Electroacupuncture on the Head Points for Improving Gnosia in Patients with Vascular Dementia

ZHAO Ling 赵凌，ZHANG Hong 张虹，ZHENG Zhong 郑重 & HUANG Jiao 黄姣
College of Acupuncture and Massage, Chengdu University of Traditional Chinese Medicine, Chengdu 610075, China

Objective: To investigate the clinical effects of electroacupuncture (EA) on the head points for improving gnosia in patients with vascular dementia (VD). Methods: 90 VD patients were randomly divided into a drug group, an EA group and an EA plus drug group. Scoring with the MMSE scale and detecting the relevant potentials were done before treatment and after a 6-week treatment. Results: Gnosia was improved after treatment in all the three groups with no significant difference by the intergroup comparison. Conclusion: The above three therapies can all improve gnosia, reduce the psychological stress, strengthen attention and shorten the awaiting time for recognition; and EA plus Nimodipine seems to be the best in the curative effect.

Key words: electroacupuncture; vascular dementia; MMSE scale; relevant potentials; P300; CNV

Vascular dementia (VD) refers to a clinical syndrome of cognitive dysfunction caused by the cerebrovascular diseases. It is a chronic progressive disorder manifested mainly by reduction or disappearance of memory, cognition, language, disposition, behavior, judgment, attention and logic inference. The epidemiology survey shows that there are more than 4.2 million VD patients in China with an incidence of 324/100,000 in the old people. The authors have comprehensively analyzed and evaluated the articles published in the past 55 years on acupuncture treatment of VD. The present study was designed to evaluate the therapeutic effects and safety of electroacupuncture on the head points for improving gnosia in VD patients.

CLINICAL MATERIALS
In this series, all the 90 cases of VD were the out- or in- patients of the Hospital Affiliated to Chengdu University of Traditional Chinese Medicine admitted from February 2004 to January 2006.

Criteria for admission
1) The patients conforming to the DSM-IV diagnostic criteria and having dementia for more than 6 months; 2) The patients conforming to NINDS/AIREN diagnostic criteria for vascular dementia; 3) The patients with HIS score ≥7; 4) The patients with mild dementia (CDR=1.0) and moderate dementia (CDR=2.0); 5) The patients aged 45–80, and with menopause for over 1 year in females; 6) The patients who can coordinate well with the researchers and voluntarily sign a fact-known consent.

Criteria for exclusion
1) The patients with Alzheimer’s disease or with dementia caused by other factors; 2) The patients with HIS score <7; 3) The patients with CSDD score >8 and diagnosed by DSM-IV as having obvious mental depression, or the patients with other mental disease or disorder; 4) The patients with severe internal diseases or severe neural dysfunction, such as malignant tumor, aphasia, dysopia and dysacusis; 5) The patients under 45 or over 80 years of age; 6) The patients unable to complete detection of the relevant potentials.

Randomly grouping
The SAS statistic analysis system was used. The 90
patients were randomly divided into a drug group, an electroacupuncture group and an electroacupuncture plus drug group. The patients’ clinical data were coded from 01 to 90 and sealed in a light-proof envelope. And the researchers, case collectors and physicians worked separately with the technicians responsible for data statistics and evaluations.

The experimental drug and medical apparatus used

Nimodipine, 20 mg/tablet, was produced by Shanxi Yabao Pharmaceutical Group with a batch number H14022821. The No. 30 stainless steel filiform needles, 1 or 1.5 cm in length, were produced by Suzhou Medical Apparatus Company. The G6805-II electric stimulator was produced by Shanghai Medical Instrument Factory.

METHODS

In order to ensure the health and safety of the patients, hypotensor, hypoglycemic agent, lipid-reducing agent and other drugs with no relation to VD treatment were not specifically restricted. However, vasodilator, cholinesterase inhibitor, glutamic acid antagonist and the brain-protecting drug should not be used.

Point selection

According to the authors’ previous research results of “clinical superior plan on VD treatment”, Sishencong (EX-HN1), Baihui (GV 20), Shenting (GV 24) and Fengchi (GB 20), located on the head and used most frequently, were selected.

1) For the electroacupuncture group: The patient took a setting position with the back against the chair. The points were routinely sterilized with 75% alcohol. And the needles were obliquely inserted into galea aponeurotica at the angle of 15–30 degrees. Fengchi (GB 20) was obliquely punctured 0.5–1.2 cun deep in the direction to the nose tip. The needles were inserted in forward direction at Shenting (GV 24), front Shencong and Baihui (GV 20). And the left, right and rare Shencong were punctured 0.5–1.2 cun deep in the direction to Baihui (GV 20). After the needling sensation was felt, the needle handles were connected to a G6805-II electric stimulator with the continuous wave at a frequency of 300–500/min and the intensity tolerable to the patient. The treatment was given once a day, 30 min each session, 5 times a week (with a 2-day interval at the weekend) for 6 weeks.

2) For the drug group, Nimodipine tablet was orally taken 20 mg a time, 3 times a day, for 6 weeks without interval.

3) For the electroacupuncture plus drug group, the above 2 methods of 1) and 2) were used together.

The indexes observed

1. Observation of safety

1) General examination: body temperature, blood pressure, pulse and respiration. 2) Blood routine tests. 3) Functional examinations for the liver and kidney. The above items were detected and recorded once the 7th day respectively before and after treatment.

2. Observation of curative effect

Evaluation of gnosia:
The MMSE scale was used to evaluate gnosia one day before treatment and the 2nd day after treatment. All the detections were carried out in a quiet environment with sufficient light in the room so that the subjects could clearly see the pictures, and with no unexpected interference. The evaluations were done by the physicians, trained psychologically and unrelated to the present research.

Detection of the gnosia-induced potential P300:
The MEB-2200 electromyogram/evoked potentiometer produced by Japanese Nihon Kohden Company were operated by professional physicians from the Electrophysiological Detection Department. After a stable P300 had been recorded on the screen, the latent period (LP) and amplitude of P300 peak were detected and the LP of N1, P2 and N2 peak
recorded. The detection was done 1 day before treatment and the 2nd day after treatment.

detection of the connected negative variation (CNV):
The detection was also operated by professional physicians from the Electrophysiological Detection Department. After a stable CNV had been recorded on the screen, the LP of points A and C, amplitude of point B and areas of the A-S₂', S₂'-C and A-C figures were detected, which were done 1 day before treatment and the 2nd day after treatment for the statistical analysis.

Criteria for evaluating therapeutic effects
1) The “Criteria for Diagnosis, Syndrome-differentiation and the Therapeutic Effects on VD” stipulated by the Anti-aging Committee of China Association of Chinese Medicine were adopted. Markedly relieved: the index of curative effect (ICE) ≥20%. Improved: ICE ≥12%. Failed: ICE <12%. Deteriorated: ICE >-12%. The ICE for gnosia = (The accumulated score (AC) after treatment – AC before treatment)/AC before treatment × 100%.
2) The changes in LP of N₂, P₃a and P₃b and the amplitude of N₂-P₃b were observed before and after treatment.
3) The LP of points A and C, the amplitude of point B and the areas of A-S₂', S₂'-C and A-C figures were detected before and after treatment.

Statistical analysis
The SPSS12.0 software was used for statistical analysis. Normal test was done for the measurement data; and One-way ANOVA was made for the measurement data conforming to normal distribution, with q test used for the paired comparison. The non-parametric test was used for the measurement data not conforming to normal distribution. χ² test was used for enumeration data, and the rank test for grade data. P<0.05 was taken as a significant difference.

RESULTS
In this series of 90 patients, 73 cases completed the whole process of the research, 6 cases quit and 11 cases were rejected from the research.

Baseline analysis
There was no significant difference among the 3 groups in sex, age, cultural level and extent of VD. Thus it can thus be seen that the patients were evenly grouped with good baseline and comparability (P>0.05).

Comparison of the therapeutic effects
In terms of improving gnosia of VD patients, the total effective rate was 66.7% in the drug group, 73.9% in the electroacupuncture group, and 76.9% in the EA plus drug group. There was no significant difference among the 3 groups in curative effect (P>0.05).

Comparison of the total and respective scores for MMSE before and after treatment
As shown in Table 1, for the intergroup comparison, there is no significant difference in the MMSE total scores among the three groups either before or after treatment (P>0.05), but very significant difference was found in all the three group before and after treatment (P<0.01). Table 2 shows that there is no difference in gnosia score for the intergroup comparison among the 3 groups either before or after treatment (P>0.05), but very significant difference was found in the drug group for the intragroup comparison before and after treatment (P<0.01), and a significant difference was found between the EA plus drug group and the other 2 groups (P<0.05). There is no obvious difference in language score for the intergroup comparison among the 3 groups either before or after treatment (P>0.05); but very significant difference was found in the drug group for the intragroup comparison before and after treatment (P<0.01), significant difference in the EA plus drug
group ($P<0.05$) and no difference in the EA group ($P>0.05$). There is a significant difference in spatial vision score in all the three groups for the intragroup comparison before and after treatment ($P<0.05$), but with no significant difference among the 3 groups for the intergroup comparison ($P>0.05$).

Table 1. Comparison of the total scores for MMSE before and after treatment in the 3 groups ($\bar{X} \pm s$)

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Pretreat.</th>
<th>Posttreat.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug group</td>
<td>24</td>
<td>19.75±5.67</td>
<td>23.96±4.37**</td>
</tr>
<tr>
<td>EA group</td>
<td>23</td>
<td>20.13±3.90</td>
<td>23.57±3.17**</td>
</tr>
<tr>
<td>EA plus drug group</td>
<td>26</td>
<td>18.85±4.84</td>
<td>22.81±5.30**</td>
</tr>
</tbody>
</table>

Note: For the intragroup comparison, **$P<0.01$. 

Table 2. Comparison of item scores of MMSE scale before and after treatment in the 3 groups ($\bar{X} \pm s$)

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Gnosia score</th>
<th>Memory score</th>
<th>Language score</th>
<th>Spatial vision score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug group</td>
<td>24</td>
<td>9.75±4.48</td>
<td>12.17±3.07**</td>
<td>3.63±1.28</td>
<td>4.33±1.44**</td>
</tr>
<tr>
<td>EA group</td>
<td>23</td>
<td>10.30±2.57</td>
<td>12.39±2.04**</td>
<td>3.57±1.16</td>
<td>4.26±1.05**</td>
</tr>
<tr>
<td>EA plus drug group</td>
<td>26</td>
<td>9.85±2.87</td>
<td>11.61±3.03**</td>
<td>2.92±1.44</td>
<td>4.19±1.23**</td>
</tr>
</tbody>
</table>

Note: For the intragroup comparison, *$P<0.05$, and **$P<0.01$. 

The P300 (Pz) detection before and after treatment

It can be seen from Table 3 that the latent period was prolonged and the amplitude lowered in all the 3 groups but with no significant difference for the intergroup comparison, hence comparable among the three groups ($P>0.05$). In EA plus drug group, there was a very significant difference in the latent period of P3a and P3b ($P<0.01$) and significant difference in the amplitude of N2-P3b ($P<0.05$).

The CNV (Pz) detection before and after treatment

It can be seen from Table 4 that before treatment, the latent period was prolonged, and the amplitude lowered with enlarged area in all the three groups but with no significant difference for the intergroup comparison, hence comparable among the three groups ($P>0.05$). There were significant differences in the latent period of A and in the areas of A–S$_2'$ and A–C for the intragroup comparison after treatment in all the 3 groups ($P<0.05$). There was a significant difference in the area of A–S$_2'$ after treatment between the drug and the EA groups and between the drug and the EA plus drug groups ($P<0.05$). There was a significant difference in the area of A–C and in the latent period of A after treatment between the drug group and the EA groups ($P<0.05$). In the drug group, there was very significant difference in the area of A–S$_2'$ ($P<0.01$) and a significant difference in the area of A–C ($P<0.05$) for the intragroup comparison before and after treatment.

Safety analysis

In this series of 90 VD patients, no adverse reactions were found in the life signs, blood routine, liver and kidney functions. And during EA, no patients suffered from faint, stuck needle, bent needle, broken needle, and with no hematoma, infection and injury at acupunctured sites. Only one patient had fever on the third day of treatment, but with no direct relation to EA therpay.
Table 3. The P300 (Pz) detection before and after treatment in the 3 groups (X ±s)

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Time</th>
<th>Latent period (ms)</th>
<th>Amplitude (μV)</th>
<th>N2-P3b</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>N2</td>
<td>P3a</td>
<td>P3b</td>
</tr>
<tr>
<td>drug group</td>
<td>25</td>
<td>Pretreat.</td>
<td>241.12±24.32</td>
<td>318.68±49.83</td>
<td>404.30±53.58</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Posttreat.</td>
<td>246.17±28.07</td>
<td>326.43±56.53</td>
<td>410.70±71.42</td>
</tr>
<tr>
<td>EA group</td>
<td>22</td>
<td>Pretreat.</td>
<td>247.27±47.36</td>
<td>306.64±41.20</td>
<td>377.53±41.81</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Posttreat.</td>
<td>237.23±23.29</td>
<td>314.82±59.78</td>
<td>387.24±80.50</td>
</tr>
<tr>
<td>EA plus drug group</td>
<td>25</td>
<td>Pretreat.</td>
<td>253.68±45.44</td>
<td>306.64±41.20</td>
<td>377.53±41.81</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Posttreat.</td>
<td>242.40±26.68</td>
<td>317.58±41.67**</td>
<td>383.96±37.51**</td>
</tr>
</tbody>
</table>

Note: For the intragroup comparison, *P<0.05, and **P<0.01.

Table 4. The CNV (Pz) detection before and after treatment in the 3 groups (X ±s).

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Time</th>
<th>Latent period (ms)</th>
<th>A</th>
<th>C</th>
<th>A–B</th>
<th>A–S2</th>
<th>S2–C</th>
<th>A–C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug group</td>
<td>14</td>
<td>Pretreat.</td>
<td>358.82±119.94</td>
<td>2273.20±166.40</td>
<td>15.01±7.43</td>
<td>9.59±4.79</td>
<td>2.01±1.49</td>
<td>11.61±5.65</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Posttreat.</td>
<td>430.64±168.72</td>
<td>2265.20±200.42</td>
<td>12.12±7.94</td>
<td>6.40±3.15**</td>
<td>1.58±1.98</td>
<td>7.98±4.78*</td>
<td></td>
</tr>
<tr>
<td>EA group</td>
<td>14</td>
<td>Pretreat.</td>
<td>355.00±146.99</td>
<td>2222.10±60.31</td>
<td>11.93±5.713</td>
<td>9.70±6.673</td>
<td>1.76±1.37</td>
<td>11.45±7.65</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Posttreat.</td>
<td>300.71±80.43</td>
<td>2182.90±60.37</td>
<td>9.67±4.77</td>
<td>11.90±8.87</td>
<td>4.09±7.29</td>
<td>15.99±14.11</td>
<td></td>
</tr>
<tr>
<td>EA plus drug group</td>
<td>16</td>
<td>Pretreat.</td>
<td>390.00±165.40</td>
<td>2237.10±98.14</td>
<td>15.14±9.99</td>
<td>15.55±14.27</td>
<td>2.72±2.88</td>
<td>18.27±16.24</td>
<td></td>
</tr>
<tr>
<td>drug group</td>
<td></td>
<td>Posttreat.</td>
<td>348.69±167.63</td>
<td>2233.10±88.81</td>
<td>12.23±6.40</td>
<td>10.19±5.55</td>
<td>1.96±1.59</td>
<td>12.15±6.51</td>
<td></td>
</tr>
</tbody>
</table>

Note: For the intragroup comparison, *P<0.05, and **P<0.01.

DISCUSSION

TCM holds that deficiency of essence and qi of the kidney and stagnation of phlegm with blood stasis in the channels are the basic cause for VD. The pathogenesis of VD with its focus in the brain lies in malnutrition of brain and stagnation of phlegm with blood stasis due to the old age, weak body, deficiency of the kidney essence and deficiency of the spleen with insufficiency qi and blood.6-8 Nimodipine, a calcium antagonist used in the present study, had been proved to be very effective for improving gnosia in VD patients.9 The point prescription for EA was made according to the “Best Choice for Acupuncture Treatment of VD”.10 Acupuncture at Baihui (GV 20) can nourish qi, strengthen yang, tonify the brain and marrow, tranquilize the mind and improve gnosia. Modern research shows that acupuncture at Baihui (GV 20) can obviously strengthen the memory.11 Acupuncture at Sishencong (EX-HN1) can make people intelligent, regulate yin and yang, strengthen yang-qi, supplement brain and calm the mind. Shenting is usually used for treating the mental disorders. Fengchi (GB 20) can be used for restoring consciousness, inducing resuscitation, and improving eyesight. Modern research has demonstrated that acupuncture at Fengchi (GB 20) can make the needling sensation reach the medullary center and directly improve the cerebral functions.12

The results of the present study show that both EA and Nimodipine can improve gnosia in VD patients, and EA plus Nimodipine may show better effect in improving memory. The results of the relative potential P300 suggest that EA plus Nimodipine may improve the positioning activity of the cortex, and improve gnosia and judgment of the VD patients. The decrease in the latent period of A and C of CNV, the reduction in the amplitude of B wave and the enlargement in the area of negative change found in the present study are identical to those reported in the literature,13 indicating that all the three therapies can lessen psychological burden of the VD patients, strengthen their attention, and the shorten awaiting time for recognition.
REFERENCES


（Translated by DUAN Shu-min 段樹民）