



## YOUR GUIDE TO

# LOWER LEG FRACTURES

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## 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.

- Many people have found quick and lasting relief from their pain by acting upon the information provided, but everyone decides for themselves what to do with this information. 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.**

# Anatomy of the lower leg

The lower leg is made up of two bones namely; the **Tibia** and the **Fibula**. The Tibia and Fibula join together at both the knee and the ankle joint. The Tibia lies on the inner side of the leg and is the bone of the lower leg that bears most of the body weight. It connects at the knee to the femur (thigh bone) and

at the ankle to the Talus (foot bone). The fibula sits on the outer side of the lower leg and joins to the tibia just below the knee joint and on the outer side of the ankle joint. The bones of the lower leg are stabilised at both the knee and ankle joint by strong fibrous ligaments, tendons and muscles.

## What is a fracture?

A fracture is a break in the continuity of the bone and is visible on x-ray. Fractures occur when the ultimate yield point of the bone is reached, which can be a result of a single traumatic incident (direct or indirect forces being applied to the bone), repetitive stress (this can cause fatigue e.g. dancers and athletes) or a pathological fracture (these occur when the bone is abnormally weakened e.g. osteoporosis). Fractures of the lower leg include both tibia and fibula, with fractures of the tibia generally resulting in associated fibula fractures due to the force that is transmitted along the membrane that connects the two. Tibia and fibula fractures mostly occur as a result of either indirect (twisting your leg with your foot planted) or direct (motor vehicle accident) trauma, but are also commonly affected by repeated stresses resulting in stress fractures of these bones.

The type of fracture that occurs is dependent on the direction and strength of the force, as well as being

influenced by the underlying strength of the bone, and the restraining action of the surrounding soft tissue. When the fractured ends of the bone pierce the skin, the injury is known as an open (or compound) fracture. A closed (simple) fracture occurs when the skin remains intact. The treatment that you will receive after sustaining a fracture to your tibia/fibula will greatly depend on the type of fracture, for example, an open (compound) fracture is seen as a great risk of infection and therefore requires special and immediate treatment. All fractures however should be viewed as potentially serious injuries as they do not only result in damage to the bone, but also to the soft tissues in the immediate surrounding areas i.e. tendons, ligaments, muscles, nerves, blood vessels and the skin.



# Common lower leg fractures

Tibia and Fibula fractures can occur anywhere along the length of the bone. The site of the fracture is mostly dependent on the site of the impact, or cause of the injury. Most fractures occur around the ankle. The common sites and types of fractures that occur in the lower leg are listed below.

(i.e. mid shaft), the type of fracture (transverse, oblique etc) and the associated soft tissue damage.

**4. Maisonneuve Fractures:** These are rare and considered to be unstable ankle injuries. Patients with this type of injury will present with pain at the top of the fibula (on the outer side just below the knee) in addition to pain on the inner side of the ankle and the ankle will feel very unstable.

**5. Stress Fractures:** Are commonly found in athletes, and can occur as a result of repetitive stress that may occur while participating in sports (also common in dancers). They often result from a change in training routine, or overtraining.

**6. Avulsion Fracture:** This fracture occurs in the area of the bone where a tendon or ligament attaches to it. This occurs when the force from the tendon or ligament is so great that it pulls a piece of the bone.

**7. Snowboarders Fracture:** This is a fracture that occurs to the outside of the talus (the bone that fits between the tibia and fibula to form the ankle joint). Computed tomography imaging may be required to diagnose this fracture. This should be suggested in snowboarders who complain of pain on the outside of their ankle, but show no signs of a break on an x-ray.

- 1. Tibial Pilon/Plafond Fractures:** This involves an injury to the lower end of the tibia (closest to the ankle) and is mostly the result of a high energy loading injury i.e. jumping from a considerable height, or low energy rotational injuries i.e. having your foot planted and rotating on it.
- 2. Tibial Plateau Fractures:** These fractures of the surface of the tibia that comes into contact with the thigh bone (femur). These fractures generally follow a trauma such as that sustained in a car accident or being hit by a car. It is thought that road traffic accidents account for 40-60% of these fractures, however in older osteoporotic patients these fractures can result from far less trauma due to the reduced strength of the bone.
- 3. Tibial Shaft Fractures:** This is the most common long bone fracture to occur and these injuries usually involve a fracture to the fibula as well. Fractures to the shaft of the tibia can result in both open and closed injuries. Tibial shaft fractures are described according to their position along the length of the tibia

Due to the severity of injury that can result from a lower leg fracture, it is essential that if you suspect you may have broken your leg, seek medical help immediately so that appropriate scans and treatment

can be provided to minimise the risk of further damage. It is also essential that you stabilise the lower leg to limit any further displacement or damage to associated soft tissue structures.

## What are the symptoms of a fracture?

Bones do not break haphazardly, with a common indicator being some sort of traumatic incident. Common features of fractures are the following:

- **A history of injury** - the type of injury gives vital information as to the site of the fracture and any associated injuries that may be present. If there has been no violent incident there may be some underlying cause for the fracture such as osteoporosis and it is important that the underlying cause is determined on examination.
- **Pain** - This is usually at the site of the injury but will vary with the site and instability of the fracture as well as from one person to another.
- **Inability to put weight on leg** - a loss of sensation or strength is particularly important as this may suggest nerve or vascular complications. It is possible however, for some people to still be able to move, or bear weight on, the joint despite a fracture occurring. Other factors therefore need to be taken into account before dismissing the possibility of a fracture.

- **Bruising and Swelling** - This is common when the fracture is close to the surface e.g. a fracture of the shaft of the tibia. Severe swelling, however does not distinguish a fracture from an injury to the surrounding soft tissue and therefore an x-ray may be needed to determine the diagnosis. A very swollen joint (especially after a direct impact as in a motor vehicle accident) may indicate a tibial plateau fracture and this will be accompanied with tenderness around the joint line on the inner/outer side of the knee.
- **Deformity** - There may be shortening of a leg, a change in the angle of the lower leg or a step in the bony alignment.
- **Tenderness and an increase in temperature** - Tenderness and localised pain over the fracture site as well as an increase in temperature are usually present; however this may also indicate a soft tissue injury.
- **All open fractures require antibiotics and an emergency Orthopaedic consultation.**

## What treatment will I receive?

Treatments of fractures in the lower leg are dependent on the nature and severity of the break. If the fracture is open, immediate surgery is required and effective infection control is essential to prevent any long term complications.

There are various techniques that can be used to ensure that the fracture site is well aligned and to maximise the union and stability between the broken bone sites.

**1. Reduction:** A reduction of a fracture simply means the realignment of the two ends of bone that have been displaced. This needs to occur if the bone does not naturally heal in the right position affecting function, or if the fracture is affecting the surrounding soft tissue.

**2. Hold/Fixation:** Either internal or external fixations are usually required to provide stability to the leg and ensure that effective healing takes place. External fixations can be either surgical or non surgical and include:

- a) Splints or casts** (plaster of paris)
- b) Traction** (used less frequently)
- c) External or frame fixation** (surgery is required to secure this structure, and the fragments are held in position by screws that pass through the bone both above and below the fracture site and held in place by a frame)

**Internal fixation** has become more popular as techniques have improved. An open reduction with an internal fixation is now frequently used in patients who are at an increased risk of long periods of immobility.

Common types of internal fixation include:

- a) Screws**
- b) Plates**
- c) Intramedullary nail** (a long rod that is inserted into the bone cavity and may be secured with a nail to prevent rotation and prevent the rod from moving)
- d) Wires**

How long you spend in hospital, and whether you receive your initial treatment in or out of hospital will again depend on the type and severity of your fracture, and what procedure was used to stabilise your fracture. It is therefore essential that you follow the advice of your Doctor as well as your physiotherapist with regards to how early you can start to put weight on your foot, what aids you need to use (e.g. crutches, stick, frame) and when you can return to activity after your fracture site has healed (e.g. after the plaster of paris has been removed).

After any period of inactivity there will be a notable loss of muscle strength in the leg and may be a reduction of range of movement in either the ankle or knee joints or both. It is therefore important that you start your exercise programme slowly, work in your pain free ranges of movement and always follow the advice of your doctor or allied health professional. Many of the isometric exercises from phase one can be started while you are in a plaster cast, and these can also help

to strengthen the muscle and encourage blood flow to the lower leg helping to prevent blot clots from occurring. It is also important while your injured leg is immobilised that you keep all other joints moving i.e. your hip and knee (if it is not affected as in a tibial plateau fracture) as well as the other leg. Reduced movement in joints for long periods of time can result in a reduced range of movement and a delay in returning to full function.

## What exercises can I do?

It is important that you are aware that the exercise programme that is included in this pack is a general programme to encourage the return of muscle strength and range of movement to the joints after you have sustained a fracture to your lower leg. It is however essential that before starting any of these exercises within this pack that you have consulted with

your Doctor or allied health professional and been given the all clear to start with strengthening activities. It is also advisable that you show this programme to your health professional to ensure that the exercises in it will be effective in aiding the recovery of your specific injury.

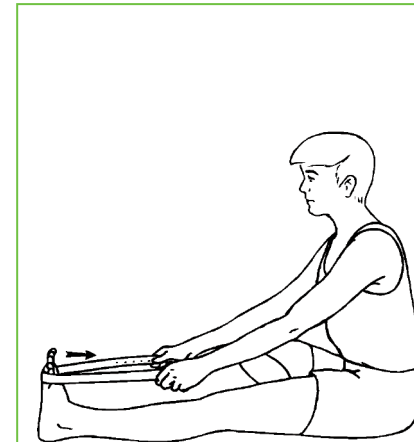
## Exercises

When starting an exercise programme 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. As already mentioned, if you are in a plaster cast, the isometric

(static) exercises in phase one can be performed, using the cast as your resistance. This will help to maintain some muscle mass while the cast is still on. All the exercises that are suitable to be done, even before the cast is removed, are indicated with an \*.

## Phase 1 STRETCHING

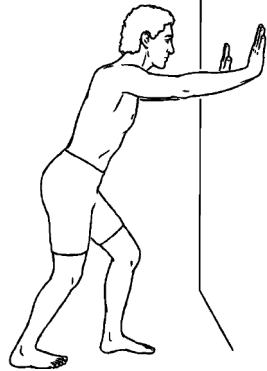
- Hold each stretch for **30 seconds** and repeat **2-3 times** on each leg
- Exercises should be performed **daily** and twice a day if possible.
- **Do not bounce** the stretch
- **Do not stretch into pain**



### GASTROCNEMIUS STRETCH

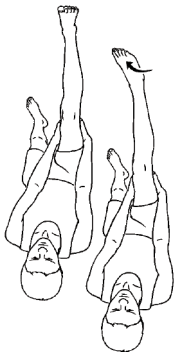
Keep the back leg straight with the heel on the floor and pointing in a straight line to the wall. Lean into the wall until a stretch is felt in the middle to upper calf. You may need to start this stretch in a seated position, with your leg straight out in front and using a towel to bring your toes towards you.

## Exercises phase 1 (continued)



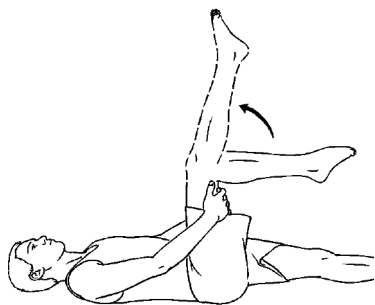
### SOLEUS STRETCH

Keep the back leg slightly bent, with the heel on the floor and pointing in a straight line to the wall. Lean into the wall until a stretch is felt in the lower calf. Again this can be started in a long sitting position with your affected leg straight out in front of you, slightly bending your knee and using a towel to bring your toes towards you. You should feel the stretch in your lower calf.



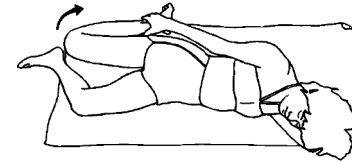
### TIBIALIS ANTERIOR STRETCH

Lay on your back with one knee bent and the other straight. Raise the bent knee up and when it is at right angles to your hip, straighten at your knee. Now point your toes forwards and inwards, and you should feel a stretch along the front of your leg. Only rotate to a pain free position



### HAMSTRINGS

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 (90° angle). 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

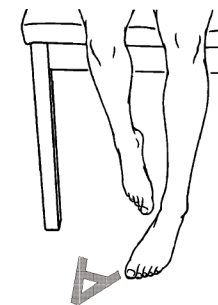


### QUADRICEPS

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 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. Use a towel in this stretch if you are unable to reach your ankle or bend your knee too far. If you have had a tibial plateau fracture, it is important to consult with your physiotherapist on the best way and when to perform this stretch.

## MOBILITY & STRENGTHENING

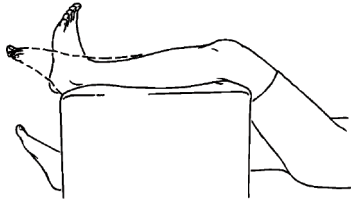
- Repeat **2 sets** of **10-12 repetitions** of each exercise
- If it is an **isometric (static)** exercise, **hold** the position for **10 seconds** and repeat **10 times**
- Make sure that you work in a **pain free range of movement** and gradually increase your range as you go.
- These exercise can be performed **daily**, and repeat twice a day if possible



### ANKLE ALPHABET

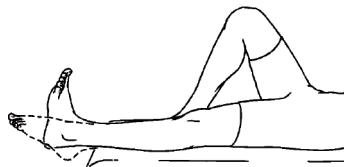
Sitting or lying with your leg out stretched in front of you. Now raise your leg, keeping the knee straight and leg still. Paint the alphabet in the air with your foot, using capital letter. Move slowly to get full range of movement in the ankle. The movement should not be from your hip, only your ankle, and the range should be pain free.

## Exercises phase 1 (continued)



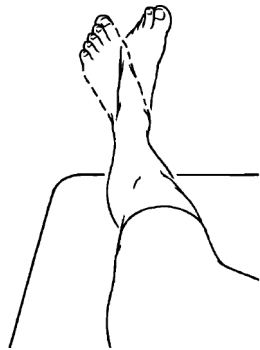
### ANKLE PUMP

Lying on your back with your leg elevated over a chair so that your knee is at a 90° angle and foot is free to move. Now gently bring your toes towards you as far as you can and then away from you as far as you can pain free.



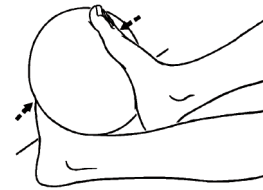
### ACTIVE FOOT MOVEMENTS UP AND DOWN

Lying on your back or sitting with your involved leg straight out in front of you. Now gently bend and straighten ankle. Move through full pain free range of motion.



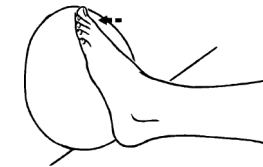
### ACTIVE FOOT MOVEMENTS IN AND OUT

Lying on your back or sitting with your back supported and involved leg straight out in front of you. Now gently turn ankle/foot in and out, without moving your knee. Move through a full pain free range of motion.



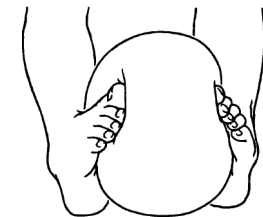
### STATIC DORSIFLEXION (TOES UP)\*

Sit with your legs straight out in front of you. Place a rolled pillow between the feet with the injured foot on the bottom. Squeeze the feet together, pulling toes of the injured foot up towards you. There should be no movement in the injured foot, merely a contraction in the shin muscle.



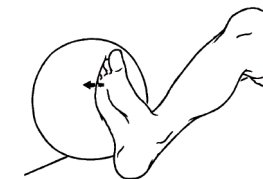
### STATIC PLANTARFLEXION (TOES DOWN)\*

Place a rolled pillow against the wall, and press the sole of your foot into the pillow i.e. your toes pointing away from you. There should be no movement.



### STATIC INVERSION (TOES IN)\*

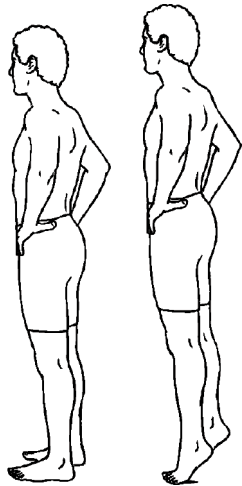
With rolled pillow between feet, press inner border of feet into pillow. There should be no movement, just a contraction of the muscles on the outside of your leg.



### STATIC EVERSION (TOES OUT)\*

Place a rolled pillow against the wall and press the outer border of your foot against the pillow. There should be no movement, just a contraction of the muscles on the inside of your leg.

## Exercises phase 1 (continued)



### CALF RAISE\*

**Seated:** Sitting slightly forwards on a chair, with your knees bent and feet flat on the floor. Now rock onto your toes so that your toes are pointing at the ground. Relax to the start position.

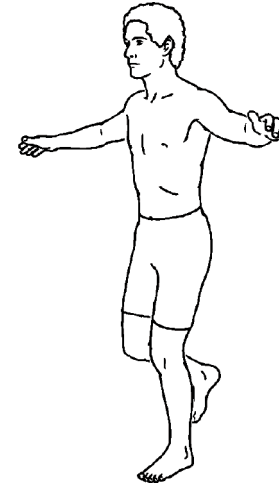
**Standing:** Once you feel strong and have enough range in your ankle you can try this standing. Standing side on to a table, holding on for support, raise up onto your toes in the following manner; first onto your big toe, then onto the middle of your foot and then onto your little toe. This sequence equals one repetition



### TOE RAISE

**Seated:** Sitting slightly forwards on a chair, with your knees bent and feet flat on the floor. Now rock onto your heels so that your toes lift up off the ground. Relax to the start position.

**Standing:** Once you feel strong enough and have enough range of movement in your ankle, you can try this standing. Standing side on to a table, holding on for support, raise up onto your toes in the following manner; first onto the outside of your heel, then onto the middle, and then on to the inside of your heel. This sequence equals one repetition.



### STORK STANDING

Start in a seated position with your feet on a pillow and rock forwards and backwards between your toes and your heels, and then side to side. Now try and progress to a standing position. Standing on a solid surface, holding onto a table or stable support to start with. Take your weight onto your involved leg and try to balance. Once you feel confident you can try and lift your hand off the table/support. Hold this position for as long as you can. You may only manage a few seconds to start with. Build this up to 30-60 seconds on each leg.

\*These exercises can be done whilst you still have the plaster cast on

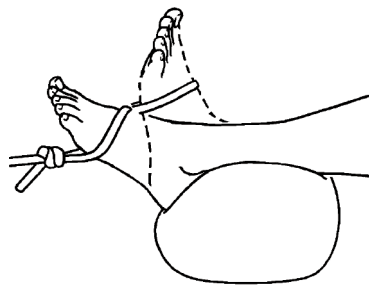
## Exercises phase 2

This phase of exercise can be started once you are able to complete phase 1 exercises pain free and with control. Do not be afraid to go back to phase 1 if you feel that you are unable to safely continue with the phase 2 exercise or you can overlap the phases if you are not completely

confident to do all the exercises in phase 2 yet. Be aware of pain as your marker of doing too much or maybe even doing the exercise incorrectly. Continue with the stretches in phase 1, and you should now be able to perform the calf stretches in a standing position.

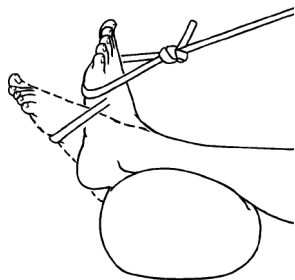
### MOBILITY & STRENGTHENING

- Repeat **2 sets** of **10-15 repetitions** of each exercise
- These exercises should be performed at **least once a day**, twice if possible
- Make sure that you work in a pain free range of movement and gradually increase your range as you go



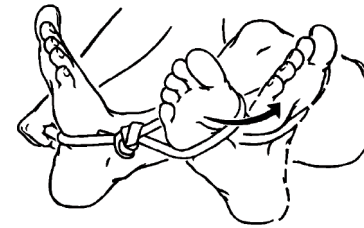
#### RESISTED DORSIFLEXION (TOES UP)

Sitting with your back supported and leg straight out in front. Anchor one end of the tubing/band to a fixed object (table leg), and the other end around your foot, pull the foot towards you. Return slowly to the starting position. Movement should be slow, controlled and pain free.



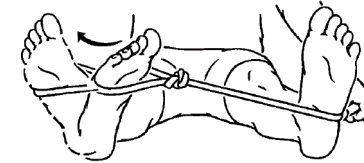
#### RESISTED PLANTARFLEXION (TOES DOWN)

In the above position, holding one end of the band, and other end tied around foot, press foot downwards towards the floor (i.e. point your toes). Return slowly to the starting position. Movement should be slow, controlled and pain free. Band can be obtained from your physiotherapist or a sports store.



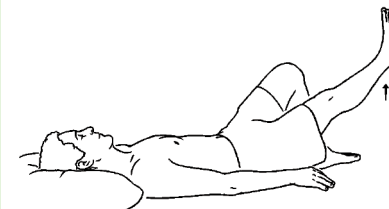
#### RESISTED INVERSION (TOES IN)

Tie the ends of the band together and anchor the band around a table. Sitting side on to the table, loop the band around the foot of your injured leg, which should be closest to the table. Move the toes up and in towards the opposite leg. Be sure to only use your ankle and not your whole leg. The movement should be slow, controlled and pain free.



#### RESISTED EVERSION (TOES OUT)

Now turn around so that your injured ankle is furthest from the table with the band attached around the foot. Now move the toes of the foot up and out towards the outer shin, pulling the band away from the table. The movement should be slow, controlled and pain free.

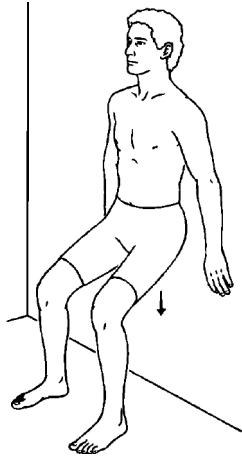


#### STRAIGHT LEG RAISE

Sitting on the floor with one knee bent and the other straight, lean back on your arms to support your back. Now raise the straight leg off the floor, keeping your knee straight. Perform one set with your toes pointing up and the second with toes pointing out, keeping your knee pointing towards the ceiling.



## Exercises phase 2 (continued)

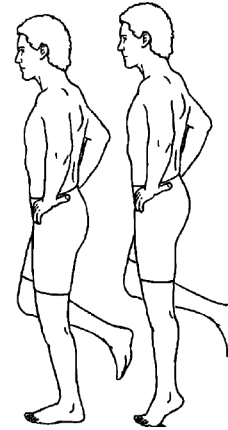
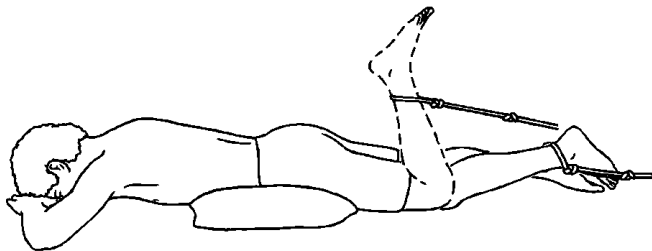


### WALL SLIDES

Standing leaning up against a wall, your feet a little away from the wall and pointing slightly outwards. Push your back against the wall. Slowly lower your body into a seated position and hold this position for 5-10 seconds. Complete 10 repetitions. If you have a restriction in the range of movement in your ankle you may find that you are not able to go down too far. Therefore limit your range according to your pain and available range of movement. You should feel the muscles in your thighs working

### HAMSTRING CURLS WITH BAND

Lying on your stomach, with one end of the band attached to a table and the other attached around your ankle. Starting with your knee straight, bend your knee towards your bottom keeping your pelvis in neutral and knee on the floor. The movement should be slow and controlled in both directions, only moving in a pain free range.

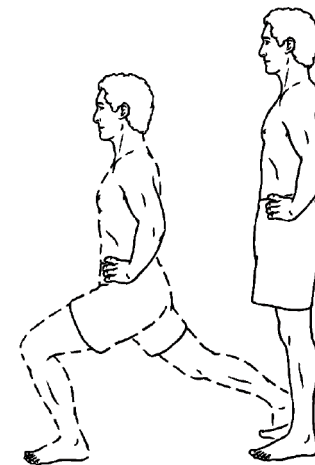


### SINGLE LEG CALF RAISE

Supporting yourself against a wall or holding onto a table, stand on one leg and raise up onto your toes in the following manner; first onto your big toe, then onto the middle of your foot and lastly onto your little toe. This sequence equals one repetition.

### STANDING TOE RAISE

Standing with your weight now on your heels, raise your toes off the ground in the same sequence as the calf raises, i.e. middle of your heel, outside and inside. This sequence is one repetition.



### STATIC LUNGE

Place one foot in front of the other. Bend both knees together until you have a 90° bend in both. Ensure that your front knee does not go over your front foot when bending to 90°. Return to the starting position. Complete all repetitions on one leg before changing to the other.

### STEPPING LUNGES

Once you are able to perform the above exercise pain free with control, progress to stepping lunges. Step forwards with one foot into a lunge position so both knees are at a 90° angle. Ensure that front knee does not go over your front foot when bending to 90°. Return to starting position and repeat the same movement with the opposite foot. Be as stable as possible during the exercise.

# Exercises phase 3

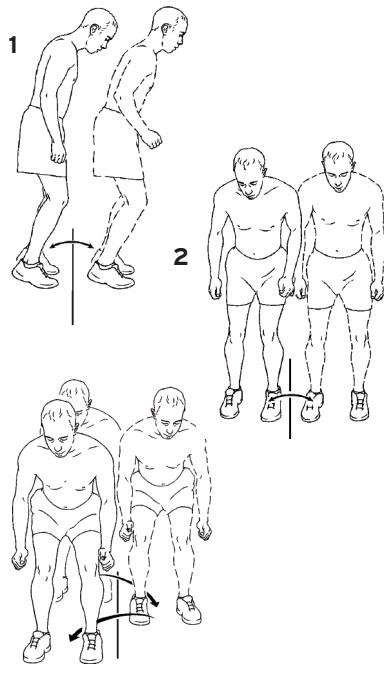
## FUNCTIONAL EXERCISES

- Only start these exercises once you are able to do Phase 1 and 2 with no pain and good control, and if you want to return to sporting activities
- It is also important that you consult with your allied health professional before starting any jumping activities to ensure that you are safe to do so

### HOPPING SEQUENCE

Standing with both feet together, hop from one point to another in the following manner

1. Forwards and Backwards
2. Side to side
3. Jump in a Square
4. Jump diagonally forwards and backwards across a central imaginary line



### RUNNING DRILLS

In order to get back to normal activity it is important to practice some of these movements during your rehabilitation program to ensure that you are ready. Therefore perform various running drills i.e. short sprints, backward running, zig-zag running, stop/start and so on to prepare yourself for your specific sport.

# 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](http://www.mdphysiotherapy.co.uk)