

Hockey Injuries

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Anterior Knee Pain in Hockey Players

Anterior knee pain is pain in the front of the knee. It is also known as *patellofemoral pain syndrome* (PFPS). The *patella* (kneecap) slides in a groove in the lower end of the *femur* (the thigh bone). This is known as the *trochlear groove*.



As the knee bends, the patella slides deeper into the groove. The joint between the patella and the trochlear of



the femur is known as the *patellofemoral joint* (PFJ).

Patellofemoral Pain

Often, very large forces are transmitted through the PFJ. This is why the cartilage on the back of the patella is the thickest in the body, at 4-5mm thick. PFPS is typically brought on by activities that create high PFJ loading.



These include squatting, kneeling, stair climbing, running, and prolonged sitting. In most people, pain is

felt when the knee bends past around 30°, and up to about 90°. This is when the greatest forces are applied to the joint surfaces.

PFPS is the most common knee complaint seen in adolescents and young adults. It affects around 9% of all young adults, and accounts for up to 45% of all knee complaints, with a higher incidence reported for females. In one study of elite female hockey players, knee pain was reported by 30% of those surveyed.



Source of Pain

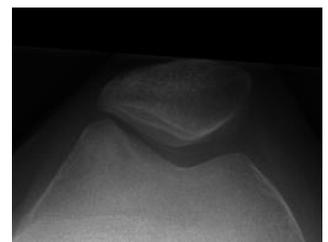
Pain may arise from a few different structures around the PFJ:

- (a) Ligaments & *retinaculum*.

These are the tissues that connect to and support the patella. For various reasons, they may become overloaded or overstretched, making them pain sensitive.



- (b) Bone stress. Bone that is loaded excessively can become painful. This can occur for a few reasons. If the patellar contact with the femur is uneven, pressure can be applied to one part of the joint, causing overload. Another reason could be thinning or loss of



cartilage, leading to reduced shock absorption.

- (c) Inflammation. Various tissues around the PFJ are pain sensitive and prone to inflammation. These include the joint capsule, the *synovium* (inner lining of the joint), a *bursa*, and the fat pads above and below the patella.



Pain in the front of the knee can also be due to causes not considered part of PFPS. These include:

- *Patellar tendinopathy*: This is where pain arises at the attachment of the patellar tendon into the bottom edge of the patella. This is common in running & pivoting sports like hockey. It is commonly called 'patellar tendinitis'. Tendinopathy can also occur at the top of the patella, where the quadriceps attach, and at the attachment of the patellar tendon into the tibia. In most people, these areas are uncommon sources of tendinopathy. However in hockey players, due to the unique positions adopted while playing, tendinopathy can occur



at any of the attachment points. Tendinopathy in hockey players will be covered in a separate newsletter



- *Apophysitis*: In children and adolescents, it is common to get pain due to stress and inflammation at growth centres. This is often seen at locations where tendons attach into bone, particularly at the patellar tendon insertions into the patella (*Sinding-Larsen-Johansson syndrome*) and



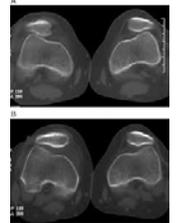
into the tibia (*Osgood-Schlatter disease*).

Causes of PFPS

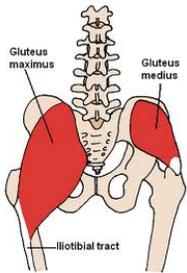
In a sport like hockey, the knees are subject to constant bending and twisting. There is also frequent contact, both with the ground and with other players. These forces can cause a lot of stress through the knee and lead to pain. Some players are more prone to developing pain than others, even with minimal stress to the knee. The reasons for this are not entirely clear. It is possible that there are multiple causes, and that these vary from person to person. Some of the possible causes are:



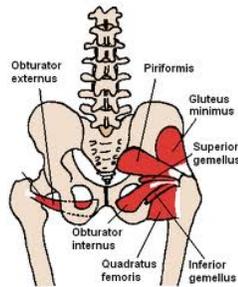
1. *Malalignment*. The most popular traditional theory is that PFPS arises due to *malalignment* of the patella within the trochlear groove. If the patella does not rest evenly against the femur, one part of the joint may be loaded more than another, leading to bone stress, impingement, or soft tissue overload.
 - (a) *Tightness or tension*. Tightness in the quadriceps, hamstring or calves can result in greater pressures being applied directly to the joints in the knee.
 - (b) *Quadriceps weakness*. Weakness in the *medial quadriceps*, known as *vastus medialis*, is thought to be a major factor in PFPS. The theory is that an imbalance between the weak *medialis* and the stronger *lateral quadriceps* (*vastus lateralis*) leads to lateral pressure on the patella. General quadriceps weakness is also a risk factor.



3. *Hip muscle weakness.* Recent research has shown that weakness in muscles around the hip may be a more important factor than



knee muscle weakness. The *gluteals*



(‘gluts’) and deep hip rotators function to keep the whole leg in good alignment whenever we put weight through one side.

4. *Growth and development.* PFPS is very common in children and adolescents. Changes to bones, joints and muscles related to growth can all be to blame. Some children (up to 30%) will have persistent pain, while others will have it intermittently. PFPS is more common in active children, and hockey players are likely to be particularly affected. The child with significant or ongoing pain should be assessed to ensure there are no structural or bony problems causing the pain.

5. *Tightness of the lateral structures.* Tightness of the lateral ligaments or *retinaculum* (connective tissues that support the patella) has been proposed as a major factor leading to PFPS. The *iliotibial band*, which runs down the outside of the thigh, can be tight and put tension on the retinaculum. Habits, posture, genetics and body shape are all factors that may play a part.

6. *Biomechanics.* Faulty movement patterns can occur for a number of reasons. Tightness in joints of the foot and ankle, poor foot control (particularly *over-pronation*), and poor hip and lumbo-pelvic control are all factors that can cause abnormal movements at the knee.



7. *Overload.* Often, PFPS will arise simply because the joint has been overloaded by too much activity. A sudden increase in training intensity, or a sustained high level of activity

may stress the tissues beyond their limits.

8. *Anatomical factors.* The shape, and the way that the bones and joints develop can affect PFJ loads. Examples include:



(a) *Genu valgus* - being excessively ‘knock-kneed’.



(b) *Genu varum* - being excessively bow-legged.



(c) *Genu recurvatum* - a knee that goes excessively past the straight position.



(d) *Femoral anteversion.* In some people the hip shape favors a leg that turns in excessively.



(e) *Tibial torsion* - a lower leg that twists excessively in or out.



9. *Instability.* An unstable PFJ can become painful due to repeated trauma (see section on ‘Instability / Dislocation’ in Resources for Patients).

Certain bone and joint abnormalities within the knee can also contribute to PFPS.

Why are females affected more?

Up to the stage of puberty, boys and girls are equally affected with regards to frequency of knee injury and incidence of pain. After puberty, the rate for girls increases substantially. A number of possible reasons for this have been identified. The most often quoted is the anatomical difference in the width of the female pelvis. This can affect the angle between the thigh and lower leg, increasing joint forces. Flexibility may be another factor. The general greater flexibility of females compared to males could lead to greater problems with dynamic control of the patella. And at puberty, boys and girls both experience a bony growth spurt. But for some physiological or hormonal reason, girls don’t get the same accompanying development of muscles. This lag in muscle development can make the knees prone to both pain and injury.

Treatment

Because there are many possible causes of PFPS, the best treatment is not always clear. Once the

patient has been carefully assessed, a range of treatments may be applied. Of particular importance will be:

1. Rest. Sometimes a period of rest may be required to allow the tissues time to heal. This may simply mean cutting down on certain activities.
2. Muscle strengthening. Depending on where the main muscle imbalances or deficits seem to be, the muscles most likely to need strengthening are:
 - (a) Quadriceps, particularly the vastus medialis.
 - (b) Hip muscles. Of particular importance are the gluteals - *gluteus maximus*, *medius* and *minimus*, and the deep hip rotator muscles.
 - (c) Core muscle groups of the lumbo-pelvic region..
3. 'Neuromuscular retraining'. Sometimes muscles aren't particularly weak, they are just working inefficiently, and their 'timing' is out.
4. Orthotics and correct footwear are important considerations when faulty biomechanics of the foot and ankle are present.



5. Stretching. Tight muscles, particularly around the knee, can increase joint loads and should be kept flexible. .



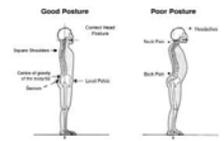
6. Taping or bracing.

Techniques using adhesive strapping tape or bracing have been shown to reduce pain and help with exercises for PFPS.



7. Massage and mobilisation. Mobilisation of stiff joints of the foot, ankle, knee, hip or spine. Massage, including deep tissue and trigger point releases, can assist in relieving tension that is contributing to greater loading through the knee.

8. Postural correction. Certain postures, especially an excessive anterior pelvic tilt, can contribute to PFPS and other knee problems.



9. Balance and coordination training. There is evidence that balance and *proprioception* (joint position sense) are abnormal in people with PFPS. Training specifically aimed at these deficits can be very beneficial.
10. Functional exercises. These are introduced before return to sport. They are exercises that more closely match the movements and demands of hockey.

For more detailed information on PFPS see 'Patellar Pain Syndrome' under Resources for Patients.

For information on all types of injuries visit:
<http://www.cssphysio.com.au/forpatients.html>

For information on hockey injuries visit:
<http://www.cssphysio.com.au/hockeynewsletter.html>



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