PS-17

EFFICACY OF AN MODIFIED ELBOW FLEXION ASSISTIVE ORTHOSIS: A CASE STUDY

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BACKGROUND

Elbow flexion assistive orthosis is useful to patients who had elbow flexion weakness from burn, trauma leading to nerve injury of elbow. However, the elbow flexion assistive orthosis has a limitation for patients with weakness of shoulder and elbow such as stroke or spinal cord injury. In this case, we would like to introduce modified elbow flexion assistive orthosis with airplane splint and usefulness of this in a central cord syndrome patient.

CASE DESCRIPTION

A 40-year-old female with acute spinal cord infarction was admitted to our hospital for rehabilitation (Figure 1).
She had incomplete spinal cord injury at the C3 level, classified as American Spinal Cord Injury Association Impairment Scale(ASIA) D.

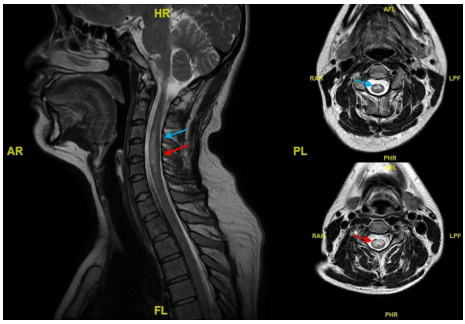

Figure 1. Sagittal (a) and axial (b,c) cervical spinal T2 weighted Magnetic Resonance Imaging (MRI) shows C3-C6 spinal cord infarction (blue arrow: C3 cord level, red arrow: C4 cord level).

The patient's motor grade was evaluated using the Medical Research Council (MRC) scale (Table 1). The patient was able to walk independently and move her hands and wrists freely, but experienced difficulty with tasks such as eating and grooming due to weakness in both shoulder and elbow flexor muscles.

Table 1. The patient's MRC scale

Key muscles (cord level)	Motor power Rt	Motor power Lt
Shoulder flexors, abductors (C5)	2	2
Elbow flexors (C5)	1	1
Wrist extensors (C6)	3	3
Elbow extensor (C7)	3	3
Finger flexors, middle finger (C8)	3	3
Small finger abductor (T11)	4	4
Hip flexors (L2)	4	4
Knee extensors (L3)	4	4
Ankle dorsiflexors (L4)	4	4
Long toe extensors (L5)	4	4
Ankle plantar flexors (S1)	4	4

A new orthosis was designed for the patient with shoulder and elbow weakness. It was an elbow flexion assistive orthosis with an airplane splint (Figure 2). After using the orthosis, the patient was able to perform eating with minimal help (Figure 3), and the Modified Barthel Index (MBI) score improved from 58 to 67 (Figure 4).

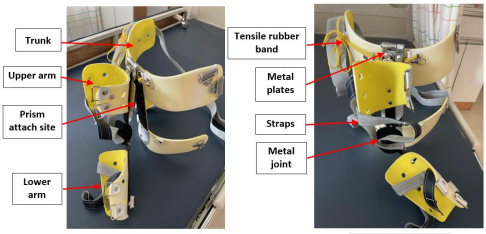

Figure 2. Components of the orthosis
Trunk, Upper arm, Lower arm parts were made of plastics, and were adjust to patient by using straps. Three parts were connected by metal plates and metal joint. Tensile rubber bands were used to assist elbow flexion, and armpit was applied by triangular prism which had three angle(30°, 60°, 90°) to maintain shoulder abduction.

Figure 3. Feeding using the orthosis

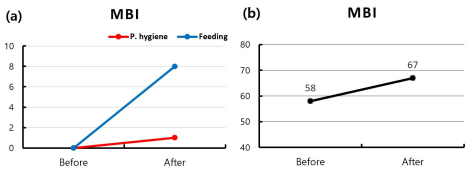

Figure 4. The Modified Barthel Index (MBI)
(a) The personal hygiene (P. hygiene) score increased from 0 to 1, and the feeding score increased from 0 to 8
(b) The MBI score increased from 58 to 67.

CONCLUSION

The patient with shoulder and elbow weakness demonstrated significant improvement in functional ability after using the orthosis. Therefore, using modified elbow flexion assistive orthosis can be a viable option for improving functional outcomes in patients with shoulder and elbow weakness.