# HAND BOOK

## **Welcome to the Ultimate Knee Pain Handbook!**

This content is a great summary of all the different types of knee pain, written in language that everyone can understand.

We hope it gives you some insight to your knee pain, and maybe some diagnostic clues as to what you may have.

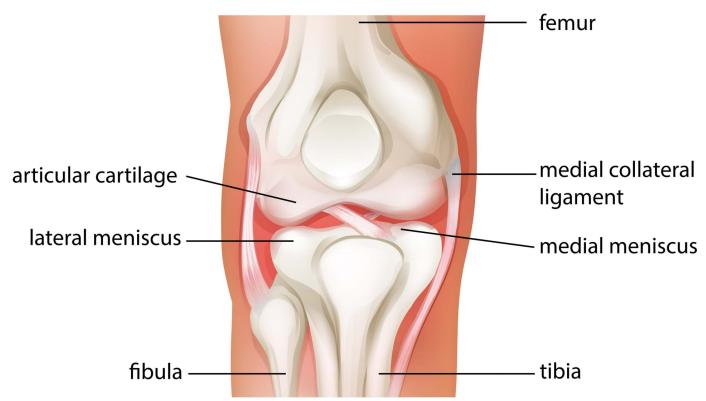


#### Knee Joint Anatomy - The Basics.

The knee joint requires elements of strength, stability, mobility and balance to operate effectively. It is essentially 2 joints in one. The main weight-bearing joint, the tibio-femoral joint, and the kneecap joint, the patellofemoral joint.



Both of these joints need to be working in harmony to achieve optimal knee function. As the knee sits between the hip and the ankle, the integrity of these joints is vital in maintaining knee function and vice versa.



## **Anatomy of the Human Knee Joint**

#### Knee Joint Injuries.

Knee Injuries may be traumatic, such as a fall during sport, or a trip and stumble around the house, or sometimes a jolt or slip at work. Knee joints can also suffer from the more ongoing type symptoms, such as patella tracking issues and osteoarthritis.

Following thorough examination and questioning regarding your knee injury, the team at Melbourne Sports Physiotherapy will implement a short and long term physiotherapy plan to help your knee recover.

Usually, the short term plan involves symptom relief to help make daily activities much easier and comfortable.

Once the knee joint is ready to take the loading, we initiate the longer term plan which involves strengthening the joint to maintain and improve current function and to reduce the possibility of aggravation.

Our physiotherapists excel at managing numerous types of knee issues.

Below is a list we commonly treat at the clinic:

- Patellofemoral pain / "Runner's knee" / Chondromalacia
- Patella tendinopathy
- Osgood Schlatter Syndrome
- ACL, MCL, LCL and PCL injuries
- Meniscus injuries
- Osteoarthritis of the Knee
- Fat Pad Impingement
- Pes Anserinus tendinopathy / Bursitis

## By Melbourne Sports Physiotherapy

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## PATELLA (KNEECAP) RELATED ISSUES

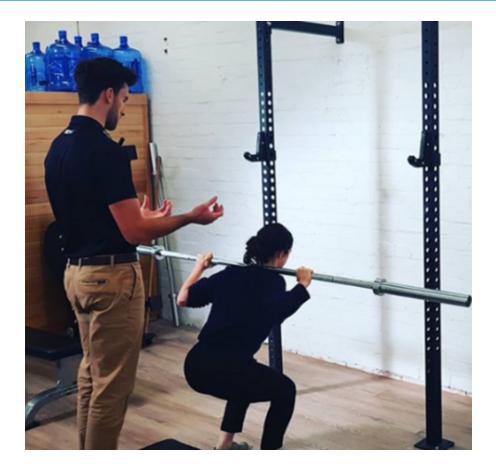
#### PATELLOFEMORAL JOINT PAIN / "RUNNER'S KNEE"

Patellofemoral Pain Syndrome (PFPS) can also be known as Patella Mal-tracking Syndrome and "Runner's Knee", and is a very common problem caused by activities that increase the load in the joint between the kneecap and the femur.

What activities are typically affected?

**T**ypical activities include but are not limited to:

- Squatting (gym in particular)
- Running
- Jumping and Landing
- Lunges
- Standing up after prolonged sitting
- Walking up and down stairs, or stair running
- Driving



#### Where are the symptoms?

Pain is generally felt at the front of the knee, around or underneath the kneecap. It can be a very vague type of pain. PFPS may also be associated with a grinding or clicking feeling underneath the kneecap.

Like all other joints, the patellofemoral joint is also subject to developing degenerative changes over time (Chondromalacia), which may also be a cause of symptoms.

#### How is it managed?

A sports physiotherapist with an interest in knee injuries, will provide a thorough knee examination to determine the exact cause of any symptoms and to rule out any structural (ligament, cartilage) problems.

They will also assess lower limb biomechanics to determine if any poor movement patterns may be contributing to the issue, for example the knee dropping inwards during a squat or increased rolling in of the foot.

From the initial physiotherapy assessment, a management plan can be put in place to address and the cause of PFPS and, ultimately, lead to a full resolution of symptoms.

#### Treatment for PFPS involves several modalities. These include:

- Joint mobilisation and soft tissue release of tight structures around the knee
- Taping of the patellofemoral joint to either offload the joint or keep it in an optimal position
- Exercise prescription addressing any weaknesses that may be contributing to the pain
- Modification of running and/or jumping/landing mechanics to correct any overloading of the patellofemoral joint
- Potential referral to a Podiatrist for an opinion regarding orthotic prescription



Research shows that PFPS can be very well managed by a physiotherapist and a full return to normal activity can be achieved with the right treatment plan. Particular strengthening exercises for the knee AND hip have been shown to be most effective for long term outcomes.

Below is an example of a hip exercise, the straight leg raise in side-lying:



## **CHONDROMALACIA**

Chondromalacia refers to physical wear of the patellofemoral joint over time as seen on X-ray or other imaging.

It can be considered as Osteoarthritis of the patellofemoral joint due to prolonged Patellofemoral Pain Syndrome (PFPS) as described earlier. It is important that PFPS is managed to avoid future Chondromalacia.



What activities are typically affected?

Symptoms can be experienced during the same general activities listed earlier for PFPS. However, osteoarthritis-type symptoms can also be experienced:

- Pain with prolonged sitting
- Pain and/or stiffness the first few steps of walking after a period of rest, such as first thing in the morning
- Relief of symptoms with movement, but increased symptoms with excessive movement/stress

#### Where are the symptoms?

Typical activities include but are not limited to:

- Squatting (gym in particular)
- Running
- Jumping and Landing
- Lunges
- Standing up after prolonged sitting
- Walking up and down stairs, or stair running
- Driving

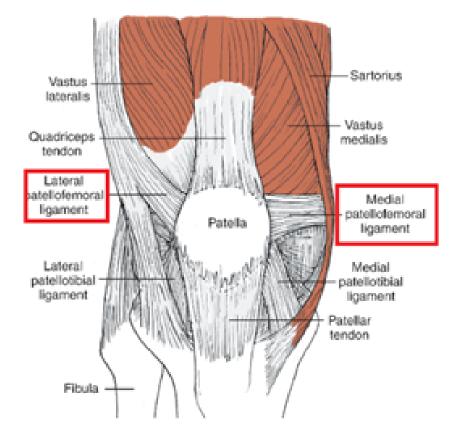
#### How is it managed?

In physiotherapy, Chondromalacia doesn't need to be confirmed with any scan as it generally does not change the management.

Although any potential physical wear on the patellofemoral joint cannot be reversed, the symptoms can be well managed with the same strategies listed earlier for PFPS to allow for return to physical activities, even impact activities such as running and tennis.

## **PATELLA SUBLUXATION / DISLOCATION**

This is an acute injury that occurs when one of the ligaments of the patellofemoral joint is abruptly injured and cannot hold the kneecap in place, causing it to dislocate.



When can it be injured?

- During non-contact, high-stress actions of the knee such as quickly turning to change direction during sport
- During direct contact, such as falling directly on the kneecap

#### How is it managed?

Initial management involves gentle loading of the knee to help ligament healing and may involve a short stint of walking with crutches, patella stabilisation taping and quads strengthening.

As the ligament becomes stronger, strengthening can be progressed to weight-bearing exercises (see example below) and eventually plyometric/power drills to ensure the knee is able to tolerate these activities before returning to sport.

Infrequently, stabilisation surgery can be performed to help physically keep the patella stable within the joint.

## **PATELLA TENDON ISSUES**

#### PATELLA TENDINOPATHY

Patella tendinopathy, also referred to as "Jumper's knee", is a condition that arises following increased loading of the patella tendon at the front of the knee. Tendon overload causes cellular changes within the tendon that ultimately results in tendon pain and dysfunction.

The patella tendon joins the large quadriceps muscle group to the tibia, just below the kneecap. Males are up to four times more likely to develop patellar tendinopathy compared to females.

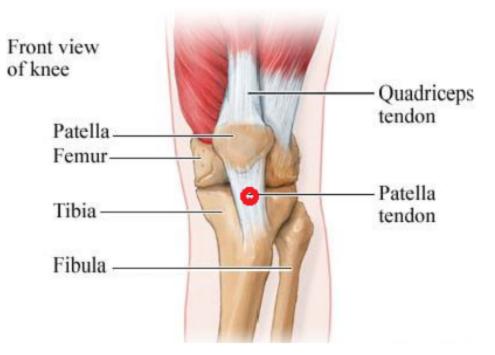
#### What activities are typically affected?

The pain is usually present during activities that cause increased loading through the patellar tendon:

- Repetitive jumping
  - Basketball
  - Volleyball
  - Netball
  - Football
- Repetitive squatting
- Walking down a decline slope
- Up to 45% of all basketballers and volleyballers experience a degree of Patella tendinopathy

#### Where are the symptoms?

Patellar tendinopathy is characterised by pain at the front of the knee felt either at the lower border of the kneecap or within the tendon itself.



A diagnosis can usually be made by a skilled physiotherapist and should not require any medical imaging.

#### How is it managed?

As this is caused by an overloading of the tendon, management involves reducing tendon loading during provocative activities. Tendon injuries, however, do not respond well to resting and hence simply doing nothing will not resolve the condition either. Instead, a very specific exercise program should be prescribed to maintain appropriate load through the tendon and to elicit a pain-relieving response. Exercises involve both isometric (sustained holds) and isotonic (slow, heavy, through range) contractions.

Another method of reducing tendon loading is by addressing biomechanical issues that may lead to an increase in patella tendon loading during jump/landing activities. A recent study has found that landing with the torso more forward in comparison to the hips reduces load through the patellar tendon. Additionally, improving ankle movement to increase load absorption through the ankle joint can both improve landing biomechanics and reduce patellar tendon load.

If the condition is not responding to load modification and exercise alone, there are some medications that can assist with the pain. However there is no evidence for injecting the patella tendon with cortisone or platelet-rich plasma (PRP). In fact, cortisone has a detrimental effect on the long-term health of the tendon.

If left unmanaged, tendinopathy can lead to a patella tendon tear/rupture.

Example of a more advanced exercise for restoring patella tendon power, the dumbell plyometric split squat:



# **OSGOOD SCHLATTER SYNDROME**

This is a common knee problem in teenagers due to the combination of a recent growth spurt and repetitive loading of the patella tendon.

It used to be widely thought, that during a growth spurt, the bone grows quicker than the muscles and patella tendon and this causes the tendon to pull at the attachment site of the tibia which causes pain.

Now, we realise the bone is still maturing, and not yet rock solid, so an rapid increase in someone's training load can irritate this 'weak spot'. Once we've finished growing and the bone is matured, this condition doesn't appear to be an issue.



What activities are typically affected?

Usually sports that involve repetitive jumping and landing:



- Football
- Netball
- Basketball
- Volleyball
- Going up and down stairs

#### Where are the symptoms?

Pain is typically felt at the top of the shin bone (tibia) onto a bony bump known as the tibial tuberosity. This is where the quadriceps/patellar tendon attaches into the bone. There may be a distinct bony lump at the painful site which is where the patella tendon pulls on the tibia.

#### How is it managed?

Osgood Schlatters is known as a self-limiting condition, meaning that it will settle over time. There is not a great deal of evidence that rest accelerates the healing process, so it is important to get information from your physiotherapist to determine how to best manage this condition.

Treatment options are tailored to the individual and may include advice involving cryotherapy for symptomatic relief, quads strengthening, soft tissue work, correction of biomechanics and controlling symptoms through load management.

Joint mobilisation and soft tissue release of tight structures around the knee Taping of the patellofemoral joint to either offload the joint or keep it in an optimal position.

Exercise prescription addressing any weaknesses that may be contributing to the pain Modification of running and/or jumping/landing mechanics to correct any overloading of the patellofemoral joint.

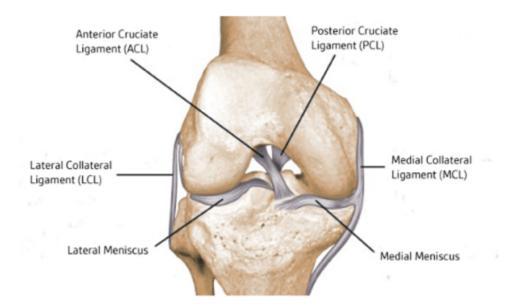
Potential referral to a Podiatrist for an opinion regarding orthotic prescription.

## **KNEE LIGAMENT INJURIES**

There are 4 ligaments within the main knee joint:

- Anterior Cruciate Ligament (ACL)
- Medial Collateral Ligament (MCL)
- Lateral Collateral Ligament (LCL)
- Posterior Cruciate Ligament (PCL)

Together, their job is to help prevent the knee from moving excessively in any direction during movement.



#### When can the Knee Ligaments be injured?

The ACL is typically injured during high-force, non-contact movements such as turning to change direction and pivoting and the MCL can also be injured in the process. ACL injuries may also occur during hyperextension of the knee.

The MCL and LCL are typically injured during contact when the knee is forced to bend inwards or outwards excessively, such as when an opponent contests possession of the ball from the side.

The PCL is typically injured during contact when the shin is forced back while the knee is bent.

Given this, it may be no surprise that knee ligament injuries are more common in sports such as:

- Netball
- Basketball
- Football
- Soccer
- Rugby
- Hockey

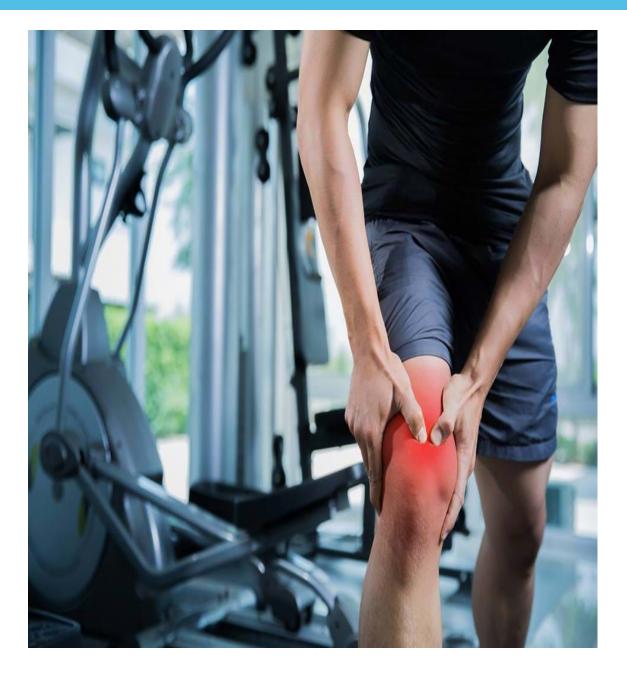


MCL, LCL and PCL injuries are generally managed in physiotherapy without surgery. Initial management involves gentle loading of the knee to help ligament healing and may involve a short stint of walking with crutches, taping, quads and hip strengthening.

As the ligament becomes stronger, strengthening can be progressed to more advanced weightbearing exercises, balance (see video below) and eventually plyometric/power drills to ensure the knee is able to tolerate these activities before returning to sport.

ACL injuries may be managed with physiotherapy alone or with surgery and physiotherapy combined. This will be discussed in the next section.





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# **ACL LIGAMENT TEAR / RUPTURE**

IS SURGICAL RECONSTRUCTION NECESSARY? (Short Answer, No!)

Here in Melbourne, most people have heard of ACL injuries given the popularity of sports like AFL, basketball, soccer and netball where sharp changes of direction are very common and there are many famous cases in elite sport. We classically associated ACL ruptures with the need for surgical reconstruction and a lengthy period of rehabilitation before potentially returning to sport. Research in physiotherapy and sports medicine has evolved and the case for non-surgical management can now be made, which is exciting given the potential complications and cost of surgery.

#### Can a ruptured ACL Repair Itself?

Impossible, you may say! Research suggests it is definitely possible. In a recent study, out 45 patients with either a fully ruptured or high grade ACL injury, 17 demonstrated clear improvement in ACL structure on MRI scan after 6-12 months of knee strengthening (Ihara, 2017).

#### Surgery and exercise or exercise-only?

Regardless of which management, there is an increased chance of osteoarthritis in the knee compared with before the injury. To assist with decision making, the following is a summary of some of the research in support of non-surgical management of ACL ruptures when compared with surgical management:

#### 1 year after ACL rupture:



Exercise-only athletes compared with ACL reconstruction athletes performed better on 2 out of 4 different single-leg hop tests. There was no difference between the groups in the other 2 tests (Moksnes, 2009).

Exercise-only athletes compared with ACL reconstruction + exercise athletes had less knee joint stability on testing, but better left vs right symmetry with hop tests. Both exercise-only and reconstruction + exercise athletes had the same rate of return to pivoting sports (Grindem, 2014)

#### 5 years after ACL rupture:

There was no difference in multiple knee questionnaire scores between early reconstruction and exercise-only management. 50% of patients who went with initial exercise-only management went on to have the reconstruction later. Authors concluded that "young active adult patients should consider rehabilitation as a primary treatment option" after an ACL tear (Frobell, 2015).

#### 10 years after ACL rupture:

Patients who had surgical ACL reconstruction had better passive knee stability on examination, but there was no difference between patients treated operatively and non-operatively with respect to osteoarthritis or meniscal injuries and activity level (Meuffels, 2009)

#### 20 years after ACL rupture:

There was no difference in osteoarthritis between surgical and non-surgical groups, and no difference in functional outcomes, although knee stability was still better in the surgical group. In other words, the findings seen at 10-year follow-up were still maintained at 20 years post-injury (van Yperen, 2018).

#### Summary of pros/cons:

# Surgery + Exercise

- Longer rehab time – minimum 10 months **before back to sport** 

- Need to rehab 2 sites - the new ACL and the structure from which the new ACL was taken (usually hamstring or patella tendon)

- Greater financial cost
- Greater muscle weakness

- Chance of failure and rereconstruction

- Pain post-surgery and other uncommon potential postsurgery complications

# **Exercise-only**

- Reduced rehab time can return in 6 months **depending on rehab**
- Reduced cost
- No surgical trauma
- ACL can repair with rehab alone without surgery
- Research is growing in support

- Surgery is still an option should you do well in rehab but have recurring incidents of instability/giving way in the future ("delayed surgery")

- No increased risk of future osteoarthritis and meniscal issues according to current research, though it is theoretically possible

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#### Elite sport cases:

- **Daniel Menzel (AFL):** Total 4 reconstructions: Left x3, Right x1 2 failed left knee reconstructions
- Alex Johnson (AFL): Total 6 reconstructions: Left x5, Right x1 4 failed left knee reconstructions
- **DeJuan Blair (NBA):** ACL rupture in both knees during high school. Surgeries failed and he went on the play NCAA1 college basketball and NBA without an ACL in either knee.
- Yuvraj Singh (Cricket): Continued playing at international level without reconstruction. ACL healed with rehabilitation.
- Jessica Rich (Snowboarding): Ruptured ACL 1 month before 2018 Winter Olympics, medically cleared for Big Air event without reconstruction, but not for Slopestyle
- **Phillippe Marquis (Skiing):** Ruptured ACL 1 month before 2018 Winter Olympics, was scheduled for surgery but competed in Mogul skiing. Would have had no chance to compete if he had immediate surgery. Ended up having surgery after the Olympics as scheduled.

#### Conclusion:

Having surgery is a difficult decision to make, but fortunately there is compelling support for non-surgical management in certain people, whereas others are recommended to have surgery. It all depends on the individual and the demands that will be placed on your knee.

The choice is yours but regardless, exercise-rehab must be thorough for successful return to sport!

## **KNEE JOINT INJURIES:**

## **MENISCUS TEARS**

Our knees have both a lateral and a medial meniscus. It is a fibrocartilage layer that separates your femur (thigh) from your tibia (shin). They are pivotal to providing rotational stability to your knee and act as a shock absorber during motion, helping to disperse compressive forces throughout the knee.

Meniscus tears come in many variations, and can happen to both medial and lateral meniscus. Medial is more common, though lateral tend to be slower to settle. The majority of torn meniscus injuries improve with graded rest, expert physiotherapy and a planned return to sport or activity.

Occasionally, surgical intervention is required, though this is far less common these days for degenerative tears.

#### When can the Meniscus be injured?

Meniscus injuries can be caused by many, and sometimes poorly understood, mechanisms. Typically, an acute, traumatic tear results from a twisting, cutting or fast change of direction motion.

Degenerational tears can occur with simple turning, golf swings, getting out of the car, kneeling or deep squatting. These are motions people would have done millions of times, then suddenly experience pain. We simply don't have all the answers as to why these tears occur.



Signs and symptoms of a torn meniscus

Pain along the inside or outside of the knee joint is common, plus or minus joint swelling. Usually, a history of twisting with a slightly flexed knee is noted. Occasionally people experience locking, collapsing or giving way sensations. Your physiotherapist has multiple clinical tests to determine a meniscal tear.

#### Do you need scans?

Generally, no. For an acute traumatic injury, scans may be ordered at the initial consultation to rule out other potential injuries. X-rays don't show meniscal tissue but MRI does, though it should be noted that scan results don't necessarily correlate with pain or functional levels.

Functional status and rehabilitation goals are much more important than the possible presence of a meniscus tear on a scan. A study by Zanetti et al (2003) showed that 36% of non-symptomatic knees had a tear on MRI (age 18–73), without any symptoms.

#### How is it managed?

Usually, a standard meniscal tear will take 6-8 weeks to settle with conservative management. This can vary quite widely.

Initial management involves gentle loading of the knee to help meniscus healing and may involve a short stint of walking with crutches, quads and hip strengthening.

As the meniscus becomes stronger, strengthening can be progressed to more advanced weightbearing exercises and eventually plyometric/power drills to ensure the knee is able to tolerate these activities before returning to sport.

### Should you have surgery for a Meniscus Tear?

Generally not.

Your knee physiotherapist will assist you in making this decision. Main consideration needs to be around whether your meniscal injury is degenerative or acute. A recent systematic review of the medical research literature by Kahn et al (2014) showed no evidence for surgical intervention in degenerative meniscal tears versus conservative rehabilitation management.

For an acute meniscal tear, with an inability to extend or move the knee, surgery may be required and has a high success rate. Rarely, will you need to rush into making a decision and most patients are able to return to multi-directional and pivoting activities with rehabilitation and without surgical repair.

# **KNEE OSTEOARTHRITIS**

This refers to physical wear of the cartilage between the femur and tibia over time as seen on X-ray or other imaging. It is a very common presentation.



What activities are typically affected?

Symptoms can be experienced typically during impact and multi-directional activities such as:

- Running
- Long walks
- General sport
- Repetitive squatting
- Going up and down stairs

However, other general symptoms can also be experienced such as:

- Pain with prolonged sitting
- Pain and/or stiffness the first few steps of walking after a period of rest, such as first thing in the morning
- Relief of symptoms with movement, but increased symptoms with excessive movement/stress

#### How is Osteoarthritis managed?

In physiotherapy, osteoarthritis is typically diagnosed after exclusion of other potential knee injuries.

Management consists of strengthening the hips and quads improve movement mechanics during movement and shock absorption for impact activities.

Hip thrusts are great for strengthening the hip extensors:





Physiotherapy joint mobilisations and soft tissue treatment techniques can be performed to reduce various muscle and joint restrictions to assist healthy movement.

Although it is not possible to reverse physical wear of the cartilage, research has shown that a tailored and thorough strengthening program improves quality of life greatly and can be the difference between being able to continue an activity such as running, and compromising by avoiding the activity. Strength is the real long term key to calming your knee osteoarthritis pain down, and allowing you to get on with life!

## **FAT PAD IMPINGEMENT SYNDROME**

#### Fat Pad Anatomy

Whilst it has an awkward name, the fat pad can be a persistent cause of knee pain. As its name suggests, it is a fatty mass that lies just below the kneecap, sitting behind the patellar tendon.

#### Signs and Symptoms of Fat Pad Impingement Syndrome

Fat pad impingement often occurs when the fat pad becomes inflamed or swollen. This may be due to a direct hit, ongoing irritation or a hyper extension injury to your knee.

During a hyper extension injury, the inferior pole of the patella can pinch into the fat pad, initiating an inflammatory response, and pain.

Due to the patellar tendon sitting on top of the fat pad, fat pad impingement can be easily misdiagnosed as patellar tendinopathy.

The key differentiation here is the fact the fat pad pain can spread medially and laterally at the front of your knee, whereby the patellar tendinopathy pain is a direct pin-point spot, just at the bottom of your knee cap, that doesn't spread.

Usually fat pad problems are irritated with kicking, or standing with knees straight, or any time you find your knees locked into extension for a long time, or quickly.

#### What should you do to treat Fat Pad Impingement Syndrome?

Overall, treatment for an irritated fat pad is quite simple, though can take a long time to settle.

For an irritated fat pad, icing post aggravating activities is a smart treatment decision. Usually 15 minutes is enough to settle the symptoms.

The key other key is to settling your fat pad symptoms is to remove or reduce what irritates it.

Anti-inflammatory medication, prescribed by our doctor, can help in certain cases, and very rarely will surgery be required to remove the inflamed and thickened fat pad.

# **PES ANSERINE BURSITIS**

The Pes Anserine bursitis is a condition characterised by inflammation of the pes bursa, which is located between three tendons on the inside of the knee, and the tiba, or shinbone.

When the Pes bursa becomes irritated, it becomes swollen and produces too much fluid, which puts pressure on the adjacent parts of the knee.

The pain is usually experienced on the inside of the lower knee, and is a classic condition that affects middle aged women in particular. It is also a common condition in running athletes, and on the other end of the scale, people with knee osteoarthritis.

It is thought to believe that biomechanically, if the knee structure has changed allowing for the knee to roll inwards, or the hip and gluteal muscles aren't strong enough to control this rolling in, the pes bursa can become irritated.

#### How to treat Pes Anserine Bursitis.

Ideally, you should limit your aggravating factors for the short term. Ice and anti-inflammatory medication can help settle the symptoms.

The long term solution is a physiotherapy-led strengthening regime, focusing on hip and knee muscle strength and control, and retraining the movement mechanics.

## **ITB SYNDROME**

#### What is ITB Syndrome?

ITB syndrome is a common issue for cyclists and runners. It relates to pain on the outside of the knee, commonly just above the knee, though ITB syndrome can have a vague pain pattern anywhere on the outside of the knee.

It is a result of irritation of the distal ITB tendon as it rubs against the distal femur (thigh bone).

#### Why does it happen?

Previously, it was thought that ITB syndrome was a tightness issue, but more research is coming out lately saying this tightness theory is a bit too simple.

Recent information points to weakness in the lateral hip muscles, in particular gluteus minimus and minimus, that allow the thigh to roll in slightly, and then start to rub on the distal ITB.

#### How to treat ITB syndrome.

The key to treating ITB syndrome is double pronged. First of all, you need to seek a physiotherapy-led strengthening program to identify, then correct any strength deficits.

The second component is to assess your running style. Often people with ITB syndrome are 'crossing over', whereby they are running like they are on a tightrope, with their feet landing nearly in line with the other.

In these cases, we ask direct you to have a 'knee window', where there is a small gap or window between your knees, to stop you from crossing over, and taking the load off the distal ITB.

# THANKS FOR READING THE ULTIMATE KNEE PAIN HANDBOOK

We hope this information was useful for you.

It is only general in nature, and should not be interpreted as physiotherapy advice or treatment. It is for information purposes only.

If you have a knee injury, we recommend you seek proper medical advice for best care and management.

The physiotherapists at Melbourne Sports Physiotherapy are experts in knee injuries, and can see you at any of the clinics in North Melbourne, Essendon or Blackburn.

- You can book online at www.melbournesportsphysiotherapy.com.au
- Or ask us a question via **ask@melbournesportsphysiotherapy.com.au**
- Or give us a call on **1300 369 930**, to see if we are the best fit to help you.

## We'd love to help you out!