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Analysis of the Effect of Aspirin and Clopidogrel in the Treatment of Cerebral Infarction and the Neurological Function of Patients

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Abstract: *Objective:* To analyze the effective treatment options for cerebral infarction (CI). *Methods:* A total of 63 CI patients were selected and divided into a research group (32 cases, treated with aspirin combined with clopidogrel) and a control group (31 cases, treated with aspirin) by drawing lots, and the therapeutic effects of the prescription of both groups were compared. *Results:* After treatment, the functional scores, hemorheology indexes, quality-of-life scores and clinical effective rate of the study group were better than those of the control group ($P < 0.05$). *Conclusion:* Aspirin combined with clopidogrel has a significant impact on CI patients, and it can be fully promoted and applied in medical institutions.

Keywords: Aspirin; Clopidogrel; Cerebral infarction

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1. Introduction

Cerebral infarction (CI) is a cerebrovascular tissue lesion that is common among middle-aged and elderly people. The main cause of the disease is cerebral atherosclerosis. Poor blood circulation in the brain can lead to softening or necrosis of brain tissue, causing damage to the cranial nerves, thereby inducing symptoms such as limb movement and sensory impairment [1]. The clinical management of CIS involves enhancing brain microcirculation, managing infarct size, and improving neurological function. Fundamental to the treatment of CI are antiplatelet drugs, which, after administration, can disrupt platelet aggregation, prevent thrombosis, and effectively manage the condition. Aspirin is a typical antiplatelet drug that can inhibit the formation of thrombus and improve brain tissue microcirculation after administration [2]. Clopidogrel is a new generation of antiplatelet drugs, and some patients with CI have greatly benefited from it [3]. In this study, 63 CI patients were selected to explore the clinical effect of the combined administration of aspirin and clopidogrel.

2. Materials and methods

2.1. General information

The study was carried out from March 2021 to February 2023. A total of 63 CI patients was selected and divided into a research group (32 cases) and a control group (31 cases) by drawing lots. In the research group, the male-to-female ratio was 18:14, with an average age of 64.25 ± 5.33 years and an onset time of 8.92 ± 1.44 hours. In the control group, the male-to-female ratio was 17:14, with an average age of 64.33 ± 5.38 years and an onset time of 8.85 ± 1.47 hours. Both groups consisted of patients diagnosed with CI, meeting the criteria for drug treatment, without any other critical illnesses, and having received no prior treatment before admission. They were also able to cooperate with the study. There were no significant differences in the baseline data of the patients ($P > 0.05$).

2.2. Methods

After the patients were admitted to the hospital, they were diagnosed accordingly. The doctors evaluated the severity of the patients' conditions and determined the treatment plan based on the patient's symptoms. The patients were treated symptomatically for various primary diseases, which involved maintaining their blood pressure and blood glucose through drugs, reducing intracranial pressure, improving cerebral edema, and concurrently performing oxygen therapy and brain protection therapy to ensure that the patients are well-hydrated and their electrolytes are in a balanced state. If the patients' condition worsened, the treatment plan will be adjusted.

Patients in the control group were administered aspirin alone, at a dosage of 100 mg per day. The dosage was adjusted based on the patient's disease progress, and the medication was provided for a duration of one month. On the basis of the regimen of the control group, patients in the research group were treated with clopidogrel at a dose of 75 mg/d. The dosage was adjusted based on the patient's disease progress, and the medication was provided for a duration of one month.

2.3. Evaluation indicators

The functional scores, hemorheology indicators, quality-of-life scores, and clinical effectiveness were compared between the two groups.

2.4. Statistical analysis

SPSS 23.0 software was used to analyze the research data, measurement data (mean ± standard deviation) was *t*-test, count data % was χ^2 test, $P < 0.05$ indicated that there was a statistical level difference.

3. Results

3.1. Functional scores

As shown in **Table 1**, the functional scores of the study group after treatment were better than those of the control group ($P < 0.05$).

3.2. Hemorheology indexes

As shown in **Table 2**, the hemorheology indexes of the study group after treatment were better than those of the control group ($P < 0.05$).

Table 1. Comparing the functional scores of the two groups before and after treatment (mean ± standard deviation)

Group	NIH Stroke Scale/Score (NIHSS)		Modified Rankin score		Activities of Daily Living (ADL) score	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Research group (n = 32)	14.85 ± 2.23	8.75 ± 1.04	4.11 ± 0.82	0.58 ± 0.11	32.19 ± 3.05	61.44 ± 5.87
Control group (n = 31)	14.92 ± 2.17	10.83 ± 1.98	4.07 ± 0.75	1.24 ± 0.35	32.27 ± 2.98	51.02 ± 3.44
t	0.126	5.244	0.202	10.164	0.105	8.560
P	0.900	0.000	0.841	0.000	0.917	0.000

Table 2. Comparison of hemorheology indexes between the two groups (mean ± standard deviation)

Group	Whole blood viscosity (mPa·s)		Plasma viscosity (mPa·s)		Platelet aggregation rate (%)		Erythrocyte aggregation index	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Research group (n = 32)	4.55 ± 1.13	3.11 ± 0.79	2.11 ± 0.42	1.36 ± 0.35	82.94 ± 8.45	55.12 ± 4.49	5.28 ± 1.24	2.06 ± 0.64
Control group (n = 31)	4.59 ± 1.08	4.26 ± 1.13	2.08 ± 0.38	1.89 ± 0.62	83.02 ± 8.36	67.05 ± 5.73	5.33 ± 1.19	3.55 ± 1.02
t	0.144	4.694	0.297	4.195	0.038	9.215	0.163	6.969
P	0.886	0.000	0.767	0.000	0.970	0.000	0.871	0.000

3.3. Quality-of-life scores

As shown in Table 3, the scores of quality of life in the study group were higher than those in the control group after treatment (P<0.05).

Table 3. Comparison of quality of life scores between the two groups ($\bar{x}$±s)

Group	Bodily function		Physiological function		Emotional function		General health	
	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment	Before treatment	After treatment
Research group (n = 32)	54.12 ± 3.66	80.25 ± 3.89	51.03 ± 4.28	81.04 ± 3.36	57.03 ± 3.16	82.44 ± 4.69	55.83 ± 3.64	80.12 ± 4.45
Control group (n = 31)	54.07 ± 3.58	69.54 ± 2.77	50.98 ± 4.33	71.59 ± 2.65	56.94 ± 3.22	72.35 ± 2.98	55.72 ± 3.59	72.08 ± 2.97
t	0.055	12.552	0.046	12.369	0.112	10.155	0.121	8.407
P	0.956	0.000	0.963	0.000	0.911	0.000	0.904	0.000

3.4. Clinical efficacy

As shown in **Table 4**, after treatment, the clinical effective rate of the study group was higher than that of the control group (P < 0.05).

Table 4. Comparison of clinical efficacy between the two groups (n [%])

Group	Very effective	Effective	Ineffective	Total effective rate
Research group (n = 32)	22	8	2	30 (93.8)
Control group (n = 31)	15	8	8	23 (74.2)
χ^2				4.509
P				0.033

4. Discussion

Epidemiological survey data confirm that CI patients account for about 70% of patients with various acute cerebrovascular diseases, and middle-aged and elderly people are the main patients with CI [4]. According to the CI classification standard, most CI patients are classified as atherosclerotic type, which is characterized by poor blood flow in cerebral arteries, leading to softening or infarction of brain tissue, and damage to the physiological functions of the nervous system of patients. Most patients are accompanied by motor, sensory, language and other dysfunctions, decreased living ability, and increased risk of death [5].

At present, there are many treatment options for CI. Thrombolytic therapy is widely recognized by medical researchers as the best treatment option, but the treatment time window is strict. For CI patients who do not have indications for thrombolysis, comprehensive drug intervention or interventional therapy is required to relieve their symptoms. Clinical research has confirmed that the primary influencing factor in the onset and progression of CI is atherosclerosis. In patients with atherosclerosis, the necrotic area of vascular endothelial tissue gradually increases. Collagen tissue beneath the necrotic endothelial tissue loses the restraint provided by the endothelium and forms adhesions. These adhesions induce the release of thromboxane A2, leading to platelet adherence to fibrin tissue, clot formation, and thrombus development. This in turn results in the narrowing or complete occlusion of the blood supply arteries to brain tissue, ultimately triggering CI. Therefore, it can be concluded that in the treatment of CI, it is essential to inhibit the release of thromboxane A2 and curb platelet activity to manage the disease and alleviate symptoms [6]. Aspirin is a non-steroidal anti-inflammatory drug with antipyretic and analgesic effects. After administration, it can induce the acetylation of platelet cyclooxygenase, effectively inhibit the thromboxane A2 receptor, thereby blocking platelet aggregation and preventing thrombosis. Long-term single use of aspirin therapy can lead to drug resistance in patients, and the drug cannot effectively control the adhesion between the vascular endothelium and platelets, thereby affecting the antithrombotic effect. Therefore, a combination of antiplatelet drugs with different mechanisms is required for comprehensive therapeutic intervention. Clopidogrel is a new generation of anti-platelet drugs. After administration, it can block the binding of platelet receptors to adenosine diphosphate (ADP), significantly reduce the activation of glycoprotein complexes mediated by ADP, and then block the platelet aggregation caused by ADP. It also has a blocking effect on platelet aggregation caused by non-ADP. According to pharmacological research data, clopidogrel can also protect the function of vascular endothelial tissue, inhibit the synthesis of lipid cells and macrophages, improve plaque stability, repair damaged vascular smooth muscle tissue, and achieve a good antithrombotic effect [7]. The combined application of aspirin and clopidogrel in patients with CI can inhibit platelet aggregation and thrombus formation through different mechanisms, help improve the blood supply to the brain tissue, and accelerate the recovery of patients, and its curative effect is significantly better than aspirin alone.

This study confirmed that the functional scores of the patients in the study group were significantly better than those in the control group after treatment. The specific reason is that the pharmaceutical ingredients of aspirin can have a strong inhibitory effect on the pathologically-induced prostaglandin cyclooxygenase in platelets, making it unable to play a catalytic role, thereby reducing the synthesis of thromboxane A2, preventing platelets from aggregating, and preventing thrombosis. The mechanism of action of clopidogrel is significantly different from that of aspirin. After administration, it can act on ADP, making it unable to bind to platelet receptors, thereby reducing the activity of ADP-related GPIIb/IIIa complexes, blocking platelet aggregation and thrombosis. In addition, the inhibitory effect of the drug on ADP receptors is irreversible, and it can exert an antiplatelet effect for a long time after administration. The combined administration of the two drugs results in enhanced anti-platelet and anti-thrombotic effects, leading to the expansion of cerebral artery

tissue and improved blood oxygen supply to brain tissue, resulting in gradual restoration of nerve and motor function. The results of this study showed that the hemorheology indexes of the patients in the study group were better than those in the control group after treatment. This is because the main mechanism of action of aspirin is to inhibit cyclooxygenase activity, while clopidogrel can bind to platelet P2Y12 receptors, block ADP from binding to platelets, inhibit adenylate cyclase activity, and deactivate the platelets. Besides, the combined application of aspirin and clopidogrel can improve cerebral artery stenosis, block the secretion of substances that induce platelet aggregation such as collagen and thrombin, inhibit the combination of fibrinogen and platelets, reduce blood viscosity, and effectively improve multiple hemorheology indicators [9]. The results of this study showed that the efficacy of the treatment and the quality-of-life score of the patients in the research group were better than those in the control group after treatment. Aspirin primarily acts by inhibiting the acetylation of cyclooxygenase, thereby suppressing the synthesis of thromboxane A2. It also hinders platelet aggregation triggered by adrenaline, ADP, and other substances, reduces the synthesis of substances like thrombin, collagen, antigen, and antibodies, ultimately preventing thrombosis. On the other hand, clopidogrel's primary mechanism of action is the inhibition of ADP, which prevents platelet receptors from binding to ADP. Consequently, fibrinogen cannot function as intended, leading to the inhibition of platelet activity and the prevention of aggregation. The combined administration of aspirin and clopidogrel offers multifaceted resistance against platelets and thrombus formation, leading to enhanced blood supply to brain tissue, facilitation of vascular endothelium repair, improvement in multiple physiological functions, and a significant enhancement in patients' quality of life. This study posits that the combined treatment intervention involving antiplatelet drugs with distinct mechanisms can yield notably favorable therapeutic outcomes for CIS patients. At the same time, it is important to note that CI treatment takes a long time, and it should be coupled with rehabilitation exercises. By engaging in suitable rehabilitation exercises, patients can progressively enhance their limb mobility, while also receiving guidance on daily life management, which includes diet and proper rest. Throughout the treatment, it is crucial for CI patients to attend regular check-ups at the medical institution. Doctors can then make necessary adjustments to the treatment plan based on these reexamination outcomes. Additionally, providing psychological counseling to help patients gain a correct understanding of CI is essential for effective condition management and control.

5. Conclusion

In conclusion, the combined use of aspirin and clopidogrel has shown significant clinical effectiveness for CI patients, and its application in medical institutions should be encouraged. However, it is worth noting that this study had a relatively small sample size, lacked horizontal data analysis, and was conducted over a relatively short timeframe. Further research is needed to refine the treatment process and analyze the mechanisms underlying aspirin and clopidogrel treatment for CIS patients.

Disclosure statement

The authors declare no conflict of interest.

References

[1] Deng W, 2023, Safety and Effectiveness Analysis of Aspirin Combined with Clopidogrel Bisulfate in the Treatment of Patients with Cerebral Infarction. Chinese and Foreign Women's Health Research, 2023(1): 36–37 + 50.

[2] Wu L, 2022, The effect of Aspirin and Clopidogrel in the Treatment of Cerebral Infarction and the Evaluation of the Impact on the Neurological Function of Patients. Medical Diet Therapy and Health, 20(8): 33–36.

[3] Xu J, 2021, Observation on the Effect of Aspirin Combined with Clopidogrel in the Treatment of Acute Cerebral Infarction and the Impact on Quality of Life. China Health and Nutrition, 31(13): 118.

[4] Sai S, Zhu Q, Zhang W, et al., 2021, The Effect of Oral Aspirin Combined with Clopidogrel Bisulfate on NHISS Scores in the Treatment of Cerebral Infarction. Chinese and Foreign Medical, 40(6): 88–90.

[5] Xue Q, 2021, Effects of Aspirin Combined with Clopidogrel Bisulfate in the Treatment of Cerebral Infarction on Cerebral Blood Flow and Efficacy in Ischemic Regions. Journal of Mathematics and Medicine, 34(10): 1535–1536.

[6] Zhang Y, 2021, Study on the Therapeutic Effect of Clopidogrel Combined with Aspirin in Patients with Cerebral Infarction and its Influence on Hemorheology. Health Care Guide, 2021(21): 68.

[7] Liu J, Wang L, Zhong Z, et al., 2021, Study on the effectiveness of oral aspirin combined with clopidogrel bisulfate in the treatment of cerebral infarction. China Health and Nutrition, 31(22): 125.

[8] Sun Y, 2020, Analysis of the Effectiveness and Patient Satisfaction of Aspirin Combined with Oral Clopidogrel Hydrogen Sulfate in the Treatment of Cerebral Infarction. Capital Food and Medicine, 27(1): 101.

[9] Wu C, 2020, The Effect of Aspirin Combined with Oral Administration of Clopidogrel Hydrogen Sulfate in the Treatment of Cerebral Infarction and the Impact Analysis of Neurological Deficit Score. Medical Diet Therapy and Health, 18(7): 86–87.

[10] Zhang G, 2020, The Application Effect of Aspirin Combined with Clopidogrel Bisulfate Orally in the Treatment of Cerebral Infarction and the Impact Analysis of Neurological Deficit Score. Clinical Medicine Literature Electronic Journal, 7(5): 53.