

KNEECAP PAIN

Description

Patellofemoral pain syndrome, also called excessive lateral patellar compression syndrome, is characterised by anterior knee pain that is aggravated by activities such as squatting, downhill running, biking, and descending stairs.

In tennis, playing serve and volley, pushing off after having hit a wide ball, and deep bending for low volleys are most painful. The pain is caused by excessive or abnormal contact of the under surface of the kneecap with the bone of the upper leg due to sideward pulling of the kneecap ('lateral tracking').

The lateral tracking results in pressure being concentrated on the outer part of the kneecap (as opposed to being distributed over the whole kneecap). It may also occur as a result of direct injury to the kneecap, such as falling on the kneecap or dashboard injury.

Risk factors

The patella has a wedge shape and slides on extension and flexion of the knee in a groove formed by the femoral condyles. Static risk factors for increased lateral tracking of the kneecap include inward rotation of the thighbone, knock knees, outward rotation of the shin bone, and increased pronation of the foot.

This combination of factors is called the "miserable malalignment syndrome" (figure 1). Dynamic risk factors include insufficiently developed thigh muscles, which deprives the knee of adequate support; shortened or stiff muscles which causes the kneecap to be pulled outwards; and too much, too long and too intensive training in too short a time.

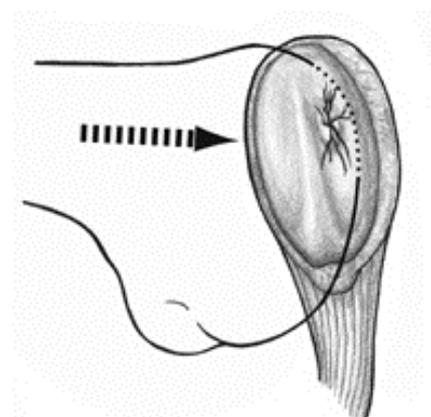


Fig 1. "Miserable malalignment syndrome"

First Aid

Rest from offending activity, and stretching and strengthening exercises, will bring about the speediest recovery, although continued sports activity does not usually lead to irreversible problems or damage. Intermittent application of ice, particularly after exercise and at the end of the day, can help reduce pain and swelling.

In the event of serious injury, have the injury examined by a (sports) physician, for example when there is swelling of the knee or when pain is also experienced when not playing tennis. In some cases, the player will be referred to a (sport) therapist for further examination or treatment.

How to Ensure the Best Recovery

Once the worst pain has subsided you can gradually start increasing the load on your knee. In doing these exercises, pain is a sign that you need to rest. **Warning:** do not exceed the pain threshold, as this will only slow down the healing process! Rehabilitation progresses in three stages from easy to strenuous.

Stage 1. Improvement of Normal Function

Rehabilitation should be aimed at improving the maltracking.

- Regular stretching of the muscles on the outer side of the leg (m. tensor fascia lata and tracts iliotibialis) will restrain the lateral tracking rotation of the kneecap and improve knee alignment. Stretching exercises should be performed as follows. Stand up straight and cross your right leg behind your left leg. Bend the upper body slowly left as far as you can (figure 2). Hold this position for 20 to 30 seconds, followed for 10 to 20 seconds of rest and repeat three times.



Fig 2. stretching of the muscles on the outer side of the leg

- To ensure that the knee works properly, it is important that the muscles surrounding the kneecap i.e. the quadriceps (inner upper thigh) and hamstrings (rear upper thigh) are flexible enough.

Stretching exercise for the quadriceps. Stand up straight and find support for one hand. Bend one leg, take hold of the ankle and pull the ankle towards the buttocks until you can feel the strain in the upper leg. Bringing the upper leg further backwards can increase the stretch. Hold this position for 20 to 30 seconds, followed by 10 to 20 seconds rest and repeat three times.

Stretching exercise for the hamstrings. Stand up straight. Place the heel of the leg that will be stretched in front of you and keep the heel on the ground. Keep your back straight and lean forward slowly from the hips until you feel a slight pull. Hold this position for 20 to 30 seconds, followed by 10 to 20 seconds rest and repeat three times.

- Static quadriceps strengthening (emphasis on medial oblique muscle). Sit down on the floor with your legs straight. Place a rolled-up towel under your knee. Try pushing the towel into the floor by contracting your quadriceps muscles. Hold for three seconds and relax. Start with three series of fifteen repetitions.
- Straight leg raise (figure 3). Sit down on the floor with your legs straight. Bend the unaffected knee. Now tighten the muscles of the affected knee and point your toes towards the ceiling. Lift your leg ten to fifteen inches, keeping the leg straight. Hold for two seconds and return to the starting position. Perform two to three sets of fifteen repetitions.
- Co-ordination training. Stand on the injured leg with arms spread, then close your eyes and try to keep your balance.



Fig 3. Straight leg raise

- Cycling. The alignment of the kneecap can be improved by non-strenuous cycling every day for 15 to 30 minutes. When cycling be sure to use a bicycle with gears. Stay in the lowest gear which will allow high cadence. This produces the least strain on the knee. Try to avoid headwind and steep terrain.
- Avoid long periods of sitting with bent knees or sitting in the same position.

Stage 2. Build-up

As soon as you are able to perform the exercises described above without discomfort, you can consider resuming your sport. Listed here below are a few exercises to improve your sport condition.

- Double leg squats (figure 4). Stand up straight with your feet at shoulders width apart. Stretch your hand straight out in front of you. Bend your knees slowly and keep your back straight. Bend the knees to a maximum of 110 degrees. The knees must not protrude in front of the feet. Start with two to three series of ten repetitions.



Fig 4. Double leg squats

- Single leg step (figure 5). Stand on the involved leg facing sideways on a step leaving the other leg hanging over the edge. Bend the involved leg and point the toes of the other foot towards the ceiling. Touch the step below you with the heel of the other leg and then straighten the involved leg. Start with one to two series of ten to fifteen repetitions.



Fig 5. Single leg step

- Make small quick steps on the spot, shifting support between the left and right leg.
- If this goes well, you can start jogging. Start off jogging and progress to short accelerations, followed by turning and pivoting exercises. Eventually you can include sprints in the exercise.

- Following this you can do jumping exercises, such as hopping, lateral jumps (skating jumps) on alternating legs and skipping.

Stage 3. Return to Play

- In the event of a mild injury, there is no need to stop playing tennis altogether, as long as the player adapts his game to the restrictions imposed by the injury. With more serious injuries, training can usually be resumed after six weeks to three months.
- Try to play on gravel courts as much as possible and avoid hard court. The peak strain on the knee is less on a surface that allows some sliding than it is on surfaces where this is not possible.
- Consult with your trainer and try to get him to adapt your training program, allowing you to start off hitting the ball from an area measuring two square meters (approx. two square yards). In this way you can continue practicing your footwork (taking small steps, positioning yourself correctly to hit the ball) without putting excess strain on the knee.
- Initially, you should limit activities that will put excess strain on the knee, such as sprints, jumping exercises, low volleys, intensive left-right exercises and serve and volley training.
- If the adapted training goes well you can gradually start doing more exercises, and increasing the distance you have to run to reach the ball (tennis drills from corner to corner)
- After this, low volleys and smash hits can be added to the training program and the player can resume playing (practice) matches.
- If practice matches can be played without problems, then the player is ready to get back to playing competitions.

Preventing Re-injury

- Be sure to do a thorough warming-up. Do, in any case, some stretching exercises for the thigh muscles. In this way your muscles and the rest of your body are prepared for the work to come.
- Increase the intensity and the extent of the exercise gradually in order to avoid straining. This is especially relevant in the change from summer season to winter season when gravel courts are exchanged for the harder indoor courts.
- Do muscle strengthening exercises for the thighs to avoid (new) knee injuries.
- Wear properly fitting tennis shoes when playing tennis, and properly fitting trainers when working out. It is essential for the shoes to be adapted to the player's weight and to the surface he will be playing on.
- In the case of (moderate) foot deformities, such as bunion deformity (hallux valgus) or hollow foot, it is advisable to buy special, individual reinforcements for the shoe to help correct the form of the foot and to give arches additional support.
- Fatigue will cause your condition to deteriorate and lessen the strength of the muscles. This increases the chances of stumbling and straining a muscle. So, make sure to stay in shape!
- Regular bicycling (low resistance and on flat surfaces) helps the knee cap alignment which in turn helps the knee to work efficiently.
- You can try taping or knee braces to see if they help.