

Clinical observation on cervical chiropractic for cervical spondylosis of vertebral artery type

脊骨神经医学颈椎矫正技术治疗椎动脉型颈椎病临床观察

Fan Shao-ting (范少挺)

Luohu District Hospital of Traditional Chinese Medicine of Shenzhen, Guangdong Province, Shenzhen 518001, China

Abstract

Objective: To observe the curative effect of cervical chiropractic for cervical spondylosis of vertebral artery type (CSA) and to explore its possible mechanism.

Methods: Sixty CSA patients were randomly divided into two groups. Thirty patients in the treatment group were treated with chiropractic manipulation for cervical vertebrae, once every other day, 7 treatments in total. The other 30 patients in the control group received oral administration of flunarizine hydrochloride, 10 mg per night, for 14 d. Cervical vertigo and functional assessment scale and transcranial cerebral Doppler (TCD) were measured before treatment and 7 days after treatment.

Results: The total effective rate was 96.7% in the treatment group and 83.3% in the control group. The curative rate was 66.7% in the treatment group and 20% in the control group. The differences between the two groups in the total effective rate and the curative rate were statistically significant (both $P < 0.05$). The scores of cervical vertigo symptom and functional assessment after treatment in both groups were significantly higher than those before treatment (both $P < 0.01$); the difference between the two groups was statistically significant ($P < 0.05$). After treatment, the maximum systolic velocity (Vs), the maximum diastolic velocity (Vd), the mean velocity (Vm), the pulsatility index (PI) and the vascular resistance index (RI) in both groups were significantly improved compared with those before the treatment (all $P < 0.01$); there were significant differences between the two groups (all $P < 0.05$).

Conclusion: Cervical chiropractic is an effective method for CSA, and its curative effect is better than that of flunarizine hydrochloride alone. Its mechanism may relate to correcting cervical instability.

Keywords: Tuina; Massage; Chiropractic; Cervical Spondylosis; Vertebrobasilar Insufficiency; Vertigo; Flunarizine

【摘要】目的：观察脊骨神经医学颈椎矫正技术治疗椎动脉型颈椎病(CSA)的疗效并探讨其可能的作用机制。**方法：**将60例CSA患者随机分为2组，治疗组30例采用脊骨神经医学颈椎矫正技术治疗，隔日1次，共7次；对照组30例口服扩管药物盐酸氟桂利嗪胶囊10 mg，每晚睡前1次，共14 d。治疗前及治疗后7 d进行颈性眩晕症状与功能评估量表评分及经颅多普勒(TCD)检测。**结果：**治疗组总有效率为96.7%，对照组为83.3%；治疗组治愈率为66.7%，对照组为20%，组间总有效率及治愈率差异均有统计学意义(均 $P < 0.05$)。两组患者治疗后的颈性眩晕症状与功能评估量表评分均较治疗前明显增加(均 $P < 0.01$)，组间差异有统计学意义($P < 0.05$)。两组患者治疗后椎动脉、基底动脉的收缩期最大血流速度(Vs)、舒张末期最大血流速度(Vd)、平均血流速度(Vm)、血管搏动指数(PI)及阻力指数(RI)均较治疗前明显改善(均 $P < 0.01$)，组间差异均有统计学意义(均 $P < 0.05$)。**结论：**采用脊骨神经医学颈椎矫正技术治疗CSA的疗效确切，且其疗效优于单纯服用氟桂利嗪胶囊，其作用机制可能是纠正“颈椎失稳”。

【关键词】推拿；按摩；整脊疗法；颈椎病；椎底动脉供血不足；眩晕；氟桂利嗪

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In recent years, the incidence of cervical spondylosis has been significantly higher than before, while the affected population trends to be younger^[1]. Cervical spondylosis of vertebral artery type (CSA) is a common type and accounts for about 10%-15% of patients with cervical spondylosis^[2]. It is characterized by vertigo accompanied by nausea, vomiting and even faint,

which seriously affects the quality of life (QOL) of patients. Although there are multiple treatments such as medication, physiotherapy and surgery, their shortcomings include adverse reactions, complicated operation and invasiveness^[3]. Recently, chiropractic has been introduced to China and shown good effects in the treatment of spine-related diseases^[4-6]. It is a non-invasive and non-drug treatment with simple operation and immediate effect. Chiropractic can be divided into chiropractic for cervical vertebrae, thoracic vertebrae, lumbar vertebrae and pelvis. I used cervical chiropractic

Author: Fan Shao-ting, bachelor, attending physician.
E-mail: shaoting98@163.com

to treat patients with CSA. The report is given as follows.

1 Clinical Materials

1.1 Diagnostic criteria

Referring to the *Guide of Diagnosis, Treatment and Rehabilitation of Cervical Spondylosis* (2010 Edition)^[7], the clinical diagnostic criteria of CSA: a cataplexy attack history accompanied by cervical vertigo; positive Spurling's sign; imaging showed segmental instability or Luschka joint hyperplasia; excluded dizziness caused by other reasons; positive neck movement test.

1.2 Inclusion criteria

Those who met the above diagnostic criteria; aged 35-65 years old; duration ≤ 5 years; undergone a washout period of over 5 d for those received other non-operative treatments.

1.3 Exclusion criteria

Otogenic vertigo (Meniere's syndrome, benign position vertigo, etc.); ophthalmic dizziness (refractive errors, glaucoma, etc.); brain-derived vertigo (atherosclerosis induced vertebrobasilar blood insufficiency, lacunar infarction, brain tumor, sequelae of traumatic brain injury, etc.); vascular vertigo (hypertension, coronary heart disease; severe heart, lung or brain diseases); suspected or confirmed cervical or spinal canal tumors or bone joint tuberculosis; the transcranial cerebral Doppler (TCD) examination showed one side or both of the vertebral arteries were absent, completely closed, or underdeveloped; cervical spinal canal stenosis or spinal cord compression; cervical instability caused by severe osteoporosis or systemic connective tissue disease; severe skin damage or skin disease in the manipulation area; not cooperating with the treatment, unwilling to accept, or withdraw from the study.

1.4 Statistical method

The SPSS 19.0 version software was used for data analysis. The enumeration data were processed by Chi-square test. Normality test was first employed for measurement data. The measurement data in normal distribution were expressed by mean \pm standard deviation ($\bar{x} \pm s$). Comparison within the group before and after treatment used paired *t*-test, and comparison between groups used analysis of variance. $P < 0.05$ indicated that the difference was statistically significant.

1.5 General data

From January 2016 to June 2017, 60 CSA patients from Luohu District Hospital of Traditional Chinese Medicine, Shenzhen, Guangdong Province, who met the inclusion criteria were divided into a treatment group and a control group by random number table method, 30 cases in each group. Age range of the patients in the treatment group was 35-65 years, and the duration was from 6 d to 5 years; in the control

group the age was 35-65 years, and the duration was from 8 d to 5 years. There were no significant differences in gender, age and duration between the two groups (all $P > 0.05$), (Table 1).

Table 1. Comparison of general data of the two groups

Group	<i>n</i>	Gender (case)		Age ($\bar{x} \pm s$, year)	Duration ($\bar{x} \pm s$, day)
		Male	Female		
Treatment	30	13	17	49.1 \pm 9.1	110.1 \pm 12.2
Control	30	11	19	51.9 \pm 8.3	97.3 \pm 14.1

2 Methods

2.1 Treatment group

Patients in the treatment group were treated with chiropractic. C₁-C₇ vertebral displacement was confirmed with mouth opening and lateral cervical spine X-ray combined with palpation examination. In accordance with the requirements of the cervical chiropractic, the displacement of the cervical spine was corrected one by one, once every other day, for 7 times.

2.1.1 Cervical chiropractic

Took C₁ left-posterior rotation displacement for example. The patient took a supine position, with the neck relaxed, and hands relaxed on both sides of the body. The doctor stood to the patient's head, facing the patient. Firstly, applied An-pressing and Rou-kneading manipulations for 3-5 min to relax the neck soft tissue. The doctor squatted slightly to the left of the patient's head. The left forefinger pulp of the doctor was placed on the rear of C₁ transverse process. The middle finger and ring finger were slightly bent and closely attached to each other. The thumb and palm supported the occipital bone. The right hand palm was gently placed on the patient's right forehead or temporomandibular jaw. With both hands flexing the neck by about 15° and rotating to the right at an appropriate angle, the doctor's left forefinger felt the small joint activity. When the forefinger felt resistance, a small swift force was given toward the patient's nose tip. Often a 'click' sound could be heard, indicating the success of adjustment (Figure 1).

2.1.2 Operation precautions and accident handling

The practice requires gentleness, rapidness, and small amplitude. It could be repeated 2-3 times if the effect was not satisfactory. It's forbidden to repeatedly or violently manipulate to seek the 'click' sound. Before practice, the doctor should explain the main procedure to the patient to eliminate stress. If the muscle tension couldn't be relieved due to stress, the treatment should be suspended. Few patients' vertigo might temporarily increase. In this case, a rest for a few minutes could relieve it.



Figure 1. Cervical chiropractic

2.2 Control group

Patients in the control group received oral flunarizine hydrochloride (China Food and Drug Administration approval number: 930003, 5 mg, Xi'an Janssen Pharmaceutical Co., Ltd., China), 10 mg each night for 14 d.

3 Results

3.1 Observation items

The items were tested in all patients before treatment and 7 d after treatment.

3.1.1 Cervical vertigo symptom and functional assessment scale^[8]

The maximum score of cervical vertigo symptom and functional assessment scale is 30 points, and it consists the following 5 items.

Vertigo: sixteen points including intensity of vertigo (8 points); number of attacks (4 points); and total duration of attacks (4 points).

Neck and shoulder pain: four points.

Headache: two points.

Daily living and work: four points.

Mental and social adaptability: four points.

According to the score before and after treatment, the improvement index was calculated as: Improvement index = (Post-treatment score – Pre-treatment score) ÷ Post-treatment score.

3.1.2 TCD examination

The hemodynamic parameters of left and right vertebral and basilar arteries of all participants were examined using the Elegre SONOLINE color Doppler sonography (Siemens AG, Germany) at 2.5 MHz of probe frequency: peak systolic velocity (Vs), end-diastolic flow velocity (Vd), mean velocity (Vm), pulsatility index (PI) and resistance index (RI). The patients were examined before treatment and 1 week after the treatment respectively, and the test value was printed out.

3.2 Criteria of therapeutic efficacy

Refer to the cervical spondylosis efficacy criteria in the *Criteria of Diagnosis and Therapeutic Effects of Diseases and Syndromes in Traditional Chinese*

Medicine^[9].

Cured: The original main symptoms disappeared; muscle strength, neck and limb function returned to normal.

Improved: The original main symptoms, and function of neck and limb improved.

Failure: No improvement in symptoms.

3.3 Results

3.3.1 Comparison of therapeutic efficacy

The total effective rate was 96.7% in the treatment group and 83.3% in the control group, with a significant difference between the two groups ($P < 0.05$). The curative rate was 66.7% in the treatment group and 20.0% in the control group. The difference was statistically significant ($P < 0.05$). These results suggested that the treatment group should be superior to the control group (Table 2).

3.3.2 Comparison of cervical vertigo symptom and functional assessment scale score

The differences in scores in both groups before and after treatment were statistically significant (both $P < 0.01$), indicating that both treatment methods were effective. The scores and improvement index were statistically significant different between the two groups after treatment (both $P < 0.05$), suggesting that the symptom improvement in the treatment group was better than that in the control group (Table 3).

3.3.3 Comparison of hemodynamic parameters

TCD was used to detect the hemodynamics of vertebral artery and basilar artery. Intra-group comparison: Vs, Vd, Vm, PI and RI of vertebral artery and basilar artery in both groups after treatment were significantly different from those before treatment respectively ($P < 0.01$ or $P < 0.05$). Between-group comparison: after treatment, the Vs, Vm and RI of vertebral artery and basilar artery of the treatment group were significantly different from those of the control group ($P < 0.01$ or $P < 0.05$), while there were no significant differences in Vd and PI. The above results indicated that the hemodynamic improvements in the treatment group were better than those in the control group (Table 4-Table 6).

Table 2. Comparison of therapeutic efficacy between the two groups (case)

Group	<i>n</i>	Cured	Improved	Failure	Curative rate (%)	Total effective rate (%)
Treatment	30	20	9	1	66.7 ¹⁾	96.7 ¹⁾
Control	30	6	19	5	20.0	83.3

Note: Compared with the control group, 1) $P < 0.05$

Table 3. Comparison of the scale score and improvement index ($\bar{x} \pm s$)

Group	<i>n</i>	Score (point)			Improvement index
		Before treatment	After treatment	Difference value	
Treatment	30	20.75±3.01	28.93±2.64 ¹⁾²⁾	9.06±1.52 ²⁾	0.39±0.07 ²⁾
Control	30	20.68±2.84	24.06±2.31 ¹⁾	4.38±1.48	0.24±0.08

Note: Compared with before treatment within group, 1) $P < 0.01$; compared with control group, 2) $P < 0.05$

Table 4. Comparison of hemodynamic parameters of basilar artery ($\bar{x} \pm s$)

Group	<i>n</i>	Time	Vs (cm/s)	Vd (cm/s)	Vm (cm/s)	PI	RI
Treatment	30	Before treatment	53.9±5.1	20.3±6.6	35.9±8.5	0.77±0.12	0.58±0.05
		After treatment	64.6±6.7 ¹⁾³⁾	26.3±8.6 ¹⁾	45.9±6.6 ¹⁾³⁾	0.57±0.13 ²⁾	0.42±0.02 ²⁾³⁾
Control	30	Before treatment	56.9±6.1	21.6±7.5	36.9±7.7	0.75±0.12	0.55±0.01
		After treatment	60.9±6.4 ¹⁾	27.7±7.6 ¹⁾	41.3±7.9 ¹⁾	0.59±0.16 ²⁾	0.54±0.02 ²⁾

Note: Intra-group comparison, 1) $P < 0.01$, 2) $P < 0.05$; inter-group comparison, 3) $P < 0.01$

Table 5. Comparison of hemodynamic parameters of left vertebral artery ($\bar{x} \pm s$)

Group	<i>n</i>	Time	Vs (cm/s)	Vd (cm/s)	Vm (cm/s)	PI	RI
Treatment	30	Before treatment	51.5±6.2	20.7±7.5	36.9±7.8	0.76±0.12	0.56±0.02
		After treatment	62.6±5.7 ¹⁾³⁾	25.7±8.5 ¹⁾	47.4±6.8 ¹⁾³⁾	0.56±0.13 ²⁾	0.49±0.03 ²⁾³⁾
Control	30	Before treatment	51.1±5.3	21.7±7.6	37.8±6.8	0.76±0.11	0.56±0.01
		After treatment	60.8±5.7 ¹⁾	24.9±7.4 ¹⁾	43.9±7.7 ¹⁾	0.57±0.16 ²⁾	0.52±0.02 ²⁾

Note: Intra-group comparison, 1) $P < 0.01$, 2) $P < 0.05$; inter-group comparison, 3) $P < 0.01$

Table 6. Comparison of hemodynamic parameters of right vertebral artery ($\bar{x} \pm s$)

Group	<i>n</i>	Time	Vs (cm/s)	Vd (cm/s)	Vm (cm/s)	PI	RI
Treatment	30	Before treatment	53.5±6.9	21.7±6.3	36.3±6.2	0.74±0.12	0.54±0.03
		After treatment	64.2±6.7 ¹⁾³⁾	26.7±7.2 ¹⁾	48.3±7.8 ¹⁾³⁾	0.55±0.12 ²⁾	0.49±0.02 ²⁾³⁾
Control	30	Before treatment	53.1±8.3	21.3±7.6	37.2±6.7	0.74±0.11	0.55±0.02
		After treatment	60.6±7.7 ¹⁾	25.6±7.4 ¹⁾	44.3±7.1 ¹⁾	0.56±0.14 ²⁾	0.51±0.01 ²⁾

Note: Intra-group comparison, 1) $P < 0.01$, 2) $P < 0.05$; inter-group comparison, 3) $P < 0.01$

4 Discussion

The clinical symptoms of CSA are positively correlated with neck activity. The pathogenesis of CSA is complex, and the pathogenesis of 'cervical instability' has received more and more acceptance by scholars^[10-14]. Fan WJ, *et al*^[15] believe that 'cervical instability' should be the main cause of vertebrobasilar artery insufficiency. Cervical instability refers to the decreased or lost ability of the cervical spine to maintain its own stability, leading to vertebral subluxation and beyond the physiological limits^[16], resulting in cervical disc degeneration, intervertebral instability or osteophyte

hyperplasia which oppresses vertebral artery and sympathetic plexus, causing vertebrobasilar insufficiency, and a series of clinical symptoms^[17]. The theoretical basis of chiropractic is 'subluxation of the spine', which means that the spine deviates from its normal position^[18]. Therefore, the concept of cervical subluxation and cervical instability is almost the same. The cervical chiropractic improves the cervical instability by correcting cervical subluxation, to reduce or eliminate pathological stimulation to the vertebral artery and achieve the therapeutic effect.

At present, vasodilator such as flunarizine hydrochloride, a calcium ion antagonist, is often used

for vertigo caused by CSA^[19]. TCD can accurately measure Vs, Vd, Vm, RI and PI of vertebral artery, and plays an important role in the detection of vertebral artery lesions^[20]. A scale that quantifies symptoms can assess the clinical efficacy of acupuncture for CSA, with good validity and reliability^[21]. Therefore, flunarizine hydrochloride was chosen as the intervention measure in the control group. TCD was used to check the hemodynamic parameters, and the cervical vertigo symptom and function evaluation scale was selected as the main outcome measurement in order to fully and objectively evaluate the results of this study.

This study shows that cervical chiropractic can improve the vertebral-basilar artery blood flow velocity, reduce its PI and RI, and effectively improve the vertebrobasilar artery blood supply. The curative rate and the total effective rate in the treatment group were higher than those in the control group, which indicated that the cervical spine orthopedic has definite curative effect on CSA, and its curative effect is better than oral flunarizine hydrochloride capsule. Thus it is worthy of widely clinical use. The sample size in this study is small, so we need to expand the sample size in the future and make a further study.

Conflict of Interest

There was no potential conflict of interest in this article.

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Statement of Informed Consent

Informed consent was obtained from all individual participants in this study.

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Translator: Feng Xiao-ming (丰晓冥)