

A Comparison of Multimodal Return-to-Sport Testing and Force Plate-Based Balance Testing among Anterior Cruciate Ligament Reconstruction Patients

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INTRODUCTION: Return to sport (RTS) testing after anterior cruciate ligament reconstruction (ACLR) surgery plays a crucial role in guiding an athlete's postoperative rehabilitation and mitigating the risk of re-injury upon return to play. However, current RTS testing batteries vary considerably between institutions and the use of expensive modalities such as isokinetic testing limits their implementation outside of comprehensive sports rehabilitation clinics. Force plate-based balance testing may be a simpler alternative to assess some of the same parameters measured in a multimodal RTS testing battery. The purpose of our study was to assess the degree of association between RTS test findings and force plate balance metrics.

METHODS: We conducted a cross-sectional study of patients who underwent ACLR at our center and were at least 6 months postoperative. Subjects completed our multimodal Institutional Return-to-Sport (IRTS) testing battery, which included range-of-motion testing and isokinetic quadriceps strength testing. Subjects also completed a balance testing protocol on a commercially-available force plate. Associations between IRTS findings and balance metrics were measured using the Spearman rank correlation coefficient. Significance of each correlation was evaluated at the 5% significance level.

RESULTS:

Sixteen patients (7 male, 9 female) were enrolled in our study with median age of 29 years (range 20 - 47) and median BMI of 23.1 (range 18.1 - 44.7). Active and passive knee flexion ROM for both the involved and uninvolved legs were positively correlated with entropy of both the center-of-pressure (COP) and vertical force signals ($p < 0.05$). Achieving a passing value for quadriceps strength on isokinetic testing at 60 and 180 deg/s was positively correlated with the degree of bilateral limb symmetry of the entropy of the vertical force signal ($p = 0.02$). Passing the triple hop test was positively correlated with bilateral symmetry in entropy of both the center-of-pressure (COP) and vertical force signals ($p = 0.046$ and $p = 0.002$, respectively).

DISCUSSION AND CONCLUSION:

Force plate-based balance testing metrics are significantly correlated with key components of the ACLR RTS protocol including knee flexion ROM testing, quadriceps isokinetic strength testing, and the triple hop test. Therefore, force plate balance testing may serve as a convenient proxy for these measurements and may be a viable alternative to more cumbersome modalities such as isokinetic testing for the purposes of assessing RTS readiness after ACLR.