

EFFECTS OF FUNCTIONAL KNEE BRACES ON NEUROMUSCULAR ADAPTATION IN ANTERIOR CRUCIATE LIGAMENT INJURED PATIENTS

Hsiu-Chen Lin, Tung-Wu Lu¹, Horng-Chang Hsu² and Shu-Ya Chen

School of Physical Therapy, China Medical College, Taichung, Taiwan

¹Institute of Biomedical Engineering, National Taiwan University, Taipei, Taiwan

²Department of Orthopedics, China Medical College Hospital, Taichung, Taiwan

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INTRODUCTION: Neuromuscular adaptation in the lower extremity has been found in anterior cruciate ligament (ACL) injured patients, with mechanical and electromyographic alterations such as reduced knee extensor moment and power, increased hamstrings muscle activity, and decreased muscle strength (Berchuck, Andriacchi, Bach, & Reider, 1990; DeVita, Lassiter, Hortobagyi, & Torry, 1998). Functional knee bracing has been a common method to enhance functional knee stability in these patients for the past three decades. However, the long-term effects of knee bracing on ACL-reconstructed (ACL-R) patients have not been reported in the literature. There is thus an urgent need to identify the effects of bracing on the gait displayed by these patients.

METHODS: Four groups of subjects, each with 10 males, were selected as subjects. The first two are ACL-R patients with patellar tendon autograft: one routinely wearing DonJoy Goldpoint braces (Smith & Nephew DonJoy Inc., U.S.A.) after reconstruction for at least 3 months and the other without any bracing. The third was ACL-deficient (ACL-D) patients without bracing. They were recruited to quantify the natural neuromuscular adaptation without internal and external restraint. The duration from their ACL injuries or reconstruction were at least 6 months. The fourth group included matched healthy controls. Kinematic (VICON, Oxford Metrics, U.K.), kinetic (AMTI, Mass., U.S.A.) and EMG (MA300, Motion Lab., U.S.A.) data of lower extremities were collected simultaneously during normal gait. Reduced data were analyzed with a three-way ANOVA with brace (wearing versus without wearing brace), knee condition (ACL-R, ACL-D, and uninjured) and test condition (with versus without brace) as factors. Significance level was set at 0.05.

RESULTS AND DISCUSSION: Gait variables and muscle activation patterns are being analyzed to allow further statistical analysis. It is hoped to show if quadriceps avoidance gait patterns are present in ACL-D patients as suggested in previous studies and if there are significant differences in gait variables between patients with or without wearing knee braces.

CONCLUSION: This study investigates the long-term effects of knee bracing on the neuromuscular adaptation in ACL-R and ACL-D patients. The results can be used to guide future application of knee bracing and associated rehabilitation in ACL injured patients. The goal is to help patients return to their sports in a shortest period of time.

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