

Injuries to Lower Limb

The following is a list of common sporting conditions and injuries. The severity of each condition may lead to different treatment protocols and certainly varying levels of intervention. As treatment therefore is quite subjective we have merely provided a list of commonly used modalities. Further tips may appear under *Treatment goals, advice and aftercare* for each injury.

Conservative treatment of sports injuries often includes:

- Rest.
- Ice.
- Anti-inflammatory medications.
- Stretching.
- Sports massage.
- Ultrasound.
- Strengthening exercises, especially eccentric.

Hip and Thigh

Because many pelvic and lower back disorders refer pain to the hip area and are often an integral part of hip lesions it is essential to consider these areas at the same time. Therapists must carry out a visual examination and test all areas when assessing the hip joint. Please refer to the course textbook for further information on these conditions and how to treat them. Also ensure you are fully able to test for them from the Examination sheet.

Contents

Piriformis Syndrome/Sciatica.....	2
Hip Joint Capsulitis and Bursitis	3
Hip Joint - Sprains	4
Sportsmans Hernia.....	Error! Bookmark not defined.
Pubis Symphysis.....	6
Muscle Strains – Iloppoas, Hamstrings, Adductors	7
Muscle Imbalances – VMO, Adductors, Piriformis	Error! Bookmark not defined.



Piriformis Syndrome/Sciatica

Structures affected

A group of 6 muscles, referred to as the piriformis group
The sciatic nerve as it arises from beneath or in the middle of the piriformis muscle

Signs and Symptoms

Often associated with lower back pain
Pain deep in the gluteal region
Nerve pain referring to the posterior aspect of the lower limb
Often confused with hamstring strain
Hamstrings will not be tender to palpate
Piriformis will be very tender to touch
Limited hip internal rotation
Feet will appear to be very laterally rotated when observed from behind

Biomechanics of injury

The sciatic nerve may be compressed as it arises from the piriformis muscle
Any tightness of the piriformis group and limited external rotation of the hip
Any repetitive activity such as walking, sitting, rowing, cycling, etc, may lead to short piriformis group which may compress and irritate the sciatic nerve.

Assessments

Observation of lateral rotation of the feet
Check piriformis length by laying client prone; flexing knees to 90°; support the ankles and allow the limb to internally rotate (by the feet falling laterally) – angle of each will indicate muscle length.
The slump test will initially identify if the pain is sciatic pain or that caused by a disk problem in the spine

Treatment Goals, Advice and Aftercare

Deep tissue massage to the glutes
Deep tissue massage targeting the piriformis
NMT on the piriformis to alleviate any neurological holding
Combined NMT-PNF to the piriformis. Carried out by applying pressure to the piriformis and internally rotating the hip (as with the piriformis length test mentioned above)
Assess biomechanics (walking)
Refer for orthotics if the client is over pronating

Hip Joint Capsulitis and Bursitis

Structures affected

Trochanteric bursa sits between the greater trochanter and ITB
Lesser trochanter (iliopsoas)

Signs and Symptoms

Pain in the anterior groin area when flexing the hip (iliopsoas bursitis)
Snapping noise occurs with both forms of bursitis (both)
Deep aching in the lateral hip (trochanteric bursitis)
Localised tenderness on palpation (trochanteric)
Unable to lie on the affected side in bed (trochanteric)
Inflammation (both)
Pain in the ITB (trochanteric)

Biomechanics of injury

Tight ITB
Running downhill
Impact to the lateral hip
Large Q angle
Leg length discrepancy
All above will cause irritation to the trochanteric bursa

Assessments

All symptoms mentioned above are present
Tight ITB (Ober's Test)
Resisted hip flexion with the knee flexed will cause pain (iliopsoas)
Check for any night pain in case of more serious condition such as stress fracture

Treatment Goals, Advice and Aftercare

Rest until pain and inflammation subside
Apply ice to the area to reduce inflammation and pain
Lengthen all associated muscles – predominantly ITB and Hip flexors in each instance
Restore strength to key muscles such as Gluteus Medius and Adductors to restore pelvic balance which may have contributed to problem
Address any other causative factors such as leg length discrepancies and foot biomechanics with orthotics
If little progress is noted refer for further investigations to re-check for more serious problems such as stress fracture

Hip Joint - Sprains

Structures affected

Sprains are categorised into 1st, 2nd and 3rd degree dependent upon the severity of the tear and the percentage of fibres that have torn.

Any of the ligaments of the hip joint can be damaged

Iliofemoral, ischiofemoral, pubofemoral ligaments

Complete rupture will result in the hip being dislocated, this can be very serious and should not be attempted to be relocated by anyone who is not medical trained

Signs and Symptoms

Obvious deformity of third degree tear
Pain with passive movement of the joint
Instability of the joint
Poor ROM
Pain on active movement
Inflammation
Discolouration
Weak

Biomechanics of injury

Excessive rotation
Excessive abduction
Rotation of the core while the feet are fixed

Assessments

Passive extension and external rotation will test the iliofemoral and ischiofemoral ligaments
Passive abduction will test the pubofemoral ligament

Treatment Goals, Advice and Aftercare

Ice application to reduce pain and inflammation
Be cautious when icing the groin area (testicles)
Fluid drainage may be needed to reduce oedema
Mobilisation following any adaptive shortening
Restore ROM
Restore any lost strength
Tensile loading Concentrate on proprioceptive exercises

Sportsmans hernia

Structures affected

- Inguinal hernia common
- Femoral hernia less common
- Men are more likely to suffer an inguinal hernia

Signs and Symptoms

- Small swelling in the groin area
- Localised pain
- Increased pain when coughing or sneezing or laughing
- The swelling may disappear when laying supine

Biomechanics of injury

- Any internal tissue protruding through weakness in the abdominal wall
- Small tear in the abdominal wall

Assessments

- Signs and symptoms mentioned above are present

Treatment Goals, Advice and Aftercare

- If untreated any herniated tissue may gradually have its blood supply impeded
- Seek medical advice

Osteitis pubis

Structures affected

- Symphysis pubis

Signs and Symptoms

- Localised tenderness on palpation
- Pain in the groin
- Tight adductor muscles
- Pain with active and resisted adduction
- Pain at end ROM abduction
- Pain eases with prolonged periods of rest

Biomechanics of injury

- Inflammation of the symphysis pubis
- Overuse injury
- Repetitive overuse of the adductors
- Common in runners
- Can be caused by direct impact (a fall)
- Common during pregnancy

Assessments

- X-ray or scan may show disruption or inflammation
- Anterior distraction test may highlight localised pain

Treatment Goals, Advice and Aftercare

- For moderate cases 6 weeks complete rest
- More severe cases require up to 3 months complete rest
- Use of crutches if necessary
- Ice can be used to reduce pain and inflammation
- Once pain has subsided restore full ROM at the hip and lower back
- Restore strength
- Gradual return to sport
- Assess biomechanics and adjust if necessary

Adductor strain

Structures affected

Muscle strains normally occur at the MTJ but can also occur in the muscle belly
Graded 1st, 2nd and 3rd degree according to severity and the number of fibres left in tact
Adductor magnus, longus, brevis, gracilis and sartorius

Signs and Symptoms

Sudden pain felt around the groin during activity
Localised pain on palpation
Possible discolouration
A palpable dip may be felt in the muscle if there is a complete rupture
Pain at end ROM
Pain with active and resisted muscle actions

Biomechanics of injury

Most likely to occur during eccentric muscle action
High impact or unexpected force is usually associated with muscle strains
Muscle imbalance between agonist and antagonist pairs will make the athlete more susceptible to muscle tears
Also very common with rugby and football when a player slips over stretching the adductor muscles

Assessments

Passive abduction will cause pain at end ROM
Active and resisted adduction will be weak and painful

Treatment Goals, Advice and Aftercare

P.R.I.C.E. during the acute phase
Tensile loading is important after the acute phase of injury
Isometric followed by dynamic and the resisted contractions
Restoring length
Restoring strength
Insuring that proprioception has also been restored
If 3rd degree sometimes surgery is necessary

The Knee

Contents

Osgood Schlatter’s Syndrome	9
Patellar Tendonitis - Jumper’s Knee	10
Meniscal tears	11
Ligament sprains - MCL, LCL, PCL, ACL	12
Runners Knee - ITB Friction Syndrome	14
Thigh strains - Rectus Femoris	15
Haematomas	16
Myositis Ossificans / ectopic calcification	17



Osgood Schlatter's Syndrome

Structures affected

- Tibial tuberosity (insertion point of the quadriceps tendon)

Signs and Symptoms

- Inflammation of the bony prominence (tibial tuberosity), this will appear more projecting than the unaffected side – bony growth over long period of suffering the syndrome
- Localised pain on palpation
- Pain when contracting isometric/isotonic against resistance
- Pain worsens after activity

Biomechanics of injury

- Following a rapid growth period
- More common in boys aged 10-15
- High levels of activity
- The tendon repeatedly pulling at the patella bone

Assessments

- Contracting the quads at their shortest length (with the knee straight will cause pain)
- The appearance of the bony lump and other symptoms mentioned above
- Noticeable increase in activity for the individual (overload)

Treatment Goals, Advice and Aftercare

- RICE
- Reduce high impact activity – try to replace with swimming to maintain cardiovascular fitness
- Ice massage to the painful area
- Use massage to relieve tension in quadriceps muscles and tendon
- Developmental stretching of the quadriceps once pain and inflammation had reduced

Patellar Tendonitis - Jumper's Knee

Structures affected

- The quadriceps tendon, just inferior to the patella

Signs and Symptoms

- There will be localised pain on palpation
- There will be inflammation around the tendon and knee cap
- Pain when extending at the knee (contracting the quads)
- Pain after activity

Biomechanics of injury

- Athletes who regularly exert a lot of pressure through the knee
- The condition can be seen as the inflammation and/or degeneration of the tendon
- The tendon will experience often micro tears from overloading the tendon
- Under firing vastus medialis

Assessments

- Evidence of the signs and symptoms of injury are present

Treatment Goals, Advice and Aftercare

- /// RICE
- /// Ice massage
- /// Reduce high impact/loading activity
- /// Relieve tension in quads using massage
- /// Eccentric strengthening exercises

Meniscal tears

Structures affected

- The medial or lateral meniscus
- The meniscus sit between the femoral condyles and tibial plateau
- The medial meniscus is more like to be injured and is the larger of the two

Signs and Symptoms

- Clicking, locking and intermittent pain are classic signs of meniscal damage
- Pain described as inside the knee or to either the lateral or medial side
- Swelling
- Poor ROM when flexing the knee
- Pain on weight bearing

Biomechanics of injury

- Degeneration of the meniscus
- Twisting with the foot fixed
- Direct impact

Assessments

- Client lying prone, pressure applied to the foot with the knee flexed to 90°, rotating the foot medially and laterally (Appley's Test). Positive test will produce pain and or clicking

Treatment Goals, Advice and Aftercare

- Apply ice
- Start to mobilise the leg as soon as possible to help with reducing swelling (CPM)
- Massage muscles surrounding the knee to relax any hypertonic
- Restore ROM
- Restore strength particularly in the quadriceps
- Proprioceptive exercises
- Surgery – knee arthroscopy may be necessary if the damage is extensive

Ligament sprains - MCL, LCL, PCL, ACL

Structures affected

- MCL – medial joint line
- LCL – lateral joint line (attaching on the head of fibula)
- PCL – medial femoral condyle to the posterior edge of the tibia
- MCL – notch of the distal femur and lateral femoral condyle to the tibial plateau

Signs and Symptoms

- Swelling (amount varies according to severity and ligament)
- Discolouration
- Localised pain on palpation for MCL and LCL
- Pain on weight bearing particularly when bending the knee

Biomechanics of injury

- MCL – often associated with twisting with the foot planted or impact from the lateral side of the knee forcing the knee into an increased valgus angle
- LCL – impact to the medial side of the knee forcing the knee into an increased varus angle
- PCL – not often injured, possible with impact to the front of the tibia when the knee is flexed
- MCL – again associated with twisting to change direction, or a backwards fall

Assessments

- MCL – valgus stress test
- LCL – varus stress test
- PCL – posterior draw test
- ACL – anterior draw test

Treatment Goals, Advice and Aftercare

- Apply ice
- Dependent upon severity of injury surgery may be required, particularly with ACL/PCL rupture
- Period of immobilisation likely
- Restore ROM
- Restore strength
- Proprioceptive exercises
- Strapping and taping of the knee on return to sport

Runners Knee - ITB Friction Syndrome

Structures affected

- Iliotibial band on the lateral thigh

Signs and Symptoms

- Lateral knee pain
- Pain when flexing and extending the knee
- Pain worsens with running
- Weak hip abduction
- Pain on palpation of the ITB

Biomechanics of injury

- Overuse injury most common in long distance runners

Assessments

- Ober's test
- Observation during the Thomas and Kendall test
- Palpation of tightness

Treatment Goals, Advice and Aftercare

- Ice the lateral knee to ease pain
- Assess biomechanics when running
- Reduce frequency and duration spent running
- Release the ITB
- NMTs applied to any excessively tight areas
- Gradually increase running
- Advise on ITB stretches

Thigh strains - Rectus Femoris

Structures affected

Rectus Femoris muscle located in the middle of the anterior thigh
Muscle strains most commonly occur at the musculo-tendinous junctions (MTJ), but can occur in the muscle belly
Graded 1st, 2nd and 3rd degree according to severity

Signs and Symptoms

Pain when actively extending the knee or flexing the hip
Pain with weight bearing
Localised pain on palpation
Pain at end ROM
If complete rupture the muscle may recoil and a palpable dip may be felt in the muscle
Possible discolouration

Biomechanics of injury

Muscle strains often occur with eccentric muscle action

Assessments

Pain with active and resisted knee extension and hip flexion

Treatment Goals, Advice and Aftercare

P.R.I.C.E. during the acute phase
Tensile loading is important after the acute phase of injury
Isometric followed by dynamic and the resisted contractions
Restoring length
Restoring strength
Insuring that proprioception has also been restored
If 3rd degree sometimes surgery is necessary

Haematomas

Structures affected

- Often occurring to the rectus femoris

Signs and Symptoms

- Swelling
- Tenderness
- Discolouration
- Restricted ROM due to pain

Biomechanics of injury

- Direct impact to the muscle compresses the muscle against the bone

Assessments

- Symptoms above are present
- Determine between inter and intramuscular
- Intramuscular will need to be monitored more carefully, as myositis ossificans can occur (see below)

Treatment Goals, Advice and Aftercare

- Apply ice
- Massage around and above the injury
- Active muscle pump – get the client to actively contract the affected muscle
- Restore ROM
- Restore strength

Myositis Ossificans / ectopic calcification

Structures affected

- Any muscle which has suffered a direct impact causing an intramuscular haematoma
- Bone formation at the site of impact within the muscle

Signs and Symptoms

- History of suffering an intramuscular haematoma
- Palpable lump
- Lots of pain on palpation
- Pain when contracting the muscle

Biomechanics of injury

- After a direct impact to the muscle
- Occurs if the initial injury is poorly managed (no ice, no elevation)
- Return to sport to quick
- Rehabilitation program to intense

Assessments

- Pain on palpation and contraction of the muscle
- Either no improvement or regression in R.O.M. following successive treatments may be a strong early indication for this condition.
- Palpation may result in tenderness and tension from associated swelling
- Other assessments at early stage may prove inconclusive
- After the initial stages, X-ray will show the bony growth

Treatment Goals, Advice and Aftercare

- Once condition is suspected, refer to hospital for investigation and confirmation of diagnosis
- Cease all sporting activity and minimise any loading through the affected muscle
- If diagnosis confirmed no further treatments and minimise activity until further tests confirm condition resolved.
- Further X-rays many weeks later will assess growth or dissipation of calcification and whether surgical excision necessary.

Contents – Lower Leg, Ankle and Foot

Shin Splints.....	2
Achilles Tendonitis	19
Inversion and Eversion Sprains	20
Plantar Fasciitis	21
Metatarsal Stress Fracture (also known as March Fracture).....	22
Muscle Strains (Tennis Leg).....	24



Achilles Tendonitis

Structures affected

- Achilles tendon usually 2-3cm above insertion

Signs and Symptoms

- Localised tenderness
- Stiffness
- Sometimes a 'creaking' sensation

Caused by

- Overuse
- Possible lack of flexibility to gastrocnemus and soleus
- Poor footwear and lack of shock absorption to heel
- Musculoskeletal Imbalances

Checks

- Check history – usually slow onset
- Palpate for localised tenderness
- Pain on stretching or contracting calf muscles
- Footwear

Treatment Goals, Advice and Aftercare

- Reduce or stop activities causing the problem
- Massage calf muscles to reduce tension and alleviate stress to Achilles
- Apply ice to reduce inflammation; especially post-exercise
- Restore flexibility to calf muscles

Inversion and Eversion Sprains

Structures affected

ATFL – just anterior to the lateral malleolus
CFL – directly inferior to the lateral malleolus
Deltoid – inferior aspect of the medial malleolus
Sprains are categorised into 1st, 2nd and 3rd degree dependent upon the severity of the tear and the percentage of fibres that have torn.

Signs and Symptoms for all ligaments

- Localised pain on palpation
- Pain on weight bearing
- Inflammation and discolouration
- Poor stability
- Feeling very weak

Caused by

All movements are forced and usually occur from impact or rolling over on the ankle
ATFL – excessive inversion and plantar-flexion of the ankle
CFL – excessive inversion of the ankle
Deltoid – excessive eversion of the ankle

Checks

ATFL – passive inversion and plantar flexion of the ankle
CFL – passive inversion of the ankle
Deltoid – passive eversion of the ankle

Treatment Goals, Advice and Aftercare

- Ice application to reduce pain and inflammation
- Fluid drainage may be needed to reduce oedema
- Mobilisation following any adaptive shortening
- Restore ROM and strength
- Tensile loading of the damaged ligaments
- Concentrate on proprioceptive exercises
- Strapping and taping if necessary

Plantar Fasciitis

Structures affected

- Plantar Fascia
- Sole of the foot
- Particularly felt around the heel of the foot

Signs and Symptoms

- Heel pain often on the medial aspect (origin of fascia)
- Pain worse in the morning and often easing with movement, as the fascia warms up
- If no treatment, pain can worsen with increased activity as the fascia will tighten
- Pain on the outside of the foot due to overcompensation

Caused by

- Overuse injury
- The plantar fascia is placed under constant stress, normally from running.
- Normal pronators who are supinating
- People who excessively pronate will suffer greater strain on the fascia
- Tight calf muscles can cause plantar fasciitis, by increasing pronation of the foot
- Poor footwear (limited medial arch support)

Checks

- Pain on palpation of the arch and antero-medial aspect of the heel
- Pain when stretching the fascia (flexing the toes and dorsi-flexing the ankle)
- Over pronation
- Footwear
- Calf muscle length

Treatment Goals, Advice and Aftercare

- Reduce inflammation and tenderness with ice application
- Taping – while doing physical activity
- Using a medial arch support in the shoes if over pronating
- Stretching the plantar fascia
- Stretching the calf muscles if they are short
- Strengthening the plantar fascia, i.e. using the toes to gather a towel
- Sports massage to the foot and calf muscles
- Gait analysis if symptoms persist

Metatarsal Stress Fracture (also known as March Fracture)

Structures affected

Most commonly the second metatarsal, although may affect other metatarsals
The metatarsal bones are between the toes and the tarsal bones in the foot

Signs and Symptoms

- For overuse - general slow onset of discomfort/pain
- Pain on increased weight bearing activities
- Localised pain on palpation and percussion
- Some swelling and discolouration

Biomechanics of injury

Most commonly an overuse injury
Or a sudden onset from impact such as from a studded boot.
Repeatedly putting high loads of force through the foot, i.e. gymnasts and military – hence the term ‘march’ fracture.
Over-pronation or over-supination can contribute to stress fractures in the foot

Assessments

Percussion test to the end of the toe in line with the affected metatarsal, positive test will cause pain
An x-ray will almost certainly never show the stress fracture in its early stages, although it will show as a white ‘halo’ after a few weeks

Treatment Goals, Advice and Aftercare

- Rest for 4-6 weeks or until pain has subsided
- Gait analysis to see if foot biomechanics contributed to the stress fracture, refer on if orthotics are necessary
- Stretching any muscles that have shortened
- Assess footwear
- Proprioception exercises

Anterior Compartment Syndrome

Structures affected

- Antero-lateral muscle compartment of the lower leg
- Can be acute or chronic

Signs and Symptoms

- Acute injury can be from a high impact to the front of the leg
- Chronic anterior compartment syndrome can develop from the fascia being too tight following the hypertrophic effect of training
- Chronic – onset of pain and increasing when running or performing physical activity
- Swelling and a 'glassy' appearance
- May be pain on resisted dorsi flexion
- May be pain when plantar flexing the foot

Biomechanics of injury

- Acute impact to the leg can cause swelling and/or bleeding within the compartment
- Overuse can cause tight fascia in the compartment, gradually decreasing the nutrient supply due to pressure and therefore increasing during activity.

Assessments

- Check for all signs and symptoms above

Treatment Goals, Advice and Aftercare

- If chronic and seemingly very swollen and painful – connective tissue massage
- A fascia release (surgical procedure) may be necessary if symptoms persist or worsen
- If acute, ice massage to try to reduce pain and swelling. Monitor signs and symptoms and refer to hospital if they increase, indicating bleeding may be continuing.
- Stretch the anterior compartment
- Compression bandages are contra-indicated as they will increase pressure and further impede circulation.

Muscle Strains

Structures affected

Muscle strains or tears often occur at the musculotendinous junctions, but can occur in the muscle belly.

The musculotendinous junction (MTJ) is the portion of the muscle which is susceptible to the highest loading throughout the muscle

Muscle tears are more likely to occur during eccentric muscle action

Are graded 1st, 2nd and 3rd degree dependent upon severity (percentage of muscle fibres torn)

Signs and Symptoms

Pain in active movements of the muscle involved

Pain on palpation

Possible discoloration

If a complete tear has occurred the muscle may recoil to its origin and insertion and be visible as small balls

Biomechanics of injury

Muscle strains more commonly occur during eccentric muscle action

This is more like if there is a muscle imbalance between agonist and antagonist pairs

A high velocity action or unexpected force is normally associated with muscle strains

Assessments

Active movements will be painful

Resisted movements will show decreased strength in the muscle and be painful

There will be pain on palpation

Treatment Goals, Advice and Aftercare

P.R.I.C.E. during the acute phase

Tensile loading is important after the acute phase of injury

Isometric followed by dynamic and the resisted contractions

Restoring length

Restoring strength

Insuring that proprioception has also been restored

Periosostitis (tibia – shin splints)

Structures affected

- Anteromedial aspect of tibia
- Lower half of the tibia

Signs and Symptoms

- Pain and inflammation on the lower half of the leg
- Pain worse at beginning of activity and easing with time throughout training
- Pain returns shortly after activity
- Some palpable lumps at the medial portion of the tibia

Biomechanics of injury

- Overuse injury
- Poor biomechanics when running (foot or knee)
- Poor footwear
- Change in surface or training intensity
- Muscle imbalances

Assessments

- Palpate between the anterior ridge of the tibia and the anterior compartment - small bumps may be felt and cause local tenderness
- May be painful to dorsi flex and invert the foot against resistance

Treatment Goals, Advice and Aftercare

- Rest and ice until inflammation and pain goes
- Adjust footwear, biomechanics or training surface
- Ensure that ROM at the ankle is ok
- Increase activity gradually rather than returning to full training

You may pay particular attention to a full understanding of the relationship between damage, mechanics and which tests cause discomfort or pain – and in which range.