

The anterior crucial ligament (ACL) reconstruction is performed to restore the important informative and functional structure of the knee joint. It has great influence on the joint function, as well as on its degeneration. When the ACL is injured, the weight bearing of the leg is different. It influences the tension of the trunk and limb muscles which leads to overloading, affects position and smoothness of movement. This, in turn, evokes excessive load on different structures, eg. the meniscus or lateral ligaments. If the movement is wrong and not well-controlled, the structures may be damaged.

This is why the preoperative physiotherapy aims to:

- reduce ailments connected to the injury,
- restore the full possible function of the knee joint,
- restore the best possible function of the lower limb,
- prevent other joints' overload (of the other limb or spine) that might occur due to compensation,
- prepare the patient for the surgery.

The physiotherapy programme is always writtten individually and depends on:

- the size of injury and other structures' damages,
- the duration of tissue restorative processes (the inflammatory process),
- the period of time from the injury and defensive mechanisms,
- the reconstruction method,
- age and physical activity of the patient.

The programme and its intensity depend on the size of injuries, tissue healing time and individual sensitivity to irritation. Other important factors are age, physical condition, devotion and spending time on following the therapeutic team's advice.

Physiotherapy after ACL injury and reconstruction can be divided into the following stages:

1. preparation for a surgery
2. early post operative phase (up to 1 month)
3. restoring of the function (up to 3 months)
4. full function and recreational activity (3-6 months)
5. preparation for sports activity (6-9 months).

### **Ad.1**

Preparation for a surgery means informing the patient about the stages of treatment (therapeutic rehabilitation), methods of protection and non-weight bearing. It's important to know that function restoration doesn't depend merely on the surgical method (the implantation of the "new ligament") but also on the time devoted to cooperation with the therapeutic team (doctor+physiotherapist). Physical preparation for the knee surgery involves:

- reducing the inflammatory process (swelling and pain),
- regaining, if possible, full range of motion of the joint (extension mostly),
- restoration of best muscle strength, control and proprioception,
- learning how to walk with crutches.

### Ad. 2

In this phase we (see: [rehabilitation after a surgery](#)):

1. reduce swelling, inflammatory process and pain through
  - cooling
  - elevation of the limb
  - and pharmacotherapy administered by a doctor.
2. introduce exercises:
  - that ensure the range of motion is kept and that prevent from post operative accretions and that keep proper muscle pump (eg. flexing the leg by pulling it towards the buttock with the heel on the floor – to the point of pain and the feeling of "swelling" in the joint and foot movements with the leg straight),
  - that slowly mobilize the patella (pushing it to the sides or up and down),
  - that stretch the ilio-tibial tract and the posterior muscle group of the limb,
  - that actively stabilize the joint (isometric with co-contraction)
  - of proprioception in sitting and lying position (deep perception that gives secure support).

### Ad.3

We try to restore full range of motion (from hyperextension up to 120°), to strengthen the muscles and later to work on proprioception in a standing position and correct gait pattern. At the beginning exercises in the end position of flexion and of rotative movements with weight bearing are not allowed. The following exercises are recommended:

- patella and post operative scars mobilization,
- stretching the posterior thigh muscle group, muscles of calf, ilio-tibial tract (eg. sit down, the treated leg is straight, the other one is put on the thigh of the first one; put the foot under yourself and bend your straight trunk towards your legs),
- isometric exercises of the quadriceps muscle with a co-contraction of the posterior thigh muscle group with the adductors (eg. semi squats),
- strengthening of the posterior thigh muscles in closed kinetic circuits in various positions,
- strengthening of the pelvic girdle,
- balancing in standing on two feet and on one foot, learning how to walk on various bases,
- cycling on a stationary cycle with the saddle high.

### Ad.4

Here we increase the weight bearing and the level of difficulty. We put stress on strength and endurance exercises of the pelvic girdle and the whole limb and on proprioception. Be careful to do the exercises correctly – keep the axis of the limb, do not turn the knee to the sides. The following are recommended:

- various semi squats with the trunk bent forwards, also on an instable ground,
- balancing whilst walking on a soft or instable ground,
- squats with one leg in front and in various directions
- stationary cycle with a lowered saddle,
- trotting (learning how to run),
- skipping the rope,
- swimming (alternating leg movements as in swimming the crawl); don't swim breaststroke!,
- stretching,
- in the end, when the patient wishes to do sports, we must introduce: jumping on two feet/on one foot and running training.

**Ad.5**

Sportspeople or people actively doing recreational sport at this stage should:

- increase the running training range with slowing down and turns,
- increase the range of dynamic proprioception and coordination exercises, that is: jumps (with turns and stopping), jumping over an obstacle, exercises on a trampoline,
- introduce specific elements of exercises for a given discipline (throwing, dribbling, jugglery).

The return to full activity is possible if there are: joint stability, full and painless range of motion, the possibility to do all movements specific to a given discipline. At the end of the treatment there should be some functional tests done (the results should be about 85-90% when compared with the healthy limb). Also, the operating surgeon should give his/her permission to the patient to do sports.

Written by: Michal Kabzinski