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Efficacy Analysis of Recombinant Human Pro-Urokinase Combined with Percutaneous Coronary Intervention in the Treatment of Acute ST-Segment Elevation Myocardial Infarction

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Abstract

Purpose This article discusses the clinical therapeutic effect of recombinant human pro-urokinase combined with percutaneous coronary intervention in the treatment of acute ST-segment elevation myocardial infarction. Method A retrospective analysis of 89 patients with acute ST-segment elevation myocardial infarction admitted in our hospital from January to December 2020 was conducted and divided into the treatment group (n=46) and the control group (n=43) according to different treatment options. The control group was treated with percutaneous coronary intervention, and the treatment group was treated with recombinant human pro-urokinase based on that. The levels of LVEF, LVEDD, CK-MB, hs-CRP, and coronary artery recanalization rates were compared between the two groups. Results Before the operation, there was no statistically significant difference in the levels of LVEF and LVEDD between the two groups (P>0.05). After the operation, the LVEF levels of the two groups increased, and the LVEDD levels decreased. The difference between the groups was not statistically significant (P>0.05). Similarly, before the operation, there was no significant difference in the levels of CK-MB and hs-CRP between the two groups (P>0.05). After the operation, the levels of CK-MB and hs-CRP in the two groups decreased, but the levels of the treatment group were lower than those of the control group. The difference between the groups was statistically significant (P<0.05). Conclusion Recombinant human pro-urokinase combined with percutaneous coronary intervention can achieve better results in the treatment of acute ST-segment elevation myocardial infarction, which can further reduce the levels of CK-MB and hs-CRP and increase the coronary recanalization rate.

Keywords

Recombinant human pro-urokinase; Percutaneous coronary intervention; Acute myocardial infarction.

1. INTRODUCTION

Acute ST-segment elevation myocardial infarction is a common type of acute myocardial infarction. It mainly refers to ischemic chest pain that lasts for more than 20 minutes, where the serum myocardial necrosis marker concentration is elevated and occurs dynamic evolution, and the electrocardiogram shows ST-segment elevation [1]. The main clinical manifestations of acute ST-segment elevation myocardial infarction are pain, fever, tachycardia, nausea and vomiting, arrhythmia, etc. Some patients may even experience heart failure and shock. PCI is the main method for the treatment of acute ST-segment elevation myocardial infarction. It can achieve coronary revascularization, but it cannot completely guarantee the complete recovery of myocardial reperfusion. According to research [2], combined intravenous thrombolytic therapy during the implementation of PCI can further alleviate the condition and promote coronary recanalization. The report of 46 patients with acute ST-segment elevation myocardial

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infarction with recombinant human pro-urokinase therapy based on PCI in our hospital combined is as follows.

2. MATERIALS AND METHODS

2.1. General Materials

Inclusion criteria: All selected patients meet the diagnostic criteria for acute ST-segment elevation myocardial infarction in the "Guidelines for the Diagnosis and Treatment of Acute ST-segment Elevation Myocardial Infarction" [3]. As for the contents of the study, the patient knows the situation and agrees to cooperate with the study.

Exclusion criteria: those with drug allergies, those with severely defective liver and kidney functions, and those with blood diseases or bleeding tendency.

A retrospective analysis of 89 patients with acute ST-segment elevation myocardial infarction admitted in our hospital from January to December 2020 was divided into the treatment group (n=46) and the control group (n=43) according to different treatment options. There were 26 males and 20 females in the treatment group, aged from 48 to 75 years old, with an average of (60.39±5.89) years old, including 14 cases of extensive anterior wall infarction, 11 cases of inferior wall infarction, 12 cases of right ventricular infarction, and 9 cases of high lateral wall infarction. In the control group, there were 24 males and 19 females, aged from 50 to 76 years old, with an average age of (61.48±5.95) years, including 13 cases of extensive anterior wall infarction, 10 cases of inferior wall infarction, 10 cases of right ventricular infarction, and 10 cases of high lateral wall infarction. There was no statistically significant difference between the two groups of patients in terms of gender, age, and type of myocardial infarction (P>0.05).

2.2. Methods

After admission, both patients in two groups were bed rested and received routine treatments such as low-flow oxygen inhalation and ECG monitoring. The control group was treated with percutaneous coronary intervention (PCI), given 300 mg aspirin (SFDA approval number: H31022424; Manufacturer: Shanghai Xinyi Pharmaceutical Co., Ltd.; Specification: 50mg/tablet) and 300 mg Clopidogrel (SFDA approval number: J20180029; Manufacturer: Sanofi (Hangzhou) Pharmaceutical Co., Ltd.; Specification: 75mg/tablet) before operation. The conventional disinfection drapes and Judkins method were used to puncture the right radial artery and inject 70U/kg low molecular weight heparin sodium (SFDA approval number: H10980115; Manufacturer: Hangzhou Jiuyuan Gene Engineering Co., Ltd.; Specification: 2ml: 5000IU) through the arterial sheath. Coronary angiography was performed to observe the condition of the diseased blood vessels and perform endovascular angioplasty and stent placement. After the operation, dual antiplatelet drug treatment was given.

The treatment group was treated with recombinant human pro-urokinase (SFDA approval number: S20110003; Manufacturer: Tasly Biomedicine Co., Ltd.; Specification: 5mg/branch) before PCI. After confirming that the thrombus has no reflow or heavy load, urokinase is injected through the catheter several times with 50,000 to 100,000 U/time, and the total amount is less than 500,000 U.

2.3. Observation Indicators

The left ventricular ejection fraction (LVEF) and left ventricular end-diastolic diameter (LVEDD) were compared between the two groups. The levels of creatine kinase isoenzyme (CK-MB) and high-sensitivity C-reactive protein (hs-CRP) were compared between the two groups. The coronary artery recanalization rate of the two groups of patients was compared, and the TIMI blood flow grade ≥ 2 can be regarded as coronary artery recanalization [4].

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2.4. Statistical Analysis

Research data was entered through EXCEL2021, and SPSS 22.0 was used for statistical analysis. The count data is represented by [n(%)], and the χ^2 test is performed. The measurement data is expressed by ($\bar{x}\pm s$), and the t-test is performed. P<0.05 indicates that the difference is statistically significant.

3. RESULTS

3.1. Comparison of LVEF and LVEDD Levels Between Two Groups

Before the operation, there was no statistically significant difference in the levels of LVEF and LVEDD between the two groups (P>0.05). After the operation, the LVEF levels of the two groups increased, and the LVEDD levels decreased. There was no statistically significant difference between the groups (P>0.05), as shown in Table 1 below:

Table 1. Comparison of LVEF and LVEDD levels between two groups ($\bar{x}\pm s$)

Group	LVEF (%)		LVEDD (mm)	
	Before Operation	After Operation	Before Operation	After Operation
The Treatment Group (n=46)	52.11±4.53	68.12±5.36*	64.78±5.23	51.23±4.57*
The Control Group (n=43)	53.15±4.79	68.74±5.78*	64.12±5.01	50.48±4.44*
t	1.053	0.525	0.607	0.784
P	0.295	0.601	0.545	0.435

Note: Compared with before operation, *P<0.05.

3.2. Comparison of CK-MB and hs-CRP Levels Between Two Groups

Before surgery, there was no statistically significant difference in the levels of CK-MB and hs-CRP between the two groups (P>0.05). After the operation, the levels of CK-MB and hs-CRP in the two groups decreased, but the levels of the treatment group were lower than those of the control group. The difference between the groups was statistically significant (P<0.05), as shown in Table 2 below:

Table 2. Comparison of CK-MB and hs-CRP levels between two groups ($\bar{x}\pm s$)

Group	CK-MB (U/L)		hs-CRP (mg/L)	
	Before Operation	After Operation	Before Operation	After Operation
The Treatment Group (n=46)	222.56±35.36	166.36±22.69*	20.11±3.55	6.88±2.46*
The Control Group (n=43)	215.74±34.11	184.23±24.11*	19.69±3.26	10.12±2.78*
t	1.053	0.525	0.607	0.784
P	0.295	0.601	0.545	0.435

Note: Compared with before operation, *P<0.05.

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3.3. Comparison of Coronary Artery Recanalization Rates Between Two Groups

The coronary artery recanalization rate in the treatment group was 91.30% (42/46), and the coronary artery recanalization rate in the control group was 74.42% (32/43). The difference between the groups was statistically significant (χ^2=4.522, P=0.033).

4. DISCUSSION

In the treatment of patients with acute ST-segment elevation myocardial infarction, early effective reperfusion therapy can alleviate myocardial necrosis, reduce the infarct size, and reduce related complications, which is of great significance for improving the prognosis [5]. PCI can achieve coronary revascularization, recanalize the blocked coronary artery, and restore the forward blood flow. However, studies [6] have shown that even if some patients undergo PCI treatment, the forward blood flow still cannot be fully recovered, and poor myocardial perfusion may still occur, which is also one of the main risk factors for PCI failure. Based on PCI, combined thrombolytic therapy can achieve early optimization of perfusion, improve myocardial ischemia, maintain myocardial function, help reduce infarct size, and maintain stable disease [7].

In this study, the treatment group was treated with recombinant human pro-urokinase combined with percutaneous coronary intervention. The results showed that the levels of CK-MB and hs-CRP in the two groups decreased after the operation, but the levels in the treatment group were lower than those in the control group (P<0.05). CK-MB is an important indicator of myocardial injury. After the onset of acute myocardial infarction, CK-MB will be released into the blood, and its level is negatively correlated with myocardial function. The lower the CK-MB level means the better the patient's myocardial function. hs-CRP is a widespread inflammatory factor, which is involved in atherosclerosis. The decrease in hs-CRP level also reflects the relief of acute myocardial infarction from the side [8]. Combined with the above results, it can be seen that recombinant human pro-urokinase combined with percutaneous coronary intervention can further improve the patient's myocardial function and control the development of the disease.

Recombinant human pro-urokinase is a precursor of urokinase, which is a fibrin selective thrombolytic agent. It has an activating effect on plasminogen on the surface of thrombus fibers, but it does not activate free plasminogen, so the risk of bleeding is low, and it has good safety and applicability. Recombinant human urokinase was used for thrombolysis before PCI. During interventional procedures, drugs and capillaries can enter the end of the artery along with the blood flow to further enhance the thrombolytic effect [9]. Repeated use of recombinant human pro-urokinase can keep the distal end of the responsible blood vessel in a thrombolytic state and prevent the accumulation of microthrombi in the distal coronary artery. In the study, the coronary artery recanalization rate of the treatment group was significantly higher than that of the control group (P<0.05), which was consistent with the results reported by Cui et al. [10]. This reflects that recombinant human pro-urokinase combined with percutaneous coronary intervention can further improve the coronary artery recanalization rate.

In summary, the overall effect of recombinant human pro-urokinase combined with percutaneous coronary intervention in the treatment of acute ST-segment elevation myocardial infarction is relatively ideal, which can further reduce the levels of CK-MB and hs-CRP and is beneficial to increase the coronary artery recanalization rate.

REFERENCES

[1] Jinghong Zhao, Yan Qiao, Tao Liu, et al. Study on the application effect of low-dose recombinant human pro-urokinase in patients with acute ST-segment elevation myocardial infarction in the

ISSN: 2472-3703 DOI: 10.6911/WSRJ.202111_7(11).0045

emergency percutaneous coronary intervention [J]. Journal of Practical Cardiocerebral Pulmonary Vascular Disease, 2021, 29(09): 77-81+93.

[2] Xiaofeng Liu and Yingfu Yao. The clinical effect of recombinant human pro-urokinase combined with percutaneous coronary intervention in the treatment of acute ST-segment elevation myocardial infarction [J]. Henan Medical Research, 2021, 30(19): 3563-3565.

[3] Chinese Medical Association Cardiovascular Diseases Branch, Chinese Journal of Cardiovascular Diseases Editorial Committee. Guidelines for the diagnosis and treatment of acute ST-segment elevation myocardial infarction [J]. Chinese Journal of Cardiovascular Diseases, 2010, 38 (07): 675-687.

[4] Junfeng Wang and Xiaofeng You. Application of recombinant human pro-urokinase combined with PCI in patients with acute ST-segment elevation myocardial infarction [J]. Modern Diagnosis and Treatment, 2021, 32(11): 1751-1752.

[5] Xiaohui Zhao, Shuangdong Lu, Jie Chen, et al. Study on the preventive effect of recombinant human pro-urokinase on the no-reflow phenomenon after percutaneous coronary intervention in patients with ST-segment elevation myocardial infarction [J]. Journal of Practical Cardiocerebral Pulmonary Vascular Disease, 2021, 29(06): 105-109.

[6] Guanmao Zhang, Xuebin Chen, Jin Wang, et al. Application of recombinant human pro-urokinase combined with tirofiban and catheter aspiration in patients with acute ST-segment elevation myocardial infarction after percutaneous coronary intervention [J]. Henan Medical Research, 2021, 30(13): 2437-2439.

[7] Yong Wang, Qing Hu, Tao Di, et al. Efficacy of recombinant human pro-urokinase combined with nitroglycerin on acute ST-segment elevation myocardial infarction without reflow after coronary intervention [J]. Chinese Clinical Research, 2021, 34(02):155-158.

[8] Yong Wang, Jiangyan Gao, Jianjun Hu, et al. The improving effect of combined intracoronary administration of sodium nitroprusside and recombinant human pro-urokinase on no-reflow during emergency percutaneous coronary intervention in elderly patients with acute ST-segment elevation myocardial infarction [J]. Evaluation and Analysis of Drug Use in Chinese Hospitals, 2021, 21(01): 19-22.

[9] Xiaohui Zhao, Shuangdong Lu, Jie Chen, et al. Effect evaluation of recombinant human pro-urokinase and alteplase in the treatment of acute ST-segment elevation myocardial infarction [J]. Central South Medical Science Journal, 2021, 49(01): 72-77.

[10] Xiaolei Cui, Hengbo Gao, Dongqi Yao, Yingping Tian. Observation on the efficacy and safety of recombinant human pro-urokinase in patients with ST-segment elevation myocardial infarction[J]. Medical Journal of Chinese People's Liberation Army, 2018, 30(12): 41-44.