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Antagonist Coactivation in Athletes Following Anterior Cruciate Ligament Reconstruction

Authors : Milad Pirali, Sohrab Keyhani, Mohhamad Ali Sanjari, Ali Ashraf Jamshidi

Abstract : Purpose: The effect of hamstring antagonist activity on the knee extensors torque of the Anterior Cruciate Ligament reconstruction (ACLR) is not clear and persistent muscle weakness is common after ACLR. Hamstring activation when acting as antagonist is considered very important for knee strengths. Therefore the purpose of this study was to examine hamstring antagonist coactivation during maximal effort of the isokinetic knee extension in ACLR athletes with hamstring autograft. Materials and Methods: We enrolled 20 professional athletes who underwent primary ACLR (hamstring tendon autograft)with 6-24 months postoperative and 20 healthy subjects as control group. Each subjects performed maximal effort isokinetic knee extension and flexion in 60/˚ s and 180/˚ s velocities for the involved and uninvolved limb. Synchronously, surface electromyography (EMG) was recorded of vastus medialis (VM), vastus lateralis (VL), rectus femoris (RF) and biceps femoris (BF). The antagonist integrated EMG (IEMG) values were normalized to the IEMG of the same muscle during maximal isokinetic eccentric effort at the same velocities and ROM. Results: A one-way analysis of variance designs shows significantly greater IEMG coactivation of hamstring and decreased activation of Vm in ACLR when compared to uninvolved and control group leg in 60/˚ s and 180/˚ s velocities. Likewise peak torque to body weight was decreased in ACLR compared to uninvolved and control group during knee extension in both velocities ($p < 0.05$). Conclusions: Decreased extensors moment caused by decreased quadriceps inhibition and increased hamstring coactivation. In addition, these result indicated to decrease of motor unit recruitment in the VM (as a kinesiologicmonitore of the knee). It is appearing that strengthening of the quadriceps to be an important for rehabilitation program after ACLR for preparation in athletes endeavors. Therefore, we suggest that having more emphasis and focus on quadriceps strength and less emphasis on hamstring following ACLR.

Keywords : ACLR-coactivation, dynamometry, electromyography, isokinetic
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