뇌신경재활
발표일시 및 장소 : 10 월 27 일(토) 14:00-14:10 Room C(5F)

OP2-4-1

Exoskeletal overground robot-assisted gait training for individuals with Parkinson's disease

Da Young Lim[1*], So Young Ahn[1], Soo Kyung Bok[1†]

Chungnam National University, School of Medicine, Department of Rehabilitation Medicine[1]

Objective
The purpose of this study is to determine repetitive locomotor treatment using the robot-assisted gait training (RAGT) device (Exowalk®, HMH Co. Ltd, Korea) on the functional improvement of patients with Parkinson's disease.

Methods
This is a nonblinded prospective, randomized, controlled study from June to October 2018. Twenty cognitively intact Parkinson's disease (Hoehn-Yarh stage 2, 3) patients with history of freezing of gait (FOG) during "ON" phase of medication were included. Participants were randomized into 2 groups as follows. Ten patients were treated with RAGT, and 10 were treated with conventional gait training (CGT). RAGT group underwent a rehabilitation program of robot assisted gait training for 30 minutes, 5 times a week for 2 weeks, whereas the CGT group received a conventional gait training in same intensity. The outcome measure of efficacy was recorded by gait analysis, 10MWT (Meter Walk Test), TUG (Time Up and Go test), TT (Time to turn), N10m (Number of gait during 10 meter walk), NT (number of gait during turning), FOG-Questionnaire, and the motor score of MDS-UPDRS (Movement Disorder Society – Unified Parkinson's Disease) Part III. The assessments were performed at the beginning and at the end of the treatment.

Results
All patients participated in the experiment without fail. Both groups showed functional improvement, especially in TUG, NT, cadence, and FOG-Questionnaire. Compared with the CGT group, RAGT group showed a better result of 10MWT.

Conclusions
RAGT could be applied to individuals with Parkinson's disease to facilitate gait recovery. The subjects were well adapted to RAGT. However, larger sample size is needed to investigate the effectiveness and efficacy of RAGT as single gait training and combined with other gait training strategies.

Table 1.
Demographic and clinical features of patients.

	RAGT group (n = 10) mean	CGT group (n = 10) mean
Age (years)	73.6	72.8
Sex (Male/female)	4/6	5/5
Disease duration (years)	6.52	6.99
MDS -UPDRS part III score	27.30	28.10
Hoehn and Yahr stage	Number of patients	
2	5	7
3	5	3

Abbreviations: RAGT, Robotic Assist Gait Training; CGT, Conventional Gait Training; n, number of patients; MDS-UPDRS, Movement Disorder Society - Unified Parkinson's Disease Rating Scale.

Table 2.
Patients' performance in all outcome measures before (T0) and after (T1) 10 sessions of training.

	T0 Mean (SD)		T1 Mean (SD)	
	RAGT	CGT	RAGT	CGT
10MWT (s)	31 (0.08)	30 (0.10)	20 (0.12)*	22 (0.09)
TUG (s)	33 (0.20)	31 (0.15)	20 (0.25)*	21 (0.18)*
N10m (n)	42 (5.39)	44 (4.46)	36 (6.34)	38 (3.51)
NT (n)	10 (4.34)	10 (6.20)	7 (5.31)*	8 (6.12)
Stride length (cm)	66.3 (2.13)	67.4 (3.19)	79 (2.89)	75 (2.57)
Cadence (steps/min)	77.6 (4.70)	78.1 (5.11)	70.9 (4.98)*	72.3 (4.75)*
Total double support (%)	30.8 (9.18)	30.6 (8.12)	29.6 (8.89)	29.8 (8.17)
FOG – Questionnaire (0-24)	13 (6.30)	12 (5.91)	9 (5.76)*	9 (6.18)*
MDS-UPDR Part III Score	27.3 (6.65)	28.1 (5.99)	25.5 (6.53)	27.2 (6.23)

Abbreviations: SD, Standard Deviation; RAGT, Robotic Assist Gait Training; CGT, Conventional Gait Training; N10m, Number of gait during 10 meter walk; n: number; NT, Number of gait during Turning; s, seconds; cm, centimeters; steps/min, steps/minutes; MDS-UPDRS, Movement Disorder Society - Unified Parkinson's Disease Rating Scale.
* = statistically significant ($p < 0.05$).

Figure 1. A patient on a Exowalk