

Mechanical and Functional Deficits after Revision Anterior Cruciate Ligament Reconstruction: A Case Study

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Introduction:

Anterior cruciate ligament (ACL) reconstruction is a common procedure in sports medicine. Although approximately one in ten young athletes will go on to rupture their ACL graft, mechanical and functional outcomes after revision ACL reconstruction (RACL) have yet to be comprehensively characterized. The aims of this project were to: (1) evaluate anterior-posterior tibiofemoral laxity, lower extremity strength, and biomechanical function during jumping, hopping, and landing tasks in an athlete following RACL and rehabilitation, and (2) establish a foundation of evidence for a long-term, prospective study designed to fully characterize outcomes after RACL.

Methods:

Anthropometrics were measured and anterior/posterior tibial translation was assessed using a KT 2000 knee arthrometer. Isokinetic knee extension/flexion and hip abduction strength were measured with a dynamometer at 300°/sec and 120°/sec, respectively. Single-leg (SL) power during a 10 second hopping task was calculated using force plate data. The subject performed three trials of drop vertical jump (DVJ), SL drop landing (SLL), and SL broad jump (SLBJ) tasks on force plates while wearing retroreflective markers, and kinematic and kinetic data was collected with a 3D high-speed motion analysis system.

Results:

The subject (age = 23.2 years; 158.1 cm; 56.2 kg) was tested at 12 months post-RACL. Anterior-posterior tibial translation was 255% greater in the involved limb (13.5 mm) than the uninvolved limb (5.3 mm). The subject exhibited substantial involved limb deficits in knee extension strength (-21.9%) and ankle power during the SL hopping task (-25.4%). During the DVJ, the ratios of peak landing to peak takeoff force were 1.08 (uninvolved) and 1.23 (involved). Substantial kinetic inter-limb differences in joint angles and moments were measured in the DVJ (all lower extremity joints), SLL (knee and ankle), and SLBJ (all lower extremity joints).

Discussion:

Deficits in knee stability, strength, and biomechanical function are potential outcomes of RACL, however future work in this area will further develop the outcomes profile of RACL. Additional investigation is required to determine the association of these identified deficits on subsequent graft failure. In addition, further efforts are warranted to develop both surgical and rehabilitation strategies to improve functional performance after RACL.

Acknowledgements:

The authors would like to acknowledge Kim Barber-Foss for her assistance and NIH grant T35 DK 60444 as the source of funding for this project.