

Revision Anterior Cruciate Ligament Reconstruction – Current Evidence, Predictors and Outcome

Akademisk avhandling

Som för avläggande av medicine doktorsexamen vid Sahlgrenska akademien, Göteborgs universitet kommer att offentligas försvaras i R-aulan, Mölndals sjukhus, Länsmansgatan 28, Mölndal, den 8:e April 2022, klockan 09.00.

av **Eleonor Svantesson**, leg. läkare

Fakultetsopponent:

Jon Olav Drogset, Professor

Faculty of Medicine and Health Sciences, Department of Neuromedicine and Movement Science, Norwegian University of Science and Technology.

and

Consultant Orthopaedic Surgery, Trondheim University Hospital, Trondheim Norway

Avhandlingen baseras på följande delarbeten

- I. Factors associated with additional anterior cruciate ligament reconstruction and register comparison: a systematic review on the Scandinavian knee ligament registers. Svantesson E, Hamrin Senorski E, Baldari A, Ayeni OR, Engebretsen L, Franceschi F, Karlsson J, Samuelsson K. Br J Sports Med. 2019;53(7):418-425.
- II. Strength in numbers? The fragility index of studies from the Scandinavian knee ligament registries. Svantesson E, Hamrin Senorski E, Danielsson A, Sundemo D, Westin O, Ayeni OR, Samuelsson K. Knee Surg Sports Traumatol Arthrosc. 2020;28(2):339-352.
- III. Increased risk of ACL revision with non-surgical treatment of a concomitant medial collateral ligament injury: a study on 19,457 patients from the Swedish National Knee Ligament Registry. Svantesson E, Hamrin Senorski E, Alentorn-Geli E, Westin O, Sundemo D, Grassi A, Čustović S, Samuelsson K. Knee Surg Sports Traumatol Arthrosc. 2019;27(8):2450-2459.
- IV. Graft Choice for Anterior Cruciate Ligament Reconstruction With a Concomitant Non-surgically Treated Medial Collateral Ligament Injury Does Not Influence the Risk of Revision. Svantesson E, Hamrin Senorski E, Östergaard M, Grassi A, Krupic F, Westin O, Samuelsson K. Arthroscopy. 2020;36(1):199-211.
- V. Only 10% of patients with a concomitant MCL injury return to their preinjury level of sport one year after ACL reconstruction: a matched comparison with isolated ACL reconstruction. Svantesson E, Piusi R, Beischer S, Thomeé C, Samuelsson K, Karlsson J, Thomeé R, Hamrin Senorski E. Submitted manuscript.
- VI. Factors that affect patient reported outcome after anterior cruciate ligament reconstruction-a systematic review of the Scandinavian knee ligament registers. Hamrin Senorski E, Svantesson E, Baldari A, Ayeni OR, Engebretsen L, Franceschi F, Karlsson J, Samuelsson K. Br J Sports Med. 2019;53(7):410-417.
- VII. Comparison of concomitant injuries and patient-reported outcome in patients that have undergone both primary and revision ACL reconstruction - a national registry study. Svantesson E, Hamrin Senorski E, Kristianson F, Alentorn-Geli E, Westin O, Samuelsson K. J Orthop Surg Res. 2020;15(1):9.

SAHLGRENKA AKADEMIN
INSTITUTIONEN FÖR KLINISKA VETENSKAPER



Revision Anterior Cruciate Ligament Reconstruction – Current Evidence, Predictors and Outcome

Eleonor Svantesson

Department of Orthopaedics, Institute of Clinical Sciences, Sahlgrenska Academy, University of Gothenburg, Sweden, 2022.

Abstract

Despite extensive research in the field of anterior cruciate ligament (ACL) reconstruction, primary ACL reconstruction failure and a high re-rupture rate remain a problem. Far too many patients experience a second devastating hit – the need to undergo a revision ACL reconstruction. This thesis aims to review current evidence, predictors and outcome related to revision ACL reconstruction. For this purpose, seven studies were conducted and they were stratified into three distinct themes – Current evidence, The impact of a concomitant medial collateral ligament (MCL) injury and Outcome after revision. Registry-based data formed the foundation of this thesis, for which the Swedish national knee ligament registry and a local rehabilitation registry were utilized. Additionally, evidence from all three Scandinavian knee ligament registries was synthesized.

In Theme I, the evidence provided from the Scandinavian knee ligament registries was systematically reviewed to find predictors of ACL revision and to determine the robustness of these predictors by applying the Fragility index. Young age was the strongest and most robust predictor of ACL revision, where an approximately 5-fold increase in the risk of revision was found for adolescents compared with the oldest age group (patients over 35 years of age). Patient sex did not influence the risk of revision. The use of hamstring tendon (HT) autografts was associated with an increased risk of revision compared with patellar tendon (PT) autografts, although a larger HT graft diameter was protective in terms of ACL revision. Notably, there was great variability in current Scandinavian knee ligament registry studies in terms of the statistical robustness of significant predictors of ACL revision. Nearly one third of the analyses had a fragility index of zero, which indicates high statistical fragility and questions the robustness of current predictors of revision reported by the registries.

Theme II explored the impact of a concomitant MCL injury on the risk of ACL revision and how the treatment of these injuries affects outcome. Patients without a concomitant MCL injury ran an approximately 30% lower risk of revision ACL reconstruction compared with patients who had a concomitant MCL injury at primary ACL reconstruction. Specifically, the risk of ACL revision was increased for patients in whom the concomitant MCL injury was treated non-surgically, while patients receiving surgical treatment for an MCL injury did not display any difference in the risk of revision compared with patients without a concomitant MCL injury. The ACL graft choice between HT and PT did not influence the risk of revision in patients undergoing ACL reconstruction with a concomitant non-surgically treated MCL injury. In terms of functional outcome, patients with and without a non-surgically treated MCL injury were able to attain similar outcomes in terms of return to sport, tests of muscle function and patient-reported outcome (PRO) at one year postoperatively. However, only 10% of the patients with a concomitant non-surgically treated MCL injury had returned to their pre-injury level of sport, compared with 26% of the patients without an MCL injury at one year after ACL reconstruction.

In Theme III, a systematic review of the Scandinavian knee ligament registries found that the PRO was significantly lower after an ACL revision compared with the primary ACL reconstruction, although a few assessments between the 1- to 5-year follow-ups revealed a clinically relevant difference. The largest impairments after a revision compared with a primary ACL reconstruction were found in sport and recreational activities, as well as in quality of life. In Study VII, when a cohort that had undergone both a primary and a revision ACL reconstruction was assessed, there were minor differences between the two occasions according to the one-year PRO. However, the prevalence of cartilage injuries increased significantly at the revision ACL reconstruction (35.1%) compared with the primary ACL reconstruction (18.3%), which could indicate potential for a further deterioration in knee function after ACL revision with time. Clinically relevant predictors of significantly inferior PROs one year after revision ACL reconstruction were the use of an allograft and a concomitant injury to the posterolateral corner at the time of revision ACL reconstruction.

Keywords: anterior cruciate ligament, ACL, reconstruction, revision, medial collateral ligament, MCL, knee

ISBN: 978-91-8009-669-0 (TRYCK)

<http://hdl.handle.net/2077/70522>

ISBN: 978-91-8009-670-6 (PDF)