

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)

P 2-74

Comparison of Low versus High frequency rTMS in Cerebellar Ataxia after Brainstem Infarction

Jong Hwa Lee^{1†}, Sang Beom Kim¹, Kyeong Woo Lee¹, Min Woo Hong^{1*}

Dong-A University Hospital, Department of Rehabilitation Medicine¹

Background

Cerebellar ataxia is one of the most common symptoms in patients of brainstem infarction. Recently, many researchers have demonstrated the effects of repetitive transcranial magnetic stimulation (rTMS) over the cerebellum in patients with ataxia after brainstem infarction. Because efferent pathways from the cerebellum are connected with both excitatory and inhibitory neurons in the motor cortex, it is difficult to predict whether the modulation of cerebello-cerebral inhibition would increase or decrease the excitability of the motor cortex. Thus, many controversies exist regarding the proper frequency to be applied. Previous studies demonstrated that low-frequency rTMS over the cerebellum has beneficial effects in ataxic patients with brainstem infarction. Thus, we developed two different protocols, low- and high-frequency rTMS. The aim of this study is to compare the effect of low- and high-frequency rTMS on ataxic patients with brainstem infarction.

Method

We enrolled patients who were confirmed as acute brainstem infarction by magnetic resonance imaging with symptoms of cerebellar ataxia. All patients were randomly assigned to the low-frequency rTMS group (LF) or the high-frequency rTMS group (HF). The coil was placed 2 centimeters below the inion and 2 centimeters lateral to the midline on the cerebellar hemisphere ipsilateral to the ataxic side, targeting on the posterior cerebellar lobe. Both groups received a session of rTMS that comprised 900 stimuli for 10 days. The intensity of stimuli was 100% of patient's resting motor threshold at both groups. The frequency of LF was 1 Hz and that of HF was 10 Hz. Before the first intervention and after the last intervention, patients were evaluated using Berg Balance Scale (BBS), 10 meter walk test (10MWT), Modified Rankin Scale (MRS), Functional Ambulation Category (FAC), Modified Barthel Index (MBI), and Scale for the Assessment and Rating of Ataxia (SARA).

Results

Eight patients were recruited in each group. There were no significant differences in the baseline characteristics and initial measurements between two groups (Table 1). After the treatment, both groups showed significant improvements in BBS, 10MWT, FAC, SARA. MBI

was improved only in HF. There were no significant differences in change of any measurements between the two groups (Table 3).

Conclusion

In this study, we found the therapeutic effects of low- and high-frequency rTMS on ataxic patients with brainstem infarction. We found that both low- and high-frequency rTMS protocols had positive effects on patient's recovery. And the result showed no superiority between two protocols.

Table 1. Baseline characteristics of two groups

	LF (n=8)	HF (n=8)	p-value
Age	63.71±10.14	62.43±12.27	0.903
Side of involvement			
Rt.	5	4	
Lt.	3	4	
BBS	35.86±11.43	30.57±12.99	0.303
10MWT time	18.29±9.50	15.57±4.44	0.603
10MWT number of steps	22.43±4.69	20.71±3.65	0.516
10MWT step length	0.46±0.09	0.50±0.08	0.516
MRS	2.00±0.93	1.86±0.83	0.838
FAC	2.71±0.70	2.71±0.45	0.656
MBI	83.00±20.23	91.00±4.17	0.747
SARA	8.79±2.78	8.21±2.93	0.902

Values are presented as mean±standard deviation.

LF, low-frequency rTMS group; HF, high energy rTMS group; BBS, Berg Balance Scale; 10MWT, 10 meter walk test; MRS, Modified Rankin Scale; FAC, Functional Ambulation Category; MBI, Modified Barthel Index; SARA, Scale for the Assessment and Rating of Ataxia

*p<0.05 by Mann-Whitney U test

Table 2. Change of measurements after treatment

	LF (n=8)			HF (n=8)		
	Pre	Post	p-value	Pre	Post	p-value
BBS	35.86±11.43	43.57±9.96	0.017*	30.57±12.99	38.57±13.53	0.018*
10MWT time	18.29±9.50	15.86±6.51	0.040*	15.57±4.44	13.57±5.01	0.017*
10MWT number of steps	22.43±4.69	19.86±4.61	0.041*	20.71±3.65	19.29±4.10	0.042*
10MWT step length	0.46±0.09	0.53±0.11	0.041*	0.50±0.08	0.54±0.10	0.046*
MRS	2.00±0.93	1.57±0.73	0.180	1.86±0.83	1.43±0.49	0.083
FAC	2.71±0.70	4.29±1.03	0.025*	2.71±0.45	4.14±1.36	0.015*
MBI	83.00±20.23	87.43±16.27	0.066	91.00±4.17	93.00±4.17	0.043*
SARA	8.79±2.78	5.36±2.40	0.018*	8.21±2.93	6.00±2.90	0.018*

Values are presented as mean±standard deviation.

LF, low-frequency rTMS group; HF, high energy rTMS group; BBS, Berg Balance Scale; 10MWT, 10 meter walk test; MRS, Modified Rankin Scale; FAC, Functional Ambulation Category; MBI, Modified Barthel Index; SARA, Scale for the Assessment and Rating of Ataxia

*p<0.05 by Wilcoxon signed rank test

Table 3. Changes of Measurements between two groups

	LF (n=8)	HF (n=8)	p-value
BBS	7.71±5.99	8.00±5.83	0.600
10MWT time	-2.43±5.12	-2.00±1.60	0.894
10MWT number of steps	-2.57±1.84	-1.43±1.18	0.241
10MWT step length	0.07±0.06	0.04±0.05	0.477
MRS	-0.43±0.49	-0.43±0.73	0.830
FAC	1.57±0.49	1.43±0.90	0.940
MBI	4.43±4.66	2.00±2.78	0.383
SARA	-3.43±1.74	-2.21±1.91	0.259

Values are presented as mean±standard deviation.

LF, low-frequency rTMS group; HF, high energy rTMS group; BBS, Berg Balance Scale; 10MWT, 10 meter walk test; MRS, Modified Rankin Scale; FAC, Functional Ambulation Category; MBI, Modified Barthel Index; SARA, Scale for the Assessment and Rating of Ataxia

*p<0.05 by Wilcoxon signed rank test