

Anterior Cruciate ligament injuries in children and adolescents

With the increasing number of children and adolescents pursuing high-level sports, the number of anterior cruciate ligament (ACL) injuries in this age group has increased in turn. In recent years, the number of ACL tears diagnosed in our young patients has increased steadily. Adolescents at the end of puberty (15-18 years of age) have the highest risk of ACL tears. Girls have a three-eight times higher risk of injuries than boys due to differences in ligament anatomy and physiological leg axes. Statistically speaking, every 50th football player (in girls/women every 30th player) will sustain an ACL tear. Assuming there are 22 football players on a field per match, this means an ACL rupture occurring on the field every 2-3 matches.

What is the cruciate ligament?

The ACL is a knee joint stabiliser. It runs from the middle of the lower leg (tibia) to the inside of the outer knee ' (femoral condyle) and thus connects the thigh and lower leg (Fig. 1). If the cruciate ligament ruptures, the knee can become unstable and can, for example, give way whilst running normally.

In addition to its function as a stabiliser, the ACL also has a so-called proprioceptive function. This means that small nerve endings in our cruciate ligament constantly signal to the brain whether the knee is straight or bent. This is especially important in sports, as the body subconsciously counteracts this so that our knee can withstand greater loads.



Fig. 1: Knee with anterior cruciate ligament and menisci. The posterior cruciate ligament is covered in this view by the anterior cruciate ligament. Red indicates the rupture of the ACL. Note the growth plates directly above and below the knee joint.

What are the typical signs of a cruciate ligament tear?

Rapid swelling of the knee joint after a fall or twisting of the knee is suspicious an anterior cruciate ligament (ACL) rupture. Usually children and adolescents also report a "pop" in the knee during the accident.

If the accident occurred a long time ago, a feeling of instability with recurring buckling of the knee, as well as impaired athletic performance level may be late signs of an ACL rupture.

If an ACL injury is suspected, an MRI of the affected knee is usually undertaken. This may also be useful in excluding commonly associated injuries (e.g. meniscus tears).



How is an ACL tear treated?

An isolated ACL tear in a child or adolescent who is not very physically active may be considered for management without surgery (conservative treatment). The treatment consists of longer-term physiotherapy to stabilise the knee joint. The aim here is for the surrounding musculature to be reconditioned in order to compensate for the now missing stabilising action of the ACL. Of note, however, many studies have shown that these unstable knees have a high risk of injury to the menisci or cartilage in the later life. We therefore generally recommend surgical cruciate ligament surgery in these patients as well.

An ACL tear with associated injuries in the knee joint, especially a meniscus injury, or in those pursuing high-level sports usually require operative treatment with reconstruction of the cruciate ligament using a tendon graft. The operation is similar to adult techniques, where a tendon is removed and implanted into the knee joint. In children and adolescents, particular attention should be paid to the growth plates (Fig. 1). If these are injured, growth disorders such as leg length discrepancies or knock-knees can occur in the long-term. With an age-appropriate operative technique, however, the risk of growth disorders is low, even in smaller children. The technique shown in Figure 2 is most commonly used, but other methods exist. Injuries to the menisci and cartilage are treated in the same sitting as the cruciate ligament replacement.



Figure 2: ACL replacement in children and adolescents with open growth plates. Replacement of the cruciate ligament with drill holes placed through the bones around the knee M.S. Kocher, M.B. Millis; *orthopedic techniques, pediatric orthopedic surgery*, Elsevier 2011, ISBN 978-1-4160-4915-9)

Postoperative care following cruciate ligament replacement

As a rule, the knee must be non-weight bearing for some time after an ACL operation (using crutches). The duration of non-weight bearing depends on the technique chosen and any accompanying injuries. After an operative ACL replacement, active physiotherapy over a longer period of time is also required. The ligament graft must first grow adequately into the knee, then the muscles must be re-trained and finally the knee must relearn the proprioceptive feedback properties as described above. Regardless of the technique, however, it takes 9-12 months for a full return to normal sporting life following the operation. The patient is usually accompanied by a physiotherapy team until they return to sports.