

# ASSESSMENT OF KNEE PROPRIOCEPTION IN PATIENTS AFTER ACL RECONSTRUCTION OR ACL REPAIR

Paulina Zalewska (1), Tomasz Guszczyn (2), Szczepan Piszczatowski (1)

1. Bialystok University of Technology, Poland; 2. The Medical University of Bialystok Children's Clinical Hospital, Poland

## Introduction

Anterior cruciate ligament (ACL) injury is one of the most common injuries of the knee [1]. This ligament is crucial for the stability of the joint. It is presumed that it also plays an important role in the proprioception, and its damage may affect its disturbance [2]. The basic method of ACL reconstruction is to replace the damaged ligament with a graft. Now, however, more and more often the new method named Internal Bracing is used, where the damaged ligament is not replaced, but is repaired and reinforced with synthetic tape, which allows for faster recovery [3]. Hence, the aim of this study was to determine the knee proprioception for patients after ACL surgery, depending on the method used (ACL repair using Internal Bracing or ACL reconstruction with hamstrings autograft), using Joint Position Sens (JPS) test.

## Methods

Anterior cruciate ligament (ACL) The studies involved 48 participants who underwent ACL reconstruction using one of the two methods – with use of the Internal Bracing method (20 patients), as well as an autologous graft (28 patients) and the rehabilitation process has been completed. Patients were qualified for the project on the basis of clinical assessment made by an orthopaedist. The research was approved by the bioethics committee. The BIODEX System 4 Pro isokinetic dynamometer was used to test proprioception in the knee joint. First, the whole set of tests was performed for the healthy limb as a reference, and then for the operated limb.

JPS test was defined as ability to reproduce the given angular position (30° and 60°) in the knee joint three times in two ways:

- a. passively (muscles fully relaxed) - joint was moved to an appropriate angle and hold for 10 second (the patient was told to remember the position) and then returned to the starting position (90°). Next, the arm of dynamometer slowly moved participant's shank. When the patient decided that the current position of the limb coincides with the memorized position, he/she stopped the machine with a button and the current angle was recorded
- b. actively (moderately tense muscles) - in this variant, the muscles of the lower limb were maintain in moderate tension during learning and next, the participant reproduced appropriate angular position on his own.

## Results

Table 1 presents the example results for JPS test for operated limbs for patients after ACL reconstruction (ACLR) and Internal Bracing method (IB).

	30°		60°	
	ACLR	IB	ACLR	IB
passive	5.3	6.3	3.5	3.4
active	4.7	4.4	3.9	4.8

Table 1: Mean JPS results [°] obtained for operated limbs for both group of patients.

## Discussion

Analyzing the JPS results it can be seen that both group of patients generally obtained lower error values for 60° than 30°. Interestingly lower error values were noted for active variant for 30° and passive variant for 60° also for both group of patients. It is also hard to say which group obtained better results, as lower error values for ACLR were noted for 30° passive and 60° active, and in the other variants for IB, although here the differences were no longer as visible.

Summarizing, it can be concluded that there is a visible effect of ACL surgery type on knee proprioception. However, further studies is necessary in order to gain a deeper understanding of the discussed phenomena.

## References

1. Benos et al, Front Bioeng Biotechnol, 20, 8:967, 2020.
2. Johansson et al, Clin Orthop Relat Res, 268, 161-168, 1991.
3. Dabis et al. Clin Sports Med 38(2), 275-283, 2019.

## Acknowledgements

Research was performed as a part of projects WI/WM-IIB/7/2020, WZ/WM-IIB/3/2020 and financed with use of funds for science from Polish Ministry of Science and Higher Education.

The printing of the article was financed from the **ZIREG project - Integrated Program of the Bialystok University of Technology for Regional Development**, contract no. POWR.03.05.00-00-ZR22 / 18. Project co-financed by the European Union from the European Social Fund under the Knowledge Education Development Operational Program 2014-2020.

