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

Dequan Jia¹, Bo Qin¹* and Xiaomei Wei²
¹Department of Cardiovascular, Lanling County People & 39th Hospital, Linyi, Shangdong, China
²Department of Tumor Radiotherapy, Lanling County People & 39th Hospital, Linyi, Shangdong, China

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 χ² 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).

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
Effect of ticagrelor on brain natriuretic peptide, heart rate and myocardial enzymes in patients

Table 1: Comparison of clinical data between two groups

<table>
<thead>
<tr>
<th>Clinical Data</th>
<th>Observation Group</th>
<th>Control Group</th>
<th>χ²/t</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>20</td>
<td>19</td>
<td>1.215</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>17</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>58.29±4.72</td>
<td>57.83±4.59</td>
<td>0.641</td>
<td>0.592</td>
</tr>
<tr>
<td>Number of Embolic Branches</td>
<td>Anterior Wall</td>
<td>12</td>
<td>14</td>
<td>1.593</td>
</tr>
<tr>
<td></td>
<td>Anterior Wall</td>
<td>18</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inferior Wall</td>
<td>7</td>
<td>6</td>
<td>2.989</td>
</tr>
</tbody>
</table>

Table 2: Comparison of plasma BNP, myocardial enzymes and HR between the two groups (X ± s)

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

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.

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

<table>
<thead>
<tr>
<th>Groups</th>
<th>Cases</th>
<th>Myocardial Infarction</th>
<th>Angina Pectoris</th>
<th>Arrhythmia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation Group</td>
<td>37</td>
<td>1 (2.70)</td>
<td>0 (0.00)</td>
<td>1 (2.70)</td>
</tr>
<tr>
<td>Control Group</td>
<td>37</td>
<td>2 (5.41)</td>
<td>1 (2.70)</td>
<td>0 (0.00)</td>
</tr>
<tr>
<td>X²</td>
<td></td>
<td>1.294</td>
<td>0.648</td>
<td>0.972</td>
</tr>
<tr>
<td>P</td>
<td></td>
<td>0.061</td>
<td>0.059</td>
<td>0.068</td>
</tr>
</tbody>
</table>

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 those in the control group (P<0.05), as given in table 2.

Statistical analysis
The data was processed by SPSS18.0 software, and the count data was analyzed by χ² test, which was represented by n (%). The measurement data was detected by t-test, which was represented by (X ± 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.

Before treatment, 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.
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.

REFERENCES


