

Anterior Cruciate Ligament Reconstruction

Early predictors of outcome

Akademisk avhandling

som för avläggande av medicine doktorsexamen vid Sahlgrenska akademien, Göteborgs universitet, kommer att offentlig förvaras i Hörsal aulan, R-huset, Sahlgrenska Universitetssjukhuset/Mölndal, fredagen 5:e April 2019, klockan 9:00

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Avhandlingen baseras på följande delarbeten:

- I. **Graft diameter as a predictor for revision anterior cruciate ligament reconstruction and Koo's and EQ-5D values: a cohort study from the Swedish national knee ligament register based on 2240 patients**
Snæbjörnsson T, Hamrin Senorski E, Ayeni OR, Alentorn-Geli E, Krupic F, Norberg F, Karlsson J, Samuelsson K
American Journal of Sports Medicine 2017;45(9):2092-2097
- II. **Adolescents and female patients are at increased risk for contralateral anterior cruciate ligament reconstruction: a cohort study from the Swedish national knee ligament register based on 17,682 patients**
Snæbjörnsson T, Hamrin Senorski E, Sundemo D, Svantesson E, Westin O, Musahl V, Alentorn-Geli E, Samuelsson K
Knee Surgery Sports Traumatology Arthroscopy, 2017 December;25(12):3938-3944
- III. **Graft diameter and graft type as predictors of anterior cruciate ligament revision: a cohort study from the Swedish and Norwegian national knee ligament registries based on 18,425 patients**
Snæbjörnsson T, Hamrin Senorski E, Svantesson E, Karlsson L, Engebretsen L, Karlsson J, Samuelsson K
Submitted to The Journal of Bone and Joint Surgery
- IV. **Young age and high BMI are predictors of early revision surgery after primary anterior cruciate ligament reconstruction: a cohort study from the Swedish and Norwegian knee ligament registries based on 30,747 patients**
Snæbjörnsson T, Svantesson E, Sundemo D, Westin O, Sansone M, Engebretsen L, Hamrin Senorski E
Accepted by Knee Surgery Sports Traumatology Arthroscopy
- V. **Graft fixation and timing of surgery are predictors of early anterior cruciate ligament revision: a cohort study from the Swedish and Norwegian knee ligament registries based on 18,425 patients**
Snæbjörnsson T, Hamrin Senorski E, Svantesson E, Westin O, Engebretsen L, Karlsson J, Samuelsson K
Manuscript

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ABSTRACT

The rupture of the anterior cruciate ligament (ACL) is a serious injury, often resulting in functional instability and increased laxity of the knee joint. Patients suffering an ACL injury run the risk of further complications, such as meniscal or cartilage injury in the short term and degeneration of the knee joint in the long term. With the occurrence of ACL injuries on the rise in recent years, there is still room for improvement in treatment when striving for reliable knee function. This thesis consists of five cohort studies with the overall aim of finding predictors of outcome after ACL reconstruction.

Study I is a cohort study with data from the Swedish National Knee Ligament Register (SNKLR) with emphasis on hamstrings tendon (HT) autograft diameter as a predictor of ACL revision. A total of 2,240 patients were included for analysis. The results of the study showed that, when the diameter of the graft falls between 7.0 and 10.0 mm, the likelihood of revision is 0.86 lower with every 0.5 mm increase in graft diameter. The size of the graft diameter did not affect Knee Injury and Osteoarthritis Outcome Score subscales or European Quality of Life-5 Dimensions.

Study II is a cohort study with data from the SNKLR with the emphasis on surgical predictors of contralateral ACL reconstruction. A total of 17,682 patients were included for analysis. The study was unable to identify any specific surgical technique used during the study period that was predictive of contralateral ACL reconstruction. Females and younger patients showed an increased risk of contralateral reconstruction. Patients with a cartilage injury at the time of the index ACL reconstruction had a reduced risk of contralateral ACL reconstruction.

Studies III-V are cohort studies with data from the SNKLR and the Norwegian Knee Ligament Register (NKLR) with the emphasis on surgically related and patient-related predictors of ACL revision within two

years of the index ACL reconstruction. Patient data from 58,692 individuals were merged and analyzed.

In Study III, the early ACL revision rate of patients treated with patellar tendon (PT) or HT autografts was analyzed with regard to graft diameter. The results showed that, in a direct comparison, patients treated with PT autografts have a similar early revision rate compared with those treated with HT autografts (PT autografts 2.63%; HT autografts 2.08%). Patients treated with HT autografts with a diameter of ≥ 9.0 mm or ≥ 10.0 mm ran a reduced risk of early ACL revision compared with all patients undergoing ACL reconstruction with PT autografts.

In Study IV, patient-related variables when undergoing ACL reconstruction were evaluated. Variables predictive of an increased risk of early ACL revision were young age, overweight in BMI and females more than over one SD in weight. Gender, tobacco use and height were not shown to be significant risk factors for early ACL revision. Patients identified with an increased risk of ACL revision within two years, or high-risk individuals, include adolescents playing soccer at the time of injury.

In Study V, surgery-related variables when undergoing ACL reconstruction were analyzed in relation to the risk of early ACL revision after ACL reconstruction. The results showed that patients treated with crosspins/Rigidfix compared with other fixation methods in the femur were predictive of a reduced risk of early ACL revision. Moreover, patients undergoing ACL reconstruction within three months of their ACL injury ran an increased risk of ACL revision within two years.

Keywords: Knee, anterior cruciate ligament, ACL, registry, hamstring tendon, patellar tendon, graft failure, graft diameter, graft fixation, autograft, revision, outcome