

The Effect of Neuromuscular Electrical Stimulation in Treatment of Acute Cerebral Infarction with Dysphagia and Psychological Disorder

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ABSTRACT

Objective: To explore the effect of neuromuscular electrical stimulation in treatment of acute cerebral infarction with dysphagia and psychological disorder. **Methods:** 78 cases of patients with acute cerebral infarction with dysphagia and psychological disorder were selected and randomly divided into two groups. Control group were treated with conventional drug treatment and swallowing training while neuromuscular electrical stimulation was used to additionally treat the experimental group. Profile of Mood States (Poms) and Robson self-esteem questionnaire (RSEQ-30) scores were used to evaluate the effect of neuromuscular electrical stimulation in the two groups before and after treatment. **Results:** In control group, both Poms and RSEQ-30 scores were not significant different before treatment. In experimental group, Poms and RSEQ-30 scores were significantly lower and higher than before treatment ($P < 0.05$), respectively. Similarly, after treatment, Poms and RSEQ-30 scores in the experimental group were significantly lower and higher than control group ($P < 0.05$), respectively. **Conclusion:** Neuromuscular electrical stimulation in treatment of acute cerebral infarction with dysphagia and psychological disorder could eliminate the patient's psychological barriers and improve their quality of life.

0 Introduction

Dysphagia is one of nervous system complications that are most frequently seen in patients with acute stroke, with the probability of incidence varied from 19% to 81%. It has a severe impact on patients' physical rehabilitation and quality of life and even causes psychological disorders like mental pain and depression^[1]. Therefore, it is very necessary to treat dysphagia and psycho-

logical disorder in patients with cerebral infarction. Currently, as, for neuromuscular electrical stimulation (NMES), a new behavioral therapy method, its curative effect and safety for dysphagia have been proved in many studies. However, there are fewer researches on its curative effect on psychological disorders in patients with acute cerebral infarction^[2]. In this study, 78 patients with acute cerebral infarction with dysphagia and psychological disorder admitted to our hospital were

recruited and curative effects of neuromuscular electrical stimulation on acute cerebral infarction with dysphagia and psychological disorder were discussed.

1 Materials and methods

1.1 Clinical materials

78 cases with acute cerebral infarction with dysphagia and psychological disorders receiving treatment in our hospital from January 2014 to June 2015 were recruited. Their diagnosis was in line with the diagnosis standards for acute cerebral infarction adopted by the Fourth National Cerebrovascular Diseases Conference^[3] and confirmed through combination with CT or MRI exams. All 78 cases had swallowing disorders like dysphagia and drinking bucking and were assessed by the Watian drinking water test as Grade III,IV, and^[4]. All patients experienced experience a first episode. Patients, which have other nervous system damage, obvious language disorders, a history of mental illness and mental retardation, were excluded. All patients manifested clear mind could accurately answer the question and signed the Patient Consent Form. Out of 78 cases, there were 48 male patients and 30 female patients, aged 60-82 years and having a median age of 78.9 ± 3.5 years. These 78 cases were randomly divided into a control group and an experimental group. The control group had 36 patients: 23 males, 13 females, with a median age of 77.3 ± 4.2 years; 24 cases of solitary lesions, 12 cases of multiple lesions, 28 patients with hypertension, 15 patients with hyperlipidemia and 8 patients with diabetes; and the experimental group had 42 patients: 28 males, 14 females, with a median age of 78.4 ± 4.1 years; 30 cases of solitary lesions, 12 cases of multiple lesions, 35 patients with hypertension, 22 patients with hyperlipidemia and 8 patients with diabetes. By comparison, there was no significant difference in age distribution, sex composition and condition levels between both groups (all $P > 0.05$).

1.2 Method

Psychological tests were performed using Profile of Mood States (Poms) and Robson self-esteem questionnaire (RSEQ-30) on the two groups of patients before and after treatment. Conventional drug therapy and swallowing training were applied to the control group and neuromuscular electrical stimulation was and additional treatment for the experimental group.

1.2.1 In swallowing training, all patients were instructed and trained by the same therapist. The method had included the following procedures. The oral lip, cheeks,

tongue, posterior pharyngeal wall and palatopharyngeal arch of the patients was rubbed gently by the therapist with his/her finger soaked in ice water or a frozen cotton stick dipped in water. Patients were also advised to make air swallowing actions and performed repeated stimulation and exercise swallowing reflex of the patients, all of which could provide the patients with a strong swallowing ability.

1.2.2 A neuromuscular electric stimulation therapy unit (produced by Guangzhou Sunjava Medical Information Industry Co., Ltd.) was used in neuromuscular electric stimulation therapy. After the electrodes were adhered and fixed, the wave width was adjusted to 800 ms and the strength to 28 mA, with a therapy interval of 3 s, 20 min a time, one time a day, a 20-day course of therapy, a total of 2 courses, and a two-day interval between courses.

1.3 Double-blind methods were used for observational indexes

Psychological tests were performed by professional psychological doctors using a psychological tester (produced by Shanghai Weilian Chinese Medical Product Co., Ltd.). The test contents included: ① Profile of Mood States (Poms): composed of six items T-tension – anxiety, D-depression-dejection, A-anger-hostility, V-vitality-initiative, F-fatigue-weakness, C-confusion-dizziness, and total scores; ② Robson self-esteem questionnaire (RSEQ-30): comprising seven items Sig-single, Wor-worthiness, A/S- Appearance/social acceptance, R/D-recovery ability /stability, Com-competition, CPD-Autonomy, Val-value, and total score.

1.4 Statistical methods: Analysis of all data was carried out using SPSS13.0.

The metering data was represented as mean + deviation ($\bar{x} \pm s$). t-tests were adopted in comparison of intra-group differences while inspection and analysis were performed on the count data using χ^2 examinations. $P < 0.05$ means the differences were statistically significant.

2 Results

2.1 Comparison of Poms scores for the two groups of patients before and after treatment

Statistical analysis and comparison were conducted on Poms scores for the two groups of patients before and after treatment. For the control group, only two item T-

tension – anxiety and F-fatigue-weakness after treatment were significantly lower than before treatment ($P < 0.05$). There was no significant difference between the remaining indexes. For the experimental group, T-tension – anxiety, A-anger-hostility, V-vitality-initiative, F-fatigue-weakness and total scores after treatment

were remarkably lower than before treatment ($P < 0.05$). The two groups were compared after treatment and T-tension–anxiety, A-anger-hostility, V-vitality-initiative, F-fatigue-weakness and total scores in the experimental group were notably lower than in the control group, with the results as shown in Table 1.

Table1 Comparison of Poms scores for the two groups of patients before and after treatment ($\bar{x} \pm s$, scores)

Category of group (Number of cases)	T-tension– anxiety	D-depres- sion-dejec- tion	A-anger- hostility	V-vitality- initiative	F-fatigue- weakness	C-confu- sion-dizzi- ness	Total scores
Control group (36)							
Before treatment	11.27±3.78*	11.32±7.15	13.79±5.47	13.08±5.45	9.37±3.92*	7.27±3.65	65.23±28.02
After treatment	9.32±3.41	11.20±6.72	13.17±5.98	12.75±5.08	8.96±3.81	6.98±3.43	64.97±27.97
Experimental group (42)							
Before treatment	11.18±3.91*	11.07±7.38	13.46±5.60*	13.10±5.83*	9.42±4.08*	7.22±3.72	64.86±27.76*
After treatment	7.27±3.43	10.49±7.25	9.78±5.27	9.63±5.81	6.23±4.75	6.64±3.87	51.17±25.46
t	2.638	0.446	2.661	2.504	2.768	0.407	2.280
P	0.010	0.657	0.009	0.014	0.007	0.685	0.025

Note: t value and P value are the comparative results of the control and experimental groups; * comparison of pre-treatment and post-treatment and their differences were statistically significant ($P < 0.05$).

2.2 Comparison of RSEQ-30 scores for the two groups of patients before and after treatment

RSEQ-30 scores were compared between the two groups of patients before and after treatment. In control group, only Val-value after treatment was obviously higher than before treatment ($P < 0.05$). Similar to Poms scores, the remaining indexes were not significantly different. In experimental group, Sig-single, Wor-worthiness, A/S- Ap-

pearance/social acceptance, R/D-recovery ability /stability, Com-competition, CPD-Autonomy, Val-value and total scores after treatment were remarkably higher compared to those before treatment ($P < 0.05$). The two groups were compared after treatment. Interestingly, Sig-single, Wor-worthiness, A/S- Appearance/social acceptance, R/D-recovery ability/stability, Com-competition, CPD-Autonomy and total scores in the experimental group were notably higher than control group (Table 2).

Table2 Comparison of RSEQ-30 scores for the two groups of patients before and after treatment ($\bar{x} \pm s$, scores)

Category of group (Number of cases)	Sig-single	Wor-worthi- ness	A/S- Ap- pearance/so- cial ac- ceptance	R/D-recov- ery ability /stability	Com-com- petition	CPD-Au- tonomy	Val-value	Total scores
Control group (36)								
Before treat- ment	17.32 ±4.15	16.27±5.71	16.51±3.65	17.54±5.86	15.48±5.12	15.92±4.67	9.13±2.85*	111.76±20.48
After treat- ment	17.61 ±4.72	16.35±5.42	16.90±3.81	18.06±5.49	15.67±5.08	16.17±4.45	9.92±8.79	112.36±19.48
Experimental group (42)								

Before treatment	17.36 ±4.20	16.12±5.42*	16.68±3.70*	17.62±5.47*	15.52±5.14*	15.97±4.92*	9.01±2.95*	112.42±21.78*	
After treatment	20.20 ±4.08	18.76±4.85	19.14±3.94	20.78±5.38	19.01±4.79	18.36±3.80	9.98±3.67	122.06±20.18	
t	-	-2.072	-2.541	-2.205	-2.985	-2.345	-0.040	-2.150	
P	2.600	0.011	0.042	0.013	0.030	0.004	0.022	0.968	0.035

group; * comparison of pre-treatment and post-treatment and their differences are statistically significant (P<0.05).

3 Discussion

Dysphagia is one of complications commonly seen in patients with cerebral infarction and a common symptom in patients with cerebral infarction combined with pseudo bulbar palsy. The latter disease results from bilateral corticobulbar (or corticonuclear) tract damage and is embodied in incomplete paralysis or paralysis of the muscle supported by the medulla oblongata and difficulty in the movement of lingualis, soft palate, pharynx and larynx, leading to deglutition disorders, voice disorders and speech and language impairment^[5]. According to incomplete figures, 19%-81% of patients with cerebral infarction experienced dysphagia^[1]. Many studies have suggested that the probability to have pneumonia in patients with cerebral infarction with dysphagia is three time higher than those without dysphagia^[6]. Furthermore, Dysphagia has severe influences on the quality of life of patients.

Neuromuscular electrical stimulation for the treatment of Dysphagia was firstly applied and proposed by Park and now is a commonly used therapy means to treat dysphagia^[7-8]. By inputting specific low-frequency pulse simulation to the nerves and muscles of the larynx and the neck, neuromuscular electrical stimulation excites the swallowing muscle group and nerves. This action promotes the movement of the swallowing muscle group and allows for restoration and reconstruction of swallowing reflex arcs, thus improving dysphagia symptom^[8-10]. Patients with cerebral infarction have psychological disorders. Many studies have suggested that the incidence rate of psychological orders in these patients reaches up to 100%^[11]. As dysphagia may cause inconveniences and pains in the life of patients and it is recovered very slowly, usually having a profoundly adverse psychological impact on patients. Therefore, improving dysphagia in patients as soon as possible can have a great significance in the elimination of psychological disorders in patients with cerebral infarction and improvement of patients' quality life.

In this study, 118 patients with cerebral infarction associated with dysphagia and psychological disorders ad-

mitted in our hospital were recruited to discuss the curative effect of neuromuscular electrical stimulation on acute cerebral infarction with dysphagia and psychological disorder. The results showed that Poms scores and RSEQ-30 scores before and after treatment were not significantly different with the control group that did not have neuromuscular electrical stimulation. Interestingly, tension – anxiety, anger-hostility, V-vitality-initiative, F-fatigue-weakness and total Poms scores were notable lower after treatment than before treatment in the experimental group. While Sig-single, Wor-worthiness, A/S- Appearance/social acceptance, R/D-recovery ability /stability, Com-competition, CPD-Autonomy, Val-value, and total RSEQ-30 scores after treatment were remarkably higher than before treatment. Besides, Poms scores after treatment were notably lower than the control group, and the RSEQ-30 scores were remarkably higher than the control group. These results demonstrated that the treatment of dysphagia with neuromuscular electrical stimulation contributed to eliminating psychological disorders in patients. By simulating the swallowing muscles with current, neuromuscular electrical stimulation improved the coordination of swallowing muscle groups of patients and allowed for certain restoration of swallowing functions of patients. Such restoration can radioactively simulate the central nervous system, thus making patients consciously enhance training and further strengthen the confidence of patients in treatment and increase positivity in training^[12].

In conclusion, patients with cerebral infarction associated with dysphagia treated with neuromuscular electrical stimulation is able to eliminate psychological disorders in patients, thus increasing patients' compliance with treatment, the confidence and positivity of patients in treatment. All these further improve dysphagia in patients and significantly increases the quality of life, thus it is worth of clinical promotion.

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