Influence of Nursing Effect on the Antiinflammatory Potential of Atorvastatin in Acute Cerebral Infarction

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Xu *et al.*: Effect of Nursing on Antiinflammatory Effect of Atorvastatin

The present study was aimed to observe the antiinflammatory and nursing effect of atorvastatin on acute cerebral infarction. About 180 patients with acute cerebral infarction who were treated in Chengdu Fifth People's Hospital were selected as research subjects. They were divided into the control group (90 cases) and the research group (90 cases). The control group received conventional treatment while the research group received atorvastatin treatment. In addition, the research group received a comprehensive nursing intervention program, while the control group received only a routine nursing mode. The therapeutic effects and nursing effects of the 2 groups were compared. By comparing the serum lipid-related indices of the two groups, the patients in the research group were found to have a significant advantage over the control group. Through observing and comparing the levels of markers of immune inflammation, the improvement in serum TNF level, IL-6 and ICAM-1 concentrations in the research group was more significant, $p<0.05$. In addition, the comprehensive life quality evaluation score and FMA exercise ability score of the research group showed significant advantages, $p<0.05$. For patients with acute cerebral infarction, atorvastatin treatment can produce good antiinflammatory effect and the treatment effect can be significantly improved after adopting scientific nursing measures.

Key words: Cerebral infarction, acute phase, atorvastatin, antiinflammatory effect, nursing intervention, efficacy observation

Cerebral infarction is also called ischemic stroke or stroke (Chinese medicine). Due to blood supply disorder in local brain tissue area, brain ischemia and hypoxic lesions leading to necrosis can occur, which cause clinical manifestations of a neurological deficit known as cerebral infarction. According to the difference in pathogenesis, cerebral infarction can be divided into cerebral thrombosis, cerebral embolism and lacunar cerebral infarction[1-3]. Among them, cerebral thrombosis is the most common type of cerebral infarction, accounting for about 60 % of all cerebral infarctions. Therefore, the commonly referred cerebral infarction actually refers to cerebral thrombosis.

Acute cerebral infarction refers to brain necrosis caused by sudden interruption of cerebral blood supply (fig. 1). Usually, the acute cerebral infarction is mainly caused by atherosclerosis and thrombosis in the arteries supplying blood, making the lumen narrow or even blocked, leading to focal acute cerebral insufficiency. In addition if abnormal objects (solid, liquid and gas) enter the cerebral artery or the neck artery through blood circulation, resulting in the blocking of blood flow, die to sudden reduction in blood flow, brain tissue softening and necrosis in the corresponding innervation area occurs thus causing acute cerebral infarction[4-12]. The acute cerebral infarction poses a serious threat to patient's life and it is essential to apply active and effective drug treatments along with scientific nursing intervention programs. The following is an exploration of the influence of nursing effect on the antiinflammatory effect of atorvastatin in acute cerebral infarction.

In this study, 180 patients who had been treated in the Chengdu Fifth People's Hospital for acute cerebral infarction (fig. 2) from January 2015 to June 2018 were selected as research subjects. The inclusion criteria were, patients who met the diagnostic criteria for cerebrovascular diseases formulated by the 4th National Conference on Cerebrovascular diseases in 1995. The selected patients were randomly divided into a research group (90 cases) and a control group (90 cases). In the

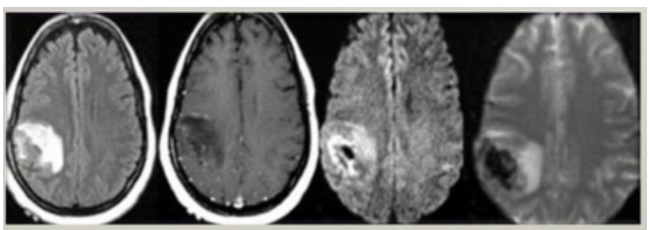

Fig. 1: Image of acute cerebral infarction

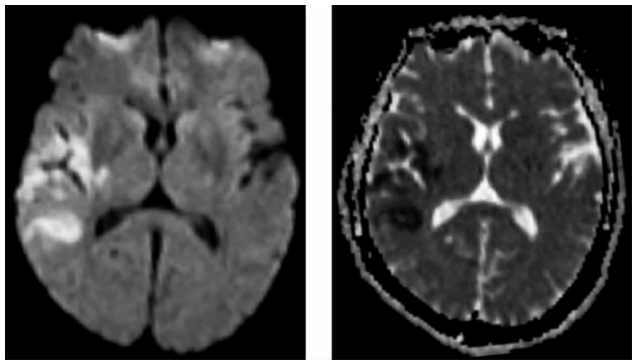

Fig. 2: Examination chart of a patient with acute cerebral infarction

research group, there were 50 males and 40 females, the oldest was 72 y, the youngest was 36 y, and the average age was 48.6±3.5 y. In the control group, there were 55 males and 35 females, the oldest was 72 y, the youngest was 38 y, and the average age was 47.9±3.0 y. There was no significant difference in the general data between the two groups before treatment.

After admission, the patients in the control group were given routine treatment mode, including dehydration to reduce intracranial pressure, maintenance of hydroelectrolyte balance, antiinfection. In addition, 20 mg of edaravone were dissolved in 250 ml of sodium chloride (0.9 %) solution, and infused intravenously twice a day. Moreover, the patients were provided with general routine nursing care, such as environmental nursing, drug guidance and monitoring of vital signs. The treatment scheme was continued for 1 mo.

However, the patients in the research group also was administered orally with atorvastatin tablet (20 mg), once a night continuously for 1 mo. In addition, a comprehensive nursing intervention program was implemented for these patients, including psychological guidance, environmental nursing, health promotion education and diet nursing.

Serum total cholesterol (TC), triglyceride (TG), low-density lipoprotein cholesterol (LDL-C) and high-density lipoprotein cholesterol (HDL-C) were measured before and after treatment. Serum inflammatory markers were determined as well, including C-reactive protein (CRP), tumor necrosis factor alpha (TNF-α), interleukin 1 (IL-1), IL-6, IL-10, E-protein, P-protein, vascular cell adhesion molecule-1 (VCAM-1), intercellular adhesion molecule-1 (ICAM-1). The patients' quality of life level was evaluated by the hospital's self-made comprehensive quality of life assessment questionnaire,

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including indicators such as psychological function, body function and life function. In addition, a simple FMA exercise ability evaluation method was adopted to evaluate the neurological function.

The statistical analysis software SPSS21.0 was used to process data. The measurement data were expressed by mean±standard deviation, with t test conducted for intergroup comparison. Enumeration data were expressed by natural (n) and percentage (%), with X^2 used for intergroup comparison. The intergroup difference is of statistical value when $p<0.05$.

According to the data in Table 1, the improvement of all indices after treatment in the research group was significantly better than that in control group, $p<0.05$. As shown in Table 2, the levels of markers of inflammation after treatment were observed. The results showed that serum TNF-α, IL-6 and ICAM-1 concentrations were significantly reduced in the research group, $p<0.05$. No significant differences were found between two groups for other indices. As shown in Table 3, the research study group showed significant advantages in all index scores. As shown in Table 4, compared with the control group, the FMA exercise ability score in the research group again showed significant advantage. The comparison of NIHSS scores before and after treatment is shown in fig. 3.

Many studies have shown[13,14] that atorvastatin has direct antiinflammatory effects in addition to lipid-lowering effect. Atorvastatin can prevent the rupture of atherosclerotic plaques, reduce the number of macrophages in atherosclerotic plaques, inhibit the expression of matrix protease, prevent the destruction of the plaque fibrocap and prevent monocytes from adhering to the endothelial cell wall. Clinically, large retrospective studies, such as air force/Texas coronary atherosclerosis prevention study, pravastatin inflammation/CRP evaluation (PRINCE)[15], all of which confirmed that the high antiinflammatory effect

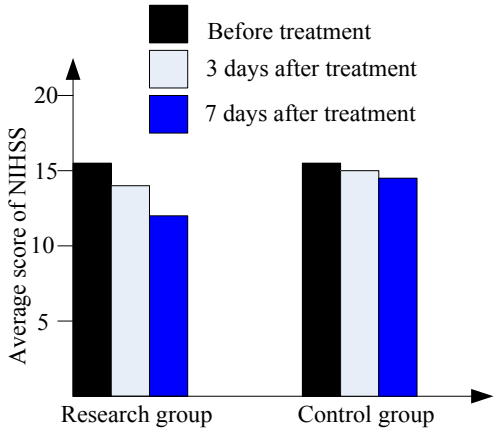

Fig. 3: Comparison of NIHSS scores before and after treatment ■ Before treatment, ■ 3 days after treatment, ■ 7 days after treatment

TABLE 1: COMPARISON OF BLOOD LIPID INDICATORS BETWEEN THE TWO GROUPS BEFORE AND AFTER TREATMENT

Group	TC (mmol/l)		TG (mmol/l)		LDL-C (mmol/l)		HDL-C (mmol/l)	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Research group	5.29±1.20	2.18±0.73	1.88±0.65	0.96±0.21	3.74±1.18	1.42±0.50	1.36±0.35	0.69±0.15
Control group	5.48±1.17	3.69±0.99	1.83±0.61	1.56±0.52	3.85±1.20	2.26±0.55	1.39±0.42	0.98±0.28
t	0.28	9.36	0.11	9.04	0.22	8.37	0.13	6.70
P	>0.05	<0.05	>0.05	<0.05	>0.05	<0.05	>0.05	<0.05

Mean±standard deviation

TABLE 2: COMPARISON OF IMMUNE INFLAMMATORY MARKERS BETWEEN THE TWO GROUPS

Group	CRP (mg/dl)	TNF-α (pg/dl)	IL-1 (pg/dl)	IL-6 (pg/dl)	IL-10 (pg/dl)	E-Selectin (pg/dl)	P-Selectin (pg/dl)	VCAM-1 (pg/dl)	ICAM-1 (pg/dl)
Research group	2.4±0.6	16.0±1.9	8.7±0.6	8.6±1.3	3.8±0.94	2.5±0.5	3.8±0.7	17±2.1	13.6±2.1
Control group	2.7±0.9	22.5±1.8	9.6±1.2	10.6±1.2	3.9±0.8	2.5±0.3	3.6±0.9	18.9±3.2	18.6±3.0
t		9.03	1.05	12.16	0.21	0.47	1.02	0.23	8.90
P	>0.05	<0.05	>0.05	<0.05	>0.05	>0.05	>0.05	>0.05	<0.05

Mean±standard deviation

TABLE 3: COMPARISON OF LIFE QUALITY SCORE BETWEEN TWO GROUPS (ẋ±S)

Group	Number of cases	Time	Body function	Mental function	Living function
Research group	90	3 days after admission	13.2±0.63	14.6±0.69	14.0±0.52
		1 month after admission	23.4±0.75	20.6±0.73	21.6±0.78
Control group	90	3 days after admission	13.7±0.64	14.2±0.75	14.1±0.82
		1 month after admission	16.9±0.53	17.6±0.48	18.5±0.91

TABLE 4: COMPARISON OF FMA EXERCISE ABILITY SCORES BETWEEN THE TWO GROUPS

Group	Number of cases	3 days after admission	1 month after admission
Research group	90	52.7±0.96	74.6±1.40
Control group	90	51.9±0.86	66.3±1.35
t		0.18	4.37
P		>0.05	<0.05

Mean±standard deviation

of atorvastatin and its ability to reduce hsCRP after long-term treatment. Some scholars pointed out[16] that the level of dhsCRP was significantly reduced 7-14 d after atorvastatin treatment. This shows that this drug can effectively reduce hsCRP and has important potential application as an antiinflammatory drug for patients with acute cerebral infarction. Therefore, it is reasonable and necessary to apply atorvastatin in the treatment of acute cerebral infarction.

The contents of comprehensive nursing intervention can be described by following 5 points. First, psychological nursing, nurses should conduct positive communication with patients to have a certain understanding of their current psychological status and apply targeted and individualized programs to help them channel bad emotions. Second, conduct health promotion education to strengthen belief. Doctors should teach patients the causes, treatment approaches, medication status, treatment effect, precautions of acute cerebral infarction, so as to enable the patients to form correct cognition of the disease, strictly follow medical advice, form good treatment compliance and be able to consciously carry out self-management. In addition, education is also carried out for the family members of patients to encourage them to have a positive and optimistic attitude when caring for the patients and to spread positive energy to the patients. Third, peer effects, the department should organize a group study of patients in the department's teaching and research office every week, so that everyone can gain more useful treatment experience, improve the communication with patients, encourage each other, and jointly fight against the disease. Fourthly, the patient is provided with a quiet, comfortable, clean and neat hospital environment with bedsheets are changed frequently, so that the patient is well cared and the patient is provided with a quiet sleeping environment at night. Fifth, develop a healthy diet plan for patients, avoiding spicy food. Sixth, the guidance on medication method, pay attention to the time, dosage and precautions of each medication and keep a detailed record of patients' medication history, so that patients can timely check and improve the rate of medical compliance.

In conclusion, the antiinflammatory effect of atorvastatin may overlap with the dynamic changes of inflammatory markers in acute cerebral infarction. Previous studies using platelet activation markers in patients with stable or unstable cardiovascular disease have shown that statins have antiplatelet effects, which is distinct from statins ability to lower cholesterol. Other studies have shown that atorvastatin can inhibit oxidative stress and platelet activation by directly inhibiting platelet NOX2/platelet prostaglandin and thrombin A2, which provides a theoretical basis for statins inhibiting or regulating thrombosis. Many studies have shown that atorvastatin has direct antiinflammatory effects in addition to lipid-lowering effects. In addition, with scientific nursing intervention measures, the effect of adjuvant treatment can be brought into full play. Therefore, using atorvastatin to treat patients with acute cerebral infarction can produce good antiinflammatory effects, and then adoption of comprehensive nursing measures can enable patients to achieve a higher quality of life. Therefore, this treatment is worth of being promoted in clinics.

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