DIAGNOSTIC ACCURACY OF CLINICALLY ACCESSIBLE FORCE SENSING INSOLES TO IDENTIFY UNDERLOADERS DURING GAIT POST ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION

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Background: Anterior cruciate ligament reconstruction (ACLR) patients walk with aberrant, underloading gait patterns characterized by lower peak vertical ground reaction force (vGRF) relative to body weight (BW) during the loading phase of gait. Methods for identifying underloaders (<1.09 BW) have been established in laboratory environments but are time and cost prohibitive. Establishing clinically feasible tools to identify underloaders in clinical settings is necessary for gait retraining intervention implementation. **Purpose:** To determine the diagnostic accuracy and clinically relevant cut-points of force sensing insoles (Loadsol®) to identify underloaders post-ACLR. **Methods:** Participants with a primary history of ACLR (n=18) walked on a treadmill equipped with force plates at habitual walking speed while wearing Loadsols® to measure peak vGRF. ROC curves were used to determine the diagnostic accuracy of Loadsols® to identify underloaders. Youden's Index, sensitivity, specificity, and positive and negative predictive values were calculated to determine the most clinically applicable cut-point to identify underloaders. **Results:** Loadsols demonstrated excellent diagnostic accuracy for identifying underloaders (AUC=0.80). Youden's index was highest for two cut-points. Cut-point 1 had a value of 1.06 BW (sensitivity: 0.56, specificity: 1.00, positive predictive value (PPV): 100%, and negative predictive value (NPV): 69%). Cut-point 2 had a value of 1.08 BW (sensitivity: 0.67, specificity: 0.89, PPV: 86%, and NPV: 73%). **Conclusion:** Loadsols® are clinically accessible and diagnostically accurate tools for identifying underloaders in a clinical setting. The optimal cut-points for identifying underloaders with Loadsols® in clinic and research settings are <1.06 BW and <1.08 BW, respectively.

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