

Others-ADL Assistive Devices

P-36

### **The Effect of a Pronation Orthosis on Manual Wheelchair Propulsion with C5 Spinal Cord Injury: A Single Case Study**

Akane Tokui<sup>1</sup>, Miki Inoue<sup>2</sup>, Yumiko Yoshida<sup>2</sup> and Toru Akune<sup>2</sup>

<sup>1</sup> *College, National Rehabilitation Center for Persons with Disabilities, Japan*

<sup>2</sup> *Hospital, National Rehabilitation Center for Persons with Disabilities, Japan*

tokui-akane@rehab.go.jp

**Background :** It is generally known that for C5 or C6 spinal cord injury patients that a pronation orthosis can prove to be helpful for tasks such as self-feeding. However the research regarding pronation orthosis for manual wheelchair use is still very limited. Though mentioned lightly in the article, in-depth data or discussion about manual wheelchair propulsion is quite lacking.

**Aim :** The purpose of this case study was to validate the effect of a pronation orthosis for a C5 patient self-propelling a manual wheelchair.

**Methods :** A C5 tetraplegia patient (complete) ran a 10m path on a manual wheelchair with and without a pronation orthosis. During each run the time and number of strokes was measured, and the propelling motion was recorded by three videos. It was measured weekly for 13 weeks. We compared the time, number of strokes, the difference of the stroke patterns and each angle of shoulder and elbow joint between with and without the orthosis. All statistical analyses were performed using SPSS 21 (IBM Japan, Ltd.) and all plots were made using Dartfish 5.5 (Dartfish Japan Co.,Ltd.).

**Results :** For seven weeks as the first half of period, the mean time was significantly different between the two groups, with (18.19s ± 0.70) and without orthosis (19.27s ± 0.93, P=0.029) but there was no significant difference in the latter half. The mean time of the latter half (with: 13.22s ± 1.17, without: 13.10s ± 1.05) became faster significantly than the first half (P=0.00). The stroke pattern in the beginning of period was arching type, but it changed to single-looping type gradually. The first day of measurement, the motion pattern of the elbow without the orthosis was single-looping, but it changed to double-looping by wearing a pronation orthosis. Finally, in both cases, with and without a pronation orthosis, the motion pattern of the elbow became double-looping type.

**Discussion & Conclusion :** The results of this study indicate that a pronation orthosis improves patient's ability for self-propelling manual wheelchair forward by changing the motion pattern of the upper limbs. This experiment was conducted with one subject therefore increasing the number of subjects could support our conclusion more strongly. We believe that with a pronation orthosis, patients can expect to increase their abilities when using a wheelchair not only table top activities.