

Effect of Micro Acupotomy and Stellate Ganglion Stimulation on Patients with Cervical Vertigo

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Wang *et al.*: Effect of Micro Acupotomy and Stellate Ganglion Stimulation on Cervical Vertigo

This article aims to evaluate the treatment effect of micro acupotomy and stellate ganglion stimulation on cervical vertigo. 90 patients with cervical vertigo were randomly divided into two groups, observation group and control group, with 45 cases in each group. The observation group was given micro acupotomy and stellate ganglion stimulation and the control group was given regular acupuncture treatment. The two groups were treated for 2 w. The therapeutic effect and evaluation of symptoms and functions of cervical vertigo score of the two groups of patients after treatment were observed. The mean blood flow levels of vertebralbasilar artery, right vertebral artery and left vertebral artery before and after treatment were observed. The results show that there were significant differences in mean changes of vertigo symptoms and functional scores between the two groups of patients ($p < 0.01$) and the improvement of the observation group was larger than that of the control group ($p < 0.05$); there was significant difference in the speeds of the blood flow of the vertebral-basal artery between the two groups before and after treatment ($p < 0.05$) and the improvement of the observation group was larger than that of the control group ($p < 0.05$). By comparison, the clinical effects of the two groups were statistically different ($p < 0.05$), no side effects occurred in the two groups of patients. Micro acupotomy combined with stellate ganglion stimulation is effective in treating cervical vertigo.

Key words: Cervical vertigo, acupotomy, stellate ganglion stimulation, vertebral artery

Cervical Vertigo (CV) is a disorder caused by compressed vertebral artery or stimulated sympathetic nerve due to narrowing of the cervical spine. Advanced degenerative changes of the cervical spine is considered to be associated with vertigo, so elderly individuals with CV is more common^[1]. But the incidence of cervical syndrome and its trend in the young have been rising^[2], about 50 % of patients have vertigo symptoms^[3]. The main symptoms of CV include vertigo, nausea, palpitations and sweating. Commonly used clinical therapies such as western medicine and surgical operation spend a lot and have potential adverse effect. Acupuncture has been widely used to treat CV, but it is uncomfortable with the large-diameter acupuncture needles.

Therefore, it is particularly important to develop a more comfortable and more effective therapeutically techniques. Micro acupotomy and stellate ganglion stimulation is a minimally invasive technique. It can relieve compressed vessels and nerves. This study combined the experience of massage with modern medicine and used micro acupotomy at neck and stellate ganglion stimulation to treat CV.

MATERIALS AND METHODS

Demographics:

All patients with CV were enrolled from the outpatient clinic and wards of the massage department of the Affiliated Hospital of Shandong University of Traditional Chinese Medicine from November 2018 to October 2019. 90 patients who met the inclusion criteria were divided into an observation group and a control group according to the random number table method, with 45 cases in each group. Among them, there were 20 males and 25 females in the observation group, with a mean age of (43.52 ± 9.20) y, an average disease course of (2.67 ± 8.26) y and the symptom and function scores of (12.35 ± 3.45) points. There were 22 males and 23 females in the control group, with an average age of (41.86 ± 10.36) y, the average duration of (2.46 ± 9.35) y and the symptom and function scores of (11.35 ± 4.21) points. All patients have signed an informed consent and voluntarily joined the study.

Diagnostic criteria:

The diagnostic criteria have been formulated according

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to the minutes of the second cervical syndrome symposium^[4]. CV with history of cataplexy; positive in cervical rotation test; x-ray films with abnormal findings; mostly with sympathetic nerve symptoms; ocular and otogenic vertigo should be excluded; exclusion of insufficient blood supply in vertebral artery V1, V2 segments, neurosis and intracranial tumors, etc.; vertebral angiography or Digital Subtraction Angiography (DSA) need to be made before diagnosis and operation.

Inclusion criteria: We included patients meeting the diagnostic criteria of CV; aged from 18 to 65 y old, with good compliance; conscious and able to cooperate with the healer.

Exclusion criteria: We excluded patients who did not meet the diagnostic criteria for CV; with pregnancy, dizziness in acupotomy operation, poor compliance and mental diseases; having vertigo caused by craniocerebral, tumor, otogenic, rhinogenic, drugs and traumatic diseases; having severe abnormal primary diseases such as cardiovascular and cerebrovascular, diabetes, liver and kidney and blood system diseases.

Observation group:

Micro acupotomy at back neck and stellate ganglion stimulation: Patient position is described as follows. The patient sat in front of the treatment bed with both elbows and forearms on the bed, the head slightly lowered, the mouth slightly opened and the jaw retracted, wearing a disposable surgical cap to fully expose the patient's neck, shoulders and occipitalia. Operation steps are as follow. Apply regular Anerdian disinfectant on the neck, shoulders and occipitalia skins and anterior cervical stellate ganglion area; micro acupotomy operators strictly laid towels, wore masks, caps and sterile gloves. Microneedle-scalpel model, HZ series produced by Beijing Zhuoyue Huayou Company, I-6 disposable microneedle-scalpel, specification was $\Phi 0.40 \times 30$ mm, batch number-181100 was used here.

Micro acupotomy treatment: Choice of needle scalpel insertion point is explained here. The choice of the main treatment points includes the margin of the posterior edge of the foramen magnum, the starting and ending points of the large and small rectus muscles behind the head, the pain areas around the spinous processes and the transverse processes of C2 to C6, combined with the positive reaction points touched by the doctor during touch diagnosis, 8 to 10 needle entry points were selected and marked. Micro acupotomy method is explained clearly based on the "three-line one-point

needle entry method"^[5], combined with the method to cut and puncture layer by layer. The specific operation is done here. Use left thumb to vertically press the needle slowly at the confirmed needle entry points and at the same time allocate the local soft tissues to the left and right, so that the blood vessels and nerves avoid the needle scalpel to break through the path and then enter the needle, break through and puncture layer by layer (fascia, muscles, ligaments, etc.).

Stop for a short while after reaching each layer. First gently and slowly puncture to probe the resistance under the scalpel and the patient's feeling, once the resistance is encountered, the patient has no abnormal feeling (pain or numbness, electrified feeling), make a rapid and elastic breakthrough, until it reaches the bone surface. The operator can pull the needle scalpel back a little and make a cross cut. Make sure not to directly stimulate the bone surface. After the operation is completed, take out the needle scalpel and press the needle hole with a cotton swab for a while until the bleeding stops.

Combination of micro acupotomy and stellate ganglion stimulation:

Positioning-The patient is seated with head slightly lowering at the level of the circular cartilage, at its side, open a 1.5 cm line and the intersection point of the line and the 2.5 cm line above the sternoclavicular joint is the needle entry point. **Operation method-**Put together the index and middle fingers of the left hand to touch the surface of the C7 transverse process and when depressing, push the sternocleidomastoid muscle, common carotid artery and internal carotid artery the outer side to separate them from the trachea and esophagus. Use the right hand to hold the scalpel to slowly and vertically pierce the base of the C7 transverse process on the inner side of the arterial pulse. Slightly move the needle scalpel body to strengthen the stimulation for 3 to 5 times, to the extent that the patient feels soreness and tolerates as much as he/she can. During the operation, the needle scalpel cannot leave the bone surface and slide. Remove the needle scalpel and then quickly use a sterile surgical dressing for pressing to prevent bleeding and infection. Instruct the patient to rest and observe the condition.

After the patient's treatment with micro acupotomy and stellate ganglion stimulation, the surgeon slightly relaxes the patient's neck and shoulders, and then carries out cervical spine positioning and rotating manipulation, respectively once to the left side and right side. The operation is completed and the treatment

is given once a week, for 2 consecutive times. Observe the results after 2 w.

Control group:

Regular acupuncture treatment: Acupoint selection-Baihui, Fengchi (both sides), cervical segment C2-7 Jiaji acupoints (double), Dazhui; Acupuncture technique-Uniform reinforcing reducing method; Acupuncture needle model-“Huatuo Brand” acupuncture needles produced by Suzhou Medical Articles Factory Co., Ltd., with the specification of Φ 0.30×40 mm acupuncture needle; Operation-Puncture 0.5 to 0.8 cun horizontally forward at Baihui, at both sides of Fengchi acupoints puncture straightly towards the nose tip 0.8 to 1 cun, from Dazhui acupoint, puncture upward obliquely 0.5 to 1 cun, at each cervical spine, straightly puncture 1 cun, all to the extent of getting qi. After getting qi, leave the needle for 20 min and leave the needle for 10 min to run the needle once. Acupuncture treatment, do it once every other day, three times a week. After 2 w of treatment, the results of the two groups were assessed.

Efficacy criteria:

With reference to the criteria for determining the curative effect of vertigo in the disease diagnosis criteria of the traditional Chinese medicine, it was formulated, Cure: Vertigo and other concomitant symptoms have disappeared; improvement: Vertigo and other concomitant symptoms have improved; not cured: Symptoms such as vertigo, etc., have not improved or worsened.

Efficacy outcome measures:

Evaluation of symptoms and functions of CV before and after treatment, referred to the preliminary study on evaluation of symptoms and functions of patients with CV^[6] standard to evaluate patients symptoms and functions. The standard mainly includes 5 items: 16 points for vertigo, 4 points for neck and shoulder pain, 2 points for headache, 4 points for daily life and work ability, 4 points for psychological and social adaptability. The full score is 30 points and the lower the score, the more serious the symptom and function disorder of vertigo.

Measure the blood flow speed of vertebral-basal artery. Color Doppler ultrasound examination was used to detect changes in the average blood flow speed of the Basilar Artery (BA), Left Vertebral Artery (LVA) and Right Vertebral Artery (RVA) before and after the treatment.

Statistical analysis:

Statistical Package for the Social Sciences (SPSS) 20.0 software was used for all statistical analyses. Measurement data were all expressed as ($\bar{x}\pm s$). Count data were represented by [n (%)], pairwise comparison was performed by Dunnett's test, rate was tested by χ^2 test, ($p<0.05$) indicated statistically significant difference.

RESULTS AND DISCUSSION

General data between the two groups were compared. There was no statistically significant difference in gender, age, duration, symptoms and function scores of patients between the two groups (both $p>0.05$) (Table 1).

The symptoms and function scores of the two groups were compared. There was no obvious difference between the symptoms and function scores of the two groups of patients with CV before the treatment ($p>0.05$). By comparison of the scores between the two groups before and after the treatment, the scores increased and the group difference was statistically significant ($p<0.01$). The score and improvement of CV in the observation group after treatment were higher than those in the control group ($p<0.05$) (Table 2).

Vertebral-basal artery blood flow speed between the two groups before and after treatment was compared. The average blood flow speed of the BA, LVA and RVA in the observation group and the control group were increased as compared with before treatment ($p<0.05$). After the treatment, the average blood flow speed of BA, LVA, RVA between the observation group and control group was statistically significant ($p<0.05$) (Table 3).

Clinical effects between two groups were compared. The results show that the total effective rate of the observation group is better than that of the control group ($p<0.05$) (Table 4).

Before treatment, both groups of patients were informed of the treatment process in detail, so that the patients could be treated with a relaxed state of mind. 90 patients in both groups could consciously agree and receive treatment, and no adverse event occurred. Three patients in the observation group had short-term mental stress after the first treatment with the micro acupotomy and all improved after a rest. One patient in the control group felt dizzy during the treatment with micro acupotomy after the first acupuncture treatment in the 2nd w of treatment, which may be related to fasting acupuncture and the patient no longer felt dizzy in the second acupuncture treatment and the remaining patients had no treatment-related adverse events.

TABLE 1: DEMOGRAPHIC AND CLINICAL INFORMATION

Group	Cases	Gender/cases		Age/year			Disease course/year		
		Male	Female	Minimum	Maximum	Average ($\bar{x}\pm s$)	Shortest	Longest	Average ($\bar{x}\pm s$)
Observation group	45	20	25	36	60	43.52 \pm 9.20	0.8	11	2.67 \pm 8.26
Control group	45	22	33	35	59	41.86 \pm 10.36	0.5	10.3	2.46 \pm 9.35

TABLE 2: COMPARISON OF SYMPTOMS AND FUNCTION SCORES BETWEEN TWO GROUPS

Group	Time point	Vertigo	Daily life and work ability	Psychological and social adaptability	Shoulder pain	Headache	Total score
Observation group (n=45)	Before treatment	6.63 \pm 2.89	1.95 \pm 0.78	2.16 \pm 1.82	1.89 \pm 1.11	1.23 \pm 0.60	12.35 \pm 3.06
	After treatment	9.87 \pm 2.82	3.54 \pm 0.72	2.93 \pm 0.72	2.72 \pm 0.64	2.34 \pm 0.43	20.73 \pm 2.04
Control group (n=45)	Before treatment	7.08 \pm 2.36	1.92 \pm 0.90	2.23 \pm 0.82	1.65 \pm 0.58	0.84 \pm 0.29	13.28 \pm 3.17
	After treatment	10.05 \pm 2.48	2.05 \pm 1.34	2.48 \pm 0.47	1.98 \pm 0.72	1.22 \pm 0.53	17.82 \pm 3.41

TABLE 3: COMPARISON OF VERTEBRAL-BASAL ARTERY BLOOD FLOW SPEED BETWEEN THE TWO GROUPS BEFORE AND AFTER TREATMENT ($\bar{x}\pm s$, cm/s)

Group	Time point	BA	LVA	RVA
Observation group (n=45)	Before treatment	38.46 \pm 5.62	27.51 \pm 4.58	24.27 \pm 2.89
	After treatment	42.49 \pm 5.88	31.56 \pm 5.32	31.65 \pm 6.09
Control group (n=45)	Before treatment	37.51 \pm 5.73	26.49 \pm 4.72	25.22 \pm 6.85
	After treatment	40.36 \pm 5.45	30.62 \pm 5.17	29.73 \pm 4.07

TABLE 4: CLINICAL EFFECTS OF TWO GROUPS (CASES)

Group	Cases	Cured	Improvement	Not cured	Total effective rate
Observation group	45	18	22	3	41 (93.3 %)
Control group	45	9	26	10	35 (77.7 %)

CV is a frequently occurring vertigo in the traditional Chinese medicine. The traditional Chinese medicine believes that the occurrence of vertigo is mostly caused by liver and kidney qi and blood deficiency, and external evil invasion causes phlegm and fire disturbance, leading to disease^[7]. Modern medicine believes that the onset of this disease is the result of a combination of multiple factors, mostly related to cervical spine instability, vertebral artery rotation or compression, sympathetic nerve regulation dysfunction, etc.,^[8,9]. Patients with CV often have sympathetic symptoms during the attack by the disease, such as vertigo, headache, nausea and vomiting, palpitations and sweating. The etiology and pathogenesis are not yet clear. Some studies have shown that upon stimulation the sympathetic nerve causes vertebral-basal artery blood flow disorder, which

is the main cause of the disease. Some scholars have found that there is a two-way connection between the sympathetic ganglion posterior fibers and the cervical ganglion, and speculate that the attack by the CV may be related to the compression of the cervical dura sac and posterior longitudinal ligament or sympathetic nerve stimulation^[10]. The treatment method in this study is the clinical experiences in many years of the corresponding author of this article, Professor Li Huadong. Our study demonstrated that micro acupotomy and stellate ganglion stimulation is effective in terms of changes in CV symptoms and blood flow. After treatment, aspects such as symptoms and function scores and vertebral-basal artery blood flows of the two groups have been significantly improved as compared with those before treatment and no serious adverse reaction occurred

during the treatment process. Compared with the total effective rate, the treatment with micro acupotomy and stellate ganglion stimulation takes a shorter time, but with obvious advantages in curative effect.

Mechanism of action of micro acupotomy is briefly discussed below. In this study, the suboccipital triangle was taken as the focus of micro acupotomy treatment. The internal and external balance of the cervical spine was broken due to cervical disc herniation, joint bone hyperplasia and cervical muscular strain. The cervical spine biomechanical imbalance escalated neck soft tissue strain and degeneration, which caused spasm and loss of elasticity of the neck muscles. Especially the contracture and narrowing of the suboccipital muscles located in the suboccipital triangle, compressed the vertebral artery, slowed blood flow and at the same time, stimulated the cervical sympathetic nerves, causing symptoms such as palpitations and vertigo. Micro acupotomy therapy is the innovation and development of the traditional acupuncture method and it has the advantages such as easy operation, low trauma and high safety. In essence, it is percutaneous minimally invasive soft tissue release^[11]. During the treatment, it could have the effect of acupuncture into channels and acupoints, promote the absorption of aseptic inflammation and could “take pain as acupuncture”, to relieve the high stress state of local tissues by “cutting, peeling, producing and mowing” and restore the dynamic balance of the internal and external neck tissues. In this study, the micro acupotomy operation was based on the “three-line one-point needle entry method” and combined with the “needle scalpel layer-by-layer cutting method” to release the suboccipital muscle group and the paravertebral muscle group. On the one hand, it directly relieved the compression on the cervical nerves and vertebral arteries by the atlanto-occipital part and the paravertebral soft tissue, improved the blood supply of the vertebral-basal artery. On the other hand, after the needle scalpel pierced the skin, it could exert its analgesic effect through the analgesic mechanism of the spinal cord and brain. At the same time it acted on the starting and ending points of muscles, fascia, ligaments, etc., blocked the focal points to continue to issue noxious stimuli, regulated the cervical proprioceptive disorder, released the muscle protective spasm state^[12] and restored the internal and external mechanical balance of the neck.

Mechanism of micro acupotomy stellate ganglion stimulation is discussed here. Stellate ganglion is functionally a sympathetic ganglion, located deep in the

prevertebral fascia at the outer side of the intervertebral foramen and is composed of cervical ganglia 6th and 7th and 1st thoracic ganglion. Its postganglionic fibers are widely distributed in the chest. When the cervical zygapophyseal joint and its surrounding structures have disorder, leading to the tension contracture of the neck muscle group, the cervical thoracic ganglion can be irritated. Through the sympathetic nerve reflex, it can cause leakage of the dermatomic skin area or the contents of the blood vessel, causing symptoms such as vertigo, neck and shoulder pain, etc.,^[13]. At the same time, vertebral-basal artery spasm and labyrinthine artery ischemia, lead to circulatory disorders of the vestibular system circulation, which exacerbates vertigo. The stellate ganglion also belongs to the autonomic ganglion, which can reflexively regulate the ipsilateral head and facial autonomic functions after stimulation, improve local blood circulation and achieve therapeutic effect. Therefore, it is commonly used in clinic as a target for nerve block^[14] and its intervention in the treatment of heart and cerebrovascular diseases has been widely used in clinic. The anatomical position of the stellate ganglion is close to the Shuitu acupoint of the stomach channel of the zu yangming channel. The traditional Chinese medicine believes that “the channel passes through and cures places it reaches”. The stomach channel goes up to head and face to stimulate Shuitu acupoint, which can achieve the effect of unblocking head and facial channels, regulating qi, promoting qi and blood circulation. Modern research has also shown that stimulating Shuitu acupoint can improve cerebral blood flow, stabilize the internal environment and have a significant regulating effect on the central nervous, endocrine, immune systems, etc.,^[15]. The micro needle scalpel penetrates the skin and reaches the stellate ganglion adjacent to the transverse process of the cervical spine. In this process, on the one hand, the scalpel handle penetrates layer by layer, which directly relieves the muscle spasm in the anterior cervical area, exerts its acupuncture analgesic effect and improves local microcirculation. On the other hand, when the micro needle scalpel touches the stellate ganglion, it indirectly adjusts the sympathetic nerve excitement through the feedback of information such as “acid, anesthesia, bloating and pain”, reduces vertebral artery spasm and reflexes to visceral autonomic nerves, and improves clinical symptoms such as vertigo, palpitations and nausea of patients with CV.

Cervical spine positioning and rotating manipulation as a common clinical therapy can improve cervical spine physiological curvature, increase vertebral artery

blood flow, reduce sympathetic nerve compression and stimulation symptoms, with wide application in clinical practices. In this study, after the micro acupotomy surgery, the soft tissues of the patient's shoulders were relaxed for a short time to stretch the muscles and relieve spasm. Finally, the cervical spine positioning and rotating manipulation directly adjusted the position relations between the joints, loosened the adhesion and reshaped the mechanical balance of the cervical spine, thereby guaranteeing the curative effect of wakening the brain and eliminating vertigo.

Patients with CV were treated with micro acupotomy and stellate ganglion stimulation, by stimulating the "point" of the disease cause, the symptoms of vertigo were quickly relieved and the effect of "wakening the brain and opening the holes" was achieved. Then cervical spine positioning and rotating manipulation was carried out, which could not only adjust the tendons and curve for recovery, relieve the compression symptoms of the vertebral-basal artery, but also could clear and activate the channels and collaterals, and treat both the muscles and bones to make up for the disadvantage of focusing on "points" in the treatment with micro acupotomy, consolidate the effect of small needle knife therapy. In conclusion, micro acupotomy combined with stellate ganglion stimulation can effectively improve the vertebrobasilar artery blood flow velocity in patients with CV, improve the quality of life and clinical efficacy of patients with CV and promote their rehabilitation.

Conflict of interests:

The authors declared no conflict of interest.

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