

# Should patients reach certain knee function benchmarks before anterior cruciate ligament reconstruction? Does intense 'prehabilitation' before anterior cruciate ligament reconstruction influence outcome and return to sports?

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Recovery after anterior cruciate ligament (ACL) reconstruction remains imperfect, as shown by mediocre return to sports results in recent systematic reviews.<sup>1</sup> In the March 2015 issue, Grindem *et al*<sup>2</sup> asked whether intense preoperative rehabilitation could improve outcome after ACL reconstruction. They compared preoperative and 2-year postoperative patient-reported knee function in two different cohorts of patients undergoing primary unilateral ACL reconstruction. One cohort included patients who underwent rehabilitation at a sports medicine clinic, 'rehabilitation cohort', and the other cohort consisted of patients in the Norwegian national registry, representing 'usual care'. Patients in both cohorts were considered similar with respect to sex, age, time to surgery, graft and prevalence of concomitant injuries.

In the rehabilitation cohort, patients underwent an intense 5-week preoperative rehabilitation programme, with the aim to regain at least 90% hamstring and quadriceps strength (as measured isokinetically in a seated position) and 90% hop performance, prior to surgery. ACL reconstruction was performed at one of seven different hospitals. The postoperative rehabilitation was individually tailored, again with the aim to regain 90% muscle strength and hop performance and to return to sport.

## SUPERIOR RESULTS WITH A COMPREHENSIVE REHABILITATION PROGRAMME

Patients in the rehabilitation cohort reported significantly better Knee Injury and Osteoarthritis Outcome Score (KOOS) in all five subscales preoperatively compared with the usual care cohort, with differences up to 24.6 points in the various subscales (10 points considered a clinically relevant difference). Patients receiving usual care reported preoperative KOOS scores of 45.2, and 36.0 for the most patient-relevant subscales Sports and Quality of life, which tallies with, for example, the Swedish National Knee Ligament Register.<sup>3</sup>

Importantly, the superior knee function in the rehabilitation cohort remained at the 2-year follow-up in both KOOS Sports (85.1 vs 67.6) and Quality of life (78.6 vs 67.7). It was therefore suggested that patients can achieve better preoperative and postoperative knee function with comprehensive preoperative rehabilitation, and it was concluded that 'there is untapped potential for improving knee function prior to ACL reconstruction in the standard practice in Norway'.<sup>2</sup>

## SHOULD PATIENTS REACH CERTAIN KNEE FUNCTION BENCHMARKS BEFORE ACL RECONSTRUCTION?

Is there further support in the literature for comprehensive preoperative rehabilitation ('or 'prehabilitation' as it is sometimes called)? In their systematic review, de Valk *et al*<sup>4</sup> concluded that there is level III evidence (based on two cohort studies) that preoperative quadriceps strength deficits greater than 20%, and low eccentric quadriceps torques, are associated with lower Cincinnati Knee score, poorer quadriceps strength and lower KOOS Quality of life scores, respectively. In addition, a recent RCT showed that patients undergoing a 6-week rehabilitation programme prior to ACL reconstruction had

superior hop performance and self-reported knee function 12 weeks post-operatively, compared with a control group that received no prehabilitation.<sup>5</sup>

A question that remains unanswered is what level of knee function is optimal (or needed) before undergoing ACL reconstruction? Interestingly, Grindem *et al*<sup>2</sup> recommended that patients should have a leg symmetry index of 90% for muscle strength and hop ability prior to ACL reconstruction, which is similar to previous recommendations before returning to non-contact and non-pivoting sports after ACL reconstruction.<sup>6</sup> This may not be achievable for all ACL-deficient patients, however, and future studies should explore whether certain criteria should be met prior to ACL reconstruction to achieve superior functional postoperative outcomes, and to facilitate return to sports.

## IS CENTRALISATION TO SPECIALISED CLINICS NEEDED IN THE FUTURE?

To put the positive results from Grindem *et al*<sup>2</sup> in perspective, we can compare the findings with those of the KANON trial by Richard Frobell *et al*<sup>7</sup> in neighbouring Sweden. In that study, the corresponding 1-year postoperative KOOS scores in the subgroup of patients who started with 'state-of-the-art' ACL rehabilitation alone, but ended up with a delayed ACL reconstruction, were 68.5 for Sports and 65.5 for Quality of life, respectively. Similar results were observed for patients receiving rehabilitation and early (within 10 weeks) ACL reconstruction, with 2-year postoperative KOOS scores of 71.8 and 67.3, respectively. Thus, these KOOS scores in the KANON trial are very similar to those of the usual care cohort, and the question is: what is the secret to the outstanding 2-year KOOS scores in the rehabilitation cohort at the Norwegian Research Center for Active Rehabilitation?

The superior results observed in the rehabilitation cohort may be attributed to factors other than the specific rehabilitation programme. We speculate that treatment at a specialised sports medicine clinic provides additional advantages beyond the rehabilitation programme alone—quality education, attention to psychological responses during rehabilitation, supervised goal-oriented rehabilitation, etc.<sup>8</sup> Moreover, patient selection with, for example, more motivated patients in the rehabilitation cohort, cannot be ruled out. Nonetheless, the novel approach taken by the authors in comparing outcomes from their

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prospective cohort study with that of the Norwegian national registry, representing usual care, is commended. Regardless of which parts of their treatment strategy were effective, the results suggest that preoperative and postoperative care of patients undergoing ACL reconstruction should be reserved for specialised clinics to achieve the best possible outcome for the patients.

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