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The Effect of End-Effector Type Robotic Assisted Gait Training in Patients with GBS

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Introduction

Guillain-Barre syndrome (GBS), also called acute inflammatory demyelinating polyneuropathy (AIDP) is rapid-onset immune-mediated polyradiculopathy involving sensory, motor and autonomic nerves. The clinical manifestations of GBS can range from mild muscle weakness to complete muscle paralysis, which may lead to severe impairment in walking ability and cause functional deficits. Therefore, it is critical to help regain muscle strength and improve balance in GBS. Rehabilitation in GBS includes strength, endurance and gait training with graduated increases in mobility, maintenance of posture and alignment as well as joint function. To regain walking ability, various treatments were undertaken to assist gait training including robotic-assisted gait training (RAGT). RAGT has been shown to be effective in improving gait function in patients with stroke and spinal cord injury. However, no studies have reported the effect of gait training using an end-effector type robotic device in GBS patients. In this study, we report the effect of gait training using an end-effector type robotic device in GBS patients.

Subjects & Methods

Among GBS patients who had been hospitalized in our clinic from April 2016 to April 2018, 13 patients with GBS were enrolled. Among them, one participant was dropped out of the trial due topain and discomfort around saddle area. The final sample consisted of 12 participants with 10 males and 2 females. Subjects received RAGT for 24 times (Table 1). All participants were assessed with manual muscle test, Functional Ambulation Categories (FAC), Modified Barthel Index Score (MBI) and Rivermead Mobility Index (RMI) before and after RAGT.

Results

Compared to baseline, all outcome measures were improved after RAGT (Table 2). Strength in muscles of the lower extremities significantly improved after RAGT except for hip extension. Also FAC, MBI, 2-minutes walking distances and RMI which are associated with gait function were significantly improved.

Conclusion

This study showed RAGT using end-effector type device improves walking ability in GBS patients. RAGT can be considered as one of gait training tools to recover gait function in patients with GBS. However, this study has a limitation of small sample size and lack of

control group, so further study is required to confirm the effectiveness of RAGT in GBS patients.

Table 1. Demographics of Study Group

	N = 12
Age	55.1±16.7
Gender	Male : 10 (83.3%) Female : 2 (16.7%)
Number of Treatments	24 sessions
Onset	4.0±3.9

Table 2. Outcome measures at Initial and the End of the RAGT

		Initial	End	P-value
Muscle power	Hip Flx.	3.1±0.7	3.6±0.8	0.004*
	Hip Ext.	2.7±0.8	3.3±0.5	0.317
	Knee Flx.	3.0±0.8	3.3±0.8	<0.001*
	Knee Ext.	3.2±0.8	3.4±0.7	0.001*
	Ankle Flx.	2.6±1.2	3.0±1.1	0.001*
	Ankle Ext.	2.8±1.2	3.2±0.9	0.002*
FAC		2.7±1.7	4.0±2.0	0.013*
MBI		56.9±24.5	71.2±24.0	0.002*
2-min walking		35.4±42.2	81.3±69.6	0.009*
RMI		5.5±3.7	8.1±4.5	0.005*

*p<0.05, FAC : Functional Ambulation Categories, MBI : Modified Barthel Index Score, RMI : Rivermead Mobility Index, Flx. : Flexor, Ext. : Extensor