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Biomechanical Assessment of the Reconstruction of the Anterolateral Ligament During ACLSurgery. The In-Vivo Study

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Summary:
In about 2/3 of cases the addition of the ALL reconstruction during the ACL surgery is important.

Abstract:
Introduction
Patients diagnosed with „isolated“ tear of the anterior cruciate ligament (ACL) often have different degrees of rotational laxity and ACL reconstruction may not restore it completely. Anterolateral structures, particularly the anterolateral ligament (ALL) may be the key to restoring the rotational stability of the knee. Another option how to restore the rotational stability is to perform the double-bundle (DB) reconstruction. Therefore, the aim of this study was to evaluate the effect of the ALL recontruction during the singl-bundle (SB) ACL surgery and to compare it with the DB reconstruction.

Material and Methods
We have conducted a prospective randomised controled study. 40 patients with isolated ACL ruptures were included and divided at random into two groups: SB ACL and ALL reconstruction (Group I; 20 cases) and DB ACL reconstruction (Group II; 20 cases). To evaluate the rotational stability in time „zero“ objectively, all measurements were performed using an image-free computer navigation system. Internal rotation (IR) were done with the rollimeter (force 2,5 Nm) attached to the iron shoe during the surgery. All tests were performed at 30° of flexion. In Group I, IR was tested before the surgery, after the SB ACL reconstruction, and after the additional ALL reconstruction. In Group II, IR was tested before and after the surgery. Demographic data in both groups was similar. The Mann-Whitney U test was used to statistically evaluate the outcomes ($p < 0,05$).

Results
In Group I, mean IR before surgery was 17,6°, after the ACL reconstruction 12,3° ($p < 0,05$), and after the ALL reconstruction 8,6° ($p < 0,05$). In 7 cases (35 %) with remaining rotational laxity after the ACL reconstruction less than 12° the stability in IR after the ALL reconstruction did not improve significantly ($p > 0,05$). In Group II, IR was 18,2° at average before the surgery and 10,4° after the ACL reconstruction ($p < 0,05$). We found no statistically significant difference between both groups in terms of IR laxity before and after the surgery.

Conclusions
Isolated SB reconstruction stabilizes the knee in IR sufficiently only in about 1/3 of patients. In remaining 2/3 of cases the addition of the ALL reconstruction is important. There is no significant difference regarding IR stability between DB reconstruction and SB together with ALL reconstruction. After DB reconstruction remaining IR laxity is higher, but without statistical significance.