

THE KNEE JOINT

At a glance

As explained in more detail below, the knee is a very complex joint. Owing to its anatomical structure, it is extremely prone not only to injury, but to wear and tear as well. We must differentiate between normal (i.e. age-related) changes on the one hand and changes related to accidents or injuries on the other.

For example, changes in the meniscus and cartilage can occur as a result of injuries, but are more often due to normal, age-related wear and tear. In an advanced stage, it is often difficult or impossible to identify a clear-cut cause. The clinical picture of such diseases is often complex and demands a lot of medical experience.

In the following pages, we will describe the most important pathological and traumatologic conditions of the knee joint, but keep in mind that due to space constraints we cannot make a claim to be exhaustive. Our goal is to familiarize you with the important concepts associated with the knee joint so you can have an aid for a deeper conversation with the physician or simply a general introduction to this topic.

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1. Introduction

The knee joint is not only one of the largest, but also one of the most complex joint in the human body. It is able to withstand significant strain and injury risks in everyday and occupational life as well as in sports. However, people with anatomical problems such as bowlegs or knock-knees may experience pain. Normal age-related processes and excess weight, as well as physical inactivity, can lead to wear and tear on the joint.

2. Anatomy and physiology

The round femoral knuckles or condyles lie almost flat on the tibial plateau, rolling or gliding every time the joint is bent or extended. This occurs only if the cartilage layer is intact, as it functions as a gliding surface that is continuously lubricated by the synovial fluid.

The crescent-shaped lamellae or menisci, anchored outwards and inwards on the tibial plateau, surround the femoral knuckles and guide it through it. In addition, ligaments stabilize the joint; their inner (medial) and outer (lateral) sides prevent the femur and tibial plateau from bending outward or inward under normal conditions. The anterior and posterior cruciate ligaments provide additional stabilization, so that the tibial plateau is also anchored in place to prevent it from slipping too far to the front or back.

Muscles also contribute to stabilizing the joint – therefore specific strengthening exercises are the focus of all rehab measures

The joint capsule, whose inner side is covered by an inner articular layer, the synovial membrane, encloses the entire articular space. This synovial membrane secretes the joint or synovial fluid, which lubricates the cartilaginous areas and nourishes the cartilage itself.

Not only do the menisci and ligaments stabilize the joint, but muscles also contribute greatly to stabilization. For this reason, specific strengthening of the muscles is generally the focus of rehabilitation measures.

3. Damages and injuries to the meniscus

1. Cause(s)

Damage to the meniscus can be traced back primarily to wear and tear. Direct effects of accidents such as those that occur during skiing usually play only a secondary role. Chronic incorrect strain or overload of the joint in everyday life that we are not even aware of (microtraumas), and so-called macrotraumas caused by accidents that involve a sprain in the joint, can be regarded as causes. A clear case of knock-knee or bowlegs also leads to premature wear and tear.

Additionally, the tissue loses elasticity and strength as it ages. The menisci become flatter and will tear more easily. Tears may be full or partial, there are many possible injury patterns.

2. Clinical aspects/ Symptoms/Diagnosis

Meniscal disease or injury leads to a changed and painful range of movement in the joint, especially if it occurs in combination with damaged cartilage (osteoarthritis).

Since the inner (medial) meniscus is most susceptible to pathological changes, most patients feel pain in the inner or medial part of the knee. Pain can be relatively non-specific at first, generally occurring after significant overexertion; at later stages, the pain becomes chronic.



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If the menisci suffer a laceration (jagged tear) or avulsion (sprain), constrictions (articular blockages) can also occur. They are caused when a torn part of the meniscus breaches the space between the femoral knuckle and tibial plateau. This often leads to an articular discharge that often manifests outwardly as a swollen joint; the contours of the joint then look "blurred."

Final confirmation is provided by magnetic resonance imaging (MRI) – normal X-rays are not very meaningful

To the experienced practitioner, the clinical symptoms, in combination with the normal physical examination, can already confirm the diagnosis. Final confirmation is provided by magnetic resonance imaging (MRI), which clearly shows the anatomical structures of the knee. Neither normal X-rays nor computerized axial tomography (CT) are very meaningful.

3. Therapy essentials

Initially, therapy focuses above all on avoiding strain and overload. Additional therapeutic measures may include:

- suitable sports activities such as cycling
- physical therapy
- knee joint supports
- weight loss, if necessary

Since all measures taken together help support the joint through the combined effect of all remedies, the patient's pain gradually diminishes. Painkillers should only be taken as a last resort because they can have dangerous side effects.

Well-localized sprains or lacerations of the meniscus can be surgically treated with special endoscopes called arthroscopes. As part of a knee endoscopy, these operations are minimally invasive and can often be done on an outpatient basis.

If the patient has pronounced knock-knees or is very bowlegged, then a correction called osteotomy may be indicated in early adulthood.

4. Ligament injuries

1. Cause(s)

Injuries to the ligaments (cruciate and collateral) are usually the result of an accident in which external forces acting on the knee exceed what the ligaments can handle. This typically occurs in high-intensity sports such as soccer or skiing.

2. Clinical aspects/ Symptoms/Diagnosis

Intense pain and a rapid swelling of the knee joint after an accident point to a possible ligament injury. Movement is restricted or non-existent.

The clinical examination, which should only be performed by an experienced physician, reveals a varying degree of joint instability. In other words, when the femur is immobilized, the tibial shaft can be shifted to the front or back (the so-called front or back drawer), indicating that one of the cruciate ligaments is torn.

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An X-ray of the injured knee joint should be taken in order to rule out a bone fracture. An MRI scan helps make an accurate diagnosis and shows the kind of injury the ligament has suffered; it also clarifies whether other structures of the knee joint such as the meniscus, for example, could also have been affected.

3. Therapy essentials

Surgical treatment is often required for most ligament injuries.

During the rehabilitation stage supports can be applied. They support the fine movements of the joint

An intensive and long postoperative treatment, either on an outpatient or stationary basis, is needed after surgery; the foremost objective of the treatment is to strengthen muscle coordination so the femoral muscles can once again regain control.

In the early postoperative stage, external stabilizing aids (hinged braces) are often applied to offer mechanical protection to the joint. In the later stages, elastic bandages can be applied. They supplement rehabilitation therapy by supporting the fine movements of the joint.

5. Cartilage damage (osteoarthritis)

1. Cause(s)

Cartilage damage also occurs as a result of normal, age-related wear and tear and degeneration. The cartilage, which is the gliding layer of the articulation, flattens out and loses elasticity. Accidents can also cause entire cartilage pieces to break off. Likewise, if a person has pronounced knock-knees or bowlegs, the condition can also lead to premature cartilage and joint wear and tear, often damaging the menisci as well (see above). Obesity is a common cause of premature wear and tear.

2. Clinical aspects/ Symptoms/Diagnosis

Cartilage damage caused by degenerative changes manifests itself very gradually. Pain upon exertion is the main symptom, and movement of the diseased joint becomes restricted with time. This is when doctors talk about osteoarthritis.

Typically, pain in the joints occurs – particularly during or after exertions. Movement is severely restricted in advanced stages

Degenerative damage to the cartilage will sooner or later expose the bone located underneath. If this also occurs in the cartilaginous surface facing it, then direct and painful rubbing of bone against bone will be the result.

Damage to the cartilage will also cause the articular cavity to flatten, loosening the ligaments as a result. This hinders the physiological movement of the joint, which in turn accelerates the wear and tear process.

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Pain in the joints, particularly during or after exertions, is an indicator of the changes described above. Movement is severely restricted in advanced stages.

An X-ray will clearly show the narrowing of the articular space described above and the characteristic formation of osteophytes, or pathological outgrowths in the bones. MRI and CT scans can pinpoint the degree of joint damage more accurately.

3. Therapy essentials

Patients with cartilage damage should avoid straining or overloading the joint as a precautionary measure. This applies both to professional and sports activities. Walking, Nordic walking, swimming or cycling are ideal sports activities for patients with diseased or prematurely damaged knee joints. Needless to say, it makes sense to lose weight.

An arthroscopic procedure to smooth out the cartilage ("shaving") could be part of a followup treatment; rheumatoid pain medications and other painkillers are effective for pain reduction. However, joint bandages also help a great deal to reduce or even eliminate pain (see the section "How do FUTURO™ Knee Supports work?").

6. Combined injuries

1. Cause(s)

Accidents often involve structural damage to the knee joint. A very typical multiple injury pattern is the so-called "unhappy triad", in which the

- anterior cruciate ligament, the
- medial meniscus, and the
- tibial (medial) collateral ligament

are torn. This injury occurs typically during skiing when the lower leg twists while the upper leg remains static in a fall.

Swelling caused by a hematoma in the joint, intense pain and pronounced instability point to a complex ligament injury

2. Clinical aspects/ Symptoms/Diagnosis

Intense pain, swelling caused by a hematoma in the joint, and instability point very clearly to a complex ligament injury. X-rays to rule out bone fractures and CAT or MRI scans will show the full extent of such injuries.

3. Therapy essentials

In these types of injuries, surgery is almost always unavoidable.

Naturally, the scope of the follow-up treatment will depend on the nature of the injury and the surgical procedure performed, therefore we can describe only the essential steps here:

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During the immediate postoperative phase it is generally essential to mobilize the knee without putting any weight on it. In most cases the knee can regain motion very early on – often with the help of an orthotic knee device to maintain joint mobility and to activate and strengthen the knee muscles.

7. Patellofemoral Joint Pain

1. Cause(s)

This definition encompasses many conditions related to the kneecap: impaired upper leg muscles, kneecap malformations that make it prone to lateral dislocation, but also damage to the cartilage located on the back of the kneecap.

2. Clinical aspects/ Symptoms/Diagnosis

Pain of varying intensity in the kneecap area indicates the likelihood of patellofemoral pain syndrome. Typically, the pain occurs when walking, running, and straightening up after squatting. Pain in the kneecap upon pressure or percussion is typical as well. X-rays and MRI scans can help confirm the diagnosis.

Both knee supports and physical therapy to strengthen the muscles are commonly used in therapy

3. Therapy essentials

Strain and overexertion should be avoided. Physical therapy to strengthen the upper leg muscles can help keep the kneecap in proper position. Knee bandages are also popular. If the kneecap tends to dislocate (see above), a surgical procedure could stabilize it. On the other hand, if the pain is caused by damaged cartilage behind the kneecap, then arthroscopic smoothing out of the cartilage is an option.

8. How do FUTURO™ Knee Supports work?

Thanks to their ability to fit any part of the patient's anatomy and the elasticity of the material, FUTURO knee supports take the shape of anatomical contours very well. They exert a slight compression on the affected painful parts of the joint and provide some heat.

Scientific studies have also demonstrated the biomechanical effect of the supports: Fully unconscious reflexes support or improve the perception of the actual position and exertion status of the joint, thus stabilizing it very accurately by activating the corresponding muscles. Scientists call this unconscious reflex "the proprioceptive effect" of joint supports. In the final analysis, the joint's fine motor movements are improved, and protected at the same time.

The reduction or even elimination of the need for painkillers is another important patient benefit. Thus, it is possible to minimize the dangerous side effects painkillers often have.



Developed in collaboration with a panel of specialized physicians and medical therapists.

Learn More about FUTURO™
Knee Supports, [CLICK HERE](#)