Influence of Xiaoshuan enteric-coated capsules + aniracetam therapy on cerebral blood perfusion and nerve function in patients with convalescent cerebral infarction

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ABSTRACT

Objective: To investigate the influence of Xiaoshuan enteric-coated capsules + aniracetam therapy on cerebral blood perfusion and nerve function in patients with convalescent cerebral infarction. Methods: A total of 177 cases of patients with convalescent cerebral infarction were retrospectively reviewed and then divided into the control group (n=109) and the Xiaoshuan enteric-coated capsules group (n=68). Control group received aniracetam therapy on the basis of routine treatment, and Xiaoshuan enteric-coated capsules group received Xiaoshuan enteric-coated capsules + aniracetam therapy on the basis of routine treatment. The differences in ultrasound cerebral blood perfusion parameter levels as well as serum neurotrophy index and nerve injury index contents were compared between the two groups. Results: Before treatment, there was no statistically significant difference in ultrasound cerebral blood perfusion parameter levels as well as serum neurotrophy index and nerve injury index contents between the two groups. After treatment, ultrasound cerebral blood perfusion parameters PSV and TMV levels in Xiaoshuan enteric-coated capsules group were higher than those in control group whereas RI level was lower than that in control group; serum neurotrophy indexes bFGF, BDNF and VEGF contents were higher than those of control group; serum nerve injury indexes GFAP, NSE, UCH-L1 and S100B contents were lower than those of control group. Conclusion: Xiaoshuan enteric-coated capsules + aniracetam therapy can significantly increase cerebral blood perfusion and optimize nerve function in patients with convalescent cerebral infarction.

1. Introduction

After active thrombolysis anticoagulation, acute cerebral infarction enters into the stable stage, also known as convalescent stage, and the reasonableness of therapy for patients with convalescent cerebral infarction will directly decide the patients’ long-term neural function and quality of life[1,2]. Aniracetam belongs to racetam brain cell metabolism drug, it can strengthen the phospholipase activity in neuron synapses and promote the use of amino acids, glucose, phospholipids, etc by neurons so as to optimize the cerebral reactivity and excitability, it has been proven to be the reliable drug to optimize the neural function in patients with cerebral infarction[3], but its monotherapy for convalescent stage may be limited. Traditional Chinese medicine treatment of cerebral infarction also has a long history, Xiaoshuan enteric-coated capsules is the Chinese patent medicine to cure qi and blood stasis of ischemic stroke, and it’s combination with western medicine has currently been recommended for the treatment of patients with convalescent cerebral infarction[4,5]. In this article, Xiaoshuan enteric-coated capsules and aniracetam were used in the treatment of patients with convalescent cerebral infarction, and their application value was specifically discussed from the cerebral blood perfusion, neural function and other aspects to provide practical basis for the clinical practice of subsequent cases.

2. Information and methods

2.1 Clinical data

A total of 177 patients with cerebral infarction were treated in this hospital between October 2016 and May 2017 and then entered in convalescent stage, and they were divided into the control group...
(n=109) and the Xiaoshuan enteric-coated capsules group (n=68) after the therapies at convalescent stage were reviewed. Control group included 59 male cases and 50 female cases that were 47-72 years old; Xiaoshuan enteric-coated capsules group included 37 male cases and 31 female cases that were 45-76 years old. The differences in above data distribution were not significant between the two groups, the patients' family members also signed the informed consent, and the study was authorized by the ethics committee.

The inclusion criteria were as follows: (1) diagnosed with acute cerebral infarction by head CT; (2) with cerebral infarction attack for the first time; (3) with history of brain trauma and cerebral hemorrhage; (4) cooperating with all treatment and blood examination during rehabilitation period. The exclusion criteria were as follows: (1) combined with Alzheimer's disease, Parkinson's disease and other brain disorders; (2) combined with cognitive dysfunction such as depression and schizophrenia; (3) combined with systemic infectious diseases; (4) combined with severe heart, liver and kidney insufficiency.

2.2 Therapy

Both groups received routine therapy for convalescent cerebral infarction, including anti-platelet, lipid regulation, neurotrophy, etc. Control group received routine therapy combined with aniracetam treatment: aniracetam capsule, taken orally, 0.2 g/time, three times a day. The Xiaoshuan enteric-coated capsules group received routine therapy combined with Xiaoshuan enteric-coated capsules and aniracetam treatment: Xiaoshuan enteric-coated capsules, taken orally, 400 mg/time, three times a day. The usage and dosage of aniracetam were the same as those of control group.

2.3 Cerebral blood perfusion

Before and after treatment, internal carotid artery flow perfusion of the two groups was detected by color Doppler diasonograph, including peak systolic velocity (PSV), mean velocity (TMV) and resistance index (RI).

2.4 Nerve function

Before and after treatment, fasting peripheral venous blood serum was obtained from two groups of patients, RIA method was used to determine the contents of neurotrophy indexes and nerve injury indexes, neurotrophy indexes included basic fibroblast growth factor (bFGF), brain-derived neurotrophic factor (BDNF) and vascular endothelial growth factor (VEGF), and nerve injury indexes included glial fibrillary acidic protein (GFAP), neuron-specific enolase (NSE), ubiquitin carboxyl - terminal hydroxylase -1 (UCH-L1) and S100B protein (S100B).

2.5 Statistical methods

Ultrasound cerebral blood perfusion parameters, neurotrophy indexes, nerve injury indexes and other data were input in SPSS 25.0 and in terms of mean ± standard deviation, data of two groups were compared by t test, P value was calculated and P<0.05 meant that the differences were statistically significant.

3. Results

3.1 Ultrasound cerebral blood perfusion parameters

Comparison of ultrasound cerebral blood perfusion parameters PSV (cm/s), TMV (cm/s) and RI levels between the two groups was as follows: before treatment, the PSV, TMV and RI levels were not significantly different between the two groups (P>0.05). After treatment, PSV and TMV levels in both groups were higher than those before treatment whereas RI levels were lower than those before treatment; PSV and TMV levels in Xiaoshuan enteric-coated capsules group were higher than those in control group whereas RI level was lower than that in control group (P<0.05), shown in Table 1.

<table>
<thead>
<tr>
<th>Groups</th>
<th>n</th>
<th>Time</th>
<th>Control group</th>
<th>Xiaoshuan enteric-coated capsules group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Before treatment</td>
<td>54.28±6.07</td>
<td>54.61±6.23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After treatment</td>
<td>63.69±7.15*</td>
<td>72.51±8.67*</td>
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<tr>
<td></td>
<td>109</td>
<td></td>
<td>30.27±4.15</td>
<td>30.18±3.97</td>
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<tr>
<td></td>
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<td>After treatment</td>
<td>37.64±4.59*</td>
<td>46.13±8.4*</td>
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<td></td>
<td>68</td>
<td></td>
<td>0.81±0.09</td>
<td>0.65±0.07*</td>
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</tbody>
</table>

Note: compared with same group before treatment, *P<0.05.

Table 1. Comparison of ultrasound cerebral blood perfusion parameter levels between the two groups.

<table>
<thead>
<tr>
<th>Groups</th>
<th>n</th>
<th>Time</th>
<th>Control group</th>
<th>Xiaoshuan enteric-coated capsules group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Before treatment</td>
<td>12.19±1.75</td>
<td>12.25±1.69</td>
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<tr>
<td></td>
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<td>After treatment</td>
<td>15.88±1.74*</td>
<td>21.34±2.72*</td>
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<td>109</td>
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<td>9.28±1.54</td>
<td>9.23±1.72</td>
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<td></td>
<td>After treatment</td>
<td>13.70±1.96*</td>
<td>17.53±2.13*</td>
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<td></td>
<td></td>
<td></td>
<td>209.37±24.58</td>
<td>301.52±36.61*</td>
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<tr>
<td></td>
<td></td>
<td>After treatment</td>
<td>301.52±36.61</td>
<td>387.55±43.27*</td>
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<tr>
<td></td>
<td>68</td>
<td></td>
<td>0.82±0.09</td>
<td>0.65±0.07*</td>
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<tr>
<td></td>
<td></td>
<td>After treatment</td>
<td>0.74±0.08</td>
<td></td>
</tr>
</tbody>
</table>

Note: compared with same group before treatment, *P<0.05.

Table 2. Comparison of serum neurotrophy index contents between the two groups (pg/mL).
infarction promotes blood circulation, dredges collaterals and so on, which enteric-coated capsules is the Chinese patent medicine that tonifies experience in the treatment of cerebral infarction, and Xiaoshuan patients are limited after western medicine treatment. TCM has rich neurons, but the intelligence and limb function recovery in some cell metabolism drug, it can promote the metabolism of damaged infarction, aniracetam has been commonly used in clinic as a brain basic means of western medicine treatment of convalescent cerebral to the greatest extent

3.2 Neurotrophy indexes

Comparison of serum neurotrophy indexes bFGF, BDNF and VEGF contents between the two groups was as follows: before treatment, serum bFGF, BDNF and VEGF contents were not significantly different between the two groups (P>0.05). After treatment, serum bFGF, BDNF and VEGF contents of both groups were higher than those before treatment; serum bFGF, BDNF and VEGF contents of Xiaoshuan enteric-coated capsules group were higher than those of control group (P<0.05), shown in Table 2.

3.3 Nerve injury indexes

Comparison of serum nerve injury indexes GFAP (ng/mL), NSE (pg/mL), UCH-L1 (ng/mL) and S100B (pg/mL) contents between the two groups was as follows: before treatment, serum GFAP, NSE, UCH-L1 and S100B contents were not significantly different between the two groups (P>0.05). After treatment, serum GFAP, NSE, UCH-L1 and S100B contents of both groups were lower than those before treatment; serum GFAP, NSE, UCH-L1 and S100B contents of Xiaoshuan enteric-coated capsules group were lower than those of control group (P<0.05), shown in Table 3.

4. Discussion

The recovery of nerve and limb function in patients with convalescent cerebral infarction will directly decide the long-term quality of life, efficient and reasonable intervention should be taken in this period to optimize the neurons function in infarcted area to the greatest extent[6,7]. Anticoagulation and antiplatelet are the basic means of western medicine treatment of convalescent cerebral infarction, aniracetam has been commonly used in clinic as a brain cell metabolism drug, it can promote the metabolism of damaged neurons, but the intelligence and limb function recovery in some patients are limited after western medicine treatment. TCM has rich experience in the treatment of cerebral infarction, and Xiaoshuan enteric-coated capsules is the Chinese patent medicine that tonifies qi, promotes blood circulation, dredges collaterals and so on, which can treat the limb numbness, hemiplegia, difficult sluggish speech, breath shortness, tiredness and other disorders caused by cerebral infarction[8,9]. In this study, Xiaoshuan enteric-coated capsules combined with aniracetam was used in clinical treatment of patients with convalescent cerebral infarction, and its clinical benefit was discussed from cerebral blood perfusion, neurotrophy and nerve injury.

Cerebral blood perfusion disorder is the root cause of cerebral infarction, internal carotid artery is the main blood vessel that supplies blood flow to the brain, and its blood flow velocity and resistance can intuitively reflect the patients’ cerebral blood supply and are closely related to the function of neurons[10,11]. PSV and TMV reflect the peak velocity and mean velocity of the artery respectively, their levels decrease rapidly after cerebral infarction, and their levels at convalescent stage are highly consistent with the recovery of the disease[12,13]. RI stands for vascular resistance, which significantly increases after cerebral thrombosis and is positively correlated with the degree of vascular occlusion[14]. This study showed that compared with those before treatment, carotid artery PSV and TMV levels in both groups increased whereas RI levels decreased after treatment, indicating that both therapies are effective; further compared with those of control group, the PSV and TMV levels in Xiaoshuan enteric-coated capsules group were higher while RI level was lower after treatment, confirming that Xiaoshuan enteric-coated capsules can further increase the cerebral blood perfusion of patients with convalescent cerebral infarction, this is the foundation of increased blood and oxygen supply for neurons, and it indicates the positive role of combined Chinese and western medicine treatment in optimizing the condition of patients with convalescent cerebral infarction.

Neuronal ischemic hypoxic injury in cerebral infarction lesions, edema around infarcts, and so on can all cause obvious neurologic damage, lead to the decreased secretion of neurotrophic factors and the increased expression of nerve damage factors, and prompt the aggravation of nerve dysfunction together. bFGF, BDNF and VEGF are the factors closely associated with neurotrophy, both bFGF and VEGF promote angiogenesis and can be synthesized by both glial cells and endothelial cells, and the increase in their expression can promote the formation of collateral circulation around infarcts and improve neuronal blood perfusion[15,16]; BDNF is synthesized by neurons and glial cells and has a reconstruction effect on neuron growth and axonal structure. BDNF level generally reduces in cerebrospinal fluid of patients with cerebral infarction. In this study, serum bFGF, BDNF and VEGF contents of both groups were higher than those before treatment, which confirms the positive role of the two therapies in promoting neural axon regeneration, increasing the neuronal nutrition supply and other aspects; further compared with those of control group, serum bFGF, BDNF and VEGF contents of Xiaoshuan enteric-coated capsules group were higher after treatment,
indicating that Xiaoshuan enteric-coated capsules therapy can further increase the nutrition supply to the damaged nerve tissue and lay the foundation for subsequent improvement of neural function. GFAP, NSE, UCH L1 and S100B are the indexes reflecting the degree of nerve injury, they specifically exist in nerve tissue and seldom exist in the circulating blood under physiological state, but after cerebral infarction and nerve tissue damage, the above indexes are released from neurons and glial cells into the cerebrospinal fluid, ultimately pass through the blood brain barrier with increased permeability, enter into the peripheral blood and are detected[17-19]. In this study, serum contents of above nerve injury indexes of both groups were lower than those before treatment, and the decrease in Xiaoshuan enteric-coated capsules group was more significant, which illustrates that Xiaoshuan enteric-coated capsules combined with western medicine treatment can effectively alleviate nerve damage, and confirms the superiority of combine traditional Chinese and western medicine treatment.

To sum up, it is concluded that the Xiaoshuan enteric-coated capsules combined with aniracetam therapy can effectively increase the cerebral blood perfusion and optimize the neural function of patients with convalescent cerebral infarction, it is a reliable way to promote intelligence and limb function rehabilitation, and it is worthy of popularization and application in clinical practice in the future.

References


