Clinical Observation on the Effect of Electroacupuncture Combined with Repetitive Transcranial Magnetic Stimulation at Different Frequencies on Visuospatial Ability in Patients with Post-stroke Cognitive Impairment

Chen Yu
Taihe Hospital, Shiyan ,China

Abstract: To observe the effect of electroacupuncture combined with repetitive transcranial magnetic stimulation (rTMS) at different frequencies on visuospatial ability in patients with post-stroke cognitive impairment (PSCI). A total of 92 patients with PSCI in our hospital from May 2024 to October 2025 were randomly divided into two groups. The control group (46 cases) received routine treatment, and the observation group (46 cases) received electroacupuncture combined with rTMS at different frequencies. Cognitive function and visuospatial ability were compared between the two groups. After treatment, cognitive function in the observation group was higher than that in the control group (P<0.05). Visuospatial ability in the observation group was higher than that in the control group (P<0.05). On the basis of basic treatment, electroacupuncture combined with rTMS at different frequencies can improve cognitive function and visuospatial ability in patients with PSCI, which is conducive to patient recovery.

Keywords: Electroacupuncture; Repetitive Transcranial Magnetic Stimulation at Different Frequencies; Stroke; Cognitive Impairment; Visuospatial Ability

1. Introduction

Stroke is a common clinical cerebrovascular disease with high risk, which may even endanger patients' lives. Affected by ischemia and hypoxia of brain tissue and nervous system, patients are prone to different types of dysfunction, among which cognitive impairment is a common type that directly affects patients' prognosis[1-2]. Electroacupuncture is a common treatment for patients with PSCI, which can induce resuscitation, activate blood circulation and unblock collaterals, and promote patient recovery. Repetitive transcranial magnetic stimulation at different frequencies improves cerebral metabolism and helps restore the function of damaged nervous system by stimulating the cerebral cortex[3-4]. This study mainly observed the specific effect of the above two treatment regimens in patients with PSCI.

2. Materials and Methods

2.1 General Data

A total of 92 patients with PSCI in our hospital from May 2024 to October 2025 were randomly divided into two groups. The control group (46 cases) received routine treatment, and the observation group (46 cases) received electroacupuncture combined with rTMS at different frequencies. In the control group, there were 25 males and 21 females, aged 62–77 years, with a mean age of (65.45±1.58) years. In the observation group, there were 24 males and 22 females, aged 60–79 years, with a mean age of (63.15±1.38) years. There was no significant difference in baseline data between the two groups (P>0.05).

2.2 Methods

Both groups received basic treatment, including improving cerebral circulation and nourishing brain cells. The control group received additional electroacupuncture on the basis of basic treatment. The selected acupoints included Quchi (LI11), Fengchi (GB20), Sishencong (EX-HN1), Shenting (GV24) and Baihui (GV20). Routine disposable sterile acupuncture needles with a specification of 0.30 mm×40.00 mm were used. The insertion depth was 0.5–0.8 cun. After Deqi, the needles were connected to a low-frequency electromagnetic pulse therapeutic apparatus with a frequency of 120 times/min, 30 minutes per session, once a day. The

observation group received additional rTMS at different frequencies on the basis of the control group treatment. Patients were instructed to maintain a supine position, and the transcranial magnetic stimulation therapeutic apparatus was accurately connected. The surface of the skull was ensured to be tangent to the stimulation coil, and the motor threshold was measured. During treatment, the stimulation intensity was set at 80% of the motor threshold, and the frequencies were set at 10 Hz, 15 Hz and 20 Hz respectively, 10 minutes for each frequency, once a day. Both groups were treated continuously for 4 weeks.

2.3 Observation Indicators

(1) Cognitive function assessment. The Mini-Mental State Examination (MMSE) was used to analyze the changes of cognitive function before treatment, 2 weeks and 4 weeks after treatment. The attending physician evaluated patients' attention, memory, time and place orientation according to the scale. The score ranged from 0 to 30, and a higher score indicated better recovery of cognitive function.

(2) Visuospatial ability comparison. The Clock Drawing Test (CDT) was used to evaluate patients' visuospatial ability. Patients were instructed to draw a clock face on white paper with their unaffected hand and mark the numbers accurately. Nurses instructed patients to draw any time at will, such as 10:30. A 4-point scoring system was adopted: 1 point for correct clock shape, 1 point for correct 12 numbers, 1 point for correct number positions, and 1 point for correct hand positions. A higher score indicated better visuospatial ability.

2.4 Statistical Methods

SPSS 26.0 software was used for data analysis. Measurement data (NDI score, symptom score, etc.) were expressed as mean ± standard deviation ($\bar{x}\pm s$) and analyzed by t-test. Enumeration data were expressed as percentage (%) and analyzed by chi-square test. A P-value <0.05 was considered statistically significant.

3. Results

3.1 Cognitive Function Assessment

According to MMSE scores, the observation group had higher scores at 2 weeks and 4 weeks after treatment than the control group ($P<0.05$), as shown in Table 1.

Table 1. Comparison of Cognitive Function Assessment Between the Two Groups ($\bar{x}\pm s$)

Group	Number of Cases	Before treatment	2 weeks after treatment	4 weeks after treatment
Observation	46	10.52±2.33	18.52±1.15	22.68±1.35
Control	46	10.68±2.15	14.05±1.26	17.15±1.41
t	-	1.455	20.205	24.422
P	-	0.256	<0.001	<0.001

3.2 Visuospatial Ability Comparison

After treatment, visuospatial ability in the observation group was higher than that in the control group ($P<0.05$), as shown in Table 2.

Table 2. Comparison of Visuospatial Ability Between the Two Groups ($\bar{x}\pm s$)

Group	Number of Cases	Before treatment	2 weeks after treatment	4 weeks after treatment
Observation	46	1.55±0.22	2.66±0.31	3.11±0.21
Control	46	1.54±0.18	1.86±0.25	2.34±0.34
t	-	1.868	13.345	18.311
P	-	0.685	<0.001	<0.001

4. Discussion

Cognitive impairment is a common sequela after stroke, mainly caused by ischemia and hypoxia of brain tissue and nervous system due to stenosis and occlusion of cerebral arteries, which directly affects patients' prognosis. Effective treatment regimens should be adopted to help restore damaged cognitive function in the treatment of patients with PSCI[5-6].

Repetitive transcranial magnetic stimulation at different frequencies is widely used in the treatment of these patients. It stimulates the cerebral cortex with pulses of different frequencies to enhance cortical excitability and restore the function of damaged cortex. Electromagnetic pulses can penetrate the skull to stimulate deep remote cortex and neurons, promoting the repair of damaged neurites[7]. It also antagonizes oxidative stress in patients, inhibits the expression of inflammatory factors, and protects nerve cell function. According to

traditional Chinese medicine theory, PSCI is related to disorder of six spirits, malnutrition of brain marrow and unsmooth qi and blood. Electroacupuncture stimulation at Quchi, Fengchi, Sishencong, Shenting and Baihui can tranquilize the mind, induce resuscitation, nourish the spirit, improve intelligence, promote blood circulation and regulate qi, and promote the repair of cranial nerves. In this study, cognitive function and visuospatial ability in the observation group were significantly improved after treatment, indicating that the combined treatment can help restore patients' cognitive function. The two treatments have different mechanisms in promoting the recovery of PSCI, and their combined use can produce a synergistic therapeutic effect, promote the recovery of damaged nerve function and improve patients' visuospatial ability.

In conclusion, on the basis of basic treatment, electroacupuncture combined with rTMS at different frequencies can be applied in the treatment of patients with PSCI to help restore cognitive function and improve visuospatial ability.

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References

[1] Fang Y Y, Sun M M. Effect of high-frequency repetitive transcranial magnetic stimulation combined with routine rehabilitation training on post-stroke cognitive impairment with dysphagia[J]. Chinese Medical Innovation, 2025, 22(36): 28-32.

[2] Chen Y S, Qiu J Y, Liu Q J, et al. Effect analysis of cognitive rehabilitation combined with transcranial magnetic stimulation in the treatment of patients with post-stroke cognitive impairment[J]. Chinese Journal of Typical Cases, 2025, 19(04): 412-416.

[3] Xu L L. Clinical effect of Xingnao Kaiqiao acupuncture combined with repetitive transcranial magnetic stimulation in the treatment of post-stroke cognitive impairment[J]. Clinical Research and Practice, 2025, 10(25): 147-150.

[4] Chen S Q, Zhang G W, Lin D Y, et al. Clinical study on Tongdu Xingshen acupuncture combined with repetitive transcranial magnetic stimulation in the treatment of post-stroke cognitive impairment[J]. New Journal of Traditional Chinese Medicine, 2025, 57(15): 151-156.

[5] Xu Q B. Effect of repetitive transcranial magnetic stimulation on cerebral blood circulation and cognitive function in patients with mild post-stroke cognitive impairment[J]. Journal of Practical Laboratory Medicine, 2025, 17(02): 106-109.

[6] Song X X, Gu X D, Fu J M, et al. Research progress of repetitive transcranial magnetic stimulation in the treatment of post-stroke cognitive impairment[J]. Zhejiang Medical Journal, 2025, 47(09): 1003-1008.

[7] Zhang X M, Wang J, Sun J, et al. Clinical observation of Baihui long-retained needle combined with low-frequency repetitive transcranial magnetic stimulation in the treatment of cognitive impairment after ischemic stroke[J]. Journal of Anhui University of Chinese Medicine, 2025, 44(06): 55-59.

