

# The Effect of the Early Application of Tirofiban on Acute Ischemic Stroke (AIS) after Intravenous Thrombolysis with Urokinase

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**Abstract:** *Objective:* Discussion and analysis of the effect of the early application of Tirofiban on acute ischemic stroke (AIS) after intravenous thrombolysis with urokinase. *Method:* The subjects of this study are 40 patients with AIS admitted at the Yibin Fourth People's Hospital, of which were computer-randomized into a control group (20 cases, with regular urokinase intravenous thrombolysis therapy) and a research group (20 cases, combined with early Tirofiban treatment) from January 2018 to December 2022. The intervention outcomes between these two groups were compared and analyzed. *Result:* The blood platelet-related parameters before treatment had no statistical difference between the two groups ( $P > 0.05$ ), but the research group was higher than that of the control group after treatment ( $P < 0.05$ ). The Barthel index before treatment in both groups had no statistical difference ( $P > 0.05$ ), but the research group was higher than that of the control group after treatment ( $P < 0.05$ ). *Conclusion:* Early Tirofiban treatment for patients with AIS after intravenous thrombolysis with urokinase could effectively regulate the blood platelet-related parameters, hence improving treatment benefits and living capacity for patients, with definite clinical benefits.

**Keywords:** Acute ischemic stroke; Intravenous thrombolysis with urokinase; Tirofiban, Treatment effect

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## 1. Introduction

Acute ischemic stroke (AIS), with an incidence rate of 60%–80%, is characterized by rapid onset, a high disabled rate, and a high fatality rate without any signs. The main treatment for acute cerebral infarction is thrombolysis, which could fast clean the blocked blood vessels and recover the blood supply in the ischemia regions<sup>[1]</sup>. However, it is proved that 14.67% of patients have paralysis occur after 1 day of thrombolysis treatment. Thus, clinicians should focus on the intervention treatment after thrombolysis for AIS patients. Tirofiban is an antagonist of the platelet glycoprotein IIb/IIIa receptor, and early use in combination with Alteplase thrombolysis could highly benefit patients with AIS<sup>[2]</sup>. This study mainly investigated the effect of the early application of Tirofiban for AIS patients after thrombolysis with urokinase.

## 2. Materials and methods

### 2.1. General information

The subjects of this study are 40 patients with AIS admitted at the Yibin Fourth People's Hospital and were computer-randomized into a control group (20 cases with 11 men and 9 women, mean age of  $63.25 \pm 0.54$  years old) and a research group (20 cases with 13 men and 7 women, mean age of  $63.21 \pm 0.38$  years old)

from January 2018 to December 2022. The baseline of patients' information before comparison research is  $P > 0.05$ . Informed consent is signed by all study patients.

## 2.2. Research methods

All patients were given thrombolysis with urokinase, by which 100 mL of saline solution and 1,000,000 IU of urokinase were taken continuously for 30 min, followed by head CT or MRI scans to exclude intracranial hemorrhage occurrence. Regular treatment and care were given for the control group, while early use of Tirofiban was given for the research group for 30 min, with the initial of 0.4 mg of Tirofiban per kg of patient's weight per min followed by 0.1  $\mu\text{g}/\text{kg}/\text{min}$ , with a total duration of 48 hours.

## 2.3. Research measurements

The research measurements of this study included:

- (1) Evaluation of the treatment effect;
- (2) Test of blood platelet-related parameters using a fully automatic hematology analyzer<sup>[3,4]</sup>;
- (3) Evaluation of the patients' life ability with Barthel index rating scales, on the scale of 100 points, an increase of the points indicated improvement of life ability.

## 2.4. Statistics analysis

This study used the statistics software SPSS 21.0 as a data processing tool, of which the counting data were described as (%), the verification was calculated by  $\chi^2$ ; measurement data were described as mean  $\pm$  standard deviation (SD), the verification was calculated using the  $t$ -test, and  $P < 0.05$  indicated statistical significance.

## 3. Results

### 3.1. Comparison of the blood platelet-related parameters before and after treatment between the two groups

**Table 1** showed the comparison of the blood platelet-related parameters before treatment between the two groups had no statistical differences ( $P > 0.05$ ); but after treatment, the blood platelet-related parameter in the research group was higher than that in the control group ( $P < 0.05$ ).

**Table 1.** The comparison of blood platelet-related parameters before and after treatment between the two groups (mean  $\pm$ SD)

Subject	PCT (%)		PDW (fl)	
	Before treatment	After treatment	Before treatment	After treatment
Research group (n = 20)	0.22 $\pm$ 0.05	0.36 $\pm$ 0.05	16.62 $\pm$ 2.01	12.02 $\pm$ 1.45
Control group (n = 20)	0.21 $\pm$ 0.07	0.31 $\pm$ 0.08	16.56 $\pm$ 1.56	13.78 $\pm$ 2.03
$t$	0.0568	5.4871	0.1198	6.7487
$P$	> 0.05	< 0.05	> 0.05	< 0.05

Abbreviations: PCT, plateletcrit; PDW, platelet distribution width

### 3.2. Comparison of the Barthel index before and after treatment between the two groups

The Barthel index before treatment between the two groups had no statistical differences ( $P > 0.05$ ). However, after treatment, the Barthel index in the research group was higher than that of the control group ( $P < 0.05$ ), as shown in **Table 2**.

**Table 2.** The comparison of the Barthel Index before and after treatment between the two groups (mean ± SD)

Subjects	Before treatment	After treatment	<i>t</i>	<i>P</i>
Research group ( <i>n</i> = 20)	41.56 ± 5.62	59.45 ± 3.45	13.2655	< 0.05
Control group ( <i>n</i> = 20)	41.45 ± 5.71	50.56 ± 3.77	11.0457	< 0.05
<i>t</i>	0.3781	9.9715		
<i>P</i>	> 0.05	< 0.05		

### 3.3. Comparison of the treatment effect between the two groups

In **Table 3**, the research group has a treatment effect of 95%, which is higher than the control group ( $P < 0.05$ ).

**Table 3.** The comparison of the treatment effects between the two groups [n (%)]

Subject	Significant effective	Effective	Ineffective	Overall effective
Research group ( <i>n</i> = 20)	10 (20%)	9 (45%)	1 (5%)	19 (95%)
Control group ( <i>n</i> = 20)	7 (35%)	7 (35%)	6 (30%)	14 (70%)
$\chi^2$	-	-	-	4.6588
<i>P</i> value	-	-	-	< 0.05

## 4. Discussion

AIS is a disease caused by insufficiency of cerebral blood supply, resulting in ischemia, anoxia, and necrosis of brain tissues, which could lead to a series of clinical signs. AIS has a high disability rate and fatality rate, as well as a high recurrence rate after treatment. Intravenous thrombolysis is an effective measure for acute ischemia cerebral vessel diseases, which enables blocking cerebral arteries to recover quickly and the blood supply in the brain to be supplemented. In clinical, thrombolysis therapy reduces the enzymatic activity of fibrinolysis in the human body and raises the activity of thrombin to prevent the occurrence of new thrombus [5-8]. In the study, after treatment, the blood platelet-related parameters in the research group is superior to the control group ( $P < 0.05$ ); after treatment, the Barthel index in the research group is superior to the control group ( $P < 0.05$ ); the effective rate in the research group is higher than the control group ( $P < 0.05$ ). Tirofiban is an antagonist specific to the platelet glycoprotein IIb/IIIa receptor and could inhibit platelet aggregation. With its short half-life period, the balance of blood coagulation-anti coagulation in the body could restore after 4 hours of drug withdrawal. The inhibition mechanism of Tirofiban to platelet aggregation and thrombosis is worked by inhibit the binding of fibrinogen to the platelet glycoprotein IIb/IIIa receptor [9,10]. The results indicated that early use of Tirofiban after urokinase intravenous thrombolysis could effectively improve platelet adhesiveness for patients with AIS.

In conclusion, for patients with AIS, early use of Tirofiban after urokinase intravenous thrombolysis could effectively improve blood platelet-related parameters so as to improve treatment benefits and living capacity, with definite clinical benefits.

### Disclosure statement

The author declares no conflict of interest.

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