

Effect of ticagrelor on brain natriuretic peptide, heart rate and myocardial enzymes in patients with coronary atherosclerotic heart disease after stenting

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Abstract: The main aim of the current work was to investigate the application of ticagrelor in patients with coronary atherosclerotic heart disease (CAHD) and its effects on brain natriuretic peptide (BNP), heart rate (HR) and myocardial enzymes. Seventy-four postoperative patients who underwent stenting for CAHD were selected as subjects, randomly divided into control group (n=37) and observation group (n=37). The control group was treated with clopidogrel after operation, while the observation group was given ticagrelor treatment. The plasma BNP, HR, myocardial zymogram and adverse cardiac events were compared between the two groups. SPSS18.0 software was used for statistical analysis and the count data was analyzed by χ^2 test and the measurement data was detected by t-test. The levels of BNP, HR, creatine kinase isoenzyme (CK-MB) and troponin (cTnI) in the observation group were all lower than those in the control group at 3 months after treatment ($P < 0.05$). There was no significant difference in the incidence of myocardial infarction, angina pectoris and arrhythmia between the two groups at 3 months after treatment ($P > 0.05$). The utilization of ticagrelor in patients with postoperative stenting for CAHD improved the BNP, HR and myocardial enzyme level in patients, and also reduced the incidence of adverse cardiac events.

Keywords: Ticagrelor. stenting. brain natriuretic peptide.

INTRODUCTION

Coronary atherosclerotic heart disease (CAHD), also known as coronary heart disease (CHD), is caused by coronary artery lesions that leads to different degrees of stenosis in the vascular lumen, myocardial hypoxia, ischemia or necrosis resulted from obstruction. Clinical manifestations are typical chest pain, nausea, vomiting, fever, and severe cases even cause heart failure, shock and so on (Yuan *et al.*, 2016). Stenting intervention is the preferred treatment for patients with CHD, which can improve the symptoms of patients and promote recovery. However, due to the lack of effective intervention methods in some patients, the postoperative complication rate is higher, which in turn affects the prognosis of patients (Wei *et al.*, 2017; Meng *et al.*, 2017). It has been shown in the clinical studies that CHD patients who receive antiplatelet aggregation drugs such as aspirin and clopidogrel after stenting can reduce the incidence of thrombosis, but the long-term prognosis is poor (Liang *et al.*, 2016). Ticagrelor belongs to a platelet aggregation inhibitor, and its effect is due to clopidogrel. However, there are few studies on the effects of ticagrelor on BNP, HR and myocardial enzymes after coronary artery stenting (Liu *et al.*, 2016). Therefore, a randomized controlled trial was used in this study to investigate the application of ticagrelor in CAHD patients and its effects on BNP, HR and myocardial enzymes (Mao and Yan, 2016).

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MATERIALS AND METHODS

Clinical data

Seventy-four postoperative patients who underwent stenting for CAHD treated from April 2017 to May 2018 were selected as subjects, who were then randomly divided into control group (n=37) and observation group (n=37). There was no significant difference in age, number of embolism and location of myocardial infarction between the two groups ($P > 0.05$), as shown in table 1.

Methods

The patients in control group were treated with clopidogrel after operation. Clopidogrel (Sanofi Anwante [Hangzhou] Pharmaceutical Co. Ltd., Chinese medicine quasi-word: J20130083) was orally administered 75mg once a day for 3 consecutive months (a course of treatment). Observation group: The patients were treated with ticagrelor after operation. Ticagrelor (Astra Zeneca AB, quasi-character of Chinese medicine: J20130020) was orally administered 90mg twice a day, in morning and evening respectively, for 3 consecutive months.

Observational index

Plasma BNP, Myocardial Enzymogram and HR

From both the groups, 5mL of fasting venous blood was taken in the morning before treatment and 3 months after treatment, centrifuged for 25min under centrifugal force of 1108g. After serum separation, the levels of plasma

Table 1: Comparison of clinical data between two groups

Clinical Data		Observation Group	Control Group	χ^2/t	P
Gender	Male	20	19	1.215	0.067
	Female	17	18		
Age		58.29±4.72	57.83±4.59	0.641	0.592
Number of Embolic Branches		2.59±0.74	2.63±0.71	1.593	0.115
Myocardial Infarction Location	Anterior Wall	12	14	2.989	0.512
	Anterior Wall	18	17		
	Inferior Wall	7	6		

Table 2: Comparison of plasma BNP, myocardial enzymes and hr between the two groups ($\bar{x} \pm s$)

Group		BNP (pg/mL)	HR (times/min)	CK-MB (U/L)	CTnI (ng/mL)
Observation	Prior to Treatment	324.69±34.11	82.53±8.61	67.81±5.39	1.26±0.53
	3 Months after Treatment	160.49±21.1 ^{ab}	67.82±4.6 ^{ab}	40.23±4.31 ^{ab}	0.91±0.23 ^{ab}
Control	Prior to Treatment	325.61±35.09	82.36±8.35	67.80±5.38	1.25±0.52
	3 Months after Treatment	235.98±27.8 ^b	78.43±6.41 ^b	56.89±5.12 ^b	1.13±0.34 ^b

Compared with the control group, ^aP<0.05. Compared with those before treatment, ^bP<0.05.

Table 3: Comparison of incidence of adverse cardiac events between the two groups [n (%)]

Groups	Cases	Myocardial Infarction	Angina Pectoris	Arrhythmia
Observation Group	37	1 (2.70)	0 (0.00)	1 (2.70)
Control Group	37	2 (5.41)	1 (2.70)	0 (0.00)
X ²	---	1.294	0.648	0.972
P	---	0.061	0.059	0.068

BNP, CK-MB and cTnI were measured by automatic biochemical analyzer (Liu *et al.*, 2016; Ma *et al.*, 2017). In addition, the HR levels before and after treatment were recorded in both groups.

Cardiac adverse events

The incidence of myocardial infarction, angina pectoris, and arrhythmia after treatment was recorded.

STATISTICAL ANALYSIS

The data was processed by SPSS18.0 software, and the count data was analyzed by χ^2 test, which was represented by n (%). The measurement data was detected by t-test, which was represented by ($\bar{x} \pm s$), and P<0.05 indicated a statistically significant difference.

Ethical approval

This study was approved from the institutional ethical review board of Lanling County People, China. All the experiments were conducted as per Helsinki's declaration for human volunteers. All subjects gave informed, signed consent to participate in the study by themselves. The reference No is 543/ERB/LCH/2017.

RESULTS

Comparison of plasma BNP, myocardial enzymes and HR

There were no significant differences in plasma BNP, myocardial enzymes and HR between the two groups

before treatment (P>0.05). The BNP, HR, CK-MB and cTnI levels in the observation group were lower than those in the control group (P<0.05), as given in table 2.

Comparison of incidence of adverse cardiac events

There was no significant difference in the incidence of myocardial infarction, angina pectoris and arrhythmia between the two groups (P>0.05), as shown in table 3.

DISCUSSION

Stenting intervention is the first choice for patients with CHD, which can prolong the life span of patients and reduce clinical mortality. However, due to the high risk of surgery and trauma, the incidence of postoperative complications is high, which affects the prognosis of patients (Zhu *et al.*, 2016; Yang *et al.*, 2016). In recent years, ticagrelor has been applied in patients with CHD after stenting, and the effect is satisfactory (Li and Huang, 2016). In this study, the BNP, HR, CK-MB and cTnI levels in the observation group were lower than the control group after 3 months treatment, indicating that ticagrelor was helpful for postoperative CHD patients to improve the myocardial function and HR, which is conducive to patient recovery. Ticagrelor belongs to the adenosine diphosphate receptor antagonist and can be consistent with the P2Y12 receptor antagonist. The drug itself is inactive and the drug metabolism process does not require the participation of liver metabolic enzymes,

which helps to consolidate the postoperative effect (Arhuidese *et al.*, 2016; Zhang *et al.*, 2017). At the same time, the utilization of ticagrelor can inhibit myocardial and vascular protection indirectly while inhibiting platelet enhancement, thereby reducing the incidence of adverse cardiac events (Cao and Bian, 2017; Lu, 2017). In the present study, no significant difference was found in the incidence of myocardial infarction, angina pectoris and arrhythmia, implying that ticagrelor is helpful to improve the surgical effect, reduce the incidence of adverse reactions and facilitate the recovery of patients after CHD stenting.

CONCLUSION

From the findings of this study it can be concluded that the utilization of ticagrelor in patients with postoperative stenting for CAHD can improve the BNP, HR and myocardial enzyme level in patients, and also can reduce the incidence of adverse cardiac events.

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