



The Immediate Effects of the Kickstart™ Walking System on Temporal-Spatial Parameters of Gait and Functional Assessment in Patients with Lower Extremity Neuromuscular Deficit

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INTRODUCTION

A vital attribute of gait is clearance of the foot during swing phase (Whittle, 2007). There are many clinical presentations that result in patients adopting abnormal gait patterns to achieve this clearance, many of which result in a reduction in step length and/or gait velocity. One such clinical presentation is severely reduced or absent function of the hip flexors. The Kickstart™ Walking System, designed by Cadence Biomedical, was created with the goal of compensating for this particular deficit. This study aims to document acute changes in gait patterns due to initial use of the device. Temporal-spatial parameters with and without the device are the primary outcome measures of the study; specifically, step length of the affected side, self-selected gait velocity, cadence, stance versus swing time ratios, and a gait symmetry index (Herzog et al., 1989). A ten meter walk test was used to measure functional changes.

METHOD

The protocol used here was approved by the Institutional Review Board of Eastern Michigan University.

Subjects: Two post-CVA patients (one male and one female) who demonstrated difficulty clearing one leg during swing phase. The patients are otherwise healthy.

Apparatus: 3D motion analysis was taken with Vicon Motion Capture. The subject walked on an 8mx1.5m elevated platform with 2 embedded AMTI force plates.

Procedures: The testing protocol began by having subjects complete five to eight trials of the Timed 10-Meter Walk Test with no device (ND) as the control condition. Each subject was then fitted with the Kickstart™ by an ABC-certified orthotist trained in fitting the device. The subjects then repeated the protocol.

Data Analysis: Temporal-spatial measures were calculated using custom scripts written for MATLAB version R2013a. Statistical analyses were performed using IBM SPSS 20 statistical software. A one-tailed Student's T-test was

used to test for significance in differences of the temporal-spatial, functional, and kinematic variables across conditions. The level of statistical significance was set at ($p=0.05$).

RESULTS

Improvements in temporal-spatial and functional outcome measures were recorded in all subjects.

CONCLUSION

As was seen in the improvement in outcome measures between the no device condition (ND) and the Kickstart™ condition (KS), the Kickstart™ led to an increase in step length on the affected side of the subjects which appeared to contribute to improvement in other outcome variables.

CLINICAL APPLICATIONS

The improvements in several outcome measures of gait and function indicate that the Kickstart™ has a broad potential for clinical application. This device could serve as an effective tool for gait training in an in-patient rehabilitation setting. Fitting of the product as soon as possible post-episode could significantly decrease the time in which a patient would be immobile, possibly leading to shorter recovery times (English et al., 2006). This device may also give therapists more confidence in allowing patients to function independently, which could lead to quicker discharge time. The capability of the Kickstart™ as a destination therapy has the potential of leaving patients with a higher level of function long term, which would lead to a higher level of satisfaction and improved quality of life.

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