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RESEARCH ARTICLE

Scalp-cluster acupuncture with electrical stimulation can improve motor and living ability in convalescent patients with post-stroke hemiplegia

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Abstract

OBJECTIVE: To determine whether patients with post-stroke hemiplegia could benefit from long-term treatment with scalp cluster (SC) acupuncture combined with electrical stimulation (ES) and to evaluate the feasibility of this treatment to improve motor and living abilities.

METHODS: Twenty patients were enrolled and divided into two groups: SC acupuncture and SC acupuncture with ES (SC and SC + ES, respectively). All participants also received rehabilitation training. All participants were blindly evaluated using the Fugl-Meyer assessment scale for motor ability, the modified Barthel Index for living ability, and a scale for the degree of neurological deficits. Outcome was assessed at three points before randomized grouping, at the beginning or treatment, and after 4 weeks of treatment.

RESULTS: Following 4 weeks treatment, all the patients exhibited significant improvements in aspects of motor ability, living ability, and the severity of neurological deficits. The experimental group (SC + ES) scored higher on the Fugl-Meyer assessment scale (68 ± 12) and the modified Barthel Index (49 ± 9) than the control (SC) group (50 ± 13, 36 ± 13, respectively).

CONCLUSION: When patients with post-stroke hemiplegia are treated using SC acupuncture with ES, motor and living ability can improve more than if they were treated with SC acupuncture alone.

Keywords: Stroke; Rehabilitation; Hemiplegia; Electrical stimulation; Scalp cluster acupuncture

INTRODUCTION

Cerebral stroke is common across the globe and leads to a wide range of disabilities.[1] Hemiplegia is one of the most common complications following stroke. It often causes motor impairment, which is a major reason for reduced activities of daily life and socialization.[2] Various physical therapies have been used in patients with post-stroke hemiplegia to improve their motor ability and daily living. However, the outcomes for some patients with hemiplegia are not satisfactory.

Acupuncture has been used to treat several chronic diseases, including chronic pain,[3] weight management,[4] functional dyspepsia,[5] and especially hemiplegia.[6-9] Reports show that acupuncture can improve post-stroke depression,[10] and that scalp-cluster (SC) acupuncture is more effective than traditional scalp acupuncture in

treating patients with post-stroke hemiplegia.[11,12] However, this method requires keeping needles in patients' scalp acupoints repeatedly over several months. Additionally, it can result in complications such as skin edema and pain, which might force some patients to discontinue treatment.

Electrical acupuncture is an improved method that stimulates acupoints by passing a certain frequency electrical current through needles. Compared with the traditional needle-twirling method, stimulation frequency in electrical acupuncture is higher, which results in stronger stimulation of the acupoints. In theory, electrical acupuncture might be more effective than traditional acupuncture, which would shorten the duration of treatment and decrease complications that result from long-term acupuncture. To our knowledge, there have not been any similar studies that examined the effect of SC acupuncture combined electrical stimulation in treatment of convalescent patients with post-stroke hemiplegia.

Here, the aim of this study was to determine whether SC acupuncture combined with ES is more effective than SC acupuncture alone in the treatment of patients with post-stroke hemiplegia.

METHODS

Participants

This was a blinded randomized controlled trial (RCT) that aimed to determine whether SC acupuncture combined with electrical stimulation (ES) was more effective than SC acupuncture alone in treating post-stroke hemiplegia. All patients were diagnosed with cerebral stroke according with the diagnostic criteria for hemorrhagic stroke in "Diagnostic Essentials of Cerebrovascular Diseases" revised by the Chinese Fourth Conference on Cerebrovascular Disease of the Chinese Medical Association in 1995.[13] Patients with post-stroke hemiplegia, hospitalized in the department of rehabilitation at the Second Hospital of Shandong University from January 2013 to December 2015, were enrolled with the following inclusion criteria: (a) the diagnosis of stroke was confirmed by CT or MRI of the head; (b) the diagnosis met the criteria outlined in "stroke syndrome diagnostic criteria (Trial)", established in 1994 by the acute encephalopathy research group of the State Administration of Traditional Chinese Medicine of the P. R.C;[14] (c) timing was ≥ 2 weeks and ≤ 3 months after stroke, and hemiplegia presented on their affected sides; (d) they were at the stable stage of the disease and with clear consciousness; (e) the severity of neurological deficits was at least 10. These scores were determined according to "The scoring criteria of degree of clinical neurological deficits for patients with cerebral stroke (1995)" established in 1995 by the Chinese Fourth Conference on Cerebrovascular Disease of the Chinese Medical Association.[15] Exclusion criteria were: (a) unconsciousness; (b) medically unstable; (c) uncontrolled seizures (> 1 per week for the last 2 months); (d) severely impaired communication or cognition; (e) other confounding neurological conditions affecting the rehabilitation training; (f) other medical issues affecting the rehabilitation training or acupuncture therapy.

The study was conducted at the rehabilitation department of an urban general hospital in China and approved by the ethics committee of the Second Hospital of Shandong University. The research was conducted in accordance with the Declaration of the World Medical Association. All participants were informed about the study and signed the informed consent to agree that their data could be used for research purposes. All participants were numbered sequentially according to the order of enrollment and then divided into the control (SC) and experimental (SC + ES) groups using a randomized digital table.

Interventions

All participants received rehabilitation training. Those randomized to the control group received SC acupuncture and those entering the experimental group received SC acupuncture combined with ES.

Selection of the therapeutic acupoints followed the following principles. According to the method developed by Yu Zhishun, the surface of the scalp was divided into seven sections: (a) parietal area: the line from Baihui (GV 20) to Qianding (GV 21) and the bilateral parallel lines 1 and 2 inches to either side; (b) anterior parietal area: the line from Qianding (GV 21) to Xinhui (GV 22) and the bilateral parallel lines 1 and 2 inches to either side; (c) frontal area: the line from Xinhui (GV 22) to Shenting (GV 24) and the bilateral parallel lines 1 and 2 inches to either side; (d) occipital area: the line from Qiangjian (GV 18) to Naohu (GV 17) and the bilateral parallel lines 1 inch to either side; (e) suboccipital area: the lines from Naohu (GV 17) to Fengfu (GV 16) and from Yuzhen (BL 9) to Tianzhu (BL 10); (f) nuchal area: the line from Fengfu (GV 16) to Fengchi (GB 20), including five acupoints; (g) temporal area: one point 0.5 inches inferior to Touwei (ST 8), the point 0.5 inches anterior and inferior to the parietal nodule, and the line between these two points. Major acupoints, including the parietal area and the anterior parietal area were used in all patients. Additionally, adjunct acupoints were selected as follows: (a) for patients with language disorders, we selected the temporal or nuchal area; (b) for patients with visual impairment, we selected the occipital area; (c) for patients with mental impairments, we selected the frontal area; (d) for patients with dysphagia, we selected the nuchal area. Two traditional Chinese medical practitioners were asked to verify the choice and location of the selected acupoints at the beginning of each treatment.

Acupuncture therapy was given 5 times a week for 4 weeks using sterilized needles (0.40 mm × 50 mm). Three to five needles were used in each area. Needles