

EVALUATION OF DAILY USE AND FUNCTION OF CONVENTIONAL BODY-POWERED PROSTHESES AND CUSTOM VO/VC TERMINAL DEVICE

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ABSTRACT

The majority of persons with upper limb amputation use body-powered prostheses due to simplicity, robustness, and low cost. However, little is known concerning the daily use, function, and average force exertion for these body-powered devices. In addition, body-powered prosthesis users must choose between a voluntary-opening (VO) and voluntary-closing (VC) device. It is yet to be determined whether a device capable of both VO and VC would provide added benefit and function.

The two main objectives for this study were to quantify the actuation frequency and force exertion for body-powered prosthesis users, and to investigate the impact of a novel VO/VC terminal device capable of being used in both VO and VC modes [1]. Four subjects with a trans-radial amputation were recruited and were fit with an instrumented harness. This harness contained load cell electronics in-line with the Bowden cable and measured the force exerted by the user to actuate the device, as well as the frequency with which the device was used on a daily basis. We also sent the subjects home with the novel VO/VC device, using the same mechanism to track the number of times they used the device as well as how often they switched the device between VO and VC modes. Following the home trial portion, all subjects performed outcome measures of Box and Blocks, Jebsen-Taylor Hand Function Test, Southampton Hand Assessment Procedure (SHAP), and Assessment of Capacity for Myoelectric Control (ACMC) with both their conventional and VO/VC devices, in randomized order. Subjects were also asked to complete a qualitative survey concerning their experiences with the VO/VC device.

All subjects chose to use both modes of the VO/VC device during home use and during the outcome measures. Two subjects performed better at both the Box and Blocks and Jebsen-Taylor using the VO/VC device over their home device. One subject performed better on the SHAP using the VO/VC over their home device. Although the VO/VC device used in this study was experimental all subjects chose to switch modes during both their outcomes and in daily use. This suggests that devices capable of switching modes are useful. The qualitative feedback questionnaires identified room for improvement in the mechanism which could lead to improved outcomes and performance. VO/VC

devices in general appear to be useful in daily life and warrant further research attention.

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