PIN RELEASE AND RELOCK AS AN ACCOMMODATION STRATEGY FOR TRANSTIBIAL PROSTHESIS USERS

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Short Video Presentation at: http://depts.washington.edu/jsweb/video/TARPIN_presentation_v1.mp4

Objectives of This Research

- Create a novel socket for people with transtibial amputation to accommodate limb volume loss
- Allow for quick and easy execution of socket release and relock using push buttons on the socket
- Compare limb fluid volume changes for two release/relock sequences and a no-release control

The Release/Relock Socket

The mechanism is housed within the distal socket. There are two operation buttons:

- 1- Release pin tether to partial doff or full doff length
- 2- Draw in tether using a motor-driven mechanism

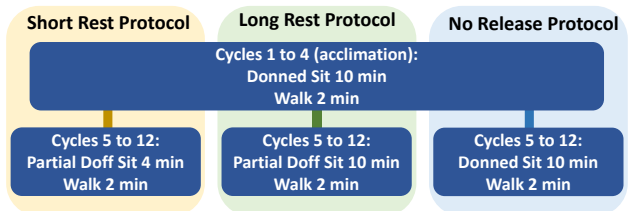
A ratcheted dial is used for panel adjustment to one of two positions: fully closed; fully open

White tether release button and green tether draw button on a release/relock socket.

Socket release. A partially doffed socket. The tether length is 5 cm.

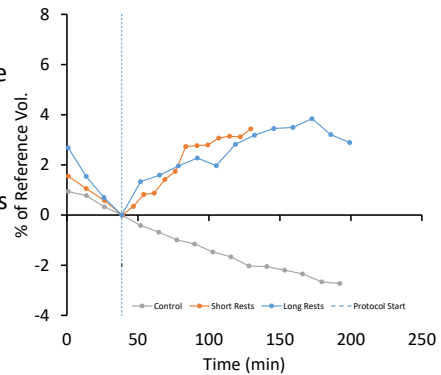
Protocol

People with a transtibial amputation at least 18 months prior and at a K-level of 2 or higher were eligible. On 3 separate test days, participants walked on a treadmill for 2 min bouts. In between bouts they sat with their prosthesis donned for 10 min (control), or partially doffed with panels released for 4 min (short rests) or 10 min (long rests). Limb fluid volume was monitored using bioimpedance analysis[1].

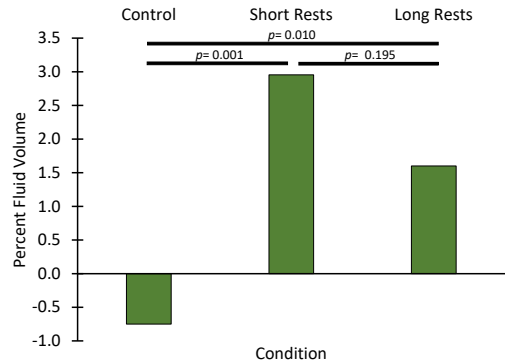


Results

Twelve participants (11 male, 1 female) between the ages of 35 to 74 took part in this study. All participants except one (Charcot foot) had their limb amputation as a result of trauma. Results from a participant showing mean limb fluid volume during stance phase of each bout for the 3 protocols are shown.



Median limb fluid volume change was significantly less for short rests v. control and long rests v. control. There were no significant differences between long rests and short rests.



Interpretation

- By reducing interface pressures during sitting, partial doffing facilitated limb fluid volume recovery, helping to reduce volume loss over the session
- Participant physiological differences may explain why some participants lost less fluid volume for 4-min v. 10-min release durations and others did not

Reference

[1] Clin Orthop Rel Res. 2014;472:3017-25.

This research was supported by USAMRAA W81XWH-16-C-0020 and W81XWH-18-1-0595.