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Original Article

Tongue acupuncture in treatment of post-stroke dysphagia

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Abstract: Tongue acupuncture is a technique that treats illness through acupuncture applied to the tongue. This study was designed to assess its therapeutic effects in the treatment of post-stroke dysphagia. A clinical control study was conducted with randomly selected 180 patients with post-stroke dysphagia. The patients were assigned into 2 groups: 90 in the Tongue acupuncture group received tongue acupuncture on the basis of conventional medication, 90 in the conventional acupuncture group received acupuncture on the neck and wrist. Acupoints in the tongue are Juanquan (EX-HN10) (at the midpoint of dorsal raphe of the tongue) and Haiquan (EX-HN11) (Sublingual frenulum midpoint). Acupoits on the body are Fengchi (GB20) and Neiguan (PC6). The effective rate, the national institutes of health stroke scale (NIHSS), TV X-ray fluoroscopy swallowing function (VFSS), the incidence rate of pneumonia were used to evaluate the efficacy after 4 weeks treatment. The NIHSS and VFSS of tongue acupuncture group were improved significantly than that of the conventional group ($P < 0.01$, respectively). The incidence rate of pneumonia decreased ($P < 0.01$). The effective rate of the tongue acupuncture group was higher than that of conventional group (96.67% vs. 66.67%, $P < 0.01$). On the basis of the conventional medication, tongue acupuncture would effectively improve the swallow functions, decrease the neurological deficit and reduce the incidence of pneumonia in patients with post-stroke dysphagia.

Keywords: Acupuncture, tongue, dysphagia, stroke, the national institute of health stroke scale (NIHSS), television X-ray fluoroscope swallowing scale (VFSS)

Introduction

Stroke has been the leading cause of death followed by cancer and cardiac vascular events, and the incidence of post-stroke dysphagia is 14% to 71% [1-4]. Acupuncture for the stroke has been accepted by many countries including China with a long history, and been enrolled in the catalog of fundamental medical care in China for decades [5]. It is believed that the tongue acupuncture is effective in the treatment of post-stroke dysphagia [6-10] according to the ancient Chinese literature *Internal Classic* (Nei Jing). However, this belief does not have much support of well-controlled clinical trials [11-13].

Post-stroke dysphagia is neurological impotent to control the mouth, pharynx, larynx, and esophagus. The mainly clinical problems are cheek muscle tension decreased; tongue movement limited, and swallowing reflex delayed. Modern research has shown that swallowing center in the brain is located at cerebral cortex motor area bilaterally with characteristics of bilateral asymmetry distribution. When the dominant hemisphere damaged, the other side can be compensated, that makes it possible for discover a way to recover the post-stroke swallowing functions.

Current treatments for post-stroke dysphagia are symptomatic treatment, including cold stimulation, electrical stimulation, nasogastric diet, psychological care, and gastric fistula operation. However, those clinical outcomes are not exact [14]. Therefore, effective treatment for post-stroke dysphagia has become a problem to be settled urgently.

Our previous study and many Chinese literatures [6-8] about tongue acupuncture in the treatment of the stroke patients with aphasia demonstrated that tongue acupuncture is also

Table 1. Comparison of NIHSS between groups of patients with post-stroke dysphagia (mean ± s)

Group	n	Before treatment	After treatment
Tongue acupuncture	90	7.85 ± 0.63	3.33 ± 0.54*,#
Conventional acupuncture	90	7.66 ± 0.74	4.26 ± 0.59※

1. There was no statistical significance between groups before treatment, P > 0.05. 2. Before treatment *vs.* After treatment: #Tongue acupuncture, P < 0.01; ※Conventional acupuncture, P < 0.01. 3. Comparison between groups "after treatment": *Tongue acupuncture *vs.* Conventional acupuncture, P < 0.05.

Table 2. Comparison of VFSS between 2 groups of patients with post-stroke dysphagia (*mean* ± s)

Group	n	Before treatment	After treatment
Tongue acupuncture	60	4.35 ± 0.74	8.88 ± 0.93*,#
Conventional acupuncture	60	4.46 ± 0.89	6.96 ± 0.74※

1. Comparison between Before treatment and After treatment: Tongue acupuncture, #P < 0.01; Conventional Acupuncture, ※P < 0.01. 2. After treatment, t = 4.162, *P < 0.05.

effective to post-stroke dysphagia. So we performed a randomized controlled study of tongue acupuncture on the post-stroke dysphagia in this study.

Material and methods

Subjects

All the 180 patients with post-stroke dysphagia were in-patients in the author's hospitals. Those subjects were 50 to 60 years old (55.6 ± 5.8 years on average) with 96 males and 84 females. They were assigned into two groups according to the orders of their visits (December 2011 through October 2014): 90 in the tongue acupuncture group, 90 in the conventional acupuncture group.

Inclusion criteria

The inclusion criteria of stroke were based on The Criteria for the Diagnosis and Therapeutic Effects of Traditional Chinese Medicine issued by the State of Administration of TCM [15]. The vital signs were stable; and VFSS showed dysphagia.

Exclusion criteria

The patients with severe heart, liver, kidney diseases; transient ischemic attack; mental illness and bilateral cerebral hemisphere or brainstem infarction caused audio-visual organs severe disabilities were excluded from this study.

Treatment group and acupuncture

The 180 patients with post-stroke dysphagia were randomly assigned into two groups: 90 in the tongue acupuncture group, 90 in the conventional acupuncture group.

Patients in the tongue acupuncture group received acupuncture on the tongue. Acupoints in the tongue are Juanquan (EX-HN10) (at the midpoint of dorsal raphe of the tongue) and Haiquan (EX-HN11) (Sublingual frenulum midpoint). Acupoits on the body are Fengchi (GB20) and Neiguan (PC6).

Before acupuncture, 1/5000 potassium permanganate mouthwash was used to clean patient's mouth, let patient stretch tongue outside (if the tongue cannot protrude, the operator would fix the tongue outside of the mouth with gauze dressings). Routine disinfected tongue surface, chose No. 28 sterile acupuncture needle (1~1.5 inches, disposable, Suzhou medical instruments factory, Suzhou, China), rapidly into the acupoint, twisting 12 times, keep needling 1~2 minutes. The above operation was 1 time daily, 5 times a week. The clinical efficacy was evaluated after 4 weeks treatment.

The conventional acupuncture group received needling on the neck and wrist mainly reinforcing-reducing, 1 time daily, 5 times a week, and treatment of 4 weeks. The clinical efficacy was evaluated after 4 weeks treatment.

National institute of health stroke scale (NIHSS)

Neurological evaluation was performed using NIHSS before and 4 weeks after treatments. The scale is composed of 15 items, 0~42 points. 0~1 means normal or tends to be normal; 2~4 points said minor stroke; 5~15 points, said moderate stroke; 16~20 points said moderately severe stroke; more than 20 points said severe stroke. Higher scores show more serious stroke.

Table 3. Comparison of the effective rate between two groups

Group	n	Cure	Effective	Improved	Invalid	Total effective rate (%)
Tongue acupuncture	90	42	31	14	3	96.67
Conventional acupuncture	90	15	18	27	30	66.67

Chi-squire test ($\chi^2 = 4.325 > 3.841$, $P < 0.01$).

Functional assessment of post-stroke dysphagia by VFSS

VFSS was used for post-stroke dysphagia grading [16]. The patient was sitting and accepting two different concentrations barium examination. Respectively 5 ml, 20 ml 180% w/v barium thick liquid and 5 ml, 20 ml 50% w/v barium dilute liquid in the mouth, and swallow follow the operator's orders; VFSS showed the swallowing duration, and anteroposterior plus lateral swallowing images were recorded (30 frames per second). VFSS showed aspiration, silent aspiration, penetration, stranded (the piriform fossa, epiglottis valley), determinate the time through mouth, time through pharynx, evaluate the function of mouth and pharynx. The image data was analyzed by a radiologist to judge the swallowing function normal or abnormal. The score ranges 0~10 points, 10 points indicate normal swallowing function. The lower score means more serious swallowing dysfunction.

Incidence rate of pneumonia

The chest X-ray film was assessed by a radiologist. The incidence rate of pneumonia was calculated.

Statistical analysis

The descriptive statistical analysis was performed and the results were presented as $\overline{x} \pm s$. The differences between groups were analyzed with repeated-measures analysis of variance (MANOVA). The *chi-squire* test was used for analyzing the enumeration data. The *Ridit* analysis was performed for the ranked data. α level of the analysis was set to 0.05 to determine statistical significance. All the statistical tests are 2-sided.

Results

General conditions of the patients

The general conditions of the patients before treatment were comparable in age and course (t-test, $P > 0.05$ respectively), sex (χ^2-test, $P > 0.05$). The average NIHSS was 7-16 (8.04 ± 0.75), also comparable between groups (t-test, $P > 0.05$).

Comparison of neurological recovery

Comparison of NIHSS between 2 groups of patients "before treatment" showed no statistical significance (**Table 1**, $P > 0.05$); this demonstrated that the conditions of two groups were comparable. NIHSS score "after treatment" was significantly lower than that "before treatment" ($P < 0.05$ respectively); In the Conventional acupuncture group, the NIHSS decreased significantly after the treatment, this suggested that conventional acupuncture could partially decrease the neurological injury, or that was a natural duration (data not shown in this study) or by the medication, so the conventional acupuncture group was the control group of this study.

Comparison between groups "after treatment", tongue acupuncture group was obviously lower than that of conventional group ($P < 0.05$). This suggested Tongue acupuncture as a special acupuncture could decrease the neurological injury.

Comparison of VFSS score

Before treatment VFSS score comparison had no statistical significance (**Table 2**, $P > 0.05$), that indicated that the conditions of two groups were comparable. The overall average Ridit value were not equal or not all equal ($P < 0.01$). Further comparing using multiple samples of rank sum test (Kruskal Wallis method), showed that VFSS scores were obviously improved after treatment ($P < 0.05$ respectively).

Comparison of the incidence rate of pneumonia

The pneumonia incidence in tongue acupuncture group was 3/90 (3.3%), significantly lower than that of conventional acupuncture group (8/90, 8.9%) ($P < 0.05$).

Comparison of the effective rate

The result of the effective rate is displayed in **Table 3**. For the tongue acupuncture group, 87 of 90 the patients responded to the treatment with the total effective rate of 96.67%. For the

conventional acupuncture group, 60 of 90 the patients responded to the treatment with the total effective rate of 66.67%. There were significant differences between two groups (*chi-squire* test) ($P < 0.01$). These results showed that the tongue acupuncture was more effective than the conventional acupuncture in the treatment of post-stroke dysphagia.

Discussion

Traditional Chinese medicine holds: post-stroke dysphagia is pathogenesis of blocking meridians by the wind, fire, phlegm, blood stasis. Diseases in brain are related to the spleen, kidney and the heart. Tongue is closely related to *zang-fu* organs through the channels and collaterals directly or indirectly.

Tongue acupuncture is a therapy by needling acupoint in the tongue to treat the diseases such as dysphagia, aphasia and trigeminal neuralgia. By needling tongue, the heart, spleen, kidney meridian awake brain, dredge the bullishness and finally improve the swallowing functions. Tongue acupuncture increased cerebral blood flow of ischemic brain, and decreased cerebral vascular resistance.

The present study showed that tongue acupuncture was better than the body acupuncture to regulate the brain function including the swallowing functions. Tips from this, the effects of the tongue acupuncture may depend on the regulation of the central nervous system, by adjusting the cortex, and the thalamus cortex to balance the specific conduction system and nonspecific conduction system, establish cerebral collateral circulation, improve the blood flow of the damaged parts in the brain, and rebuild the brain activity of neural circuits.

In conclusions, this study was a prospective, randomized, mono-blind control study. The results showed that tongue acupuncture was better than the conventional acupuncture in improving the recovery of neurological functions including the swallowing function in patients with post-stroke dysphagia, decreased the incidence of pneumonia. However, as a small sample study, the limitations existed, so large scale clinical trials including the double blind clinical investigations are urgently needed in order to further investigate the efficacy of the tongue acupuncture to treat post-stroke dysphagia.

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Disclosure of conflict of interest

None.

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