

Dynamic Imaging of Patellar Tracking During Axial Loading

Instability of the knee-cap is a clinical manifestation of a complex disharmony in the underlying joint resulting in pathological patellar tracking. Management of a patient with PFI is based on a thorough clinical examination and radiologic evaluation of the joint in order to tailor the best possible treatment. A person prone to multiple recurring patellar dislocations often requires surgery, with the aim to correct the underlying risk-factors. This may entail reconstruction of different ligaments and/or some bony procedures.

Deciding on the most appropriate surgical procedure is often reliant on measurement obtained on plain radiographs and Magnetic Resonance Imaging (MRI). Today's radiologic evaluation provides us with an overview of the joint in a fixed moment using static images, be it with plain radiographs, MRI or computed tomography often without any load on the knee. However, instability is a result of a dynamic interplay of several interacting factors under loaded conditions. We wish to add dynamic radiologic tools to our arsenal in the form of dynamic MRI with axial loading when the knee undergoes a range of motion between 0-40° of flexion. This novel technique will pave the way for a new radiological modality that can be implemented for other conditions of the knee not related to instability of the knee-cap, as well as applications to other joints in the body.

Aim(s)

This composite project has four main aims to address:

- Create MRI-protocols to evaluate the anatomic and biomechanical conditions in the patellofemoral joint during knee flexion and axial loading of the knee amongst patients with and without PFI. This is to reproduce dynamic imaging of the knee during realistic conditions.
- Validate the method, which will secure that the imaging provides reliable data.
- Evaluate what effect different patella stabilizing procedures have on patellar tracking in relation to the femoral trochlea postoperatively.
- Put the difference in patellar tracking in relation to the change in patient reported outcome measures.

Study group/platform

Patient recruitment will be undertaken in the outpatient clinic at Sahlgrenska University Hospital/Mölndal overseen by two senior orthopaedic surgeons. The image acquisition and analysis using dynamic MRI will be undertaken at the radiology department at Sahlgrenska University Hospital/Mölndal under the supervision of a research nurse, two senior radiologists, an MRI physicist and a biomedical engineer.

The time plan for this project is three years as this project includes a follow-up of two years.

Our ethical approval is currently under process and is expected to be approved within a couple of months.

Profile

We seek a master's student in Medical Engineering with a keen interest in Image Analysis and Post-processing related to Magnetic Resonance Imaging. If you are not fluent in Swedish, then we would like that you have proficient English communication skills.

Contact

Harald Olsson, e-post: harald.olsson@vgregion.se

The project is in collaboration with the Computer Vision Group, E2, Chalmers.