

뇌신경재활

게시일시 및 장소 : 10 월 18 일(금) 13:15-18:00 Room G(3F)

질의응답 일시 및 장소 : 10 월 18 일(금) 15:45-16:30 Room G(3F)

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Biometric Data Usage for Intensity Control of Robotic Rehabilitation on Stroke Patients

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OBJECTIVE

It is well known that one of the methods of stroke treatment is robotic rehabilitation, which can be of some benefit to the patient when applied to the right patient. While robotic rehabilitation is increasingly being carried out, there are few attempts to apply a patient's biometric data to robotic rehabilitation. We are trying to use a patient's biometric data and rated perceived exertion (RPE) to control the exercise intensity of robotic rehabilitation. The purpose of this study is to compare the effect of subjective judgment of the therapist only and objective patient's biometric data on the patient's functional change when applied for robotic rehabilitation.

METHODS

We included stroke patients over the age of 19, who had a gait disturbance (with a duration of more than 1 week since stroke). Patients were randomly assigned to one of two groups. In one group (case group), exercise intensity was controlled through the patient's heart rate and RPE, and the other group (control group) were adjusted for exercise intensity according to the know-how of the therapist only. In case group, the exercise intensity was raised to the next level when the patient's heart rate reserve was less than 40 percent or the borg scale was less than 12 points. All patients were instructed to perform Morning Walk[®]-assisted gait training for 20 minutes five times a week during 3 weeks, and patient's functions were evaluated during the first week and last week. We evaluated patient's functional ambulation category (FAC), modified barthel index (MBI), berg balance scale (BBS) and 10 meter walk test (10MWT).

RESULTS

A total of 16 patients were enrolled, of which 6 were in the case group using biometric data and 10 were in the control group using the subjective judgment of the therapist. There was no significant difference in participant's clinical characteristics between the two groups (table1). After robotic rehabilitation, both groups showed improvement in function evaluation. In the case group, BMI and 10MWT are significantly improved, and in the control group, MBI, BBS, and 10MWT are significantly improved (table2). However, when

comparing the functional change between the two groups after treatment, there was no statistically significant difference (table3).

CONCLUSION

In conclusion, adjusting the intensity of robotic therapy through the patient's heart rate and RPE of the patient and through the know-how of the therapist can have a positive impact on the patient's function change. In addition, when the robot intensity was adjusted using the patient's heart rate and RPE, the treatment effect was similar to that of the know-how of the therapist. These results show the possibility that one therapist can simultaneously treat many patients at robotic rehabilitation. Further research will be needed on how to apply biometric data for optimal robotic rehabilitation treatment.

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Table 1. Clinical Characteristics of Participants

		Case	Control	<i>p</i>
Mean Age		68.6 ± 13.2	60.3 ± 11.2	.12
Sex, n (%)	Male	4 (66.67)	5 (50)	
	Female	2 (33.33)	5 (50)	
Affected side	Right	2	6	
	Left	3	2	
	Both	1	2	.49
Duration from onset (days)		73.3	70.0	.56
Pathophysiology	Ischemic	4 (66.67)	7 (70)	
	Hemorrhagic	2 (33.33)	3 (30)	.96

The data are presented as mean ± standard deviation or numbers (%)

Table 2. Functional changes before and after training

	Case			Control		
	Before	After	<i>p-value</i>	Before	After	<i>p-value</i>
FAC	2.83 ± 1.33	3.33 ± 1.51	.18	4.00 ± 1.33	4.20 ± 1.40	.157
MBI	39.50 ± 24.83	59.20 ± 26.58	.043	63.30 ± 32.56	73.50 ± 34.12	.028
BBS	19.00 ± 18.06	26.50 ± 23.46	.068	35.70 ± 22.27	41.90 ± 20.72	.011
10MWT	15.16 ± 1.01	10.18 ± 5.65	.018	6.61 ± 2.79	5.68 ± 2.39	.043

p values were calculated using Wilcoxon signed rank test, $p < .05$ was considered to be statistically significant

Table 3. Comparison of functional differences between case and control group

	Case	Control	<i>p-value</i>
FAC	3.33 ± 1.51	4.20 ± 1.40	.313
MBI	59.20 ± 26.58	73.50 ± 34.12	.513
BBS	26.50 ± 23.46	41.90 ± 20.72	.142
10MWT	10.18 ± 5.65	5.68 ± 2.39	.267

p values were calculated using Mann-Whitney test, $p < .05$ was considered to be statistically significant