Effects of Salvia miltiorrhiza on Hemorheology and vascular endothelial function in patients with unstable angina pectoris

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ABSTRACT

Objective: To investigate the effect of Salvia miltiorrhiza (SM) on vascular endothelial function and hemorheology in patients with unstable angina pectoris (UAP). Methods: A total of 60 cases of UAP patients from October 2014 to October 2015 as the research object, randomly divided into treatment group and control group; the two groups were treated with conventional bed rest, ECG monitoring, oxygen inhalation, application of nitroglycerin, beta blockers, aspirin and antiplatelet, statin therapy, the treatment group based on the use of salvianolate 200 mg+5% glucose 250 mL (neutralization amount of 0.9% sodium chloride was used in patients with diabetes or glucose insulin) intravenous drip, 1 times/d, two groups were treated for 2 weeks; the two groups before and after treatment and take venous blood in the morning fasting peripheral blood viscosity, plasma viscosity, measured by automatic blood rheometer (low and middle shear and high shear rate), hematocrit and erythrocyte aggregation index, serum endothelin (ET) and nitric oxide (NO) level was measured by nitrate reductase Set. Results: after the treatment, the treatment group, the plasma viscosity, whole blood viscosity (low shear, cut and high shear rate), red blood cell hematocrit and red blood cell aggregation index decreased than the control group, there is statistical significance; after treatment, in treatment group, the serum NO level, et reduce degree is significantly better than the contrast group, there is statistical significance. Conclusion: Salvia miltiorrhiza can effectively improve blood rheology, improve microcirculation, regulate vascular endothelial function, effectively reduce the risk of cardiovascular events in UAP patients, it is worthy of clinical application.

1. Introduction

Unstable angina pectoris (UAP) is a common clinical disease, in the elderly, for the serious state of coronary heart disease, the disease between stable angina and acute myocardial infarction, pathogenesis mechanism for the formation of atherosclerotic plaque rupture and thrombosis, leading to coronary artery occlusion, clinical manifestations of acute myocardial ischemia of the clinical syndrome, the onset is sudden, easily progress to acute myocardial infarction[1,2]. Studies have shown that changes in blood rheology and endothelial dysfunction play an important role in the pathogenesis of UAP[3]. With blood of depside salt from Salvia miltiorrhiza, pulse, blood and other effects can effectively protect the myocardium, anti atherosclerosis, anti thrombosis, anti lipid peroxidation, improving the function of endothelial cells, improve blood rheology etc. It has been widely used in the treatment of coronary heart disease (CHD)[4,5]. The clinical data of 60 patients with UAP admitted in our hospital from October 2014 to October 2015 were analyzed. The aim was to study the effect of the salvia miltiorrhiza on Hemorheology and endothelial function in patients with UAP.

2. Clinical data

2.1. General information

60 patients with UAP were selected as the object of study from October 2014 to 2015 from October, all patients are in line with the
UAP diagnosis and treatment recommendations[6]: before admission angina within 48 h of onset > 1 times above, attack wave inverted T electrocardiogram associated with two or more adjacent precordial ST segment depression >0.1 mV, down; and excluded accompanied by serious heart, lung, liver, kidney function, eliminate suffering from severe high blood pressure, infection, autoimmune, malignant tumors and other diseases, and were randomly divided into treatment group and control group. Treatment group of 30 cases, male 18 cases, female 12 cases; age 47-70 years old, average (62.8±6.5) years old; primary labor type angina 10 cases, deterioration of labor type angina 13 cases, 7 cases of angina pectoris. The control group of 30 cases, male 17, female 13; age 47-70 years old, average (63.1±5.8) years old; primary labor type angina 11 cases, deterioration of labor type angina 12 cases, 7 cases of angina pectoris. Compared with no statistical significance (P>0.05) in the two groups.

2.2. Method
Two groups were bed rest, ECG, oxygen, application of nitroglycerin, beta blockers, aspirin, antiplatelet drugs, statins and other treatment, treatment group based on the use of salvianolic acid salt (Shanghai Lvgu pharmaceutical, Chinese medicine quasi word Z20050249) 200 mg in 5% glucose 250 mL (diabetic patients with 0.9% sodium chloride solution or glucose plus with the amount of insulin) intravenous drip, 1 times daily. The course of treatment was 2 weeks in two groups.

Table 1
Comparison of hemorheology before and after treatment (n=30).

<table>
<thead>
<tr>
<th>Group (mPa/s)</th>
<th>Time</th>
<th>Plasma viscosity (mPa/s)</th>
<th>Low shear viscosity (mPa/s)</th>
<th>Medium shear viscosity (mPa/s)</th>
<th>High shear viscosity (mPa/s)</th>
<th>Red cell volume (%)</th>
<th>Red cell aggregation index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment</td>
<td>BT</td>
<td>1.95±0.15</td>
<td>11.62±1.99</td>
<td>8.31±0.52</td>
<td>6.12±0.55</td>
<td>43.15±2.5</td>
<td>2.90±0.75</td>
</tr>
<tr>
<td></td>
<td>AT</td>
<td>1.28±0.28</td>
<td>8.75±2.35*</td>
<td>5.27±0.55*</td>
<td>4.85±0.35*</td>
<td>39.74±1.85*</td>
<td>2.13±0.42*</td>
</tr>
<tr>
<td>Control</td>
<td>BT</td>
<td>1.93±0.18</td>
<td>11.70±1.25</td>
<td>8.22±0.47</td>
<td>6.05±0.57</td>
<td>43.25±2.31</td>
<td>2.88±0.85</td>
</tr>
<tr>
<td></td>
<td>AT</td>
<td>1.54±0.17</td>
<td>9.85±2.37</td>
<td>6.22±0.37</td>
<td>5.22±0.57</td>
<td>41.22±2.53</td>
<td>2.43±0.61</td>
</tr>
</tbody>
</table>

Note: compared with the control group, *P<0.05. BT: Before treatment; AT: After treatment.

3. Results
3.1. Comparison of hemorheology before and after treatment

Product and erythrocyte aggregation index in the treatment of two groups of plasma viscosity, whole blood viscosity (low shear, cut and high shear rate), red blood cell hematocrit were decreased in the treatment group was better than the control group and had statistical significance (P<0.05). See table 1.

2.3. Observation index

Two groups before and after treatment to take early morning fasting peripheral venous blood 6mL, divided into two parts. The one were anticoagulant EKTA-2K, plasma viscosity, whole blood viscosity (low shear, cut and high shear rate), red blood cell hematocrit and red blood cell aggregation index were measured by automatic blood rheometer. The other was used to extract serum, and the levels of ET and NO were determined by nitrate reductase method.

2.4. Statistical processing
Using (Mean ± SD) as a means of measurement data, Using t test, count data by using the χ² test, the analysis software of SPSS 18.0 P<0.05 was statistically significant.

3. Discussion

UAP is one of the critical patients with coronary atherosclerotic heart disease, and it is easy to progress to acute myocardial infarction. The contradiction between coronary blood flow and myocardial need the blood is the root of the onset of the disease, coronary artery blood supply can not meet the myocardial metabolism, resulting in ischemia and hypoxia, performance, chest tightness, chest pain and other symptoms, therefore coronary spasm or stenosis is lead to reduced blood supply to the myocardium are the main contradiction[7]. UAP clinical changes fast, coronary flow drastically reduced in a short period of time, collateral circulation too late to establish the effective compensation, resulting in myocardial ischemia or small necrotic foci, and then evolve into acute myocardial infarction[8]. Research shows UAP and coronary artery blood flow learn change, platelet aggregation, plaque formation and rupture, impaired endothelial function is closely related, due to smoking, hypertension, high cholesterol and other factors, which lead to plaque instability, at rest or small motion can be disease, if not to the emergency treatment, prone to acute myocardial infarction[9].

UAP patients with high levels of fat in the blood will lead to...
erythrocyte lipid bilayer composition of abnormal erythrocyte deformation capacity and blood flow decreased. When erythrocyte pass plaque location, microcirculation disorder and easily cause acute myocardial infarction[10]. Erythrocyte membrane lipid bilayer cholesterol ratio higher, blood flow worse, erythrocyte deformation ability is abate, resulting in an increase in resistance, the velocity of blood flow slowed down, the emergence of microcirculation perfusion, vascular endothelial ischemia and hypoxia, causing endothelial tissue function and structure change[9,11]. Studies have shown that patients with coronary heart disease of whole blood high shear and low shear viscosity higher than normal people, hints of red cell deformability decreased and aggregation ability enhancement[12], atherosclerotic plaque is in an unstable state, easy cause vascular endothelial dysfunction and lipid deposition, in inflammation reaction, leading to platelet activation and thrombosis initiated by[13].

ET and NO is an important indicator of vascular endothelial function, which plays an important role in the relaxation and contraction of vascular endothelial function. Under normal circumstances, NO and ET in the coronary artery endothelial cells to maintain homeostasis, mutual maintenance of vascular tension. If the balance is destroyed, it will lead to endothelial dysfunction, affect the vascular tone[14]. With the continuous understanding of the biological function of vascular endothelial cells, it is considered that endothelial dysfunction induced by vascular endothelial cell injury is an early manifestation of acute myocardial infarction[15].

Unstable angina pectoris (UAP) belongs to the category of traditional Chinese medicine chest, pathogenesis is blood stasis, and vascular wall integrity, blood related properties and hemodynamic[4]. Depside salt from Salvia miltiorrhiza is effective component extracted from Salvia miltiorrhiza, which magnesium lithospermate B content of more than 80%, with anti myocardial ischemia and protect the ischemic and reperfusion injury, anti platelet aggregation and adhesion, improve hemodynamics and regulate blood lipid metabolism and anti atherosclerotic plaque stability, promote angiogenesis and improve endothelial cell functions involved in inflammation[16]. This study shows that the treat group, the plasma viscosity, whole blood viscosity (low shear, cut and high shear rate), red blood cell hematocrit and red blood cell aggregation index decreased than the control group, significant difference (P<0.05), indicating that the treatment group in improving inflammatory response, the red blood cells, blood fluid viscosity, blood rheology deformation, blood circulation is obviously superior to the control group. After treatment, the two groups of serum NO increased, ET decreased, the treatment group improved better than the control group, there was statistical significance (P<0.05), which showed that the effect of Salvia miltiorrhiza polyphenols in the protection and regulation of endothelial cells was more significant.

Salvia miltiorrhiza can effectively improve the blood rheology of UAP patients, regulate vascular endothelial function, improve microcirculation, effectively reduce the risk of cardiovascular events, it is worthy of clinical application.

Reference