



Grant Information Summary:

Knee Joint Forces While Walking With and Without a Functional Knee Brace in Recent ACL-Reconstructed Subjects

Practical Significance:

The results showed that a functional knee brace can reduce the force on a surgically repaired ACL in the knee during walking in people soon after surgery.

Background

Functional knee braces have been shown to change the way individuals with ACL reconstruction surgery walk. The brace causes a reduction in the knee torque and a compensatory increase in the hip torque. These results suggest that internal knee forces may be reduced while walking with the brace compared to walking without the brace. This reduction may be especially beneficial to people with recent ACL reconstruction surgery since the graft would not be fully healed.

Objective

Purpose was to test the effects of a functional knee brace on lower extremity muscle forces and the knee shear force during the stance phase of walking in ACL-reconstructed and healthy individuals.

Design and Setting

Biomechanical data describing walking were obtained in a gait laboratory.

Subjects

Nine ACL-reconstructed and 10 healthy subjects were tested.

Measurements

Ground reactions and sagittal plane video were recorded as subjects walked with and without a functional knee brace. Hamstrings, quadriceps, and gastrocnemius muscle and knee shear force were then predicted with a mathematical model.

Results

ACL subjects walked with 78% more hamstrings and 19% less quadriceps force (both $p < .05$) than healthy subjects. The knee

brace produced an additional 43% increase and an additional 13% decrease in hamstrings and quadriceps forces (both $p < .05$) in the ACL group. Peak knee shear force was 41% lower in ACL subjects compared to healthy subjects ($p < .05$). The knee brace further reduced the peak knee shear force 28% ($p < .05$) in the ACL group.

Results

The functional knee brace protects a reconstructed ACL during walking by altering muscle forces and reducing the shear force applied to the knee joint.

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Publication and Presentations

DeVita, P. & Hortobagyi, T. Functional Knee brace alters predicted knee muscle and joint forces in person with ACL reconstruction during walking
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