BIOMECHANICAL ESTIMATE OF OUTPUT FORCE OF LIGAMENTUM PATELLAE IN CASE OF ITS RUPTURE

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Using a case of patellar ligament rupture of a weightlifter in a contest, the critical stages are shown on film recordings of the lifter's movements. Special program of FAM (polynomial approximation method) was used in evaluating the discreet positions of the selected points of the weightlifter - barbell system. Analytical solution is presented for the time dependence of the displacement, speed and acceleration of the points under study. Especially that of the barbell centre of gravity. Dynamic characteristics in the time range of the patellar ligament rupture moment are used in the mathematical estimate of the resultant tendon force of the quadriceps femoris muscle and of the force stretching the patellar ligament. Data processing showed that the resultant tensile force acting on the patellar ligament was around 14 500 N. The presentation is complete with figures, tables and calculations.

THE VALUES OF FORCES IN LUMBAR SPINE ESTIMATED DURING MAXIMAL STATIC EXTERNAL LOADS IN A SELECTED POSITION

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The investigation of the loads on the individual levels of the lumbar spine was carried out. To record the maximum effort of the tested person - "the back and leg dynamometry", in five separate positions of the body, was analysed. For one subject, radiography and phonography were used.

External moment of force, compressive, shear and reaction forces were estimated using mathematical methods. For the study, 120 persons were tested without x-ray photos as well as with radiography data of one person were used in developing a mathematical model to estimate the range of values of the forces created on the level L5-S1.

The individual segments of the lumbar spine were loaded irregularly and the values of five of the forces created during testing indicate that there must exist some mechanisms (like intrabdominal pressure) which must reduce these forces, otherwise one may reach potential limits of failure as estimated for bones in laboratory testing.

EXAMINATION OF THE HUNGARIAN ELITE ATHLETES USING SELECTED BIOMECHANICAL METHODS

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Hoping to realize the motto of this conference: "Improving performance in sports without drugs". We work on coming to the front with well-proven methods in biomechanics, which help us to develop the athletes to the limit, based in the olympic ideal.

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