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Original Research Article

Mitigating effect of clopidogrel and systematic management on adverse events after interventional therapy for coronary heart disease

Jing Shao[1]*, Wenqiang Chen[2]
[1]Jinan Third People's Hospital, [2]Department of Cardiology, Qilu Hospital of Shandong University, Jinan, China

For correspondence: **Email: lanzongyilangnpkk@163.com; **Tel:** 13805310270*

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Abstract

Purpose: *To investigate the efficacy of clopidogrel combined with systemic management care in the prevention of adverse events in patients with coronary heart disease after interventional therapy.*
Methods: *100 patients undergoing interventional therapy after coronary heart disease admitted to Jinan Third People's Hospital from April 2018 to April 2020 were assigned at a ratio of 1:1 either into control (low-molecular-weight heparin (LMWH) injection) or study groups randomly (clopidogrel plus system management care). Thrombin time, prothrombin time, fibrinogen, incidence of adverse events, NIHSS score and QLI score were determined for the two groups.*
Results: *There thrombin time, prothrombin time and fibrinogen in the two groups were similar ($p > 0.05$). The study group showed a significantly lower incidence of adverse events than the control group ($p < 0.05$). The treatment administered to the study group resulted in a higher QLI (quality of life) scores than those in the control group ($p < 0.05$). Remarkably lower National Institutes of Health Stroke Scale (NIHSS) score was reported in the study group versus control group ($p < 0.05$).*
Conclusion: *Clopidogrel plus systemic management care might be a preferable therapeutic strategy for patients with coronary heart disease undergoing interventional therapy. It reduces the incidence of adverse events, significantly improves the quality of life of patients, and enhances neurological function. Thus, this therapeutic strategy has significant promise in the management of coronary heart disease.*

Keywords: *Coronary heart disease, Interventional therapy, Clopidogrel, Systemic management care, Adverse events*

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INTRODUCTION

Adverse events following interventional therapy are common in patients with coronary heart disease, and it might result in secondary injuries. Multiple factors such as coronary atherosclerosis, decreased blood vessel elasticity, and insufficient blood supply to the heart are contributors coronary heart disease [1-3]. Commonly, interventional therapy is required for patients with severe conditions. And it is imperative to utilize anti-platelet aggregation drugs after interventional therapy to avoid myocardial infarction [4-6]. Of which, low-molecular-weight heparin (LMWH) is often used clinically to treat patients with coronary heart

disease in interventional therapy via the manner of subcutaneous injection, and is characterized by fast decomposition and easy absorption. Nevertheless, albeit universal use, it has been proved to present adverse reactions, impeding the prognosis of patients [7-9]. Clopidogrel is a common anticoagulant drug that is frequently used in the treatment of cardiovascular and cerebrovascular diseases, and yields promising results. This study was designed to further explore the efficacy of clopidogrel in combination with systematic management in patients with coronary heart disease after interventional therapy by enrolling coronary heart disease patients treated in Jinan Third People's Hospital.

METHODS

General patient information

This was a randomized-controlled trial on 100 coronary heart disease patients with interventional therapy admitted to Jinan Third People's Hospital from April 2018 to April 2020, with 50 patients in each group. Patients in the experimental group were 40-70 years old, while patients in the control group were 43-71 years old. They were comparable with respect to general data such as gender, age and disease course ($p > 0.05$), as shown in Table 1. The trial protocol was conducted in accordance with the guidelines of Declaration of Helsinki [8], and it has been reviewed and approved by the ethic committee of Jinan Third People's Hospital (license no. 2017.253.22).

Inclusion/exclusion criteria

Inclusion criteria

Participants were eligible to participate if confirmed with coronary heart disease and underwent interventional therapy, aged ≥18 years old; whereas participants were ineligible for participation in the study if they had cerebral infarction, cerebral hemorrhage and other cerebrovascular diseases within six months, resistance to clopidogrel, mental disorders and cannot cooperate with the research, other organic diseases, or history of drug allergy, drug abuse, bad habits.

Treatments

The control group received LMWH injection. LMWH (manufacturer: Sanofi Winthrop Industries; SFDA approval number: J20040118; specification: 0.4 ml: 4100AXaIU) 0.4 mL was subcutaneously injected, 1 time/d, aspirin enteric-coated tablets (manufacturer: Bayer Health Care Co., Ltd.; SFDA approval number: J20130078; specification: 100 mg * 30 s + 4.6 g/s * 10 s) was orally given, one tablet once daily for 3 months.

The study group was given clopidogrel plus system management care. The patients were treated with clopidogrel bisulfate tablets [manufacturer: Sanofi (Hangzhou) Pharmaceutical Co., Ltd.; SFDA approval number: J20130083; specification: 75 mg * 7s (Polivix)] orally, one tablet once daily. Aspirin enteric-coated tablets was also orally administered, one tablet once daily for 3 months. System management care is a comprehensive physical and mental care for patients, including psychological counseling and health education, as such patients develop good living habits, and monitoring of blood pressure, blood sugar and other indicators to ensure a favorable condition of patients.

Evaluation of treatment indicators

The thrombin time, prothrombin time, fibrinogen, incidence of adverse events, National Institutes of Health Stroke Scale (NIHSS) score and Quality of Life Index (QLI) were compared between the two groups.

Table 1: General patient information (mean ± SD)

Index	Study group	Control group	t/X^2	*P*-value
Gender (male/female)	26/24	23/27	0.36	0.55
Age (years)	58.32±4.49	58.61±4.17	0.33	0.74
Height (cm)	168.25±10.66	168.59±10.08	0.16	0.87
Weight (kg)	70.25±4.49	70.93±4.61	0.75	0.46
Course of disease (years)	2.26±0.51	2.33±0.60	0.63	0.53
History of smoking (years)	7.75±1.00	7.53±1.21	0.99	0.32
History of drinking (years)	10.61±2.01	10.22±1.96	0.98	0.33
Hypertension (n)	13	15	0.20	0.66
Diabetes (n)	10	9	0.07	0.80
hyperlipidaemia (n)	6	7	0.09	0.77

The thrombin time and prothrombin time were measured. The standard value of thrombin time is 9 – 18 s, prothrombin time is 9 ~ 14 s, and fibrinogen is 2 – 4 g/L.

The Survey Short Form (SF-36) questionnaire was used to assess the quality of life. It consists of 36 items under 8 dimensions, with the scores ranging from 0–100; the items include physical function, body pain, social function or role, mental health, emotional function, vitality, energy or fatigue, and perception of health [9]. The score is positively proportional to the quality of life.

NIHSS scores was rated from dimensions of consciousness, staring, facial paralysis, upper extremity strength, lower limb muscular strength, ataxia, aphasia, dysarthria, sensation, visual field, negligence, and distal limb function, with the full score ranging from 0 to 42 points. Higher NIHSS scores indicate more severe neurological function and neurological deficit. A score of 0 - 1 indicates normal, 1 - 4 means mild stroke, 5 - 15 is considered severe stroke, and 16 - 20 is considered moderately severe stroke, while 21 - 42 is considered severe stroke [10-12].

Statistical analysis

SPSS 20.0 software and GraphPad Prism 7 (GraphPad Software, San Diego, USA) were applied for data analysis and graphics plotting respectively. Measurement data ($\bar{x} \pm s$) and the count data [n (%)] were verified via t-test and X^2 test respectively. $P < 0.05$ was assumed to indicate statistically significant difference.

RESULTS

Coagulation function

Regarding the coagulation function, the thrombin time, prothrombin time and fibrinogen in the two groups did not statistically differ ($p > 0.05$), as shown in Table 2.

Incidence of adverse events

The study group exhibited milder adverse reactions than the control group ($p < 0.05$, Table 3).

NIHSS score

Significantly lower NIHSS score was observed in the study group compared with. the control group [(5.67 ± 1.28) vs. (7.79 ± 2.04), (t = 6.22, $p < 0.001$)].

Table 2: Comparison of thrombin time and prothrombin time (mean ± SD, s)

Group	Thrombin time (s)	Prothrombin time (s)	Fibrinogen (g/L)
Study	11.26±1.35	12.00±1.01	(2.24 ± 0.53)
Control	11.49±1.28	12.36±1.20	(2.36 ± 0.47)
T	0.87	1.62	1.20
P-value	0.38	0.11	0.23

QLI scores

For QLI, the study group was noticeably higher than the control group ($p < 0.05$, Table 4).

DISCUSSION

Adverse cardiovascular events including thrombus, hemorrhage, reinfarction, and myocardial ischemia are common after interventional therapy in patients with coronary heart disease. It would compromise the treatment outcome, undermine the patient's prognosis, and increase the risk of sequelae [13-15]. Therefore, anticoagulant drugs to counteract the above-mentioned adverse events are in urgent need. In addition, interventional treatment of coronary heart disease requires surgery to insert a stent into the patient's artery. Thus, puncture infection may occur in the course of recovery, and proper care is required to avoid puncture infection [16-19].

Despite a wide use of LMWH in clinical anticoagulation therapy, it has been proven to demonstrate a higher incidence of cardiovascular adverse events and a poor prognosis. Encouragingly, previous studies reported robust effectiveness of clopidogrel for interventional treatment of coronary heart disease, with a good safety profile.

Table 3: Comparison of the incidence of adverse events between the two groups

Group	Myocardial ischemia	Bleeding	Thrombus	Total incidence (%)
Study	1	3	0	8%
Control	3	5	8	32%
X^2				9.00
P-value				0.003

Table 4: Comparison of QLI scores between the two groups

Group	Imitations due to physical problems	Body pain	Social function or role	Mental health	limitation due to emotional problems	Vitality	Energy or fatigue	General perception of health
Study	8.89±1.03	9.11±0.37	8.64±1.10	8.55±1.22	8.75±1.2o	8.39±1.03	8.79±1.03	8.69±1.03
Control	6.13±1.00	7.20±0.26	6.51±1.17	6.48±0.48	6.o8±0.43	6.15±1.02	6.33±1.07	6.43±1.05
T	13.59	29.87	9.38	11.16	15.36	10.23	8.87	12.53
P-value	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001

In light of this, we intended to investigate the treatment effectiveness and prognosis of coronary heart disease treated with clopidogrel combined with system management care.

According to our results, the coagulation function of the two groups were similar, indicating that clopidogrel plus system management care yields a equal efficacy to LMWH. Interestingly, the study group experienced a milder adverse event in relative to the control group, indicating that clopidogrel combined with systematic management care has a good safety profile. Consistently, the results reported by Dan [20] proposed that the coagulation function of patients undergoing interventional treatment of coronary heart disease treated with clopidogrel plus conventional treatment was superior, suggesting the robustness of this study. Additionally, the study group demonstrated a superior performance with respect to NIHSS score and QLI score to the control group. Taken together, the combination therapy benefits a lot in terms of patients' quality of life and neurological function.

CONCLUSION

Copidogrel combined with systematic management care reduces the incidence of adverse events in patients after coronary interventional treatment, improves the quality of life of patients, and enhances neurological function. Therefore, this combined therapy has potentials for the management of coronary heart disease.

DECLARATIONS

Conflict of Interest

No conflict of interest associated with this work.

Contribution of Authors

The authors declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by them.

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