

Joanna Kvist
Anna Ek
Katja Sporrstedt
Lars Good

Fear of re-injury: a hindrance for returning to sports after anterior cruciate ligament reconstruction

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J. Kvist (✉) · A. Ek · K. Sporrstedt
Division of Physiotherapy,
Department of Health and Society,
Faculty of Health Science,
Linköping University,
581 83 Linköping, Sweden
E-mail: Joanna.Kvist@ihs.liu.se
Fax: +46-13-221706

L. Good
Division of Orthopaedics and Sports
Medicine,
Department of Neuroscience
and Locomotion,
Faculty of Health Science,
Linköping University,
581 85 Linköping, Sweden

Abstract Unrestricted participation in sports activities and return to the pre-injury level is often reported as an indicator of the success of ACL reconstruction. The athletes' choice not to return to their pre-injury level may depend on the knee function, but some times, social reasons or psychological hindrances such as fear of re-injury may influence their return to sports. The aim of this study was to investigate whether fear of re-injury due to movement is of significance for returning to previous level of activity in patients who have undergone anterior cruciate ligament reconstruction. The Tampa Scale of Kinesiophobia (TSK), the Knee Injury and Osteoarthritis Outcome Score (KOOS) and some general questions were mailed to 87

patients who underwent ACL reconstruction 3–4 years before the study was conducted. Sixty-two patients (74%) answered the questionnaires (34 men and 28 women). Fifty-three percent of the patients returned to their pre-injury activity level. The patients who did not return to their pre-injury activity level had more fear of re-injury, which was reflected in the TSK. In addition, high fear of re-injury was correlated with low knee-related quality of life. Fear of re-injury must be considered in the rehabilitation and evaluation of the effects of an ACL reconstruction.

Keywords Psychology · Knee joint · Anterior cruciate ligament · Rehabilitation · Tampa Scale of Kinesiophobia

Introduction

Anterior cruciate ligament (ACL) injuries often result in a premature end to a career in sports. There is a plethora of follow-up studies after ACL reconstruction and many of these use the rate of return to athletic activity as an indicator of the success of this procedure. However, some patients are not able to return to their pre-injury level in spite of a, by objective means, restored knee function. In a literature review, only 36% (13–70%) of the patients who reduced their activity level did so because of the knee function alone [1, 3, 4, 7, 10, 13]. Social reasons or psychological hindrances such as fear of

re-injury may have influenced their return to sports [2, 4, 7, 10]. Psychological responses will always occur in physical trauma or injury and most athletes with injuries will experience negative emotions and lack of self-confidence because of reduced physical ability [5]. A common observation made by both physicians and physical therapists, who deal with this category of patients, is a lack of confidence with the injured knee in spite of a restored objective and subjective stability. A fear of a painful re-injury may confound the treatment effect of the reconstruction and rehabilitation. The aim of this study was to investigate whether fear of re-injury is a factor of significance for returning to previous level of

activity in patients who have undergone ACL reconstruction.

Materials and methods

Between January 1998 to December 1999, 117 patients underwent ACL reconstruction at the University Hospital of Linköping. Three to four years later, all patients from that group who met the following inclusion criteria, age 16–35 year, unilateral injury, no previous ACL reconstruction, and no further knee injury since surgery, were identified to constitute a cohort of 84 subjects for this study.

The Tampa Scale of Kinesiophobia (TSK) [15], the Knee Injury and Osteoarthritis Outcome Score (KOOS) [11] and a general questionnaire were mailed to the patients. If the response was delayed more than 1 month, a reminder was sent out. The patients who did not answer even after the second letter were contacted by phone. This procedure resulted in 62 patients under study, 34 men and 28 women, a response rate of 74%. Forty-seven patients (76% of those who answered) were operated on within 4 months after the injury. Fifty-five patients had their ACL reconstructed using a bone-patellar tendon-bone graft and seven using a quadruple hamstrings tendon graft.

Kori et al. [6] describe kinesiophobia as “..an excessive, irrational and debilitating fear of physical movement and activity resulting from a feeling of vulnerability to painful injury or re-injury”. Kinesiophobia results in an avoidance behaviour, namely the expectation that movement can cause re-injury and thus increase suffering [15], making the patients fear for returning to sports and activity. TSK is aimed at quantifying fear of re-injury due to movement and physical activity and was originally designed for patients with musculoskeletal pain [14]. The TSK consists of 17 statements on subjective experience of injury and physical activity. Each statement is provided with a four-point Likert scale. The sum of the statements make a score from 0 to 51, with a higher score indicating more fear. The reliability (Cronbach’s alpha 0.77–0.81) and the validity of the questionnaire were acceptable when tested on patients with acute and chronic musculoskeletal pain and in volunteers who participated in an aerobic exercise programme especially designed for people with back problems [8, 14, 15]. The TSK version used in this study was translated to Swedish by Eva Johansson (personal communication) and subsequently corrected by testing on 40 patients with chronic pain. Eight statements were rephrased by the authors to better fit patients with knee injury. Specifically “pain” was changed to “knee trouble” in statements 4, 8, 12, to “trouble” in statement 11, and to “get injured” in statement 17. The statement 10 was changed from: “Simply being careful that I do not

make any unnecessary movements is the safest thing I can do to prevent my pain from worsening” to “Simply being careful that I do not make any unnecessary movements is the safest thing I can do to prevent my injured leg from worsening”. In statement 15, “injured” was changed to “injured again”. The statement 16 was changed from “Even though something is causing me a lot of pain, I don’t think it’s actually dangerous” to “Even though my injured knee is causing me a lot of pain, I don’t think it’s actually dangerous”.

The KOOS is a self-administrated questionnaire constructed for patients with osteoarthritis and ACL rupture. It consists of five subscales, i.e. pain, symptoms, function in daily living, function in sport and recreation, and knee-related quality of life. A score is calculated within every subscale, where 100 indicates no problems and 0 indicates extreme problems. The Swedish version of KOOS was used in this study [11].

The general questionnaire used included questions about the pain experienced at the time of injury (How much pain did you experience at the injury; On a 10-cm visual analogue scale, 0=“no pain” and 10=“worst imaginable pain”), return to pre-injury level of activity (Have you returned to your pre-injury level of activity; yes, no), reasons for not doing that (open question), and training activity in order to identify contact sports (In which activity/sport were you active before the injury? Which activity/sport are you active in now?).

Specific objectives and statistics

Linear relationships between the TSK and the KOOS subscales, between the TSK and “pain at injury time”, and between the TSK and “age” were analysed using the Pearson product-moment correlation coefficient. Any gender difference in the rate of returning to pre-injury activity was evaluated with the Chi-square test. The proportion of patients active in contact sports before and after injury was evaluated for significance using the Chi-square test. Any difference in the TSK between the patients who returned to pre-injury activity and the patients who did not was evaluated with the unpaired *t*-test. The Statistica software package (StatSoft Inc, USA) was used for all statistical testing.

Results

Descriptive results from KOOS and TSK are shown in Table 1. Two patients (3%) did not complete the pain subscale of KOOS and one patient (2%) did not complete the quality-of-life subscale. Fifteen patients (24%) were excluded from the TSK because they did not answer all the questions.

Table 1 Mean and standard deviation (median and range) of patients' age, Tampa Scale of Kinesiophobia (TSK), Knee Injury and Osteoarthritis Outcome Score (KOOS) subscales, pain at injury, the rate of return to pre-injury level of activity, and number of patients who were active in contact sports before injury and at follow-up

	Men	Women	Total
Age (at follow-up) ^a	28 (20–35)	26 (18–37)	27 (18–37)
TSK	18 ± 5 (n = 26)	15 ± 7 (n = 21)	17 ± 6 (n = 47)
KOOS			
Pain	85 ± 19 (n = 33)	82 ± 17 (n = 27)	84 ± 18 (n = 60)
Symptoms	75 ± 16 (n = 34)	74 ± 25 (n = 28)	74 ± 20 (n = 62)
ADL	94 ± 8 (n = 34)	90 ± 14 (n = 28)	92 ± 12 (n = 62)
Sports/Rec	64 ± 23 (n = 34)	60 ± 28 (n = 28)	62 ± 25 (n = 62)
QOL	64 ± 20 (n = 33)	63 ± 22 (n = 28)	64 ± 21 (n = 61)
Pain at injury ^a	9 (1–11) (n = 34)	7 (1–11) (n = 28)	8 (1–11) (n = 62)
Return to activity level	50% (n = 17)	57% (n = 16)	53% (n = 33)
Contact sports before injury	27	20	47
Contact sports at follow-up	11	8	19

ADL function in daily living, Sports/Rec function in sport and recreation, QOL knee-related quality of life

^aMedian and range

There was a negative correlation ($r = -0.50$, $p < 0.05$) between the TSK and the knee-related quality of life (KOOS) (Fig. 1). In addition, there was a weak negative correlation ($r = -0.43$, $p < 0.05$) between the TSK and present “pain” (KOOS). No correlation was found between the TSK and age, pain at injury, or “symptoms” (KOOS).

Thirty-three patients (53%) returned to their pre-injury activity level with no gender differences ($p > 0.05$). Before injury, 47 patients (76%) were active in contact sports such as soccer, handball, ice hockey, floorball, or American football. After surgery, only 19 patients (31%) were active in the same sports ($p < 0.05$). Some of these patients reported that although active at the same level in the same sport, their performance was not at the same level as before. In an open question, the patients reported the reason for not returning to their pre-injury level (Table 2). The patients who did not return to their pre-injury activity level scored higher on the TSK (20 ± 6

vs. 15 ± 6 , $p = 0.01$), which means that they had more fear for pain or re-injury.

Discussion

We found that 53% of the patients had returned to their pre-injury activity level 3–4 years after ACL reconstruction. This is in accordance with previous studies, as reported in a review of 15 studies published the last 3 years, where 56% of the patients returned to their pre-injury activity level after an ACL reconstruction [7]. The rate of returning to contact sports was lower. Many patients complained that their performance was worse at the follow-up compared to before the injury. Commonly, the reason for not returning to sports is not reported. In the present study, 24% reported that the cause was fear of re-injury. The same cause has previously been reported in 7% [10] and 30% [2] of the patients.

In the present study, the patients who returned to their pre-injury level of activity had less fear for re-injury due to movement, as expressed by the TSK. This is the first study in which the TSK is used in patients after ACL reconstruction. Some authors reported that fear of re-injury is a factor of importance for failure to return to

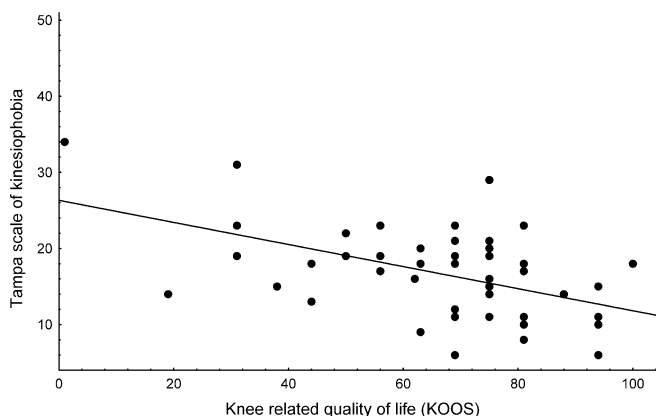


Fig. 1 Correlation between knee-related quality of life as scored in the KOOS questionnaire and fear of re-injury as scored by Tampa Scale of Kinesiophobia ($r = -0.50$, $p < 0.05$)

Table 2 Reasons reported for not returning to pre-injury level

	Men (n = 17)	Women (n = 12)	Total (n = 29)
Problems with knee function	6 (35%)	4 (33%)	10 (35%)
Fear of re-injury	3 (18%)	4 (33%)	7 (24%)
No motivation to continue	2 (12%)	0 (0%)	2 (7%)
Other	2 (12%)	3 (25%)	5 (17%)
No answer	4 (24%)	1 (8%)	5 (17%)

the previous level of activity [2, 7, 10] and the TSK is a questionnaire to quantify that fear. Although, the TSK has only been used in patients with chronic pain or musculoskeletal pain [8, 14, 15] its validity for the ACL-patients is not confirmed. Kori et al. [6], who have studied patients with musculoskeletal pain, states that patients who are motivated and confront their fear of movement/re-injury will return to their previous level of activity to a greater extent than the subjects who avoid the problem. After interviewing ten ACL-injured patients, Mainwaring [9] reports that all were afraid of re-injuring their knees, and this fear sometimes decreased their ability of rehabilitation. A greater focus on the psychological aspects of the injury during the rehabilitation may help the injured athletes to return to their previous level of activity.

A suspicion we had, that could not be substantiated, was that the pain the patients experienced, both at injury time and presently, would be an important factor causing fear of re-injury. Although the patients' ability to remember the pain at the injury time may be questioned, there was no correlation between pain at injury and only a weak correlation between present pain and fear of re-injury. This, however, is in accordance with Vlayen et al. [15] who evaluated people with chronic low back pain by TSK and found a weak correlation between their relation to present pain and fear of re-injury due to movement.

The intention of this study was to highlight an area that is often forgotten in the rehabilitation and evaluation after ACL-injury or reconstruction. No attempts were made to find the reasons for fear or disability to return to sports. Plausible factors that have not been evaluated are for example, impaired knee proprioception and neuromuscular control possibly resulting in both

decreased performance and increased fear of re-injury. The number of injured knee structures, objective knee stability, time between injury and ACL reconstruction, and follow-up time are important factors that influence performance [12]. The long rehabilitation time and difficulties to regain a position in the sports team may affect motivation, and cease the athlete's competitive career in favour of social and family life [7]. Further prospective research combining assessments of psychological variables and functional tests is warranted in order to fully elucidate why patients return or not to their pre-injury level and to fully establish the reasons for fear of re-injury.

Conclusions

1. The results of our study support the impression that only half of the patients with a surgically treated ACL rupture return to their previous level of activity.
2. Those patients who did not return to their previous level of activity were more afraid of re-injury due to movement and had a worse knee-related quality of life than those who had returned to their previous level of activity.
3. Fear of movement that is assumed to cause re-injury is a psychological factor, which affects the return to previous level of activity and must be considered in the evaluation of the effects of an ACL reconstruction.

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