

SUMMARY

Assesment of kinematic parameters of the pelvis and lower limb during single leg landing in patients after anterior cruciate ligament reconstruccion

Introduction: Anterior cruciate ligament (ACL) reconstruction and participation in postsurgery physiotherapy are aimed to restore static and dynamic stability of the knee joint, enabling the patient to return to sports activity. However, this does not eliminate the risk of further injury, which occurs both in operated (5-11%) and unoperated (8-21%) limbs. The literature underlines the correlation between lower limb kinematics during single leg landing with the risk factors of ACL injury.

Study aim: Verification of the hypothesis regarding the possible differennce between kinematics parameters of pelvis and lower limb joints during single leg landing between three types of lower limbs: operated and unoperated (study group) as well as healthy one (control group).

Material and methods: The study included 18 patients (16 men, 2 women; mean age: $24,1 \pm 7,3$ years) after ACL reconstruction in the mean time of 13 months after the surgery. Simultaneously a control group was recruited that consisted of 18 persons (14 men, 4 women; mean age: $25,3 \pm 3,3$ years). To evaluate the kinematics of pelvis and lower limb joints the optoelectionical system for three dimensional motion analysis BTS Smart (BTS Bioengineering, Milan, Italy) was used. The averange and peak ranges of displacements of pelvis and lower limb joints during single leg landing after a hurdle jump and drop jump in operated and unoperated (study group) and healthy (control group) were assessed. Based on the ranges of displacements of individual limb segments the empirical kinematic landing pattern was constructed, which was compared to two theoretical patterns basen on the literature: predisposing to ACL injury (containing factors (segment displacements) related with ACL injury) and protective pattern aganist ACL injury (containing factors (segments displacements) opposite to the predisposing pattern).

Results: The comparision of empirical and theoretical patterns of individual lower limbs during single leg landing showed presence of the greateststs number of predisposing factors to ACL injury (4-5) and the lowest number of protective factors aganist ACL injury (1-3) in a healthy limb. In the operated limb the lowest number of predisposing factors to ACL injury (1) and the greatest number of protective factors aganist ACL injury (3-5) were observed. Unoperated limb was

characterized by an occurrence of similar number of factors (2-3) predisposing to and protective against ACL injury. These observations are supported by significant intergroup differences for many kinematics parameters.

Conclusions: The assessment of kinematic parameters of pelvis and lower limbs' joints showed a differentiation between both the average and peak ranges of segment displacements among various types of limbs, occurring during both of the landing techniques. The observations also indicate the presence of the highest risk of ACL injury in a healthy limb, and the lowest risk in an operated limb.