Changes in Ultrasonographic Articular Cartilage Cross-Sectional Area between a High-Loading and Normal Loading Condition Following Anterior Cruciate Ligament Reconstruction
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Background: Cuing an increase in vertical ground reaction force (vGRF) has been shown to mitigate aberrant biomechanics exhibited by individuals after anterior cruciate ligament reconstruction (ACLR). Aberrant biomechanics are linked to increased post-traumatic osteoarthritis (PTOA) risk following ACLR. Measurements of cartilage cross-sectional area (CSA) using ultrasound (US) before and after loading can estimate cartilage deformation, and may be an accurate measurement indicative of cartilage health. However, it remains unknown whether the cartilage response to a single real-time gait biofeedback (RTGBF) trial which cues an increased vGRF differs from the cartilage response of normal walking.

Purpose: The purpose of this study was to determine the differences between normal loading and high-loading conditions regarding changes in femoral articular cartilage cross-sectional area.

Methods: Individuals 6 – 12 months following primary unilateral ACLR (N = 10) participated in a normal walking trial and a RTGBF walking condition which cued an increase in vGRF. US CSA of the anterior femoral cartilage of the ACLR limb was assessed before and after each loading condition. Paired t tests between absolute and percent change CSA for the control and RTGBF conditions were conducted.

Results: There were no significant differences between normal and RTGBF conditions for either absolute or percent change CSA (effect size .257, .313; all p-values > 0.05)

Conclusions: The change in cartilage deformation did not associate with increased loading yet only a small sample size was included. Additional data is needed to determine whether increased loading decreases cartilage deformation, and thus may decrease risk of PTOA.