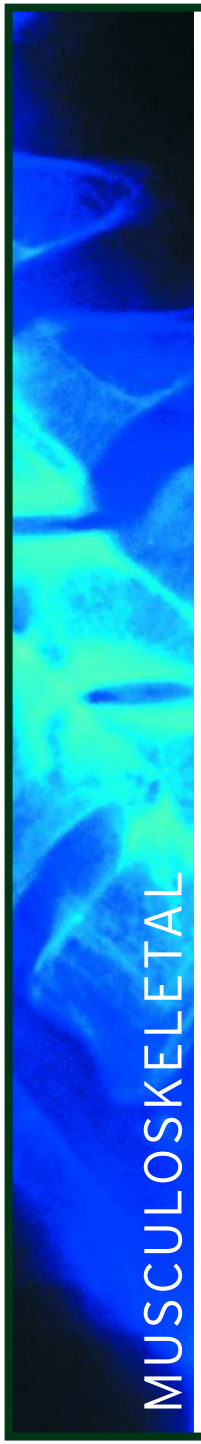


MD PHYSIOTHERAPY SERVICES

YOUR GUIDE TO

GENERAL KNEE PAIN

Contents

Introduction

Please take note of the following before starting any of the exercises in this guide:

- The information contained in this guide is intended to assist in managing your recovery.
- This guide is based on the latest medical research in the field and contains, to the best of our knowledge, the best advice available.
- This guide is complimentary to other medical services and is not intended as a substitute for a health care provider's consultation.
- Never disregard medical advice or delay in seeking it because of something you've read in this guide.
- Should you doubt a particular exercise in your situation, please consult your health professional.

When consulting your health professional, it is wise to take this guide with you to show them.

The Knee Joint

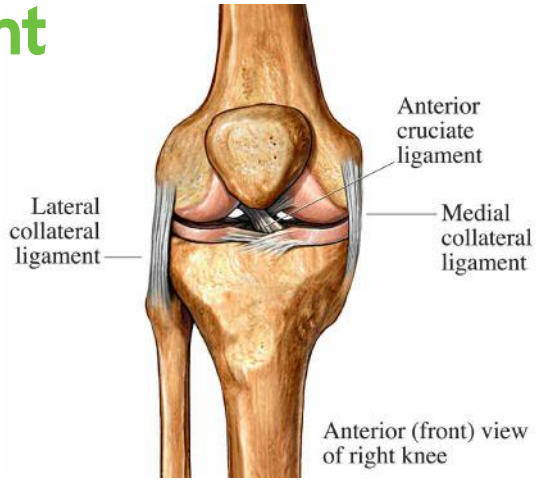
The knee joint is one of the most complex joints in the human body, and is designed to provide mobility and stability. It is a form of hinge joint, with the two main movements being flexion (bending the knee) and extension (straightening the knee). It is not, however, a true hinge joint, as it also allow for rotation of the tibia (the shin bone). The knee is also called the tibio-femoral joint and refers to the region where the thigh bone (femur) joins with the shin bone (tibia). The stability of the knee joint depends mainly upon the ligaments, joint capsule, and surrounding muscles.

BONES

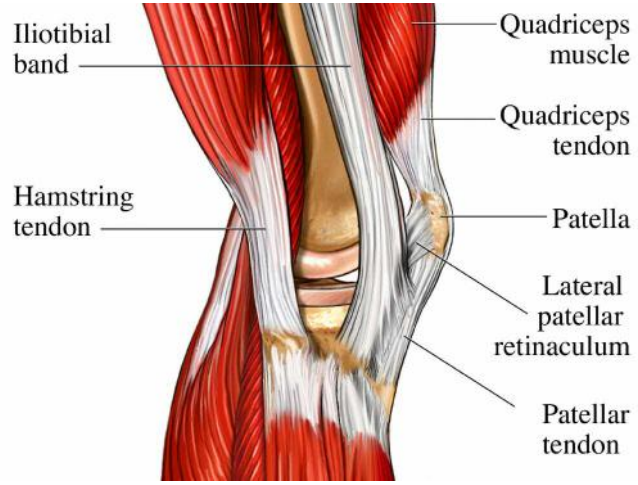
The femur (thigh), tibia, fibula (lower leg bones) and patella (knee cap) make up the bony structure of the knee joint. The ends of the bones and back of the patella are covered in smooth cartilage. The patella (knee cap) is located in the tendon of the quadriceps (thigh) muscle.

LIGAMENTS AND TENDONS

Ligaments are strong bands of connective tissue linking bone to bone, and tendons link muscle to bone. The medial/lateral collateral ligaments (on the inside and outside of the knee), the anterior/posterior ligaments (situated within the knee at the front and back of the knee respectively) and the cruciate ligaments all play a vital role in the normal biomechanics (movement) of the knee and aid in creating a stable joint.



Anterior Cruciate Ligament (ACL) prevents the shin bone from moving forwards during weight bearing. It also works with the muscles to stabilise the joint in fexion, extension and rotation.
Posterior Cruciate Ligament (PCL) prevents the shin bone from sliding backwards on the thigh bone, and prevents over straightening (hyperextension) of the knee.
Medial Collateral Ligament (MCL) helps to stabilise the inner aspect of the knee and prevents excessive widening of the medial (inside) section of the knee joint where the thigh bone meets the shin bone.
Lateral Collateral Ligament (LCL) helps to stabilise the outer aspect of the knee and prevents excessive widening of the lateral (outside) section of the knee joint.
Iliotibial Band (ITB) acts as dynamic stabiliser on the outside aspect of the knee.



MENSCI

These are two oval spongy discs that cushion any stresses placed on the knee joint. The medial & lateral menisci form a shock absorber within the knee joint, absorbing some of the force which goes through the knee during movement and activity. They also stabilise the knee (especially when it is bent at a 90° angle) and play a role in joint lubrication and nutrition. Due to the reduced blood supply to the meniscus, damage may result in part of the meniscus being removed, if it is unable to heal after a repair.

BURSAE

A bursa is a flattened sac found between muscle and bone, tendon and bone, tendon and ligament and so forth. Bursae aid in reducing the friction between the anatomical structures.

MUSCLES

The thigh muscles are made up of a group of four muscles known as the quadriceps. The quadriceps muscles contract together to straighten the knee (extension). The muscles at the back of your leg are the hamstring muscle group, which consists of three muscles that work together to bend the knee. The knee muscles, however, do not always act in isolation, and muscles of the hip and lower leg also contribute to knee movement and function.

Understanding pain

Pain is a unique sensation to each individual, and can be influenced by a variety of physical, psychological and social factors. It is essential to understand why pain develops, if we are going to manage and treat it successfully. The body uses a series of events to feel pain, involving both physical reactions and emotional responses.

Pain receptors:
Special nerve endings in our skin pick up any stimulation, such as heat or pressure. They send pain signals to the brain via the spinal cord.

Brain:
Pain impulses reach the cerebral cortex (the thinking part of the brain), which assesses the location and severity of the pain. The brain then sends messages to the receptors to reduce the sensation of the pain, and to the muscles to withdraw from what is causing the pain.

Autonomic Nervous System:
The brain also activates the autonomic nervous system, which affects breathing, blood flow and pulse rate, to start with the repair of the injury. It also sends messages to the limbic centre of the brain, which controls our emotions such as sadness and anger.

TYPES OF PAIN

Acute Pain is a sudden onset of pain that can range from mild to severe pain, and last anything from a couple of days to a few months. The pain will subside once the injury has healed.

Chronic Pain occurs when nerves continue to send pain messages, even when healing has occurred and there is no continuing tissue damage. This pain continues due to a variety of reasons, such as nerve damaged, disease, or psychosocial factors.

UNDERSTANDING INFLAMMATION

Inflammation (swelling) is the body's protective reaction to injury, irritation, or disease. After initial injury or infection, the body triggers chemicals from its white blood cells to protect the tissues against foreign substances. The increased blood flow causes redness and warmth in the area. Inflammation can often be painful due to compression or irritation of the nerve endings. An affected joint is therefore often swollen, tender, red, and warm, and sometimes involves joint stiffness.

Inflammation, although often painful, and sometimes harmful, is in fact a crucial response to tissue damage. It kick starts tissue repair, whilst protecting the area from infection, and further injury.

What causes knee pain?

Pain is perceived within the knee joint when nerve endings are stimulated by chemicals released from damaged tissues or structures. Theses nerve endings are present in bone, and soft tissue of the knee. Therefore you may feel pain within or around the knee when you receive a knock, bump or blow to the knee, or when performing an activity that you are not accustomed to, or haven't performed in a while. Other means of sustaining knee pain could be as a result of:

OVERUSE & OVERLOAD

Movement of the knee causes an increase of pressure within the joint, and requires the muscles to act. Doing an activity repetitively, such as walking, jogging or ascending/descending stairs may instil or exacerbate pain. Overusing the joint can result in excessive friction and tension within the muscles, tendons or ligaments, which eventually leads to micro-tears within the tissues, and this can result in pain, swelling and inflammation.

BIOMECHANICAL & MUSCULAR IMBALANCES

The knee is designed to work in perfect alignment between the shin, thigh bone, and the knee cap (patella). The knee cap sits within the tendon of the front thigh muscles (quadriceps) and glides over the groove on the thigh bone. Should any of these muscles be weak, or if one muscle is working harder than another, the knee cap may be pulled out of alignment. If the patella is not centred in the groove correctly, this results in increased pressures between joint surfaces and subsequent wear and tear. As with any joint in the body, the surrounding muscles need to be in a good balance of strength and flexibility, otherwise the body will begin to compensate and certain structures will have to bear more load than they can handle.

PREDISPOSING FACTORS

Overweight or obesity can contribute to knee pain, as more stress and strain is placed on the knee.

A previous injury in the knee or surrounding structures can lead to weakness, instability, scarring or misalignment which affects the knee function.

Chronic conditions such as rheumatoid, or osteoarthritis, gout or lupus, can all contribute to the optimal working function of the knee joint.

DAMAGE TO THE STRUCTURES

The anatomical structures within the knee joint can be damaged when overloaded during movement or activity. Injury can result in tears to the soft tissues like the muscles, ligaments and tendons, or break or damage to hard structures like the bone, cartilage or mensci.

Common knee problems

LIGAMENT INJURIES

Cruciate ligament injuries - are usually caused by sudden twisting or hyperextension (excessive straightening) motions of the knee (ACL), or by a direct blow to the knee (ACL/PCL). These are characterized by a 'popping' sound and giving way of the leg when weight bearing.

Collateral ligament injuries - are caused by direct impact to the side of the knee, which causes a stretch or tear to the ligament on the opposite side of the knee. The joint is often unstable following these types of injuries.

TENDON INJURIES

Patellar tendonitis – repetitive stress on the quadriceps muscle causes strain on the patella tendon. It may become swollen or torn, causing pain in the lower aspect of the knee, from under the knee cap. It is usually called Jumper's Knee, and results from overdoing a movement or activity.

Iliotibial Band Syndrome (ITB) - is an ache or burning pain on the outside of the knee caused by the ITB rubbing against the outside of the knee bone. It is often caused by muscle imbalances that become symptomatic when the knee is overused (such as overtraining in long distance running), and the pain usually worsens when resuming this activity.

CARTILAGE AND STRUCTURAL DAMAGE

Anterior Knee pain (Patellofemoral syndrome) - is a wearing of the cartilage at the back of the patella, caused by friction against the femur. It can occur due to trauma, muscle weakness or overuse of the knee. A dull pain around or under the knee cap is felt, and is often worsened with weight bearing, especially walking down stairs.

Meniscus tears - occur when weight is applied to the knee whilst it is twisted or rotated (like turning to hit a tennis ball). The knee may 'lock', click or feel as if it is going to give way, following this type of injury.

Osteoarthritis – is a degenerative condition where the joint cartilage gradually wears away, causing pain and swelling. It is common to have morning stiffness which eases when moving about, with osteoarthritis. The joint may also lock or click with movement.

What treatment can I receive?

The treatment you will receive will depend upon the cause, nature and severity of your knee pain. Your GP or health professional will be able to diagnose your injury from the following information:

A history of the injury: The type of injury and how it occurred gives vital information as to the site, and what structures may have been injured. If there has been no violent incident there may be some underlying cause for the injury and it is important that the underlying cause is determined on examination.

Description of Symptoms: The type and site of the pain, swelling present and other sensations such as clicking, grinding, locking, giving way, all provide clues of what is going on within the joint.

X-rays: If your GP or health professional suspects a broken bone, or structural damage to the bones or cartilage, an X-ray may be done to confirm this.

MRI scan/Ultra sound scan: MRI/US scans are done to confirm a diagnosis of a soft tissue injury (such as ligaments or mensci).

In most cases knee pain can be treated with common conservative measures. The goal of treatment is to reduce pain by reducing the inflammation, and to return the knee to full function.

If you have sustained a knee injury from a traumatic event, or if there is swelling present, the **RICE** principle should be followed initially following the accident or injury.

REST	Stop using the injured area. Allow your injured region to rest from weight bearing, or any activity that brings on symptoms, for approximately 24 hours after the injury. You can move the area, but make sure that it is pain free to prevent any further damage
ICE	Ice the area every 2 hours for 15- 20 minutes to decrease pain and swelling for the first 48-72 hours
COMPRESSION	Apply pressure to the area in the form of a stocking, tight sock, brace, strapping or bandage to provide both support and pressure to decrease any swelling
ELEVATION	Keep the injured area raised. Elevate the area ideally higher than your heart, to reduce swelling and pain

Ice is an important aid in relieving pain and decreasing swelling by reducing the bleeding in the damaged tissue. It should be applied for 10-15 minutes every two hours (never apply ice directly to the skin) and is an essential part of the treatment, especially in the first 48hrs after an acute injury.

PRECAUTIONS WHEN USING ICE THERAPY

- Ice treatment must be used carefully otherwise it may cause a skin burn.
- Never put an ice pack directly onto the skin, always use a damp towel or cloth to prevent an ice burn.
- Only apply an ice pack to areas of skin with normal sensation i.e. you must be able to feel hot and cold.
- Never put an ice pack over an open wound or graze.
- Do not apply an ice pack to an area with poor circulation.
- Never leave an ice pack on the skin longer than the time stated in this advice sheet.

ANTI-INFLAMMATORY MEDICATION

This can be taken to control inflammation. It is important to get advice from your pharmacist before starting a course of anti-inflammatory medicine.

PHYSIOTHERAPY

This would include a full assessment and treatments such as soft tissue techniques, education and a full rehabilitation programme to ensure return to full function. They may also refer you to a podiatrist for a biomechanical assessment and advice regarding footwear.

What exercises can I do?

It is important that you are aware that the exercise program that is included in this pack is a general exercise program to encourage the return of muscle strength and range of movement to the knee joint. It is advisable that you show this program to your allied health professional, if you are seeing one, to ensure that the exercises in it will be effective in aiding the recovery of your specific injury and to see whether you are performing these exercises in the correct manner.

When starting an exercise program it is important that you start slowly, and ensure that you are able to do all exercises in a controlled, pain free, and full range of movement before moving on to the next exercise phase. If you are not used to doing exercise, always start gradually, feeling only a slight exertion, and slowly progress as you get stronger. You may feel some discomfort while doing the exercises or afterwards, and this is completely normal, especially if the exercises are not familiar to you. Just be cautious not to exacerbate other existing symptoms.

Try to include aerobic exercises (exercise which gets your heart beating faster) such as cycling, swimming and walking, as long as it is pain free, as these are relatively easy on your knee joints.

If you experience an increase in your pain during any of the exercises, decrease the intensity of the exercises by:

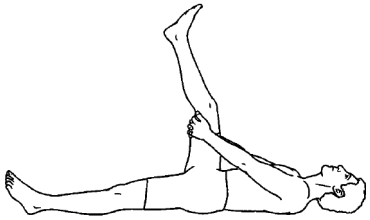
- decreasing the number of sets
- decreasing the number of repetitions
- decreasing the range of movement
- decreasing the resistance

Do all exercises slowly and breathe normally. Progress gradually according to your own level of comfort. Stiffness or fatigue may result following the exercises, but should not last longer than 24 hrs, and your symptoms should not in any way be aggravated by the exercises.

Exercises phase 1

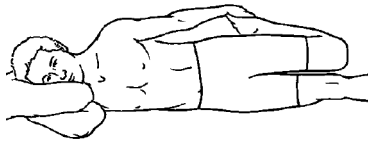
STRETCHES

- Hold each stretch for **30 seconds** and repeat **2-3 times** on each leg
- You should feel a pull in the muscle, which can be uncomfortable if the muscle is very tight, but it should not exacerbate your pain.
- Hold the stretch steady **Do not bounce**



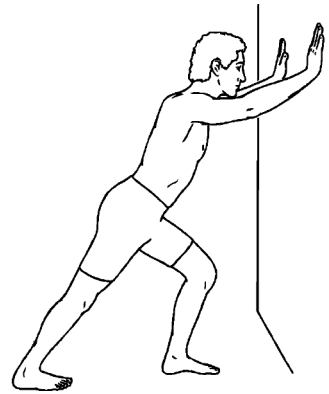
HAMSTRING STRETCH

Lying on your back, one leg straight and one knee bent. Raise the bent leg up towards your chest until your knee is in line with your hip. Now straighten the knee. You should feel a stretch at the back of your leg. You can use a towel if necessary to aid you in lifting your leg for the stretch.



QUADRICEPS

Lying on your right side, your right arm extended up to cushion your head, use your left hand to grasp your left ankle as you bend your left knee backwards. You should feel the stretch along the front of your thigh. Repeat this twice on your right before rolling over to stretch your left leg. It is important to keep the other leg bent at both the hip and the knee, so as not to hyperextend your back. A towel can be use to aid you in this stretch if you are unable to reach your ankle or bend your knee too far.



CALF STRETCH

Stand about a meter away from a wall. Place both hands against the wall with one foot further back than the other. Now lean in towards the wall, bending the front knee and keeping the back knee straight and the heel on the floor. Hold for 20-30 seconds, and then simply bend your back knee slightly, still keeping your heel flat on the floor. You should feel the stretch lower down your leg in the region of your Achilles tendon. Hold for 20-30 seconds and then repeat with the other leg.

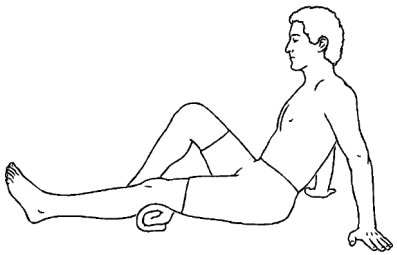
BUTTOCK STRETCH

Lying on your back, rest your right ankle on your left knee. Using your hands lift your left leg into the air, bending the knee at 90°. Pull your left leg gently towards your body. You should feel a stretch in the upper back part of your right leg. If this stretch is too painful to do initially, leave it and only try with phase 2 exercises. A towel can be used to aid you in this stretch

Exercises phase 1 (continued)

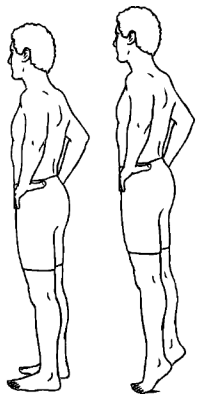
STRENGTHENING

- Complete 2 sets of 10-15 repetitions on each leg.
- Always work in a pain free range of movement



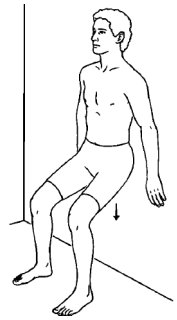
TERMINAL LEG EXTENSIONS

Sitting on the floor with one leg outstretched in front of you and a pillow/rolled up towel under the knee. Try and lift the heel off the floor by contracting your thigh muscles and straightening the leg. Hold for 10 seconds and then relax. You should feel the muscle on the inside of your leg contracting. Your main focus should be on contracting your thigh muscle and not on lifting your heel off the floor. As you get stronger the two will go hand in hand. Repeat 10 on each leg.



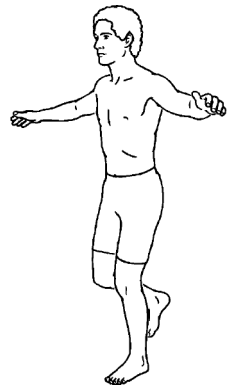
CALF RAISES

Supporting yourself against a wall, raise up onto your toes in the following manner: First onto your big toe, then onto the middle toes and lastly onto your little toe. Repeat this sequence 10 times.



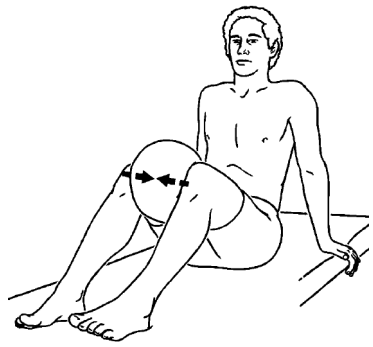
WALL SLIDES

Stand leaning up against a wall, your feet a little away from the wall, shoulder width apart and knees parallel to each other. Keep your back against the wall throughout the movement. Slowly lower your body into a seated position (knees to 90°) and hold for 10 seconds. Perform 10 repetitions.



STORK STANDS

Balance on one leg for 30 seconds then repeat with the other leg.
Repeat this exercise with your eyes closed. Repeat the original exercise (with eyes open) 10 times on each side (i.e. for a total of 5 min per leg).
Progress to standing on an unsteady surface, e.g. a cushion or a narrow piece of wood, starting with standing on both feet (Stand for a total of 5 min).
If you have access to a wobble/balance board use that instead.



BALL SQUEEZING AND PUSHING

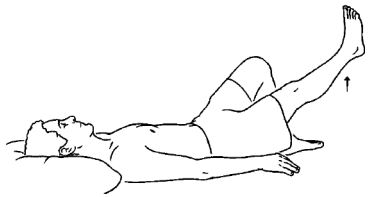
Lying on your back with your knees bent, firstly place the ball between your knees and squeeze. Hold for 10 seconds and repeat 5 times. Now place the ball between your knee and the wall, push out for 10 seconds and repeat 5 times on each leg.

Exercises phase 2

Phase 2 exercises can be started when you are able to do all the Stretching and Strengthening exercises in Phase1 with no adverse effects and good control. Continue to work in a pain free range of motion, and continue to do the stretching exercises of phase 1 with each exercise session.

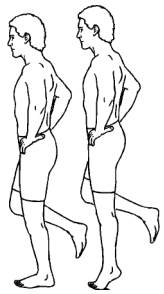
STRENGTHENING

- Maintain good control and form throughout these exercise i.e. in both directions of movement
- Continue to do 2 sets of 10-15 repetitions of the exercises. You can progress the exercises by doing more sets or more repetitions, should you feel you are getting stronger



STRAIGHT LEG RAISES

Sit on the floor with one knee bent and the other straight, and your arms supporting your back by bringing them close to your body. Now raise your straight leg 20cm off the floor, keeping the knee straight and toes pointing towards the ceiling. Repeat 2 sets of 10-15 repetitions. Now change the toe position so that the toes are pointing outwards. Make sure that the rotation of your foot is from your ankle and not simply turning at your hip.
Repeat 2 sets of 10-15 repetitions.

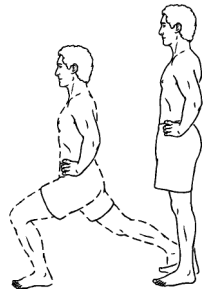


SINGLE LEG CALF RAISES

Standing on one leg, supporting yourself against a wall, raise up onto your toes in the following manner: First onto your big toe, then onto the middle toes and lastly onto your little toe. Repeat this sequence 10 times per leg.

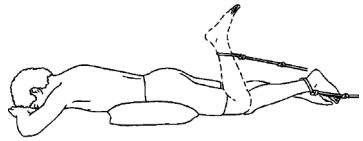
STEP UPS

Stand on one leg on a step facing up the stairs. Slowly lower yourself by bending your knee. Return to start position without pushing off with the opposite leg. Be aware that your knee and foot do not roll inwards. Perform 2 sets of 10 reps per leg.



LUNGES

Lunge with one foot forward trying to keep the knees 90°. Ensure that your front knee does not go over your front foot. Return to the start position. Perform 10 reps with the one foot forward before changing to the other foot forward. Try to be as stable as possible during the exercise. This can be done statically, by not returning to the start position after each set.



HAMSTRING CURLS WITH BAND

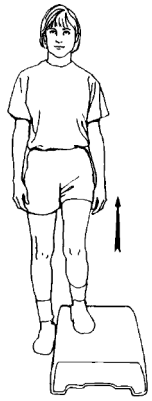
Lying face down, one end of the band tied around your ankle and other end tied to the top of a table leg. Start with your knee straight, hips on the floor and stable. Bend your knee pulling against the band, to bring your foot down towards your buttocks without knee or hips to lifting off the floor. Repeat x 10.

MINI SQUATS

Stand with feet hip width apart and hands out in front. Bend the knees keeping feet flat on the floor - knees must not go past a 90° angle. Return to the starting position. Movements should be slow and controlled and your knee should go down straight .

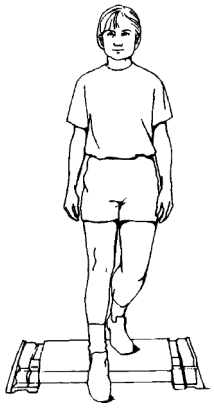
Exercises phase 3

- Progress to Phase 3 exercises once you are able to complete both Phase 1 and Phase 2 without pain or aggravation of symptoms.
- Make sure that you have the balance and stability to safely perform these exercises



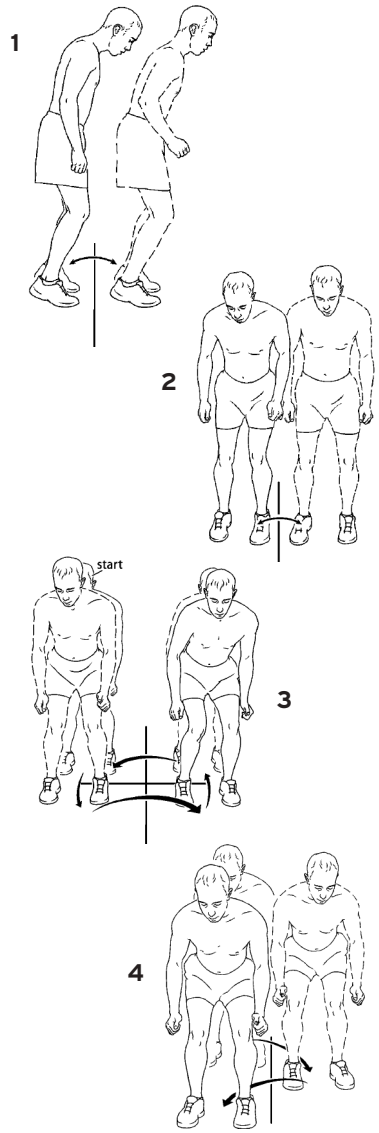
LATERAL STEP-UPS

Standing side on to a step, with one leg hanging off the step. Slowly lower the outside leg towards the floor, ensuring that your weight is more on your heel but foot is flat, and that as you bend, your knee goes in a straight line. Make sure the movement is controlled and that you do not let the hanging leg touch the floor before you return to your start position



STEP-DOWNS

Stand on one leg on a step facing down the stairs. Slowly lower yourself by bending your knee. Return to start position without pushing off with the opposite leg. Be aware that your knee and foot do not roll inwards, that your weight is mostly on your heel with your foot flat, and that your knee goes down in line with your second toe.



HOPPING

Standing on two legs hop from one point to another in the following manner

1. Forwards and backwards
2. Side to side
3. In a square (clockwise and anticlockwise)
4. In a zigzag forwards and then backwards Repeat each sequence 10 times per leg. Progress to hopping on one leg.

RUNNING DRILLS

These can be done once the above can be performed with good control and without pain. With the drills try replicating movements that you could do in your sport i.e. running forwards, backwards, side to side, sudden change of direction, zigzag running etc. Also try and change the pace as you do them i.e. sudden sprinting, sudden stopping

Contact us

This guide is designed to assist you in the self-management of your injury/condition.

We are here to assist your recovery in the shortest but safest possible time. If you have any uncertainties or queries regarding the information, please do not hesitate to contact us on:

Phone 017890400999 / 07870166861
www.mdphysiotherapy.co.uk