

FUNCTIONAL UTILITY OF WEARING A MYOELECTRIC ORTHOSIS FOR UPPER EXTREMITY PARALYSIS DUE TO SPINAL CORD INJURY

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INTRODUCTION

Spinal cord injury (SCI) remains a leading cause of long-term disability in the United States with the majority of injuries resulting in incomplete quadriplegia due to cervical lesions.¹ This leads to significant neurological impairment including upper extremity (UE) weakness and decreased independence with self-care activities of daily living (ADLs). Previous work demonstrated that using a myoelectric elbow-wrist-hand orthosis as a therapeutic adjunct to a multi-week rehabilitation regimen resulted in decreased UE motor impairment and increased function in stroke survivors with moderate UE hemiparesis.² The purpose of this case study was to determine if wearing a myoelectric elbow-wrist-hand orthosis reduces upper extremity motor impairment and increases functional ability in an individual with chronic, incomplete spinal cord injury and resultant quadriplegia.

METHODS

The current findings come from a case study involving a 49-year-old male with chronic (>4 years post-injury), traumatic SCI at the C4-C5 level. As a result of his injury, he presented with severe, bilateral upper extremity paresis and was completely dependent for all ADLs prior to this study. He was provided with a custom-fit MyoPro 2.0 Motion-G upper extremity orthosis to facilitate return to independence with basic self-care activities such as feeding and grooming. After receiving the orthosis, he completed three sessions with an occupational therapist and was then instructed on a home exercise program (HEP) to continue making progress toward his goals. Approximately one month after receiving his orthosis, he was re-assessed by his occupational therapist on a variety of self-care activities as well as physical abilities such as UE active range of motion, strength, and spasticity.

RESULTS

The subject demonstrated significant improvements in self-feeding tasks while wearing the MyoPro 2.0 Motion-G orthosis, progressing from requiring total assistance to requiring setup to don the orthosis. He also

demonstrated significant improvements in active range of motion (Before: 0 degrees active elbow flexion against gravity; With Orthosis: 100 degrees active-assisted elbow flexion against gravity) and decreased muscle spasms when wearing the myoelectric orthosis. All of these results were recorded after 32 days with three occupational therapy sessions and 15 self-directed sessions (approximately every other day) wearing the orthosis at home.



Figure 1. MyoPro 2.0 Motion-G Upper Extremity Orthosis.¹

CONCLUSION

This case study is the first published research demonstrating the functional and clinical utility of a myoelectric upper extremity orthosis to improve elbow and hand function. These findings indicate that this may be a promising orthosis for increased function and quality of life for individuals with chronic SCI and resultant quadriplegia.

SIGNIFICANCE

Prior to this work, the majority of published research using myoelectric orthoses for upper extremity impairment has been in stroke and brachial plexus injury. This is one of the first documented cases of the functional utility of a myoelectric orthosis for individuals with traumatic spinal cord injury with resultant quadriplegia. This case study shows promising evidence that a

myoelectric upper extremity orthosis may increase function and quality of life for individuals with SCI.

REFERENCES

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DISCLOSURE

The author of this work is a Clinical Consultant for Myomo, Inc. in addition to her primary role as a PhD student at The Ohio State University.

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