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Effects of Atorvastatin calcium combined with Aspirin on serum levels of Hcy, NSE, UA, hs−CRP and inflammatory factors of patients with cerebral infarction

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ABSTRACT

Objective: To study the effects of Atorvastatin calcium combined with Aspirin on serum levels of homocysteine (Hcy), neuron-specific enolase (NSE), uric acid (UA), high sensitity C-reactive protein (hs-CRP) and inflammatory factors of patients with cerebral infarction. **Methods:** 100 cases of patients with cerebral infarction from March 2014 to May 2016 were treated in the Department of Neurology of our hospital and affiliated to Huazhong University of Science and Technology of traditional Chinese medicine and Western Medicine. The subjects were divided into the control group (n=50) and the treatment group (n=50) randomly. The control group was treated with Aspirin, the treatment group were treated with Atorvastatin calcium combined with Aspirin. The two groups were treated for 28 d. The serum levels of Hcy, NSE, UA, hs-CRP, interleukin-6 (IL-6), interleukin-8 (IL-8) and tumor necrosis factor-α (TNF-α) of the two groups before and after treatment were compared. **Results:** There were no significantly differences of the serum levels of the Hcy, NSE, UA and hs-CRP of the two groups before treatment (P>0.05). After treatment, the serum levels of the Hcy, NSE, UA and hs-CRP of the two groups were significantly lower than before treatment, and that of the treatment group were significantly lower than the control group (P<0.05). There were no significantly differences of the serum levels of the IL-6, IL-8 and TNF-α of the two groups before treatment (P>0.05). After treatment, the serum levels of the IL-6, IL-8 and TNF-α of the two groups were significantly lower than before treatment, and that of the treatment group were significantly lower than the control group (P<0.05). **Conclusions:** Atorvastatin calcium combined with Aspirin can significantly reduce the serum levels of Hcy, NSE, UA, hs-CRP, IL-6, IL-8 and TNF-α of the patients with cerebral infarction.

1. Introduction

Cerebral infarction is a kind of cardiovascular and cerebrovascular diseases, which is characterized by acute onset, rapid progression, morbidity and mortality[1]. Research shows that the pathogenesis of cerebral infarction is complicated, it is related to atherosclerosis, drinking, smoking, diabetes, high blood pressure, heart disease and other factors[2,3]. The incidence of cerebral infarction is maninly for the elderly, and with the aggravation of the aging of society, the incidence of cerebral infarction is increasing year by year, which seriously threaten the health of the elderly patients[4]. Aspirin is one of the first-line drugs in the acute phase of cerebral infarction and the prevention of grade two. It has the function of inhibiting the platelet function and inhibiting the formation of thrombus[5]. Atorvastatin calcium is a common type of cholesterol lowering drugs, in addition to lowering blood lipids, it also plays the role of inhibiting inflammation, preventing recurrence of cerebral infarction and improving the role of atherosclerosis[6,7]. This study was to investigate the effects of atorvastatin calcium combined with aspirin on serum homocysteine (Hcy), neuron-specific enolas (NSE), uric acid (UA), high sensitity C-reactive protein (hs-CRP) and

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inflammatory factors in patients with cerebral infarction. The results are as follows.

2.Materials and methods

2.1.General information

100 cases of patients with cerebral infarction in our hospital from March 2014 to May 2016 were selected as study subjects. Case inclusion criteria: (1) Consistent with the diagnostic criteria for cerebral infarction developed in the fourth national Cerebrovascular Disease Conference[8]; (2) The diagnosis of infarction were confirmed by the results of CT or MRI in the brain; (3) The time of cerebral infarction is not more than 3 d. Case exclusion criteria: (1) Hemorrhagic cerebral infarction or transient ischemic attack; (2) Patients received surgical treatment in the past 6 months; (3) The patients with heart, brain, liver, kidney and other diseases; (4) Previous patients with neurological impairment; (5) Patients with psychiatric disorders.

All the cases were divided into the control group and the experimental group according to the random number table, each with 50 cases. There were 27 males and 23 females in the control group, they were aged from 60 to 80 years old; Weight 41–74 kg, mean weight (55.18±14.21) kg; Infarct site: 7 cases of temporal lobe, 19 cases of basal ganglia region, 5 cases of parietal lobe, 8 cases of frontal lobe, 6 cases of occipital lobe, 5 cases of cerebellum; There were 26 males and 24 females in the experimental group, they were aged from 61 to 78 years old; Weight 40–73 kg, mean weight (56.38±13.18) kg; Infarct site: Infarct site: 8 cases of temporal lobe, 18 cases of basal ganglia region, 6 cases of parietal lobe, 7 cases of frontal lobe, 5 cases of occipital lobe, 6 cases of cerebellum. There was no significant difference in gender, age, weight, infarct location between the two groups (P>0.05). All cases included in this study were informed and agreed to join the study, and approved by the hospital ethics committee.

2.2. Treatment methods

All cases were treated with routine treatment, including control of blood pressure, blood glucose, blood lipid, electrolyte disturbance, nutrition and nerve cells, etc. The control group were treated with Aspirin Enteric-coated Tablets (purchased from Bayer medicine health care Co., Ltd, Chinese medicine standard word: J20130078) for 100 mg/time, 1/d, taken orally. The test group was treated with atorvastatin (purchased from Pfizer Pharmaceutical Co., Ltd. in the United States, specifications 20 mg/tablet, drug standards J20070061) on the basis of the control group for 20 mg/time, 1/d, taken orally. Two groups of patients received the corresponding treatment for 28 d continuously.

2.3.Detection index

Fasting elbow venous blood (5 mL) of two groups of patients was collected after treatment, then serum was separated for 15 min with a speed of 2 000 r/min. Serum levels of Hcy, NSE, UA, hs-CRP, IL-6, IL-8 and TNF-α were detected and compared.

Serum NSE, UA, IL-6, IL-8 and TNF-α levels were detected using enzyme-linked immunosorbent assay (ELISA), which was determined by the German SIEMENS ADVIA2400 automatic biochemical analyzer, and the reagents were purchased from Shanghai Rongsheng biological Co. Ltd. Detection of serum HCY was using Germany SIEMENS ADVIA-XP chemiluminescence analyzer and related reagents, hs-CRP using the SIEMENS ADVIA-XP specific protein analyzer BNP and matching reagents; detection of serum Hcy, hs-CRP levels using immune scattering turbidity. All operations were strictly in accordance with the test kit specification.

2.4.Statistical analysis

We used SPSS19.0 software package to process the test result data, count data was expressed by rate (%), using the method of χ^2;mean ± standard deviation ($\bar{x}\pm s$) represents measurement data, the use of t test was to compare the difference between groups, with P<0.05 as a statistically significant.

3. Results

3.1. Comparison of serum Hcy, NSE, UA and hs-CRP levels before and after treatment in two groups

Before treatment, the levels of serum Hcy, NSE, UA and hs-CRP showed no significant difference between the two groups (P>0.05); After treatment, the serum levels of Hcy, NSE, UA and hs-CRP in the two groups were significantly lower than before treatment (P<0.05), and the serum indexes of the patients in the experimental group were significantly lower than those in the control group (P<0.05) (Table 1).

Table 1

Comparison of serum Hcy, NSE, UA and hs-CRP levels before and after treatment in two groups (n=50,$\bar{x}\pm s$).

Group	Time	Hcy (μmol/L)	NSE (IU/L)	UA (μmol/L)	hs-CRP (mg/L)
Experimental group	Before treatment	25.12±4.80	42.15±6.38	528.41±19.35	63.30±13.17
	After treatment	9.31±1.67*#	19.31±4.82*#	231.08±9.65*#	22.64±7.62*#
Control group	Before treatment	24.96±4.54	41.74±7.02	519.62±20.07	62.89±12.05
	After treatment	17.42±2.15*	28.75±5.16*	417.67±12.35*	40.39±10.37*

Compared with before treatment, *P<0.05; compared with the control group, #P<0.05.

3.2. Comparison of serum levels of inflammatory factors in two groups before and after treatment

Before treatment, the serum levels of IL-6, IL-8 and TNF-α showed no significant difference between the two groups (P>0.05); After treatment, the serum levels of IL-6, IL-8 and TNF-α in the two groups were significantly lower than before treatment (P<0.05), and the serum indexes of patients in the experimental group were significantly lower than those in the control group (P<0.05) (Table 2).

4. Discussion

The pathological basis of cerebral infarction is caused by brain atherosclerosis in patients with atherosclerosis, arterial stenosis, or even lead to serious congestion, causing brain tissue ischemia and hypoxia, produce coma, vomiting, disturbance of consciousness and a series of clinical symptoms[9,10]. Therefore, the clinical treatment of cerebral infarction mainly to stabilize plaque, inhibit platelet aggregation, improve vascular endothelial function, anti-inflammatory, anticoagulant, anti-oxidation and so on. The research showed that the levels of Hcy, NSE, UA, hs-CRP, IL-6, IL-8, TNF-αand other inflammatory factors in the serum of patients with cerebral infarction were significantly increased. And it will cause the disease to be further intensified[11-13]. Therefore, the clinical treatment process can effectively reduce the level of expression of related cytokines, which has important clinical significance for the treatment of cerebral infarction. Aspirin is a potent inhibitor of platelet aggregation, which is a first-line drug in the acute phase of cerebral infarction and the prevention of grade two, it can inhibit the formation of platelet aggregation by inhibiting the ring oxidase to block the process of the conversion of four arachidonic acid into the A2, which can inhibit the formation of thrombus[14,15]. Atorvastatin calcium is a new kind of HMG-CoA reductase inhibitors, which have a wide range of lipid regulating effects. In addition, it can improve vascular endothelial function, reduce plasma hs-CRP, inhibit vascular smooth muscle cell migration and proliferation, inhibit monocyte Macrophage secretion and adhesion function, antioxidation, anti thrombosis and so on[16]. This study was to investigate the effects of Atorvastatin combined with aspirin on serum Hcy, NSE, UA, hs-CRP, cerebral infarction and inflammatory factor levels, in order to explore the mechanism of treatment of cerebral infarction associated with them and provide a basis for clinical treatment of cerebral infarction with reasonable treatment plan.

The results of this study showed that: before treatment, there was no significant difference in the serum levels of Hcy, NSE, UA and hs-CRP between the two groups (P>0.05); After treatment, the serum levels of Hcy, NSE, UA and hs-CRP levels were significantly lower than before treatment, while the experimental group were significantly lower than the control group, with significant differences (P<0.05). This suggests that atorvastatin calcium combined with aspirin can significantly reduce the levels of serum Hcy, NSE, UA and hs-CRP in patients with cerebral infarction. Hcy is a kind of sulphur containing amino acid, which is the intermediate product of methionine and cysteine in the process of metabolism, and researches showed that it was related to the vascular occlusive disease, which could increase the adhesion and aggregation of platelets by activating coagulation factors[17]. NSE is a specific protein in the brain gray matter, brain cells are released into the blood after cerebral ischemia or hypoxia, which is an important marker of nerve cell damage in the clinical evaluation of cerebral ischemia[18]. UA is a kind of inflammatory substance. It has been reported in the literature that it has a certain relationship between the level of serum and cerebral infarction, and the serum UA level can be regarded as one of the diagnostic indexes of atherosclerosis cerebral infarction[19]. Hs-CRP is an important inflammatory response marker, and its level in serum increased significantly with the development of cerebral infarction[20]. Atorvastatin calcium combined with aspirin in the treatment of cerebral infarction play a synergistic role, with anti platelet aggregation, unstable plaque plaque, and narrow plaque volume and so on, so it can significantly reduce the serum levels of Hcy, NSE, UA and hs-CRP of patients with cerebral infarction[21]. In addition, this study showed that: before treatment, there was no significant difference in the serum levels of IL-6, IL-8 and TNF-α between the two groups (P>0.05); After treatment, the serum levels of IL-6, IL-8 and TNF-α were significantly lower than before treatment, while the experimental group were significantly lower than the control group, with significant differences (P<0.05). This suggests that atorvastatin

Table 2

Comparison of serum levels of inflammatory factors in two groups before and after treatment (n=50,$\bar{x}\pm s$).

Group	Time	IL-6 (ng/L)	IL-8 (ng/L)	TNF-α (μg/L)
Experimental group	Before treatment	16.92±3.26	30.17±4.73	17.98±3.15
	After treatment	7.11±1.05*#	12.26±3.02*#	6.10±1.85*#
Control group	Before treatment	17.04±3.31	29.84±5.12	18.04±3.27
	After treatment	12.24±1.68*	21.40±3.57*	11.13±2.08*

Compared with before treatment, *P<0.05; compared with the control group, #P<0.05.

calcium combined with aspirin can significantly reduce the levels of serum IL-6, IL-8 and TNF-α and other inflammatory factors in patients with cerebral infarction. Research shows that the activation of inflammatory response is one of the main factors that lead to the instability of atherosclerotic plaque, therefore, with the progress of cerebral infarction, serum levels of IL-6, IL-8 and TNF-α and other inflammatory factors will be significantly increased. Atorvastatin calcium combined with aspirin may play a role in stabilizing plaque by reducing the expression of inflammatory factors, which has a positive clinical significance for the treatment of cerebral infarction[22].

In conclusion, atorvastatin calcium combined with aspirin can significantly reduce the levels of serum Hcy, NSE, UA, hs-CRP and inflammatory factors in patients with cerebral infarction.

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