

Changes in Uninvolved Limb Function During ACL Reconstruction Rehabilitation, and its Implications for Limb Symmetry Index Measures

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Summary:

Comparing the involved limb to the uninvolved limb during functional testing following ACL reconstruction is an effective means of evaluating rehabilitation progress.

Abstract:

BACKGROUND

Functional testing is an important tool in assessing the rehabilitation of an anterior cruciate ligament (ACL) reconstruction, and typically compares the injured limb's performance to a benchmark of the uninjured limb. The post-operative rehabilitation, however, may result in changes in both the involved and uninvolved limbs, thus affecting the proportionate results between both limbs.

HYPOTHESIS

This study aimed to determine the amount of change in both the involved and uninvolved limbs' function during the post-operative period, and what effect that might have on the proportional change between the two limbs. We hypothesized that proportionally there would be a greater change in the function of the involved limb vs. the uninvolved limb.

METHODS

This was a retrospective review of all patients at our ambulatory surgery center who underwent more than one Standard Functional Test (SFT) during post-operative rehabilitation, from October 2009 to October 2013, after undergoing ACL reconstruction. In all portions of the functional testing, we recorded the performances of the involved and uninvolved limbs over time, both in absolute terms, as well as in relation to each other (limb symmetry index—LSI). Patients' first and last available SFT's, excluding those >1 year from surgery (n=112) were compared.

RESULTS

In the involved limb, changes were seen in retro step up (8.4" to 11.1", p<0.01), single leg anteromedial reach (26.3" to 28.4" p<0.01), single leg anterolateral reach (25.5" to 27.7", p<0.01), single leg squat (78° to 86°, p<0.01), single leg hop distance (43.7" to 53.9", p<0.01), triple crossover hop (10.7' to 12.8', p<0.01), triple hop distance (11.8' to 13.6', p=0.04), and timed hop (2.8 sec to 2.3 sec, p<0.01). In the uninvolved limb, absolute changes were seen over multiple SFT's in the retro step up (11.0" to 12.5", p<0.01), single leg anteromedial reach (27.4" to 28.7", p=0.04), and single leg anterolateral reach (26.4" to 28.2", p<0.01). LSI changed for retro step up (77.0% to 89.5%, p<0.01), single leg anteromedial reach (96.1% to 99.0%, p<0.01), single leg squat (88.5% to 96.1%, p<0.01), single leg hop distance (78.2% to 90.0%, p<0.01), triple crossover hop (84.5% to 92.3%, p<0.01), and timed hop (85.3% to 92.8%, p<0.01).

CONCLUSIONS

During the rehabilitation process following ACL reconstruction, the involved limb shows absolute and proportional

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increases in several parameters of the SFT. There were only small increases in functional ability in the uninvolved limb, suggesting that the uninvolved limb is an effective baseline for comparison with the involved limb. A proportionate increase in the involved limb's measurements therefore may reflect a true increase in function, rather than a spurious result due to a decrease in the ability of the uninvolved limb. In our analysis, proportionate measurements are more sensitive than absolute measurements in detecting progress in the involved limb. Of the various parameters of the SFT, the retro step up and single legged hop tests were most often sensitive to detecting a significant change in function.