

# Anterior knee pain

Anterior knee pain is very common amongst active adolescents and athletes participating in contact sports. It is one of the most common problems/injuries seen in sports medicine. The term anterior knee pain refers to pain which is present at / or around the patella (knee cap). Causes can relate to acute trauma (direct blow on the knee), age, repetitive strain or biomechanical problems. Pain will usually be experienced at the sides, under and / or below the patella. Stair climbing or descending, prolonged bent knee sitting, running, jumping, squats and lunges will usually worsen the pain. Anterior knee pain can be effectively managed by conservative treatment (rehabilitation exercises). Accurate diagnosis, patient education and patient compliance with the rehabilitation process (anything from six weeks to three months, depending on the severity and the athlete) are vital for the recovery process.

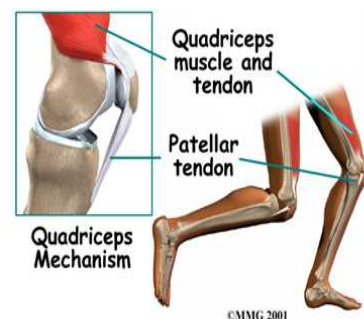
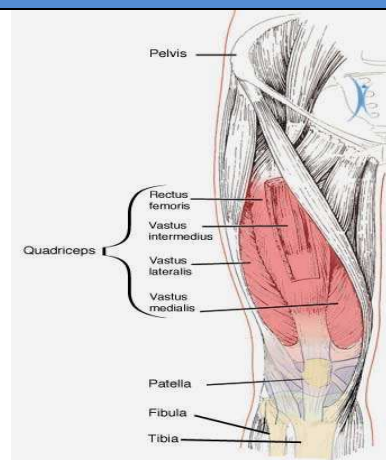
## Anatomy of the knee joint

The quadriceps (muscles at the front of thigh) is the most powerful muscle group in the body. The knee extensor mechanism is a continuous structure from the anterior (front) pelvis to the anterior tibia (shin bone). It begins with a tendon from the anterior pelvis, extending downwards with the quadriceps muscle group. Another tendon forms at the lower end of the quadriceps group. This tendon provides attachment for the distal (lower part) quadriceps to the anterior of the proximal (upper part) tibia. The patella sits completely within this distal quadriceps tendon.

The patella articulates with the distal femur (thigh bone). This articulation is known as the patellofemoral joint. The articular surface of the patella is shaped like a keel of a boat, which allows it to glide in the femoral groove of the distal femur. Imprecise movements between the patella and the femur are referred to as patellofemoral dysfunction/maltracking, which might cause anterior knee pain.

The patellar tendon is the portion of the distal tendon between the patella and the tibia. This tendon can become inflamed or degenerative. When this happens it is called patellar tendonitis or jumpers knee.

The quadriceps muscle group consists of four muscles named: rectus femoris, vastus lateralis, vastus medialis, vastus intermedius. Only one of these four, the rectus femoris, crosses the hip joint. The relevance of this is that the rectus femoris acts as a knee extensor and hip flexor. The other three crosses only the knee joint and thus is responsible for knee extension only. The vastus lateralis is active throughout the range of motion of knee extension whereas the **Vastus Medialis Oblique is mostly active during the last 30° of knee extension.**



## Does the age of an athlete play a role in anterior knee pain?

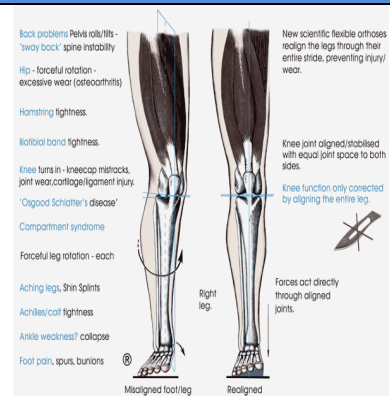
Between the ages of 8 and 15 years anterior knee pain might relate to inflammation at the tendon attachment at the growth plate. The growth plates of the knee are situated at the anterior proximal tibia (Osgood-Schlatter disease) and at the lower pole of the patella (Sinding-Larsen-Johansson syndrome). Thus, in layman's language: "growth pains" occur at these sites. Between the ages of 15 and 30 acute trauma will most likely be the reason for anterior knee pain. Beyond the age of 40 years, degenerative processes within the knee might cause anterior knee pain.

## Can too much exercise cause anterior knee pain?

Repeated forceful loading on the patellofemoral joint may cause anterior knee pain particularly where an individual has had little preparation to participate in extensive physical activity. Sometimes even well-trained children are susceptible to patellofemoral overload. E.g. A promising all-round young athlete will be participating in several sport disciplines. Such children engage in 7-8 sessions (sometimes even more) of high impact activities during a single week. Parents need to monitor activity levels of their children to ensure that they stay in reasonable limits for physical training/sport participation.

## The role of biomechanics in anterior knee pain

Biomechanical factors might play a role in anterior knee pain. Genu varum (knock knees) indicates an angle on the knees medially (towards the midline of the body). You can see this when the athlete is standing upright and the knees are closer together ("falling towards each other") than the feet. Excessive internal rotation (antroversion) of the femurs and/or pronated (flat) feet can contribute to this. This condition is associated with anterior knee pain. Tight muscles in the lower limbs (quadriceps, hamstrings, calves, ITB) can also increase the pressure on the patellofemoral joint during weight bearing activities. Weakness of the quadriceps muscles, the hip abductors and the hip external rotators can increase the potential for patellofemoral pain. A high sitting patella is more likely to be more unstable, which can also cause pain.



## What treatments are available?

Initially, knee activity should be reduced, at least relatively. A patient with the movie-goer's sign (pain at the patella with prolonged sitting) can benefit from straightening the leg or walking periodically as needed. If the patient is a runner or engages in impact activity and insists on continuing some rigorous activity, swimming or another nonimpact aerobic activity is a reasonable alternative.

Ice is the safest and "cheapest" anti-inflammatory "medication," but its successful use requires discipline. Applying ice for 10 to 20 minutes after activity is recommended. A common complaint is the inconvenience of holding an ice bag on the knee, but a simple elastic wrap solves this problem. Crushed ice in a plastic bag or a bag of frozen vegetables also works well.

Patients with anterior knee pain have not been conclusively shown to benefit from non-steroidal anti-inflammatory drugs (NSAIDs). Although the same statement can be made about many treatments for patellofemoral pain, the drawback of NSAIDs is that their potential side effects may be more significant than any adverse effects of ice application or rehabilitative exercises.

Sport shoes have improved significantly in the past decade, but to the point of confusion as so many choices are available. In honest truth, the quality and age of footwear are more important than the brand name. Certain brands for that matter are linked indefinitely with lower leg and knee injuries. It is not uncommon to hear patients state that a new, quality shoe helped alleviate their knee pain. A neutral shoe is probably your best bet when buying shoes for training. One can rather get custom made insoles than buying anti-pronation or anti-supination shoes, especially if you do not even know your foot type and foot movements during gait.

Anterior knee pain treatment differs from person to person. It is beyond the scope of this information document to go through all the possibilities in detail. Thus, in short, some commonly used treatments do include one or a combination of the following:

- Stretching exercise routines the quadriceps and especially for the hamstrings, calves and ITB.
- Well planned strengthening exercises for the quadriceps (particularly the VMO), hip abductors, and hip external rotators;
- Neutral shoes OR custom made orthotics for supporting the longitudinal arch of the feet;
- Patellar taping techniques;
- Patellar tendon counterforce brace;
- Non-steroidal anti-inflammatory medication
- Surgery (minority of the cases). This is the last option and post-surgery rehabilitation is a MUST in any case.

## Conclusion

Anterior knee pain is a common problem, especially in young, active athletes between the ages of 8 and 15 years. It seems anterior knee pain is more common under girls than boys. Anterior knee pain which does not resolve with training intervention (prescribed by a Biokineticist) should be considered serious and further clinical investigations must be engaged. Most of the cases are benign however and can be resolved with conservative treatment (rehabilitation exercises according to evaluation results).

**Keep exercising to get better. Patellofemoral pain can be hard to treat and your knees won't get better overnight. Some people are lucky and get better quickly, but it might take six weeks or even longer for your knee to get better. Keep in mind that the absence of pain does not necessarily mean the cause of the problem is fully corrected. Early termination of rehabilitation exercises might cause the problem to return within a month or so. You will be less likely to get anterior knee pain again if you stay in good shape.**