt, olive oil and mix until combined. Pour the salad into a large serving dish and serve fresh.



**Recipe 2:** Green Greek salad

**Ingredients:** 2 cups of medium chopped tomatoes, 2 cups of chopped cucumbers, 1 cup medium chopped lettuce, 1 cup chopped onion, ½ cup chopped white cheese, 1 cup chopped sweet green pepper, few slices of black olives, ½ cup of lemon juice, pinch of salt, 1 tablespoon of vinegar, 2 tablespoons of olive oil, 1 tablespoon of thyme.



**Method:** Put all the ingredients together, and stir them except for the white cheese, onions, and black olives. Add salt, olive oil, thyme, vinegar, and lemon juice and mix well. Top the salad with cheese, onions and black olives while serving. It can be used as a side dish or main course.





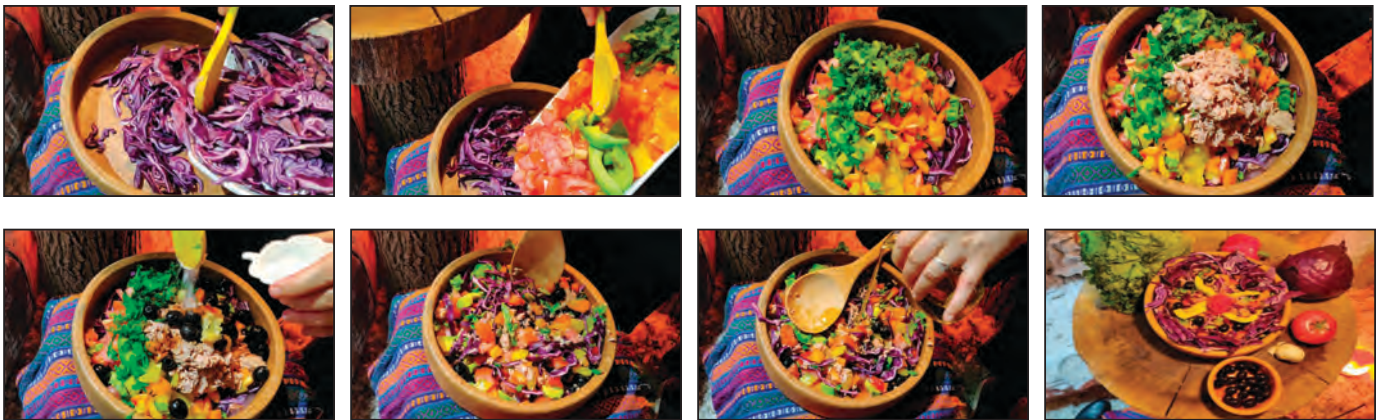
### Recipe 3: Tuna Salad

**Ingredients:** 1 cup chopped arugula, 2 cups of chopped salmon or tuna, 1 cup chopped tomatoes, ½ cup of colored capsicum, ¼ cup of black olives, 2 tablespoons of chopped parsley, ½ cup of chopped red cabbage

For dressing - 1 tablespoon olive oil, 1 clove of minced garlic, 2 teaspoons lemon juice, Pinch of chili, Pinch of salt.



**Method:** In a bowl, mix all the vegetables. Then, put all the ingredients for dressing gradually. Stir the salad and mix it well. Top it with fresh parsley and serve it directly. It can be used as a side dish with soup or main course.



### Recipe 4: Fruit bowl Salad

**Ingredients:** ¼ cup of chopped kiwi, ¼ cup of chopped strawberries, ¼ cup of chopped pineapple, ¼ cup of chopped bananas, ¼ cup of pomegranate, 1 teaspoon of finely chopped ginger, 1 teaspoon of honey, ¼ cup of orange juice, ¼ cup of lemon juice and ¼ cup chopped mint.



**Method:** Put the fruits in a bowl. Add honey, ginger, lemon juice, orange juice and mix well. Top it with freshly chopped mint and serve.



## Recipes for soup

### Recipe 1: Bone broth soup



**Ingredients:** 1liter water, Bones of meat, fish, or poultry, preferably meat, 1 teaspoon of vinegar, Pinch of salt and pepper

**Method:** Boil the ingredients in a suitable size pot over medium heat for 4 to 6 minutes, stir occasionally.



After the water boils, reduce the flame and add Onions, Celery, Carrots, Parsley, Thyme and Garlic to add some flavors. Now cook with covered lid for 10 to 24 minutes.



After that, turn off the flame and let it cool down. Once cooled, filter the broth with a cheesecloth or strainer.



Add salt and pepper according to your taste.

### Recipe 2: Mushroom soup



**Ingredients:** 1 cup of sliced potatoes, 1 cup of chopped carrots, 1 cup of chopped onions, 2 cups of chopped brown or white mushrooms, 3 tablespoons of olive oil, ¼ cup chopped parsley, 1 teaspoon of shredded ginger, 1 teaspoon of salt and pepper.  
1 cup chopped pot

**Method:** Sauté onions and carrot with butter in a suitable size pot over medium heat for 4 to 6 minutes, then add mushrooms to it and sauté it for another 5mins. Now add salt and pepper to it. Add 3 cups of lukewarm water or you can use vegetable broth instead and bring it to boil. Add the shredded ginger, parsley and serve.

### Recipe for Vitamin C juice

**Ingredients:** Half a banana, 1 orange, 2 pieces of kiwi, 2 teaspoons of flaxseed, 2 teaspoons of sesame, ¼ cup of pomegranate, 2 pieces of walnuts and almonds, 2 spoons of honey



**Method:** Mix all together and blend it in a mixture. Drink it in the morning.



### Benefits of this drink:

- It is a stimulant for the blood circulation.
- Stimulates the nerves.
- Reduces joint and respiratory infections.
- Lessens the pain.

### Recipe for Pumpkin juice

**Ingredients:** 1 cup of boiled red pumpkin, 1 cup of grapefruit, Quarter cup of lemon, ½ cup of cranberry, ¼ cup of cherries, ¼ teaspoon of turmeric, ½ teaspoon of flaxseed, ½ teaspoon of nigella, a teaspoon of cinnamon, 3 tablespoons of honey



**Method:** All materials are added to the mixer and drink two cups daily.



### Benefits of this drink:

- Activates blood circulation.
- It stimulates the nerves.
- Strengthens bones and relieves pain.
- It is a rich source of many vitamins, such as folic acid, vitamin B3, and vitamin B, which are important for the functioning of various vital processes in the body, and the work of enzymes.
- Maintains the integrity and functions of nerves, in addition to contain important minerals, such as: potassium, calcium, copper, magnesium, and phosphorous.

## Recipe for Milk cocktail

**Ingredients:** Two cups of milk, 1 teaspoon of chia seed, 1 teaspoon of nigella, a teaspoon of flaxseed, a teaspoon of honey  
1 teaspoon of turmeric, a teaspoon of honey, 2 tablespoons of oats

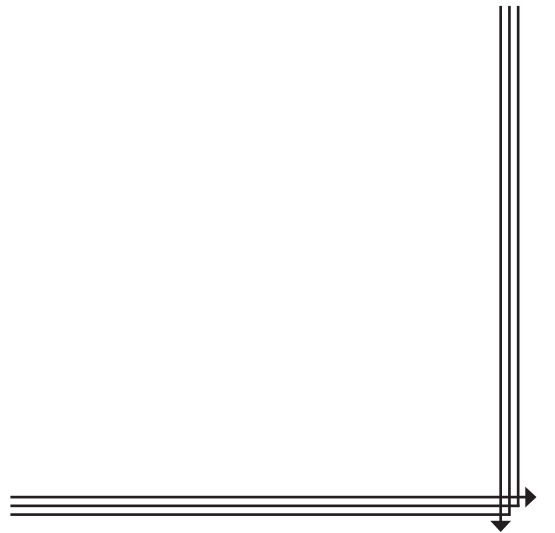
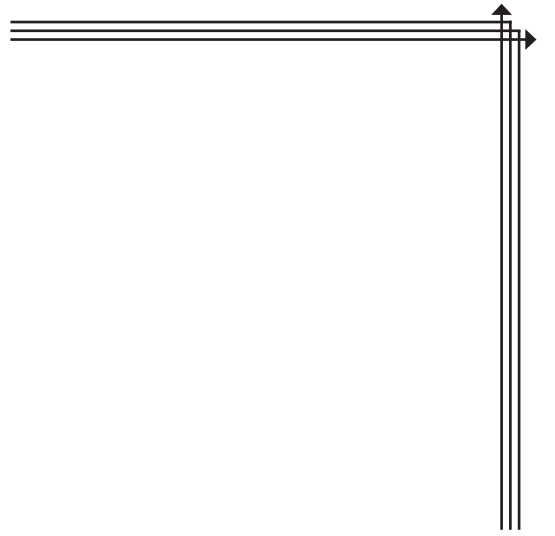


**Method:** Mix everything in a blender and drink daily.



### Benefits of drinking this mixture:

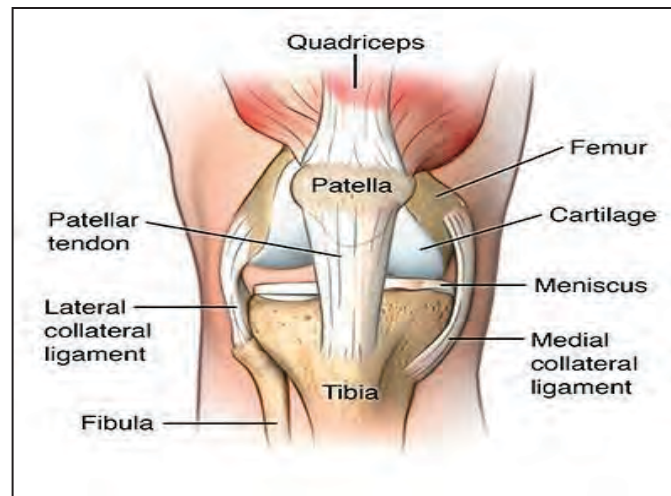
- Helps relieve pain.
- Repairs bones.
- Relieves osteoporosis pain.
- Relaxes muscles.
- Reduces inflammation.
- Stimulates blood circulation.





## CHAPTER 3: PATELLAR TENDONITIS/ JUMPER'S KNEE

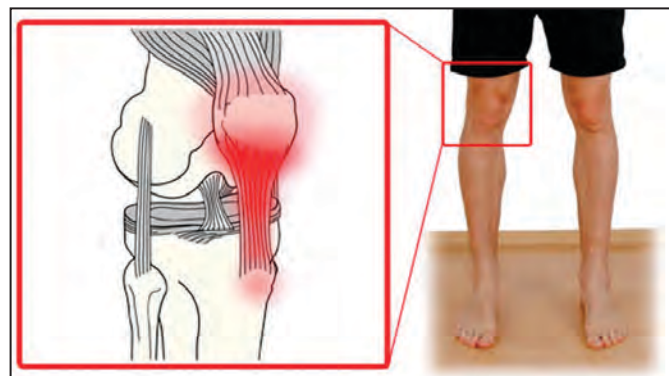
Jumper's knee, also known as patellar tendonitis, is a condition characterized by inflammation of your patellar tendon. This connects your kneecap (patella) to your shin bone (tibia). Jumper's knee weakens your tendon and can lead to tears if left untreated.



**Symptoms:** Pain is the first symptom of patellar tendinitis, usually between your kneecap and where the tendon attaches to your shinbone (tibia). Other symptoms may include:

- Swelling.
- Pain with jumping, running, or walking.
- Pain when bending or straightening your leg.
- Tenderness behind the lower part of your kneecap.

The symptoms of jumper's knee may resemble other conditions or medical problems.



### What can cause Knee Tendonitis?

Patellar tendonitis comes from repetitive stress on the knee, most often from overuse in sports or exercise. The repetitive stress on the knee creates tiny tears in the tendon that, over time, inflame and weaken the tendon. Contributing factors can be:

- tight leg muscles.
- uneven leg muscle strength.
- misaligned feet, ankles, and legs.
- obesity.
- shoes without enough padding.
- hard playing surfaces.

- chronic diseases that weaken the tendon.

### How is patellar tendonitis diagnosed?

To diagnose patellar tendonitis, your healthcare provider will first take a thorough medical history. That may include asking you about your activity level and symptoms. Be sure to tell your provider if your symptoms have changed over time. Your doctor may suggest one or more of the following imaging tests:

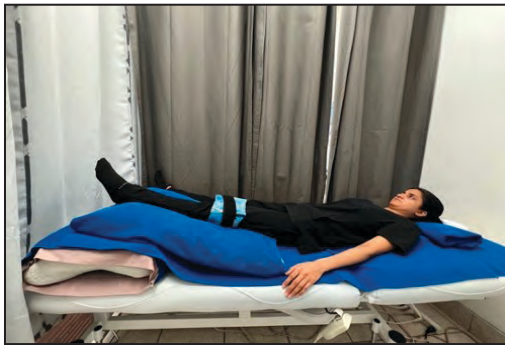
**X-rays.** X-rays help to exclude other bone problems that can cause knee pain.

**Ultrasound.** This test uses sound waves to create an image of your knee, revealing tears in your patellar tendon.

**Magnetic resonance imaging (MRI).** MRI uses a magnetic field and radio waves to create detailed images that can reveal subtle changes in the patellar tendon.

### Treatment:

**Medication, Rest & Ice-** Initially a period of rest, as well as using ice, and avoiding aggravating activities which trigger symptoms (i.e., jumping) may be required. Medications such as Acetaminophen, Ibuprofen, and Naproxen Sodium may be taken or prescribed as well. In some cases, the use of a patellar tendon strap or brace may be used to alleviate pain during functional activities.



### Patellar tendon strap.

A strap that applies pressure to your patellar tendon can help to distribute force away from the tendon and direct it through the strap instead. This may help relieve pain.

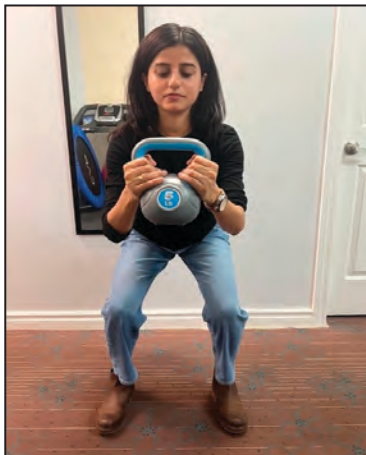


**FOAM ROLLER – QUADRICEPS:** Balance on your hands or elbows in a plank position with your quadriceps on the foam roller. Brace your core and avoid arching or rounding your lumbar spine. Roll from just above the kneecaps to the top of the thighs. Check for tender areas. Hold and oscillate over those areas until pain diminishes. To place a greater emphasis on one leg, cross the back leg over the other leg or just simply shift your body weight to one side. To isolate the medial quadriceps, widen your legs and rotate your feet out. To isolate the lateral quadriceps, bring your legs together, touch the toes and rotate your heels out. Repeat the previous instructions.



There are certain at-home exercises that can help speed up your recovery time. These exercises, paired with comprehensive physical therapy, can help reduce knee pain associated with tendonitis.

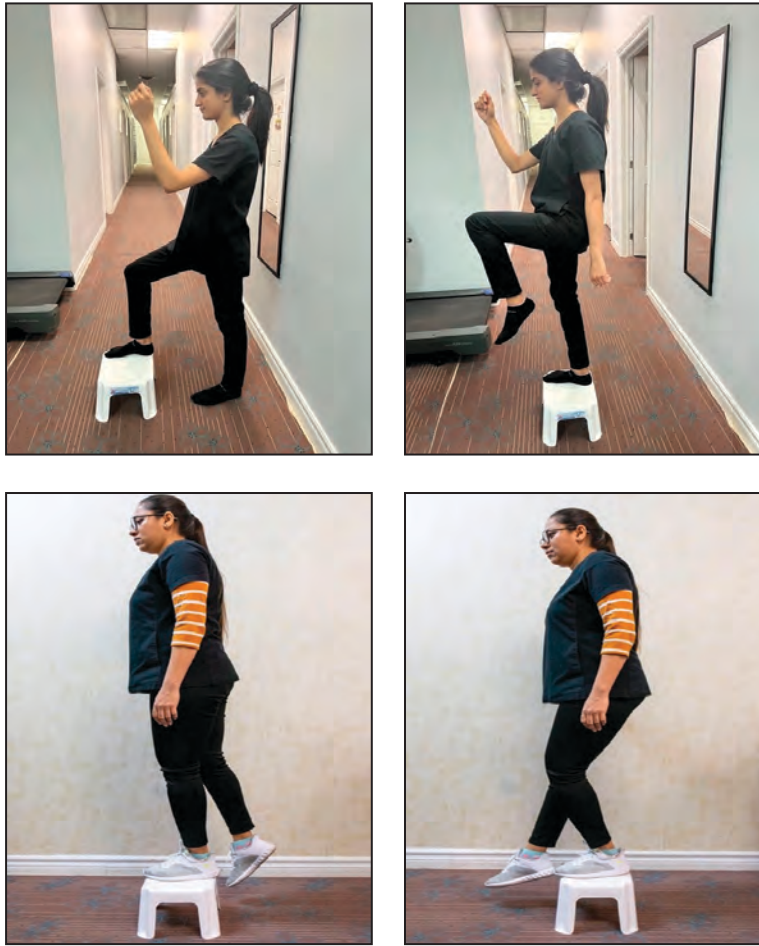
**Strengthening Exercises for Knee Tendonitis:**



Squats: Bodyweight and/or weighted, depending on the performer's abilities.

**Step-ups/downs:**

- Step up onto an object and down the object, such as a box or staircase step.
- 3 sets of 10 repetitions.



**Clam shells:**

- Lying down on one's side, legs and feet together in the form of a knee tuck, open up the legs by swinging open just the knee while keeping the feet together and the hip parallel with the floor surface.
- 3 sets of 10 repetitions.



**Hip bridges:**

- Lie supine (back is on the floor) with both legs flexed at the knee, then contract your glutes and raise up reaching a parallel with the thigh.

- 3 sets of 10 repetitions



For progression you can do single leg bridges



### **Straight leg raises:**

- Raise one's leg when lying supine, prone (belly is on the floor), and on their side.
- 3 sets of 10 repetitions



All these exercises focus on more than one muscle/muscle group because as previously noted, many muscles cross the knee joint. You can start off with 8-12 repetitions and work from there. If it is too difficult, you can decrease the number of repetitions and if it is too easy, you can increase the number of repetitions or add weights to the exercises. It is especially important to keep in mind the proper form/technique used in these exercises because incorrect form can decrease the effectiveness of them.

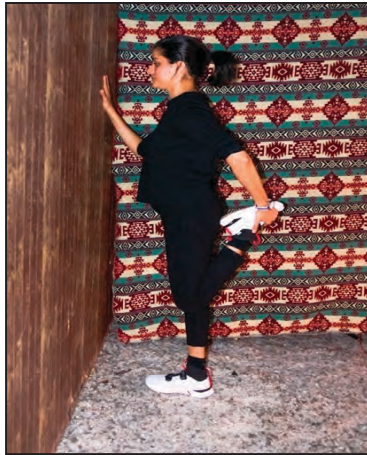
### **Stretching Exercises for Knee Tendonitis:**

When exercising, one must also be aware of muscle tightness that develops. It is important for one to stretch out their muscles as tight muscles may also contribute to patellar tendonitis.

Some stretches include:

### Quadriceps stretches:

- While standing on one leg, use hands to help bring the heel of the other leg up towards one's bottom
- One can also use a resistance band to help pull the leg towards one's bottom when lying prone on the floor.
- 60 second hold for 3 sets.



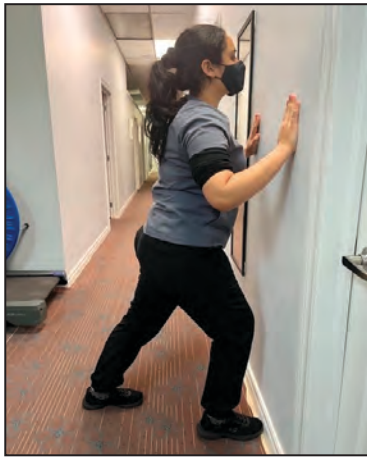
### Hamstring stretches:

- Sitting down on a surface with legs extended, bend down and try to reach for one's toes, while maintaining a neutral posture or straight back.
- 60 second hold for 3 sets



### Standing gastrocnemius stretch:

- Stand about arm's-length from the wall.
- Lean forward and place both hands on the wall about shoulder-width apart.
- Extend one foot (the side to be stretched) behind you with one heel on the ground, and the other foot closer to the wall.
- Lean into the wall with your hips until you feel a stretch in the calf of the extended leg.
- Hold this stretch for about 30 seconds, and then change sides.
- For a deeper stretch, move your foot farther back.



### Standing Soleus Stretch:

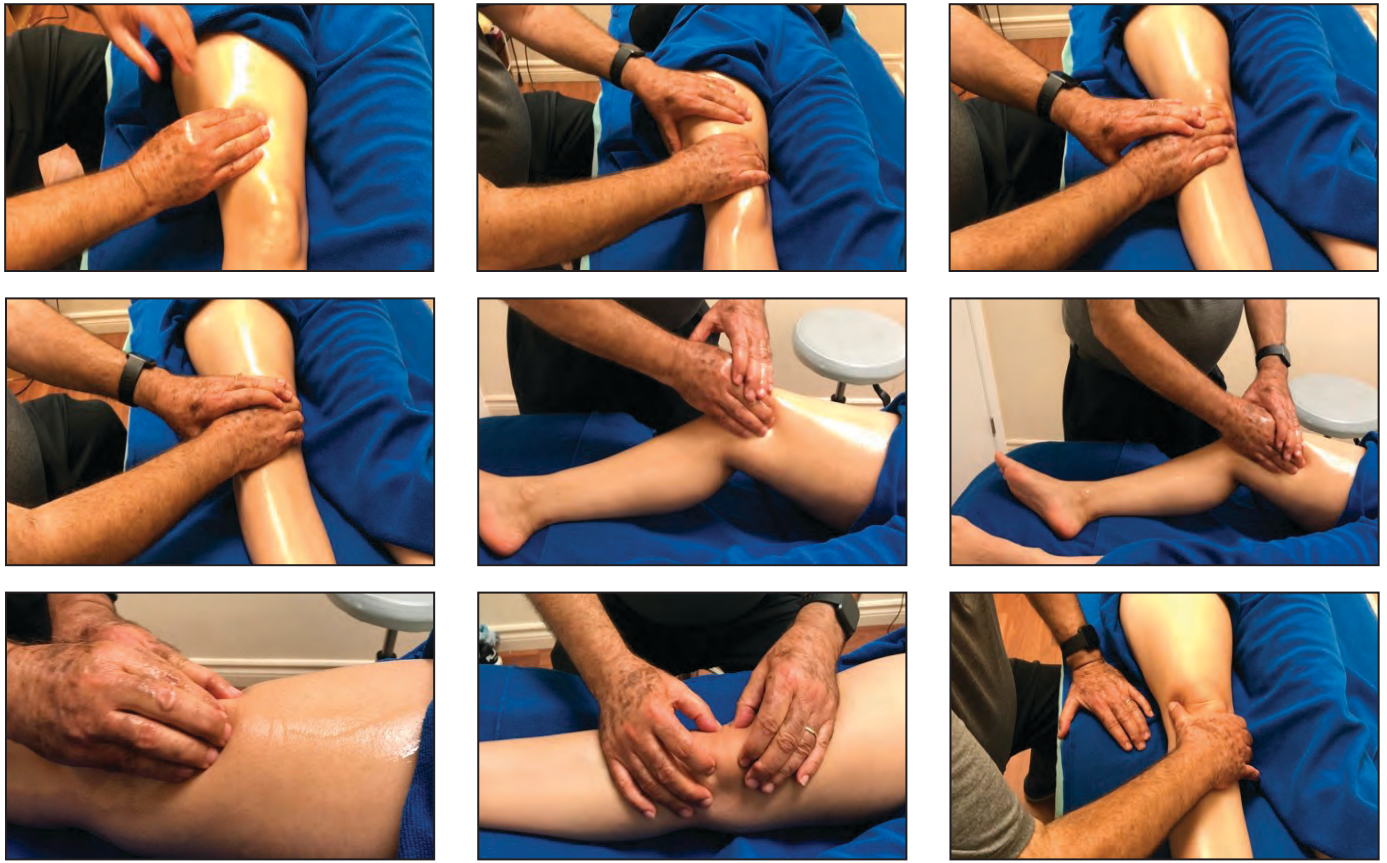
- Standing tall, take a half step forward.
- Keeping your weight evenly distributed on both feet and your heels on the ground, slowly bend your knees and sink down toward the ground.
- You should feel a stretch in the back leg, just above the heel.
- Continue to sink down slowly with your hips to deepen the stretch. Hold this stretch for about 30 seconds and change sides.



When stretching, be sure to feel a stretch and not pain. It doesn't necessarily have to be a hard/painful stretch, rather it would be sufficient if it was a comfortable stretch, a stretch that is tolerable and not painful.

**Massage techniques:** There are surrounding tissue tightness which when relieved help in enhancing faster recovery. This can be done with help of any individual or by self. Here are the instructions:

- » Keep your leg extended and use a towel roll or a small pillow to support under the knees.
- » Gently start with releasing pressure points on the muscles at inner and outer thigh.
- » Use fingertips with circular motions to release the stiffness and spasm.



**Herb-infused oil recipes:**

**Recipe 1: Lavender and olive oil**

**Ingredients:** 3 teaspoons willow, 2 teaspoons roses, 3 teaspoons eucalyptus, 3 tablespoons lavender, 1/2 cup olive oil



**Method:** Grind the materials with a coffee grinder, add to them olive oil and use 2-3 times a day. And put in an airtight container, away from the heat and the sun, and in the refrigerator.



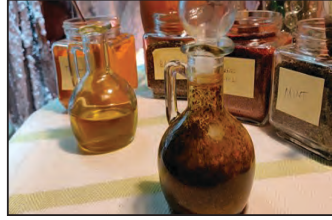
**Recipe 2: Rosemary and turmeric oil**

**Ingredients:** 4 teaspoons linden, 4 teaspoons rosemary, 6 teaspoons thyme, 1/2 cup olive oil





**Method:** Half a cup of olive oil, Turmeric, linden, rosemary, and thyme powder are grounded in a coffee grinder and placed directly with olive oil and mixed well. When mixing, close directly and leave in dark colored bottles. Before use, shake the bottle and use 2-3 times.



**Recipe 3: Nutmeg and Cloves oil**

**Ingredients:** 3 teaspoons nutmeg, 5 teaspoons of marjoram, 10 teaspoons lemon peel and dry orange peel, 2 teaspoons cloves, 1/2 cup olive oil

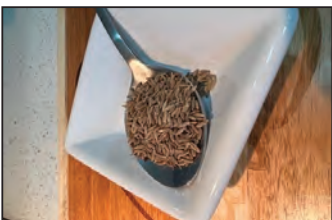


**Method:** Take all the seeds and lemon peel and grind with the coffee grinder until it becomes like powder and then add them all then olive oil and mix well and use 2-3 times. And put in an airtight container, away from the heat and the sun, and in the refrigerator.

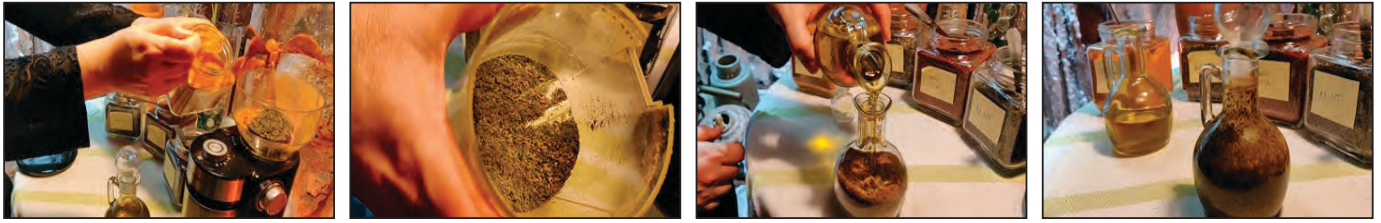


**Recipe 4: Cumin and Turmeric Oil**

**Ingredients:** 3 teaspoons caraway seeds, 3 teaspoons cumin, 3 teaspoons flaxseed, 2 teaspoons turmeric, 1/2 cup olive oil



**Method:** Grind everything together in a small grinder and place them in an airtight container, mix the olive oil in it and put away from the heat and sun preferably in the fridge. Apply 2-3 spoons to the area with a light massage.



### Recipe 5: Pumpkin and Chamomile Oil

**Ingredients:** 3 teaspoons sesame, 3 teaspoons pumpkin, 3 teaspoons flaxseed, 3 teaspoons chamomile



**Method:** Grind everything together and mix it with half a cup of olive oil and place in an airtight bowl, away from the heat and sun and in the fridge. Apply 1 spoon to the area with a light massage.



### Nutritional facts:

A proper nutrition plan can positively influence the inflammation process, aid tendon repair, and minimize the rate of muscle mass loss during the rest and recovery period. Below is a list of foods to incorporate into your diet, and some foods that you should reduce and eliminate.

**Dark leafy greens:** Vegetables, particularly dark leafy greens are rich in antioxidants which fight oxidative stress – one of the main causes of inflammation. These nutrient-dense veggies are also packed with vitamin A, vitamin C, vitamin D+K, folate, and minerals like magnesium. Another benefit is that they are high in fiber so they will keep you fuller for longer and feed your good gut bacteria.



**Protein:** This macronutrient is key to help repair any broken tissue in the; a lack of dietary protein can cause weakness, delayed recovery, pain, and fatigue. The essential amino acids which can only be obtained from food sources are Bone broth naturally contains collagen, which is excellent for healing tendons; this is purely because collagen naturally helps develop and form tissue within the body.

It is great to speed up recovery from strains, ligament injuries, strain, and tendonitis.



**Vitamin C-rich foods:** This water-soluble vitamin is essential to help rebuild collagen.



Here are some food recipes which you can incorporate in daily menu,

**Recipe 1:** Red beans Salad

**Ingredients:** ¼ cup boiled red kidney beans, drained, ¼ 1 cup boiled and drained pinto beans, ½ cup chopped red onion, ½ cup chopped red pepper, ½ cup chopped yellow pepper, ½ cup chopped cucumber, ½ cup chopped parsley.



For the dressing - ¼ cup olive oil, ¼ cup vinegar, 2 tablespoons lemon juice, 1 clove of minced garlic, 2 teaspoons ground cumin, 1 teaspoon ground coriander, ½ 1 teaspoon black pepper, ½ 1 teaspoon chili (optional), ¼ 1 teaspoon salt

**Method:** In a bowl, mix all the vegetables. Then, put all the ingredients for dressing gradually. Stir the salad and mix it well. Top it with fresh parsley and serve it directly. It can be used as a side dish with soup or main course.



### Recipe 2: Tuna Salad

**Ingredients:** 1 cup chopped arugula, 2 cups of chopped salmon or tuna, 1 cup chopped tomatoes, ½ cup of colored capsicum, ¼ cup of black olives, 2 tablespoons of chopped parsley, ½ cup of chopped red cabbage



For dressing - 1 tablespoon olive oil, 1 clove of minced garlic, 2 teaspoons lemon juice, Pinch of chili, Pinch of salt.

**Method:** In a bowl, mix all the vegetables. Then, put all the ingredients for dressing gradually. Stir the salad and mix it well. Top it with fresh parsley and serve it directly. It can be used as a side dish with soup or main course.



### Recipe 3: Green Greek salad

**Ingredients:** 2 cups of medium chopped tomatoes, 2 cups of chopped cucumbers, 1 cup medium chopped lettuce, 1 cup chopped onion, ½ cup chopped white cheese, 1 cup chopped sweet green pepper, few slices of black olives, ½ cup of lemon juice, pinch of salt, 1 tablespoon of vinegar, 2 tablespoons of olive oil, 1 tablespoon of thyme.



**Method:** Put all the ingredients together, and stir them except for the white cheese, onions, and black olives. Add salt, olive oil, thyme, vinegar, and lemon juice and mix well. Top the salad with cheese, onions and black olives while serving. It can be used as a side dish or main course.



### Recipe 3: Green Juice

**Ingredients:** 1 orange, 2 cups of pineapple, a cup of chopped avocado, 2 sticks of celery, 2 pears, lemon juice, a piece of ginger, 2 spoons of turmeric, a little black pepper, half a spoon of honey



**Method:** take all the ingredients and blend it in a blender. Don't use the juicer machine as we want to keep the pulp for good results. Pour in a glass and consume fresh.



### Recipe 4: Hot Juice

**Ingredients:** 5 medium chopped tomatoes, half a lemon, a bunch of parsley mixed with dill, a slice of garlic, and a glass of water (can be replaced with tomato juice)

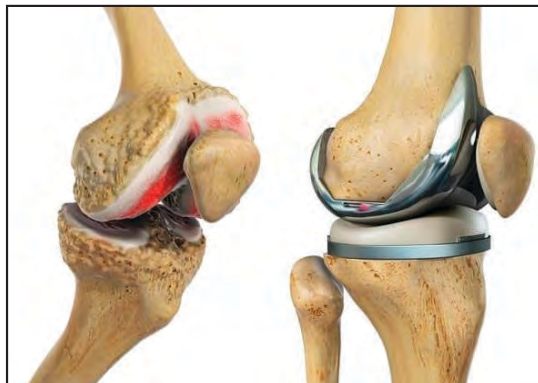


**Method:** take all the ingredients and blend it in a blender. Don't use the juicer machine as we want to keep the pulp for good results. Pour in a glass and consume fresh.



## CHAPTER 4: TOTAL KNEE REPLACEMENT AND ITS REHABILITATION

A total knee replacement is a surgical procedure whereby the diseased knee joint is replaced with artificial material. The knee is a hinge joint that provides motion at the point where the thigh meets the lower leg. The thigh bone (or femur) abuts the large bone of the lower leg (tibia) at the knee joint. During a total knee replacement, the end of the femur bone is removed and replaced with a metal shell. The end of the lower leg bone (tibia) is also removed and replaced with a channeled plastic piece with a metal stem.



**Guidelines before surgery:** Doing exercise before surgery can help you to have a faster and easier recovery. The benefits are as follows:

- Maintain the movement in your knee.
- Make your muscles strong.
- Control your pain.
- Reduce/control your body weight.
- Improve your sleep.
- Increase your knowledge of how to exercise after surgery.
- Swimming, water walking, water aerobics.
- Cycling (stationary or bicycle).
- Seated stepper.
- Elliptical machine.
- Knee movement and strengthening exercises.

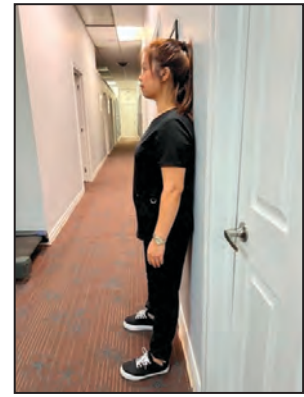
**Pre-operative exercises:** Your core muscles protect your low back and give support to your knee and hip. These muscles are your pelvic floor (muscles that control your bowel and bladder) and your lower abdominals (muscles deep in your belly). They often work poorly due to arthritis or pain, such as after surgery.

### **Pelvic floor muscles exercises:**

- Imagine you are trying to stop the stream of urine.
- Hold 6 seconds, then slowly relax.
- Repeat 6 times, several times per day in different positions.

### **Transverse Abdominal activation:**

- Pull your lower belly (below your belly button) towards your spine (imagine zipping up a tight pair of pants).
- Take 6 quiet breaths in and out through your nose, into the sides of your ribs.
- Slowly relax your belly. Repeat 6 times, several times per day in different positions.



### Lower Buttock Squeeze:

- Lie on your back with legs straight (if you have back pain, this can be done with a pillow under your knees).
- Squeeze lower buttocks together gently, as if holding a pencil between your buttocks. Hold 5–10 seconds.
- Repeat 6 times, several times per day.

### Knee Bend (Heel Slides):



- Use a towel behind your thigh to help bend your knee and slide your heel towards your buttocks.
- Hold 5–10 seconds.
- Repeat 10 times, 2–3 times per day.



### Hip turn out with resistance band:

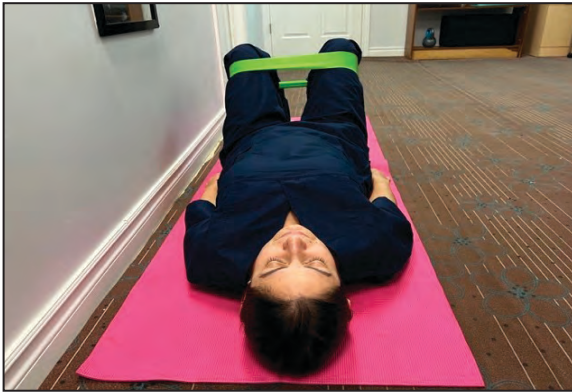
- Lie on your back with legs bent, feet hip width apart
- Bring thighs together and tie a light/ medium resistance band firmly around upper thighs, then bring thighs back in line with hips.
- Turn on core muscles to keep body and hips still while doing the following exercises:

### Double leg turn out:



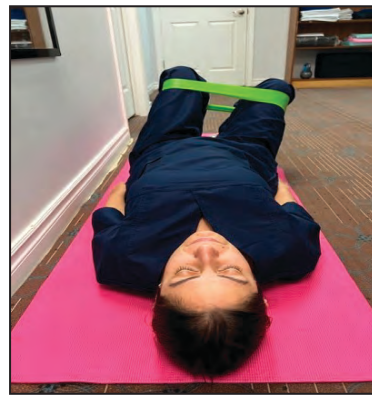
- Turn out both thighs against resistance band through your hips equally
- Bring thighs back in line with hips.

### Single leg turn out:



- Turn out one thigh only; keep the other thigh still.
- Do not hold.
- Repeat 6 times each, daily.

### Sitting Knee Bend and Straighten:

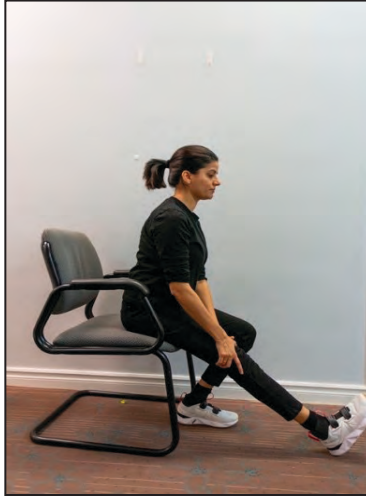


- Bend and straighten.
- Sit on the edge of firm seat with feet on floor.
- Slide heel back to bend your knee.
- Slide heel forward to straighten your knee.

### Hamstring Stretch:



- Sit up tall on the edge of a firm seat and straighten your leg with heel on floor or stool.
- Pull the lower belly into your spine and bend forward from your hips, until a gentle stretch is felt on the back of your thigh.
- Hold 30 seconds.
- Repeat 2–3 times, once per day.



## POST-OPERATIVE MANAGEMENT

### How to manage pain and swelling after surgery?

**Elevate your leg:** Elevate your leg regularly to help manage swelling. To elevate properly, lie down fully with your leg higher than your heart. Place pillows under your leg so that your ankle and knee are higher than your hip. Make sure to keep your knee straight. Stay in this position for 20-30 minutes and repeat several times during the day.



Change positions often (every 20–30 minutes) when you are awake. Try sitting, standing, and walking. Pace yourself. Rest the knee after exercise or after a busy day.

**Rest Your Joint:** When resting or lying on bed, always keep your knees straight. Do not place pillows directly underneath your knee.

### Foot and Ankle Pump

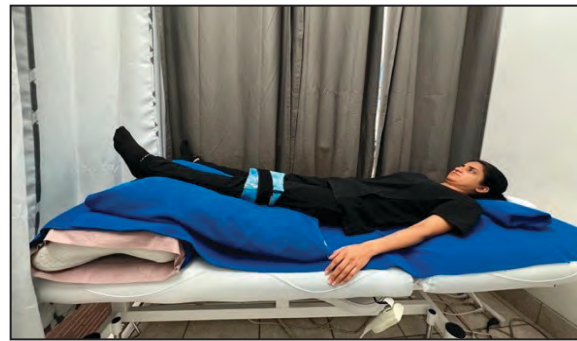
- This helps to reduce swelling and risk of blood clots.
- You may do this lying down or sitting on the edge of a chair.

- Pump your whole foot up and down.
- Repeat 10 times every hour.



**Use ice (cold therapy):** Put ice or a cold gel pack to reduce swelling. Follow these steps:

- If your incision is not healed, cover it with a clean bandage and a sheet of clean plastic wrap.
- Put a damp tea towel over your knee.
- Put a flexible gel pack or plastic bag with crushed ice on your knee.
- Leave the ice ON for a maximum of 10–15 minutes.
- Repeat several times a day as needed.



**Massage techniques:** When scar tissue is broken down through massage, you can help your body heal faster, and possibly reduce the appearance of your scar. Here's how we recommend you massage your scar tissue at home:

- In early healing phases, try and massage your scar for 10-15 minutes a day (2-3 times a day for 5 mins).
- Using the pad of your thumb or finger, firmly massage in a circular motion. You should be pressing hard enough that your fingernail turns from pink to white, but it should not be painful.
- First go up the scar clockwise, work your way up and around your scar slowly but maintaining a firm pressure. Switch it up by massaging counterclockwise. This will help to drain excess fluid from the area.
- Next, stretch the skin apart around your scar, and repeat your massaging with a firm circular motion using your thumb or finger.
- With pressure, slowly slide your finger up the scar while apply pressure. Change direction by slowly sliding down.
- Repeat the process several times for 5 minutes or so.







**Massage oils:** There are specific oil recipes when used with massage enhance the results and promotes faster recovery. Here are few recipes below,

**Recipe 1:** Cumin and Aloe vera oil

**Ingredients:** Aloe vera (3 teaspoon), cumin seeds (3 teaspoon), black seed, 1/2 cup celery oil



**Method:** Mix them together and place them in an airtight container, away from the heat and sun and in the fridge. Apply only 2-3 times to the area with a light massage. These are the most common prescriptions used in the treatment for knee pain.



**Recipe 2:** Mustard and ginger oil

**Ingredients:** 3 teaspoons mustard, 3 teaspoons watercress, 3 teaspoons ginger



**Method:** Mix them together and place them in an airtight container, away from the heat and sun and in the fridge. Apply only 2-3 times to the area with a light massage.



### Recipe 3: Honey and Castor oil

**Ingredients:** 2 teaspoons of honey, 3 teaspoons mustard seeds, 3 Teaspoons of watercress seeds, 3 teaspoons ginger, 1/2 cup vinegar, 1/2 cup castor oil.



**Method:** Mix them together and place them in an airtight container, away from the heat and sun and in the fridge. Apply only 2-3 times to the area with a light massage.



### Recipe 4: Avocado Oil

**Ingredients:** 3 teaspoons cumin, 3 teaspoons apple peel, 3 teaspoons avocado, 3 teaspoons dried cherries, 1/2 cup vinegar, 1/2 cup

olive oil.



**Method:** Boil the apples and mash them together with avocados and dry cherries. Mix everything together and place them in an air-tight container, away from the heat and sun preferably in the fridge. Apply only 2-3 times to the area with a light massage.

### **Thyme oil:**

Thyme has a nice smell and is known to contain many compounds such as linoleic acids, anti-inflammatory properties and flavonoids that help reduce inflammation by inhibiting nitric oxide responsible for increasing inflammation.



### **Chamomile oil:**

Chamomile extracts have anti-inflammatory properties because they contain flavonoid compounds and have analgesic properties that can effectively reduce knee pain.



### **Frankincense oil:**

This essential oil has been used mainly for its soothing smell in perfumes and incense for thousands of years, but when researchers from the Department of Pharmacology tested the effects of acids extracted from frankincense on inflammation, they found that it has

an anti-inflammatory effects. Frankincense are extracted from resin from a tree.



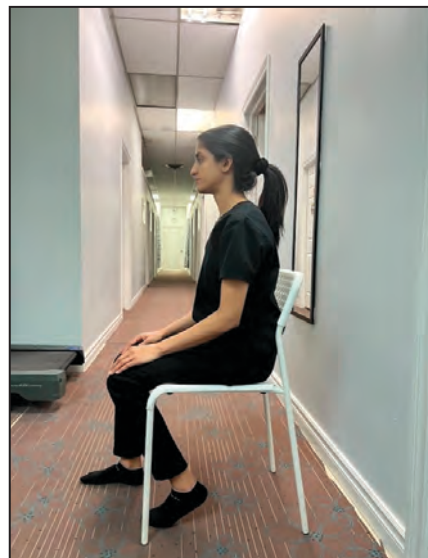
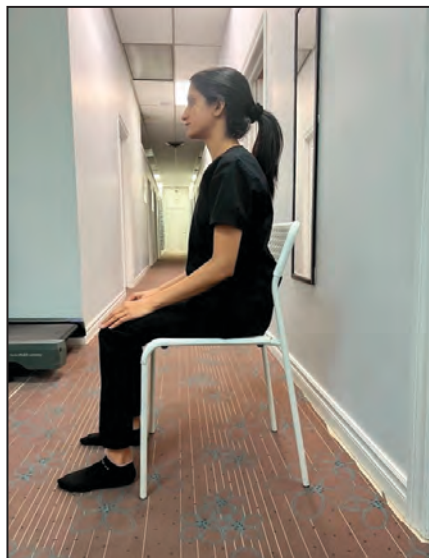
**Basil oil:**

Basil has been used as a medical herb for many years and has many health benefits and anti-inflammatory properties that can reduce swelling and inflammation and reduce burning sensation due to its soothing properties.



**Note:** You can use these recipes to massage around the knee as well as your whole leg from the thigh to your ankle. As the muscles and soft tissues around your knee joint has a tendency to become stiff following any kind of surgery so it is always a good idea to massage the whole leg to enhance its flexibility and mobility.

**Estimate your Knee Bend (flexion):** Sitting on a chair with your body weight evenly distributed on both buttocks and your back against the chair, bend your operated knee by sliding your heel under the seat. Have somebody measure the distance between your heel and the leg of your chair behind your leg.



If your foot cannot move under the chair, begin to do the exercises given below more often in the day, suggested 10 repetitions every 2 hours.



**Estimate your Knee Straightening (extension):** Push down on your thigh to straighten your knee towards the bed, making sure that your toes are pointing up to the ceiling. Straighten your knee as much as possible. Your goal for extension is to touch the bed with the back of your knee. If you are unable to straighten the knee by two weeks after your surgery then you have to perform the following exercises more often throughout the day, suggested 10 repetitions every 2 hours.



### Post-operative exercises:

**Static Quadriceps Strengthening:** Lie down on your back and tighten the muscle on the front of your operated thigh to press your knee into the bed and bring your toes towards you without moving your leg. Hold 5 seconds. Repeat 10 times.



**Knee Bend with Leg Press:** Place a sheet around the foot of your operated leg. Use it to help bend the operated knee. Keep your heel on the bed. Hold 5 seconds. Repeat the exercise for 10 times.



**Roll Stretch:** Place the heel of your operated leg on a roll with the toes pointed to the ceiling. Tighten your front thigh muscles to press your operated knee down toward the bed. Place your hands above the knee (as shown) and press down to help maximize the stretch behind your knee. Do not bounce with your hand, hold the stretch instead. Hold 10-20 seconds. Repeat 5-10 times.



**Knee Extension in Sitting:** Sit on the edge of a chair with your operated knee straight and unoperated knee bent. Point your toes towards the ceiling and push downwards on your leg, above the knee, to straighten it (as shown). Make sure that you are sitting up straight with your back arched. To increase the stretch, slowly lean forward while maintaining an arched back and keeping your chest up and forward. Hold: 10-20 seconds. Repeat: 5-10 times.



**Active-Assisted Quads Over Roll:** Place a roll under your operated knee and a sheet around your foot. Push your knee down into the roll, contract the muscles in the front of your leg and lift your foot as high as you can, using the sheet to assist. Once your knee is straight, try to let go of the sheet and hold that position using the muscle (keep pressing the back of your knee down).

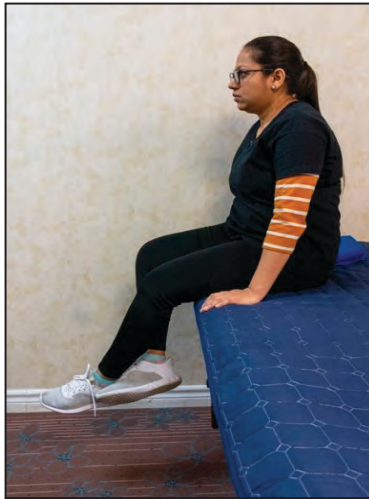
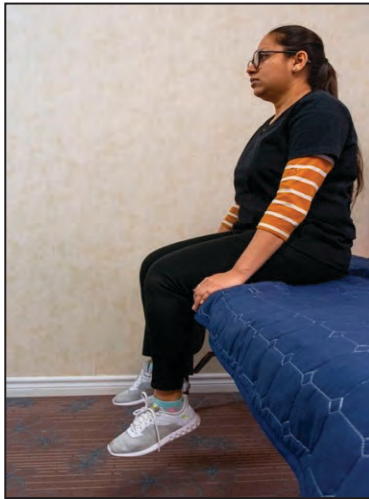


**Seated Assisted knee flexion/ extension:**

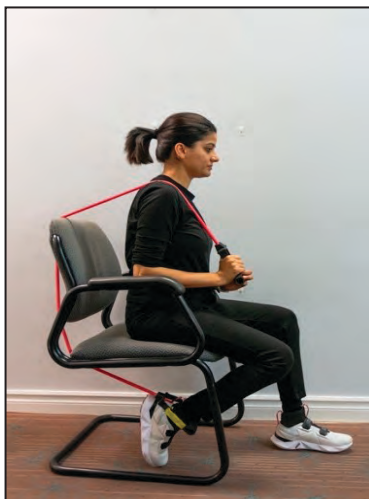
Sit at the edge of the bed or a chair. Support your operated leg with your non-operated leg. Gently allow the operated knee to bend by supporting it with a non-operated leg. Do not bend the knee beyond 90° at this stage.



Now straighten the operated knee passively using the supporting (non-operated) leg to do all the work. Ensure you do not lift your buttock off the bed or chair.



**Knee Bend Progression:** Sitting on the bed or chair, bend your operated knee with assistance of a belt (as shown). Loop the belt around the ankle of your operated leg. Bring it up and over your shoulder and pull. Hold 10-20 seconds. Repeat 10 times.

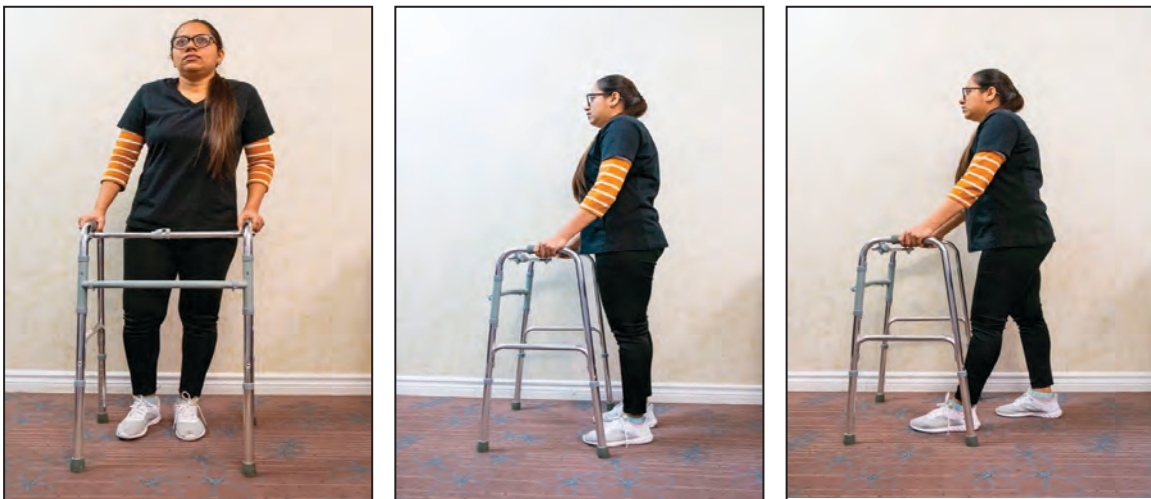


**Walking:** Soon after surgery you will begin to walk short distances in your room. It is important to know your 'weight bearing status' when you begin to walk. This means how much pressure you can put on your operated leg. You will probably use a walker for 1 to 3 weeks and then use crutches. When you are ready, you can use a cane. You will probably be able to walk on your own in 4 to 8 weeks. You must continue using your walker or crutches for the first six weeks after surgery. Your surgeon or physiotherapist will instruct you when to start using a cane.

**Non-Weight Bearing:** Non-weight-bearing means that no weight can be placed on the operated leg. Since you are not able to bear any weight on the leg, an assistive device, such as a walker or crutches, will be necessary for you to walk. When walking with your walker or crutches, keep your affected knee bent and keep your toes off the floor.



**Weight Bearing as Tolerated:** Stand up straight as you can. You are allowed to put as much weight as you feel comfortable with your operated leg.

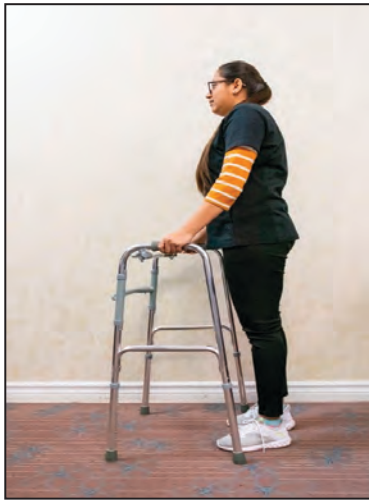


**Partial Weight Bearing:** You are allowed to put a maximum of 50% of your body weight through the operated leg.

**Using a Walker:** Once you can stand, you'll start using a walker. Push your walker a few inches in front of you. Keeping your back straight, lean on the walker so it supports your weight. Step into the center of the walker with your operated leg, being careful not to twist your leg.

**Sequence:** 1. Walker 2. Operated Leg 3. Non-operated leg

Keep your head up. Advance the walker about an arm's length away. Step halfway into the walker with your operated leg, followed by your non-operated leg. Stand up tall and straight. Wear good supportive footwear with non-slip soles whenever possible. As you get more comfortable using the walker, you may be able to move it as you step.



**Walking up a curb:** Move your feet and the walker as close to the curb as possible.

Put your weight on both your legs, then lift the walker onto the curb. Step up with the un-operated leg. Using the walker to support your weight, bring up the operated leg.

**Walking down a curb:** Move your feet and the walker as close to the edge of the curb as you safely can. Lower the walker onto the ground, keeping its back legs against the curb. Using the walker to support your weight, lower the operated leg. Then step down with the other leg.

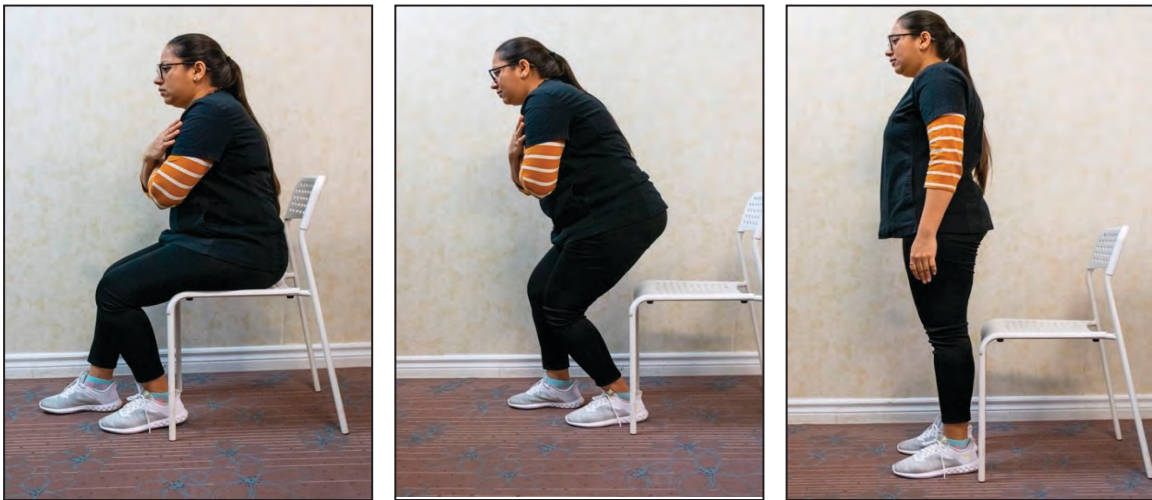
**Using crutches:** With crutches in place, lean on your hands. The top of the crutch should be just below, not in, the armpit. Move your operated leg and crutches forward at the same time. Keep the operated leg lined up with the crutches. Look straight ahead, and step through the crutches with your good leg.



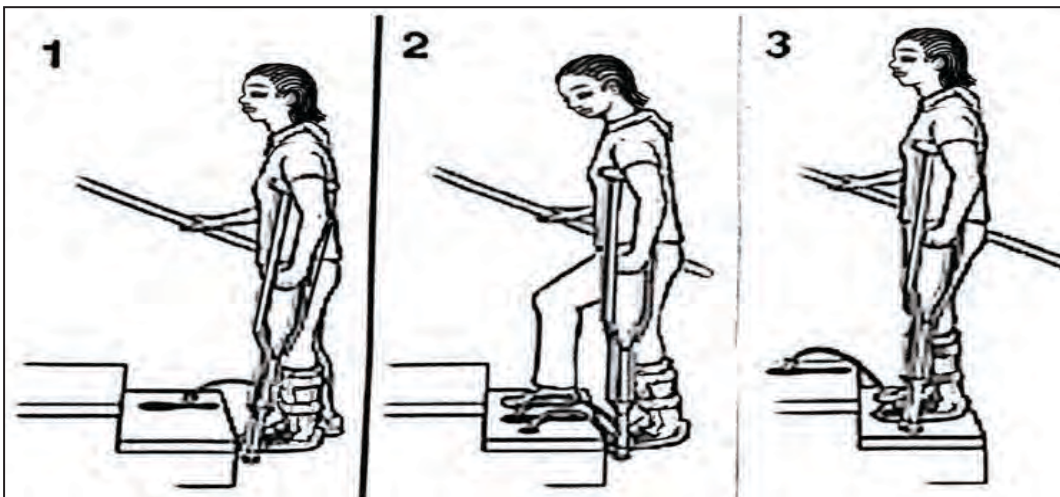
### How much should I be standing/walking?

Start with walking short distances in the hospital. Once discharged, gradually increase your walking in your house, within your tolerance. Prolonged standing can also increase your pain. An increase in knee pain and swelling, or an increase in night pain may indicate you have been doing too much.

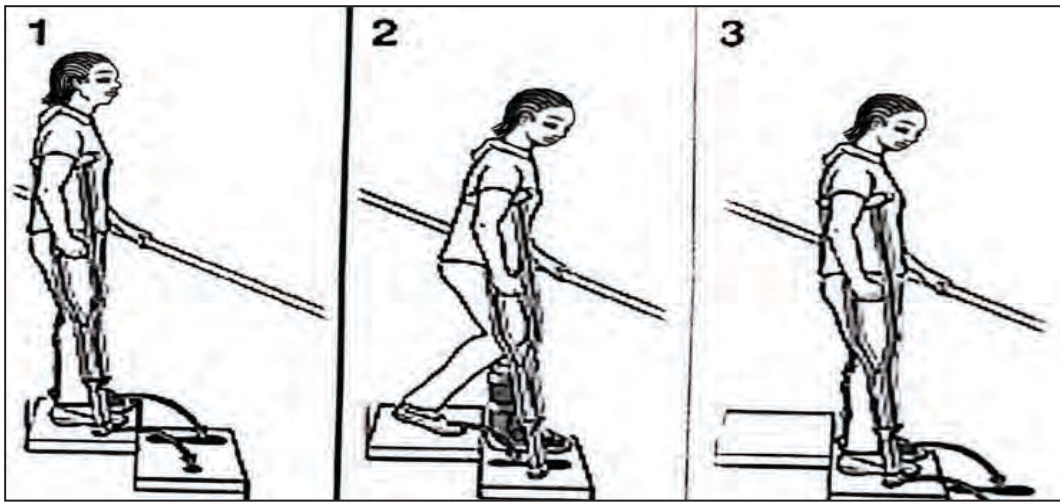
**Sit to Stand:** When rising from a seated position you must place the foot of your operated leg ahead of the other foot. Put most of the weight through your arms and non-operated leg as you push up into a standing position.



**Going Up Stairs:** Hold the handrail with one hand and a cane or crutch in the other. Step your non-operated leg up first. Then bring your operated leg and the cane or crutch up onto the step.



**Going Down:** Hold the handrail with one hand and a cane or crutch in the other. Step down with your operated leg, along with your cane or crutch. Then step down with your non-operated leg.



## REHABILITATION AFTER DISCHARGE

**Weeks 0 to 6 Post surgery:** In this early stage, you will do exercises to help you bend and straighten your knee and introduce exercises to improve your strength.

### Goals by end of Week 6:

- Bend your knee at least 110°.
- Straighten your knee so that no more than 3 finger widths can fit behind the knee and floor/bed (about 5° of bend) when lying.
- Walk short distances outside (4 to 6 blocks) using cane or walker.
- Go up and down stairs safely leading with the non-operated leg up and the operated leg down.

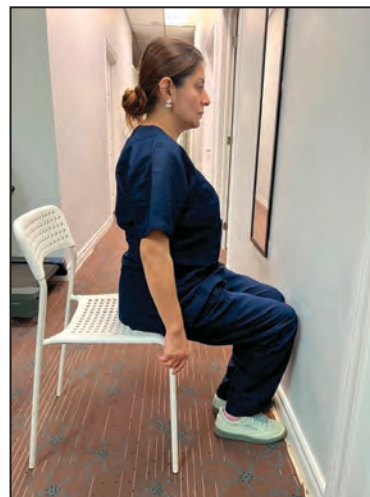
### To measure knee bend (flexion)

- Sit on chair with feet flat and toes touching a wall.
- Bend your knee by easing forward on the chair.
- Measure the gap between the wall and your knee (as shown below).

Measure it



Your Goal



### To measure knee straight (extension)

- Lie on your back on a firm surface.
- Keep your foot relaxed and press your knee down.
- Have someone measure the gap under your knee (as shown below).

Measure it



Your Goal

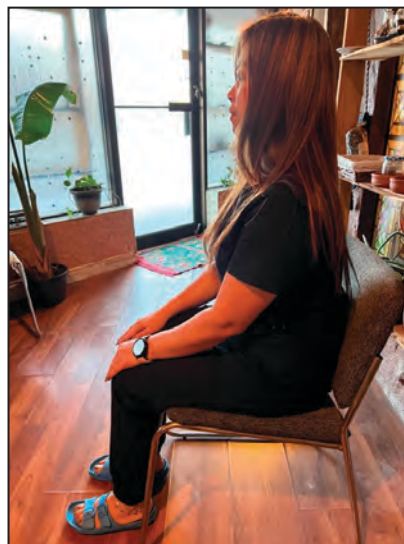


### Exercises to increase the Range of Motion:

**Lying on your back:** Use a towel or strap behind your thigh to provide support and help bend your knee. Pull thigh towards chest and relax knee to increase bend. Hold 5–10 seconds. Repeat 5–10 times.



**Sitting upright:** Sit on a chair or large therapy ball with feet on the floor. Keep feet fixed on the floor and slide bottom forwards on a chair or roll yourself forward on the ball to bend the operated knee. Hold 5–10 seconds. Repeat 5–10 times.



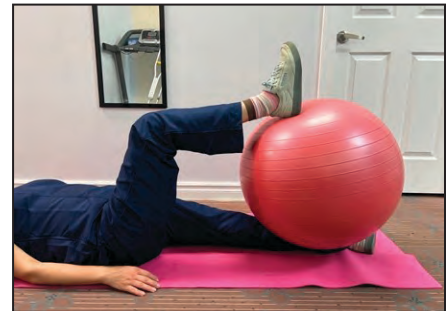


**Heel slides with towel:** Use a towel or bed sheet and place it around your foot. Using your arms slowly pull your foot to your hip. It is important to keep your heel on the table /bed the entire time. Use a sock or other frictionless surface to help perform this exercise.



### Assisted Knee Bend and Straightening with Therapy Ball

- Lie on your back, resting heel of operated leg on therapy ball.
- Keep kneecap pointing to ceiling.
- Roll ball towards you to bend knee
- Roll ball away to straighten knee.
- Repeat 10 times Progression.
- Do exercise with both heels on the ball, keep feet hip-width apart Do not do this if you are experiencing back pain.



### Active Knee Bend and Straightening

- Lie on your stomach with feet just off end of bed.
- Gently squeeze lower buttock muscles.
- Bend knee, bringing heel towards bottom.
- Straighten leg and leave foot hanging over edge of bed.
- Let gravity help to straighten knee (if lower leg is unable to touch bed, support gap with a folded towel, making sure you still feel a stretch)
- To increase knee straightening, tighten muscles on the front of the thigh to pull the kneecap towards you. Hold each position for 5–10 seconds Repeat 5–10 times.



**Progression:** Add folded towel under thigh

**For bending:** Wrap an ankle weight.

**For straightening:** Increase length of time resting knee straight for as long as you feel comfortable.

### Heel Slide on Wall:

- Lie on back with surgical leg resting on wall
- Bend operated knee by sliding heel down wall. Hold for 5–10 seconds. Repeat 5–10 times. Use the weight of the non-operated leg to bend leg more by resting it on the shin of operated leg.



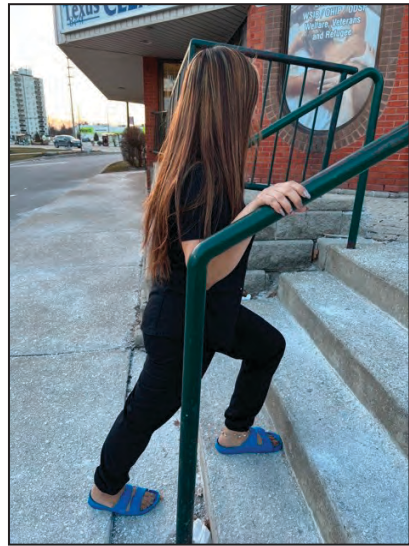
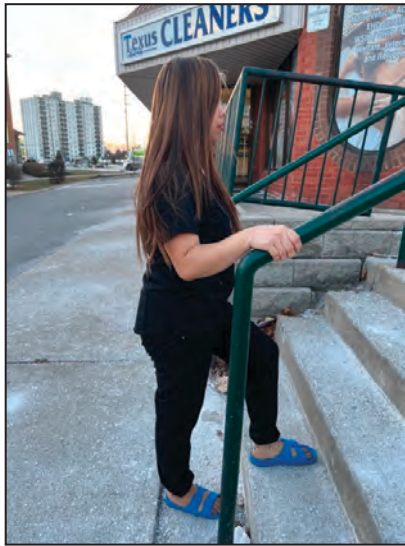
### To increase straightening:

- Slide heel up the wall.
- Tighten the front of thigh muscles to pull the kneecap towards you.
- You can straighten your knee further by pulling your foot towards you. Hold 5–10 seconds. Repeat 5–10 times.



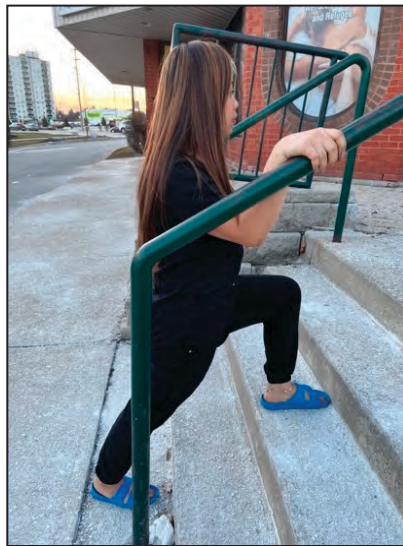
### Knee Bend on a step

- Place operated leg on the 2nd step.
- Hold rail for balance.
- Lean forward through the hip to bend the knee until stretch is felt at the front of the knee, maintain upright posture.
- Hold 5–10 seconds. Repeat 5–10 times.



**Progression:**

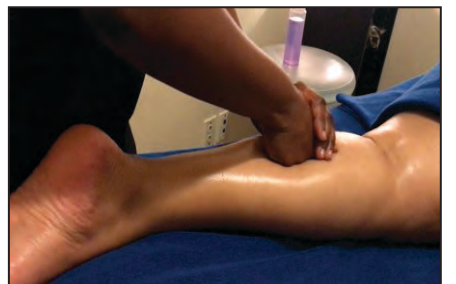
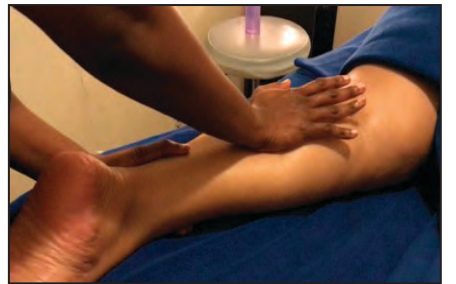
- Move the foot of the operated leg to a higher step as able.

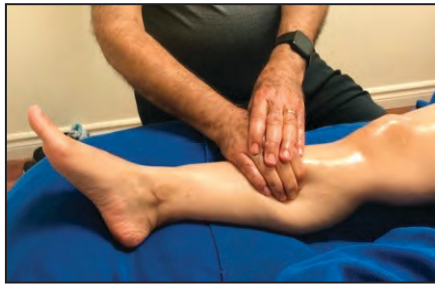


**Massage:** Soft tissue treatments for edema / pain control and to posterior musculature, ITB, Adductors, Quadriceps, Calf. No direct palpation of surgical portals for 4 weeks. The steps to follow during massage are,

- Place a towel roll under the knees before starting.
- Start out with minimal pressure and do circular movements.
- You can increase the pressure as tolerated.
- Work the area behind the knees and upper thigh the longest.
- Massage the knee for about 10 minutes.







**Oils useful with massage:**

**Recipe 1:** Cumin and Camphor oil

- Ingredients:** 5 spoons camphor  
3 tablespoons cumin  
3 tablespoons oatmeal  
2 teaspoons chia



**Method:** Mix everything together and grind it well in a coffee grinder, mix it with olive oil, put it directly on the knee with massage, and then cover with a hot towel. 2-3 times a day. Put the oil in an airtight container, away from the heat and sun, and in the refrigerator.



**Recipe 2:** Cumin and Eucalyptus oil

- Ingredients:** 3 teaspoons safflower  
3 teaspoons eucalyptus  
3 teaspoons black bean  
3 teaspoons cumin  
1/2 cup olive oil



**Method:** Grind dry ingredients in a coffee grinder together and mix them with olive oil. Place them in an airtight container, away from the heat and sun and in the fridge. Apply only 2-3 times to the area with a light massage.

**Patellar mobilization:** superior/inferior and medial/lateral- This exercise is done by simply pushing the patella up and down and side to side and holding that position.

- Sit upright with your legs straight out in front of you.
- Grip your kneecap (patella) between your thumb and fore finger and gently move it from side to side and up & down.
- It may feel odd initially and there may not be much movement.
- Repeat 10 times, 3 times a day.



### STRENGTHENING EXERCISES:

- Start by doing your strengthening exercises daily.
- Start with 1 set of 8-15 repetitions.
- Progress gradually to 3 sets of 8-15 repetitions, take 1-2 minutes break between sets.
- Once you are able to do 3 sets of 8-15 repetitions, you can do them every other day (3 -4 times a week).
- You do not need to hold the exercise position, instead move slowly and smoothly with control.
- Move on to an exercise labeled “progression” when you can easily complete 3 sets of 8-15 repetitions.

### Straight Leg Raise

- Lie on your back with your operated leg straight and your other knee bent.
- Pull your toes up, tighten your thigh muscle and lift the operated leg off the bed,
- keeping the leg straight. Lift the leg 4-6 inches off the bed.
- Hold for a count of 5, then slowly lower the leg.
- Start with 10 repetitions. Gradually progress to 30 repetitions, 2 times per day.

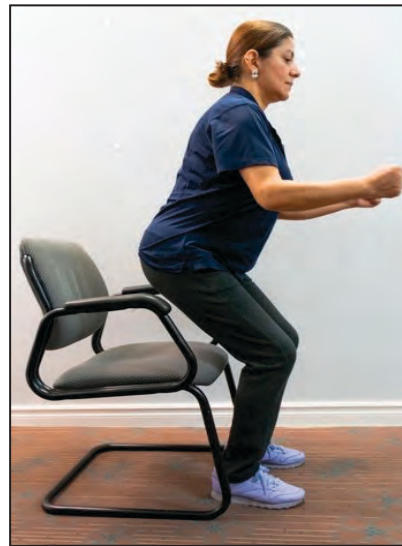
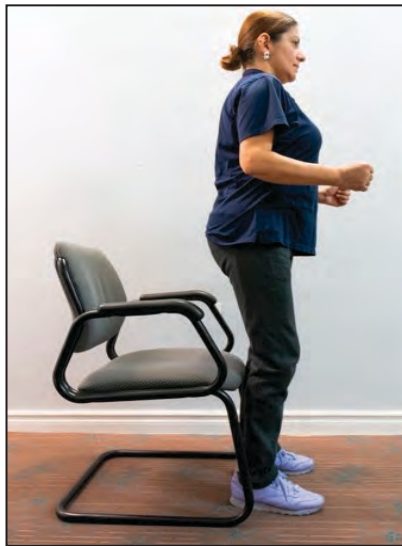


### Quadriceps Isometrics

- Lie on your back with your legs straight. You can place a small roll under your knees.
- Pull your toes up, push the backs of your knees down, tightening your thigh muscles. Gently squeeze your buttock muscles as well.
- Hold for a count of 5, then relax.
- Start with 10 repetitions. Gradually progress to 30 repetitions, 2 times per day.

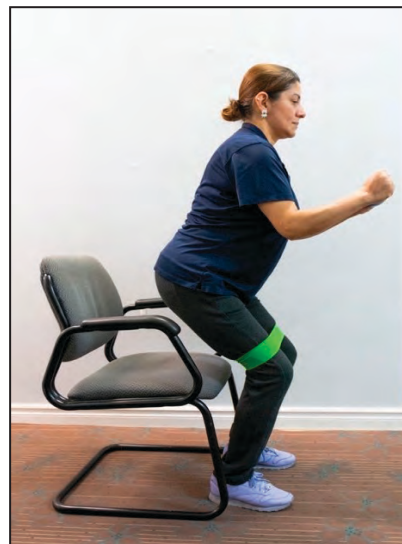


**Chair Rise:** Stand in front of a chair with your feet and knees hip-width apart. With your weight distributed evenly between your feet, stick your buttocks back and slowly sit down without using your hands. Pause briefly and then stand up fully, again without using your hands. If needed, you may use your hands to assist you in raising and lowering from the chair. Progress to not using your hands.



**Progression:**

- Tie a TheraBand around your thighs (above your knees) and hold a TheraBand as pictured, with your thumbs up.
- Start with your knees, feet, and hands hip-width apart.
- Lower and raise off the chair while maintaining outward pressure on each band (hip-width apart).
- Knees remain in line with feet and not ahead of toes.



## Chair Squat:

- Stand in front of a chair.
- Lower into a squat by bending at the hip. Do not let your knees come over your toes
- Lower down until your buttocks just touch the chair then return to the starting position.
- Do 3 sets of 10 repetitions.



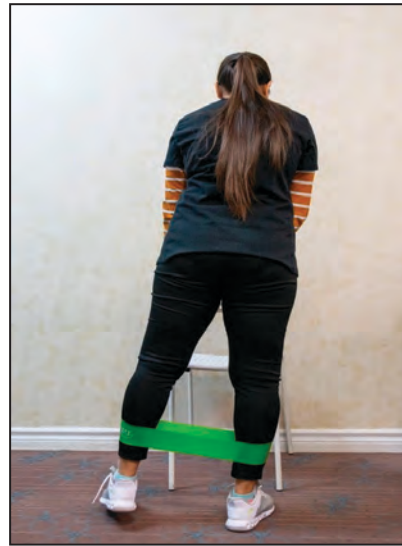
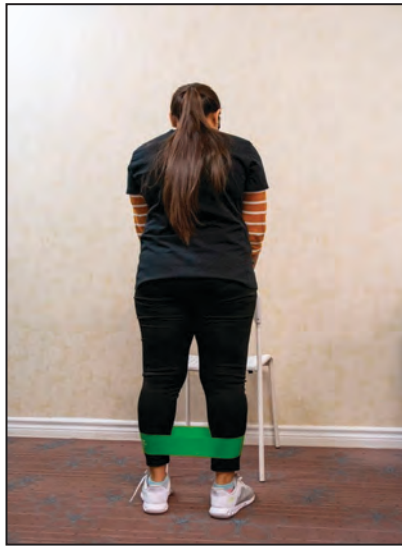
## Standing Hip Abduction

- Use a chair or counter for support.
- Keeping your toes pointed forward, lift one leg out to the side.
- Keep your trunk upright – do not lean over.
- Hold the leg lift for a count of five, then return to the starting position.
- Do 2 sets of 10 repetitions on each leg.



**Progression:** Add a resistance band or ankle weight.





### Single Leg Balance

- Use a chair or counter for support.
- Lift one leg off the floor, maintaining your balance.
- Try to hold the position for 5 seconds to start, work up to holding the position for 30 seconds.
- Do 10 repetitions on each leg.

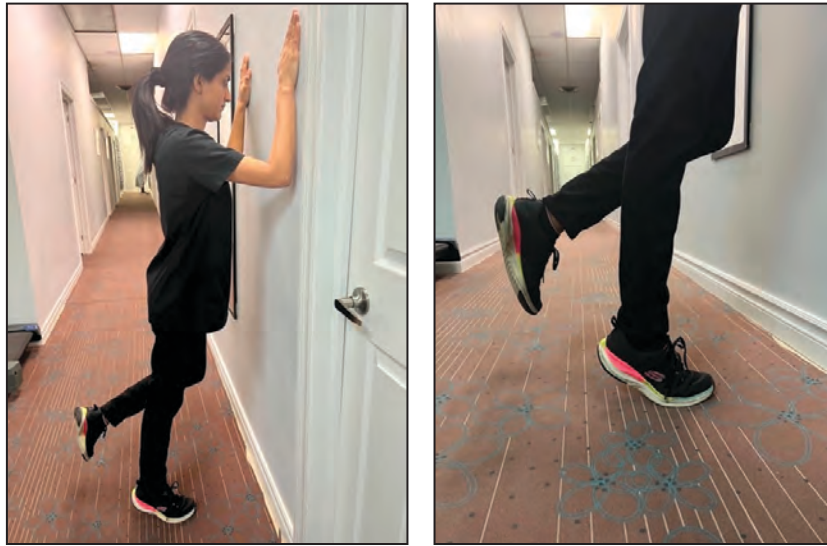
**Progression:** once you can stand without holding on, progress to standing on an uneven surface such as a pillow, a wobble board or a Bosu ball.



**Heel Raises:** Holding on to support if needed, raise your heels off the floor. Do not let your knees bend as you lift.



**Progression:** Stand only on your operated leg and complete the same heel raise.



### Seated Hamstring Curls/ Resisted Knee Bending

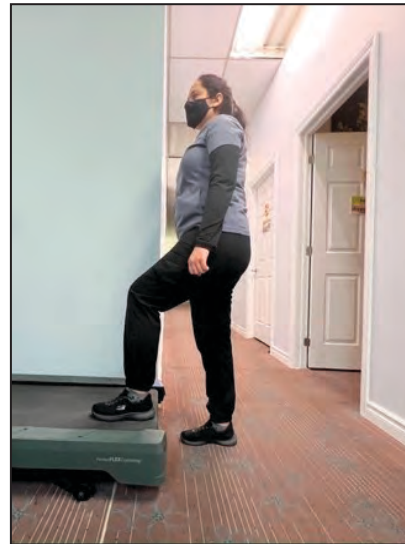
- Sitting in a chair, place a Thera-band around the ankle of your operated leg.
- Bend your knee against the resistance of the band, keeping your foot off of the floor. Keep equal weight through both buttocks.
- Slowly allow your leg to return to the starting position.



### Step Up

- Stand in front of a step.
- Place the non-operated leg on the step, then bring the operated leg onto the step.
- Step backwards off the step, bringing the operated leg down first, followed by the non-operated leg.
- Do 2 sets of 5 repetitions.

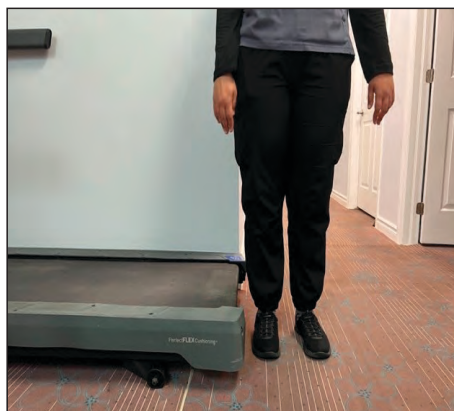
**Progression:** Bring the operated leg up first, followed by the non-operated leg. Step backwards bringing the non-operated leg down first.



## Lateral Step Up

- Stand sideways next to a step with the operated leg on the bottom step.
- Step up by straightening the knee of the operated leg.
- Slowly lower the non-operated leg back to the floor by bending the operated knee.
- Do 2 sets of 5 repetitions.

**Progression:** Place a resistance band around the knee of the operated leg.





**Bridging:** Start by lying on your back with your knees bent to 90 degrees. Squeeze your buttocks and lift your bottom off the bed.



**Progression:** Lift your buttocks off the bed with both feet on bed. Once you are up, lift your non-operated leg up straight. Keep your unoperated leg up as you lower your buttocks back to the bed.



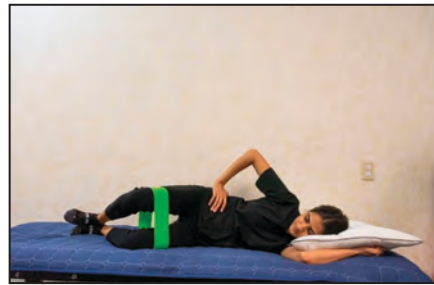
### Clam Shell

- Lie on your non-operated side with your hips and knees slightly bent and your hips stacked on top of each other.
- Keep your feet together and open your knees as much as you can without letting your top hip roll backwards.

**Note:** if possible, push your feet against a wall or headboard as you lift your top knee.

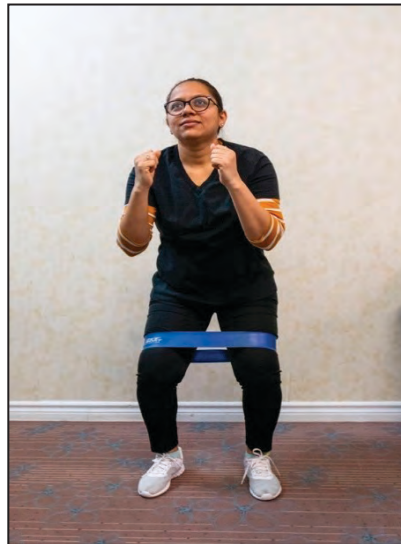


**Progression:** Tie a TheraBand around your lower thighs, just above your knees. You may want to start off with a light resistance band.



### Crab Walk:

- Bring your feet together and tie a band just above your knees.
- Stand with your feet hip-width apart.
- Stick your buttocks out as if you are about to sit in a chair.
- Do not allow your knees to go ahead of your toes.
- Press your thighs apart against the tension of the band.
- Maintain this squat position and take a few steps in one direction, then side-step back in the other direction.
- When stepping the feet back together, don't bring your feet closer than hip-width apart.
- Repeat in the opposite direction until you are back to your starting position.



### Hamstring Curl:

- Stand in front of a chair or a desk while supporting yourself with your hands, bring the heel of the operated leg towards your buttock. Remain standing up tall.

- Move your thigh backward to keep it beside another leg.



**Progression:** Use an ankle weight around your ankle to increase the difficulty.

### Terminal Knee Extension Squat

- Stand with your feet hip-width apart and loop a TheraBand around your operated knee and leg of a heavy chair or table.
- Bend both knees and stick your buttocks back to perform a small squat. Straighten your knees and hips and return to the starting position. As you straighten your knees, pull back on the band with your operated knee.



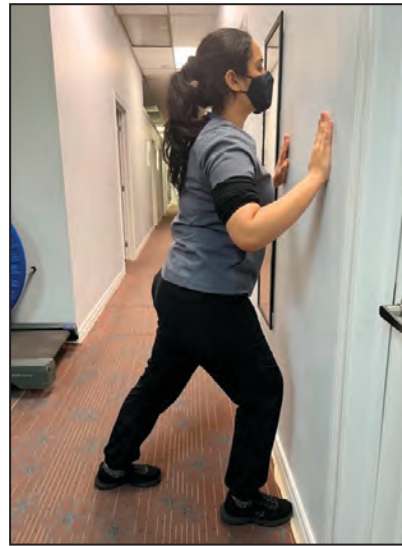
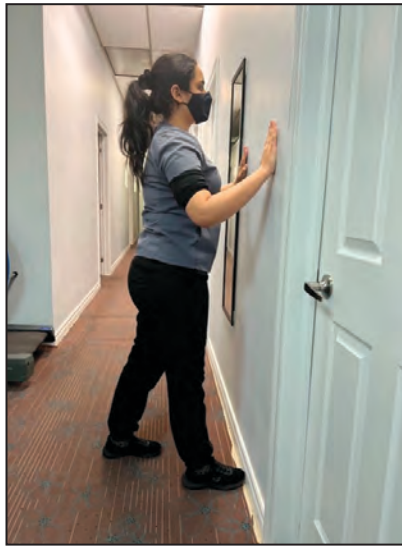
### STRETCHES:

#### Calf Stretch:

- Stand facing wall with one leg ahead of the other.
- Keep back leg straight with heel on floor and toes pointing forward.

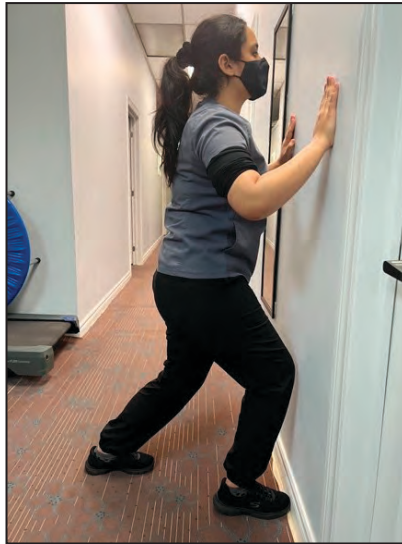
#### Upper calf:

Lean into the wall by bending the knee of the front leg until stretch is felt in the calf of the back leg.



### Lower calf:

- Bend the knee on the back leg, keeping heel on the floor



### Quadriceps Stretch in Standing

- Standing with your involved knee bent, gently pull heel toward buttocks, feeling a stretch in the front of the leg.
- You can take the support of a wall with the opposite hand.
- Hold for 5 seconds.
- Repeat 10 times.



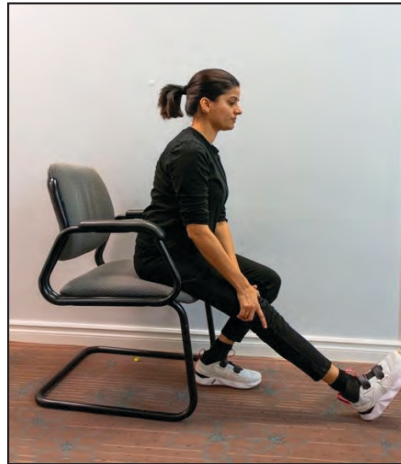
## Quadriceps Stretch Lying on Stomach

- Wrap a belt around the ankle of your operated leg.
- Pull the belt to bring the heel of your operated leg toward your buttocks.
- Once you feel a strong stretch in the front of your thigh hold it for 45 seconds and then let go of the belt and try to hold it using your muscles.



## Hamstrings stretch in sitting

- Sit on the edge of a chair with your knee straight and your toes pointed towards the ceiling.
- Keep your chest up while you move your chest forward until a stretch is felt behind the thigh and knee.



## Hamstrings stretch in standing

- Place your operated leg straight out in front of you with your heel on the floor.
- Lean forward bending from the hips and rest your hands on your bent un-operated leg.
- Make sure you keep your back straight.
- Hold each stretch for 20-30 seconds for maximum effect.





## Psoas Stretch (Front of Groin)

- Sit on a chair without armrests, hold on to a seat or furniture for support.
- Sit up tall and turn on core muscles.
- Let the operated leg hang off the side of the chair.
- Slide the operated leg back on your toes until you feel a stretch at the front of your thigh.
- Hold 30 seconds up to 1 minute. Repeat 3–4 times.
- Do several times a day on each side.



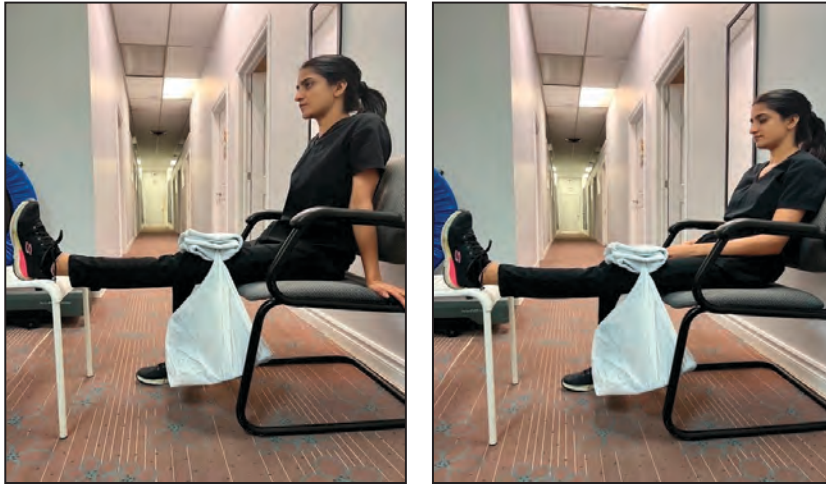
## Extension Progression Stretches

**Assisted Knee Extension on a roll:** Your therapist can assist to regain straightening of the operated knee. The therapist will push down with two hands above your knee. You should guide your therapist to hold a stretch that is tolerable for you. Hold 10-20 seconds. Repeat 5-10 times.



**Weighted Knee Extension in Sitting:** Sitting as shown, tie the handles of two bags together with equal weight in each bag and place it around your operated leg above the kneecap (one bag hangs on each side). Ensure the weight is NOT directly on your

knee. Allow your knee to relax and “sink” towards the floor. You should feel a stretch behind your knee. Hold 5-10 minutes. Repeat 2-3 times/day.



**Gravity Assisted Knee Extension Stretch:** Lie on your stomach with your operated knee, foot, and ankle off the end of bed. Place a towel under your thigh just above the knee. To add stretch, place two bags around your leg as shown and place light weights in each bag or if you have ankle weights you can tie the weight at the ankles. Hold 5-10 minutes. Repeat 2-3 times/day.



**Forward Knee Lunge Stretch:** Place the foot of your operated leg on a step. Lunge forward to bend your operated knee. Use support as needed and keep your body up tall. Hold 10-20 seconds. Repeat 5-10 times.



**POST-OPERATIVE (Weeks 7 to 12):** Do the strengthening exercises 3–4 times per week to allow your muscles time to recover in between sessions.

## Bridging

- Lie on your back, thighs hip-width apart, squeeze large, rolled towel firmly between thighs.
- Use your lower buttock muscles to lift hips off the bed.
- Keep squeezing towel and slowly lower hips down.

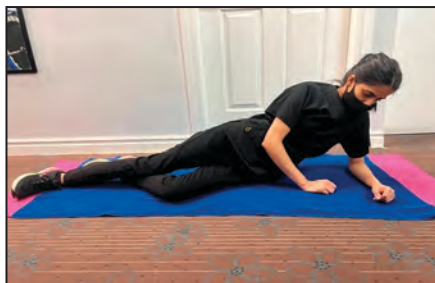


**Progression:** Maintain squeeze on towel between thighs, lower hips a little and lift back up in small movements (pulses), using your lower buttocks to press into your feet.

## Leg Lift Side Lying

- Lie on the non-operated side, bottom leg bent, top (operated) leg straight resting on a pillow.
- Turn on core muscles to keep body and hips still.
- Squeeze your lower buttock and push into the heel to straighten the operated leg, lift leg up.
- Slowly lower down.
- Hold 5–10 seconds, repeat 8–15 times Do 3–4 times a week.

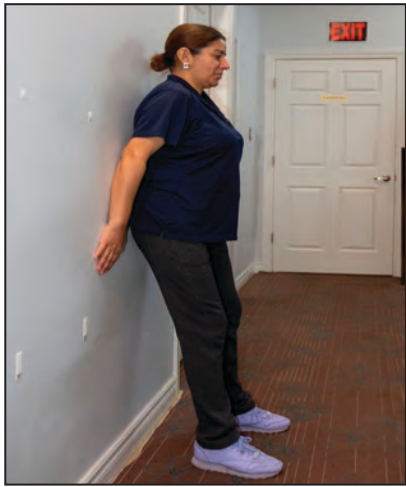
**Progression:** Hold leg up for 5–10 seconds.



## Wall Slides:

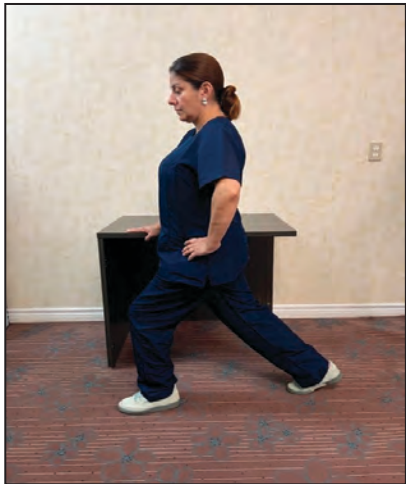
- Stand with back against wall.
- Place feet hip width apart and 1-1.5 feet from the wall.
- Bend hips and knees to slide down the wall, as low as you feel comfortable. Keep tailbone against wall, knees over ankles and toes pointing forward.
- Use lower buttocks to slide back up the wall.
- Repeat 8–15 times, do 3–4 times a week.

**Tips:** Hold a rolled towel between thighs to make core muscles and inner thigh work harder. If knees knock together as you lower, tie a resistance band around mid-thighs and press thighs against the band to hold thighs hip-width apart.



### Split Squat (Lunge)

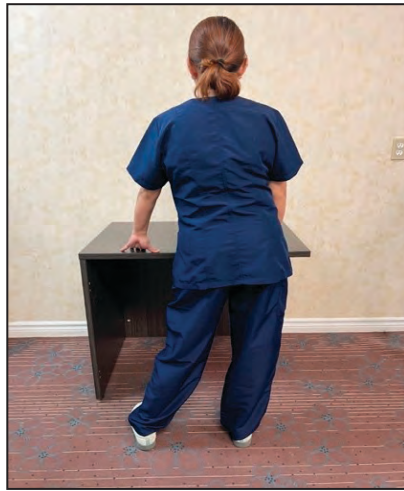
- Hold counter for support.
- Place one leg in front, other leg behind resting on ball of foot.
- Lower body toward the floor, bending from hip and knee.
- Use buttock muscles to lift you up to starting position.
- Repeat 8–15 times, switch sides Do 3–4 times a week.



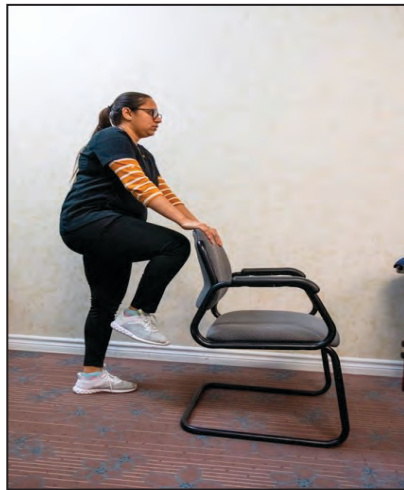
**Exercises to Improve Balance:** Training your balance after total knee replacement will lower your risk of falling and help you feel more confident when walking outside. Always have a firm counter or railing within reach when doing balance exercises. For better control, turn on core and lower buttock muscles when doing balance exercises.

### Side to Side Weight Transfers:

- Stand facing kitchen sink or railing.
- Place feet hip-width apart.
- Shift your weight fully side to side onto each leg.
- Hold each position for 5–10 seconds Repeat several times daily.

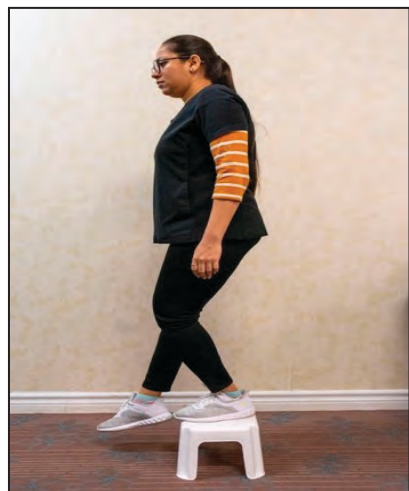


**Progression:** March on the spot



### One Leg Balance on a step

- Stand with a step with a wall support in reach with your hand. Practice placing one foot up and down on a step while balancing on one leg, keeping pelvis level and posture straight.
- Start with using hand support on the same side as moving leg, then remove hand support.
- Hold up to 45 seconds Repeat on the other leg Repeat several times daily.



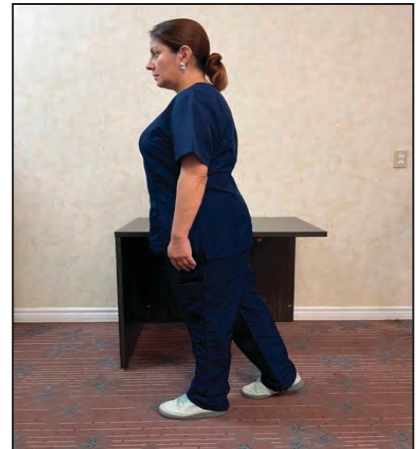
### Progressions:

- Stand on one leg on pillow.
- Slowly turn head side to side while balancing on one leg.



### Forward and Back Weight Transfers (Rocking Horse):

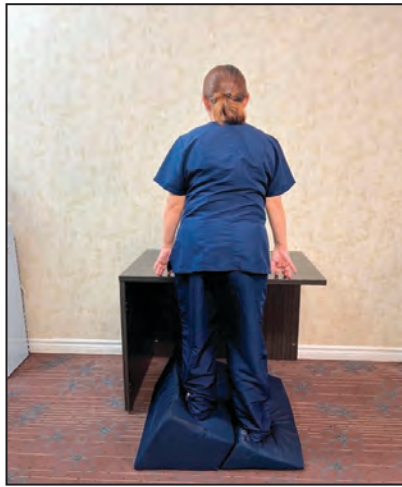
- Stand beside the counter or table.
- Place one foot in front of the other, resting on the heel (opposite leg to the hand support)
- Shift your weight forward by lifting from the heel of the back leg, rocking through the ball of your foot forward then roll backwards.
- Switch foot position and repeat.
- Repeat 8–15 times.
- Do several times a day.



**Progression:** Take a full step forward and backward without holding on to support. Walk, placing your feet on a straight line. Start with small steps, progressing to bigger steps.

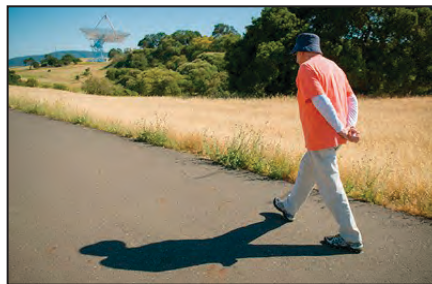
### Side to side

- Step on to a firm cushion/pillow or balance board (place board to rock side to side). Keep body still and hips level.
- Press down into cushion/ pillow down (or tip board down on one side) through straight leg, bending the other knee.
- Repeat movement from side to side.

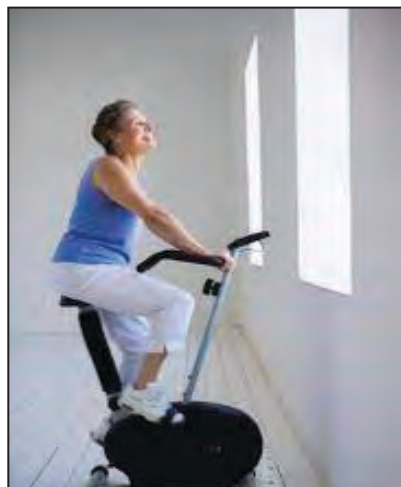


**Resuming an Active Lifestyle:** When you can return to your leisure activities after surgery depends on the physical demands of the activity and your stage of recovery.

**Walking:** This is an excellent activity, and you are strongly encouraged to gradually increase your walking distance after you leave the hospital. Walk outdoors if the sidewalks are dry or consider going to a nearby mall to walk indoors when the sidewalks are wet and slippery.



**Stationary Cycling:** can be resumed 1-2 weeks following your surgery.



**Swimming / Aquafit:** can be resumed 6-12 weeks following surgery only if the incision is well healed and dry. No whip kick but gentle breaststroke and flutter kick is allowed. Avoid side-to-side leg exercise in Aquafit (jumping jacks).



**Special Attention:** Do not take up new sporting activities as inexperienced people are at a higher risk for injuries and accidents. It is not harmful to kneel on your new knee, however kneeling may be painful. The use of a padded surface or pillow is recommended when kneeling. All of the following activities are associated with slippery or unstable surfaces and increase your risk of falling.

- Downhill skiing.
- Cross-country skiing.
- Ice skating.
- Inline skating.
- Mountain biking.
- Canoeing.
- Sailing.
- Kayaking.

**High risk activities that are never permitted are as follows:**

- Singles tennis.
- Jogging / Running.
- Squash / Racquetball.
- Basketball.
- High impact aerobics.
- Weight Training.

Heavy lifting is never recommended. Generally, it is recommended to use lighter to moderate resistance and increase the challenge by increasing the number of repetitions performed.

## Food & Nutrition

Good nutrition helps you heal quickly, protect your joints and get your strength back post-surgery. Prior to joint replacement surgery, patients should maintain a diet that includes fruits, vegetables, grains, lean meats, fish, poultry, low-fat dairy products, or other sources of protein.

For patients undergoing joint replacement surgery, make sure to include the following in your diet:

### Omega-3s

Due to their anti-inflammatory properties, omega-3 fatty acids have been proven to relieve joint pain and swelling. Studies have shown that in people with rheumatoid arthritis, resulted in reduced joint pain, stiffness and need for non-steroidal anti-inflammatory replacement surgery, boost your omega-3 walnuts.



using omega-3s for three to four months resulted in reduced joint pain and swelling. The omega-3s also reduced the need for drugs to relieve pain. Before and after joint replacement surgery, boost your omega-3 intake by eating salmon, krill, flaxseed and walnuts.







### Iron-rich Foods

Although there is not much blood loss in TKR, as it is a minimal invasive surgery. Iron-rich foods can help patients build up their blood stores. Foods high in iron include red meats, leafy green vegetables (such as spinach and kale), beans, and dried fruit.



**Vitamin D** plays a key role in bone health. It helps increase bone density by promoting the absorption of calcium.

**You can get vitamin D in three ways:**

- Eating oily fish, mushrooms, dairy products, and fortified foods.
- Receiving 5–30 minutes of sun exposure during peak daylight hours.
- Taking supplements.



### Anti-inflammatory Diet

Due to the swelling and bruising that are inevitable after surgery, any tool that can be used to reduce or prevent inflammation is beneficial. Foods high in antioxidants (typically dark red in color) such as pomegranates, red cherries, and beets help prevent inflammation and aid in recovery. Eating a typical “Mediterranean diet” consisting of fish, fruits, vegetables, nuts, seeds, beans, and olive oil is a perfect anti-inflammatory diet that will aid in recovery.



### Recipe 1: Red beans Salad

**Ingredients:** ¼ cup boiled red kidney beans, drained, ¼ 1 cup boiled and drained pinto beans, ½ cup chopped red onion, ½ cup chopped red pepper, ½ cup chopped yellow pepper, ½ cup chopped cucumber, ½ cup chopped parsley.



**For the dressing:** ¼ cup olive oil, ¼ cup vinegar, 2 tablespoons lemon juice, 1 clove of minced garlic, 2 teaspoons ground cumin, 1 teaspoon ground coriander, ½ 1 teaspoon black pepper, ½ 1 teaspoon chili (optional), ¾ 1 teaspoon salt

**Method:** In a bowl, mix all the vegetables. Then, put all the ingredients for dressing gradually. Stir the salad and mix it well. Top it with fresh parsley and serve it directly. It can be used as a side dish with soup or main course.



### Recipe 2: Wheat and greens salad

**Ingredients:** 2 cups of finely chopped parsley, 1 onion, finely chopped, 2 tablespoons of groats of wheat soaked in water, ¼ cup of pure olive oil, ½ cup of finely chopped tomatoes, 2 tablespoon of squeezed lemon, ¼ cup of finely chopped hot pepper - to taste, ½ cup of washed lettuce or any green leaves of your choice.



**Method:** Put the soaked wheat, tomatoes, onions, mint, parsley and hot pepper and green leaves in a bowl and mix. Add lemon, salt, olive oil and mix until combined. Pour the salad into a large serving dish and serve fresh.



### Recipe 3: Green Greek salad

**Ingredients:** 2 cups of medium chopped tomatoes, 2 cups of chopped cucumbers, 1 cup medium chopped lettuce, 1 cup chopped onion, ½ cup chopped white cheese, 1 cup chopped sweet green pepper, few slices of black olives, ½ cup of lemon juice, pinch of salt, 1 tablespoon of vinegar, 2 tablespoons of olive oil, 1 tablespoon of thyme.



**Method:** Put all the ingredients together, and stir them except for the white cheese, onions, and black olives. Add salt, olive oil, thyme, vinegar, and lemon juice and mix well. Top the salad with cheese, onions and black olives while serving. It can be used as a side dish or main course.



### Recipe 4: Tuna Salad

**Ingredients:** 1 cup chopped arugula, 2 cups of chopped salmon or tuna, 1 cup chopped tomatoes, ½ cup of colored capsicum, ¼ cup of black olives, 2 tablespoons of chopped parsley, ½ cup of chopped red cabbage.



**For dressing:** 1 tablespoon olive oil, 1 clove of minced garlic, 2 teaspoons lemon juice, Pinch of chili, Pinch of salt.

**Method:** In a bowl, mix all the vegetables. Then, put all the ingredients for dressing gradually. Stir the salad and mix it well. Top it with fresh parsley and serve it directly. It can be used as a side dish with soup or main course.



### Recipe 5: Fruit bowl Salad

**Ingredients:** ¼ cup of chopped kiwi, ¼ cup of chopped strawberries, ¼ cup of chopped pineapple, ¼ cup of chopped bananas, ¼ cup of pomegranate, 1 teaspoon of finely chopped ginger, 1 teaspoon of honey, ¼ cup of orange juice, ¼ cup of lemon juice and ¼ cup chopped mint.



**Method:** Put the fruits in a bowl. Add honey, ginger, lemon juice, orange juice and mix well. Top it with freshly chopped mint and serve.





## Recipes for soup

### Recipe 1: Bone broth soup



**Ingredients:** 1liter water, Bones of meat, fish, or poultry, preferably meat, 1 teaspoon of vinegar, Pinch of salt and pepper

**Method:** Boil the ingredients in a suitable size pot over medium heat for 4 to 6 minutes, stir occasionally.



After the water boils, reduce the flame and add Onions, Celery, Carrots, Parsley, Thyme and Garlic to add some flavors. Now cook with covered lid for 10 to 24 minutes.



After that, turn off the flame and let it cool down. Once cooled, filter the broth with a cheesecloth or strainer. Add salt and pepper according to your taste.



## Recipe 2: Mushroom soup



**Ingredients:** 1 cup of sliced potatoes, 1 cup of chopped carrots, 1 cup of chopped onions, 2 cups of chopped brown or white mushrooms, 3 tablespoons of olive oil, ¼ cup chopped parsley, 1 teaspoon of shredded ginger, 1 teaspoon of salt and pepper. 1 cup chopped pot .

**Method:** Sauté onions and carrot with butter in a suitable size pot over medium heat for 4 to 6 minutes, then add mushrooms to it and sauté it for another 5mins. Now add salt and pepper to it. Add 3 cups of lukewarm water or you can use vegetable broth instead and bring it to boil. Add the shredded ginger, parsley and serve.

## Recipes for juices

### Recipe 1: Green Juice

**Ingredients:** 1 orange, 2 cups of pineapple, a cup of chopped avocado, 2 sticks of celery, 2 pears, lemon juice, a piece of ginger, 2 spoons of turmeric, a little black pepper, half a spoon of honey



**Method:** take all the ingredients and blend it in a blender. Don't use the juicer machine as we want to keep the pulp for good results. Pour in a glass and consume fresh.



## Recipe 2: Pumpkin juice

**Ingredients:** 1 cup of boiled red pumpkin, 1 cup of grapefruit, Quarter cup of lemon, ½ cup of cranberry, ¼ cup of cherries, ¼ teaspoon of turmeric, ½ teaspoon of flaxseed, ½ teaspoon of nigella, a teaspoon of cinnamon, 3 tablespoons of honey



**Method:** All materials are added to the mixer and drink two cups daily.



### Benefits of this drink:

- Activates blood circulation.
- It stimulates the nerves.
- Strengthens bones and relieves pain.
- It is a rich source of many vitamins, such as folic acid, vitamin B3, and vitamin B, which are important for the functioning of various vital processes in the body, and the work of enzymes.
- Maintains the integrity and functions of nerves, in addition to contain important minerals, such as: potassium, calcium, copper, magnesium, and phosphorous.

## Recipe 3: Milk cocktail

**Ingredients:** Two cups of milk, 1 teaspoon of chia seed, 1 teaspoon of nigella, a teaspoon of flaxseed, a teaspoon of honey, 1 teaspoon of turmeric, a teaspoon of honey, 2 tablespoons of oats





**Method:** Mix everything in a blender and drink daily.



**Benefits of drinking this mixture:**

- Helps relieve pain.
- Repairs bones.
- Relieves osteoporosis and pain.
- Relaxes muscles.
- Reduces inflammation.
- Stimulates blood circulation.

**Recipe 4:** Vitamin C juice

**Ingredients:** Half a banana, 1 orange, 2 pieces of kiwi, 2 teaspoons of flaxseed, 2 teaspoons of sesame, ¼ cup of pomegranate, 2 pieces of walnuts and almonds, 2 spoons of honey.

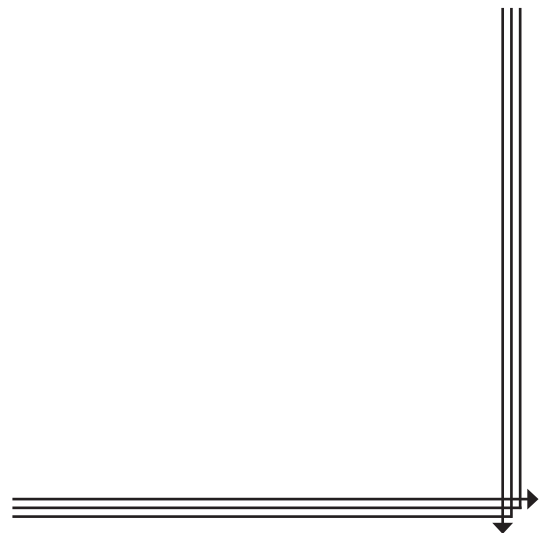
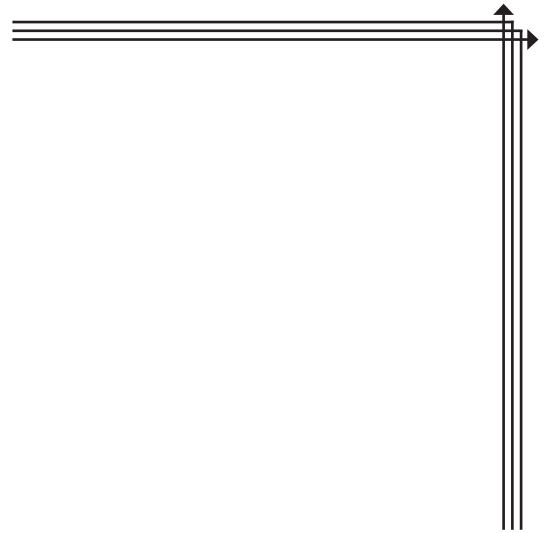


**Method:** Mix all together and blend it in a mixture. Drink it in the morning.



**Benefits of this drink:**

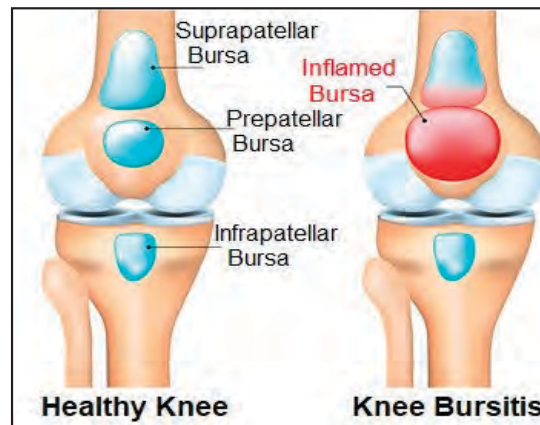
- It is a stimulant for the blood circulation.
- Stimulates the nerves.
- Reduces joint and respiratory infections.
- Lessens the pain.



## CHAPTER 5: KNEE BURSITIS AND ITS REHABILITATION

### What is a bursa?

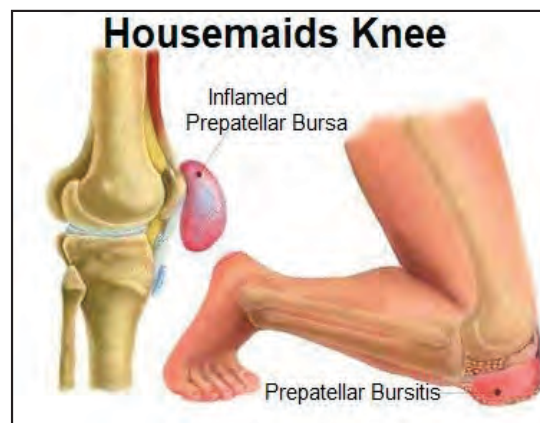
A bursa is a fluid-filled sac that functions as a gliding surface to reduce friction between moving tissues of the body. There are three major bursae of the knee. When a bursa becomes inflamed, the condition is known as bursitis. This can cause swelling, warmth, and tenderness in the affected area.



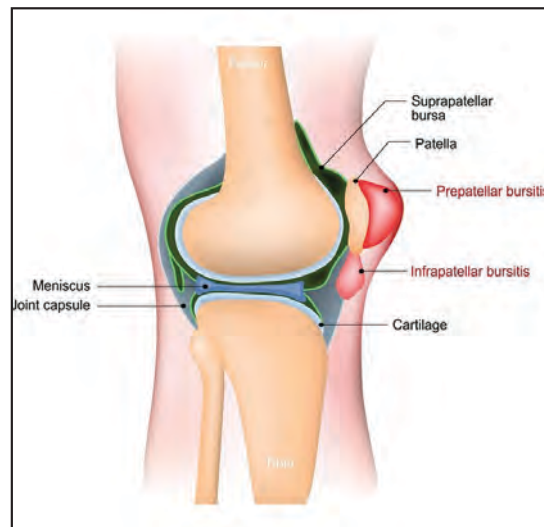
**What is the bursa surrounding the knee?** The knee joint is surrounded by three major bursae.

**Prepatellar Bursa:** At the tip of the knee, over the kneecap bone (patella), is the prepatellar bursa. This bursa can become inflamed (prepatellar bursitis) from direct trauma to the front of the knee.

This commonly occurs when maintaining a prolonged kneeling position, thereby causing irritation of the prepatellar area. It has been referred to as “housemaid’s knee,” “roofer’s knee,” and “carpet layer’s knee,” based on the patient’s associated occupational histories. Prepatellar bursitis can also be caused by a bacterial infection. If a knee injury such as an insect bite, scrape, or puncture wound breaks the skin, bacteria may get inside the bursa sac and cause an infection. This is called infectious bursitis. Infectious bursitis is less common, but more serious and must be treated more urgently.



**Infrapatellar Bursa:** Strain of the large tendon below the kneecap can cause both tendonitis and infrapatellar bursitis. This bursa of the knee is located just under the kneecap beneath the large tendon that attaches the muscles in front of the thigh and the kneecap to the prominent bone in front of the lower leg. This bursa is called the infrapatellar bursa, and when inflamed, the condition is called infrapatellar bursitis. It is commonly seen with inflammation of the adjacent tendon as a result of a jumping injury, hence the name “jumper’s knee.”



**Pes anserine bursa:** Inflammation of the bursa at the inner side of the knee (anserine area) can cause pes anserine bursitis. Pes anserine bursitis causes local tenderness of the inner knee. This bursa of the knee is located on the lower inner side of the knee and is called the “anserine bursa.” This bursa most commonly becomes inflamed in middle-aged women. This condition is referred to as anserine bursitis. Anserine bursitis is particularly common in those who are obese. These patients can notice pain in the inner knee while climbing or descending stairs.



**Symptoms:** Knee bursitis signs and symptoms vary, depending on which bursa is affected and what’s causing the inflammation. In general, the affected portion of your knee might feel warm, tender, and swollen when you put pressure on it. You might also feel pain when you move or even at rest.

A person with septic prepatellar bursitis may notice the skin over the knee:

- Appears red.
- Is noticeably warmer than other areas.
- Looks patchy or has a rash, bumps, or sores (indicating a skin infection).

Septic bursitis can also cause body-wide symptoms, such as:

- Fever.
- Fatigue.

- A general feeling of being sick.

### Causes

- Knee bursitis can be caused by:
- Frequent and sustained pressure, such as from kneeling, especially on hard surfaces.
- Overuse or strenuous activity.
- A direct blow to your knee.
- Bacterial infection of the bursa.
- Complications from osteoarthritis, rheumatoid arthritis or gout in your knee.

### Diagnosis:

Bursitis of the knee is diagnosed based upon the typical location of a bursa displaying signs of inflammation including knee pain, tenderness, stiffness, and sometimes redness and warmth. Typically, there is point tenderness at the site of the inflamed bursa.

### Tests

- X-rays. X-rays provide clear pictures of bone. Your doctor may order them to make sure there is not a fracture that is causing your symptoms.
- Other imaging tests. The diagnosis of bursitis is usually made on physical examination, but computerized tomography (CT) and magnetic resonance imaging (MRI) scans may be ordered to check for other soft tissue injury.
- Aspiration. If your doctor is concerned about the possibility of infection, he or she may aspirate (draw fluid with a needle) the bursa and send this sample to the lab for analysis.

**Conservative Management:** Nonsurgical treatment is usually effective if the bursa is simply inflamed and not infected:

**Activity modification:** Avoid the activities that worsen symptoms. Substitute another activity until the bursitis clears up. Low-impact exercise, such as cycling, is a good option.

**Ice:** Apply ice at regular intervals 3 or 4 times a day for 20 minutes at a time. Each session should reduce swelling considerably if the knee is also being rested.



**Elevation:** Elevate the affected leg except when it is necessary to walk.



**Nonsteroidal anti-inflammatory drugs (NSAIDs):** Medications such as naproxen and ibuprofen may relieve pain and control inflammation.

**Aspiration:** They use a needle to drain the fluid out of your knee. They can do this in their office. You won't need to go to the hospital. It might hurt for a few days afterward. You'll also wear a knee wrap to keep swelling down.

**Steroid injection:** The doctor can also give you a steroid shot in the swollen knee to ease inflammation. It's a stronger dose of the medicine than you could take as a pill.

**Massage techniques to reduce inflammation:** Wear comfortable, loose clothing that allows easy access to the thigh. Maintain good posture and balance. Use a combination of infused oil recipes described later in the chapter for better results.

Friction strokes are applied with no lubrication by pressing fingers firmly into the tissue and compressing a small area while moving the tissue back and forth using short strokes.

- **Front Thigh Glide:** Glide down using heel of hand. End at the top of knee and release. Bring hand back to starting position. Repeat this sequence 5 times. Now repeat the same sequence on the left leg, using left hand.



- **Outside Thigh Glide:** Place heel of the right hand on top outside right thigh. Glide down outside thigh. End at the top of the knee and release. Repeat this sequence 5 times. Now repeat the same sequence on the left leg, using your left hand.



- **Inner Thigh Glide:** Seated, place heel of the left hand on top inner right thigh. Glide down with heel of hand. End at top of knee and release. Repeat this sequence 5 times. Now repeat the same sequence on the left leg, using your right hand.



- **Knee Friction:** Without lubrication, strokes are applied around knees. Press four fingertips firmly into tissue, compressing small area while moving tissue up and down using five short strokes around knee—bottom, outside,

top, and inside.



- **Finishing Glide Stroke:** Sit with both feet flat on floor. Place one hand palm down on each upper thigh. Glide down over kneecaps across to outside thigh and up to starting position using light to medium pressure.



### Infused-oil recipes:

#### Recipe 1: Lavender and olive oil

**Ingredients:** 3 teaspoons willow, 2 teaspoons roses, 3 teaspoons eucalyptus, 3 tablespoons lavender, 1/2 cup olive oil



**Preparation of the oil:** Grind the materials with a coffee grinder, add them to olive oil and use 2-3 times a day. And put in an airtight container, away from the heat and the sun, and in the refrigerator.



#### Recipe 2: Rosemary and turmeric olive

**Ingredients:** 5 teaspoons turmeric, 4 teaspoons linden, 4 teaspoons rosemary, 6 teaspoons thyme, 1/2 cup olive oil



**Preparation of the oil:** Half a cup of olive oil, Turmeric, linden, rosemary, and thyme powder are grounded in a coffee grinder and placed directly with olive oil and mixed well. When mixing, close directly and leave in dark colored bottles. Before use, shake the

bottle and use 2-3 times.



### Recipe 3: Nutmeg and Cloves oil

**Ingredients:** 3 teaspoons nutmeg, 5 teaspoons of marjoram, 10 teaspoons lemon peel and dry orange peel, 2 teaspoons cloves, 1/2 cup olive oil



**Preparation of the oil:** Take all the seeds and lemon peel and grind with the coffee grinder until it becomes like powder and then add them all in olive oil and mix well and use 2-3 times. And put in an airtight container, away from the heat and the sun, and in the refrigerator.



### Recipe 4: Honey and Basil oil

**Ingredients:** 3 teaspoons honey, 2 teaspoons basil, 2 teaspoons turmeric



**Preparation of the oil:** Grind turmeric and basil like powder, add honey, then add to olive oil and mix well. And put in an airtight container, away from the heat and the sun, and in the refrigerator.



### Recipe 5: Devil's claw and olive oil

**Ingredients:** 3 teaspoons basil, 5 teaspoons devil's paw, 3 tablespoons fennel, 1 cup olive oil





**Preparation of the oil:** Grind the material with a coffee grinder, then add olive oil and use 2-3 times a day. Then wipe and place in opaque bottles and in the refrigerator.



### Exercises for Knee Bursitis:

You can stretch your leg right away using these three stretches and later you can start doing some strengthening exercises.

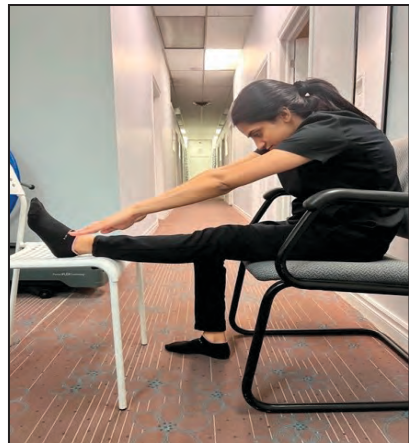
#### Hamstrings stretch:

- While lying on your back, place a towel or cord around your thigh.
- While keeping your knee straight, slowly pull your leg in an upward direction using the towel to pull higher. You will feel a stretch along the muscles in the back of your thigh.
- Try to hold it for 30 seconds.
- Slowly return to the starting position.



#### Hamstring stretch seated:

- Begin by sitting in a hardback chair; prop your leg on a stool or chair directly in front of you.
- While keeping your back straight, slowly reach for your toes while at the same time keeping your knee straight. You will feel a stretch along the muscles in the back of your thigh.



### Hamstrings stretch standing:

- While standing, place your foot on a stool or chair.
- While keeping your knee straight, slowly bend forward to touch your toe. You will feel a stretch along the muscles in the back of your thigh.
- Try to hold it for 30 seconds.
- Slowly return to the starting position.
- This exercise should be performed on both legs.



**Standing Calf Stretch:** Facing a wall, put your hands on the wall at about eye level. Keep one leg back with the heel on the floor, and the other leg forward. Turn your back foot slightly inward (as if you were pigeon-toed) as you slowly lean into the wall until you feel a stretch in the back of your calf. Hold for 15 to 30 seconds. Repeat 3 times. Do this exercise several times each day.



**Quadriceps Stretch:** Stand an arm's length away from the wall, facing straight ahead. Brace yourself by keeping one hand against the wall. With your other hand, grasp the ankle of the opposite leg and pull your heel toward your buttocks. Don't arch or twist your back. Keep your knees together. Hold this stretch for 15 to 30 seconds. Repeat 3 times on each side.



**Hip Adductor Stretch:** This stretch is also used during warm-ups to get your muscles ready for other exercises. It is important to try to relax during stretching exercises. Do not hold your breath. Instead focus on taking slow deep breaths while trying to stretch a little bit further. This stretch can be performed in two different ways lying on your back or sitting on the floor.

- Lie on your back.
- Remember to keep your toes pointed toward the ceiling and.
- your knee straight.
- Slowly move your leg out to the side until a comfortable stretch is felt in your groin.
- Try to hold it for 30 seconds.
- Slowly return to the starting position.



**Adductors stretch sitting:** We recommend sitting on the floor or a firm surface.

- Put your feet together and sit with your back straight.
- Place your hands on your knees.
- Slowly press your knees down towards the floor until a comfortable stretch is felt in your groin.
- Try to hold it for 30 seconds.
- Slowly return to the starting position.

This exercise should be performed on both legs



## Strengthening Exercises:

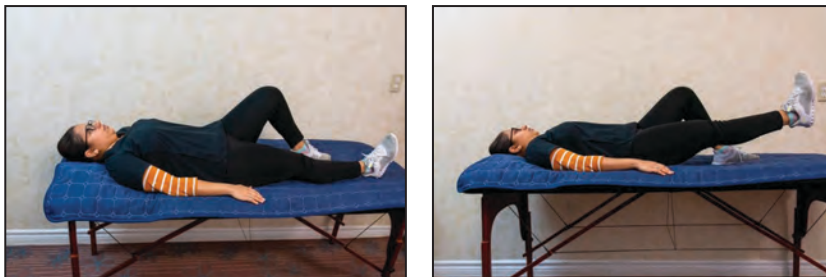
**Quad Sets:** Sitting on the floor or a bed with one leg straight and other leg bent, press the back of your straight leg into the floor/bed by tightening the muscles on the top of your thigh. Hold this position for 10 seconds. Relax. Do 3 sets of 10.



**Heel Slide:** Sit on a firm surface with your legs straight in front of you. Slowly slide the heel of one leg toward your buttock by pulling your knee to your chest as you slide. Return to the starting position. Do 3 sets of 10.

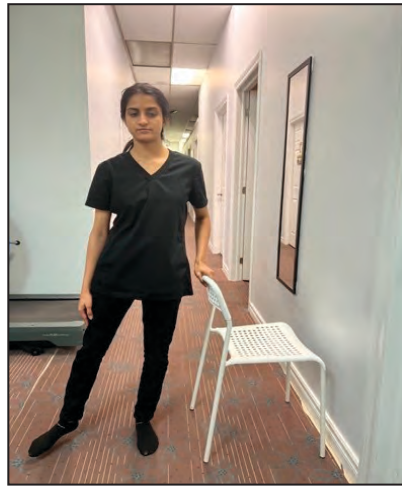


**Straight Leg Raise:** Lie on your back with your legs straight out in front of you. Bend one knee and place the foot flat on the floor. Tighten up the top of your thigh muscles on the opposite leg and lift that leg about 8 inches off the floor, keeping the thigh muscles tight throughout. Slowly lower your leg back down to the floor. Do 3 sets of 10 on each side.



## Hip Abduction (Standing):

- Stand with a chair on your side. Keeping one hand on the chair.
- Begin by slightly rotating your toes toward the side.
- While keeping your knee straight, slowly move your leg out toward the side. You will feel the muscles on the side of your hip tighten.
- Try to hold the end position for 5 seconds before slowly returning your leg to the starting position.



**Side-Lying Leg Lift:** Lying on your side, start by rotating your toes so they are pointing towards the ceiling. While keeping your knee straight, tighten the front thigh muscles on your top leg and lift the leg away from the other leg. Try to hold the end position for 5 seconds before slowly returning your leg to the starting position. Do 3 sets of 10.



**Side Lying Adduction:** Lying on your side on a comfortable mat or firm surface. Remember to keep your back straight for this exercise. You can use your arms for balance during this exercise.

- Start by crossing your upper leg over your lower leg.
- While keeping your knee straight, slowly raise your lower leg toward the ceiling. (You will feel your inner hip muscles tighten)
- Try to hold the end position for 5 seconds before slowly returning your leg to the starting position
- This exercise should be performed on both legs.



**Prone Knee Bends:** Lying on your stomach on a comfortable surface. Keep the front part of your thigh in contact with the surface at all times. Ankle weights or exercise bands can be added to increase the degree of difficulty.

- Point your toes away as if you were pushing on a gas pedal.
- Slowly bend your knee up until your lower leg points towards the ceiling.
- Hold the bend for 5 seconds before slowly returning your leg to the starting position.

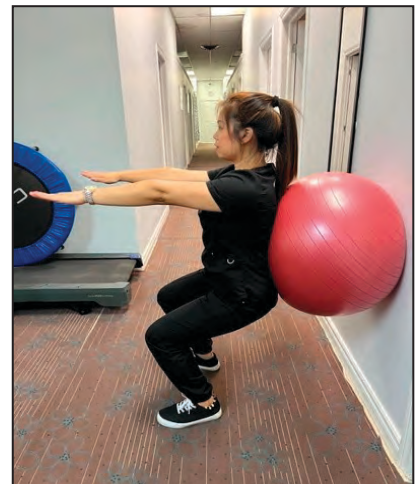
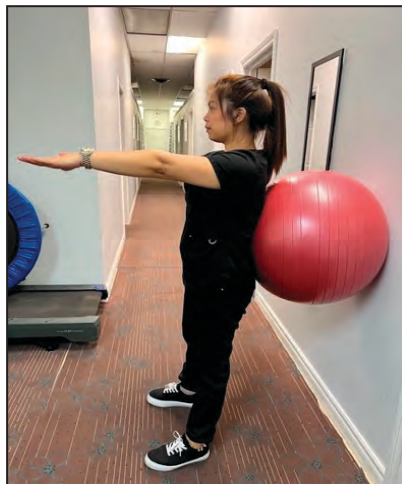


**Prone Knee Extension:** This exercise works the buttock, hamstring and calf muscles along the entire leg. To perform this exercise, lie on your stomach on a comfortable surface. Ankle weights or exercise bands can be added to increase the degree of difficulty.

- Point your toes away as if you were pushing on a gas pedal.
- Slowly lift your entire leg off the table while trying to keep your knee straight.
- Hold for 5 seconds before slowly returning your leg to the starting position.
- This exercise should be performed on both legs.



**Wall Squat with A Ball:** Stand with your back, shoulders and head against a wall and look straight ahead. Keep your shoulders relaxed and your feet 2 feet away from the wall and a shoulder's width apart. Place a soccer or basketball- sized ball behind your back. Keeping your head against the wall, slowly squat down to a 45degree angle. Your thighs will not yet be parallel to the floor. Hold this position for 10 seconds and then slowly slide back up the wall. Repeat 10 times. Buildup to 3 sets of 10.



**Nutritional Facts:** Some foods have anti-inflammatory effects include ginger, garlic, cinnamon, turmeric, leafy greens, and blueberries. If incorporated in regular diet helps to enhance the results faster with pain and inflammation. The food below is among the best of the best when it comes to anti-inflammatory effects.

**Avocados:** It's the sugars found in avocados that may make them particularly good at reducing inflammation. One study found that AV119, a patented blend of sugars found in avocado, was effective in blocking the proinflammatory response in keratinocytes, specific cells involved in the body's innate immune response.



**Berries:** Their high antioxidant levels — specifically antioxidants called anthocyanins—are what make berries particularly beneficial



when it comes to targeting inflammation.

**Tomatoes:** Tomatoes and tomato juice are both chock-full of several antioxidants with powerful anti-inflammatory properties, such as vitamin C, lycopene, and potassium. Lycopene is particularly effective at reducing inflammation, as well as the risk of certain cancers and heart disease.



**Cherries:** Packed full of antioxidants like catechins and anthocyanins, cherries are very effective at decreasing oxidative stress and fighting inflammation.



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**Mushrooms:** Mushrooms are rich in selenium, B vitamins, copper, phenols, and other antioxidants that provide anti-inflammatory protection against inflammatory conditions.



**Dark chocolate and cocoa:** Dark chocolate and all things cocoa are not only delicious, but they are also nutritious! The cocoa found in chocolate is full of antioxidants, which can help reduce inflammation in the body and heals quickly.



**Chili peppers and bell peppers:** Chili peppers are packed with antioxidants and vitamin C, two key nutrients responsible for their significant anti-inflammatory effects. Hot chili peppers are also a great source of sinapic acid and ferulic acid, which can reduce inflammation.



**Peppermint tea:** Take fresh peppermint leaves and boil it in water for 5-10 minutes. Strain the tea and have it hot. It helps reduce the inflammation.



**Ginger tea:** Prepare the fresh ginger by peeling it and slicing it thinly to maximize the surface area. In a pot, add the water and ginger, and bring to a boil for at least 10 minutes. For a stronger and tangier tea, allow to boil for 20 minutes or more, and use more slices



of ginger. Remove it from the heat, strain, and add the lime juice or just add a slice of lemon and honey to taste. Enjoy your ginger tea.



### Recipe 1: Red beans Salad

**Ingredients:** ¼ cup boiled red kidney beans, drained, ¼ 1 cup boiled and drained pinto beans, ½ cup chopped red onion, ½ cup chopped red pepper, ½ cup chopped yellow pepper, ½ cup chopped cucumber, ½ cup chopped parsley.



**For the dressing:** ¼ cup olive oil, ¼ cup vinegar, 2 tablespoons lemon juice, 1 clove of minced garlic, 1 inch of ginger crushed finely, 2 teaspoons ground cumin, 1 teaspoon ground coriander, ¼ teaspoon black pepper, ¼ teaspoon chili (optional), ¼ teaspoon salt

**Method:** In a bowl, mix all the vegetables. Then, put all the ingredients for dressing gradually. Stir the salad and mix it well. Top it with fresh parsley and serve it directly. It can be used as a side dish with soup or main course.



### Recipe 2: Tuna Salad

**Ingredients:** 1 cup chopped arugula, 2 cups of chopped salmon or tuna, 1 cup chopped tomatoes, ½ cup of colored capsicum, ¼ cup of black olives, 2 tablespoons of chopped parsley, ½ cup of chopped red cabbage



**For the dressing:** 1 tablespoon olive oil, 1 clove of minced garlic, 2 teaspoons lemon juice, Pinch of chili, Pinch of salt.



**Method:** In a bowl, mix all the vegetables. Then, put all the ingredients for dressing gradually. Stir the salad and mix it well. Top it with fresh parsley and serve it directly. It can be used as a side dish with soup or main course.

### Fruit bowl Salad

**Ingredients:** ¼ cup of chopped kiwi, ¼ cup of chopped strawberries, ¼ cup of chopped pineapple, ¼ cup of chopped bananas, ¼ cup of pomegranate, 1 teaspoon of finely chopped ginger, 1 teaspoon of honey, ¼ cup of orange juice, ¼ cup of lemon juice and ¼ cup chopped mint.



**Method:** Put the fruits in a bowl. Add honey, ginger, lemon juice, orange juice and mix well. Top it with freshly chopped mint and serve.



### Green Greek salad

**Ingredients:** 2 cups of medium chopped tomatoes, 2 cups of chopped cucumbers, 1 cup medium chopped lettuce, 1 cup chopped onion, ½ cup chopped white cheese, 1 cup chopped sweet green pepper, few slices of black olives, ½ cup of lemon juice, pinch of salt,

1 tablespoon of vinegar, 2 tablespoons of olive oil, 1 tablespoon of thyme.



**Method:** Put all the ingredients together, and stir them except for the white cheese, onions, and black olives. Add salt, olive oil, thyme, vinegar, and lemon juice and mix well. Top the salad with cheese, onions and black olives while serving. It can be used as a side dish or main course.



### Recipe for Bone broth soup



**Ingredients:** 1liter water, Bones of meat, fish, or poultry, preferably meat, 1 teaspoon of vinegar, Pinch of salt and pepper

**Method:** Boil the ingredients in a suitable size pot over medium heat for 4 to 6 minutes, stir occasionally.



After the water boils, reduce the flame and add Onions, Celery, Carrots, Parsley, Thyme and Garlic to add some flavors.

Now cook with covered lid for 10 to 24 minutes.



After that, turn off the flame and let it cool down. Once cooled, filter the broth with a cheesecloth or strainer.



Add salt and pepper according to your taste and serve it hot.

## Green Juice



**Ingredients:** 1 orange, 2 cups of pineapple, a cup of chopped avocado, 2 sticks of celery, 2 pears, lemon juice, a piece of ginger, 2 spoons of turmeric, a little black pepper, half a spoon of honey

**Method:** take all the ingredients and blend it in a blender. Don't use the juicer machine as we want to keep the pulp for good results. Pour in a glass and consume fresh.



## Pumpkin juice

**Ingredients:** 1 cup of boiled red pumpkin, 1 cup of grapefruit, Quarter cup of lemon, ½ cup of cranberry, ¼ cup of cherries, ¼ teaspoon of turmeric, ½ teaspoon of flaxseed, ½ teaspoon of nigella, a teaspoon of cinnamon, 3 tablespoons of honey



**Method:** All materials are added to the mixer and drink two cups daily.



### Benefits of this drink:

- Activates blood circulation.
- It stimulates the nerves.
- Strengthens bones and relieves pain.
- It is a rich source of many vitamins, such as folic acid, vitamin B3, and vitamin B, which are important for the functioning of various vital processes in the body, and the work of enzymes.
- Maintains the integrity and functions of nerves, in addition, it contains important minerals, such as: potassium, calcium, copper, magnesium, and phosphorus.

## Milk cocktail

**Ingredients:** Two cups of milk, 1 teaspoon of chia seed, 1 teaspoon of nigella, a teaspoon of flaxseed, a teaspoon of honey, 1 teaspoon of turmeric, a teaspoon of honey, 2 tablespoons of oats



**Method:** Mix everything in a blender and drink daily.



**Benefits of drinking this drink:**

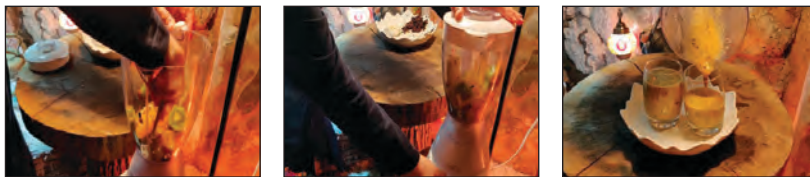
- Helps relieve pain.
- Repairs bones.
- Relieves osteoporosis pain.
- Relaxes muscles.
- Reduces inflammation.
- Stimulates blood circulation.

**Vitamin C juice**

**Ingredients:** Half a banana, 1 orange, 2 pieces of kiwi, 2 teaspoons of flaxseed, 2 teaspoons of sesame, ¼ cup of pomegranate, 2 pieces of walnuts and almonds, 2 spoons of honey.

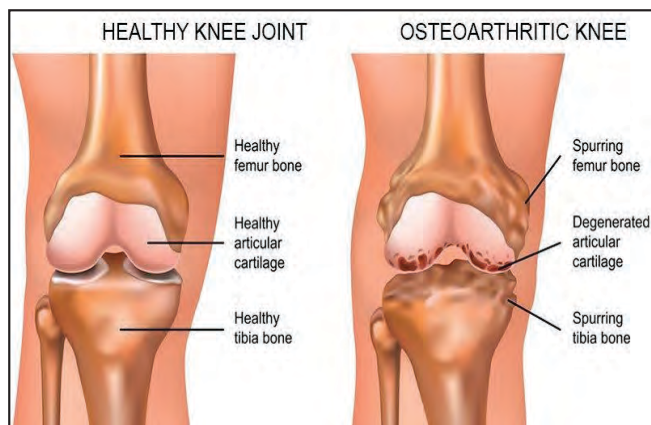


**Method:** Mix all together and blend it in a mixture. Drink it in the morning.



## CHAPTER 6: REHABILITATION FOR KNEE OSTEOARTHRITIS

Osteoarthritis, commonly known as wear-and-tear arthritis, is a condition in which the natural cushioning between joints cartilage wears away. When this happens, the bones of the joints rub more closely against one another with less of the shock-absorbing benefits of cartilage. The rubbing results in pain, swelling, stiffness, decreased ability to move and, sometimes, the formation of bone spurs.



**Symptoms:** Osteoarthritis symptoms often develop slowly and worsen over time. Signs and symptoms of osteoarthritis include:

- **Pain.** Affected joints might hurt during or after movement.
- **Stiffness.** Joint stiffness might be most noticeable upon awakening or after being inactive.
- **Tenderness.** Your joint might feel tender when you apply light pressure to or near it.
- **Loss of flexibility.** You might not be able to move your joint through its full range of motion.
- **Grating sensation.** You might feel a grating sensation when you use the joint, and you might hear popping or crackling.
- **Bone spurs.** These extra bits of bone, which feel like hard lumps, can form around the affected joint.
- **Swelling.** This might be caused by soft tissue inflammation around the joint.

**Causes:** The most common cause of osteoarthritis of the knee is age. Almost everyone will eventually develop some degree of osteoarthritis. However, several factors increase the risk of developing significant arthritis at an earlier age.

- **Age.** The ability of cartilage to heal decreases as a person gets older.
- **Weight.** Weight increases pressure on all the joints, especially the knees. Every pound of weight you gain adds 3 to 4 pounds of extra weight on your knees.
- **Heredity.** This includes genetic mutations that might make a person more likely to develop osteoarthritis of the knee. It may also be due to inherited abnormalities in the shape of the bones that surround the knee joint.
- **Gender.** Women ages 55 and older are more likely than men to develop osteoarthritis of the knee.
- **Repetitive stress injuries.** These are usually a result of the type of job a person has. People with certain occupations that include a lot of activity that can stress the joint, such as kneeling, squatting, or lifting heavy weights (55 pounds or more), are more likely to develop osteoarthritis of the knee because of the constant pressure on the joint.
- **Athletics.** Athletes involved in soccer, tennis, or long-distance running may be at higher risk for developing osteoarthritis of the knee. That means athletes should take precautions to avoid injury. However, it's important to note that regular moderate exercise strengthens joints and can decrease the risk of osteoarthritis. In fact, weak muscles around the knee can lead to osteoarthritis.
- **Other illnesses.** People with rheumatoid arthritis, the second most common type of arthritis, are also more likely to develop osteoarthritis. People with certain metabolic disorders, such as iron overload or excess growth hormone,

also run a higher risk of osteoarthritis.

**Diagnosis:** During the physical exam, your doctor will check your affected joint for tenderness, swelling, redness and flexibility.

**Imaging tests:** To get pictures of the affected joint, your doctor might recommend:

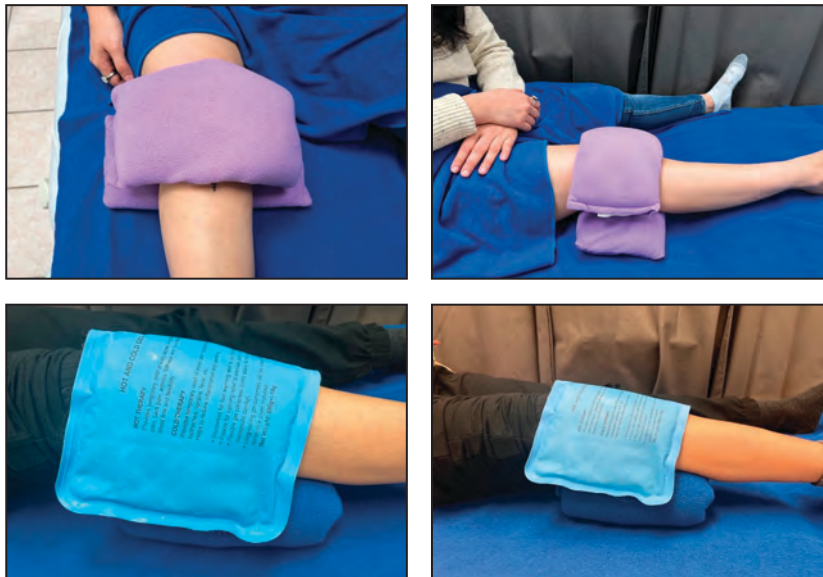
- **X-rays.** Cartilage doesn't show up on X-ray images, but cartilage loss is revealed by a narrowing of the space between the bones in your joint. An X-ray can also show bone spurs around a joint.
- **Magnetic resonance imaging (MRI).** An MRI uses radio waves and a strong magnetic field to produce detailed images of bone and soft tissues, including cartilage. An MRI isn't commonly needed to diagnose osteoarthritis but can help provide more information in complex cases.

### Managing osteoarthritis of the knee

There's no cure for osteoarthritis, but there are things you can do for yourself that can make a difference to how the condition affects you. There are also some treatments available that could significantly reduce your pain.

**Weight loss.** Losing even a small amount of weight, if needed, can significantly decrease knee pain from osteoarthritis.

**Heat and cold.** Both heat and cold can relieve pain and swelling in your joints. Heat, especially moist heat, can help muscles relax and ease pain. Cold can relieve muscle aches after exercise and decrease muscle spasms.



**Using devices such as braces.** There are two types of braces: “unloader” braces, which take the weight away from the side of the knee affected by arthritis; and “support” braces, which provide support for the entire knee.

**Shoe inserts.** Shoe inserts or other devices might help reduce pain when you stand or walk. These devices can support your joint to help take pressure off it.





**Assistive devices.** Assistive devices can help relieve stress on your joints. A cane or walker takes weight off your knee or hip as you walk. Hold the cane in the hand opposite the leg that hurts.



**Injections of corticosteroids or hyaluronic acid into the knee.** Steroids are powerful anti-inflammatory drugs. Hyaluronic acid is normally present in joints as a type of lubricating fluid.

**Alternative therapies.** Some alternative therapies that may be effective include topical creams with capsaicin, acupuncture, or supplements, including glucosamine and chondroitin.

**Physical therapy.** A physical therapist can show you exercises to strengthen the muscles around your joint, increase your flexibility and reduce pain. Regular gentle exercise that you do on your own, such as swimming or walking, can be equally effective.

**Occupational therapy.** An occupational therapist can help you discover ways to do everyday tasks without putting extra stress on your already painful joint. For instance, a toothbrush with a large grip could make brushing your teeth easier if you have osteoarthritis in your hands. A bench in your shower could help relieve the pain of standing if you have knee osteoarthritis.

**Massage therapy.** Chronic osteoarthritis responds well to massage. Pain is relieved as the muscles surrounding the joints relax, releasing stiffness and allowing for better range of motion and mobility. Increased relaxation, decreased stress, and a sense of well-being are additional benefits of massage therapy.

The area to focus on for the knee pain massage is just above the knee on the quad muscles, because trigger points on the quadriceps refer pain to the knee. Do not massage directly on the kneecap.

In the knee osteoarthritis pain, massage techniques we will be massaging the trigger points and not directly the area of the pain.

- Have the other person lie comfortably on their back.
- Hold one foot with both hands placing your thumbs on the sole.
- Knead and rub the sole with your thumbs and the top of the foot with your fingers using firm pressure.
- Move up the leg starting with the calf.
- Rub the calf muscles with both hands using long upward strokes.
- Use your thumbs, forearm, or the heel of your hand to apply more pressure in spots where the muscle feels tight or has knots.
- Continue this process as you move up the thigh to the hip making sure to include all the muscles in the upper leg.
- Repeat on the other leg.



### **Knee Friction Massage Technique:**

- Have the patient lie on their back on a hard or semi-hard surface, a mattress will do just fine.
- Have the recipient stretch their leg out completely straight.
- You can stand or sit beside the patient by their stretched leg.
- Apply a bit of oil on to your hands.
- Gently start massaging the sides of the kneecap using long gliding strokes to warm up the area.
- Start the friction process by placing your thumb at the sides of the knee-cap.
- Press in with your thumbs on either side of the knee and glide your thumb from the top to the bottom of the knee maintaining the pressure.
- Repeat this process for 5-10 minutes varying the pressure as per the needs of the recipient. Switch to the other knee.



### **Quad Compression Massage Technique:**

- Have the patient lie down on their back on a semi-hard or firm surface, a mattress will do just fine.
- Have them lay their leg flat on the surface. Cover the whole body except for the leg you are going to massage.
- Stand by the side of the patient and start massaging the quad muscles using a kneading technique.
- You can also use your fist to knead the muscle belly.
- Continue kneading the quad muscles all around in a circular direction. You can apply this massage technique for

5-10 minutes before switching to the other leg.



### Self-massage for OA:

- Begin by rhythmically drumming the palm of your closed hands on the upper, middle, and lower portions of your thigh.
- Keep the pressure light and complete 30 to 60 seconds of tapping in each section of your leg before moving on.
- Next, sit with your knee extended and your heel on the floor.
- Use the palm of your hand and glide from the top of your thigh down to just above the knee.
- Release the pressure and repeat the stroke five to 10 more times.
- Once you finish with the thigh, use all your fingers, and press firmly into the tissue surrounding the knee itself.
- Finally, sit with your legs extended in front of you and use the palm of your hand to glide down your leg to your kneecap, over to the outside of the thigh, and back up to the starting position again.



You can make your own oil for massaging your knee by using simple herbs readily available in your own kitchen. The recipes for the oils are mentioned below,

**Recipe 1:** Sesame and cress seeds oil

**Ingredients:** 3 teaspoons red pepper, 3 teaspoons sesame, 3 teaspoons cress seeds, 3 teaspoons pumpkin seeds, 1/2 cup vinegar



**Preparation:** Grind everything together in a small grinder and place them in an airtight container, pour the vinegar in the bottle and mix it. Put the lid tightly and keep it away from the heat and sun. Wrap the bottle in a dark cloth and keep it in a dark place. Apply 2-3 times to the area with a light massage.



**Recipe 2:** Orange peel and Cinnamon oil

**Ingredients:** 3 teaspoons chia seeds, 3 teaspoons orange peel, 3 teaspoons flaxseed, 3 teaspoons cinnamon, 1/2 cup olive oil

**Preparation:** Grind all the dried herbs and mix them together in olive oil. Place the oil in an airtight container, away from the heat and sun and in the fridge. Apply 2-3 times to the area with a light massage.

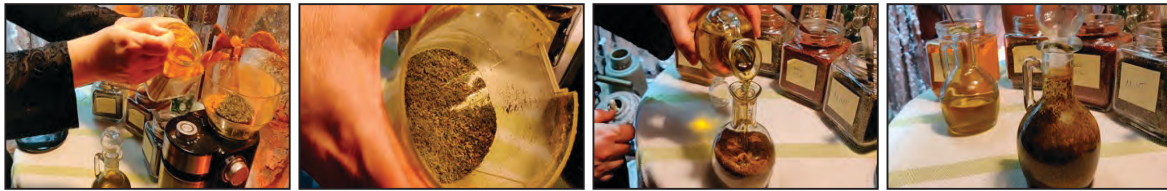


**Recipe 3:** Cumin and Turmeric Oil

**Ingredients:** 3 teaspoons caraway seeds, 3 teaspoons cumin, 3 teaspoons flaxseed, 2 teaspoons turmeric, 1/2 cup olive oil



**Method:** Grind everything together in a small grinder and place them in an airtight container, mix the olive oil in it and put away from the heat and sun preferably in the fridge. Apply 2-3 spoons to the area with a light massage.



**Recipe 4: Pumpkin and Chamomile Oil**

**Ingredients:** 3 teaspoons sesame, 3 teaspoons pumpkin, 3 teaspoons flaxseed, 3 teaspoons chamomile



**Method:** Grind everything together and mix it with half a cup of olive oil and place in an airtight bowl, away from the heat and sun and in the fridge. Apply 1 spoon to the area with a light massage.



**Recipe 5: Mustard and Ginger oil**

**Ingredients:** 3 teaspoons black seeds, 3 teaspoons cress seeds, 3 teaspoons mustard seeds, 3 teaspoons ginger, 1/2 cup olive oil



**Method:** Mix them together and place them in an airtight container, away from the heat and sun and in the fridge. Apply 2-3 times to the area with a light massage.



**Benefits of this oils:**

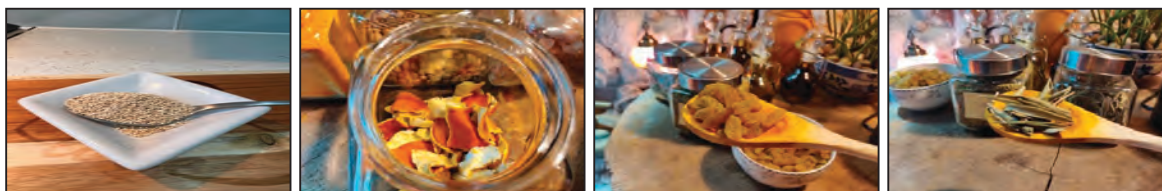
- These are the most common recipes that reduce inflammation.
- Activates nerves.
- Activates circulation.

- Nourishes muscles.

### Recipe 6:

Olive and Orange peel oil

**Ingredients:** 3 teaspoons quinoa, 3 teaspoons orange peel, 3 teaspoons of raisins, 1 teaspoon of olive leaves, 1/2 cup olive oil



**Method:** Grind everything together and mix it with olive oil. Place it in an airtight container, wrap it with a dark color cloth and keep it away from the heat and sun. Apply 2-3 times to the area with a light massage.



### Other essential oils used to relieve knee joint pain:

**Rose Mary Oil:** Rosemary herb has medicinal properties, rosemary oil has antibacterial, antioxidant, analgesic and anti-arthritis properties so it is very useful in the treatment of arthritis and when applying oil to the skin it heats the area and numbs the nerves which relieves pain.



**Frankincense oil:** This essential oil has been used mainly for its soothing smell in perfumes and incense for thousands of years, but when researchers from the Department of Pharmacology tested the effects of acids extracted from frankincense on inflammation, they found that it has an anti-inflammatory effects. Frankincense is extracted from resin from a tree.



**Basil oil:** Basil has been used as a medical herb for many years and has many health benefits and anti-inflammatory properties that can reduce swelling and inflammation and reduce burning sensation due to its cooling properties.



**Thyme oil:** Thyme has a nice smell and is known to contain many compounds such as linoleic acids, anti-inflammatory properties and flavonoids that help reduce inflammation by inhibiting nitric oxide responsible for increasing inflammation.



**Olive oil:** Olive oil has anti-inflammatory and antioxidant properties and has a lot of health benefits, as virgin olive oil is a popular treatment for osteoarthritis and rheumatoid arthritis because it contains polyphenols.



**Chamomile oil:** Chamomile extracts have anti-inflammatory properties because they contain flavonoid compounds and have analgesic properties that can effectively reduce arthritic pain.



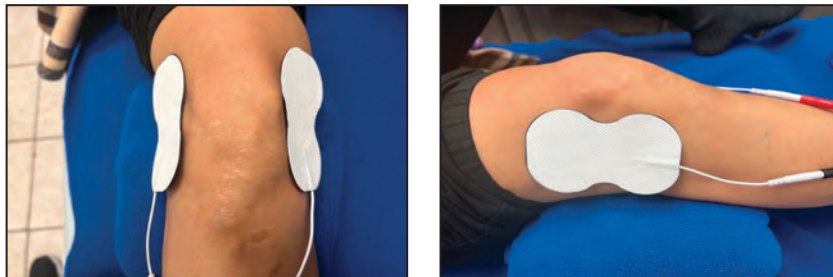
**Pumpkin Seed oil:** Containing elements, vitamins and minerals that promote healthy bones and joints, as they contain magnesium, zinc, vitamin E and K. Pumpkins also contain high rates of carotenoids and Omega-3. Pumpkin seeds are rich in magnesium

which improves our bone density and strengthens the bone joints. For women, pumpkin seeds have a promising effect by cutting off the risk of osteoporosis which makes the bones porous and delicate.

It is one of the most powerful vegan food that helps in reducing arthritis and rheumatism pain. The pumpkin seed oil is highly effective in treating joint pains. A regular massage with pumpkin seed oil can bring down the intensity of your joint pain.



**Transcutaneous electrical nerve stimulation (TENS).** This uses a low-voltage electrical current to relieve pain. It provides short-term relief for some people with knee and hip osteoarthritis.



### Stretches:

**Standing quadricep stretch:** Stand next to a wall with your left hand on it for balance and bend your right knee to bring your foot up. Reach behind you with your right hand and grab your ankle. Then slowly pull your ankle up and back, away from your buttock. Hold the stretch for 20 seconds twice on each side.



**Hip flexors stretch:** Kneel with your one knee and your other foot on the floor. Your kneeling shin should be flat on the floor and positioned further back than your shoulders, and your other knee should be bent at a 90-degree angle. Rest your hands on your right knee and lean forward over your right knee, keeping your back straight. Don't lean further than the end of your toes. Hold the stretch



for 20 seconds three times on each side.



**Forward fold:** Start by standing with your feet shoulder-width apart and slowly bend forward from the waist. Keep your legs as straight as possible and don't bounce. Don't worry if you can't reach the floor; you can even reach for a chair cushion to start if that's what your flexibility allows. Hold the stretch for 20 to 30 seconds three times.



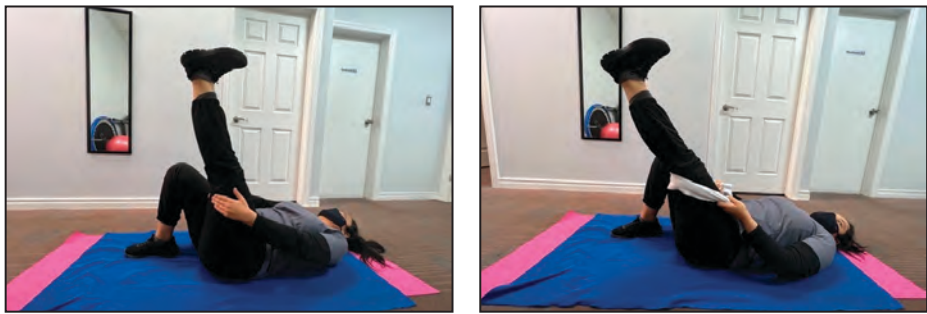
**Calf stretches:** Stand facing the wall about two paces away and place both hands on the wall. Step forward with your right foot but keep your left leg straight and extended back, with your heel on the ground. Lean forward until you can feel the pull on the back of your left calf. Hold for 10 to 20 seconds three times for each leg.

To stretch the other main muscle in your calf, do the same stretch but bend your left knee slightly.



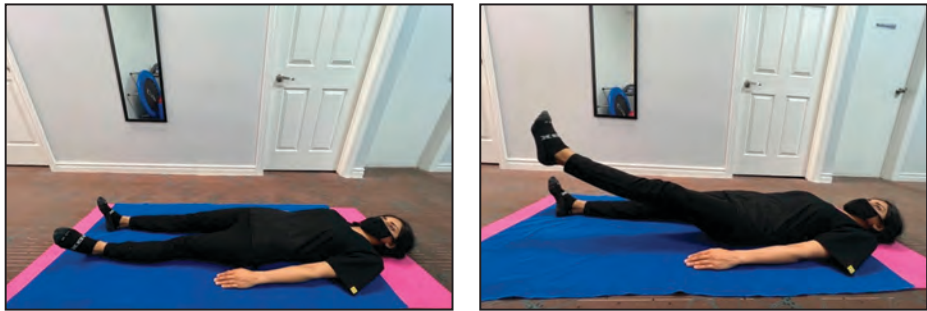
**Supine Hamstring Stretch:** Lie on the floor with both legs bent. Lift one leg off the floor and bring the knee toward your chest.

Clasp your hands behind your thigh below your knee. Straighten your leg and then pull it gently toward your head, until you feel a stretch. (If you have difficulty clasping your hands behind your leg, loop a towel around your thigh. Grasp the ends of the towel and pull your leg toward you.) Hold this position for 30 to 60 seconds. Repeat with the opposite leg. You should feel this stretch at the back of your thigh and behind your knee.



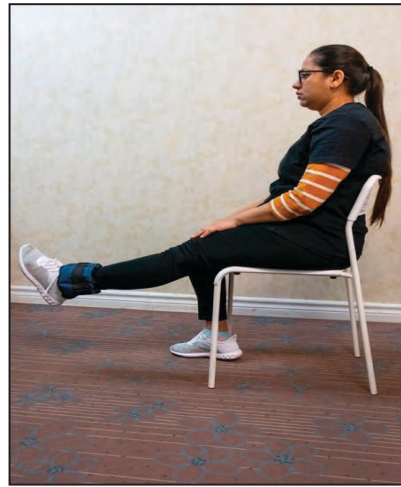
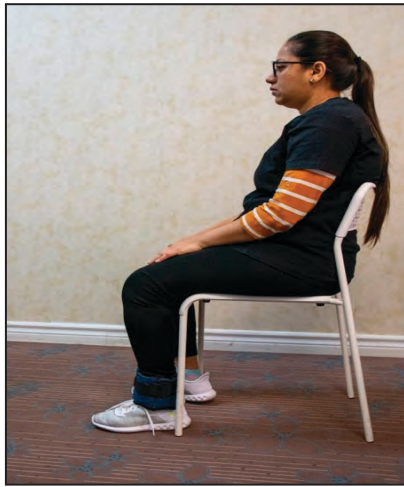
**Strengthening Exercises:**

**Straight-leg raise (lying):** Get into the habit of doing this in the morning and at night while lying in bed. Bend one leg at the knee. Tighten the thigh muscle of your affected leg and slowly raise it 6 to 10 inches off the floor. Hold for a slow count of five, then lower. Repeat 5 times with each leg every morning and evening.



**Straight-leg raise (sitting):** Get into the habit of doing this every time you sit down. Sit well back in the chair with a good posture. Straighten one leg, hold for a slow count to 10 and then slowly lower your leg. Repeat this at least 10 times with each leg. If you find you can do this easily, straighten and raise one leg, before holding for a count of 10. As you improve, try the exercise with light weights on your ankles and with your toes pointing towards you.



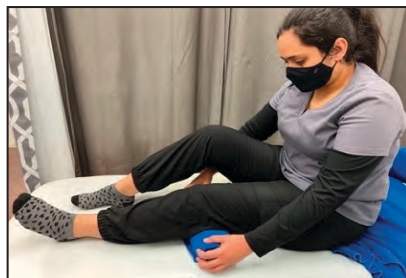


**Straight-Leg Raises (Prone):** Lie on the floor on your stomach with your legs straight. Rest your head on your arms. Tighten your glutes and hamstring muscles of the affected leg and raise the leg toward the ceiling as high as you can. Hold this position for 5 seconds. Lower your leg and rest it for 2 seconds. Repeat.



You should feel this exercise at the back of your thigh and into your buttock. As the exercise becomes easier to perform, gradually increase the resistance by adding an ankle weight. Begin with a 5 lb. weight and gradually progress to a greater level of resistance, up to a 10 lb. weight.

**Quads over a roll:** Keeping the knee in contact with the towel, straighten the affected leg and slowly lift the heel off the surface over 2 seconds. Hold the leg as straight as it will go for 5 seconds then SLOWLY lower down over 2 seconds. Hold the leg as straight as it will go for 5 seconds then SLOWLY lower down over 2 seconds. You can use a resistance band or a towel to lift your feet above the floor or bed.



**Seated knee extension with resistance:** Sit on a firm chair (one where the seat is quite high above the ground if possible). Tie an ankle weight to work the muscle more and slowly straighten the knee until it is fully straight. Hold this position for 5 seconds and then lower slowly.

**Progression:** Use the appropriate level of resistance band red through to black or increase the ankle weight.



**Sit to stand (without using hands):** Sit in a chair of standard height and firm seat. Place the chair back against a wall or close to it. Slowly stand without using your hands to help. Start by leaning forward over your toes. As your buttocks lift, bring your hips under your body and straighten up. Sit back down slowly.



**Variations**

- Use a lower chair to make it more challenging.

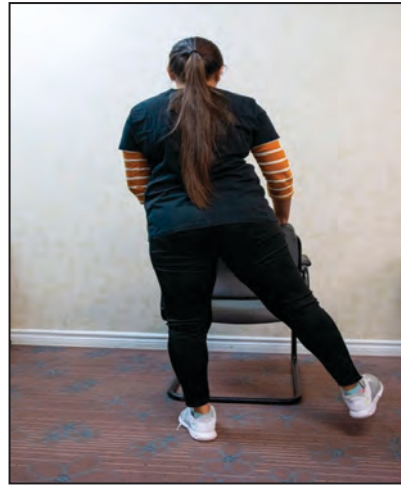
- Hold for 3 seconds with the buttocks just off the chair without touching down.
- Increase the amount of body weight taken through the arthritis knee.

**Standing leg side raises:** Use the back of a chair or a wall to provide support.

Maintain a good upright posture with shoulders and hips both facing forwards throughout. It is very easy to allow yourself to twist around as you do the exercise, but this will mean the wrong muscles are being exercised.

Keeping body still and knee straight, lift arthritis leg out sideways leading with the heel. Do not allow the leg to turn or swing forward, keep the knee and toes pointing forward and your heel slightly behind you as you perform the movement.

Hold for 5 seconds and then lower slowly.



**Step-ups and step-downs:** Place your arthritis leg onto a stepper in front of you. Be safe. Use a hand support (back of chair or a wall) for balance. Step up onto the step slowly, carefully controlling the movement of your arthritis knee. Your weight should be on your arthritis leg through the whole exercise. Concentrate on the alignment of your arthritis leg hip, knee and ankle. Position your knee over your foot throughout.



**STEP DOWN:** Stand on the step. Taking care to control the movement of your arthritis knee, reach your other foot towards the floor in front. If you can reach the floor, just touch it lightly. Return to the starting position. Your weight should be on your arthritis leg through the whole exercise. Concentrate on the alignment of your arthritis leg hip, knee and ankle position your knee over your foot throughout.



**Crab walk with resistance band:** Place a loop of a resistance band around both thighs just above the knees, so that there is tension when ankles are separated 10 cm. Slightly bend both knees. You should stand facing a table, a kitchen bench, or a wall which you can reach if you lose balance. Select the appropriate level of resistance band to vary resistance. Step sideways against the pull of the resistance band. Do not twist or turn your body or legs. Your feet must point forwards while you are stepping sideways.



**Calf raises:** Stand holding onto the back of the chair. Slowly rise onto toes. Hold for 5 seconds. Slowly lower.

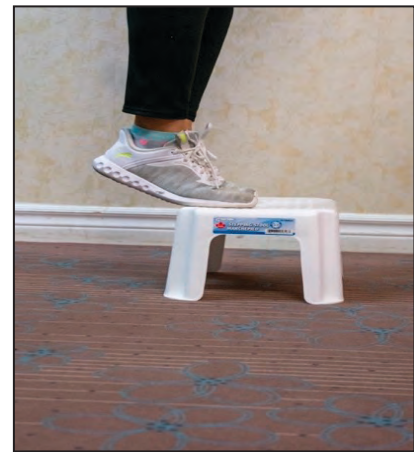
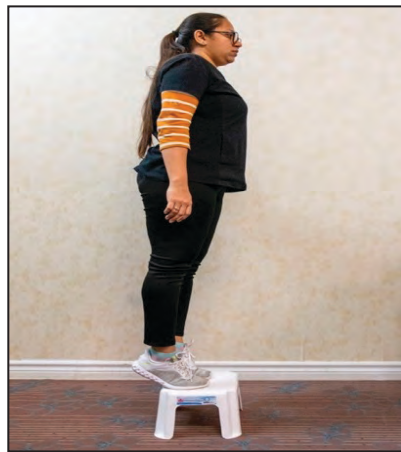


## Progressions

- Single heel raises



- Raises from the edge of a step



**Wall Squats:** Stand near a wall. Lean your trunk and buttocks against the wall and keep your back straight. Step feet away from the wall until your feet are approximately 30 cm (1 ft) away from the wall. Stand with feet apart. Slightly turn your feet outwards. Keep your trunk and buttocks against the wall and keep your back straight. Slowly slide down the wall (as if to sit), keeping your trunk and buttocks in contact with the wall as you do. Keep your knees moving over your toes. Stop when your knees are bent to about 60 degrees (or less if it is painful). Slowly slide back up keeping your trunk and buttocks in contact with the wall as you do.



## Food & Nutrition:

Many people find that making changes to their diet can help with osteoarthritis symptoms, which include pain, stiffness, and swelling. Some foods have anti-inflammatory capabilities which can help reduce symptoms while other foods may amplify them.

Including specific foods in the diet can strengthen the bones, muscles, and joints and help the body to fight inflammation and disease.

People with osteoarthritis can try adding the following foods to their diet to ease their symptoms:

Vitamin C, Vitamin D, Omega 3, Beta carotene, Turmeric, garlic, ginger, olive oil, green leafy vegetables and nuts.

**Vitamin C:** Lack of vitamin C intake in the diet leads to the erosion of cartilage. Main food sources are tropical fruits such as guava, papaya, and pineapple. Citrus fruits such as oranges and grapefruit, cantaloupe, Strawberries, Kiwi, and raspberry.

Cruciferous vegetables such as flower, broccoli, turnips, Paprika and tomatoes.



**Vitamin D:** Protects cartilage from corrosion, reduces the likelihood of narrowing distances between joints. The body needs to be exposed to sunlight to take advantage of vitamin D found in seafood such as salmon, sardines, shrimp, eggs and vitamin D-fortified milk.



**Beta-carotene:** prevents and protects cartilage erosion. And the food sources are: Sweet potatoes, Spinach, some cruciferous vegetables such as green cabbage and Greek lettuce. Pumpkins, cantaloupe, Parsley, Apricot, Mint leaves, tomatoes and Asparagus.



**Omega-3:** is found in high-fat fish such as salmon, tuna, sardines and mackerel. Omega-3 is an anti-inflammatory that prevents arthritis and cartilage erosion. 3-6 ounces of fish are recommended during the week to reduce the likelihood of arthritis and promote heart health.





**Turmeric:** Turmeric is an Indian food and contains a compound called curcumin, which studies have indicated is effective in reducing roughness and knee pain.



**Camel's eye nut/Walnut:** Walnuts are a great source of antioxidants, and they also contain plenty of useful minerals and vitamins. That includes protein, zinc, vitamin E, and fiber. Walnut oil might have ten times as many Omega-3 fatty acids as extra virgin olive oil, which is already on the list of osteoarthritis-preventing foods. Walnuts aren't the only nut with these benefits. Pistachios, almonds, pine nuts, and even peanuts are all equally good sources of these nutrients. Just remember to eat them in moderation, since they're also high in fat and calories.



**Oils:** There are some types of oils that reduce inflammation in addition to fish oil such as virgin olive oil, which contains the substance "oleocanthal" that reduces cholesterol and reduces inflammation.



**Broccoli:** Contains sulforaphane, which scientists have proven slows the progression of osteoporosis, as well as rich in vitamins C, K and calcium.



**Green Tea:** Green tea has many health benefits, including the ability to slow the progression of osteoarthritis. Whether you prefer cold or hot tea, green tea is loaded with antioxidants and anti-inflammatory properties that can help to reduce the speed at which cartilage is destroyed, as well as limit swelling and pain. Contains high levels of polyphenols that are resistant to any inflammation present in the body, especially arthritis.



**Garlic:** Garlic contains a compound known as diallyl disulfide, which inhibits the growth of enzymes that cause osteoarthritis and other joint and cartilage disease. Garlic has many antioxidant and anti-inflammatory properties, as well, which makes it a superfood when it comes to arthritis.



**Ginger:** Like most of the foods on this list, ginger contains components that reduce inflammation and pain caused by osteoarthritis.



### Recipes for food:

#### Recipe 1: Red beans Salad

**Ingredients:** ¼ cup boiled red kidney beans, drained, ¼ 1 cup boiled and drained pinto beans, ½ cup chopped red onion, ½ cup chopped red pepper, ½ cup chopped yellow pepper, ½ cup chopped cucumber, ½ cup chopped parsley.



**For the dressing:** ¼ cup olive oil, ¼ cup vinegar, 2 tablespoons lemon juice, 1 clove of minced garlic, 2 teaspoons ground cumin, 1 teaspoon ground coriander, ¾ teaspoon black pepper, ¾ teaspoon chili (optional), ¾ teaspoon salt

**Method:** In a bowl, mix all the vegetables. Then, put all the ingredients for dressing gradually. Stir the salad and mix it well. Top it with fresh parsley and serve it directly. It can be used as a side dish with soup or main course.



## Recipe 2: Tuna Salad

**Ingredients:** 1 cup chopped arugula, 2 cups of chopped salmon or tuna, 1 cup chopped tomatoes, ½ cup of colored capsicum, ¼ cup of black olives, 2 tablespoons of chopped parsley, ½ cup of chopped red cabbage



**For dressing:** 1 tablespoon olive oil, 1 clove of minced garlic, 2 teaspoons lemon juice, Pinch of chili, Pinch of salt.

**Method:** In a bowl, mix all the vegetables. Then, put all the ingredients for dressing gradually. Stir the salad and mix it well. Top it with fresh parsley and serve it directly. It can be used as a side dish with soup or main course.





**Recipe 3: Green Greek salad**

**Ingredients:** 2 cups of medium chopped tomatoes, 2 cups of chopped cucumbers, 1 cup medium chopped lettuce, 1 cup chopped onion, ½ cup chopped white cheese, 1 cup chopped sweet green pepper, few slices of black olives, ½ cup of lemon juice, pinch of salt, 1 tablespoon of vinegar, 2 tablespoons of olive oil, 1 tablespoon of thyme.



**Method:**

Put all the ingredients together, and stir them except for the white cheese, onions, and black olives. Add salt, olive oil, thyme, vinegar, and lemon juice and mix well. Top the salad with cheese, onions and black olives while serving. It can be used as a side dish or main course.



**Recipe 3: Green Juice**

**Ingredients:** 1 orange, 2 cups of pineapple, a cup of chopped avocado, 2 sticks of celery, 2 pears, lemon juice, a piece of ginger, 2 spoons of turmeric, a little black pepper, half a spoon of honey



**Method:** take all the ingredients and blend it in a blender. Don't use the juicer machine as we want to keep the pulp for good results. Pour in a glass and consume fresh.



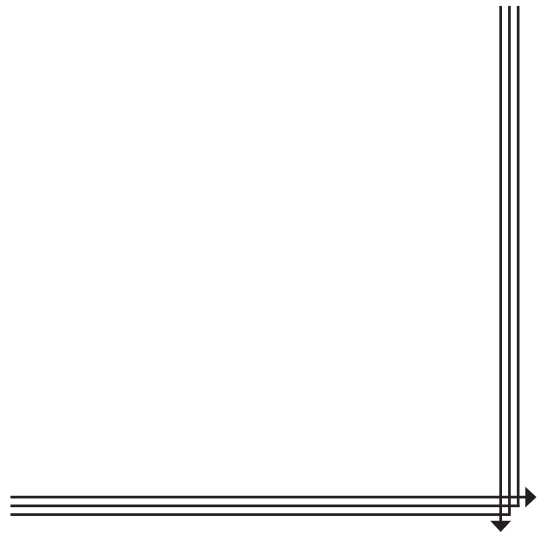
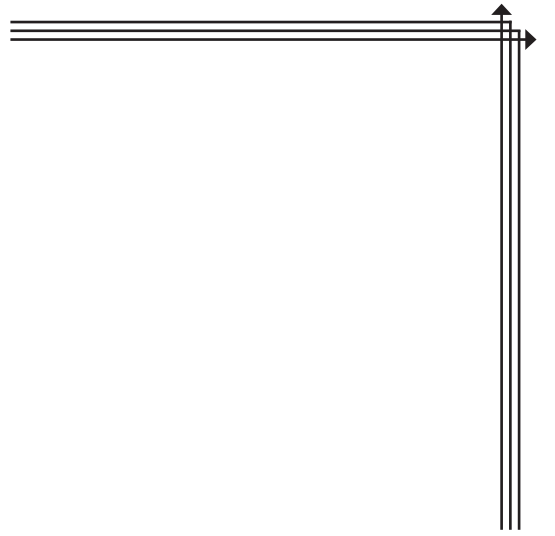
#### Recipe 4: Hot Juice

**Ingredients:** 5 medium chopped tomatoes, half a lemon, a bunch of parsley mixed with dill, a slice of garlic, and a glass of water (can be replaced with tomato juice)



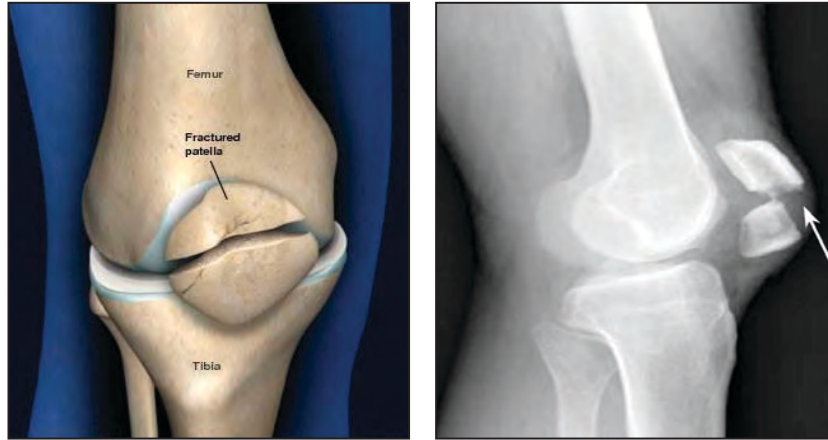
**Method:** take all the ingredients and blend it in a blender. Don't use the juicer machine as we want to keep the pulp for good results. Pour in a glass and consume fresh.





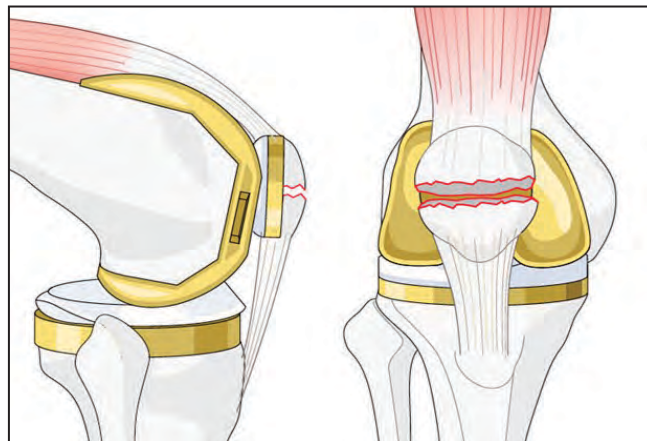
## CHAPTER 7: REHABILITATION FOR PATELLAR FRACTURE

A patella fracture is a break in your kneecap, the bone that covers your knee joint. It's usually caused by a traumatic injury, such as a fall or a blow to your kneecap. A patella fracture can be simple or complex. Some fractures require surgery to repair. Recovery can be long, and side effects are common.



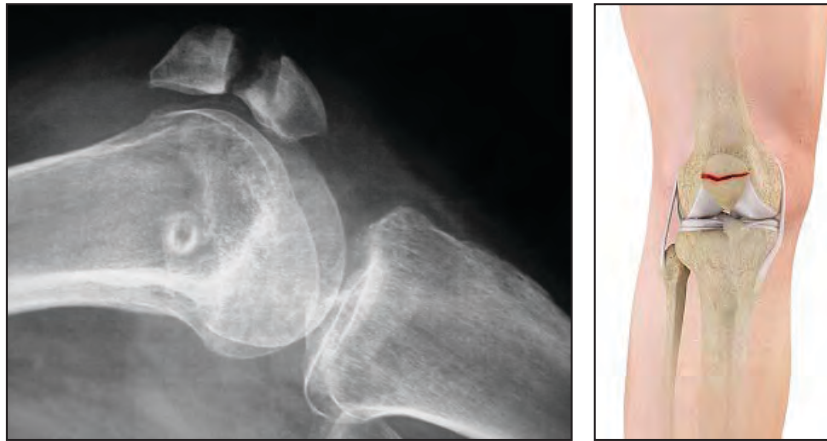
### What are the different types of patella fracture?

**Stable patella fracture:** In a stable fracture, also called a “nondisplaced” fracture, the broken pieces of your bone remain essentially in the right place. They may still be connected to each other, or they may be separated by a millimeter or two. This type of fracture usually heals well without surgery. If your healthcare provider determines that you don't need surgery, they will immobilize your knee in extension with either a knee immobilizer, a hinged knee brace or a cast. You'll be allowed to bear as much weight as you're comfortable.

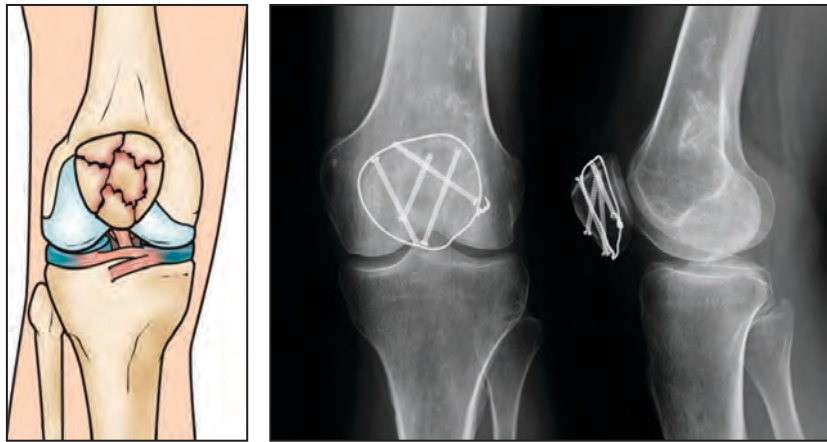


**Displaced patella fracture:** In a displaced fracture, your broken bone pieces have been displaced from their correct position and don't line up with each other as they should. These pieces often need to be fixed with surgery in order to heal and allow your knee to function properly.

**Transverse patella fracture:** A transverse fracture is a fracture where your patella breaks into two pieces. These breaks are often fixed with surgery. Various surgical techniques can be used to fix these injuries. Your surgeon will decide which is best for you.



**Comminuted patella fracture:** In a comminuted fracture, your bone has shattered into three or more pieces. A comminuted fracture can be stable or unstable. When a comminuted fracture is unstable, some of your bone pieces may be too small to reconnect and may need to be removed in surgery.



**Open patella fracture:** In an open fracture, your skin over your bone has been broken. Either your bone pieces themselves have penetrated through your skin, or something has penetrated your knee from the outside. An open fracture requires prompt treatment with antibiotics and surgery to thoroughly clean the wound. Open fractures tend to have a higher rate of infection, so it's important to seek urgent medical treatment. Your surgeon will decide which surgical treatment will best fix your fracture.





## What causes the patella to fracture?

A patella fracture is usually caused by a direct blow to your kneecap, such as in a fall, from a sports injury or from a car accident. More rarely, it can also be caused by a sudden muscle contraction in your knee.

## Signs and symptoms of a fractured patella

- Pain.
- Swelling.
- Bruising.
- Palpable patellar defect (a change in your kneecap that you can feel through your skin).
- Inability to straighten your leg.
- Inability to raise your extended leg.
- Inability to walk.

## Diagnosis

### Physical Examination

After discussing your symptoms and medical history, your doctor will examine your knee. The edges of the fracture can often be felt through the skin, particularly if the fracture is displaced.

During the exam, your doctor will check for hemarthrosis. In this condition, blood from the fractured bone ends collects inside the joint space, causing painful swelling. If you have a large amount of blood in your knee, your doctor may drain it to help relieve your pain.

Your doctor will order x-rays from a number of different angles to look for a fracture and to view the alignment of the bones.

## Treatment

### Nonsurgical Treatment or Conservative management

If the pieces of bone are not out of place (displaced), you may not need surgery. Your doctor may apply a cast or splint to keep your knee straight and help prevent motion in your leg. This will keep the broken ends of bone in proper position while they heal.

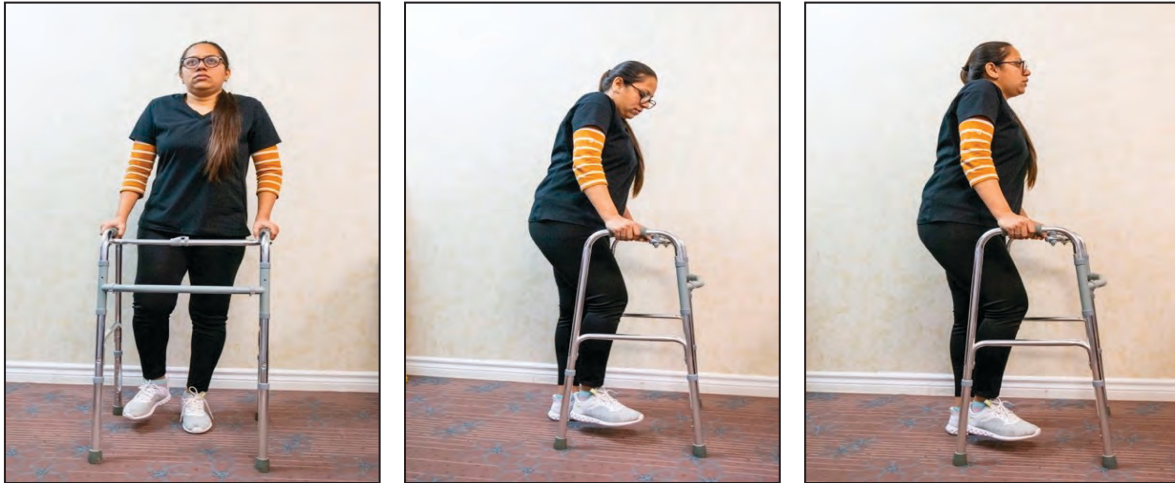
Un-displaced fracture (mostly vertical, horizontal and comminuted fractures) with extensor mechanism in place.

- Fracture immobilized with POP cylinder cast or range of motion brace locked in extension (4-6 weeks):
- As healing takes place, knee flexion can gradually be increased.
- Range of motion brace must be worn until union (on X-rays) and clinical signs of healing (not tender on palpation) are present.
- Crutch walking 6-8 weeks.
- Rehabilitation.



**Using a Walker:** Once you can stand, you'll start using a walker. Push your walker a few inches in front of you. Keeping your back straight, lean on the walker so it supports your weight. Step into the center of the walker with your operated leg, being careful not to twist your leg.

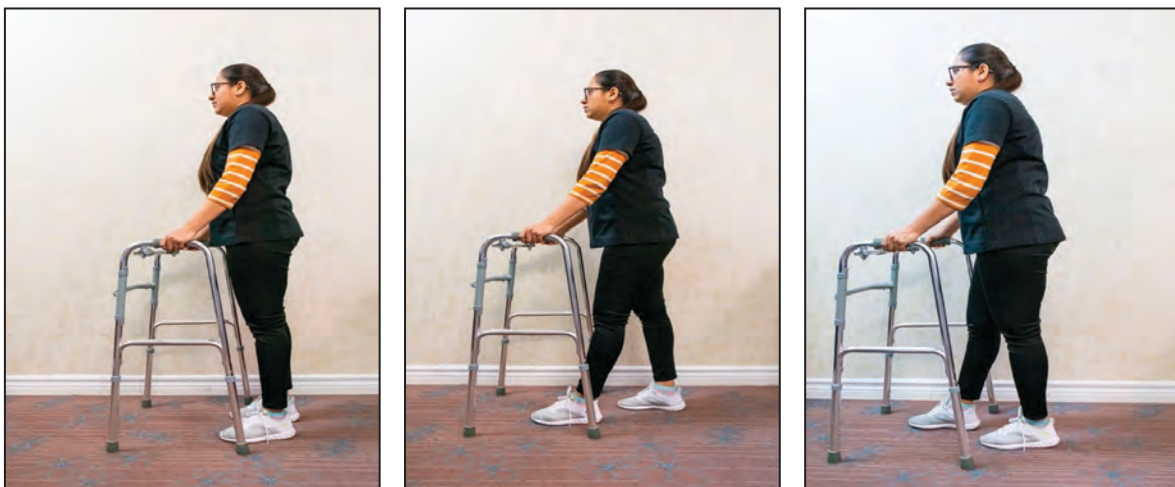
**Non-Weight Bearing walking:** Non-weight-bearing means that no weight can be placed on the operated leg. Since you are not able to bear any weight on the leg, an assistive device, such as a walker or crutches, will be necessary for you to walk. When walking with your walker or crutches, keep your affected knee bent and keep your toes off the floor.



**Partial Weight Bearing:** You are allowed to put a maximum of 50% of your body weight through the operated leg.

**Sequence:** 1. Walker 2. Operated Leg 3. Non-operated leg

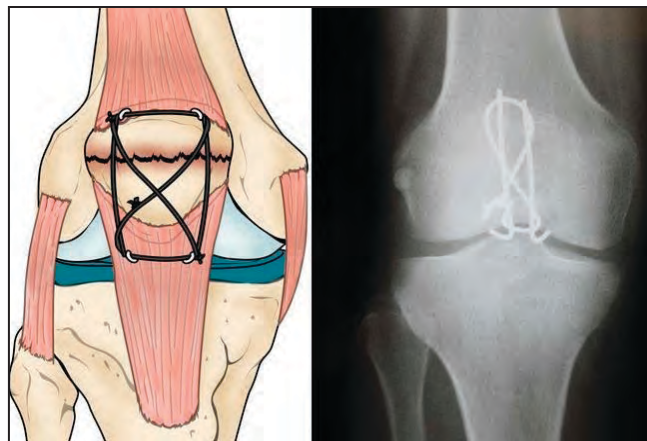
Keep your head up. Advance the walker about an arm's length away. Step halfway into the walker with your operated leg, followed by your non-operated leg. Stand up tall and straight. Wear good supportive footwear with non-slip soles whenever possible. As you get more comfortable using the walker, you may be able to move it as a step.



**Using crutches:** With crutches in place, lean on your hands. The top of the crutch should be just below, not in, the armpit. Move your operated leg and crutches forward at the same time. Keep the operated leg lined up with the crutches. Look straight ahead, and step through the crutches with your good leg.



**Surgery:** If your bone pieces are displaced, they will need to be put back together in surgery. Bone pieces that are too far apart from each other have a hard time coming back together on their own because the strong muscles attached to your knee tend to pull the bone pieces apart. Orthopedic surgeons can use screws, pins, plates or wires to reconnect your bone pieces. If your pieces of bone are too small, your surgeon may remove them. They may also need to reattach your tendon to your bone.



**Rehabilitation:** Physical therapy will be very important to restore the mobility of your knee. This injury can cause stiffness and muscle weakness, and you may need to retrain your knee to move as it did prior to your injury. Physical therapy will be focused on strengthening, stretching and range-of-motion exercises.

### Immediate Postoperative Phase 0- 6 weeks

#### Goals:

- Restore full passive knee extension.
- Diminish pain and joint swelling.
- Restore patellar mobility.
- Initiate early controlled motion.

**Brace:** Drop locked brace locked at 0degree extension with compression wrap. Sleep in brace. Wear at all times. Take immobilizer off only for physical therapy sessions.



**Weight bearing:** Weight-bearing as tolerated with the knee locked in extension.



- Range of motion: Passive knee flexion 0-30degree.
- NO Active knee flexion.
- Ice and elevation: for 20 minutes of each hour.



**Therapeutic Exercises:** Ankle pumps, Isometric quadriceps, hamstring, adductor, abductor strengthening exercises.

### 1. Ankle pumps

The foot and ankle should be actively “pumped” up and down 10-20 times every hour to promote circulation and decrease swelling.



## 2. Isometric Quad sets

1. Lie on your back with your legs straight. You can place a small roll under your knees.
2. Pull your toes up, push the back of your knee down, tightening your thigh muscles. Gently squeeze your buttock muscles as well.
3. Hold for a count of 5, then relax.
4. Start with 10 repetitions. Gradually progress to 30 repetitions, 2 times per day.



## 3. Isometric hamstring sets in supine

- Lie on your back with your legs bent only till pain free range i.e. (0-30 degrees)
- Place one heel against the floor.
- Push the heel towards the floor as if trying to bend your knee further.
- No movement should occur, but the hamstring muscles should tense.
- Hold the tension for a moment and then relax.



## 4. Isometric hip adduction:

Lie on your back with a ball or a towel roll between your ankles.

Keeping your legs straight, tighten your abdominal muscles and squeeze the ball with your legs.

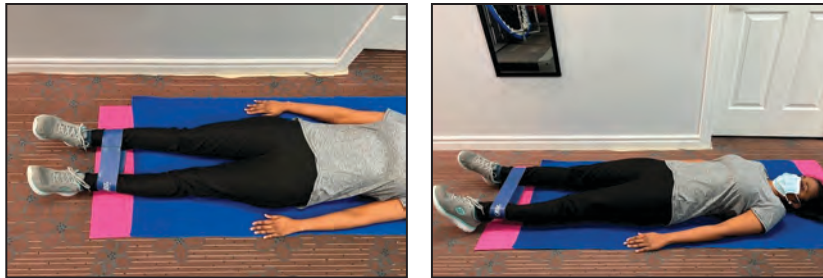
You should feel the muscles down the inside of your thighs tighten.

Hold this position, ensuring you breathe throughout.



## 5. Isometric hip abduction:

Tie an exercise band around your ankles, and gently pull your legs open to create tension in the band. This exercise strengthens the outside of your thighs and buttock muscles.



## Protection Phase (Weeks 2 to 6)

### Goals:

- Control forces on healing tendon.
- Gradually increase knee flexion.
- Restore full passive knee extension.
- Restore patellar mobility.

### Week 2 to 3

- Brace: Continue use of locked brace (6 weeks)

Sleep in brace (4 weeks)

Weight bearing: Weight bearing as tolerated (usually 50-75% Body weight).

- Range of motion: PROM knee flexion 0-45 degrees

No active knee flexion

### Full passive knee extension:

- Sit on a chair and place your heel on the edge of a stool or chair.
- Relax the thigh muscles.
- Let the knee sag under its own weight until maximum extension is achieved.



**Exercises:** Electrical muscle stimulation to quadriceps muscles.

Continue doing the mentioned above exercises i.e.

- Quad sets.
- Ankle pumps.
- Isometric Hip abduction/adductions.
- Electrical muscle stimulation to quadriceps during active contractions.

### **Patellar mobilization:** Superior/inferior and medial/lateral

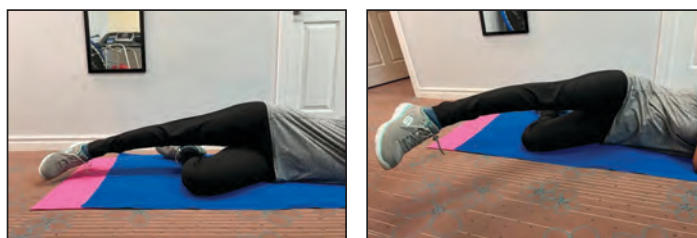
You can do this exercise only if you have un-displaced fracture with no open wounds. This exercise is done by simply pushing the patella up and down and side to side.

- Sit upright with your legs straight out in front of you.
- Grip your kneecap (patella) between your thumb and fore finger and gently move it from side to side and up & down.
- It may feel odd initially and there may not be much movement.
- Repeat 10 times, 3 times a day



### **Gravity eliminated SLR**

You can do a single leg raise in the side lying position. Lie down on your side with your spine straight and your good leg on the bottom with your knees flexed. Now contract your front thigh muscles of your fractured leg keeping your knee straight, pull your legs towards your chest. Go back to the starting position and repeat this exercise for 10-15 reps.



- \* Ice and elevation: Continue ice, elevation and compression.

### **Week 4:**

- Continue all exercises listed above.
- Weight bearing: Progress to one crutch (at 28 days).
- PROM: 0-75degrees – 90degrees.
- NO Active knee flexion.
- Exercises:

### **Switching to one crutch:**

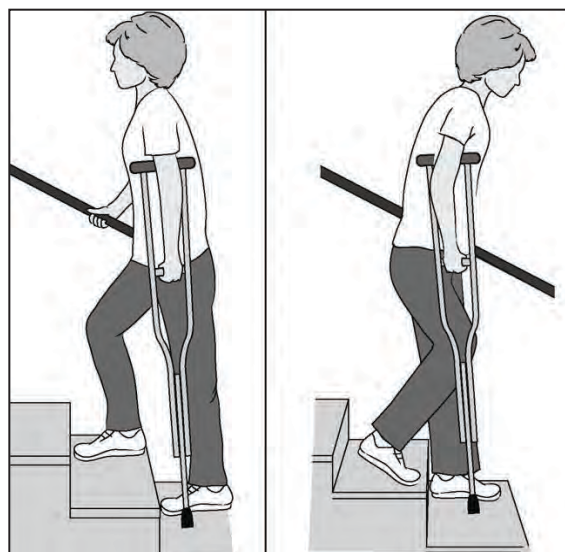
Progressing to one crutch can be more convenient at times because it allows you to move around your environment a bit easier and have an arm free for other activities, such as carrying groceries. Using one crutch may also be easier while negotiating stairs, as long as there is a railing for support. Keep in mind that switching to a single crutch forces you to put some pressure on your injured leg and it may increase your risk of falling.

- Place the crutch under the arm opposite your injured leg.
- As you prepare to walk, move the solitary crutch about 12 inches forward and also step forward with your injured leg at the same time. Then, step past the crutch with your healthy leg while firmly grabbing the hand grip with your outstretched arm.
- To move forward, keep repeating this same sequence: stepping with the crutch and injured leg, then stepping past the crutch with the healthy leg.
- Remember to balance yourself by keeping most of your weight on the crutch when stepping with your injured leg.



### Walking up and down the stairs

- If there is no stair rail, then either use both crutches, take the elevator, or get assistance from someone.
- Grab the railing with the hand on your injured side. As you start to climb the stairs, keep the crutch underneath the arm of your uninjured side and grab the railing with the hand from your injured side.
- Put pressure on the railing and the crutch on the opposite side at the same time and then step up with your uninjured leg first.
- Then bring your injured leg and the crutch up beside your uninjured leg, onto the same step.
- Repeat this pattern until you get to the top of the stairs but be careful and take your time.



### Coming down the stairs

- Remember the pattern for walking down the stairs is opposite to that of walking up stairs.



- Grip the railing firmly and place your injured leg on the lower step first, followed by the crutch on the opposite side and your uninjured leg. Don't put too much pressure on your injured leg, though, because a sharp jolt of pain may make you nauseated or dizzy.
- Always maintain balance and don't rush yourself. Follow the pattern of injured leg, then healthy leg all the way down to the bottom of the stairs.

**Massage:** Light massage stimulates blood flow (nutrient and oxygen exchange), reduces inflammation, and enhances fibroblast (healing cells) production at the fracture site. Massage reduces the chances that stiff tissue sets in around the injury site. The more mobile the tissue, the greater flexibility that's maintained for when your cast is removed.

Light massage, also known as lymphatic massage or medical massage cupping, produces a gentle stretch to the skin without causing bone movement. Therefore, it can be applied over an area where a ligament, tendon, or bone needs to be splinted in order to heal in place. Massage is an effective treatment to reduce scarring after injury. Scarring is the natural healing process of damaged tissues. The body produces collagen fibers and sends them to repair around an injury site.

Scarring can be restrictive and aggravate to cause pain. Massage uses specialized techniques to loosen, break down and realign collagen fibers. Reduced scar tissue increases normal function of soft tissues, decreasing pain and tightness.

### Massaging around the knee joint

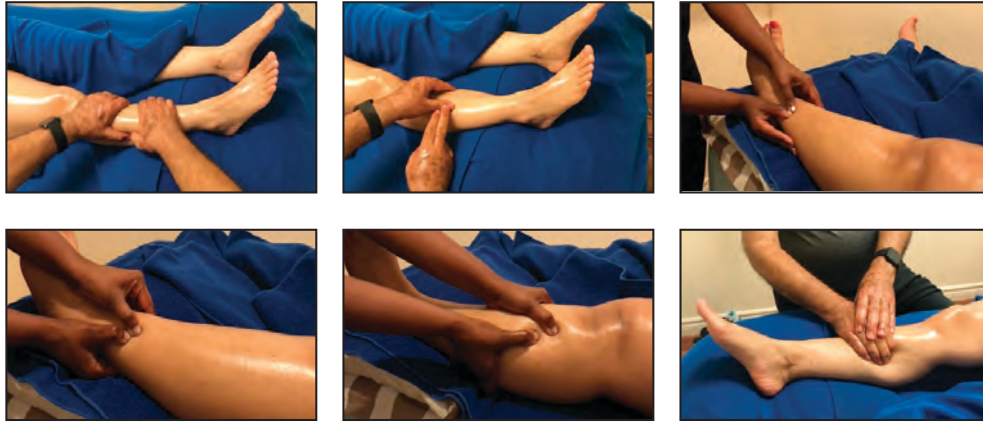


### Posterior aspect of the knee and calf massage





### Anterior leg massage



### Massaging thigh muscles



### Oils that work for fractured bones:

#### First Recipe for the oil

Nutmeg, marjoram, cloves, lemons, olive oil:

3 teaspoons nutmeg

5 teaspoons of marjoram

10 teaspoons lemon peel or dry orange peel

2 teaspoons cloves

1/2 cup olive oil



### Preparation of the oil

Take all the seeds and lemon peel and grind with the coffee grinder until it becomes like powder and then add them all into olive oil and mix well and use 2-3 times. And put in an airtight container, away from the heat and the sun, preferably in the refrigerator.



### Benefits of this oil:

Relieves pain

Activates circulation

Activates nerves

Reduces inflammation

Nourishes muscles.

### Second Recipe for the oil

Celery, turmeric, basil & honey

2 teaspoon celery seeds

3 teaspoons honey

2 teaspoons basil

2 teaspoons turmeric



### Preparation of the oil

Grind turmeric, celery seeds and basil like powder, add honey, then add to olive oil and mix well. And put in an airtight container,



away from the heat and the sun, preferably in the refrigerator.

### Benefits of this oil:

Relieves pain

Activates and stimulates nerves

Activates circulation

Nourishes muscles

Reduces inflammation.

### Third recipe for the oil

Mint, ginger, thyme, black pepper

4 teaspoons mint

5 tablespoons ginger

5 tablespoons black pepper

3 teaspoons wild thyme

1 cup olive oil



### Preparation of the oil

Mix the material and grind it together, then add it to olive oil and place in an airtight container, away from the heat and sun and in the fridge.



### Benefits of this oil:

It stimulates nerves.

Activates circulation and relieves pain

Nourishes muscles

Reduces inflammation.

### Fourth Recipe for the oil

3 teaspoons basil

5 teaspoons devil's claw

3 tablespoons fennel

1 cup olive oil



## Preparation of the oil

Grind the material in a coffee grinder, then add olive oil and use 2-3 times a day. Then wipe and place in opaque bottles or cover the bottle with a dark color cloth. Put the bottle in a dark place or in the refrigerator.



## Benefits of this oil:

- Relieves pain
- Relaxes nerves
- Nourishes muscles
- Activates circulation
- Reduces inflammation

## Best Essential Oils for Fractured Bones

- Essential oils have the potential to improve the blood flow and lymph flow in the area where the fracture has occurred.
- As the increased blood circulation, and flow will be helpful to carry nutrients and minerals, and further will heal the tissues around the fractured bones.
- These essential oils are good for inflammation and swellings and help to relieve the pain.
- It can warm up the affected area, and further can speed up the healing process to a greater degree.

## Peppermint Essential Oil

Peppermint essential oil is a good choice for bone healing if you have a bone fracture due to injury or accident. Peppermint essential oil contains robust therapeutic grade properties such as analgesic, anti-inflammatory, antispasmodic, etc. which makes it good for aches, pain, and inflammation. This is also good for producing calming and relaxing effects. And calm the spasms that cause muscle cramps. In the list of the essential oils for bone healing, peppermint is the best one.



## Ginger Oil

Ginger, an excellent antioxidant that helps reduce inflammation, and kill bacteria to heal infectious areas. Ginger oil is ideal for fractures, internal bleeding, and tissue damaged by pieces of broken bones. It also helps to improve circulation and fight the joint and muscle pains related to broken bones. Apply 2-3 drops to the inflamed area, or the bottom of the feet, 3 times daily.



## Lavender

Lavender is the topmost natural essential oil with an excellent range of medicinal properties. Lavender has analgesic, anti-inflammatory, antispasmodic properties. Lavender essential oil is the perfect one for bone healing and fracture. It can speed up the healing process and reduce inflammation. This natural essential oil is the perfect one for improving the mood and reducing the pain.



**Frankincense:** Boosts the production of collagen which helps the bones and the tissue around the fracture heal faster and reduce the risk of an infection. Frankincense can also help reduce inflammation and minimize scarring.



**Clove:** oil makes an ideal natural pain-killer due to its anti-inflammation, antispasmodic and analgesic properties. It is thought to work by blocking nerve signals from sending the message of pain from the body to the brain, thus giving the user a break from pain.



## Cypress oil:

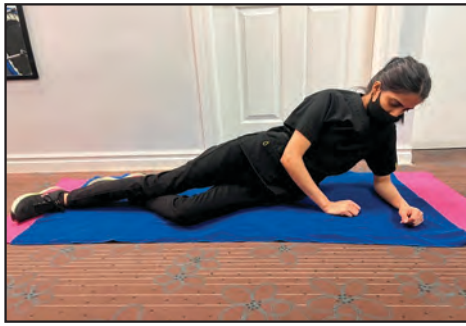
which is an anti-spasmodic known to improve circulation and reduce fatigue and stress. Cypress oil helps support the delivery of oxygen and nutrient rich blood to the site of injury. Formulated to support healthy circulation to deliver oxygen and nutrient rich blood to the body and the brain, while simultaneously carrying toxins and waste away from the cells to be eliminated. It may help open the vasculature to allow for optimal blood flow to both carry healing oxygen and nutrients to cells and allow the injured bone to heal faster.



## Week 4 Exercises

### Hip abduction/adductions

Lying on your side, with the lower leg bent. Start by rotating your top leg toes so they are pointing towards the ceiling. While keeping your knee straight, tighten the front thigh muscles on your top leg and lift the leg away from the other leg. Try to hold the end position for 5 seconds before slowly returning your leg to the starting position. Do 3 sets of 10.



## Hip Adduction

Lying on your side on a comfortable firm surface. Remember to keep your back straight for this exercise. You can use your arms for balance during this exercise.

1. Start by crossing your upper leg over your lower leg.
2. While keeping your knee straight, slowly raise your lower leg toward the ceiling. (You will feel your inner hip muscles tighten)
3. Try to hold the end position for 5 seconds before slowly returning your leg to the starting position

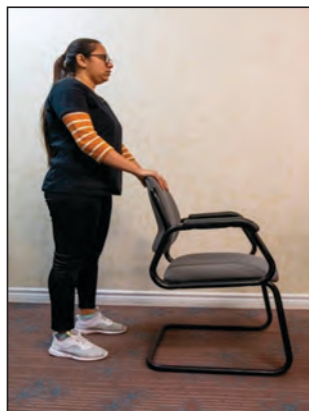
This exercise should be performed on both legs.

Initiate mini squats (0-45 degree).



## Mini squat or chair squat

1. Stand in front of a chair
2. Lower into a squat by bending at the hip. Do not let your knees come over your toes.
3. Lower down to half squat position using the support of the chair and then go back to original position.
4. Do 3 sets of 10 repetitions.



Initiate weight shifts

## Side to Side Weight Transfers

Stand facing kitchen sink or railing

Place feet hip-width apart

Shift your weight fully side to side onto each leg

Hold each position for 5–10 seconds Repeat several times daily.



Initiate proprioception drills.

## Proprioception

This is regaining awareness of your joint position by re-educating the leg with balance exercises.

## Single-leg Stance

Stand on your operated leg. Try to maintain your balance for one minute. Keep your upper body, hips and arms still and in alignment.



## Single Leg Balance

1. Use a chair or counter for support.
2. Lift one leg off the floor, maintaining your balance.
3. Try to hold the position for 5 seconds to start, work up to holding the position for 30 seconds.
4. Do 10 repetitions on each leg.

Progression: once you can stand without holding on, progress to standing on an uneven surface such as a folded mat, a wobble board or a bosu ball.





Progress to: Do the above exercise with your eyes closed standing on an uneven surface like a mat or a pillow. You try to stand and maintain your balance on your fractured leg and good leg bent at knee on a folded mat with closed eye.



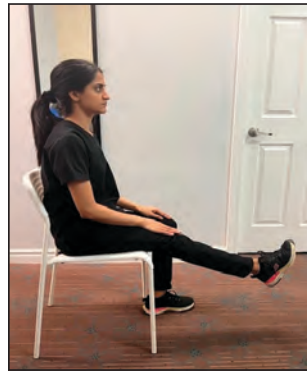
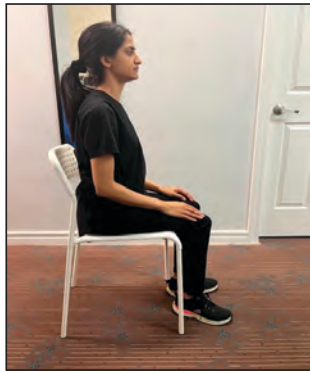
### Weeks 5-6:

- Discontinue use of crutch at 5 weeks post op
- Brace: Unlock brace for ambulation at 6 weeks
- Range of motion: AROM, AAROM
- Week 5: 0-90-100 degree
- Week 6: 0-115 degree
- Exercises: Initiate pool exercise program



### Active knee extension 90-0 degree

Sit on a chair with your feet flat on the ground. Now slowly and in a controlled way try to extend your knee to a range till it's pain free. Hold the position for 5 seconds and come back to the starting position. Repeat this for 10-15 reps.



- Multi-angle isometrics knee extension.
- Continue all exercises listed above.
- Continue ice, compression and elevation as needed.



- Initiate SLR flexion:  
Lying on your back, tighten your thigh muscle while keeping your knee straight and lift your leg up, till it is pain free. Hold the leg there for 5 seconds and then return to its original position. Perform exercise 5 -10 times holding each contraction for 5 secs. Progress to 30 times holding each contraction for 5-10 secs.



### Weeks 7-10:

Brace: Use post op brace unlocked for ambulation until 7-8 weeks.

(or until determined safe).

Range of motion: 0-115/125 degree

Discontinue sleeping in brace

**Exercises:** Gradually increase muscular strength

**Straight leg raises flexion:** Continue doing SLR as mentioned above.

### Hip abduction/adduction:

Lying on your side, with the lower leg bent. Start by rotating your top leg toes so they are pointing towards the ceiling. While keeping

your knee straight, tighten the front thigh muscles on your top leg and lift the leg away from the other leg. Try to hold the end position for 5 seconds before slowly returning your leg to the starting position. Do 3 sets of 10.



### Hip Adduction

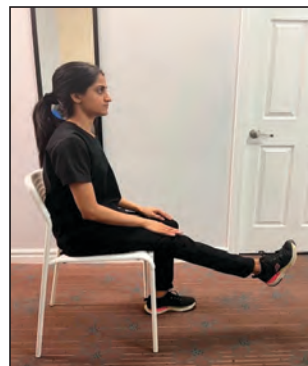
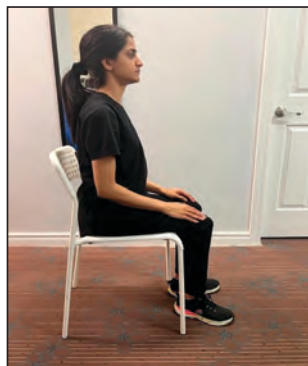
Lying on your side on a comfortable firm surface. Remember to keep your back straight for this exercise. You can use your arms for balance during this exercise.

1. Start by crossing your upper leg over your lower leg.
2. While keeping your knee straight, slowly raise your lower leg toward the ceiling. (You will feel your inner hip muscles tighten)
3. Try to hold the end position for 5 seconds before slowly returning your leg to the starting position

This exercise should be performed on both legs.



**Knee extension 90-0:** Sit on a chair with your feet flat on the ground. Now slowly and in a controlled way try to extend your knee to full range, if full range is not possible up until now you can do to the range which is comfortable for you. Hold the position for 5 seconds and come back to the starting position. Repeat this for 10-15 reps.

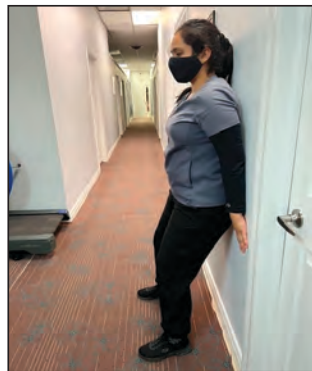


### Partial squats with chair:

Stand in front of a chair and slowly squat with equal weight on each leg. Bend your knees from 0° to a maximum of 45° of flexion, making sure your knees do not move beyond your toes. You can start doing the squats using support from a chair or a wall and then progress to unsupported. Start with one set of 10 reps. Hold for 5-10 seconds. Slowly come back up. Relax. Increase the number of reps as your strength increases, up to 30 reps x 15 secs hold.

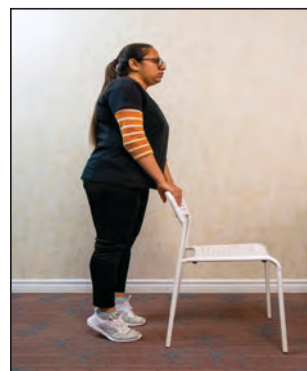


**Wall squats:** Stand near a wall. Lean your trunk and buttocks against the wall and keep your back straight. Step a feet away from the wall until your feet are approximately 30 cm (1 ft) away from the wall. Stand with feet apart. Slightly turn your feet outwards. Keep your trunk and buttocks against the wall and keep your back straight. Slowly slide down the wall (as if to sit), keeping your trunk and buttocks in contact with the wall as you do. Keep your knees moving over your toes. Stop when your knees are bent to about 60 degrees (or less if it is painful). Slowly slide back up keeping your trunk and buttocks in contact with the wall as you do.



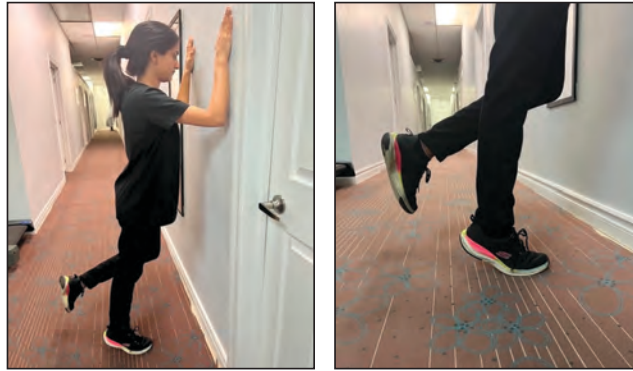
**Calf raises:**

Stand holding onto the back of the chair.  
Slowly rise up onto toes.  
Hold for 5 seconds.  
Slowly lower the heels to the ground.



Progressions

1. Single heel raises



**Hamstring curls (restricted ROM)**

Lying on your stomach, place a resistance band around your ankle and also have it attached to an anchor point. Bend your knee slowly 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. You can do the same exercise without placing the resistance band if it is uncomfortable for you.



**Proprioception drills**

Stationary Bicycle



Pool program



**Weeks 12-16:**

- Range of motion: Week 12: 0-125 degree

- Exercises: \*Continue all exercises listed above

Initiate lateral step-ups

### Lateral Step Up

1. Stand sideways next to a step with the operated leg on the bottom step.
2. Step up by straightening the knee of the operated leg.
3. Slowly lower the non-operated leg back to the floor by bending the operated knee.
4. Do 2 sets of 5 repetitions.

Progression: Place a resistance band around the knee of the operated leg.



### Initiate front step-downs

Starting position

- Stand on the step.
- Taking care to control the movement of your fractured knee, reach your other foot towards the floor in front. If you can reach the floor, just touch it lightly. Return to the starting position.
- Your weight should be on your involved leg through the whole exercise.
- Concentrate on the alignment of your involved leg – hip, knee and ankle – position your knee over your foot throughout.



Initiate backward lunges

Walking program

\*No sports!

### Light Activity Phase (Months 4-6)

Goals: Enhancement of strength, endurance

Initiate functional activities

Improve tensile strength properties of tendon

Exercises: Continue strengthening exercises

Continue emphasis on eccentrics and functional exercises

- \*May initiate plyometrics (month 5)
- \*May initiate agility drills (lateral shuffle) month 5
- \*May initiate light running months 5-6

## Food & Nutrition

After a fracture, your bone needs to rebuild. The fracture healing process brings with it increased nutritional needs and giving your body proper nutrition for fracture healing can support speedy recovery. Here's how you can meet your nutrition needs for healing bone fractures:

### Protein

About half your bone's structure is made of this. When you have a fracture, your body needs it to build new bone for the repair. It also helps your body take in and use calcium, another key nutrient for healthy bones.

Eating 1-1.5 grams of protein per kilogram of body weight is recommended for optimal bone health. For example, if you weigh 150pounds you'll need about 68 to 100 grams of protein daily.

Good sources: Meat, fish, milk, cheese, cottage cheese, yogurt, nuts, seeds, beans, soy products, and fortified cereals.



### Calcium

Calcium is probably the first nutrient you think of when it comes to building strong bones. Calcium is an essential component of bone, and high calcium levels are linked to high bone mineral density. Having enough calcium available in your blood is important during the reparative (repair) phase of fracture healing. When new bone tissue gets woven together and having more calcium included in that structure means stronger healed bone.

General recommended quantity for adults get between 700 and 1,200 mg of calcium every day for strong bones.

Good sources: Foods high in calcium include dairy products like milk, yogurt, and cheese, green veggies such as kale, spinach, and broccoli, and calcium-fortified products such as milk alternatives (think almond milk, soy milk and coconut beverage) and orange juice.



### VITAMIN D

Vitamin D regulates your body's calcium absorption, so getting enough vitamin D is essential for making calcium available for use in fracture healing and building new bone. Your body produces vitamin D naturally from exposure to sunlight, so try to expose your skin for 15-20 mins daily. The recommended daily intake of vitamin D is 800 IU.

Food sources: Vitamin D can be found in a few food sources: egg yolks, oily fish such as salmon, trout and mackerel, and fortified milk, yogurt, and orange juice.



## Vitamin C

Collagen is a protein that's an important building block for bone. Vitamin C helps your body make collagen, which helps your bone fracture heal. You can get it from many tasty, fresh fruits and veggies. Aged or heated produce can lose some of its vitamin C, so go for fresh or frozen.

Good sources: Citrus fruits like oranges, kiwi fruit, berries, tomatoes, peppers, potatoes, and green vegetables.



## VITAMIN K

Vitamin K helps bind calcium to bone, so it's important for rebuilding healthy bone after fracture. The recommended minimum intake of vitamin K is 120 mcg for men and 90 mcg for women but getting more could be beneficial for preventing osteoporosis or accelerating bone fracture healing.

Food sources: You can find vitamin K in leafy greens and green vegetables like kale, collards, spinach, and broccoli.



## Iron

When you don't have enough healthy red blood cells you may heal more slowly after a fracture. Iron helps your body make collagen to rebuild bone. It also plays a part in getting oxygen into your bones to help them heal.

Good sources: Red meat, dark-meat chicken or turkey, oily fish, eggs, dried fruits, leafy green veggies, whole-grain breads, and fortified cereals.





## Potassium

Get enough of this mineral in your diet, and you won't lose as much potassium when you pee. There are lots of fresh fruits rich in potassium.

Good sources: Bananas, orange juice, potatoes, nuts, seeds, fish, meat, and milk.



Some of the food recipes that you can include in your meal plan to help heal your fracture faster are as follows:

### Recipe for Tuna Salad

**Ingredients:** 1 cup chopped arugula, 2 cups of chopped salmon or tuna, 1 cup chopped tomatoes, ½ cup of colored capsicum, ¼ cup of black olives, 2 tablespoons of chopped parsley, ½ cup of chopped red cabbage



**For dressing:** 1 tablespoon olive oil, 1 clove of minced garlic, 2 teaspoons lemon juice, Pinch of chili, Pinch of salt.

**Method:** In a bowl, mix all the vegetables. Then, put all the ingredients for dressing gradually. Stir the salad and mix it well. Top it with fresh parsley and serve it directly. It can be used as a side dish with soup or main course.



### Recipe for Greek salad

**Ingredients:** 2 cups of medium chopped tomatoes, 2 cups of chopped cucumbers, 1 cup medium chopped lettuce, 1 cup chopped onion, ½ cup chopped white cheese, 1 cup chopped sweet green pepper, few slices of black olives, ½ cup of lemon juice, pinch of salt,

1 tablespoon of vinegar, 2 tablespoons of olive oil, 1 tablespoon of thyme.



**Method:** Put all the ingredients together, and stir them except for the white cheese, onions, and black olives. Add salt, olive oil, thyme, vinegar, and lemon juice and mix well. Top the salad with cheese, onions and black olives while serving. It can be used as a side dish or main course.



### Recipe for Red beans Salad

**Ingredients:** ¼ cup boiled red kidney beans, drained, ¼ 1 cup boiled and drained pinto beans, ½ cup chopped red onion, ½ cup chopped red pepper, ½ cup chopped yellow pepper, ½ cup chopped cucumber, ½ cup chopped parsley



**For the dressing:** ¼ cup olive oil, ¼ cup vinegar, 2 tablespoons lemon juice, 1 clove of minced garlic, 2 teaspoons ground cumin, 1 teaspoon ground coriander, ½ 1 teaspoon black pepper, ½ 1 teaspoon chili (optional), ¾ 1 teaspoon salt

**Method:**

In a bowl, mix all the vegetables. Then, put all the ingredients for dressing gradually. Stir the salad and mix it well. Top it with fresh parsley and serve it directly. It can be used as a side dish with soup or main course.





## Recipes for soup

### Recipe 1: Bone broth soup



**Ingredients:** 1liter water, Bones of meat, fish, or poultry, preferably meat, 1 teaspoon of vinegar, Pinch of salt and pepper

**Method:** Boil the ingredients in a suitable size pot over medium heat for 4 to 6 minutes, stir occasionally.



After the water boils, reduce the flame and add Onions, Celery, Carrots, Parsley, Thyme and Garlic to add some flavors. Now cook with covered lid for 10 to 24 minutes.



After that, turn off the flame and let it cool down. Once cooled, filter the broth with a cheesecloth or strainer.



Add salt and pepper according to your taste and serve hot.

## Recipe 2: Mushroom soup



**Ingredients:** 1 cup of sliced potatoes, 1 cup of chopped carrots, 1 cup of chopped onions, 2 cups of chopped brown or white mushrooms, 3 tablespoons of olive oil, ¼ cup chopped parsley, 1 teaspoon of shredded ginger, 1 teaspoon of salt and pepper.

1 cup chopped pot.

**Method:** Sautee onions and carrot with butter in a suitable size pot over medium heat for 4 to 6 minutes, then add mushrooms to it and sauté it for another 5mins. Now add salt and pepper to it. Add 3 cups of lukewarm water or you can use vegetable broth instead and bring it to boil. Add the shredded ginger, parsley and serve.

## Recipes for juices that can help bone healing:

### Vitamin C juice

**Ingredients:** Half a banana, 1 orange, 2 pieces of kiwi, 2 teaspoons of flaxseed, 2 teaspoons of sesame, ¼ cup of pomegranate, 2 pieces of walnuts and almonds, 2 spoons of honey



**Method:** Mix all together and blend it in a mixture. Drink it in the morning.



### Benefits of this drink:

- It is a stimulant for the blood circulation.
- Stimulates the nerves.

- Reduces joint and respiratory infections.
- Lessens the pain.

### Recipe for Pumpkin juice

**Ingredients:** 1 cup of boiled red pumpkin, 1 cup of grapefruit, Quarter cup of lemon, ½ cup of cranberry, ¼ cup of cherries, ¼ teaspoon of turmeric, ½ teaspoon of flaxseed, ½ teaspoon of nigella, a teaspoon of cinnamon, 3 tablespoons of honey



**Method:** All materials are added to the mixer and drink two cups daily.



### Benefits of this drink:

- Activates blood circulation.
- It stimulates the nerves.
- Strengthens bones and relieves pain.
- It is a rich source of many vitamins, such as folic acid, vitamin B3, and vitamin B, which are important for the functioning of various vital processes in the body, and the work of enzymes.
- Maintains the integrity and functions of nerves, in addition, it contains important minerals, such as: potassium, calcium, copper, magnesium, and phosphorous.

### Recipe for Milk cocktail

**Ingredients:** Two cups of milk, 1 teaspoon of chia seed, 1 teaspoon of nigella, a teaspoon of flaxseed, a teaspoon of honey, 1 teaspoon of turmeric, a teaspoon of honey, 2 tablespoons of oats.



**Method:** Mix everything in a blender and drink daily.



### Benefits of drinking this mixture:

- Helps relieve pain.
- Repairs bones.
- Relieves osteoporosis.
- Relaxes muscles.
- Reduces inflammation.
- Stimulates blood circulation.

### Recipe for Green Juice

**Ingredients:** 5 medium chopped tomatoes, half a lemon, a bunch of parsley mixed with dill, a slice of garlic, and a glass of water (can be replaced with tomato juice)



**Method:** take all the ingredients and blend it in a blender. Don't use the juicer machine as we want to keep the pulp for good results. Pour in a glass and consume fresh.





### Benefits of this drink:

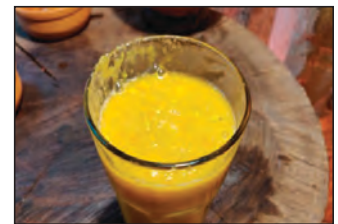
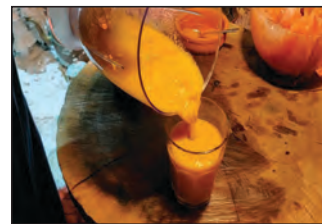
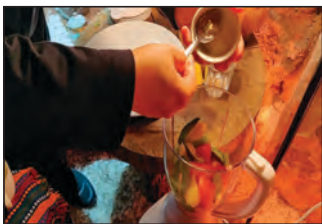
- Relieves pain, swelling and edema.
- Reduces arthritis.
- Reduces osteoporosis.
- stimulates the nerves.
- Stimulates blood circulation because it contains a large amount of vitamin C.

### Recipe for hot Juice

**Ingredients:** 1 orange, 2 cups of pineapple, a cup of chopped avocado, 2 sticks of celery, 2 pears, lemon juice, a piece of ginger, 2 spoons of turmeric, a little black pepper, half a spoon of honey.



**Method:** take all the ingredients and blend it in a blender. Don't use the juicer machine as we want to keep the pulp for good results. Pour in a glass and consume fresh.



### Foods that's not good for bone healing:

It's a good idea to cut back on or skip these foods:

**Alcohol:** While you don't have to cut out alcoholic drinks, these beverages slow down bone healing. You won't build new bone as fast to fix the fracture.



**Salt:** Too much of this in your diet can make you lose more calcium in your urine. Salt can be in some foods or drinks that don't taste salty, so check labels and aim for about 1 teaspoon, or 6 grams, a day.



**Coffee:** Lots of caffeine more than four cups of strong coffee a day can slow down bone healing a little. It might make you pee more, and that could mean you lose more calcium through your urine. A moderate amount of coffee or tea should be fine.





## CHAPTER 8: BAKER'S CYST (POPLITEAL CYST)

Baker's cysts, also known as popliteal cysts, are one of the most common disorders in the knee. These fluid-filled cysts form a lump at the back of the knee that often causes stiffness and discomfort. The condition is named after the 19th century surgeon who first described it, Dr. William Marrant Baker.

The pain with Baker's cyst can get worse when you fully flex or extend your knee or when you're active. It is usually the result of a problem with your knee joint, such as arthritis or a cartilage tear. Both conditions can cause your knee to produce too much fluid, which can lead to a Baker's cyst. Although a Baker's cyst may cause swelling and make you uncomfortable, treating the probable underlying problem usually provides relief.



**Cause:** In adults, Baker's cysts usually result from an injury or condition that causes swelling and inflammation inside the knee joint, such as:

- Osteoarthritis.
- Rheumatoid arthritis.
- Meniscus tear.
- Anterior cruciate ligament (ACL) tear.

Other conditions that damage the tissues inside the joint. In response to this inflammation, the knee produces excess synovial fluid, which travels behind the knee and accumulates in the popliteal bursa. The bursa then swells and bulges, forming a Baker's cyst.

### Symptoms of a Baker's cyst may include:

- A fluid-filled lump behind your knee.
- Pain.
- Stiffness of your knee.
- Limited range of motion and ability to bend your knee.
- Swelling of your knee and/or leg.

If the cyst becomes very large, it can interfere with blood flow in the veins of your leg. This can cause pain, swelling, weakness, or even numbness if there is nerve compression. Very rarely, the cyst can even burst.

**Complications:** Rarely, a Baker's cyst bursts and synovial fluid leaks into the calf region, causing:

- Sharp pain in your knee.
- Swelling in the calf.
- Sometimes, redness of your calf or a feeling of water running down your calf.

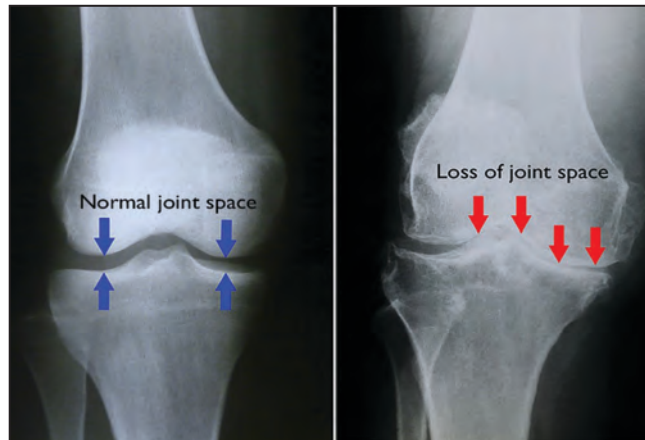
These signs and symptoms closely resemble those of a blood clot in a vein in your leg. If you have swelling and redness of your calf,

you'll need prompt medical evaluation to rule out a more serious cause of your symptoms.

**Diagnosis:** A Baker's cyst can often be diagnosed with a physical exam. However, because some of the signs and symptoms of a Baker's cyst mimic those of more-serious conditions, such as a blood clot, aneurysm or tumor, your doctor may order noninvasive imaging tests, including:

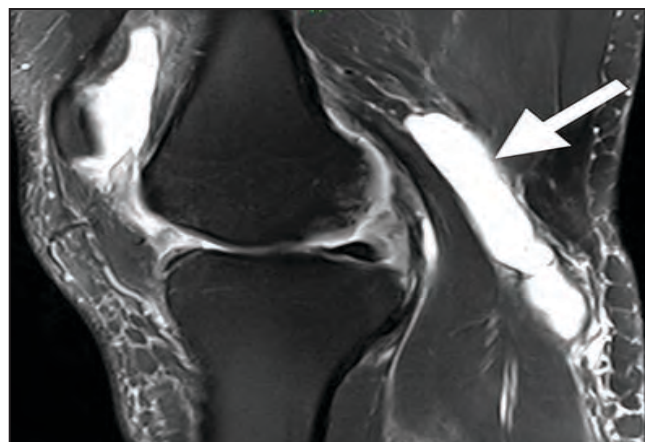
- Ultrasound.
- X-ray.
- Magnetic resonance imaging (MRI).

**X-rays:** X-rays provide images of dense structures, such as bone. Although a cyst cannot be seen on an x-ray, one may be ordered so that your doctor can look for narrowing of the joint space and other signs of arthritis in the joint.



**Ultrasound:** This test uses sound waves to create images of structures inside the body. An ultrasound will help your doctor see the lump behind your knee in greater detail and determine whether it is solid or filled with fluid.

**Magnetic resonance imaging (MRI) scans:** These tests produce clear pictures of the body's soft tissues. Your doctor may order an MRI scan to learn more about your cyst and to look for a meniscus tear or another underlying condition.



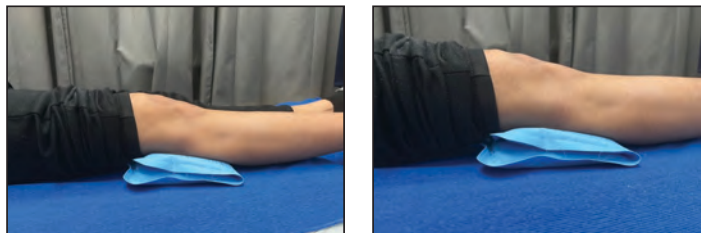
Arrow showing Baker's Cyst (Popliteal Cyst)

**Treatment:** You may not need any treatment for a Baker's cyst. They aren't dangerous and tend to go away on their own. But there are things you can do at home to ease your pain and make yourself more comfortable:

## Home treatment options can include the RICE method:

**Rest:** Resting your leg whenever possible. The pain and swelling are likely to worsen due to a change in activity level. If the pain is more severe, you may choose to use a cane or a crutch initially to take weight off of the knee.

**Ice:** Apply ice to the knee and behind the knee in particular. The rule of thumb is to ice no more than 20 minutes per hour. Only leave the ice on your knee for fifteen to twenty minutes at a time. Allow the area to warm to room temperature (another fifteen to twenty minutes) before reapplying the ice. Do not place the ice directly against the skin especially if you are using a gel pack style cold pack. Individuals with poor circulation or impaired sensation should take particular care when icing.



**Compression:** Compression helps to prevent and decrease swelling. Swelling can cause increased pain and slow the healing response. Limit it as much as possible. Tie an elastic bandage (ace wrap), trainer's tape, a brace, or even a piece of clothing around the injury. Tie it tightly enough to stabilize your knee but not so tightly that you cut off circulation. You could also use a pair of mild over-the-counter compression socks. If you are using a compression sock, it will need to be at least thigh high. Do not use a knee-high version you may make the swelling and pain worse. Do not apply any compression too tightly as it could cause numbness or tingling in the leg, foot, or toes.

- Place your leg in a natural position and allow for a slight bend in the knee. You may spray or apply some kind of ointment over the area.
- Hold one end of the bandage firmly below the kneecap and begin wrapping the bandage around.
- Make sure to cover above and below the cap. This provides maximum external support not just to the joint but also to the ligaments, muscles and connective tissue.



You can also wear a knee compression sleeve if you don't want to tie a compression bandage.



**Elevate your leg:** Elevating your leg also helps reduce swelling, and it returns blood to the heart. While laying down, raise your leg above the level of your heart (or as high as you can without causing pain). If you can't raise the injured leg, try to keep it at least parallel to the ground. Also try placing pillows under your legs when sleeping to keep them elevated. Try elevating your knee while you are resting.



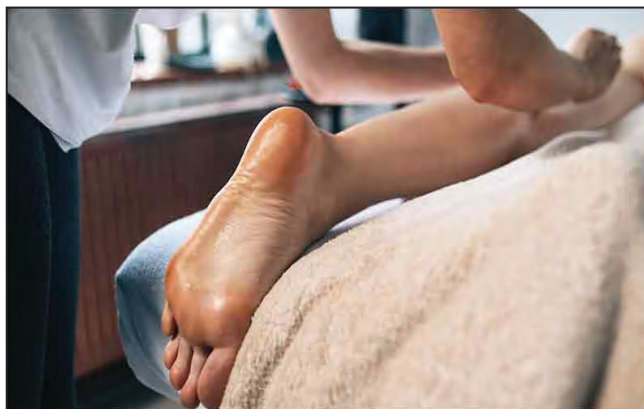
**Contrast bath:** All you do is have one bucket of hot water (must be as hot as you can handle on your skin) and one bucket of cold water. Place a towel or good size rag in each bucket. Start with the hot towel and place it over the cyst (do not squeeze or wring out the towel). Leave the towel there until it starts to cool and is no longer burning (usually around 30 seconds). Throw it back in the hot bucket and grab the cold towel. Place this over your cyst for about 30 seconds.

Throw that back in the cold bucket and continue to repeat this process until you've gone through it at least 6-7 times. Do this 3 times per day, morning, noon and night for best results. It's also advisable to do this outside due to the amount of water that gets spilled and the mess it makes.

### Massage Therapy

As the cysts are normally located in the popliteal region which is generally considered as an area contraindicated for most massage techniques. A massage therapist should not apply any deep pressure directly onto the cyst. The role of the massage therapist is more aimed at alleviating the underlying knee problem.

Massage to the area superior to the cyst can have therapeutic benefits which is balancing the muscles that influence the knee joint such as hamstrings and adductors. It is suggested that lymphatic drainage techniques may assist in reducing swelling and facilitating recovery through increasing the rate of absorption of the excessive synovial fluid.



## Self-Massage

Massage the Area. Given that you are consistently experiencing pain and discomfort around the knees and the calf region because of the condition, massaging the area has been found to have beneficial impacts in helping with the recovery effectively. It's best to use a circular or figure 8 motion with your massage to activate the oil properties and quickly release the inflammation.

You can also hold firm pressure on tender areas for 30 seconds each. Remember to breathe in and out through your nose with sound. Breathing with sound will help to activate the vagus nerve and further reduce the pain.

**Massage techniques to reduce inflammation:** Wear comfortable, loose clothing that allows easy access to the thigh. Maintain good posture and balance. Use a combination of infused oil recipes described later in the chapter for better results.

Friction strokes are applied with no lubrication by pressing fingers firmly into the tissue and compressing a small area while moving the tissue back and forth using short strokes.

- \* **Front Thigh Glide:** Glide down using heel of hand. End at the top of knee and release. Bring hand back to starting position. Repeat this sequence 5 times. Now repeat the same sequence on the left leg, using left hand.



- \* **Outside Thigh Glide:** Place heel of the right hand on top outside right thigh. Glide down outside thigh. End at the top of the knee and release. Repeat this sequence 5 times. Now repeat the same sequence on the left leg, using your left hand.



- \* **Inner Thigh Glide:** Seated, place heel of the left hand on top inner right thigh. Glide down with heel of hand. End at top of knee and release. Repeat this sequence 5 times. Now repeat the same sequence on the left leg, using your right hand.



- \* **Knee Friction:** Without lubrication, strokes are applied around knees. Press four fingertips firmly into tissue, compressing small area while moving tissue up and down using five short strokes around knee—bottom, outside, top, and inside.



\* **Finishing Glide Stroke:** Sit with both feet flat on floor. Place one hand palm down on each upper thigh. Glide down over kneecaps across to outside thigh and up to starting position using light to medium pressure.



You can use any of the following essential oil or combination of it mentioned below. But always remember to dilute your essential oils appropriately with a nice plant-based carrier oil such as coconut oil, olive oil, jojoba oil, almond oil and many more.

**Some of the essential oils that are good for baker's cyst:**

**Wintergreen essential oil:** It helps to reduce both pain and inflammation. You can simply apply it topically to the affected knee. Use caution, as you don't want to get wintergreen in your eyes. It will burn. The active molecule in wintergreen essential oil is closely related to over-the-counter anti-inflammatory medications.



**Cypress essential oil:** This helps to reduce the swelling associated with this injury.

When you have a swollen bump or lump that you can feel on the back of your knee, Cypress can help bring that swelling down. It is also antispasmodic, meaning it can reduce the stiffness in the knee that is giving you trouble.



**Frankincense Oil:** The essential oils are also one of the best baker's cyst natural remedies that you can opt for. The primary reason why it is effective enough is because of the fact that it imposes anti-inflammatory properties which has beneficial impacts in getting rid of the swelling and even the edema that is being caused because of the accumulation of fluids.



**Ginger essential oil:** It brings the heat to make the stiffness burn away from your knees. Tension is a common with baker's cyst that can reduce your mobility, so in that case ginger oil is helpful.



**Some other oils that are equally good that you can use for massaging your knee and surrounding structures are:**

**Olive Oil:** Olive oil is one of the plant-based oils which have been found to have beneficial impacts in helping with the condition of the baker's cyst.



**Castor Oil:** Castor oil is one of the effective natural remedies for baker's cyst that works wonders. The active compound in castor oil, ricinoleic acid has been found to impose the beneficial anti-inflammatory and pain reducing properties which help in overcoming the problems associated with this condition.



**Turmeric:** Turmeric is yet another one of the amazing baker's cyst natural remedies that actually do work. The primary reason behind the same is because of the fact that turmeric is loaded with beneficial anti-inflammatory properties which have beneficial impacts in faster and better recovery of the inflammation and the pain that one is enduring.



**Epsom salt:** Epsom salt is yet another one of the effective remedy for the baker's cyst that provides with beneficial impacts. The

primary reason is because of the presence of the magnesium sulfate in it which imposes beneficial impacts in helping with the inflammation and even getting rid of the pain that one often tends to experience.



Here are some recipes for herb-infused oil:

**Recipe 1:** Cumin and Aloe vera oil

**Ingredients:** Aloe vera (3 teaspoon), cumin seeds (3 teaspoon), black seed, 3 teaspoon celery seeds, ½ cup of olive oil.



**Method:** Grind everything together and pour olive oil in it. Keep it in an airtight container, away from the heat and sun and in the fridge. Apply only 2-3 times to the area with a light massage. These are the most common prescriptions used in the treatment for knee pain.

**Recipe 2:** Mustard and ginger oil

**Ingredients:** 3 teaspoons mustard, 3 teaspoons watercress, 3 teaspoons ginger, ½ cup of olive oil.





**Method:** Grind them together and mix it with olive oil. Keep them in an airtight container, away from the heat and sun preferably in the fridge. Apply only 2-3 times to the area with a light massage.

**Recipe 3: Honey and Camphor oil**

**Ingredients:** 3 teaspoons mustard, 3 Teaspoons of watercress, 3 teaspoons ginger, 1 tablespoon honey, 2 tablespoon camphor, 1/2 cup olive oil.



**Method:** Grind all dry ingredients together and mix it with honey and olive oil. Keep them in an airtight container, away from the heat and sun and in the fridge. Apply only 2-3 times to the area with a light massage.

**Recipe 4: Avocado apple oil**

**Ingredients:** 3 teaspoons cumin powder, 3 teaspoons mashed apples, 3 teaspoons avocado, 3 teaspoons dried cherries, 1/2 cup vinegar, 1/2 cup olive oil



**Method:** Before mixing the dried cherries with avocado and mashed apple you grind the cherries in a grinder so that it makes a homogenous mixture with everything. Mix them together and place them in an airtight container, away from the heat and sun and in the fridge. Apply only 2-3 times to the area with a light massage.

**Note:** You can use these recipes to massage around the knee as well as your whole leg from the thigh to your ankle. As the muscles and soft tissues around any joint has a tendency to become stiff following any kind of surgery so its always a good idea to massage the whole leg to enhance its flexibility and mobility.

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**Aspiration:** Your doctor can drain the cyst. They'll likely do it with the aid of an ultrasound. This treatment may not work if your case is severe.

**Surgery:** If you're in serious pain or if the cyst makes it hard for you to move your knee, this might be an option. But it'll work only if your doctor also treats the issue that caused the Baker's cyst to begin with, such as arthritis, any ligament injury or meniscus tear.

**Arthroscopy:** In this procedure, your doctor makes tiny incisions under anesthesia, then inserts a small camera called an arthroscope into the knee joint. The camera displays images on a video screen and your doctor uses these images to guide miniature surgical instruments.

Arthroscopy is used to treat conditions inside the knee, such as meniscus tears, that may give rise to a Baker's cyst.

**Excision:** For large cysts or those that are causing nerve and vascular problems, your doctor may perform an open surgical procedure to excise (remove) the entire cyst.

### Recovery from surgery

It is very important to follow your recovery instructions to prevent the recurrence of a Baker's cyst.

**Early movement:** If your cyst has been aspirated or if you have had arthroscopic surgery, you will most likely be allowed to walk right after the procedure, but you should avoid strenuous activity during your recovery.

**Bracing:** Your doctor may recommend that you wear a knee brace for several weeks after surgery to immobilize your knee.



**Physical therapy:** Specific exercises will help improve range of motion and strengthen the muscles around the knee. Your Physical Therapist may use massage treatments, compression wraps, and electrical stimulation to reduce knee swelling. They may also use flexibility and strengthening exercises for the lower limb to help improve muscle balance in the knee.

**Exercises:** Inflammation to the area of a Baker's cyst can cause muscle tightness and joint stiffness. You should perform pain-free flexibility and strengthening exercises to help rehabilitate the area and keep joints and muscles active. This will help prevent future weakness and/or stiffening of the surrounding muscles and joints. You should focus on your quadriceps, hamstrings, buttocks, and calf muscles.

## STRETCHING EXERCISE

### Sitting Calf Stretch

Sit down on a mat and stretch out the leg with the Baker's cyst. Then place a mini foam roller (or a stack of books) underneath your foot. Now take the short loop of a resistance band and wrap it around your toes. Grab the other end of the band with both hands and pull. Keep your back straight and your leg outstretched while you do that. You should notice a stretch in your calves. Stretch for about a minute.

After this, pull the tip of your foot further towards your torso while your back moves into the opposite direction. Loosen the arm holding the straps slightly to intensify the stretching effect on the Baker's cyst. Keep the stretch for roughly two minutes.



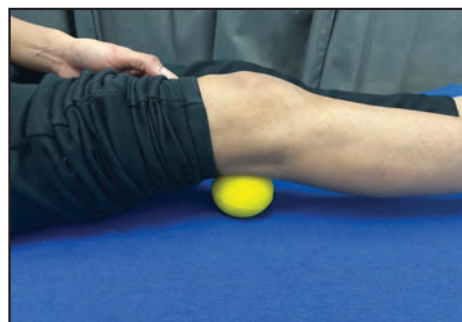
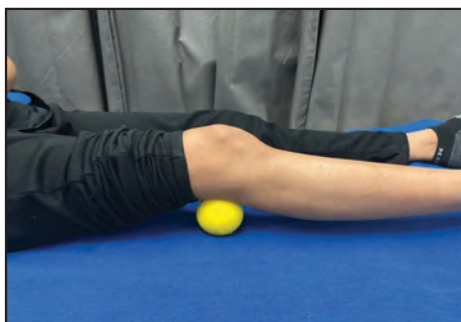
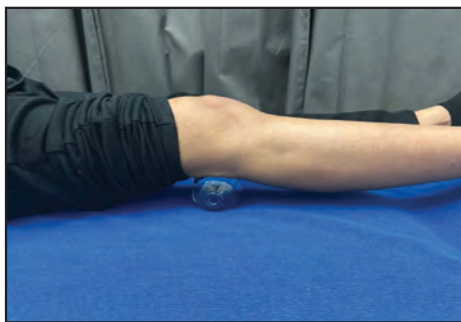
### FOAM ROLLING MASSAGE

Sit down on a mat and place the roller under your calf. Make sure to press your leg down really hard. Now begin rolling slowly into the direction of your knee. When you reach the hollow of your knee, be very careful! While foam rolling, make sure you do not exceed your pain threshold. Always stay below a 10 and above an 8 on your personal pain scale from 1-10.

### Massage Ball

This time, you'll need either the mini massage ball. If you think the mini ball is too small or applies too much pressure due to its size, use the slightly bigger one. If you don't have the massage balls, you may also use a tennis ball.

Place the ball in the hollow of your knee, right on the Baker's cyst. Perform slow circulatory movements to massage it. Stick to your 8 or 9 on the pain scale and keep massaging yourself for two minutes.



### Seated hamstring stretches

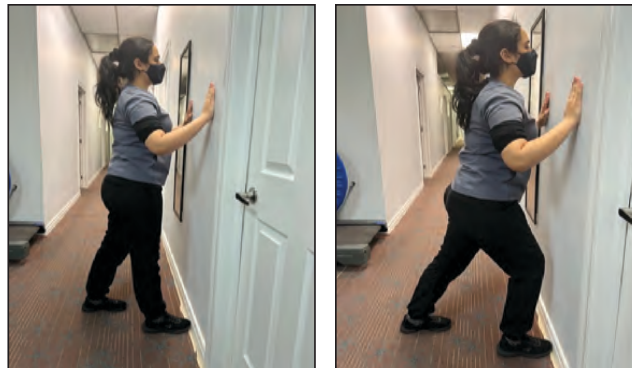
While seated, rest your heel on the floor with your knee straight. Gently, lean forward until you feel a stretch behind your knee and thigh. This stretch can be used to improve knee extension if limited.



### Standing calf stretch

Start by standing close to a wall.

Step forward with one foot and keep both feet pointed toward the wall. Keep the knee of your back leg straight. Lean forward toward the wall and support yourself with your arms as you allow your front knee to bend until you feel a gentle stretch along the back of your straight leg. Move closer or farther away from the wall to control the stretch of the back leg. When you have a Baker's cyst, the backside of the leg can be tight. This stretch will help release some of the tension in the lower leg.



### Straight Leg Raise -Leg Laterally Rotated

Lay on the ground with your affected leg straight. The opposite leg will be bent. Be sure to rotate your leg outward (laterally) slightly to gain a better activation of the medial (inner) side of the quadriceps. Due to the cyst, your knee may not be completely straight, but try to have your leg as straight as possible.



### Straight Leg Raise

Raise your leg parallel to the bent leg. Don't arch your back. Keep your abdominals engaged. Another variation is to perform this with

your toes straight into the air. You could also add an ankle weight to increase the difficulty level.

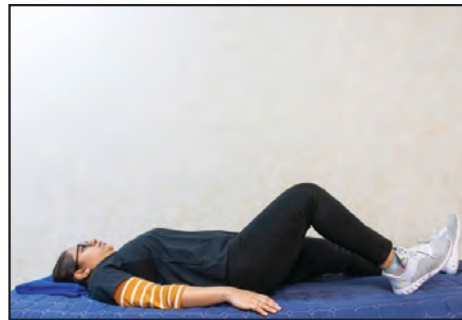
Perform 2 sets of 15 repetitions on each leg once a day.



### Heel slide

Lie on your back with knees straight.

Slide the affected heel toward your buttock as you bend your knee. Hold a gentle stretch in this position and then return to original position. This exercise can be used to gently improve knee flexion if it is limited.



### Bridge Exercise

Lay on your back with your knees bent to prepare for the bridge exercise. Keep your pelvis level as you lift your hips/pelvis and buttocks into the air. Pause, extend your leg. Hold for 3-5 seconds, then return the leg to the ground and repeat with the opposite leg. Return your buttocks to the ground and rest when you can no longer keep your pelvis from wobbling or your buttocks from dropping downward.

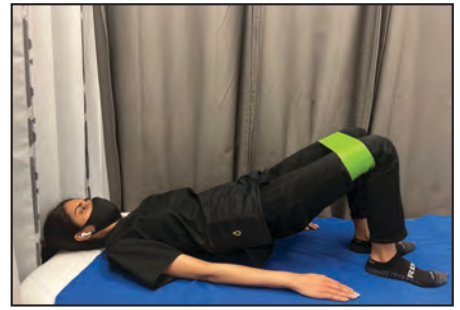
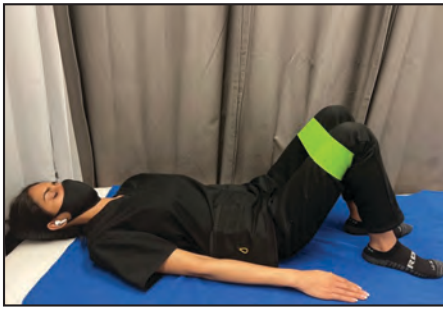
Perform 2 sets of 10 repetitions on each leg once a day.



### Bridge Exercise with an Exercise Band

Place an exercise band around your thighs above your knees. Keep your pelvis level as you lift your hips/pelvis and buttocks into the air. Pause, return back down to the ground. Don't let your pelvis wobble as you move up and down. Hold your knees 4-6 inches apart. Do not let the exercise band move on top of the painful swelling area.

Perform 2 sets of 10 repetitions once a day.



### Clamshell for External Hip Rotation

Lie on your side (with your spine in a neutral position) with your hips flexed and your feet together. Depending on your strength level, perform the exercise with or without an exercise band tied around your knees. Slowly raise your knee upward as far as you can without rolling your pelvis backward. Keep your core engaged. The only movement should be from your knee lifting up. Do not let the exercise band move on top of the painful swelling area.

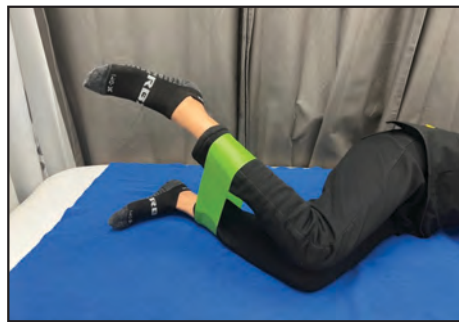
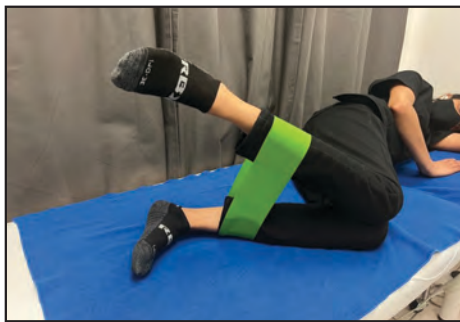
Perform 3 sets of 15-20 seconds holds once per day.



### Clamshell for Internal Hip Rotation

Lie on your side (with your spine in a neutral position) with your hips flexed and your feet together. Depending on your strength level, perform the exercise with or without an exercise band tied little above your ankles. Slowly raise your foot upward as far as you can without rolling your pelvis backward. Keep your core engaged. The only movement should be from your ankle lifting up.

Perform 3 sets of 15-20 seconds holds once per day.

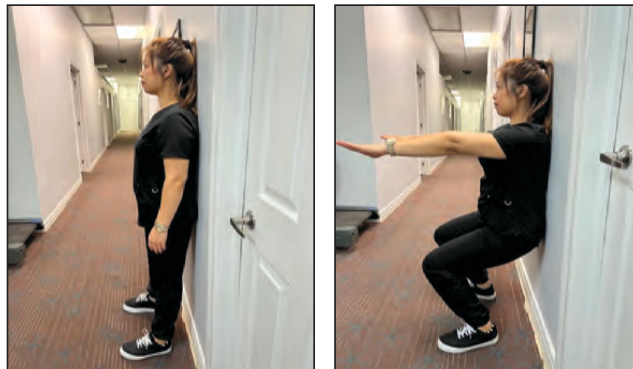


### Wall Squat

Stand with your pelvis, back, and head touching a wall. Your feet will be approximately hip width apart and far enough out from the wall. When you slide down, your knees will make a 90degree angle. Make sure your knees track your feet, and you can see your toes. Try to have the knee track toward your second toe to insure proper alignment of the knees.

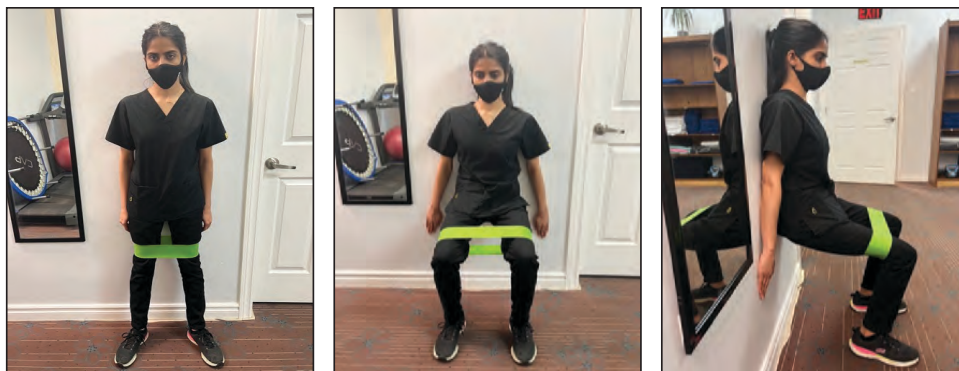
From your starting position, slowly lower your body down and hold for time. As you improve, lengthen the amount of time you hold the wall squat. Be sure to keep your pelvis, back, and head against the wall. Keep the movement pain free. You may not make it to a thigh height parallel position. Increase the depth of the squat as your ROM and pain improves. Perform 3 sets of 15-20 seconds holds

once a day.



### Wall Squat with an Exercise Band

Place an exercise band around your thighs above your knees. It will help to increase the activation of the hip muscles. From your starting position, slowly lower your body down and hold for time. As you improve, lengthen the amount of time you hold the wall squat. Be sure to keep your pelvis, back, and head against the wall. Keep the movement pain free. Do not let the band go over top of the painful swelling area. Perform 2 sets of 15-20 repetitions once a day.



### Side Stepping with an Exercise Band

Tie the exercise band above your knees. Move into a slight squat position. Try to side-step while keeping your feet facing forward. Move slowly and try to keep your head at the same level. Do not let the exercise band move on top of the painful swelling area. Walk sideways for 20-30 feet. Return back again, but don't turn around. Perform 2-3 sets.



### Other treatment options for a Baker's cyst can include:

- Taking an anti-inflammatory medication, such as ibuprofen.

- Maintaining a healthy body weight, which can help put less pressure on your joints.
- Avoiding activities that strain your knee. This includes avoiding high-impact sports like jogging.
- Using a crutch or cane when you walk.

## Prevention

A Baker's cyst often appears following a knee injury. Preventing knee injuries is, therefore, the best way to prevent these cysts from developing.

### To avoid injuring the knee:

- Wear supportive shoes that fit well.
- Warm up before exercise and sports and cool down afterward.
- Refrain from exercising on a knee that is already tender and painful.
- Seek treatment for any knee, leg, or foot injuries — an injury to one area of the body can increase the risk of falls and further harm.

**Food & Nutrition:** Anything that reduces inflammation in the body is going to allow the body to repair itself easier which would include the lymphatic system. To reduce inflammation through proper nutrition, water intake, supplementation, and stress reduction is the basic approach which we are going to take.

Basically, Baker's Cysts are the result of anything that causes joint swelling, whether that is arthritis, a torn meniscus, or an alignment issue with your femur. This swelling in the joint actually blocks the lymphatic system from cleansing the area like it normally does. This lymph blockage creates a pocket of fluid that turns into a cyst, usually in the back of your knee. Our goal is to treat the underlying cause to treat the Baker's cyst.

So, if you know the cause of your baker's cyst, you are advised to consume food and supplements according to its cause in the first place. We have discussed the food and nutrition for Arthritis, meniscus injury, ligament injury and many more in previous chapters. You can refer to those chapters and look for the recipes you want to include in your meal plan when trying to heal your Baker's cyst.

**Apple Cider Vinegar (ACV):** Apple cider vinegar is excellent for removing fluid and freeing up the joints, which is why it's such a great cure. Simply mix one tablespoon of organic apple cider vinegar along with a teaspoon of local or Manuka honey, in a glass of warm filtered water and drink 3 times daily 10 minutes before each main meal.



**Herbs:** Anti-inflammatory herbs and spices such as cayenne pepper, celery seed, turmeric, black pepper, ginger, cinnamon and garlic are all terrific for reducing inflammation within the knee (which is likely what's causing your Baker's cyst). Try and use these in your





cooking as much as possible, along with adding them to a daily smoothie so you get a decent amount, otherwise they will have little effect.



**Fatty fish:** Omega-3 fatty fish contains supplements such as fish oil supplements, flaxseed oil and chia seeds, Omega-3 works to combat infections, especially arthritis.



**Oils:** There are some types of oils that reduce inflammation in addition to fish oil such as virgin olive oil, which contains the substance “oleocanthal” that reduces cholesterol and reduces inflammation.



**Dairy products:** Milk, yogurt and various types of cheeses contain a large percentage of calcium and vitamin D that increases bone strength and reduce painful symptoms and infections.



**Dark leafy vegetables:** Cabbage, spinach and dark vegetables are rich in vitamin D and natural antioxidants enhancing the functioning of the immune system and resisting infections. Spinach from dark leafy vegetables rich in vitamin D and antioxidants enhances immune system functioning and resistance to infections.



**Broccoli:** Contains sulforaphane, which scientists have proven slows the progression of osteoporosis, as well as rich in vitamins C, K and calcium.



**Green Tea:** Contains high levels of polyphenols that are resistant to any inflammation present in the body, especially arthritis.



**Garlic:** Garlic is long known for its ability to reduce inflammation, as it contains a compound that also reduces cartilage inflammation.



**Nuts:** They also contain alpha-linolenic acid, which enhances the immune system's ability.



### Recipe 1: Wheat and greens salad

**Ingredients:** 2 cups of finely chopped parsley, 1 onion, finely chopped, 2 tablespoons of groats of wheat soaked in water, ¼ cup of pure olive oil, ½ cup of finely chopped tomatoes, 2 tablespoon of squeezed lemon, ¼ cup of finely chopped hot pepper - to taste, ½ cup of washed lettuce or any green leaves of your choice.



**Method:** Put the soaked wheat, tomatoes, onions, mint, parsley and hot pepper and green leaves in a bowl and mix. Add lemon, salt, olive oil and mix until combined. Pour the salad into a large serving dish and serve fresh.



### Recipe 2: Green Greek salad

**Ingredients:** 2 cups of medium chopped tomatoes, 2 cups of chopped cucumbers, 1 cup medium chopped lettuce, 1 cup chopped onion, ½ cup chopped white cheese, 1 cup chopped sweet green pepper, few slices of black olives, ½ cup of lemon juice, pinch of salt, 1 tablespoon of vinegar, 2 tablespoons of olive oil, 1 tablespoon of thyme.



**Method:** Put all the ingredients together, and stir them except for the white cheese, onions, and black olives. Add salt, olive oil, thyme, vinegar, and lemon juice and mix well. Top the salad with cheese, onions and black olives while serving. It can be used as a side dish or main course.



### Recipe 3: Tuna Salad

**Ingredients:** 1 cup chopped arugula, 2 cups of chopped salmon or tuna, 1 cup chopped tomatoes, ½ cup of colored capsicum, ¼ cup of black olives, 2 tablespoons of chopped parsley, ½ cup of chopped red cabbage



**For dressing:** 1 tablespoon olive oil, 1 clove of minced garlic, 2 teaspoons lemon juice, Pinch of chili, Pinch of salt.

**Method:** In a bowl, mix all the vegetables. Then, put all the ingredients for dressing gradually. Stir the salad and mix it well. Top it with fresh parsley and serve it directly. It can be used as a side dish with soup or main course.





#### Recipe 4: Fruit bowl Salad

**Ingredients:** ¼ cup of chopped kiwi, ¼ cup of chopped strawberries, ¼ cup of chopped pineapple, ¼ cup of chopped bananas, ¼ cup of pomegranate, 1 teaspoon of finely chopped ginger, 1 teaspoon of honey, ¼ cup of orange juice, ¼ cup of lemon juice and ¼ cup chopped mint.



**Method:** Put the fruits in a bowl. Add honey, ginger, lemon juice, orange juice and mix well. Top it with freshly chopped mint and serve.



#### Recipes for soup

##### Recipe 1: Bone broth soup



**Ingredients:** 1liter water, Bones of meat, fish, or poultry, preferably meat, 1 teaspoon of vinegar, Pinch of salt and pepper

**Method:** Boil the ingredients in a suitable size pot over medium heat for 4 to 6 minutes, stir occasionally.



After the water boils, reduce the flame and add Onions, Celery, Carrots, Parsley, Thyme and Garlic to add some flavors. Now cook with covered lid for 10 to 24 minutes.



After that, turn off the flame and let it cool down. Once cooled, filter the broth with a cheesecloth or strainer.



Add salt and pepper according to your taste.

## Recipe 2: Mushroom soup



**Ingredients:** 1 cup of sliced potatoes, 1 cup of chopped carrots, 1 cup of chopped onions, 2 cups of chopped brown or white mushrooms, 3 tablespoons of olive oil, ¼ cup chopped parsley, 1 teaspoon of shredded ginger, 1 teaspoon of salt and pepper.  
1 cup chopped pot.

**Method:** Sautee onions and carrot with butter in a suitable size pot over medium heat for 4 to 6 minutes, then add mushrooms to it

and sauté it for another 5mins. Now add salt and pepper to it. Add 3 cups of lukewarm water or you can use vegetable broth instead and bring it to boil. Add the shredded ginger, parsley and serve.

### Vitamin C juice

**Ingredients:** Half a banana, 1 orange, 2 pieces of kiwi, 2 teaspoons of flaxseed, 2 teaspoons of sesame, ¼ cup of pomegranate, 2 pieces of walnuts and almonds, 2 spoons of honey



**Method:** Mix all together and blend it in a mixture. Drink it in the morning.



### Benefits of this drink:

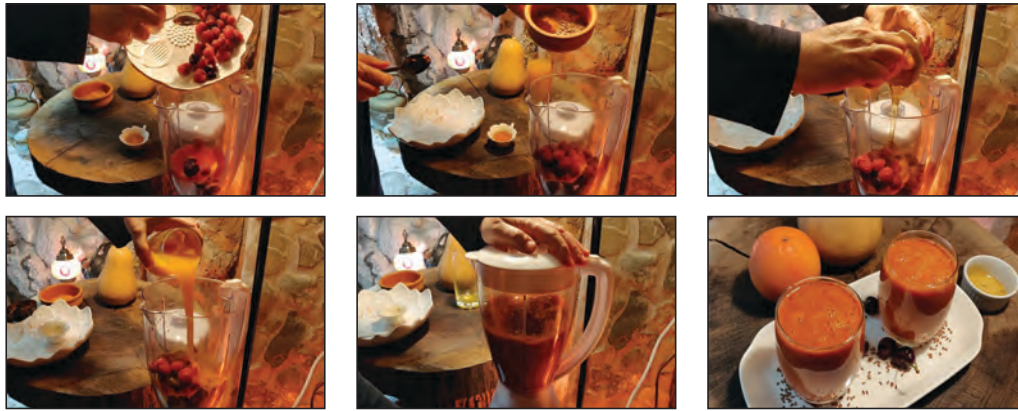
- It is a stimulant for the blood circulation.
- Stimulates the nerves.
- Reduces joint and respiratory infections.
- Lessens the pain.

### Recipe for Pumpkin juice

**Ingredients:** 1 cup of boiled red pumpkin, 1 cup of grapefruit, Quarter cup of lemon, ½ cup of cranberry, ¼ cup of cherries, ¼ teaspoon of turmeric, ½ teaspoon of flaxseed, ½ teaspoon of nigella, a teaspoon of cinnamon, 3 tablespoons of honey



**Method:** All materials are added to the mixer and drink two cups daily.



### Benefits of this drink:

- Activates blood circulation
- It stimulates the nerves
- Strengthens bones and relieves pain
- It is a rich source of many vitamins, such as folic acid, vitamin B3, and vitamin B, which are important for the functioning of various vital processes in the body, and the work of enzymes.
- Maintains the integrity and functions of nerves, in addition to contain important minerals, such as: potassium, calcium, copper, magnesium, and phosphorous.

### Recipe for Milk cocktail

**Ingredients:** Two cups of milk, 1 teaspoon of chia seed, 1 teaspoon of nigella, a teaspoon of flaxseed, a teaspoon of honey  
1 teaspoon of turmeric, a teaspoon of honey, 2 tablespoons of oats



**Method:** Mix everything in a blender and drink daily.



### Benefits of drinking this mixture:

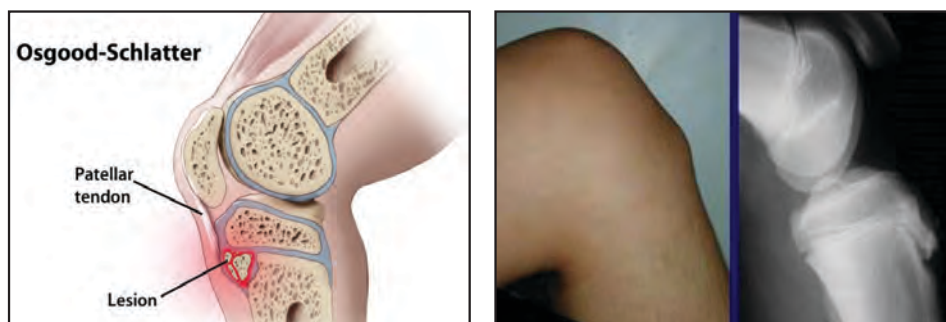
- Helps relieve pain.
- Repairs bones.
- Relieves osteoporosis and pain.
- Relaxes muscles.
- Reduces inflammation.
- Stimulates blood circulation.



## CHAPTER 9: OSGOOD-SCHLATTER DISEASE REHABILITATION

Osgood-Schlatter disease is a condition that causes pain and swelling below the knee joint, where the patellar tendon attaches to the top of the shinbone (tibia), a spot called the tibial tuberosity. There may also be inflammation of the patellar tendon, which stretches over the kneecap. This disease is a common cause of knee pain in growing adolescents.

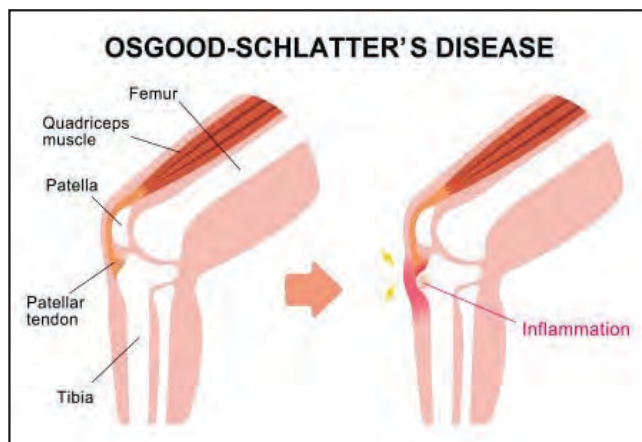
Osgood-Schlatter disease occurs most often in children who participate in sports that involve running, jumping and swift changes of direction such as soccer, basketball, figure skating and ballet. The disease typically occurs in boys ages 12 to 14 and girls ages 10 to 13. The difference is because girls enter puberty earlier than do boys. The condition usually resolves on its own, once the child's bones stop growing.



### What causes Osgood-Schlatter disease?

Osgood-Schlatter disease is caused by irritation of the bone growth plate. Bones do not grow in the middle, but at the ends near the joint, in an area called the growth plate. While a child is still growing, these areas of growth are made of cartilage instead of bone. The cartilage is never as strong as the bone, so high levels of stress can cause the growth plate to begin to hurt and swell.

The tendon from the kneecap (patella) attaches down to the growth plate in the front of the leg bone (tibia). The thigh muscles (quadriceps) attach to the patella, and when they pull on the patella, this puts tension on the patellar tendon. The patellar tendon then pulls on the tibia, in the area of the growth plate. Any movements that cause repeated extension of the leg can lead to tenderness at the point where the patellar tendon attaches to the top of the tibia. Activities that put stress on the knee especially squatting, bending or running uphill cause the tissue around the growth plate to hurt and swell. It also hurts to hit or bump the tender area. Kneeling can be very painful.



### Symptoms

Painful symptoms are often brought on by running, jumping, and other sports-related activities. In some cases, both knees have symptoms, although one knee may be worse than the other.

- Knee pain and tenderness at the tibial tubercle.
- Swelling at the tibial tubercle.

- Tight muscles in the front or back of the thigh.

## Diagnosis

During the physical exam, your doctor will check your child's knee for tenderness, swelling, pain and redness. X-rays may be taken to look at the bones of the knee and leg and to more closely examine the area where the kneecap tendon attaches to the shinbone.

## Treatment

Osgood-Schlatter disease usually resolves without formal treatment. Symptoms typically disappear after your child's bones stop growing.

## Lifestyle and home remedies

It might help your child to do as the following:

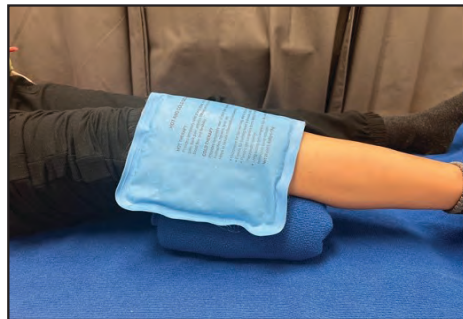
**Rest the joint:** Limit time spent doing activities that aggravate the condition, such as kneeling, jumping and running.

The amount of rest needed varies widely and depends on the person but expect anywhere from a few weeks to a few months before a significant reduction in pain and swelling is noticed.

Pain with OSD can be sporadic or nearly constant; it usually occurs in just one knee, but sometimes develops in both.

## Ice the affected area

- Cold therapy should be applied to the inflamed bump (tibial tuberosity) just below your kneecap for 20 minutes every two to three hours for a couple of days, then reduce the frequency as the pain and swelling subside.
- Always wrap ice or frozen gel packs in a thin towel in order to prevent frostbite on your skin.
- If you don't have any ice or gel packs, then use a frozen bag of peas from your freezer. This can help with pain and swelling.



**Compression:** Wrap an elastic bandage or compression wrap around your knee. Place your leg in a natural position and allow for a slight bend in the knee. You may spray or apply some kind of ointment over the area.

Hold one end of the bandage firmly against the kneecap and begin wrapping the bandage around.

Make sure to cover above and below the cap. This provides maximum external support not just to the joint but also to the ligaments, muscles and connective tissue.





**Elevation:** Lie down with your knee propped up on pillows.



**Stretch leg muscles:** You should create a daily stretch routine that you perform. In your stretch routine, you will want to make sure that you stretch your legs regularly. Stretching the muscles on the front of the thigh (quadriceps), is especially important.

**Protect the knee:** When your child is participating in sports, have him or her wear a pad over the affected knee where the knee can become irritated.

**Using patellar tendon strap:** A patellar tendon strap fits around the leg just below the kneecap. It can help to “tack down” the kneecap’s tendon during activities and distribute some of the force away from the shinbone. A patella tendon strap goes around the knee just below the Patella. It applies compression to the Patella tendon, changing how forces are transmitted through it.



**Patellar Taping:** Knee taping is a practice that’s used to relieve knee pain. It’s also done to improve knee support, which may treat and prevent various injuries.

The practice involves applying special tape around the knee.

To tape your knee:

- You’ll need to clean skin and one Y strip (pre-cut) and a strip of adhesive tape.
- Measure from the tibial tubercle (bump under your kneecap) to your quadriceps tendon. Cut one tape strip. Round the end to minimize peeling.

- Sit on a bench and bend your knee. Peel the first inch of the strip. Secure outside the tibial tubercle without stretch.
- Stretch the tape to 40 percent. Wrap the tape around the inner knee, following its natural curve. Secure the end without stretch. Rub the tape to activate the adhesive.



Now, take the Y- strip peel the first inch of tape. Peel the first inch of the Y strip. Secure in the middle and just below of the kneecap, split the Y, and remove the backing.

Stretch the tails to 50 percent. Apply the tails above and around the kneecap. Rub to activate.



**Cross-train:** Suggest that your child switch to activities that don't involve jumping or running, such as cycling or swimming, until symptoms subside.

### Massage therapy

Massage Goals: Increase Circulation in the legs.

General treatment to the anterior legs especially the quadriceps muscle, ITB, also gluteal muscle, also lower legs (gastrocnemius, soleus). Passive stretching of the quads and ITB.

A deep tissue massage is helpful for mild-to-moderate strains because it reduces muscle tension, combats inflammation and promotes relaxation. Start with a 30minute massage, focusing on your thigh muscles and kneecap area. Allow the therapist to go as deep as you can tolerate without causing too much pain.

The therapist may use a focal cross-friction technique on your kneecap area if they think there's a build-up of scar tissue.

Always drink lots of water immediately following a massage in order to flush out inflammatory by-products and lactic acid from your body.

- Have the patient lie on their back on a hard or semi-hard surface, a mattress will do just fine.
- Have the patient stretch their leg out completely straight.
- You can stand or sit beside the patient by their stretched leg.
- Apply a bit of oil on to your hands.
- Gently start massaging the sides of the kneecap using long gliding strokes to warm up the area.
- Start the friction process by placing your thumb at the sides of the knee-cap.
- Press in with your thumbs on either side of the knee and glide your thumb from the top to the bottom of the knee maintaining the pressure.
- Repeat this process for 5-10 minutes varying the pressure as per the needs of the recipient. Switch to the other knee.



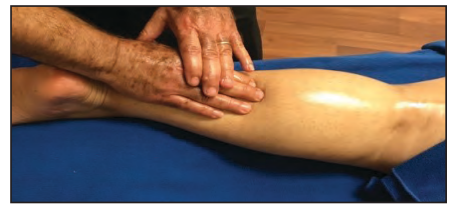
## MASSAGING QUADS & ITB

- Have the patient lie down on their back on a semi-hard or firm surface, a mattress will do just fine.
- Have them lay their leg flat on the surface. Cover the whole body except for the leg you are going to massage.
- Stand by the side of the patient and start massaging the quad muscles using a kneading technique.
- You can also use your fist to knead the muscle belly.
- You can glide your fist with medium pressure to massage ITB on the side of patient's thigh from the upper knee border up until his/ her pelvis.
- Continue kneading the quad muscles all around in a circular direction. You can apply this massage technique for 5-10 minutes before switching to the other leg.



**MASSAGING GASTROCNEMIUS & SOLEUS**





### Oils good for Osgood's-Schlatter disease:

You can apply a peppermint essential oil rub on the joints twice each day in order to reduce pain. Peppermint oil helps to relax the muscles surrounding the knee and thus provide some pain relief. Menthol is the active ingredient in peppermint oil, which helps to create a calmness as it is known to be a natural painkiller as well as a muscle relaxant.

In addition, rubbing peppermint oil directly on the areas where you are experiencing pain can help as well as this can help to reduce the swelling that is causing the pain to begin with.

To use, you will need to add the peppermint oil to carrier oil. Coconut oil works well as a carrier oil as it will also moisturize the skin. Almond oil is another great choice as a carrier oil. Mix the peppermint oil with the carrier oil and then apply it directly to the area on the leg that is hurting.



Other essential oils that can help with pain include lavender, primrose, and arnica.

## Primrose essential oil

It is good to reduce bone pain caused by chronic inflammatory conditions.



## Arnica oil

Arnica oil contains helenalin, a potent anti-inflammatory, making it a must-have for any natural first aid kit.

Its ability to reduce pain and disease-causing inflammation when applied to the skin comes in handy for all kinds of bruises, aches, sprains and even arthritis flare-ups.



## Herb infused oil recipes

### First recipe for the oil

**Ingredients:** 3 teaspoons willow, 2 teaspoons dry rose buds, 3 teaspoons eucalyptus, 3 tablespoons lavender & 1/2 cup olive oil



**Preparation of the oil:** Grind the dry herbs in a coffee grinder, add them to olive oil and use 2-3 times a day for massaging your knee. And put in an airtight container, away from the heat and the sun, preferably in the refrigerator.

### Benefits of this oil:

- Works to relieve pain with coldness, so it is comfortable and warm.
- Activates circulation.
- Activates nerves.
- Reduces inflammation.
- Nourishes muscles.



## Second recipe for the oil

**Ingredients:** Mint, ginger, thyme, black pepper, 4 teaspoons mint, 5 tablespoons ginger, 5 tablespoons black pepper, 3 teaspoons wild thyme & 1 cup olive oil.



**Preparation of the oil:** Mix the material and grind it together, then add it to olive oil and place in an airtight container, away from the heat and sun and in the fridge.

### Benefits of this oil:

- It stimulates nerves.
- Activates circulation and relieves pain.
- Nourishes muscles.
- Reduces inflammation.

## Third recipe for the oil

**Ingredients:** Safflower, eucalyptus, black beans, cumin seeds, 3 teaspoons safflower, 3 teaspoons eucalyptus, 3 teaspoons black bean 3 teaspoons cumin & 1/2 cup olive oil.



**Preparation of the oil:** Mix all the dry herb and grind them together in a coffee grinder. Then mix it with the olive oil. Place the oil in an airtight container, away from the heat and sun preferably in the fridge. Apply only 2-3 times to the area with a light massage.

### Benefits of this oil:

- Reduces inflammation.
- Activates nerves.
- Activates circulation.
- Nourishes muscles.

## Fourth recipe for the oil

**Ingredients:** Black pepper, turmeric, sunflower, pumpkin seeds, 3 teaspoons black pepper, 3 teaspoons turmeric, 3 teaspoons sunflower, 3 teaspoons pumpkin seeds & 1 cup olive oil.



**Preparation of the oil:** Mix all the herbs and grind them together in a coffee grinder. Then mix the grounded herbs into the olive oil. Place them in an airtight container, away from the heat and sun preferably in the fridge or in a dark place. Apply 2-3 times to the area with a light massage.



### Benefits of this oil:

- Reduces inflammation.
- Activates nerves.
- Activates circulation.
- Nourishes muscles.

These are the most common recipes for herb infused oils which can be used for massaging your knee to alleviate your pain.

### Physical Therapy

A physical therapist can teach you exercises to stretch the thigh's quadriceps, which can help reduce the tension where the kneecap (patella) tendon attaches to the shinbone. A patellar tendon strap also can help relieve the tension. Strengthening exercises for the quadriceps and legs in general can help stabilize the knee joint.

### Therapeutic ultrasound

Therapeutic ultrasound is a treatment used by physical therapists in order to reduce inflammation and stimulate healing for a variety of injuries, including OSD. Like its name infers, it emits sound frequencies through crystals (you can't hear it) that positively impact cells and tissues of the body. Although a single ultrasound treatment can sometimes completely relieve your pain and inflammation, more than likely it will take three to five treatments to notice significant results.

Therapeutic ultrasound treatments are painless and usually last 10 – 20 minutes.



## Exercises

### Quad stretch while lying

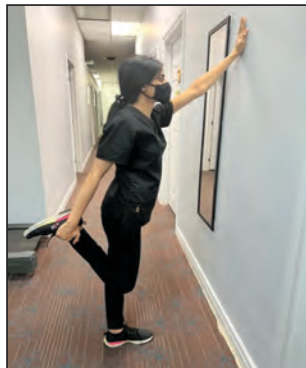
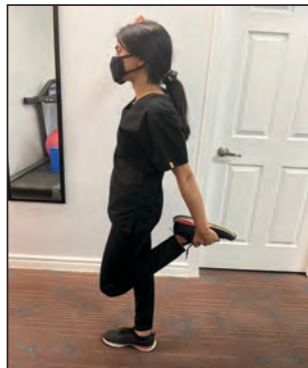
1. Lie down on stomach.
2. Pull one foot toward the buttocks until a stretch is felt in the front of the thigh.
3. Hold for 30 seconds. Then repeat on the other leg.

Do the stretch 2 to 3 times a day on both sides.



### Quad stretch standing

To stretch your quadriceps while standing, bend your leg behind you so your knee is bent, your heel about at the level of your butt. Grab your ankle and pull your foot toward your body until you feel a nice stretch in your lower thigh and knee. You can take support from a wall with your opposite hand. Hold for about 30 seconds and repeat three to five times daily until you notice reduced symptoms.



### Quadriceps foam rolling

Position your upper thigh onto the foam roller. Roll around until you locate a particularly tight and/or restricted area, and then very slowly bend your knee back and forth. Use the weight of your leg to hold the spasming muscle down over the foam roller as you slowly move back and forth over the foam roller by bending your knee.

Perform 1-2 minutes on each leg once per day.



## Hamstring stretch

1. Lie on back with towel looped around one foot. Hold towel ends in hands.
2. Keep knees straight and gently pull one leg up until a stretch is felt at the back of the leg.
3. Hold for 30 seconds. Then repeat on the other leg.

Do the stretch 2 to 3 times a day on both sides.



## Straight leg raise

1. Lie on back with one leg bent and the other leg straight.
2. Lift up the straight leg to thigh level of the other leg, then lower it back down.
3. Repeat on the other leg.

Do 2 sets of 10 leg raises with each leg.



## Clamshells

1. Lie on side with knees bent and feet together.
2. Lift the top knee up, then lower back down to starting position.
3. Repeat on the other leg.

Do 2 sets of 10 clamshells on each side.



## Bridging with resistance band

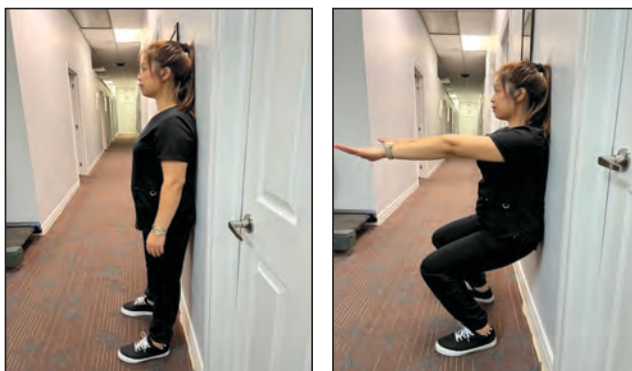
Lie on your back with your knees bent to prepare for the bridge exercise. Place an exercise band around your thighs above your knees.

Keep your pelvis level as you lift your hips/pelvis and buttocks into the air. Pause, return back down to the ground. Don't let your pelvis wobble as you move up and down. Hold your knees 4-6 inches apart. Perform 2 sets of 10 repetitions once a day.



### Wall Squat

Stand with your pelvis, back, and head touching a wall. Your feet will be approximately hip width apart and far enough out from the wall. When you slide down, your knees will make a 90degree angle. Try to have the knee track toward your second toe to insure proper alignment of the knees. From your starting position, slowly lower your body down and hold for time. As you improve, lengthen the amount of time you hold the wall squat. Be sure to keep your pelvis, back, and head against the wall. Keep the movement pain free. Perform 3 sets of 15-20 seconds holds once a day.



### Side Stepping with an Exercise Band

Tie the exercise band above your knees. Move into a slight squat position. Try to take side steps while keeping your feet facing forward. Move slowly and try to keep your head at the same level. Walk sideways for 20-30 feet. Return back again, but don't turn around. Perform 2-3 sets once per day.



### Surgery

In very rare cases, if pain is debilitating and doesn't subside after the growth spurt, surgery to remove the bony overgrowth might be recommended.

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## Alternative Medicine

### 1. Try an Epsom salt bath

There are some natural options to over-the-counter painkillers that you can try. For example, soaking in an Epsom salt bath is a good way to relieve the pain in your joints, especially your knee. Epsom salt can help to alleviate the pain in the joints, this includes any knee pain that you may be having. If you have overdone it athletically and are suffering from pain in the joints because of it, taking an Epsom salt bath can go a long way in helping to ease the pain.



The Epsom salt will enter the body through the skin. Soaking in the warm water with the salts can help to loosen stiff joints and relax the muscles. Soaking in the bath can help to reduce any swelling and simply allow you to relax for a bit.

### 2. Use peppermint oil

Peppermint essential oil can be used to help treat Osgood-Schlatter disease. It's known to be an effective natural painkiller and muscle relaxant. Studies have indicated it's particularly useful in tension headaches and joint pain, so you can try using it to treat the pain and inflammation that comes with this condition.



### 3. Dry needling

Putting needles into your skin sounds like the last thing you want to do if you're in pain. However, dry needling can help you with the symptoms of this disease. It targets trigger points, alerting your body that there's an issue, and kick starts your immune system into fighting the problem.



#### 4. Shoe orthotics

A risk factor for OSD is poor biomechanics while running and jumping, and sometimes that's caused by flat feet and knock-kneed posture. Orthotics are customized shoe inserts that support the arch of your foot, align your legs and promote better biomechanics while standing, walking, running and jumping.

Health professionals who make custom orthotics include podiatrists and some osteopaths and chiropractors.



#### Food & Nutrition

One way to combat pain that does not involve pain medications is by adding some anti-inflammatory foods to your diet.

There are many great foods that have anti-inflammatory effects. Not only can adding these foods to your diet help alleviate some of the pain that you are experiencing from Osgood Schlatter disease, but they can also improve your health overall.

Some foods that have anti-inflammatory effects include ginger, garlic, cinnamon, turmeric, leafy greens, and blueberries. These foods also have many vitamins and nutrients that your body needs in order to function properly, leading to a healthier body overall.

**Peppermint tea:** If you are suffering from Osgood Schlatter disease, drinking some peppermint tea may help soothe the mind and body.



**Apple:** Apple is a symbol of healthy eating and they are abundant in healthful potassium, vitamin C and composition. Nutritional science has also revealed that apples are particularly rich in a class of compounds known as flavonoids which is good for Osgood's disease.



**Vitamin E & selenium:** The Osgood-Schlatter disease almost always responds to treatment with vitamin E and selenium. Taking vitamin E and regular intervals of selenium will see improvements within a few weeks. Various foods contain selenium, including meats, seafood, eggs, brown rice, and

Brazil nuts. The selenium level in each food depends on the concentration of selenium in the water and soil where farmers grew the food. Individual needs may vary, so consult your doctor about the correct dosage for you.



**Raw Foods:** Most raw foods, including vegetables, fruits, nuts, seeds, legumes, and seaweed are good options for snack.

**Bone Broth:** Bone broths, good quality fish oil, grass-fed beef and other organic meats strengthen bones, cartilage, and growth plates. Joint specialists suggest that bone broth can help treat Osgood Schlatter disease symptoms.



**Spicy Foods:** Spicy foods have capsaicin a natural pain reliever can help alleviate pain. Studies have indicated that spicy foods can improve relieve Osgood Schlatter disease pain in the body.



## Supplements

A dietary supplement is a manufactured product intended to supplement one's diet by taking a pill, capsule, tablet, powder, or liquid. A supplement can provide nutrients either extracted from food sources or that are synthetic in order to increase the quantity of their consumption.

**Collagen:** Collagen is a protein and is made of amino acids. When collagen is digested it breaks into amino acids. Your body then takes the amino acids from the collagen and takes it to the areas of the body that needs it the most.

In order to get more collagen in the body, you need to eat more animal-based proteins. Collagen is present in connective tissues and the bones of animals.

Good sources of collagen include beef, chicken, pork, and fish. Getting collagen from the connective tissue and bones, boiling the bones and creating bone broth is the best option to add more collagen to your diet.





**Chondroitin Sulfate:** Chondroitin sulfate is naturally in the body and helps maintain healthy joints, bones and skin. It produces collagen, which helps keep your joints flexible and your skin looking smooth and youthful. It also reproduces cartilage, which helps heal wounds and maintain tissue integrity. Take 750 to 1,500 mg daily when using this supplement.



Some recipes to include these foods in your meal plan are mentioned below:

### Recipe for ginger tea

**Ingredients:** 2 tablespoons fresh ginger root (about 2 inches), 4 cups water, 1 tablespoon fresh lime juice (juice of 1/2 lime), optional 1 to 2 tablespoons honey to taste.



Prepare the fresh ginger by peeling it and slicing it thinly to maximize the surface area. In a pot, add the water and ginger, and bring to a boil for at least 10 minutes. For a stronger and tangier tea, allow to boil for 20 minutes or more, and use more slices of ginger. Remove it from the heat, strain, and add the lime juice or just add a slice of lemon and honey to taste. Enjoy your ginger tea.

### Peppermint tea

To make peppermint tea at home:

- Boil at least two cups of water in a pan.
- Take about a handful of mint leaves and tear them.
- Add the leaves depending on how strong a tea you would want.
- Let the water boil for a few minutes. Don't strain the water right after you turn the burner off. Let the water soak up all the goodness of mint.

- Now strain it and pour it in a cup or mug. If you wish to add some more taste to your tea, you can add a hint of honey into it. Remember, you must add honey only after you have made the tea you should never cook honey.



## Red beans Salad

**Ingredients:** ¼ cup boiled red kidney beans, drained, ¼ 1 cup boiled and drained pinto beans, ½ cup chopped red onion, ½ cup chopped red pepper, ½ cup chopped yellow pepper, ½ cup chopped cucumber, ½ cup chopped parsley.



**For the dressing:** ¼ cup olive oil, ¼ cup vinegar, 2 tablespoons lemon juice, 1 clove of minced garlic, 1 inch of ginger crushed finely, 2 teaspoons ground cumin, 1 teaspoon ground coriander, ½ 1 teaspoon black pepper, ½ 1 teaspoon chili (optional), ¾ 1 teaspoon salt

**Method:** In a bowl, mix all the vegetables. Then, put all the ingredients for dressing gradually. Stir the salad and mix it well. Top it with fresh parsley and serve it directly. It can be used as a side dish with soup or main course.



## Recipe 2: Tuna Salad

**Ingredients:** 1 cup chopped arugula, 2 cups of chopped salmon or tuna, 1 cup chopped tomatoes, ½ cup of colored capsicum, ¼ cup of black olives, 2 tablespoons of chopped parsley, ½ cup of chopped red cabbage.



**For dressing:** 1 tablespoon olive oil, 1 clove of minced garlic, 2 teaspoons lemon juice, Pinch of chili, Pinch of salt.

**Method:** In a bowl, mix all the vegetables. Then, put all the ingredients for dressing gradually. Stir the salad and mix it well. Top it with fresh parsley and serve it directly. It can be used as a side dish with soup or main course.



## Fruit bowl Salad

**Ingredients:** ¼ cup of chopped kiwi, ¼ cup of chopped strawberries, ¼ cup of chopped pineapple, ¼ cup of chopped bananas, ¼ cup of pomegranate, 1 teaspoon of finely chopped ginger, 1 teaspoon of honey, ¼ cup of orange juice, ¼ cup of lemon juice and ¼ cup chopped mint.



**Method:** Put the fruits in a bowl. Add honey, ginger, lemon juice, orange juice and mix well. Top it with freshly chopped mint and serve.



## Green Greek salad

**Ingredients:** 2 cups of medium chopped tomatoes, 2 cups of chopped cucumbers, 1 cup medium chopped lettuce, 1 cup chopped onion, ½ cup chopped white cheese, 1 cup chopped sweet green pepper, few slices of black olives, ½ cup of lemon juice, pinch of salt, 1 tablespoon of vinegar, 2 tablespoons of olive oil, 1 tablespoon of thyme.



**Method:** Put all the ingredients together, and stir them except for the white cheese, onions, and black olives. Add salt, olive oil, thyme, vinegar, and lemon juice and mix well. Top the salad with cheese, onions and black olives while serving. It can be used as a side dish or main course.



## Recipe for Bone broth soup



**Ingredients:** 1 liter water, Bones of meat, fish, or poultry, preferably meat, 1 teaspoon of vinegar, Pinch of salt and pepper

**Method:** Boil the ingredients in a suitable size pot over medium heat for 4 to 6 minutes, stir occasionally.



After the water boils, reduce the flame and add Onions, Celery, Carrots, Parsley, Thyme and Garlic to add some flavors. Now cook with covered lid for 10 to 24 minutes.



After that, turn off the flame and let it cool down. Once cooled, filter the broth with a cheesecloth or strainer.



Add salt and pepper according to your taste and serve it hot.

## Recipes for juices

### Green Juice

**Ingredients:** 1 orange, 2 cups of pineapple, a cup of chopped avocado, 2 sticks of celery, 2 pears, lemon juice, a piece of ginger, 2 spoons of turmeric, a little black pepper, half a spoon of honey



**Method:** take all the ingredients and blend it in a blender. Don't use the juicer machine as we want to keep the pulp for good results. Pour in a glass and consume fresh.



### Pumpkin juice

**Ingredients:** 1 cup of boiled red pumpkin, 1 cup of grapefruit, Quarter cup of lemon, ½ cup of cranberry, ¼ cup of cherries, ¼ teaspoon of turmeric, ½ teaspoon of flaxseed, ½ teaspoon of nigella, a teaspoon of cinnamon, 3 tablespoons of honey



**Method:** All materials are added to the mixer and drink two cups daily.



### Benefits of this drink:

- Activates blood circulation.
- It stimulates the nerves.
- Strengthens bones and relieves pain.
- It is a rich source of many vitamins, such as folic acid, vitamin B3, and vitamin B, which are important for the functioning of various vital processes in the body, and the work of enzymes.
- Maintains the integrity and functions of nerves, in addition to contain important minerals, such as: potassium, calcium, copper, magnesium, and phosphorous.

### Milk cocktail

**Ingredients:** Two cups of milk, 1 teaspoon of chia seed, 1 teaspoon of nigella, a teaspoon of flaxseed, a teaspoon of honey  
1 teaspoon of turmeric, a teaspoon of honey, 2 tablespoons of oats



**Method:** Mix everything in a blender and drink daily.



### Benefits of drinking this drink:

- Helps relieve pain.
- Repairs bones.
- Relieves osteoporosis and pain.

- Relaxes muscles.
- Reduces inflammation.
- Stimulates blood circulation.

### Vitamin C juice

**Ingredients:** Half a banana, 1 orange, 2 pieces of kiwi, 2 teaspoons of flaxseed, 2 teaspoons of sesame, ¼ cup of pomegranate, 2 pieces of walnuts and almonds, 2 spoons of honey.



**Method:** Mix all together and blend it in a mixture. Drink it in the morning.



### Benefits of this drink:

- It is a stimulant for the blood circulation.
- Stimulates the nerves.
- Reduces joint and respiratory infections.
- Lessens the pain.



### **Dr. Mahmoud Sous – Ph.D.**

During the period of 1995-1999, I went to the medical school in Poland to research about the various methods of back pain treatment. After finishing my PhD, I took variety of courses including naturopath, acupuncture, and manual techniques. This gave me an idea that exercises, and massage could be helpful in treatment of chronic pain. But my findings didn't stop me here, I also worked as a naturopath practitioner in Canada where I got familiar about treatments with Chinese medicines, osteopath techniques and some other manual therapies which helps in pain management.

Fixing injuries requires an understanding of anatomy and biomechanics. That is why my research and treatment belong to the holistic approach of using different techniques and remedies for the treatment of back pain. In 1990, I realize that there are some complex spinal aspects and issues which leads to of back pain. So, from my case studies I formulated a guideline which is clear and easy to understand and will fix your issues.

My goal is to help people visualize how the body functions and what happens inside when you experience pain. Healing requires to focus on one's action because pain results due to faulty actions and movements. This thought motivated me to work on a book which will include all home remedies where people can treat themselves to fix their pain. I have included knowledge based on my clinical research using manual massage therapy, food habits, nutrition facts, heat, sauna, hydrotherapy, cold water treatments which overall helps in pain management. It gives me pleasure to introduce this book to the community where I have shared all my experienced treatment plans.



### **Priyanka Yadav (Physiotherapist)**

I started my career in 2011, since then I have worked as a Physiotherapist in several clinics and hospitals in India. Working mostly in the Outpatient department made me realize that Physio's role is extremely crucial in the rehabilitation and recovery process of a patient. My desire to reach out to more people motivated me to work for this book. Have worked with Dr. Mahmoud on several research books on self-pain management. We have been constantly working on curating the best suited protocol for various Musculoskeletal conditions. Additionally, we have also included approaches with alternative medicine.



### **Bhoomika Pathak (Physiotherapist)**

After graduating in 2014, I have been working with various clinical conditions like sports injury, musculoskeletal injury, and neurological disorders for more than 5 years. Along with Dr. Mahmoud & colleagues I have worked on treatment and pain management for various musculoskeletal injuries and pain population. With all the successful outcomes till now, we have designed this book with stagewise guide to treat your knee pain.

**We Believe in a Pain-Free Society!**

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