

Anterior knee pain

Anterior knee pain is common with a variety of causes. The term 'anterior knee pain' is sometimes used synonymously with 'patellofemoral pain syndrome' but it is important to make a careful assessment of the underlying cause in order to ensure appropriate management and advice.

Common causes^[1]

Patellofemoral pain syndrome (PFPS)^[2]

PFPS is a diagnosis of exclusion and is defined as pain behind or around the patella. It is synonymous with the term retro-patellar pain and has in the past been referred to as chondromalacia patellae. It is caused by compressive forces in the patellofemoral joint (PFJ). PFPS is very common. Symptoms are usually provoked by climbing or descending stairs, squatting and sitting with flexed knees for long periods of time.

PFPS seems to be multifactorial, resulting from a complex interaction between intrinsic anatomy and external training factors^[3]. Pain and dysfunction often result from either abnormal forces or prolonged repetitive compressive or shearing forces between the patella and the femur at the PFJ.

PFPS is a common cause of knee pain in adolescents and young adults, especially among those who are physically active and regularly participate in sports^[4] ^[5]. Although PFPS most often presents in adolescents and young adults, it can occur at any age. Over half of all cases are bilateral (but one side is often more affected than the other).

The potential causes of PFPS remain controversial but include overuse, overloading and misuse of the PFJ. Underlying causes of PFPS include:

- Overuse of the knee - eg, in sporting activities.
- Reduced muscle strength in the hip abductors and excessive hip adduction altering the biomechanics at the PFJ.

- Minor problems in the alignment of the knee.
- Foot problems – eg, flat feet, although whether this is cause or effect is disputed.
- Repeated minor injuries to the knee due to sport or hypermobility affecting the knee.
- Increased Q angle is no longer believed to be a risk factor for PFPS.

Management of PFPS

- Multimodal physiotherapy as well as exercises focusing on strengthening posterolateral hip muscles, have been shown to reduce pain for up to one year, although the studies are of low quality^[6].
- In addition to physiotherapy, foot orthoses are often used in the management of PFPS and may offer marginal benefit^[7].
- A Cochrane review concluded that there are insufficient data to demonstrate any long-term benefits from patella taping^[8].
- The role of knee braces is controversial^[9].
- Barefoot running reduces PFJ stress and may prove to be a novel approach for runners with PFPS^[10].
- Surgery is very rarely indicated^[11]. Distal realignment to offload the PFJ (Fulkerson osteotomy) is the procedure of choice but should only be considered in patients with persistent pain who also have confirmed chondromalacia patellae, as it is not without risks of complications. Lateral retinacular release alone has been shown to benefit only 25% of patients and may make their symptoms worse.

Prognosis of PFPS

- In younger patients, if appropriate action is taken at an early stage, exercise adjusted accordingly and the quadriceps muscles built up then the outlook for full functional recovery is very good.
- In older affected patients, there may be progression to osteoarthritis.

Other common causes of anterior knee pain in adolescents

These include:

Osgood-Schlatter disease

- See the separate [Osgood-Schlatter Disease](#) article.
- [Sinding-Larsen Johansson disease](#) is another common cause of anterior knee pain in children and adolescents. It is similar to Osgood-Schlatter disease but occurs at the inferior pole of the patella.
- Osgood-Schlatter and Sinding-Larsen Johansson diseases are common causes of anterior knee pain which are aggravated by jumping and kneeling^[12].

Bipartite patella

- This is common in adolescence and may cause pain and tenderness.
- It is usually asymptomatic but variable in severity and may require surgical treatment^[13].

Patellar misalignment

- Often accompanied by damage to the chondral surface of the PFJ.
- It is more common in girls and may cause recurrent dislocation or subluxation of the patella.
- Surgery may be indicated for recurrent instability^[14].

Hypermobility

- Causes hyperextension and hyperflexion of the knee.
- This most often presents around the time of the pubertal growth spurt.

NB: chondromalacia patellae is not a clinical diagnosis. It refers to softening of the articular cartilage of the patella seen on MRI or at arthroscopy. There is no correlation between the degree of anterior knee pain and the amount of cartilage damage^[15].

Other common causes of anterior knee pain in adults

These include:

Patellar tendinopathy (jumper's knee)

- Patellar tendinopathy is a common and painful overuse disorder. It is the adult equivalent of Sinding-Larsen Johansson disease.
- Eccentric training is the treatment of choice^[16].

Bursitis

- [Prepatellar bursitis \(housemaid's knee\)](#).
- Deep infrapatellar bursitis (parson's knee): inflammation is distal to the patella and posterior to the patellar tendon.
- Anserine bursitis: often presents with spontaneous medial knee pain with tenderness in the inferomedial aspect of the joint. The cause is unknown but it is associated with diabetes mellitus and obesity^[17].

Isolated patellofemoral arthritis^[18]

- Patellofemoral osteoarthritis (PFOA) is a common form of knee [osteoarthritis](#) in middle and older age^[19].
- It is suggested that in a proportion of young adults, PFPS may be a precursor to subsequent PFOA^[19].

Presentation

See also the separate [Knee Assessment](#) article.

- Knee pain is often bilateral but more severe in one knee than the other.
- Pain may be difficult to localise but is usually anterior or anteromedial.
- Pain may be aggravated by active and passive movement.

- Pain may be aggravated by particular activities such as walking, running (especially downhill), stairs (especially going down stairs), squatting and when getting up after prolonged sitting.
- Associated features may include crepitus, clicking and swelling.

Investigations

These tend not to be that useful, as diagnosis can often be made clinically.

- X-rays (skyline views should be included with anteroposterior and lateral knee X-rays) may be indicated if there has been a history of trauma.
- MRI scanning may give much more detail of soft tissues but changes seen may not correlate with the degree of symptoms [20].
- Other investigations may be required (eg, joint aspiration, serology, arthroscopy) depending on likely diagnosis.

Differential diagnosis

NB: knee pain at any age may be referred pain from the hip.

Other causes of knee pain, including:

- Children and adolescents: referred pain from the hip – eg, [slipped capital femoral epiphysis](#), [Perthes' disease](#) and [osteochondritis dissecans](#).
- Adults: trauma – [ligamentous sprains](#) (anterior cruciate, medial collateral, lateral collateral); [meniscal tear](#); inflammatory arthropathy ([rheumatoid arthritis](#), [reactive arthritis](#)); referred pain from the hip (eg, fracture of the neck of the femur) or [sciatica](#).
- Older adults: [osteoarthritis](#), [gout](#), [pseudogout](#).
- Any age: [septic arthritis](#).

Management

The management will depend on the underlying cause. However, conservative treatment is usually effective and most patients will not require surgical intervention. Management may include:

- Avoiding the trigger activity if appropriate. This may be all that is needed
- Simple analgesics, including non-steroidal anti-inflammatory drugs (NSAIDs), may help to relieve discomfort. However, there is only limited evidence for the effectiveness of NSAIDs for short-term pain reduction in PFPS [21].
- Modification of training, quadriceps strengthening, hip muscle strengthening and core strength improvement. Referral to a physiotherapist is therefore often appropriate.
- Proper footwear is important. Foot orthoses decrease rotational forces in the tibia that affect tracking of the patella during locomotion.
- Surgical: most people achieve results that are acceptable or better with conservative treatment. If conservative measures fail, there are a number of possible surgical procedures depending on the underlying diagnosis.

Further reading

- [Sanchis-Alfonso V, Dye SF](#); How to Deal With Anterior Knee Pain in the Active Young Patient. *Sports Health*. 2017 Jul/Aug;9(4):346-351. doi: 10.1177/1941738116681269. Epub 2016 Nov 1.
- [McClinton SM, Cobian DG, Heiderscheit BC](#); Physical Therapist Management of Anterior Knee Pain. *Curr Rev Musculoskelet Med*. 2020 Dec;13(6):776-787. doi: 10.1007/s12178-020-09678-0. Epub 2020 Oct 30.

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