

Changes in ankle muscle force and power during walking in patients with peripheral artery disease

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Abstract

Background: Patients with peripheral artery disease (PAD) have significantly reduced lower extremity muscle strength compared with healthy individuals as measured during isolated, single plane joint motion by isometric and isokinetic strength dynamometers. The objective of this study was to understand the contribution of the ankle muscles during walking in patients with PAD and compared to healthy older individuals.

Methods: A total of 12 patients diagnosed with Fontaine stage II PAD and 10 healthy older controls were recruited for the study. Each subject walked across a 10-meter pathway with reflective markers placed on specific anatomical locations on lower limbs while the marker coordinates were recorded using a 12-high speed infrared camera system. Gait simulations were performed in OpenSim software (version 4.0). The muscle force and power for individual muscles at ankle and as a group of ankle plantar flexor muscles were exported from OpenSim.

Results: There was a significant reduction in ankle muscle power in patients with PAD during propulsion phase ($p < 0.05$). There were significant reductions in lateral and medial gastrocnemius muscle forces and power during propulsion in patients with PAD ($p < 0.05$). However, soleus muscle force and power were not altered during stance phase.

Conclusions: Our simulation findings identified important information about PAD gait mechanics, specifically altered ankle muscle force and power contribution during stance phase.