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Predictors of Outcome after Anterior Cruciate Ligament Reconstruction

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V. Hamrin Senorski E, Svantesson E, Beischer S, Grassi A, Krupic F, Thomée R, Samuelsson K. Factors affecting the achievement of a patient acceptable symptom state one year after ACL reconstruction - A cohort study on 343 patients from two registries. Orthopaedic Journal of Sports Medicine, 2018, Accepted


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Abstract

An anterior cruciate ligament (ACL) injury is one of the most common injuries to the knee joint. It is also one of the most researched areas within sports medicine, orthopedics and physical therapy. The goal of this thesis was to evaluate patient-related, surgery-related and injury-related factors that affect the outcome after an ACL reconstruction.

This thesis comprises nine studies covering three themes: developing a foundation for research, short-term predictors and long-term predictors. The primary statistical methods used in this thesis were univariable and multivariable regression analyses with the various binary or continuous dependent outcomes.

The first theme consists of two studies; a cross-sectional analysis of a rehabilitation outcome register, Project ACL, and a systematic review of the Scandinavian knee ligament registers. Based on the results of the study presenting Project ACL, patients who returned to knee-strenuous sport were characterized as having superior patient-reported knee function and a superior psychological state compared with patients who had not returned to knee-strenuous sport. Moreover, this study also illustrated the differences in results related to various definitions of return to sport. Modifiable factors identified in the Scandinavian knee ligament registers that favor superior patient-reported outcome include not smoking, pre- and postoperative specialized rehabilitation, using a hamstring tendon autograft and less time between ACL injury and reconstruction. The non-modifiable factors found in the registers that favor a superior patient-reported outcome included male sex, younger age and not having sustained a concomitant intra-articular injury.

The second theme consists of five prospective studies based on the Swedish National Knee Ligament Register, Project ACL and a multicenter trial. This theme covered the short-term outcomes related to patient-reported knee function, achieving symmetrical knee function defined as a limb symmetry index of ≥ 90% in five tests of muscle function and return to sport. In terms of patient-related factors, male sex and younger age had a positive influence on returning to sport and patient-reported knee function in the short term, but not on recovering symmetrical knee function. In addition, a higher pre-injury level of physical activity was associated with returning to sport. In terms of surgery-related factors, the use of a hamstring tendon autograft had a positive effect on patient-reported knee function. Finally, patients who had sustained concomitant injuries appeared to run an increased risk of inferior outcome in patient-reported knee function and returning to sport after an ACL reconstruction.

The third theme consists of two studies; an exploratory analysis of two randomized trials and a long-term analysis of the Swedish National Knee Ligament Register. This theme covered the long-term outcomes related to patient-reported knee function and the development of osteoarthritis, i.e. Kellgren-Lawrence grade ≥ 2. In terms of patient-related factors, a minor effect on long-term knee function and osteoarthritis appears to be related to patient characteristics. A lower preoperative body mass index may, however, be an important attribute in understanding which patients report better long-term knee function. Surgery-related factors showed no clinically relevant effect on the long-term outcomes that were studied. The presence of concomitant injuries appears to have a negative influence on the long-term outcome, where cartilage lesions in particular are risk factors for inferior knee function.

Keywords: anterior cruciate ligament, ACL, reconstruction, physical therapy, concomitant injury, knee, predictors, outcome