Effects of adjuvant danhong injection therapy on nerve injury and platelet activation markers in patients with acute cerebral infarction

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ABSTRACT

Objective: To investigate the effects of adjuvant danhong injection therapy on nerve injury and platelet activation markers in patients with acute cerebral infarction.

Methods: A total of 102 patients with acute cerebral infarction who were treated in our hospital between January 2016 and September 2017 were reviewed and divided into the routine group (n=54) who received conventional therapy and the danhong injection group who received adjuvant danhong injection therapy. The differences in the contents of nerve injury indexes in serum and platelet activation markers in peripheral blood were compared between the two groups before treatment, after 3 d of treatment and after 7 d of treatment.

Results: There was no statistically significant difference in the contents of nerve injury indexes in serum and platelet activation markers in peripheral blood between the two groups before treatment. After 3 d of treatment and after 7 d of treatment, copeptin, H-FABP and NSE contents in serum of danhong injection group were lower than those of routine group whereas BDNF and bFGF contents were higher than those of routine group; CD62p, CD42b, PAC-1 and PMA contents in peripheral blood were lower than those of routine group. Conclusions: Conventional therapy combined with adjuvant danhong injection therapy can effectively reduce the degree of nerve injury and inhibit the platelet activation in patients with acute cerebral infarction.

1. Introduction

Acute cerebral infarction is the most common clinical cerebrovascular disease and also one of the emergencies with the highest death rate in the elderly at present, and the appropriateness and efficiency of early treatment will directly decide the patients’ treatment outcome[1,2]. Oxygen uptake, neurotrophy, aspirin antiplatelet and so on are all common therapies for acute cerebral infarction, but effect of collateral circulation establishment is different, and the final infarction lesions recovery degree is also different. Danhong injection is a Chinese patent medicine that adjusts the levels of cerebrovascular hemodynamic parameters, optimizing neural function and so on[3,4], and many scholars have currently recommended the combination of danhong injection in the acute phase of cerebral infarction in order to protect the patient’s neurological function and prompt infarcted lesion recanalization. In the study, based on conventional treatment, danhong injection was used for the treatment of patients with acute cerebral infarction, and the effect of the therapeutic regimen on nerve injury and platelet activity was explored, the specific report is as follows.

2. Information and methods

2.1 Case information

A total of 102 patients with acute cerebral infarction who were treated in our hospital between January 2016 and September 2017 were selected as the research subjects and divided into the routine group (n=54) who received conventional therapy and the danhong injection group who received adjuvant danhong injection therapy. There were 30 males and 24 females in the routine group, and...
they were 58-78 years old; there were 27 males and 21 females in
dan Hong injection group, and they were 56-80 years old. There was
no significant difference in the distribution of basic data between the
two groups, and the hospital ethics committee approved the study.

2.2 Inclusion and exclusion criteria

Inclusion criteria: (1) diagnosed with cerebral infarction by
emergency head CT; (2) without history of cerebral infarction
or cerebral hemorrhage; (3) with the interval between onset and
admission ≤6 h; (4) whose family members signed the informed
consent. Exclusion criteria: (1) highly allergic to danh Hong injection;
(2) with history of surgery within 6 months before admission; (3)
combined with systemic infectious diseases.

2.3 Therapy

Routine group of patients received clinical conventional therapy
for acute cerebral infarction, including bed rest, oxygen uptake,
nutritional support, blood pressure and blood glucose regulation,
oral aspirin, etc. Danh Hong injection group of patients received
conventional therapy and adjuvant danh Hong injection therapy,
specifically as follows: 40 mL of danh Hong injection in 250 mL of
saline, by intravenous drip, 1 time/d for 2 weeks in a row.

2.4 Observation indexes

Before treatment, after 3 d of treatment and after 7 d of treatment,
the peripheral blood specimens were collected from the two
groups of patients to separate serum, and ELISA kit was used to
detect the contents of nerve injury indexes copeptin, heart type fatty
acid-binding protein (H-FABP), brain-derived neurotrophic factor
(BDNF), neuron-specific enolase (NSE) and basic fibroblast growth
factor (bFGF); peripheral blood specimens were collected, and
flow cytometer was used to detect the contents of platelet activation
markers platelet membrane selectin (CD62p), CD42b, platelet
membrane glycoproteins [I] [IIa (PAC-1) and platelet-monocyte
aggregation (PMA).

3. Results

3.1 Nerve injury indexes

Comparison of nerve injury indexes Copeptin (pmol/L), H-FABP
(pg/mL), BDNF (ng/mL), NSE (ng/mL) and bFGF (μg/mL) contents
in serum between two groups of patients was as follows: before
treatment, the differences in copeptin, H-FABP, BDNF, NSE and
bFGF contents in serum were not statistically significant between
the two groups (P>0.05). After 3 d of treatment and after 7 d of
treatment, copeptin, H-FABP and NSE contents in serum of both
groups were lower than those before treatment whereas BDNF and
bFGF contents were higher than those before treatment; copeptin,
H-FABP and NSE contents in serum of danh Hong injection group
were lower than those of routine group whereas BDNF and bFGF
contents were higher than those of routine group (P<0.05), shown
in Table 1.

3.2 Platelet activation markers

Comparison of platelet activation markers CD62p, CD42b, PAC-1
and PMA contents in peripheral blood between two groups of
patients was as follows: before treatment, the differences in CD62p,
CD42b, PAC-1 and PMA contents in peripheral blood were not
statistically significant between the two groups (P>0.05). After 3 d
of treatment and after 7 d of treatment, CD62p, CD42b, PAC-1 and
PMA contents in peripheral blood of both groups were lower than
those before treatment; CD62p, CD42b, PAC-1 and PMA contents
in peripheral blood of danh Hong injection group were lower than those
of routine group (P<0.05), shown in Table 2.

2.5 Statistical methods

The contents of nerve injury indexes and platelet activation markers
were all input in statistical software SPSS 23.0, t test was used to
calculate the statistic P and P<0.05 was set as the standard that the
differences were statistically significant.

Table 1.

Comparison of nerve injury index contents in serum at different points in time.

<table>
<thead>
<tr>
<th>Groups</th>
<th>n</th>
<th>Time point</th>
<th>Copeptin</th>
<th>H-FABP</th>
<th>BDNF</th>
<th>NSE</th>
<th>bFGF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine group</td>
<td>54</td>
<td>Before treatment</td>
<td>7.81±0.85</td>
<td>402.18±55.77</td>
<td>3.11±0.34</td>
<td>25.39±3.11</td>
<td>7.29±0.81</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After 3 d of treatment</td>
<td>6.25±0.67</td>
<td>331.45±35.69</td>
<td>3.89±0.42</td>
<td>19.44±2.13</td>
<td>9.32±0.98*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After 7 d of treatment</td>
<td>4.18±0.46</td>
<td>209.74±23.51</td>
<td>4.25±0.43*</td>
<td>12.01±1.54</td>
<td>13.47±1.59*</td>
</tr>
<tr>
<td>Danh Hong injection group</td>
<td>48</td>
<td>Before treatment</td>
<td>7.79±0.82</td>
<td>401.46±43.28</td>
<td>3.13±0.35</td>
<td>24.42±3.09</td>
<td>7.31±0.79</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After 3 d of treatment</td>
<td>5.07±0.53*</td>
<td>241.36±28.75</td>
<td>4.28±0.46</td>
<td>13.85±1.61</td>
<td>12.17±1.63*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After 7 d of treatment</td>
<td>2.64±0.29</td>
<td>120.88±14.76</td>
<td>5.19±0.54</td>
<td>9.65±1.01</td>
<td>17.22±2.05*</td>
</tr>
</tbody>
</table>

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

Table 2.

Comparison of platelet activation marker contents in peripheral blood at different points in time.

<table>
<thead>
<tr>
<th>Groups</th>
<th>n</th>
<th>Time point</th>
<th>CD62p</th>
<th>CD42b</th>
<th>PAC-1</th>
<th>PMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine group</td>
<td>54</td>
<td>Before treatment</td>
<td>34.82±4.11</td>
<td>85.29±9.15</td>
<td>49.82±5.61</td>
<td>24.81±3.09</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After 3 d of treatment</td>
<td>25.71±3.28</td>
<td>71.64±7.93</td>
<td>34.72±4.18</td>
<td>19.54±2.12</td>
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<td></td>
<td></td>
<td>After 7 d of treatment</td>
<td>16.34±1.88</td>
<td>63.42±7.18</td>
<td>24.12±2.73</td>
<td>14.87±1.65</td>
</tr>
<tr>
<td>Danh Hong injection group</td>
<td>48</td>
<td>Before treatment</td>
<td>34.69±4.09</td>
<td>85.64±9.07</td>
<td>49.79±5.46</td>
<td>24.75±3.12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After 3 d of treatment</td>
<td>18.64±2.12</td>
<td>65.82±7.09</td>
<td>25.69±2.77</td>
<td>15.07±1.63</td>
</tr>
<tr>
<td></td>
<td></td>
<td>After 7 d of treatment</td>
<td>11.49±1.53</td>
<td>49.66±5.71</td>
<td>16.94±2.12</td>
<td>10.92±1.53</td>
</tr>
</tbody>
</table>

Note: compared with before treatment within group, P<0.05.
4. Discussion

Acute cerebral infarction is a kind of dangerous cerebrovascular disease, which is the local cerebral blood supply obstacles and ischemic brain tissue lesion necrosis caused by the various reasons, and will then produce a series of clinical neurological deficit manifestations[5,6]. The basic therapy for emergency cerebral infarction is neurotropism, anti-oxygen free radical, antiplatelet and so on, the clinical application of western medicine scheme has been very mature, but the differences in specific curative effect are quite big, and there is still obvious neurological deficit in some patients, which is related to non-significant effect of recanalization, difficulty in collateral circulation establishment and so on[7,8]. Danhong injection is mainly made from salvia miltiorrhiza and safflower, which has the efficacies such as promoting blood circulation to remove blood stasis as well as invigorating pulse-beat and dredging meridian, and has been successfully applied in the diseases caused by blood stasis occlusion such as coronary heart disease and myocardial infarction. In this study, danhong injection was used as an adjuvant drug for the clinical treatment of acute cerebral infarction, and the effect of combined treatment of Chinese and western medicine on the patient's condition was discussed.

Modern pharmacology has proven that danhong injection can effectively improve the behavior disorders of rats with cerebral infarction and reduce the ischemic area, and also help establish the collateral circulation and restore the blood supply in the ischemic brain tissue. In addition to the patients' consciousness, language and physical dysfunction, neuron dysfunction caused by ischemia can also be characterized by the changes in the contents of many nerve-specific indexes in the circulating blood, and their contents can quantitatively reflect the illness severity and disease outcome. It has been confirmed in different studies that copeptin can be used to evaluate prognosis of diabetes insipidus and acute myocardial infarction, the current studies have shown that its content is highly correlated with the poor prognosis of cerebrovascular diseases, and high expression of Copeptin is an important sign of poor prognosis of diseases such as cerebral infarction[9,10]. H-FABP is mainly used to adjust intracellular concentration of fatty acids, it is highly expressed in the heart, brain and skeletal muscle and can accelerate fatty acid intake and provide energy, and it can be rapidly released from the inside to the outside of the cells after cell damage or death and be detected[11,12]. BDNF plays an important role in the synaptic remodeling of neurons, which can promote the structural repair and functional recovery of damaged neurons[13]. NSE is the rate-limiting enzyme that specifically exists in cerebral neurons and participates in glycolysis, and the neuron degeneration necrosis after acute cerebral infarction causes the NSE to leak from the cells to intercellular space and then infiltrate into the circulating blood, so its serum levels increase abnormally[14]. bFGF plays an important neurotrophic role in brain tissue and also plays an important role in the repair of damaged nerve tissue[15,16]. The results of this study showed that compared with those before treatment, copeptin, H-FABP and NSE contents in serum of both groups decreased whereas BDNF and bFGF contents increased after different duration of treatment; further compared with those of routine group, copeptin, H-FABP and NSE contents in serum of danhong injection group were lower whereas BDNF and bFGF contents were higher after treatment, confirming that on the basis of conventional western medicine treatment, danhong injection therapy can effectively reduce the degree of nerve injury in patients with acute cerebral infarction.

Cerebral thrombosis is the main cause of acute cerebral infarction, and increased platelet activity is the core mechanism of thrombosis, which is also the main reason for conventional antiplatelet therapy after the occurrence of cerebral infarction[17,18]. Platelet adhesion, release and aggregation are referred to as platelet activation, and the plasma membrane glycoproteins and granule membrane glycoproteins of the activated platelets change obviously, these changed glycoproteins are also regarded as the important markers of platelet activation, and their contents can be used to assess the existence and severity of platelet activation[19,20]. CD62p is a late marker of platelet activation, CD42b is mainly associated with platelet adhesion, PAC-1 and PMA are associated with platelet aggregation, and the increase in the contents of these indicators indicates increased platelet activity[21,22]. The results of this study showed that compared with those before treatment, the contents of CD62p, CD42b, PAC-1 and PMA in peripheral blood of both groups of patients decreased after different duration of treatment; further compared with those of routine group, CD62p, CD42b, PAC-1 and PMA contents in peripheral blood of danhong injection group were lower after treatment, confirming that adjuvant danhong injection therapy can effectively inhibit platelet activity and avoid further thrombosis damage to the nerve tissue. To sum up, it is concluded that on the basis of conventional western medicine treatment, adjuvant danhong injection therapy can effectively reduce the nerve injury and inhibit the platelet activity in patients with acute cerebral infarction, it helps to optimize the illness and improve the treatment outcome, and it is worth popularization and application in clinical practice in the future.

References


