Evaluation of Clinical Efficacy of Wumen Acupuncture in the Adjuvant Treatment of Non-arteritic Anterior Ischemic Optic Neuropathy

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Abstract [**Objectives**] To explore the clinical efficacy of Wumen acupuncture in the adjuvant treatment of non-arteritic anterior ischemic optic neuropathy (NAION). [**Methods**] From June 2023 to April 2024, 40 NAION patients were randomly divided into treatment group (Wumen acupuncture method + methylprednisolone sodium succinate + compound Danshen dripping pills orally) and control group (methylprednisolone sodium succinate + compound Danshen dripping pills orally). The clinical symptoms such as fundus condition and visual field were compared between the two groups before treatment, after 2 courses of treatment and 6 months after the first diagnosis. [**Results**] (i) After 2 courses of treatment, the patients with optic disc edema in the treatment group were more than those in the control group, and the difference was significant ($P<0.05$). The number of patients with retinal hemorrhage in the treatment group was less than that in the control group, and the difference was significant ($P<0.05$). The color of the optic nerve in the treatment group was less than that in the control group, and the difference was not significant ($P>0.05$). (ii) Six months after the first diagnosis, the improvement of fundus in the treatment group was better than that in the control group ($P<0.05$). After 2 courses of treatment and 6 months after the first diagnosis, the visual evoked potential was significantly improved compared with the control group ($P<0.05$). After 2 courses of treatment and 6 months from the first diagnosis, the number of lines of visual acuity improvement in the treatment group was greater than that in the control group ($P<0.05$). After 2 courses of treatment and 6 months from the first diagnosis, the average visual field defect in the treatment group was lower than that in the control group ($P<0.05$). [**Conclusions**] Wumen acupuncture method can significantly improve the symptoms of patients with non-arteritic anterior ischemic optic neuropathy, which is worthy of clinical promotion.

Key words Wumen acupuncture method, Adjuvant therapy, Ischemic optic neuropathy (ION)

1 Introduction

Ischemic optic neuropathy (ION) is a disease of neurological dysfunction caused by optic nerve ischemic disorder. It is generally divided into anterior ischemic optic neuropathy (AION) and posterior ischemic optic neuropathy (PION). Various lesions can be divided into many types. At present, non-arteritic anterior ischemic optic neuropathy (NAION) is the most common. NAION patients often suddenly suffer painless visual acuity after waking up, accompanied by optic disc edema, which is more common in middle-aged and elderly people[1]. The cause of the disease is not clear, some scholars believe that the cause of this disease is the acute perfusion of the short posterior ciliary artery and the ischemia and congestion of the optic disc caused by the factors of the blood vessel itself, which leads to the compression of the capillaries and aggravates the ischemia of the optic nerve. The phenomenon of reciprocating circulation causes the patient's optic nerve to be compressed for a long time, resulting in a serious condition. Although the treatment methods of hormones and vasodilators commonly used in clinical practice can shorten the course of NAION to a certain extent, the long-term use of hormones may cause more serious eye diseases, and the injection of vasodilators is more dangerous. Careless injection may lead to increased orbital pressure in patients, which may lead to other complications in patients[2]. With the progress and development of traditional Chinese medicine (TCM), acupuncture therapy has been used in the treatment of NAION. Through the study of the book *Acupuncture Therapy for Common Eye Diseases* written by Renfang CAO, a famous physician of Wumen Medical School, we found that the acupoint therapy mentioned in the book has high application value[3]. In order to clarify the effectiveness and safety of Wumen acupuncture method in the adjuvant treatment of NAION, we explored the effect of Wumen physician Cao Renfang's acupuncture method in the adjuvant treatment of NAION by grouping experiments on 40 NAION patients.

Received: June 11, 2024 Accepted: September 21, 2024

Supported by Suzhou Science and Technology Development Plan Project in 2021 (SKJYD2021231); The Ninth Batch of Suzhou Gusu Health Key Talents Project (GSWS2023015).

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2 Materials and methods

2.1 Case source and grouping From June 2023 to April 2024, NAION patients who were treated in the ophthalmology clinic of our hospital were selected as the research objects. Forty patients who met the inclusion criteria of NAION were selected and approved by the ethics committee of the hospital. The patients were divided into treatment group (Wumen acupuncture method + methylprednisolone sodium succinate + compound Danshen dripping pills orally) and control group (methylprednisolone sodium succinate + compound Danshen dripping pills orally) according to the parallel randomized controlled method. The general data of the two groups are shown in Table 1.

2.2 Diagnostic criteria

2.2.1 Western diagnostic criteria. With reference to the diagnostic criteria for NAION in *Chinese Expert Consensus on the Diagnosis and Treatment of NAION* (2015): (i) Sudden visual loss or

Table 1 General information of two groups ($n=20$)

Group	Gender (n)		Age//years	Disease history (n)			History of drug use//years
	Male	Female		Optic disc edema	Hypertension	Diabetes	
Control	10	10	50.62±6.72	8	6	6	4.25±3.28
Treatment	11	9	51.06±6.59	7	8	5	4.32±3.19
T/x^2	0.100		0.209	5.990			0.068
P	0.752		0.836	0.801			0.946

blindness, (ii) Fundus examination showed quadrant, horizontal and nerve bundle-like defects connected with physiological blind spots, (iii) Fundus examination showed localized or diffuse edema of the optic disc, often accompanied by radioactive strip and linear hemorrhage around the optic disc, (iv) Visual field examination revealed fan-shaped, quasi-quadrant defects connected to the optic disc, (v) The pupil has afferent disorder, and the pupil reaction is slow or fades when the light is light, (vi) There was abnormal visual evoked potential, (vii) The patient has other diseases that induce the disease, (viii) no other ocular nervous system lesions by means of examination.

2.2.2 Diagnostic criteria of TCM. With reference to the national Twelfth Five-Year Plan textbook *Ophthalmology of Traditional Chinese Medicine*, the eye is blind: (i) sudden vision loss often occurs in the morning or after sleep, without eye rotation pain; (ii) relative pupil afferent disorder may occur in eyes with monocular disease or severe binocular damage, (iii) corresponding fundus changes; (iv) visual field examination is a quadrant visual field defect connected to the physiological blind spot, (v) the P100 wave of visual evoked potential is delayed and the amplitude is decreased.

2.2.3 Diagnosis of TCM symptoms. Clinically, according to its disease manifestations, it is divided into four types: qi stagnation and blood stasis, qi deficiency and blood stasis, qi and blood deficiency and yin deficiency and yang hyperactivity. (i) Qi stagnation and blood stasis type: The patient shows a sudden drop in vision, upset, chest fullness, dark red tongue, and stringy pulse. (ii) Qi deficiency and blood stasis type: patients have visual loss, sallow complexion, lassitude, *etc.*, tongue pink with ecchymosis, pulse fine astringent. (iii) Qi and blood deficiency type: Patients with blurred vision, less food, loose stools, lazy words, *etc.*, lips and tongues are white, and the pulse is thin and weak. (iv) Yin deficiency and yang hyperactivity type: The patient's visual ability disappear, dizziness, insomnia, irritability, *etc.*, the tongue is dark red, the tongue coating is thin yellow, and the pulse string is slippery.

2.2.4 Inclusion criteria. (i) Conforming to the diagnostic criteria of Chinese and Western medicine, (ii) the course of disease is less than or equal to 14 d, (iii) the patient's general information is complete, (iv) needing to needle the skin without ulceration.

2.2.5 Exclusion criteria. (i) Eyes with other lesions, (ii) patients with liver and kidney dysfunction, (iii) patients with mental disorders, (iv) exitting the experiment halfway, (v) allergic to the required medication.

2.3 Treatment plans

2.3.1 Control group. Treated with methylprednisolone sodium succinate (manufacturer: Pfizer Manufacturing Belgium NV, approval number: H20150245, specification: 40 mg/tablet) orally, 200 mg one time daily for 3 d, and then changed to oral prednisone acetate (manufacturer: Guangzhou Kanghe Pharmaceutical Co., Ltd., approval number: H44021697, specification: 5 mg), 1 mg/(kg·d), morning service, gradually reduced to 0.5 mg/(kg·d), during the use of hormones, attention should be paid to potassium supplementation to protect the stomach. At the same time, Compound Danshen Dropping Pills (Manufacturer: Tasly Pharmaceutical Group Co., Ltd., Approval No. Z10950111, Specification: Film-coated Dropping Pills, 27 mg/pill) were taken orally, 10 pills at a time, tid. Continuous 14 d for a course of treatment, a total of 2 courses of treatment[1].

2.3.2 Treatment group. On the basis of the treatment plan of the control group, the acupuncture therapy was carried out according to the theory of Wumen Medical School in the *Common Eye Disease Acupuncture Therapy* (Cao Renfang). The acupuncture points were selected: Hegu, Jingming, Chengqi and Sanyinjiao. The patient was asked to lie in the supine position. After local disinfection of the skin, 0.3 mm×40 mm sterile acupuncture was selected, and the needle was inserted vertically for 25 – 40 mm. The twisting method was used to make up for the flat diarrhea, and the needle was retained for 30 min, once a day[4]. Continuous 14 d for a course of treatment, 2 courses of treatment.

2.4 Indicators and methods

(i) Comparison of fundus conditions between the two groups: three indexes of optic disc edema regression, retinal hemorrhage and optic nerve color fading were recorded. (ii) Comparison of visual acuity between the two groups: the standard logarithmic visual acuity chart was used to determine the uncorrected visual acuity before and after treatment, and the number of lines of visual acuity improvement was recorded. (iii) The average defect of visual field was compared between the two groups: the average defect of automatic static visual field was detected by visual field analyzer (Zeiss visual field analyzer, Humphrey field Analyzer, model: 850). (iv) Comparison of two groups of visual evoked potentials: German Roland electrophysiological system was used for visual evoked potential examination, and the graphic flip stimulation was non-invasive through black and white grids. The latency and amplitude of P100 wave were observed when the square size was 157 and 603.

2.5 Statistical methods

The fundus, visual acuity, visual field and visual evoked potential data of all patients before treatment, after 2 courses of treatment and 6 months after the first diagnosis were sorted out and entered into the Excel table. The data were summarized and the statistical software SPSS18.0 was used to analyze the data. The counting data were expressed in the form of n (%), and the measurement data were expressed by mean ± standard deviation ($\bar{x}\pm s$) by x^2 test. The paired sample T test was

used for comparison before and after the group, and the independent sample T test was used for comparison between groups. $P<0.05$ was considered statistically significant to analyze the therapeutic effect.

3 Results and analysis

3.1 Comparison of fundus examination between the two groups of patients Before treatment, there was no significant difference in fundus examination between the two groups ($P>0.05$). After 2 courses of treatment, the patients with optic disc edema in the treatment group were more than those in the control group ($P<0.05$). The patients with retinal hemorrhage in the treatment group were less than those in the control group ($P<0.05$). The color of the optic nerve in the treatment group was less than that in the control group ($P>0.05$). Six months after the first diagnosis, the number of patients with optic disc edema in the treatment group was significantly more than that in the control group ($P<0.05$). The patients with retinal hemorrhage and optic nerve color fading in the treatment group were less than those in the control group ($P<0.05$), as shown in Table 2.

Table 2 Fundus examination of patients ($n=20$, %, case)

Group	Optic disc edema subsides			Retinal hemorrhage			Lighten the color of the optic nerve		
	Before treatment	After 2 courses of treatment	Six months after the first diagnosis	Before treatment	After 2 courses of treatment	Six months after the first diagnosis	Before treatment	After 2 courses of treatment	Six months after the first diagnosis
Control	9	15	18	15	6	2	14	7	2
Treatment	6	8	9	13	13	8	15	12	9
x^2	0.960	5.013	9.231	0.476	4.912	4.80	0.125	2.506	6.144
P	0.327	0.025	0.002	0.490	0.027	0.028	0.723	0.113	0.013

3.2 Comparison of the number of lines of visual acuity improvement between the two groups Before treatment, there was no significant difference in visual acuity between the two groups ($P>0.05$). After 2 courses of treatment and 6 months after the first diagnosis, the number of lines of visual acuity improvement in the treatment group was greater than that in the control group ($P<0.05$). Before treatment, the average visual field defect of the two groups was similar ($P>0.05$). After 2 courses of treatment and 6 months after the first diagnosis, the average visual field defect in the treatment group was lower than that in the control group ($P<0.05$), as shown in Table 3 and Table 4.

Table 3 Visual acuity improved rows ($n=20$, $\bar{x}\pm s$)

Group	Before treatment	After 2 courses of treatment	Six months after the first diagnosis
Control	0.31±0.10	2.53±0.62	2.94±0.71
Treatment	0.33±0.08	1.55±0.71	2.34±0.58
T	0.698	4.650	2.927
P	0.489	0.000	0.006

Table 4 Average visual field defect of patients ($n=20$, $\bar{x}\pm s$, dB)

Group	Before treatment	After 2 courses of treatment	Six months after the first diagnosis
Control	15.62±1.35	7.56±1.54	5.31±0.37
Treatment	15.58±1.29	10.21±1.58	7.97±1.51
T	0.096	5.371	7.652
P	0.924	0.000	0.000

3.3 Comparison of two groups of visual evoked potential measurement Before treatment, the difference of visual evoked potential between the two groups was small ($P>0.05$); after 2 courses of treatment and 6 months from the first diagnosis, the visual evoked potential of the treatment group was improved compared with the control group ($P<0.05$), as shown in Table 5.

Table 5 Visual evoked potential ($n=20$, $\bar{x}\pm s$)

Group	Wave amplitude of P_{100} // μV			Peak latency of wave of P_{100} // ms		
	Before treatment	After 2 courses of treatment	Six months after the first diagnosis	Before treatment	After 2 courses of treatment	Six months after the first diagnosis
Control	4.78±2.84	7.34±3.64	11.25±4.29	112.54±15.7	104.42±5.18	98.64±5.06
Treatment	4.62±2.59	5.24±2.71	6.26±2.27	110.84±16.2	107.88±5.24	103.27±5.13
T	0.186	2.070	4.598	0.337	2.100	2.874
P	0.853	0.045	0.000	0.738	0.042	0.007

4 Discussion

The clinical treatment of NAION is mostly western medicine treatment. The treatment drugs include vasodilators, hormones and neurotrophic drugs. Vasodilator drugs may lead to lower systemic blood pressure in patients, thereby aggravating local ischemia. If not careful during injection, it may lead to retrobulbar hemorrhage in patients, increase in the blood pressure in the orbit, more serious complications in patients, and affecting the life safety of patients. Short-term use of hormone drugs (within 14 d) can improve the patient's vision and unemployment, and promote the improvement of optic disc edema. However, long-term use of such drugs can lead to glaucoma and other ophthalmic diseases, not only could not achieve remission. It may also aggravate the disease[1]. Neurotrophic drugs can reduce capillary permeability, thereby slowing optic disc edema, but such drugs generally need to be used in combination with other drugs to achieve a more significant effect.

With the development of traditional Chinese medicine, acupuncture is widely used in various diseases. Acupuncture can stimulate the local muscles of patients without increasing side effects, relieve the tension of orbicularis oculi muscle, improve the symptoms of low vision and unclear vision, and reduce the degree of optic disc edema. Long-term use can also reduce the probability of optic atrophy[5].

Traditional Chinese medicine believes that the main causes of NAION are blood stasis blocking collaterals and eye dystrophy. Patients are not comfortable, qi disorder ; or heart qi loss, slow blood flow; or excessive mood, qi and blood upward ; or gluttony, phlegm heat endogenous can lead to the onset of patients, Suzhou Wumen Medical School Ophthalmology expert Dr. Cao Renfang engaged in ophthalmology work for more than 40 years, for such diseases have unique experience, after years of clinical practice and observation, he wrote the book *Common Eye Disease Acupuncture Therapy* (published by People's Health Publishing House), a modern famous old Chinese medicine masterpiece reprint series, it also contains acupuncture therapy for NAION. In the book *Common Eye Disease Acupuncture Therapy*, it is pointed out that if the patient has a history of obvious blood loss or systemic anemia, such as irregular menstruation and metrorrhagia, the patient will obviously have ocular symptoms such as blackening in front of the eye and decreased vision. This phenomenon is more obvious before menstruation, and the patient will also have visual field defect[6]. Fundus observation shows that the patient's optic nerve papilla has obvious edema and pale color, often accompanied by unclear boundaries, thinning of yang collaterals, and tortuous filling of veins. The treatment methods are mostly based on promoting blood circulation and dredging meridians, and replenishing qi and nourishing blood. Hegu, Jingming, Chengqi and Sanyinjiao can be selected for acupuncture operation. Hegu acupoint is located between the first and second metacarpal bones on the back of the hand, and the middle point of the radial side of the second metacarpal bone. It belongs to the large intestine meridian of hand Yangming. It has the effect of regulating qi and blood, promoting blood circulation and relieving pain. It can obviously eliminate the phenomenon of optic disc edema and quickly restore the premorbid state of patients. The Jianming point is located outside the inner canthus of the eye. It is half a point away from the inner corner of the eye on both sides of the nasal bridge, which can reconcile the qi and blood of the eye and restore the patient's color. Chengqi point is located under the pupil, between the eyeball and the inferior orbital margin. It belongs to the stomach meridian of foot Yangming. Its main function is to regulate the blood vessels of the head, face and eyes. Because the spleen and stomach are exterior and interior to each other, it can also provide sufficient maintenance for the eyes. Sanyinjiao is the intersection of the three meridians of spleen, liver and kidney. It belongs to the spleen meridian of foot Taiyin, which can nourish yin and blood, invigorate the spleen and eliminate dampness[7].

NAION patients are often accompanied by cardiovascular diseases such as hypertension and diabetes. The reason may be that such diseases can easily lead to vascular blockage in patients, which in turn causes the occurrence of insufficient blood supply. Patients are accompanied by anemia, hypotension and other phenomena, leading to optic disc ischemia, which in turn causes diseases. The body treatment can be treated according to the patient's signs, and it reduces the probability of vascular blockage and stenosis, and has a positive effect on the treatment of NAION. On this basis, according to the appearance of fundus inspection, according to the severity of the patient's condition, acupuncture therapy can play a multiplier effect. Although NAION patients have a rapid decline in vision, the rate of decline does not occur in an instant, and local conditioning of the patient's eye muscles can be performed to relieve the patient's symptoms. The results of this study showed that the fundus condition, visual evoked potential and visual field of the treatment group were improved in the control group. The reason was that acupuncture therapy combined with drugs, relaxed the smooth muscle of the eye, stimulated the muscle nerve of the eye, and then alleviated the atrophy of the optic nerve of the patient, so that the patient's vision was gradually restored, and the patient's visual field defect was also improved. In summary, acupuncture therapy under the theory of Wumen medical school can effectively assist the treatment of patients with non-arteritic anterior ischemic optic neuropathy symptoms, can significantly improve the patient's fundus, visual evoked potential and visual field, relieve optic atrophy, and has clinical promotion value.

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