TACSM Abstract

Effects of ACL reconstructive surgery on vertical jump

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ABSTRACT

Anterior cruciate ligament (ACL) injuries are one of the most common injuries involving lower extremities among athletes. Due to the severity of the injury and the invasive procedure in reconstructing the ligament, ACL injuries can have a significant impact on muscular strength, flexibility, and endurance. The purpose of this study was to examine differences in ground reaction force (GRF) between lower extremities of subjects who have undergone unilateral ACL reconstructive surgery. Of particular interest is the subjects' predisposal to future injuries resulting from significant disparities of produced forces between lower extremities and, consequently, the resulting disruption of the body's kinetic chain. Ten collegiate athletes (n=10) were used for the study: Five having undergone no prior surgery involving lower extremities (control group) and five having undergone unilateral ACL reconstructive surgery (experimental group). Tests were conducted in the Biomechanics' Laboratory using the force plate to measure GRF (Newtons). Each subject completed a total of 10 vertical jumps: Five jumps were completed with only one leg on the force plate for measurement (GRF), and then five jumps were completed with only the opposite leg on the force plate for measurement (GRF). For the experimental group, the reconstructed leg was tested first, ruling out fatigue as a contributor for the expected decreased force production. Upon completion, subject's jumps were averaged and combined with their respective groups. A grand mean then was calculated for each group and used for discussion of results. Obtained data exhibited significant differences of force produced between surgically repaired and non-surgically repaired extremities. For the control group, differences were minimal on both the upward and downward phase of the jump, with an average disparity of 5 percent and 7 percent, respectively. For the experimental group, however, the non-reconstructed extremity demonstrated significantly more force on both the upward and downward phase of the jump, with an average disparity of 130 percent and 140 percent, respectively. It can be assumed these imbalances are not only occurring during explosive movements such as the vertical jump; yet, they occur during everyday activities such as walking, standing, sitting, etc. When dealing with such imbalances, the body makes compensatory changes that disrupt the body's kinetic chain. Over time, these disruptions can manifest into chronic injuries resulting from muscular strength and flexibility imbalances, improper movement patterns, and postural deviations—not to mention, the probability of a traumatic injury also is greatly increased due to the aforementioned problems.