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# Early active extension after anterior cruciate ligament reconstruction does not result in increased laxity of the knee

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**Abstract** If permission of full active and passive extension immediately after an anterior cruciate ligament (ACL) reconstruction will increase the post-operative laxity of the knee has been a subject of discussion. We investigated whether a post-operative rehabilitation protocol including active and passive extension without any restrictions in extension immediately after an ACL reconstruction would increase the post-operative anterior–posterior knee laxity (A–P laxity). Our hypothesis was that full active and passive extension immediately after an ACL reconstruction would have no effect on the A–P laxity and clinical results up to 2 years after the operation. Twenty-two consecutive patients (14 men, 8 women, median age 21 years, range 17–41) were included. All the patients had a unilateral ACL rupture and no other ligament injuries or any other history of previous knee injuries. The surgical procedure was identical in all patients and one experienced surgeon operated on all the patients, using the bone-patellar tendon-bone autograft. The post-operative rehabilitation programme was identical in both groups, except for extension training during the first 4 weeks post-operatively. The patients were randomly allocated to post-operative rehabilitation programmes either allowing (Group A, $n$=11) or not allowing [Group B (30 to –10°), $n$=11] full active and passive extension immediately after the operation. They were evaluated pre-operatively and at 6 months and 2 years after the reconstruction. To evaluate the A–P knee laxity, radiostereometric analysis (RSA) and KT-1000 arthrometer (KT-1000) measurements were used, range of motion, Lysholm score, Tegner activity level, the International Knee Documentation Committee (IKDC) evaluation system and one-leg-hop test quotient were used. Pre-operatively, the RSA measurements revealed side-to-side differences in Group A of 8.6 mm (2.3–15.4), median (range) and in Group B of 7.2 mm (2.2–17.4) (n.s.). The corresponding KT-1000 values were for Group A, 2.0 mm (0–8.0) and Group B, 4.0 mm (0–10.0) (n.s.). At 2 years, the differences between the two groups were minimal, regardless of the method that had been used. The RSA measurements in Group A were 2.7 mm (0–10.7) and in Group B 2.8 (–1.8 to 9.5). The KT-1000 values were for Group A, 1.0 mm (–1.5 to 3.5), and for Group B, 0.5 mm (–1.0 to 4.0), without any significant differences between the groups. Nor did the Lysholm score, Tegner activity level, IKDC or one-leg-hop test differ. Early active and passive extension training, without any restrictions in extension, immediately after an ACL reconstruction using bone-patellar tendon-bone graft did not increase post-operative knee laxity up to 2 years after the ACL reconstruction.

**Keywords** ACL reconstruction · Rehabilitation · Extension · Radiostereometric analysis

## Introduction

Rupture of the anterior cruciate ligament (ACL) is a common injury during both sports and leisure time activities [3, 27].

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