# Therapeutic observation of Gao's nape acupuncture plus swallowing training for pharyngeal deglutition disorder after stroke

## 高氏项针配合吞咽训练治疗卒中后咽期吞咽障碍的疗效观察

Liu Xiao-ping (刘小平)[1], Chen Fei-yu (陈飞宇)[2], Chu Jia-mei (楚佳梅)[1], Bao Ye-hua (包烨华)[1]
1 Hangzhou Hospital of Traditional Chinese Medicine, Zhejiang 310007, China
2 Dingqiao Hospital of Hangzhou, Zhejiang 310007, China

**Abstract**

**Objective**: To observe the clinical efficacy of Gao's nape acupuncture plus swallowing training in treating pharyngeal deglutition disorder after stroke.

**Methods**: One hundred patients with post-stroke pharyngeal deglutition disorder were randomized into a treatment group and a control group, with 50 cases in each group. The two groups both received routine neurological intervention. In addition, the treatment group was given Gao's nape acupuncture plus swallowing training, while the control group was intervened by swallowing training alone. After eight-week treatment, the two groups were observed in terms of the changes in repetitive saliva swallowing test (RSST), modified water swallowing test (MWST), standardized swallowing assessment (SSA) and swallowing-related quality of life (SWAL-QOL). The clinical efficacies of the two groups were also compared.

**Results**: After treatment, the RSST grading, and scores of MWST, SSA and SWAL-QOL changed significantly in both groups (*P*<0.05 or *P*<0.01). The RSST grading, and scores of MWST, SSA and SWAL-QOL in the treatment group were significantly different from those in the control group after treatment (*P*<0.05 or *P*<0.01). The total effective rate and markedly effective rate were respectively 100.0% and 72.3% in the treatment group, versus 97.9% and 34.0% in the control group. There was a significant difference in the markedly effective rate between the two groups (*P*<0.01). The difference in the clinical efficacy between the two groups was statistically significant (*P*<0.01).

**Conclusion**: Gao's nape acupuncture plus swallowing training is an effective approach for post-stroke pharyngeal deglutition disorder. Its therapeutic efficacy is more significant than that of swallowing training alone.

**Keywords**: Acupuncture Therapy; Gao's Neck Acupuncture; Stroke; Poststroke Syndrome; Pseudobulbar Palsy; Deglutition Disorders; Stroke Rehabilitation; Activities of Daily Living

【摘要】目的：观察高氏项针配合吞咽训练治疗卒中后咽期吞咽障碍的临床疗效。方法：将100例卒中后咽期吞咽障碍患者随机分为治疗组和对照组，每组50例。两组均采用常规神经内科的基础治疗，治疗组加用高氏项针针刺及吞咽训练，对照组加用单独吞咽训练。治疗8周后，观察两组反复唾液吞咽测试(RSST)分级、修订版饮水试验(MWST)评分、标准吞咽功能评分(SSA)及吞咽障碍特异性生活质量量表(SWAL-QOL)评分的变化情况，并比较两组临床疗效。结果：治疗后，两组RSST分级、MWST评分、SSA评分及SWAL-QOL评分与同组治疗前比较，差异均具有统计学意义(*P*＜0.05或*P*＜0.01)。治疗组治疗后RSST分级、MWST、SSA评分及SWAL-QOL评分与对照组比较，差异均具有统计学意义(*P*＜0.05或*P*＜0.01)。治疗组总有效率和愈显率分别为100.0%和72.3%，对照组分别为97.9%和34.0%。两组愈显率比较，差异具有统计学意义(*P*＜0.01)。两组临床疗效比较，差异具有统计学意义(*P*＜0.01)。结论：高氏项针配合吞咽训练是治疗卒中后咽期吞咽障碍的有效方法，其疗效优于单独吞咽训练。

【关键词】针刺疗法；高氏项针；中风；中风后遗症；假性延髓麻痹；吞咽障碍；中风康复；日常生活活动

【中图分类号】R246.6　　【文献标志码】A

Post-stroke deglutition disorder is a condition that occurs after a stroke, mainly manifested by inability to swallow food or choking during swallowing[1], and its incidence rate has reached 51%-73%[2]. Its complications included mental disorder, aspiration pneumonia, malnutrition, and asphyxia. Thus, this condition may bring on significant agony and a heavy financial burden[3]. Pharyngeal phase is the most crucial phase in the swallowing process, and aspiration usually occurs in this phase. Meanwhile, aspiration is a significant reason causing aspiration pneumonia[4]. It's showed that aspiration pneumonia accounts for 1/3 of

**Author**: Liu Xiao-ping, M.M., resident physician
**Corresponding Author**: Chu Jia-mei, M.D., chief physician.
E-mail: chujiamei73@163.com

pneumonia-related death in elderly patients[5]. In China, patients with pharyngeal deglutition disorder often need to receive long-term indwelling stomach tube due to a lack of effective intervention after aspiration, which will influence the prognosis and lead to a higher case fatality rate[6]. We used Gao's nape acupuncture plus swallowing training to treat 50 cases of post-stroke pharyngeal deglutition disorder, and another 50 cases treated with swallowing training alone were taken as control. The report is given as follows.

# 1 Clinical Materials

## 1.1 Diagnostic criteria

The diagnosis of pseudobulbar palsy was based on the *Symptomatology of Nervous System Diseases*[7]: ① dysphasia, dysphonia, difficulty eating; ② abnormal brainstem reflexes were positive, such as sucking reflex and palm-chin reflex; ③ affective disorders, such as forced crying and laughing; ④ disappeared soft palate reflex, weakened or normal pharyngeal reflex. Those conforming to item ① plus any of items ②-④ could be diagnosed.

## 1.2 Inclusion criteria

Conforming to the above diagnostic criteria; cerebral stroke with pseudobulbar palsy confirmed by head CT or MRI examination; disease duration within 6 months; aged 40-80 years old; deglutition disorder proved by Kubota's water swallowing test (≥level Ⅲ); conforming to pharyngeal deglutition disorder[8]; voluntarily participated in the trial and signed the informed consent form.

## 1.3 Exclusion criteria

Aged <40 or >80 years old; cerebral embolism or brainstem hemorrhage; deglutition disorders in cognition phase, preparation phase, oral phase or esophageal phase; disease duration longer than 6 months; massive cerebral infarction coupled with consciousness disorder; coupled with complete motor aphasia or sensory aphasia; diseases in pharyngeal or throat areas such as thyroid diseases, topical infection and ulcer; those with high risk of ulcer or hemorrhage; high blood pressure (>180 mmHg/120 mmHg); accompanied by severe diseases involving heart, liver, kidney, hematopoietic system or endocrine system; those unable to cooperate due to mental retardation or mental symptoms.

## 1.4 Statistical methods

All the data were processed by SPSS version 17.0. The measurement data in normal distribution were expressed as mean ± standard deviation ($\bar{x} \pm s$). Between-group comparisons were examined by two independent samples $t$-test, and intra-group comparisons were analyzed by paired $t$-test. The measurement data in abnormal distribution were expressed as [median (minimum, maximum), M (min, max)] and examined by rank-sum test. Enumeration data were analyzed by Chi-square test. Ranked data were examined by rank-sum test. $P<0.05$ was taken to indicate statistical significance.

## 1.5 General data

One hundred post-stroke pharyngeal deglutition disorder patients were recruited between June 2014 and May 2017 from the inpatients of Hangzhou Hospital of Traditional Chinese Medicine. They were randomized into a treatment group and a control group by the random number table according to their visiting sequence, with 50 cases in each group. Six patients dropped out due to exacerbation caused by a second cerebrovascular accident (three cases in the treatment group and three cases in the control group). Therefore, 94 cases were finally taken for statistical analysis. There were no significant differences in gender, age, disease duration, stroke type and number of attack between the two groups (all $P>0.05$), indicating the comparability (Table 1).

Table 1. Comparison of the general data

| Group | $n$ | Gender (case) | | Average age ($\bar{x} \pm s$, year) | Disease duration [M (min, max), day] | Type of stroke (case) | | Number of attack (case) | |
|---|---|---|---|---|---|---|---|---|---|
| | | Male | Female | | | Ischemia | Infarction | 1 | ≥2 |
| Treatment | 47 | 28 | 19 | 66.2±11.3 | 42 (1, 174) | 7 | 40 | 9 | 38 |
| Control | 47 | 26 | 21 | 65.9±10.9 | 32 (3, 158) | 5 | 42 | 12 | 35 |

# 2 Treatment Methods

## 2.1 Basic intervention

By referring to *Guidelines for the Early Management of Patients with Acute Ischemic Stroke* stipulated by American Stroke Association in April 2003, conventional Western medications were entailed, including the control of blood pressure, blood sugar and body temperature, oxygen assistance, maintenance of water-electrolyte and acid-base balance, drugs for nourishing nerves and eradicating free radicals, aspirin, cytidine diphosphate choline (CDPC), and other symptomatic treatments.

## 2.2 Control group

In addition to the basic intervention mentioned above, the control group received swallowing training.

2.2.1 Indirect approaches

Training of muscles of deglutition including cheeks and lips, etc.; to improve the strength of lips by

practicing movements such as blowing, contracting lips, and opening and closing mouth.

Holding breath and vocal training: Let the patient hold the chest still, close the glottis first and then open it suddenly, breathing out and making a sound.

Vocal cord closure training: The patient was asked to take a deep breath and hold it for 5 s, then clear his voice and pronounce 'a'. The pronunciation was repeated five times followed by breath-holding for 5 s. The patient should then clear his voice again by coughing.

Mendelssohn training: Guided the patient to feel the elevation of throat during swallowing and make efforts to extend the time when throat was at the highest level.

Cold stimulation: Gently stimulated the bilateral soft palates, the root of tongue and posterior wall of throat with an iced swab.

Glossal muscle training: The patient was asked to practice horizontal, backward, lateral and elevating movement of tongue. A spoon or tongue spatula was used to give some resistance.

2.2.2 Direct approaches

Where to place food: It's better to place food where the patient could sense it, which also benefited the holding and propelling of food.

Pattern of food: According to the level and phase of deglutition disorder, gel-like food was usually selected for training at first, and gradually replaced by pasty food, and then ordinary staple and water.

Eating posture: The patient should select a proper posture when eating. Those who were able to sit should be seated with the neck flexed slightly forward and the body leaned towards the heathy side by about 45°. Those who were unable to sit should choose a supine position with the trunk elevated by 30°, the head and neck flexed forward, and the shoulder of the affected side supported by a cushion.

The swallowing training was conducted one on one, once per day, 30 min for each session, five times a week, for a total of 8 weeks.

**2.3 Treatment group**

The treatment group was intervened by Gao's nape acupuncture in addition to the basic interventions and swallowing training.

Acupoints: Bilateral Fengchi (GB 20), Yiming (EX-HN 14), Gongxue [Extra, 1.5 cun directly below Fengchi (GB 20)], Zhiqiang (Extra, in the depression between Adam's apple and hyoid bone), Tunyan (Extra, between Adam's apple and hyoid bone, in the depression 0.5 cun away from the median line), Fayin (Extra, 0.5 cun below Adam's apple and 0.3 away from the median line), Lianquan (CV 23), Waijinjin (Extra) and Waiyuye (Extra).

Method: Patient took a sitting position. After standard sterilization, filiform needles of 0.25 mm in diameter and 40 mm in length were used for acupuncture. Fengchi (GB 20), Yiming (EX-HN 14), and Gongxue (Extra) were punctured by depth of 25-35 mm and the needles were inserted interiorly downward with twirling needling manipulation applied at 100 r/min, 15 s for each acupoint. The needles were retained for 30 min, during which the needles were manipulated three times. Afterwards, Lianquan (CV 23), Waijinjin (Extra) and Waiyuye (Extra) were treated with needles punctured towards the root of tongue by 25-35 mm. Tunyan (Extra), Zhiqiang (Extra) and Fayin (Extra) were inserted perpendicularly by 8 mm. For these points, needles were removed immediately after twirling needling manipulation was applied for 15 s. During the treatment, if patient felt like to cough, the needles needed to be removed right away and the needle holes were pressed to prevent from bleeding. The acupuncture treatment was conducted once daily, 5 times a week, for a total of 8 weeks.

## 3 Observation of Therapeutic Efficacy

### 3.1 Observation items

3.1.1 Repetitive saliva swallowing test (RSST)

RSST can be taken to observe the ability to initiate swallowing reflex, and it is of great significance in evaluating the pharyngeal deglutition disorder[9]. However, it cannot be used to identify insidious aspiration or applied to patients who have comprehension disturbance.

Method: Patient took a sitting or lying position and relaxed. The examiner placed his fingers on patient's Adam's apple and hyoid bone and asked the patient to practice swallowing repeatedly and rapidly. The swallowing movement could be confirmed by the fingers when Adam's apple and hyoid bone slipped up and down. The descending of Adam's apple and hyoid bone indicated the end of swallowing. The observation took 30 s. When patient was unable to swallow due to a very dry mouth, moisturized the tongue with 1 mL water to help with the movement. The grading was made based on the number of swallowing.

Grade Ⅰ: Able to swallow 3-4 times successively with complete elevation of Adam's apple.

Grade Ⅱ: Only able to roughly swallow once and hesitant to perform the following swallowing movements.

Grade Ⅲ: Hesitant to swallow, and the elevation of Adam's apple was incomplete.

Grade Ⅳ: Unable to move the throat.

3.1.2 Modified water swallowing test (MWST)

Had oral cavity cleaned before performing the test. Patients with a dry mouth should have the oral cavity moisturized first. Injected 3 mL cold water at oral vestibule with a syringe and asked the patient to swallow it. Then, asked the patient to simply perform

the movement of swallowing twice without water in case the patient was able to do it. The evaluation was conducted three times. Auscultation at neck can increase the accuracy of test. This test is usually used to evaluate mild-severe deglutition disorder and it is more significant in the estimation of pharyngeal deglutition disorder. However, it cannot identify insidious aspiration.

Level 1 a (1 point): Unable to swallow, no choking, with moist sounds in the throat and changes in respiration.

Level 1 b (1 point): Unable to swallow, with choking.

Level 2 (2 points): Able to swallow, no choking, with changes in respiration.

Level 3 a (3 points): Able to swallow, no choking, with moist sounds in the throat.

Level 3 b (3 points): Able to swallow, with choking.

Level 4 (4 points): Able to swallow, no choking, no moist sounds in the throat or change in respiration.

Level 5 (5 points): In addition to level 4, capable of performing the movement of swallowing twice within 30 s.

Indication of the evaluation: Those scored ≥4 points would be tested again, i.e. swallowing twice within 30 s; those scored <3 points twice wouldn't receive a third examination and the scores were recorded; for those who had been tested for three times, the lowest score would be taken as the final score.

3.1.3 Standardized swallowing assessment (SSA)

SSA is commonly used as a bedside test of swallowing function[10]. This examination can offer a primary estimation of swallowing function and risk of aspiration.

Method: The swallowing function was evaluated in terms of consciousness state, control of posture and head, capability of cough, control of oral secretion, movement of tongue, respiration, dysphasia, and water dripping, lack of swallowing movement, coughing, choking, or shortness of breath during the swallowing of 5-60 mL water, and dysphasia after swallowing. SSA

consists of three sections, with its items arranged according to the level of difficulty to avoid intensive reactions in some severe cases. The sum of the component scores was taken as the global score ranging from 18-46 points. The higher the score, the worse the deglutition function.

SSA has high reliability and validity. Gradually increasing the evaluation can effectively lower the risk and raise the safety of screening[11] and better diagnose an invisible aspiration.

3.1.4 Swallowing-related quality of life (SWAL-QOL)

SWAL-QOL evaluates the quality of life in patients with deglutition disorders from 10 domains: stress, duration for taking food, appetite, selection of food, symptoms of deglutition disorder, fear, emotion, socializing, fatigue and sleep. It is a good reflection of the bio-psycho-social medical model[12].

**3.2 Efficacy evaluation criteria[13]**

Substantially recovered: Symptoms of deglutition disorder disappeared basically, and grade 1 evaluated by MWST[14].

Markedly effective: Symptoms of deglutition disorder improved significantly, improved by 2 levels or more in MWST.

Effective: A little improvement in deglutition disorder, and improved by 1 level in MWST.

Invalid: No improvements in performances of deglutition disorder and MWST.

**3.3 Treatment result**

3.3.1 Comparison of therapeutic efficacy

The total effective rate and markedly effective rate were respectively 100.0% and 72.3% in the treatment group, versus 97.9% and 34.0% in the control group. There was a significant difference in the markedly effective rate between the two groups ($P<0.01$). According to rank-sum test, the difference in clinical efficacy between the two groups was statistically significant ($P<0.01$), (Table 2).

Table 2. Comparison of clinical efficacy (case)

| Group | $n$ | Substantially recovered | Markedly effective | Effective | Invalid | Markedly effective rate (%) | Total effective rate (%) |
|---|---|---|---|---|---|---|---|
| Treatment | 47 | 6 | 28 | 13 | 0 | 72.3[1] | 100.0 |
| Control | 47 | 2 | 14 | 30 | 1 | 34.0 | 97.9 |

Note: Compared with the control group, 1) $P<0.01$

3.3.2 Comparison of RSST grading

According to Table 3, there was no significant difference in the RSST grading between the two groups before treatment ($P>0.05$). After treatment, the RSST grading changed significantly in both groups (both $P<0.05$), and there was a significant difference in the grading between the two groups ($P<0.05$).

3.3.3 Comparison of MWST score

There was no significant difference in the MWST score between the two groups before treatment ($P>0.05$). After treatment, the MWST score changed significantly in both groups (both $P<0.01$), and there was a significant difference in the score between the two groups ($P<0.01$), (Table 4).

**Table 3. Comparison of RSST grading (case)**

| Group | $n$ | Time point | Grade I | Grade II | Grade III | Grade IV |
|---|---|---|---|---|---|---|
| Treatment | 47 | Pre-treatment | 0 | 0 | 26 | 21 |
| | | Post-treatment | 8 | 30 | 8 | 1 |
| Control | 47 | Pre-treatment | 0 | 0 | 28 | 19 |
| | | Post-treatment | 4 | 21 | 18 | 4 |

**Table 4. Comparison of MWST score ($\overline{x}$ ±s, point)**

| Group | $n$ | Pre-treatment | Post-treatment |
|---|---|---|---|
| Treatment | 47 | 1.91±0.83 | 3.72±0.85[1)2)] |
| Control | 47 | 1.87±0.85 | 3.19±1.04[1)] |

Note: Intra-group comparison, 1) $P<0.01$; compared with the control group after treatment, 2) $P<0.01$

### 3.3.4 Comparison of SSA score

There was no significant difference in the SSA score between the two groups before treatment ($P>0.05$). After treatment, the SSA score changed significantly in both groups (both $P<0.01$), and there was a significant difference in the score between the two groups ($P<0.05$), (Table 5).

**Table 5. Comparison of SSA score ($\overline{x}$ ±s, point)**

| Group | $n$ | Pre-treatment | Post-treatment |
|---|---|---|---|
| Treatment | 47 | 48.47±6.57 | 44.13±4.91[1)2)] |
| Control | 47 | 47.87±7.42 | 46.98±7.17[1)] |

Note: Intra-group comparison, 1) $P<0.01$; compared with the control group after treatment, 2) $P<0.05$

### 3.3.5 Comparison of SWAL-QOL score

There was no significant difference in the SWAL-QOL score between the two groups before treatment ($P>0.05$). After treatment, the SWAL-QOL score changed significantly in both groups (both $P<0.01$), and there was a significant difference in the score between the two groups ($P<0.05$), (Table 6).

**Table 6. Comparison of SWAL-QOL score ($\overline{x}$ ±s, point)**

| Group | $n$ | Pre-treatment | Post-treatment |
|---|---|---|---|
| Treatment | 47 | 96.47±21.51 | 108.66±21.57[1)2)] |
| Control | 47 | 95.43±20.42 | 99.57±19.80[1)] |

Note: Intra-group comparison, 1) $P<0.01$; compared with the control group after treatment, 2) $P<0.05$

## 4 Discussion

More and more people are affected by post-stroke deglutition disorders every year, and its subsequent aspiration pneumonia and severe dystrophy are greatly hindering patient's self-care ability[15]. According to traditional Chinese medicine (TCM), post-stroke deglutition disorder is caused by blocked meridians and collaterals and qi activities. Hence, acupoints in the corresponding areas are usually selected for acupuncture to unblock collaterals and orifices, so as to improve its symptoms[16]. It is also the theoretical foundation of Gao's nape acupuncture. Prof. Gao Wei-bin[17] holds that the treatment of pseudobulbar palsy should begin with improving cerebral blood circulation, while the improvement of swallowing reflex and articulation should be the second step. Therefore, in this study, Fengchi (GB 20), Yiming (EX-HN 14), and Gongxue (Extra) were treated to ameliorate cerebral blood circulation, which was the root factor; Lianquan (CV 23), Waijinjin (Extra), Waiyuye (Extra), Tunyan (Extra), Zhiqiang (Extra) and Fayin (Extra) were treated to improve the swallowing and articulation function, which was the superficial factor.

Modern medicine holds that pseudobulbar palsy after stroke is mainly caused by the damaged corticonuclear tract[18], and the core is the dysfunction of a certain part of the reflex arc. When puncturing the relevant acupoints, Gao's nape acupuncture can repeatedly stimulate the swallowing reflex pathway and gradually restore the reflex[19]. In a normal swallowing process, the oral phase is mainly to sense and propel the food in oral cavity, which involves the cooperation of masticatory and glossal muscles. These muscles are under control of trigeminal and hypoglossal nerves. The pharyngeal phase refers to when food bolus passes pharynx, which is majorly accomplished by stylopharyngeal muscle, suprapharyngeal constrictor, middle pharyngeal constrictor, hypopharyngeal constrictor and circumpharyngeal sphincter. These muscles are in the charge of vagus and glosso-pharyngeal nerves. Amongst the acupoints selected in Gao's nape acupuncture, Lianquan (CV 23), Waijinjin (Extra) and Waiyuye (Extra) are located along the route of hypoglossal nerve which controls the movement of glossal muscle. That's why acupuncture at these three points can help recover the movement of the paralyzed glossal muscle, so as to promote the recovery of oral

deglutition function, since the glossal muscle can better control the food in oral cavity. Similarly, Zhiqiang (Extra) and Tunyan (Extra) are located along the routes of glossopharyngeal and vagus nerves,and acupuncture at these two points can modulate pharyngeal and the posterior wall of pharynx, which helps to recover the function of pharynx[20-22]. These also prove that Gao's nape acupuncture works on both oral and pharyngeal deglutition phases. Since the pharyngeal phase is following the oral phase, the function of oral phase directly affects the recovery of pharyngeal phase. Meanwhile, the cerebral nerves and muscles involved in the pharyngeal phase are quite centered[23], which is good for Gao's nape acupuncture to fully play its role.

Patients enrolled in this study all received basic interventions to set up a foundation for the recovery of pharyngeal deglutition function. Of the three scales used to evaluate swallowing function, RSST and MWST are significant indicators for rating pharyngeal deglutition function, while RSST focuses more on the swallowing movement and MWST reflects patient's ability to control and swallow liquid. The results in this study showed: after treatment, the intra-group and between-group comparisons of RSST grading and scores of MWST and SSA all had statistical significance ($P<0.01$ or $P<0.05$), indicating that both treatment protocols could improve the pharyngeal deglutition function, but the efficacy of Gao's nape acupuncture plus swallowing training was more significant. SSA is more sensitive and specific to aspiration. The treatment group had a significantly lower SSA score compared with the control group after treatment, which indicated that Gao's nape acupuncture plus swallowing training helped more with reducing aspiration. However, it's reported that swallowing training could also lower the SSA score[24]. Therefore, it requires further study to understand whether Gao's nape acupuncture plus swallowing training really has an advantage in improving SSA score compared to swallowing training alone.

To some extent, central nervous system has plasticity in terms of structure and function. Swallowing training improves deglutition disorders via motor training of oral and facial muscles, velopharyngeal closure training, posture guidance and compensation techniques[25], and the core is neural facilitation technique and neuron reconstruction[26], inputting a normal swallowing model to influence the abnormal one. Meanwhile, Gao's nape acupuncture provides an effective option for promoting the formation of a new central-motor conduction pathway. But, this does not mean the possession of normal motor function. Only when the movement model is fixed in the motor cortex after systematic rehabilitation trainings, the quality of various motor functions can get a real improvement[27].

## References

[1] Xu RQ, Fan GQ. Research progression of the opportunity of acupuncture-moxibustion therapy for post-stroke dysphagia. Zhongguo Zhen Jiu, 2012, 32(11): 1054-1056.

[2] Han TR, Paik NJ, Park JW. Quantifying swallowing function after stroke: a functional dysphagia scale based on videofluoroscopic studies. Arch Phys Med Rehabil, 2001, 82(5): 677-682.

[3] Jia L, Liu D, Bai J. Clinical study progress of neck acupuncture for post-stroke deglutition disorders. Zhongguo Yiyao Zhinan, 2013, 11(20): 488-489.

[4] Fan ZQ, Qu JM, Zhu HL. Research progress of aspiration pneumonia. Zhongguo Huxi Yu Weizhong Jianhu Zazhi, 2010, 9(2): 209-212.

[5] Wang M. Effect of early-stage rehabilitation on motor function in post-stroke patients. Zhongguo Xiandai Yisheng, 2008, 46(5): 158-159.

[6] Wang YP, Zhao JL, Zhang SX. Oral feeding evaluation and nursing intervention of elderly deglutition disorder patients. Quanke Huli, 2012, 10(15): 1360-1361.

[7] Wang XZ, Jiao SS. Symptomatology of Nervous System Diseases. Beijing: People's Medical Publishing House, 1978: 240-242.

[8] Yan TB, Dou ZL, Ran CF. Practice of Paralysis Rehabilitation. Beijing: People's Medical Publishing House, 2010: 240-242.

[9] Wan Q. Clinical evaluation and management of dysphagia after stroke. Zhongguo Cuzhong Zazhi, 2007, 2(3): 231-235.

[10] Ellul J, Barer D. On behalf of ESDB/COSTAR collaborative dysphagia study. Interobserver reliability of a standardized swallowing assessment (SSA). Cerebrovasc Dis, 1996, 6(Suppl 2): 152-158.

[11] Hao GH, Yu BX, Sun YB, Dai MY, Fang W. Application of standardized swallowing assessment in screening post-extubation aspiration. Qingdao Daxue Yixueyuan Xuebao, 2012, 48(6): 473-475.

[12] McHorney CA, Robbins J, Lomax K, Rosenbek JC, Chignell K, Kramer AE, Bricker DE. The SWAL-QOL and SWAL-CARE outcomes tool for oropharyngeal dysphagia in adults: III. Documentation of reliability and validity. Dysphagia, 2002, 17(2): 97-114.

[13] Cheng JC. Clinical Study on the Effect of Musculus Longus Colli and Anterior Longitudinal Ligament Reconstruction of Swallowing Function After Nterior Cervical Fusion. Hefei: Master Thesis of Anhui Medical University, 2015.

[14] Oonishi S, Sun QL. Practical Technique for Rehabilitation of Feeding and Swallowing Disorders. Beijing: Chinese Medical Science Press, 2000: 49.

[15] Smithard DG, O'Neill PA, Parks C, Morris J. Complications and outcome after acute stroke does dysphagia matter? Stroke, 1996, 27(7): 1200-1204.

[16] Wu L. The Clinical Research of Swallowing Dysfunction After Stroke by Swallowing Staging Acupuncture Treatment. Guangzhou: Master Thesis of Guangzhou University of Chinese Medicine, 2014.

[17] Kang LR, Zheng S. Effective acupoints for bulbar paralysis by professor Gao Weibin. Zhongguo Zhen Jiu, 2016, 36(4): 402-404.

[18] Man SM, Zhang DP, Zhang PY, Li SQ, Sun JM. Investigation of relation between plasma vascular endothelial growth factor VEGF and brain vascular disease. Zhongguo Xiandai Yixue Zazhi, 2004, 14(10): 36-39.

[19] Du J, Chen LD. Rehabilitation of Integrated Chinese and Western Medicine. Beijing: People's Medical Publishing House, 2006: 417.

[20] Gao WB. Six Unique Skills of Acupuncture-moxibustion. Beijing: China Medical Science Press, 2007: 421.

[21] Chen FY, Liu XP, Bao YH, Chu JM. Clinical observation of nape acupuncture plus rehabilitation training in treating pseudobulbar palsy after cerebral stroke. Shanghai Zhenjiu Zazhi, 2018, 37(2): 135-139.

[22] Liu SL, Gao WB. Brief introduction to Professor Gao Wei-bin's needling technique of 'Ten Acupuncture Skills'. J Acupunct Tuina Sci, 2017, 15(3): 204-208.

[23] Song FC, Lü Z, Zhang X, Li X, You SW, Feng WX. The treatment effect of different stages of dysphagia caused by acute cerebral infarction with VitalStim swallowing therapy instrument. Linchuang Shenjingbingxue Zazhi, 2014, 27(3): 222-224.

[24] Yin LL. A clinical study on acupuncture combined with rehabilitation therapy for 57 cases of swallowing disorders after stroke. Zhongyi Zazhi, 2013, 54(9): 766-768.

[25] Zhang J, Wang YJ. The mechanism of dysphagia after stroke. Guowai Yixue (Naoxueguan Jibing Fence), 2004, 12(4): 274-277.

[26] Wu J. Latest research status of acupuncture-moxibustion plus rehabilitation for cerebrovascular diseases. Zhongxiyi Jiehe Xinnaoxueguanbing Zazhi, 2003, 1(3): 158-159.

[27] Zou XH. Physical Medicine and Rehabilitation. Beijing: Huaxia Press, 1992: 74.

**Translator**: Hong Jue (洪珏)