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Original Article

Treatment efficiency of heat-sensitive moxibustion affiliation in children with unilateral hyperopic anisometropic amblyopia

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Abstract: Objective: This study aims to investigate the efficacy of Heat-sensitive moxibustion affiliation treatment for unilateral hyperopic anisometropic amblyopia. Methods: 92 children (aged from 8 a to 14 a) diagnosed as unilateral hyperopic anisometropic amblyopia in the First Affiliated Hospital of Nanchang University from 2007 to 2013 were include in this prospective random controlled study. All patients were divided into three groups and treated with different therapeutic method: occlusion (group A), combination of occlusion and video game (group B), and combination of occlusion, video game and heat-sensitive moxibustion (group C). After 60 days treatment, all cases were received therapy with red light flicker, luster, light brush for 120 days at home. All treatments were finished until 180 days later. In addition, visual acuity assay and visual evoked potentials (VEP) were used in all case at pre-therapy and 20 d, 40 d, 60 d, 180 d of post-therapy during the period of treatment. Results: There were no significant differences in age, course and visual acuity in three groups ($F=1.88, 0.82, 0.38$; $P>0.05$). After 60 days treatment, the visual acuity of all case in three groups were increased. The BCVA (The best-corrected visual acuity) of patients in group B and group C were higher than that of patients in group A at every time point ($P<0.05$). After 180 days treatment, BCVA was improved from baseline by an average of 1.07 lines in the group A, 2.83 lines in the group B and 5.86 lines in the group C. Comparing with the latency of P100 of VEP elicited by reversing checkerboard with different spatial frequencies in case before treatment, the latency of P100 of VEP were shortened significantly in three groups at 180 d. Besides, the latency of P100 of VEP elicited in group C were less shorter than other case in group A and B [4 period/radian, $t=11.62$, $P<0.05$; 8 period/radian, $t=9.68$, $P<0.05$]. Conclusion: Heat-sensitive moxibustion affiliation treatment is effective and reliable therapeutic tool for unilateral hyperopic anisometropic amblyopia.

Keywords: Hyperopic anisometropic amblyopia, affiliation treatment, VEP, heat-sensitive moxibustion

Introduction

Moxibustion is a traditional Chinese method that treats diseases through thermal stimulation generated by burning Moxa at special acupuncture and moxibustion points [1]. Moxibustion is effective to treat disease by providing warm energy, expels Qi-blood stagnation, and enhances local blood circulation. Suspended moxibustion is the most common therapy in China which involves burning of moxa on the acupuncture points at a distance, and heat-sensitive moxibustion therapy as one of common suspended moxibustion treatments can stimulates a unique of Deqi [2]. Different from other conventional suspended moxibustion treatments, heat-sensitive moxibustion administered moxibustion on heat-sensitive acupuncture points, which are extremely sensitive to the heat stimulation of burning moxa. By this way, it is easier for channel Qi to transmit and to allow a strong response to be produced by weak stimulation.

Amblyopia, which harms children both physically and psychologically, is one of the most

common forms of visual impairment to affect one eye, with a world wide prevalence of up to 5% of children [3]. Although a variety of treatments are available, it is difficult to find a treatment for unilateral hyperopic anisometropic amblyopia (HAA), which severely damages vision and is the common cause of disuseexotropia [4]. Studies have shown that, in humans and other mammals, intrinsic neural connections and synaptic structures can be altered after birth by adjusting the visual system according to environmental stimulation [5, 6]. This sensitive period of visual development is called the critical period [7]. Therefore, ophthalmologists have focused heavily on establishing an ideal way to extend or restore visual development in the sensitive period of the amblyopic eye in order to improve visual acuity (VA) in older patients with HAA. During this period, an abnormal visual environment, such as anisometropic amblyopia, can lead to visual impairment. The cells that are developing in accordance with the change of environment remain in a reversible state. After this period the impact on visual pathways and the development of visual function that has been formed by the abnormal visual environment during the critical period becomes irreversible [8].

HAA must be detected and treated early in order for binocular vision to be formed after the improvement of VA [9]. Through clinical practice, we found that developing rational treatment options for HAA and subsequently choosing the right treatment is the key to the effectiveness of therapy. From August 2008 to August 2013, a total of 92 patients with HAA were selected from the ophthalmology department of our hospital and randomly divided into three groups. Group A was treated with occlusion, [10] Group B was treated with a combination of occlusion and a video game, and Group C was treated with a combination of occlusion, a video game, [11] and heat-sensitive moxibustion. The results are shown below.

Materials and methods

Ethical considerations

The study was conducted in accordance with the principles of the Declaration of Helsinki. For each patient, the study protocol and procedure was fully explained, and consent was obtained, according to the Ethical Committee of our hospital.

The experimental design

This research project was commenced in late 2008 and completed in mid-2013. The first author (Y.S.) was responsible for conducting the clinical procedures in screening patients and assigning participants to interventions. In all, 120 children previously diagnosed as having unilateral HAA at our hospital from January 2007 to January 2013 were randomly divided into three groups. Patients in Group A were treated with occlusion, Group B were treated with occlusion and a video game, and Group C were treated with occlusion, a video game, and moxibustion Fengchi. After 180 days of treatment, a total of 92 children were recruited and analyzed.

There were 45 girls and 47 boys aged 7-14 years old (average 11 years). In total, there were 36 eyes with mild anisometropic amblyopia, 36 with moderate anisometropic amblyopia, and 24 eyes with severe anisometropia amblyopia. There were 86 cases with central fixation and six with eccentric fixation. All patients were required to have routine examinations for the anterior segment and fundus so as to exclude organic eye disease. No subject had ever undergone conventional treatment for anisometropia amblyopia, nor had they undergone conventional treatment for 6 months without alleviation and quit after 6 months.

Treatment methods

The amblyopic eye was the one to be treated, and the untreated eye was completely covered for 20 days. All groups covered the healthy eye for 6 h/day in the early 60 days'. The treatment program consisted of a continuous 10-day course administered once daily. At the end of the course the children went home to do home exercises for 10 days, and then the next phase of treatment was begun. Three phases of treatment/home exercises were conducted successively. After three phases, children went home to do home training for 120 days.

Fengchi thermal positioning and heat-sensitive moxibustion operations were performed according to the moxibustion method reported by Chen Rixin [12-14]. During the covering period for Group C, heat-sensitive moxibustion at bilateral Fengchi therapy was implemented as follows: the heat-sensitive zone was probed near the Fengchi area; the heat-sensitive moxibus-

tionmoxa [15-17] (produced by Affiliated Hospital of Jiangxi TCM University) was lit about 3 cm over the skin with swing moxibustion; and the Fengchi of the heat-sensitive state was defined as being where the patient felt moxibustion perfusion into the depths of the skin or moxibustion sensor [18, 19]. All patients were trained and mastered the skill before treatment so that they could perform moxibustionat the Fengchi of the heat-sensitive state (as described above). The treatment was conducted once a day, and each treatment period lasted until the sensation of heat-sensitive moxibustion disappeared, which took about 20-40 minutes. Each subject in Group C received the heat-sensitive moxibustion therapy for 30 days in total. The best-corrected VA, thickness of the retinal nerve fibre layer (RNFL), and the amplitude and latency of the P100 peak of each patient were measured and analyzed.

Clinical data analysis

All the subjects underwent measurement of axial length with the IOL Master (IOL Master 500, Carl Zeiss Shanghai Co., Ltd), retinal thickness by Optical coherence tomography (OCT, Cirrus HD-OCT 4000, Carl Zeiss Shanghai Co., Ltd) [20] and pattern-reversal VEP stimulation in a dark and quiet room for both eyes by using the RETLPORT electrophysiological instrument (RET1-Port/Scan21, ROLAND CONSULT Stasche & Finger GmbH) [21]. The average value of the axial length of the eye is automatically obtained by IOL Master after the 5 times measurement [22].

OCT examination steps: Each participant was positioned on the OCT headrest and requested to direct their gaze at the internal fixation point. Using volume scan mode, the macular area was scanned without mydriatics. The scan field was 6 × 6 mm^2 of the macula, and the 49 × 512 scan pattern was used in the study. The instrument's inbuilt software analyzes the measurements automatically. The macula was divided into three concentric circles, a central circle 1 mm wide, the inner zone of 1-3 mm and an outer ring area of 3-6 mm. The inner and outer rings were divided into four areas: upper, lower, nasal, and temporal. Altogether this created nine areas in the macula to analyze. All the images should have the foveal position corrected manually to ensure that scanning is located in the center. The thickness of a 1 mm diameter range of the macular fovea, the RNFLT around the optic nerve head were analyzed by software automatically [23].

The latency were filtered and analyzed by means of repeated (100) simulations 2 times for each eyes. The VEP amplitude was evaluated based on the laboratory-designed reference value [24]. Visual evoked potential (VEP): a checkerboard pattern reversal was applied with the reversal frequency of 1.6 Hz. There were four kinds of checkerboard stimulating spatial frequency: 1, 2, 4, and 8 cycles/degrees, and the contrasts were held at a constant 0.95. The distance from the monitor screen to the eye during measurement of visual evoked potentials was 0.74 m [25]. All subjects had a follow-up at 6 months to observe the changes of vision and VEP, and to evaluate the therapeutic effects of HAA with different causes.

Diagnostic criteria

The diagnosis was made in accordance with the 1999 Criteria for Children with Oblique Anisometropia Amblyopia, except for those with anisometropia amblyopia caused by nystagmus. The diagnostic classification for anisometropia amblyopia includes mild (VA 0.8-0.6); moderate (VA 0.5-0.2); and severe (VA≤0.1). The evaluation of treatment criteria were as follows: patients were considered to be cured if the VA was improved to 0.9 or more; the treatment was regarded as effective if VA improved by two lines or more; and treatment was regarded as ineffective if VA improved by only one line or remained unchanged.

Statistical analysis

All values are expressed as means ± standard deviation (SD). ANOVA was used for all indexes before and after treatment comparisons, Dunnett-t test was applied for multiple comparisons. Differences between two groups were performed using the paired t test. A value of $P<0.05$ was considered statistically significant. Calculations and statistical analyses were performed using the 19.0 software package for Windows (SPSS, China).

Results

The clinical outcomes

The average patient age was 11, ranging from 7 to 14 y. There were no significant difference in

Table 1. The common condition of unilateral hyperopic anisometropic amblyopia patients at pre-therapy in three groups (x±s)

Variables	A (n=30)	B (n=32)	C (n=30)
N (Right/Left)	30 (14/16)	32 (16/16)	30 (12/18)
Age (Range, year)	10.96±3.34 (7-14)	11.39±3.48 (7-14)	11.26±3.17 (7-14)
Sex (Male to female)	14/16	17/15	16/14
Axial length (mm)	21.07±2.56	21.46±2.34	21.24±3.14
Strabismus (eye, %)	6 (%)	8 (%)	6 (%)

Data are shown as mean ± SD. Dataare shown as mean ± SD. Groups B, C *vs* Group A, #P<0.05.

the age, the sex, axial length andstrabismus ratio among three groups (all P>0.05, **Table 1**).

The best-corrected visual acuity (BCVA)

Follow-up time was divided into several periods and plotted using a mixed model analysis (see **Figure 1**). The follow-up time was divided into baseline visit (before treatment), 0-20 days, 20-40 days, 40-60 days, 60-180 days.

As shown in **Figure 2**, there were no significant differences in the BCVA of unilateral anisometropia amblyopia between the three groups before treatment (all P>0.05). In all groups BCVA increased with the passing of time. After phase of 1 of the treatment the BCVAs of Groups B and C were higher than in Group A at every time point (P<0.05). However, after 20 days' treatment there were no significant differences in either Group B or Group C (P<0.05). After 180 days BCVA had improved from baseline by an average of 1.07 lines in Group A, 2.83 lines in Group B, and 5.86 lines in Group C. The level of improvement was statistically different between the three treatment groups (P=0.12, P=0.16, P=0.27, respectively; **Figure 2**). During follow-up the BCVA of 54 eyes improved to normal VA (Group A, 9 eyes; Group B, 18 eyes; Group C, 27 eyes); the differences in improved BCVA among the three groups before and after treatment were statistically significant (all P<0.05; **Figure 2**, **Table 2**).

At each time point, the box on the left demonstrated the distribution best-corrected visual acuity for the group A, the one on the middle represented the data for the group B and the others on the right represented the data for the group C. The top and bottom of each box represented the 25th and 75th percentiles of the data and the line in the box showed the median. The three groups' means are represented by a blue (group A), green (group B), red (group C) and are connected across the visits with lines. The bars extending above and below each box represented 1.5 times the interquartile range (difference between the 25th and 75th percentiles), and the open circles are outlier values. Dataare shown as mean ± SD. Before therapy *vs* after therapy, *P<0. 05; Groups B, C *vs* Group A, #P<0.05.

The change of RNFL thickness with unilateral hyperopic anisometropia amblyopic at follow-up visits

There were no significant difference in the Thickness of RNFL around Fovea among three groups before therapy and at 180 d of therapy (all P>0.05). The details are presented in **Table 3**.

As listed in **Table 4**, there were no significant difference in Thickness of RNFL around optic disk among three groups before therapy and at 180 d of therapy (all P>0.05).

The change in VEP with unilateral hyperopic anisometropia amblyopia at follow-up visits

There were no significant differences in the amplitude of P100 waves among the three groups either before therapy or after 180 days of therapy in 1, 2, 4 and 8 cycle/degree (all P>0.05; **Table 5**), nor were any differences observed in the latency of P100 waves among three groups before and at 180 days after therapy in 1 and 2 cycle/degree (**Figure 3A** and **3B**). However, in Group B the latency of P100 waves decreased compared with that in Group A at 1 and 2 cycle/degreeat 180 days of therapy (4 cycle/degree: B=108.13±6.55, P<0.05 vs Group A; 8 cycle/degree: B=111.93±7.37, P<0.05 vs Group A). The combination of video games

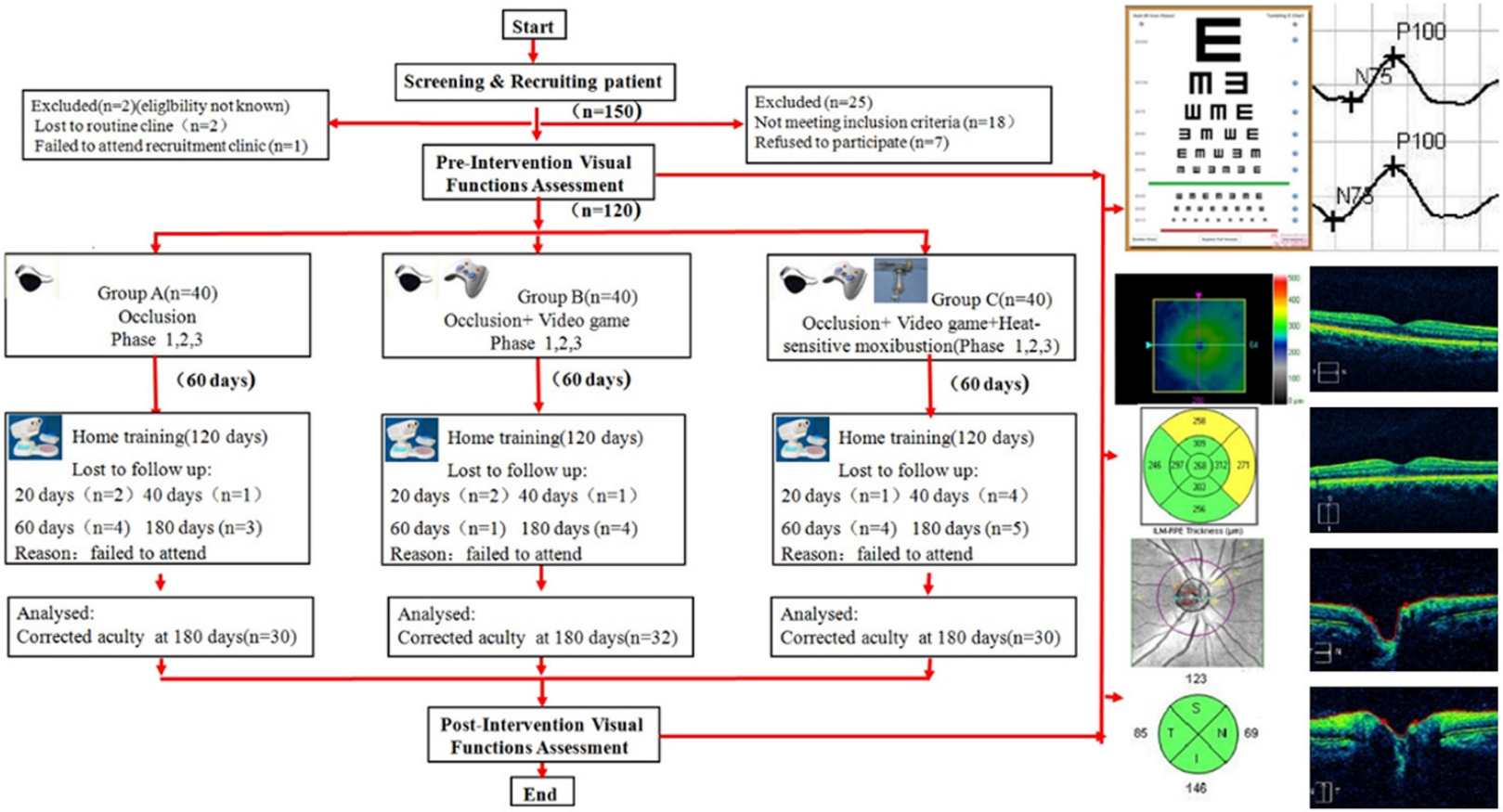

Figure 1. Outline of study procedures.

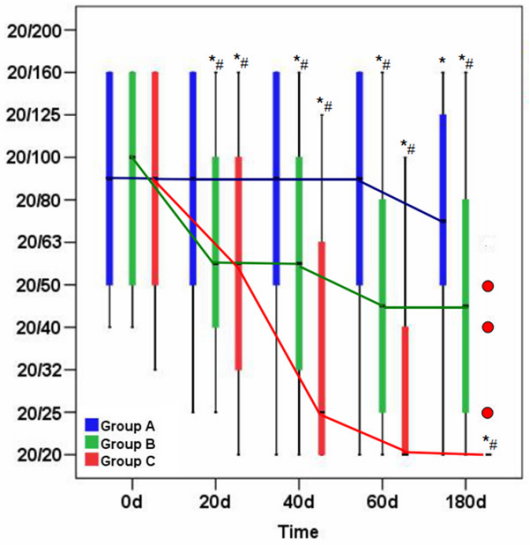

Figure 2. Mean best-corrected visual acuity from baseline to 180 days.

and heat-sensitive moxibustion reduced thelatency of P100 waves in 1 and 2 cycle/degrees, whereas playing videogames did not alter the latency of P100 waves at 20 days of therapy (**Figure 3C** and **3D**). The latency of the P100 wave in Group B was lower than that in Group C at 180 days of therapy (4 cycle/degree: C=100.40±3.14, P<0.05 vs Group B; 8 cycle/degree: C=105.40±5.02, P<0.05 vs Group B; **Figure 3C** and **3D**). In this study, we confirmed that Groups B and C could partially recover the reduction in latency of the P100 wave in unilateral hyperopic anisometropic amblyopia.

The clinical validity

After 180 days treatment, the cure rate of group B was 56.2%, while the cure rate of group A was 30%, there was statistical difference in cure rate between two groups (χ^2=8.184, P<0.05 *vs* Group A). However, in Group C, 27 patients (cure rate: 90%) experienced a therapeutic effect after 180 days treatment. There were significant difference in the cure rate among three groups (χ^2=12.626, P<0.05 *vs* Group A; χ^2=14.231, P<0.05 *vs* Group B, see **Table 6**).

Discussion

Amblyopia is a developmental disorder of visual function which has a long treatment cycle and a high rate of relapse [26]. The best treatment period for children is between 3 and 7 years of age, which is also the critical period for vision development. Early detection and timely treatment are keys to saving visual acuity in affected children. Therefore, the cooperation of parents and a commitment to treatment for preschool children are both essential for the effectiveness of this treatment [27]. In this study, the majority of subjects were >7 years old and had been diagnosed with unilateral HAA. O wing to the good vision in the healthy eye, patients tend to ignore the blurred vision in the unhealthy one, which makes it difficult for doctors and researchers to detect the existence of the weak eye. Traditional treatments, such as occlusion and video games, stimulate the amblyopic eye and improve visual function by repressing the dominant eye, a technique referred to as passive disinhibition. When the amblyopic eyeis inhibited, less of a therapeutic effect is attained because of the low sensitivity of the conventional method.

Covering is one of the preferred treatment methods for anisometropia amblyopia. With covering, the inhibition of the dominant eye to the amblyopic eye is blocked to increase visual stimulation to the amblyopic eye, which ultimately leads to an improvement in VA. Poor compliance for various reasons during treatment directly reduces the cure rate of anisometropia amblyopia. The short-term covering technique that we used can be done at home, which reduces the physiological and psychological effects on children and ultimately contributes to improving their compliance. Using short-term covering, the inhibition to the amblyopic eye was either mitigated or eliminated. This increased the opportunity to use the amblyopic eye and thereby improved its VA.

Fengchi (GB 20) is a common acupoint for clinical treatment of eye diseases. It belongs to the Gallbladder Meridian of Foot-shaoyang. Fengchi is also the rendezvous point of the Meridian of Hand-shaoyang, Meridian of Foot-shaoyang hand, Yangwei Meridian, and Yangqiao Meridian. The point is below the occipital bone and the depression is like a pool, and just as its name implies that it is an important point in eliminating pathogenic wind since the point has the function of clearing heat, dispelling wind and brightening the eye [28]. The pathogenesis of anisometropia amblyopia in children is mainly caused by the dysfunction of the VA conduction system from retinal ganglion cells to the visual center.

Table 2. Mean treatment group improvement in best-corrected visual acuity at follow-up visits (Lines)

Group	n	0 d	20 d	40 d	60 d	180 d
A	30	7.37±2.30	7.23±2.37 (0.14)	7.13±2.57 (0.24)	7.11±2.64 (0.26)	6.30±2.83 (1.07)*
B	32	7.40±2.24	5.97±2.74 (1.43)*,#	5.47±3.01 (1.93)*,#	4.73±2.96 (2.67)*,#	4.57±2.80 (2.83)*,#
C	30	7.33±2.28	5.83±2.73 (1.5)*,#	3.50±2.87 (3.83)*,#	2.23±2.22 (5.1)*,#	1.47±1.25 (5.86)*,#

Data are shown as mean ± SD. Before therapy *vs* after therapy, *P<0.05; Groups B, C *vs* Group A, #P<0.05.

Table 3. Thickness of RNFL around Fovea (μm) in three groups at follow-up visits

Region	A		B		C	
	Pretherapy	180 d	Pretherapy	180 d	Pretherapy	180 d
Central area (1 mm)						
	278.79±39.34	275.16±38. 82	277.56±37.62	276.92±37.78	275.23±38.89	276.12±37.77
Inner ring (3 mm)						
Nasal	341.89±30.56	342.15±29.98	342.93±29.81	341.77±30.15	343.61±30.02	342.19±31.13
Temporal	326.34±31.54	325.98±32.02	325.12±32.66	326.71±33.14	326.04±33.09	328.79±30.66
Superior	343.03±27.19	342.97±28.32	342.84±26.16	343.03±27.11	341.95±29.14	342.24±30.19
Inferior	335.18±24.89	335.04±25.16	334.65±26.53	335.08±27.86	335.37±28.62	337.07±26.97
Outer ring (6 mm)						
Nasal	322.79±23.16	323.67±22.02	321.19±20.88	322.52±22.19	322.63±21.67	324.12±23.28
Temporal	291.98±20.68	291.77±21.26	292.12±21.23	291.48±20.94	293.74±16.58	292.18±19.69
Superior	306.15±28.82	307.02±29.16	306.86±27.89	307.71±29.03	308.28±30.11	309.11±29.76
Inferior	302.83±40.16	303.03±39.94	303.14±39.37	304.19±38.21	304.62±38.85	305.14±39.07

Data are shown as mean ± SD. Before therapy *vs* after therapy, *P<0.05; Groups B, C *vs* Group A, #P<0.05.

Table 4. Thickness of RNFL around optic disk (μm) in three groups at follow-up visits

Region	A		B		C	
	Pretherapy	180 d	Pretherapy	180 d	Pretherapy	180 d
Full-circle	100.95±23.98	101.33±22.89	101.82±22.72	102.39±23.18	102.13±22.02	103.19±21.77
Nasal	70.82±17.74	70.99±18.06	70.96±16.61	71.64±18.17	71.09±15.92	71.31±17.63
Temporal	87.38±7.52	88.51±6.99	87.43±7.18	88.71±6.19	88.07±8.01	88.34±7.98
Superior	125.92±18.71	126.09±18.59	125.78±18.87	125.81±19.53	125.97±20.34	126.12±22.68
Inferior	126.39±21.06	126.57±20.62	126.43±20.73	127.13±19.89	126.11±23.09	127.25±20.24

Data are shown as mean ± SD. Before therapy *vs* after therapy, *P<0.05; Groups B, C *vs* Group A, #P<0.05.

Table 5. P100 of VEP at pre-therapy and post-therapy 180 d in three groups at follow-up visits

	A		B		C	
	Pretherapy	180 d	Pretherapy	180 d	Pretherapy	180 d
Latency of P100						
1 cycle/degree	106.84±5.36	105.13±6.12	105.91±5.92	104.36±6.89	106.67±6.53	104.01±6.25
2 cycle/degree	110.77±6.83	109.52±7.02	111.02±5.73	108.89±6.16	110.97±5.16	108.48±5.67
4 cycle/degree	115.63±6.39	111.53±8.18	116.13±6.09	108.13±6.55*,#	115.73±6.38	100.40±3.14*,#
8 cycle/degree	120.27±6.17	113.43±7.59*	119.83±6.16	111.93±7.37*,#	118.83±6.64	105.40±5.02*,#
Amplitude of P100						
1 cycle/degree	10.82±5.12	10.92±5.01	10.61±5.33	10.88±5.95	10.92±5.09	11.16±6.17
2 cycle/degree	11.16±6.53	11.51±5.77	11.68±6.74	11.67±5.14	11.58±6.38	12.09±6.11
4 cycle/degree	12.04±6.19	12.55±6.76	12.25±5.89	13.26±6.05	12.63±6.12	13.11±5.87
8 cycle/degree	13.31±5.07	13.86±6.91	13.42±5.94	14.13±6.08	13.77±5.83	13.75±6.94

Data are shown as mean ± SD. Before therapy *vs* after therapy, *P<0.05; Groups B, C *vs* Group A, #P<0.05.

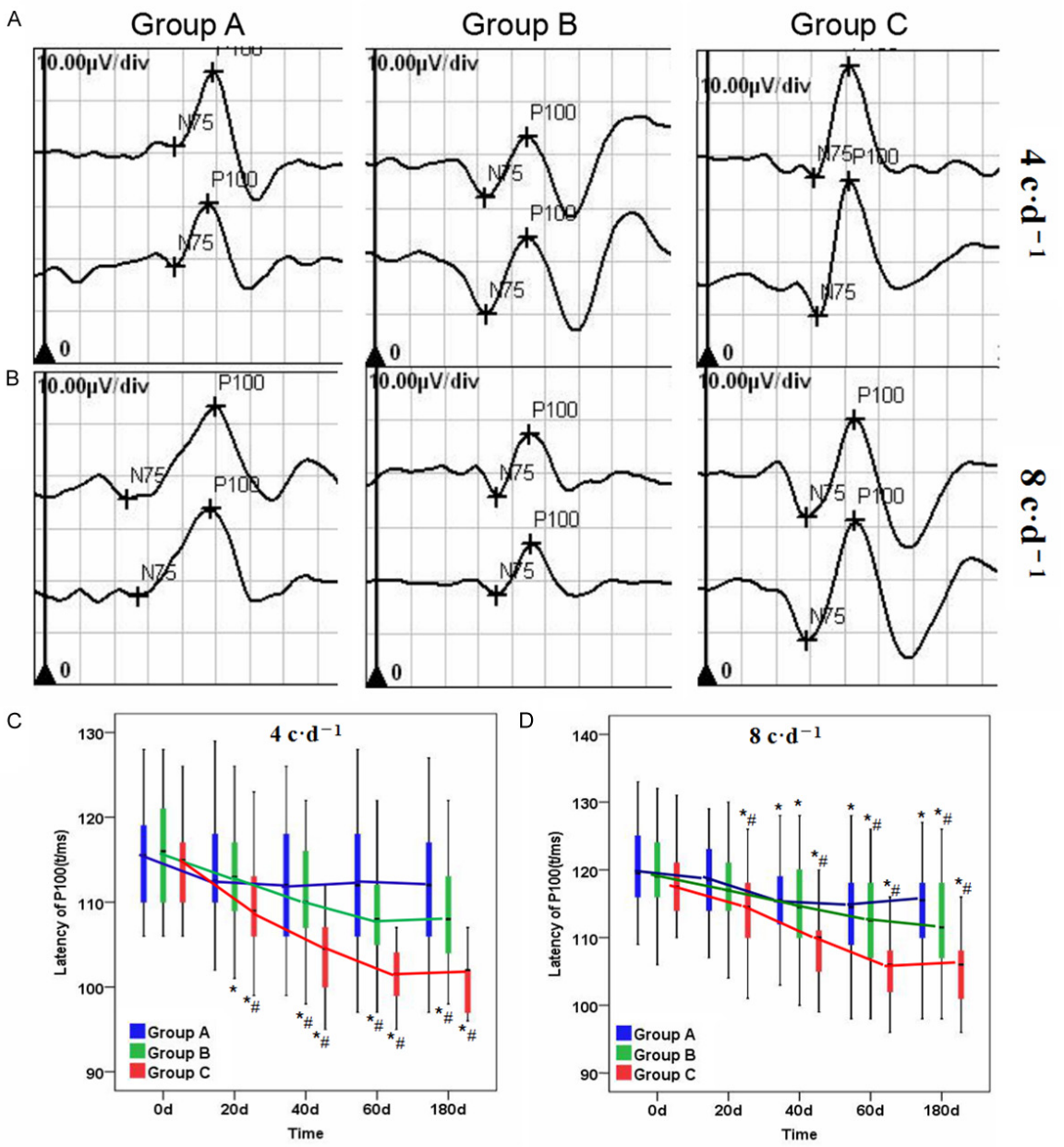

Figure 3. The change of VEP with unilateral hyperopic anisometropia amblyopic in 4 and 8 cycle/degree among three groups at follow-up visits. At follow-up visits, the latency of P100-waves among three groups was examined at 6 (A) and 8 cycle/degree (B). Four bright flashes were used for stimulation, and the latency of P100-waves (C, D) in the three groups were quantified. Dataare shown as mean ± SD. Before therapy*vs* after therapy, *P<0.05; Group B, C *vs* Group A, #P<0.05.

The heat-sensitive moxibustion is a type of Moxamoxibustion [29]. In the human nature, acupoints include two states: stimulated state and resting state. For healthy people, acupoints are in a resting state, and when human bodyis in morbid condition, acupoints on the body surface are activated and sensitized with varioustypes of sensitization. Acupoint heat-sensitization is a type of acupoint sensitization that occurs in the process of heat-sensitive moxibustion treatment. In this process, related acupuncture points were quite sensitive to moxa's heat and produced nonlocal or nonsupericial heat sensation [30]. Generally speaking, heat-sensitive moxibustion achieves good effect due to the process using the heat generated by ignited Moxa material over the moxibustion point in thermal state, it could stimulate heat-

Table 6. The relationship among age,gender, laterality andtherapeutic effectin three groups(eyes)

Variables (A/B/C)	Eyes	Curation	Invalid
Age (years)			
<10	6/8/6	6/8/6	0/0/0
≥10	24/24/24	3/10/21	21/14/3
Gender			
Male	14/17/16	4/10/14	10/7/2
Female	16/15/14	5/8/13	11/7/1
Laterality			
Right	14/16/12	4/8/11	10/8/1
Left	16/16/18	5/10/16	11/6/2
Total	30/32/30	9/18/27	21/14/3

sensitive moxibustion sense and the Meridian conduction through the heat penetration, heat expansion, heat transfer, heat at not (micro) local but rare, heat at not surface but depth, and non-thermal sensation [31, 32]. It is a novel therapy imposing an individualized amount of saturated moxibustion. Fengchimoxibustion combination therapy, however, does not have the ability to halt and reverse the progression of pathological changes caused by high myopia. Therefore, for this study we selected patients with unilateral HAA. Fengchimoxibustion can significantly alter the excitability of the cerebral cortex and improve blood circulationin the eye, ultimately nourishing the retina and the optic nerve, stimulating visual cells, eliminating the inhibition on the visual pathway and the visual cells, and improving and activating the visual pathway and the conduction of visual cells. It could be considered equivalent to restoring the visual cortex back to its developmental stages, thereby improving vision and VA and normalizing eye development and eye refraction, which stimulates the brain's visual center to respond again and to restore binocular vision.

We previously reported that Fengchimoxibustion was an efficacious treatment in patients with amblyopia [33]. The current study found that with the appropriate use of Fengchimoxibustion the development of unilateral HAA can be delayed. After 180 days of treatment the BCVA was statistically significantly lower ($P<0.05$) in Group A, but the improvement was greater ($P<0.05$) in Groups B and C.

Compos thinks that disorders of retinal development are the cause of monocular amblyopia, but Milttelman has shown that amblyopia mainly attacks the central nervous system [34]. Relevant scholars believe that the retina in patients with amblyopia is thinner than normal, [35] but Keesy suggests that it is thicker [36]. At present, however, there is no definite conclusion about whether the RNFL is thinner or thicker, and the change is related to the age and the type of amblyopia [37-39]. Most scholars reported that patients with amblyopia have the thickness change of the choroid [40-42].

This study found that after treatment the average RNFL of each optic disk and that around the optic disk become thicker, indicating that the structure of the retina in amblyopia may be abnormal. In addition, the test found that after treatment with moxibustion Fengchi combination therapy the total effective rate rose to 90%, significantly higher than that for treatment with occlusion (16.6%) or a combination of occlusion and video games (37.5%). Moxibustion Fengchi did indeed improve VA and restore binocular visual function by improving the blood circulation to the eye, which nourishes the optic nerve and could thereby improve and activate the visual pathways.

Visual evoked potential is an objective method of evaluating anisometropia amblyopia [43-45]. This study showed that the P100 peak latencies of VEP at moderate to high spatial frequencies were significantly reduced after treatment in anisometropia amblyopia. This means that Fengchimoxibustion can nourish the optic nerve and stimulate optic nerve cells. In this study, all patients were treated intensively in our dedicated anisometropia amblyopia treatment room, which guaranteed the treatment duration of each day over a period of time.

Kubova showed that compared the health control, the p100 peak's incubation of VEP amplitude has decreased, and the extended period has lengthened in patients with anisometropia amblyopia [46]. The study by Sokol found that the greater the difference between the sight in the healthy eye and that in the asthenopic one, the greater the abnormal appearance in the p100 peak's incubation of VEP [47]. Our research found that the evoked potential amplitude of the three groups after 60 days' treatment had increased greatly, and all the p100 peaks incubation of VEP after 60 days' treatment had shortened. Compared with the Gr-

oups A and B, Group C had the greatest range of reduction. This shows that the treatment effect on VEP of the amblyopic children cured by moxibustion at the Fengchi acupoint plus occlusion therapy was better than that provided by simple occlusion therapy at middle and high spatial frequencies, which indicates that moxibustion and occlusion therapy could change the evoked potential of the sick eye by nourishing the optic nerve and stimulating optic nerve cells.

Conclusion

As some children had missed the critical period of visual development, the patients with high degrees of strabismus had surgery before receiving treatment for anisometropia amblyopia. Our results show that using this method could still achieve the desired therapeutic effect in these older children. However, owing to significant individual differences between the children, the effectiveness of the therapy varied significantly. Therefore, treatment should be individualized according to the condition of the patients as well as combined with other treatment options. The cure rate for monocular anisometropia amblyopia is low, and compliance with the treatment is generally poor. As there is no direct contact with the skin, moxibustion therapy is very safe. It is a good treatment for anisometropia amblyopia in older children, and promotion of the treatment is worthwhile, as moxa is cheap, the operation is convenient and easily conducted at home by parents, it does not affect learning, and it improves the efficacy of treatment. No adverse events were found to be associated with the treatment.

Our study also had limitations, including the small number of patients, only patients with anisometropia amblyopia, and the short follow-up period. Further studies will be needed to allow us to individualize the adjuvant drugs or assess the long-term effects on this multifactorial illness.

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Disclosure of conflict of interest

None.

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