

## **KNEE**

Almost all of us have at least once in our lives suffered from an injury, pain or a knee contusion. No wonder, as the knee joint is second (after the ankle) in sustaining loads.

Don't worry, the elephants got it worse, as they're the only animals to have four knee joints! :) Seriously speaking, excessive load burdening is caused by injuries and overburdening with the strength of the quadriceps muscle. It's enough to say that the pressure on the patella while going up the stairs, for example, may be that of even 300kg.

The knee is the biggest joint. It consists of articular surfaces of the femoral bone, tibial bone and the patella, all surrounded with a common joint capsule. There're two special flexible surfaces that fit one to another during motion. They're called menisci, built of connective tissue. The joint capsule consists of two layers: the external fibrous fold and internal synovium.

To put it simply: the knee is a hinge that allows the leg to flex and extend and to rotate the leg at flexion. All of that is done under a huge load. It is possible because the knee is strengthened with external and internal ligaments.

The illnesses of the knee must be divided into two groups:

1. those that occur due to injuries and contusions,
2. those that evolve during normal joint activity.

When should we see an orthopaedist?

We mustn't dismiss the pain in the knee or troubles with flexing the leg, especially when we're hardly able to get out of the bed in the morning or walk a few dozens of meters. We also should see a doctor if we've had a contusion, even one that seems to be small. In many cases, it's enough to rehabilitate the limb and regain muscle balance. In few cases, however, a surgical procedure is necessary. Arthroscopic procedures we've been performing for many years now, allow for precise diagnosis of the pain source and to complete treatment. Almost all injuries and illnesses can be treated with knee arthroscopy.

You need to see the orthopaedist immediately when there's:

- severe knee pain,
- blunt and chronic knee pain,
- swelled and hot joint,
- temperature above 38°C,

- cold leg,
- bluish or numb foot,
- deformity of the leg or joint,
- blocked knee (no possibility to move).

## **INJURIES AND ILLNESSES OF THE KNEE JOINT:**

- [Menisci tears](#)
- [Degenerative lesions and meniscal cyst](#)
- [Discoid meniscus](#)
- [Sprain and ligamentous injuries of the knee joint](#)
- [Medial collateral ligament \(MCL\) injury](#)
- [Anterior cruciate ligament \(ACL\) injury](#)
- [Posterior cruciate ligament \(PCL\) injury](#)
- [Lateral collateral ligament \(LCL\) injury](#)

## **Menisci tears**

The menisci are plasters of the fibro-cartilage of a complex multilayer structure, which aim at bearing significant loads. The menisci cross-section looks like a piece of pizza with the external part (near the capsula) wider. Their dimensions vary depending on the size of the joint and the inter-individual variation of the joint surfaces, but it doesn't get wider than 6-7mm. The internal loose part is not thicker than a few micrometers. This is why blood vessels as pipes that might weaken its structure, run only to the half width. It's important during treatment because repaired menisci heal at vascularized sites. The main aim of menisci is to fill in the space and fit the joint surfaces, especially on the lateral side where the surfaces of the femoral and tibial condyles are prominent and don't fit one another. Their shape makes the stress to be sustained by the whole joint structure. It works as a shock absorber which protects and feeds the cartilage. Menisci also stabilize the knee.

Menisci tears most often occur during ankle sprains because at that time menisci are caught as if in pincers by the prominent joint surfaces. Isolated menisci tears occur rarely, unless the meniscus was weakened. They weaken due to overburdening: sports microinjuries, frequently repeated forced positions (kneeling, squatting), malalignment of the limb, illnesses that impair the dynamics of the hip, spine or ankle. This kind of menisci damages are of "degenerative" character, vertical or mixed. In their course the torn part of the meniscus gets damaged. Sports injuries usually connected with ligament injuries may occur due to the tearing or crushing of the meniscus.

The main symptoms of meniscus tear are: sudden severe pain on the medial or lateral side, an audible snap or blocking of the knee (impossibility to flex and/or extend). If the meniscus was torn due to an injury (squatting, spraining or sport), the knee swells and there's some fluid leaking into the joint. The knee loses its normal shape and it's more difficult to move it. Sometimes patients need to stay in a forced

slight flexion of the knee.

Management of the menisci tears is in accordance with the general post traumatic management. The knee needs to be relieved with crutches and cooled. The patient needs to see a specialist.

[Menisci tears - treatment \(find out more\)](#)

## **Degenerative lesions and meniscal cyst**

The meniscus changes with age and activity and wears off in some way. The internal, more susceptible part of fibres changes into a connective tissue of lower efficiency or vanishes completely, leaving an empty space behind. Such a meniscus can look like an egg shell, because the stronger outer part remains untouched. At this stage it may cause pain ailments. What's more important, it's susceptible to even small injuries and gets injured quite often. Constant crushing of this meniscus during walking may lead to fluid effusion. The fluid is sometimes forced not into the joint but outside and thus creates the meniscal cyst, a balloon filled with fluid and covered with a capsule. The symptoms do not appear suddenly, the pain may grow steadily and blocking of the joint doesn't have to occur, as the ailments may start with a movement of every day life, eg. standing up from a chair. The diagnosis is based on a thorough medical examination, completed with an X-ray test and, additionally, MRI or ultrasound, but only if done by experienced specialists. Especially the first examination in cases of meniscus wear-off, can lead to overdiagnosis: the natural appearance of the meniscus changed with time, can be mistaken for an injury that requires a surgical treatment.

[Degenerative lesions and meniscal cyst - treatment \(find out more\)](#)

## **Discoid meniscus**

Menisci usually look like half moons and have a cross-section that looks like a piece of pizza. The meniscus takes up up to  $\frac{1}{3}^{\text{rd}}$  to  $\frac{1}{2}$  of the femoral condyle. The discoid meniscus (most often lateral) is anatomically bigger than the usual one and separates to a greater extent (sometimes completely) the femoral bone from the tibial bone. It's often accidentally found on imaging tests or during a knee surgery. The discoid meniscus has greater mobility than the ordinary one, due to the lack of the menisco-femoral ligament, stabilizing it from the behind. It may cause the sensation of leaping and sticking. This kind of meniscus is easily susceptible to sticking and damaging.

[Discoid meniscus - treatment \(find out more\)](#)

## **Sprain and ligamentous injuries of the knee joint**

Spraining of the knee is, in other words, an excessive abnormal movement that leads to damaging of one or more stabilizing structures. The structures are the following:

the four main ligaments (the anterior ACL, the posterior PCL, MCL and LCL). Menisci (especially the lateral meniscus) and the articular capsule with its strengthenings also play a significant role in joint stabilization. Additionally, other nonligamentous structures such as muscle tendons (the semimembranosus muscle complex, the popliteous muscle complex, the goose's foot muscles and others) stabilize the knee.

Ligament injuries are rarely isolated injuries (about 7% of cases). Isolated means only one structure is damaged. Most often complex injuries occur, where at least two ligaments and menisci are damaged with additional tear of the articular capsule and a cartilage and bone contusion. A patient with a ligament injury can feel 'snapping' inside the joint, the knee giving way and observe swelling, limitation of motion and lameness at the trial of walking. The things we must do before seeing a doctor are typical (see post traumatic management), but remember that any injury of that kind requires an urgent orthopaedic consultation.

Most frequently in ligament injuries of the knee we immobilize the joint in a stabilizer, deburden it by walking with crutches and we gradually introduce rehabilitation – we allow the organism to heal the injury. There're injuries, however, which, if diagnosed correctly and operated within 14 days, have greater chances of successful treatment. To this group belong injuries that cause multidirectional instability with complete damage of one of the lateral ligaments (LCL or MCL) and one of the cruciate ligaments (ACL or PCL), with additional meniscus injuries with blockages, tears of the attachments or fractures of the intercondylar eminence (ACL attachment) or of other bone attachments of the ligaments.

The basic grouping of the ligament injuries is connected with the elongation. And so excessive movement:

up to 3mm is the 1<sup>st</sup> stage injury

3-5mm is the 2<sup>nd</sup> stage injury

from 6mm is the 3<sup>rd</sup> stage injury.

More important than this division is information if there's a continuity of the ligament or not (the so-called 'stiff and soft end point').

In most cases some of the structures heal, we just need to determine if the scar is effective and stable enough. This is a diagnosis to be made by an experienced orthopaedist.

Due to complex structure of the knee, the functions of the stabilizing structures complete one another. That's why, on the basis of a doctor's examination and additional tests, we can decide whether the structures should be operated on and whether we have chances to improve the existing condition. Decisions concerning reconstructive procedures are made with great caution. Yet we need to remember that, just like when repairing a car, changing one element for another helps only temporarily and after a few months we go back to where we were. This is why

diagnosis and treatment of all instable structures are so important. Apart from the degree of injury, the method we choose to follow also greatly depends on activity, lifestyle and age. Also, it's important to know if the instability is a problem in patient's life, causes ailments and, finally, degenerates the joint. The idea behind the treatment of the knee instability is protecting the joint from early degeneration and keeping up patient's activity.

Because ligamentous injuries are so complex, Artromedical specialists treat every patient individually.

## **Medial collateral ligament (MCL) injury**

It's an injury of structures that stabilize the knee from the medial side. This ligament isn't a single structure, it consists of several layers and surrounds the whole medial side of the knee. It's got a great healing potential but, against common knowledge, its healing comes most frequently with elongation. If the MCL injury is isolated and other ligaments haven't been torn, even a 3 to 4 mm instability can be well tolerated. If there's a accompanying injury of the ACL, for example, even a 4mm medial instability may lead to overstretching of the reconstructed ACL.

The diagnosis should be made by an experienced orthopaedist, based on the examination of stability. In some cases it's good to have a comparative ultrasound test of two limbs or an X-ray test done to see the torn bony fragment of the attachment. The MRI (in our opinion) isn't a thorough examination. Only MRI results together with doctor's examination provide chances of a precise diagnosis. It seems that dynamic comparative ultrasound examination is a good diagnostic tool.

[MCL injury - treatment \(find out more\)](#)

## **Anterior cruciate ligament (ACL) injury**

The ACL is a structure that runs inside the joint and doesn't allow the tibial bone to go in front from underneath the femoral bone. More importantly, it secures the knee from the rotational antero-lateral instability. Not longer than a dozen of years ago, American scientists reported the ACL injury morbidity as 1 in 1000 people. Today, due to the increase of activity, the number is probably much higher. The injury that leads to tears of the ACL is, most frequently, a combination of a flexion, turn and bending towards one of the lateral sides, so it's rarely an isolated injury. In the moment of injury the patient may feel "snapping" or drawing of the lower leg from beneath the femur. It's difficult to stand on the leg and within minutes/few hours the knee becomes swollen; it's losing its shape as it's being filled with blood. In most cases the patient is not able to finish playing the game or ski down the slope. The diagnosis is set by a specialist, based on a clinical examination. Sometimes, especially when the injury took place a long time ago, a reflectoric muscle contraction can produce a need for some more tests to be done. The ACL injury is well visible in the MRI test. In children the ligament is sometimes stronger than its

bony attachment. It might lead to the fracture of the intercondylar eminence, which is well visible in the X-ray.

[ACL injury - treatment \(find out more\)](#)

## Posterior cruciate ligament (PCL) injury

The posterior cruciate ligament is a strong structure that suffers injuries less frequently than the anterior ligament. The morbidity rate fluctuates (in publications) from 3 to even 30% of ligamentous knee injuries. It has a greater healing capacity than ACL and this is why some injuries are never diagnosed. This ligament is an important structure stabilizing the back drawing of the lower leg from beneath the femur. The most important is, however, that PCL is the axis of movement of the joint and when it's gone, the patello femoral joint and the medial compartment become quickly overloaded. A knee with posterior instability rarely gives way and when it's an isolated injury, it may never produce alarming symptoms. Things change when the cartilage is damaged. The diagnosis and qualification for treatment require vast experience, as the injury is often accompanied by additional rotational instabilities which should be taken into consideration during treatment and because the course of the disease is tricky.

It's difficult to pose the diagnosis; we diagnose the injury based on doctor's examination and a stress (in forced positions) X-ray tests. The MRI is useful only in acute injuries due to rare complete tear of the ligament continuity and great self-healing capacity. The diagnosis can also be established through a correlation of symptoms, examination and X-ray tests with the arthroscopic examination of the knee.

[PCL injury - treatment \(find out more\)](#)

## Lateral collateral ligament (LCL) injury

The LCL injury is rarely an isolated illness, most frequently it accompanies injuries of one of the cruciate ligaments and the popliteal muscle (the muscle secures the rotational postero lateral stability). The injury happens when the knee gives way to the outside, most often with the rotation of the lower leg. LCL is a minor structure, 2-4mm in diameter and has self-healing abilities (although not so much as the MCL). Healing usually ends with elongation.

Diagnosis can be established after a thorough doctor's examination. We must always examine other ligaments and rotational stability. Just as it is in case of MCL, the MRI isn't a reliable source of information, when not accompanied by a doctor's examination. When we deal with the lateral instability due to LCL and ACL damage, we can observe a characteristic fracture in the site of the menisco femoral ligament and the tibial attachment of the capsule, the so-called "Segond's fracture". Also, a dynamic comparative ultrasound test performed by an experienced radiologist may bring good results.

[LCL injury – treatment \(find out more\)](#)

Written by: Konrad Malinowski

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