

LIMB ASYMMETRIES DURING FUNCTIONAL HOP TESTS IN POST-ACL RECONSTRUCTION PATIENTS

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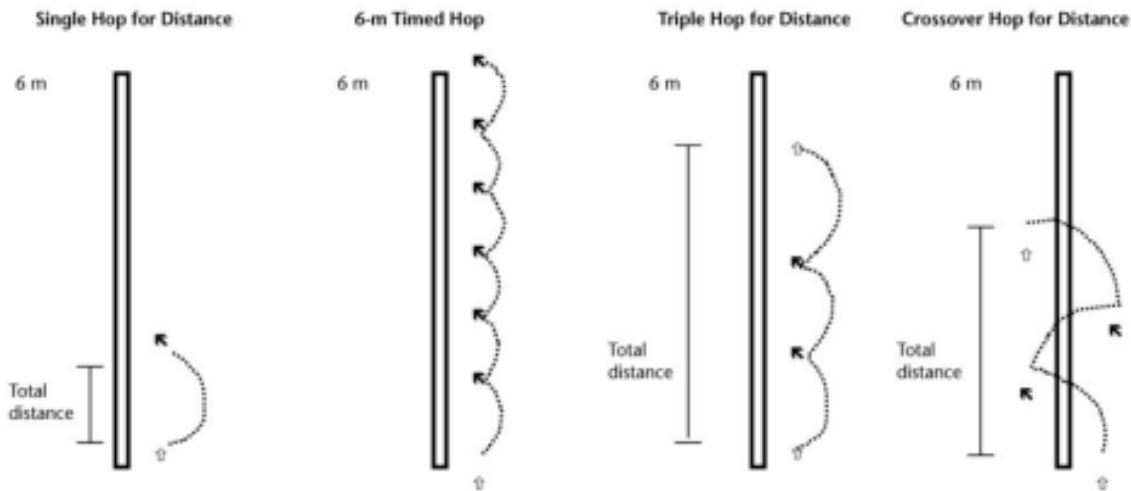
INTRODUCTION

Anterior Cruciate Ligament Reconstruction (ACLR) after a complete tear is intended to restore stability and functionality to the limb. At the conclusion of an athlete's rehabilitation, it is common practice to undergo return to sport (RTS) testing focused on assessing strength and function. Tests involving unilateral hops, isokinetic strength and postural stability are conducted to ensure a safe RTS. RTS testing has become common practice, however young athletes (≤ 25 years of age) still have a high secondary reinjury rate of 23%¹. Reinjury often leads to removal from sport, diminished quality of life, and greater potential for long-term degeneration^{1,2}. Limb asymmetries could potentially lead to re-tear of the affected limb (AL) or a new tear of the contralateral unaffected limb (UAL). Therefore, the objective of this study was to compare the performance of the AL and UAL >12 months post-ACLR during RTS functional hop testing and to interlimb differences observed in healthy controls in order to assess kinetic functionality of the lower extremities.

METHODS

11 ACLR subjects (9 females, 2 males, 22.4 ± 3.7 years old, 5.4 ± 4.2 years post-op) participated in this study. The RTS protocol for this study included the following: single hop for distance (SLH), triple hop for distance (TH), triple cross-over hop for distance (TCH), and timed 6m hop (Figure 1). All RTS tests were performed and recorded over 3 acceptable trials per limb. The AL ACLR was compared to the dominant limb (DL) and the UAL was compared to the non-dominant limb (NDL) of controls. DL was determined by which leg subjects choose to kick a ball³. The limb asymmetries between the two limbs was calculated using the Limb Symmetry Index (LSI) = $100 * (AL/UAL)$ or $100 * (DL/NDL)$ to determine the percentage of ability between limbs. An LSI $< 85\%$ or LSI

> 115% is considered a clinically important difference.



Functional Hop Tests

RESULTS

For all RTS hop test measures, no clinically important differences were found when comparing LSIs for subjects post-ACLR. When comparing those subjects to healthy controls, no clinically important differences were found as well. Full LSI data can be seen in Table 1.

DISCUSSION

For athletes >1 year post-ACLR, no clinically important differences in LSI were found between the affected and unaffected limbs for RTS functional hop testing. Additionally, no clinically important difference in LSI was found when compared to healthy controls. However, the high rate of a second ACL tear on the affected or unaffected side continues to be a common concern reported in the literature¹. This is likely due to the complex anatomical and pathomechanical nature of the injury and reconstruction surgery. Although the results show minimal differences in LSI, RTS testing may need to be qualitative as well as quantitative, including evaluations of proper landing mechanics and patient reported outcomes in order to further prevent reinjury. Evaluating kinematics

during RTS testing may improve the sensitivity of this assessment.

CONCLUSION

RTS hop tests did not produce any clinical differences between the limbs or groups. This protocol, a part of what is commonly used by clinicians, evaluates an individual's ability to safely return to high-level athletics post-ACLR. Given the high prevalence of reinjury, all objective data should be utilized from functional testing. Future study should include kinematic and kinetic assessment during functional testing along with their relationship to isokinetic testing to test for an athlete's readiness for return to sports. Functional testing can provide information regarding landing mechanics and gross power produced by the limb. Isokinetic and functional testing each provide specific information to fully assess an athlete's readiness for return to sport.

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VARIABLES	ACLR (%)	CONTROLS⁴⁻¹⁰(%)
SLH (CM)	97.0± 12.5	99.5
TH (CM)	98.9± 7.6	99.5
TCH (CM)	98.6± 8.7	99.5
6M HOP (SEC)	98.8± 8.0	101.3

Table 1: LSI (%) between AL and UAL during RTS hop tests compared to controls from literature. LSI (limb symmetry index); ACLR (ACL reconstruction)
Control Data extrapolated from literature⁴⁻¹⁰