Control of tibiofemoral movements in functional tasks after an ACL reconstruction

Published: 24-10-2022
Last updated: 22-12-2024

To investigate:Study 1. the influence of graft choice (hamstring v.s. quadriceps v.s. patellar tendon v.s. VKB repair) for ACLR on dynamic tibiofemoralmovements after an ACLR;Study 2. the influence of the anatomy of the knee on dynamic tibiofemoral...

Ethical review	Approved WMO
Status	Recruiting
Health condition type	Tendon, ligament and cartilage disorders
Study type	Observational non invasive

Summary

ID

NL-OMON57103

Source
ToetsingOnline

Brief title
Control of tibiofemoral movement after an ACL reconstruction

Condition

- Tendon, ligament and cartilage disorders

Synonym
Anterior cruciate ligament reconstruction; knee ligament surgery

Research involving
Human

Sponsors and support

Primary sponsor: Bewegingswetenschappen
Source(s) of monetary or material Support: Ministerie van OC&W

Intervention

Keyword: Anatomy of the knee, Anterior cruciate ligament reconstruction, Anterior tibia translation, Graft choice, Internal tibia rotation, Knee laxity, Neuromuscular control

Outcome measures

Primary outcome

- Dynamic anterior- and posterior tibia translation of both legs.

- Dynamic internal- and external tibia rotation of both legs.

- The angle of the tibia plateau in the sagittal plane

- The size of the tibia plateau

- The size of the femoral condyles, sagittal as well as frontal

- The size of the femoral notch, frontal plane

Secondary outcome

- Passive anterior tibia translation of both legs (KT-1000 arthrometer, Sernet et al. (2001) or rolimeter, Balasch et al. (1999)).

- Sagittal and frontal knee angles of both legs.

- Sagittal and frontal knee moments of both legs.

- Ground reaction forces of both legs.

- Muscle activity (sEMG) of both legs (Lateral and medial hamstrings, Lateral and medial gastrocnemius, Rectus femoris, Vastus medialis and lateralis, Tibialis anterior).

Study description

Background summary

Annually around 0.2-4 percent of the athletes injure their anterior cruciate ligament (ACL) (Moses, 2012). An ACL injury results in increased tibiofemoral movements (anterior tibia translation (ATT) and internal tibia rotation (ITR)), and alterations of muscle activity and lower extremity kinematics (Abourezk et al., 2017; Alkjær et al., 2012; Gardinier et al., 2012). Annually around 6000 ACL reconstructions (ACLR) are performed in the Netherlands. An ACLR aims to reduce tibiofemoral movements, which results in more knee stability. Despite functional improvements after an ACLR, one-third of the patients do not manage to return to their preinjured level of sports one year after surgery and only 44% of the patients return to competitive sports (Ardern et al., 2011).
Extensive tibiofemoral movements are known to be a predictor of the inability to return to sports. Tibiofemoral movements can be determined by different factors (Keizer and Otten, 2018). Our previous studies showed that muscle activation patterns can influence dynamic ATT and that the correlation between dynamic ATT and muscle activation patterns is different between copers (patients who manage to return to sports) and noncopers (those who don*t manage to return to sports) (Keizer et al., 2020c, 2021).
Moreover, we showed that the angle of the posterior tibia plateau relative to the plane orthogonal to the longitudinal axis of the tibia is an indicator of residual dynamic ATT (Keizer, 2020a). The studies described in this METc-proposal will build further on our previous findings (METc protocol 2017.658) using the same measurement technique to explore additional factors that might be related to dynamic tibiofemoral movements. We will investigate anatomical and structural factors that might relate to dynamic tibiofemoral movements.

Study objective

To investigate:

Study 1. the influence of graft choice (hamstring v.s. quadriceps v.s. patellar tendon v.s. VKB repair) for ACLR on dynamic tibiofemoral movements after an ACLR;

Study 2. the influence of the anatomy of the knee on dynamic tibiofemoral movements after an ACLR;

Study design

Two observational studies will be conducted. Patients at least nine months after an ACLR will be measured on one occasion.

For objective 1 patients who received an autograft (own) hamstring tendon,

autograft patellar tendon, autograft quadriceps
tendon or ACL repair will be included, evenly across the groups.

For objective 2. the same patients will be used.

The measurement will take about one to two hours. Subjects will perform dynamic tests from the return to sports test battery protocol that is used to clear patients after an ACLR to return to sports (based on Gokeler et al., 2017; jump-landing task (LESS); the single leg hop for distance (SLH); the triple hop for distance (TLH); side hop (SH); and walking). Dynamic anterior tibia translation and internal tibia rotation will be measured
using VICON. During the dynamic measurements sEMG of the Lateral and medial hamstrings, Lateral and medial gastrocnemius, Rectus femoris, Vastus medialis and lateralis, Tibialis anterior will be recorded. In addition, multiple aspects of the anatomy of the knee (angle of the tibia plateau, size of the femoral condyles, size of the tibia plateau, size of the femoral notch) will be determined using MRI scans that have been obtained before surgery as part of the clinical routine(care as usual).

Study burden and risks

Forty patients will be tested in one session which will take about two hours per session.
Minimal risk or discomforts, such as physical injury or harm, to the subjects as a result of each procedure is involved in the studies.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)

Inclusion criteria

- Patients after an ACLR using an autograft (own) hamstring tendon, patellar tendon, quadriceps tendon, or ACL repair
- Patients between 18-45 years of age
- Patients at least 9 months after surgery
- Understanding of the Dutch language

Exclusion criteria

Serious cartilage damage of the lower extremity as reported during the arthroscopy (III or higher)
Revision ACLR
Osteotomy of the tibia or femur
Contralateral ACLR
Other self-reported orthopaedic or neurologic disorders that impair lower limb function.

Study design

Design

Study type: Observational non invasive

Masking:	Open (masking not used)
Control:	Uncontrolled
Primary purpose:	Other

Recruitment

NL

Recruitment status:	Recruiting
Start date (anticipated):	16-11-2023
Enrollment:	40
Type:	Actual

Ethics review

Approved WMO

Date:	24-10-2022
Application type:	First submission
Review commission:	METC Universitair Medisch Centrum Groningen (Groningen)

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL81953.042.22