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Research Article

Comparison of Clinical Efficacy of Ticagrelor and Clopidogrel for Treatment of Coronary Heart Disease with Myocardial Ischemia

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Abstract: ***Objective.*** To compare clinical efficacy of ticagrelor and clopidogrel for treatment of coronary heart disease with myocardial ischemia to provide references for later phase of clinical treatment. ***Methods.*** Ninety-six coronary heart disease patients with myocardial ischemia admitted to our hospital from July 20 to July 2019 were recruited as subjects. They were randomly divided into study group and control group according to parity of case number, with 48 patients in each group. Control group was given treatment with clopidogrel, while patients in study group were given treatment with ticagrelor. Clinical efficacy was compared between the both groups. ***Results.*** Comparison showed that total effective rate of clinical treatment was higher in study group when compared to control group (P<0.05). Frequency of ST segment depression, duration of ST segment depression, systolic blood pressure, diastolic blood pressure, heart rate and other clinical indicators in study group were superior to control group (P<0.05). Whole blood viscosity at low shear rate, whole blood viscosity at high shear rate, plasma viscosity shear rate, total cholesterol, triglyceride and other haemorheological parameters in study group were superior to control group (P<0.05). ***Conclusion.*** Application of ticagrelor has higher clinical efficacy than clopidogreal for coronary heart disease patients with myocardial ischemia. Clinical indicators and haemorheological parameters of myocardial ischemia patients were significantly improved. It should be promoted for application.

Keywords: Ticagrelor, Clopidogrel, Coronary heart disease with myocardial ischemia

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1 Introduction

Coronary heart disease is a cardiovascular disease with high clinical incidence. Diseased population of coronary heart disease are mainly middle-aged and elderly people. Myocardial ischemia is a common clinical symptom of coronary heart disease[1]. Cardiomyocytes are sensitive to ischemia. Inadequate blood perfusion volume for heart demand can easily lead to declined myocardial metabolic function and myocardial cell damage, which affect normal life of patient[2]. At the present, diet structure and living habit of people have changed significantly. Clinical incidence of myocardial ischemia in coronary heart disease has been increasing year by year. Clinical treatment of this disease has become increasingly diversified. However, the overall treatment effect is not satisfactory[3]. In this study, 96 myocardial ischemia patients who were admitted to our hospital were enrolled and clinical efficacy of ticagrelor and clopidogrel were compared.

2 Materials and methods

2.1 General information

Ninety-six coronary heart disease patients with myocardial ischemia admitted to our hospital from July 20 to July 2019 were recruited as subjects. They were randomly divided into study group and control group according to parity of case number, with 48 patients in each group. In study group, there were 23 male patients

and 25 female patients, with age ranged from 47 to 76 years old, average age of 56.29±4.58 years old, disease course of 1–4 years, and average disease duration of 2.32±1.04 years. In control group, there were 24 male patients and 24 female patients, with age ranged from 49 to 73 years old, average age of 56.21±4.53 years old, course of disease of 1–3 years, and average disease duration of 2.24±1.01 years. The general data (age, gender and disease duration) of the two groups were statistically comparable (P>0.05).

Inclusion criteria: patients who met clinical diagnostic criteria for coronary heart disease with myocardial ischemia, and signed informed consent for treatment research.

Exclusion criteria: patients with liver and kidney dysfunction, mental illness, and those unable to cooperate with the study.

2.2 Methods

After admission, both groups of patients were given routine treatment measures which mainly included blood lipids regulation, anti-thrombotic, anti-platelet aggregation and coronary artery dilatation. On this basis, control group patients were given treatment of clopidogrel [Sanofi (Hangzhou) Pharmaceutical Co., Ltd., National Pharmaceutical Standard approval no. J20180029] for once daily and 70mg each dose, together with aspirin (Bayer Health Care Co., Ltd., National Pharmaceutical Standard approval no. J20130078) for once daily and 0.1g each dose. On the basis of routine treatment, study group patients were given treatment of ticagrelor (Shenzhen Xinlitai Pharmaceutical Co., Ltd., National Pharmaceutical Standard approval no. H20183320) for 2 times daily and 90mg each dose, together with aspirin for once daily and 0.1g each dose. Medication duration for both groups was 3 weeks. During medication, clinical indicators of patients were closely monitored by medical staffs. Timely adjustment of dosage and treatment plan were carried out in case of abnormality.

2.3 Evaluation criterion

Total effective rate of clinical treatment was indicated as markedly effective, effective, or ineffective. Those with blood viscosity, cholesterol and triglyceride indicators restored to normal and normal imaging examination were considered as markedly effective. Those with significantly improved blood viscosity, cholesterol and triglyceride indicators with reduced difference from normal value, and significantly restored imaging examination indexes were considered effective. Those with abnormality in electrocardiogram and blood lipids, and unimproved or aggravated clinical symptoms were considered as ineffective.

Clinical parameters such as frequency of ST segment depression, duration of ST segment depression, systolic blood pressure, diastolic blood pressure and heart rate of both patient groups were computed statistically. Haemorheological parameters such as whole blood viscosity at low shear rate, whole blood viscosity at high shear rate, plasma viscosity shear rate, total cholesterol and triglycerides were statistically analysed.

2.4 Statistical method

Total effective rate of clinical treatment was expressed in % form. Test method was χ^2 test. Clinical indicators and haemorheological parameters were expressed in form of $\bar{x}$±s. Test method was t test. Statistical software used for data analysis was SPSS22.0. P<0.05 indicated significance in statistical analysis.

3 Results

3.1 Comparative analysis of total effective rate of clinical treatment in two patient groups

Total effective rate of clinical treatment in study group was higher than in control group (P<0.05).

Table 1. Comparison of total effective rate of clinical treatment in both patient groups (n/%)

Group	Markedly effective	Effective	Ineffective	Total effective rate
Study group（n=48）	37	9	2	46（95.8）
Control group（n=48）	25	12	11	37（77.0）
x^2value				7.206
P value				0.007

3.2 Comparative analysis of clinical indicators of two patients groups

Frequency of ST segment depression, duration of ST segment depression, systolic blood pressure, diastolic blood pressure, heart rate and other clinical indicators in study group were superior to control group (P<0.05).

Table 2. Comparative analysis of clinical indicators of two patient groups($\bar{x} \pm s$)

Group	Frequency of ST segment reduction	ST segment decline duration(s)	systolic blood pressure(mmHg)	diastolic blood pressure(mmHg)	Heart rate per min
Study group（n=48）	35.18±4.09	119.55±13.46	104.38±2.16	62.57±3.13	65.24±3.17
Control group（n=48）	53.83±6.65	179.27±14.23	112.59±2.21	69.76±2.84	67.38±5.68
T value	16.550	21.123	18.406	11.786	2.279
P value	0.000	0.000	0.000	0.000	0.024

3.3 Comparative analysis of haemorheological parameters of two patient groups

Whole blood viscosity at low shear rate, whole blood viscosity at high shear rate, plasma viscosity shear rate, total cholesterol, triglyceride and other haemorheological parameters in study group were superior to control group (P <0.05).

4 Discussion

Table 3. Comparative analysis of haemorheological parameters in two patient groups($\bar{x} \pm s$)

Group	Whole blood viscosity at low shear rate	Whole blood viscosity at high shear rate of	Plasma viscosity shear rate	Total cholesterol	Triglyceride
Study group（n=48）	19.48±0.69	4.02±0.07	1.44±0.12	4.52±0.26	1.41±0.27
Control group（n=48）	20.87±0.79	4.29±0.13	1.65±0.13	5.28±0.35	1.76±0.33
T value	9.181	12.669	8.223	12.076	5.687
P value	0.000	0.000	0.000	0.000	0.000

Clinical incidence of coronary heart disease with myocardial ischemia is high. Patient population comprises mainly middle-aged and elderly people. Individuals with heart failure and heart enlargement are at high risk of the disease[4]. Atherosclerosis in coronary heart disease patients with myocardial ischemia is more severe, in which stenosis with or without occlusion may occur. Some patients may have diffuse fibrosis of heart muscle. The lesion can affect cardiac conduction system, papillary muscle, left ventricle and other locations. Scars develop in patient after multiple focal myocardial infarction or large myocardial infarction. Fibrous tissues distribute irregularly in myocardium, results in greatly increase of fibrous connective tissue and decrease of myocardial cells. This leads to clinical symptoms such as palpitation, chest tightness, shortness of breath and chest pain in patient. Incidence of adverse reactions such as abnormal cardiac function, electrocardiogram behavioral metabolic abnormality, sudden death, myocardial infarction and arrhythmia is very high[5]. These seriously threaten lives of patient, thus it is necessary to strengthen treatment of coronary heart disease with myocardial ischemia.

Results of this study showed that total effective rate, haemorheological parameters and clinical indicators of study group patients who received ticagrelor were superior to control group patients who received clopidogrel. Clinical treatment of coronary heart disease with myocardial ischemia mainly bases on improvement of patient's myocardial nutrition, fulfillment of arterial blood supply, and suppression of arrhythmia and heart failure. It is necessary to examine for sick sinus syndrome in patients who show severe atrial fibrillation. In patients with atrioventricular conduction blockage, installation of cardiac pacemaker should be considered[6]. Clopidogrel is an anti-platelet aggregation drug which has wide clinical application. Thienopyridine derivative of the drug can be converted into active metabolites in vivo through biotransformation and thereby inhibits aggregation of platelets. The main drawback of clopidogrel is unnecessary side effects. Patients who take clopigogrel are at bleeding risk. Its persistence of efficacy and drug tolerance effect are not satisfactory. Long-term use of the drug prone to give rise to persistent gastritis, constipation, gastrointestinal bleeding and other symptoms. Its long-term effects in improvement of haemorheological parameters and clinical indicators are not ideal[7]. This drug is gradually replaced by new generation of anti-platelet aggregation drug. Ticagrelor

is a new generation anti-platelet condensate drug. This non-thiophene pyridine has significantly higher absorption rate after administration than clopidogrel and higher drug selectivity. Ticagrelor metabolites can bind to platelet receptor and thereby inhibit activation of platelets and disease signal transmission. This can reduce the amount of new platelets produced in body, thus drug efficacy is persistent and stable. The drug has significant clinical efficacy for coronary heart disease with myocardial ischemia. After administration, metabolites of ticagrelor bind to human plasma protein without metabolic activation by liver, and residual substances are excreted through defecation. This exerts milder effect on liver and kidney functions of patient[8]. Incidence of side effects is low and medication safety can be warranted.

It could be observed that ticagrelor had higher clinical efficacy than clopidogrel for treatment of coronary heart disease with myocardial ischemia. It was effective in improving haemorheological parameters, blood pressure, heart rate, ST segment depression and duration of ST segment depression. It can be promoted for clinical application. Meanwhile, the number of samples selected in this study was not adequate, and there is lack of relevant data from medical institutions for comparative analysis. Clinical efficacy of ticagrelor and clopidogrel for treatment of coronary heart disease with myocardial ischemia requires further investigation.

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