

# Prognostic Factors in Patients with Acute Cerebral Infarction Undergoing Intravenous Thrombolytic Bridging Artery Thrombectomy

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## Zhuo *et al.*: Prognostic Factors in Patients with Acute Cerebral Infarction

To study the prognostic factors and preventive nursing of patients with acute cerebral infarction treated with intravenous thrombolytic bridging artery thrombectomy is the objective of the study. From January 2017 to December 2019, 80 patients with acute cerebral infarction in the Department of Neurology of our hospital were selected, all of whom were treated with intravenous thrombolytic bridging arterial thrombectomy, using stroke unit, establishing a green channel, combining with the evaluation of the prognosis of patients, analyzing the related risk factors affecting the prognosis and guiding the clinical prevention and nursing countermeasures, improve the prognosis of the operation. The National institutes of health stroke scale score decreased gradually from before treatment to 1 h, 2 h, 3 h, 4 h, 5 h, 6 h, 24 h, 7 d and 14 d after treatment. In terms of prognosis, the total effective rate was 93.75 %. The total incidence of adverse reactions and complications were 5.00 %. Multivariate analysis showed that age, National institutes of health stroke scale classification before thrombolysis, blood glucose before thrombolysis, Oxfordshire community stroke project classification and 24 h improvement after thrombolysis were independent predictors of prognosis ( $p < 0.05$ ). In patients with acute cerebral infarction undergoing intravenous thrombolytic bridging artery thrombectomy, stroke unit and emergency department should be seamlessly docked and postoperative neurological intensive care should be strengthened. It can collect the relevant risk factors affecting the prognosis of surgery, analyze the relationship between risk factors and the prognosis of surgery, and propose preventive nursing measures to reduce postoperative complications and improve the prognosis.

**Key words:** Acute cerebral infarction, intravenous thrombolysis, arterial embolectomy, prognostic factors

Stroke is a common cerebrovascular disease in which ischemic stroke is the main manifestation. After the onset of the disease, due to cerebrovascular embolism, normal blood perfusion is affected, resulting in oxygen and glucose metabolic disorders, leading to local ischemic necrosis of brain tissue<sup>[1]</sup>. In the current clinical treatment of acute cerebral infarction, the key point is to recanalize the occluded blood vessels, restore the blood supply of ischemic brain tissue and then restore cell metabolism. In conventional treatment, intravenous thrombolysis and arterial thrombectomy are commonly used methods, but there are also some limitations. Intravenous thrombolytic bridging arterial thrombectomy is an alternative treatment and has a good application prospect<sup>[2]</sup>. However, there are many potential factors that may affect the outcome of this procedure<sup>[3]</sup>. Based on this,

80 patients with acute cerebral infarction admitted to our hospital from January 2017 to December 2019 were selected to study the prognostic factors and preventive nursing of intravenous thrombolytic bridging artery thrombectomy in patients with acute cerebral infarction. From January 2017 to December 2019, 80 patients with acute cerebral infarction in the Department of Neurology of our hospital were selected. Inclusion criteria-The patients were over 65 y old and met the diagnostic criteria of ischemic cerebrovascular disease; the onset time was not more than 4.5 h and there were obvious manifestations of neurological impairment. National Institutes of Health Stroke Scale (NIHSS) score was 10-24, or less than 10 with aphasia lasting for more than 1 h; intracranial hemorrhage was excluded by Computed Tomography (CT) scan and there was no imaging change of early large area

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infarction; the infarction site was in the large artery. Exclusion criteria-History of intracranial hemorrhage; history of head trauma in recent 3 mo; gastrointestinal or urinary system hemorrhage in recent 3 w; major surgery in recent 2 w and arterial puncture at the site not suitable for compression hemostasis in recent 1 w. History of cerebral infarction or myocardial infarction at 3 mo; severe heart, liver and kidney dysfunction or severe diabetes mellitus. Physical examination revealed evidence of active bleeding or trauma, oral anticoagulants and International Normalized Ratio (INR) above 1.5; heparin therapy within 48 h; blood glucose levels below 2.7 mmol/l; systolic blood pressure above 180 mmHg or diastolic blood pressure above 100 mmHg; brain CT showed 1/3 area of brain tissue necrosis supplied by middle cerebral artery or 1/2 area of brain tissue necrosis supplied by anterior cerebral artery; unable to tolerate and disagree with the treatment plan. All patients gave informed consent and were approved by the medical ethics committee. When patients with acute cerebral infarction enter the emergency department, the emergency department opens a green channel, carries out emergency brain CT examination, diagnoses cerebral infarction and discharges cerebral hemorrhage. Then they entered the stroke unit and the medical staff of the stroke unit established venous access, improved emergency blood routine, emergency biochemistry, emergency myocardial enzymes, emergency coagulation, liver and kidney function, bedside Electrocardiogram (ECG) examination, excluded the contraindications of thrombolysis and performed intravenous thrombolysis. Patients were treated with intravenous thrombolytic therapy with alteplase (Actilyse®, recombinant tissue Plasminogen Activator (rtPA), produced by Boehringer Ingelheim, Germany) at a dose of 0.9 mg/kg, 10 % of which were injected intravenously for 1 min. The remaining 90 % were administered by micro-pumping for 60 min. Then immediately take brain Computed Tomography Angiography (CTA) examination to determine the location of cerebral vascular infarction and the degree of thrombolysis, and then prepare for arterial mechanical thrombectomy. Adequate preoperative preparation should be made before mechanical embolectomy. The nurses in the ward prepared the relevant work before arterial thrombectomy, checked the patient's information and prepared the skin before routine operation, and indwelled the catheter. Put on clothes and trousers according to the requirements of the operation, check the medical documents, sign and fill in the intervention handover form, and connect

the stroke unit doctors to transport patients together. In the process of transportation, alteplase intravenous thrombolytic therapy was continuously carried out for patients by using the micro-pump with electricity storage and at the same time, the ECG monitor with electricity storage was used to continuously monitor the blood pressure, pulse, respiration, pulse oxygen saturation and other indicators of patients. The stroke unit doctor performed Solitaire stent embolectomy on the patient under local anesthesia. Close monitoring was carried out after mechanical embolectomy of the artery. After the operation, the stroke unit doctors and ward nurses jointly sent the patients back to the Neonatal Intensive Care Units (NICU) ward to carry out comprehensive monitoring. The NIHSS scores of the patients from pre-treatment to different periods after treatment was counted and the lower the scores, the lighter the neurological deficit. The prognosis of the patients was evaluated according to the following criteria. Basic recovery, functional impairment score decreased by 91 %-100 %, disability grade 0 and significant progress. The functional impairment score was reduced by 46 %-90 % and the degree of disability was 1-3 grades. Functional deficit score decreased by 18 % to 45 %; functional impairment score decreased by about 17 %; functional impairment score decreased or increased by more than 18 %. Among them, basic recovery, significant progress and progress are effective for treatment. The incidence of postoperative adverse reactions and complications were statistically analyzed and the selected indicators included cerebral hemorrhage, gingival bleeding, urinary tract bleeding and upper gastrointestinal bleeding. Multivariate logistic regression analysis was used to analyze the prognostic factors. Statistical Package for the Social Sciences (SPSS) 12.0 statistical software was used for statistical analysis. Continuous variables were expressed as mean and standard deviation, and categorical variables were expressed as count and percentage. Continuous variables were analyzed by independent t-test and categorical variables by chi-square test. Binary logistic regression analysis was performed and  $p < 0.05$  was regarded as statistically significant. Comparison of NIHSS scores at different time points before and after treatment was explained here. The NIHSS score decreased gradually from before treatment to 1 h, 2 h, 3 h, 4 h, 5 h, 6 h, 24 h, 7 d and 14 d after treatment (Table 1). In terms of prognosis, the total effective rate was 93.75 % as shown in Table 2. Analysis of postoperative adverse reactions and complications is as follow. The total incidence of adverse reactions and complications

was 5 % (Table 3). Analysis of prognostic factors was shown here. Multivariate analysis showed that age, NIHSS classification before thrombolytic therapy, blood glucose before thrombolytic therapy, Oxfordshire Community Stroke Project (OCSP) classification and 24 h improvement after thrombolysis were independent predictors of prognosis ( $p < 0.05$ ) as shown in Table 4.

**TABLE 1: COMPARISON OF NIHSS SCORES OF PATIENTS IN DIFFERENT PERIODS BEFORE AND AFTER TREATMENT ( $\bar{x} \pm s$ )**

Time	NIHSS score
Before treatment	27.55±5.47
1 h after treatment	18.67±4.69
2 h after treatment	16.39±4.25
3 h after treatment	15.67±4.15
4 h after treatment	15.17±3.96
5 h after treatment	14.25±3.88
6 h after treatment	13.48±3.67
24 h after treatment	12.61±3.34
7 d after treatment	10.12±2.53
14 d after treatment	7.32±2.15

**TABLE 2: ANALYSIS OF PATIENT PROGNOSIS [n (%)]**

Prognostic effect	Number of cases	Proportion (%)
Basically cured	37	46.25
Significant progress	27	33.75
Progress	11	13.75
No change	5	6.25
Deterioration	0	0.00
Total effective	75	93.75

**TABLE 3: ANALYSIS OF POSTOPERATIVE ADVERSE REACTIONS AND COMPLICATIONS [n (%)]**

Complications	Number of cases	Proportion (%)
Cerebral hemorrhage	0	0.00
Bleeding gums	2	2.50
Urinary tract bleeding	2	2.50
Upper gastrointestinal bleeding	0	0.00
Totally	4	5.00

**TABLE 4: ANALYSIS OF FACTORS RELATED TO PATIENT PROGNOSIS**

Factor	Regression coefficient	Standard error	p	Odds Ratio (OR)	95 % confidence interval
Age	0.061	0.030	0.044	1.063	1.000-1.130
Blood glucose before thrombolysis	0.190	0.076	0.012	1.209	1.040-1.405
Thyroid-stimulating hormone	-0.108	0.234	0.650	0.898	0.566-1.425
C-reactive protein	0.194	0.131	0.137	1.215	0.938-1.573
Triglycerides	-0.389	0.400	0.332	0.677	0.308-1.488
NIHSS classification before thrombolysis	1.416	0.440	0.000	4.125	1.738-9.790
Symptoms improved 24 h after thrombolysis	3.251	0.698	0.000	25.833	6.565-101.636
Bleeding after thrombolysis	1.207	1.009	0.231	3.344	0.431-24.197
TOAST typing	0.074	0.260	0.772	1.077	0.646-1.797
OCSP typing	-1.606	0.490	0.000	0.210	0.076-0.525
History of atrial fibrillation	0.743	0.767	0.332	2.104	0.466-9.479

Note: TOAST: Trial of Org 10172 in Acute Stroke Treatment and OCSP: Oxfordshire Community Stroke Project

Stroke is a very common clinical disease with high morbidity, recurrence rate, disability rate and mortality rate. At present, the number of middle-aged stroke patients in China has reached more than 2 million and the number of deaths due to stroke every year is 1.5 million<sup>[4]</sup>. With the development of treatment technology for ischemic stroke, there are many methods available for the treatment of acute cerebral infarction. However, simple intravenous thrombolysis or arterial thrombectomy has certain limitations and cannot achieve the desired effect. In the treatment of cerebral infarction, mechanical thrombectomy of bridging artery by intravenous thrombolysis is an effective alternative treatment, especially in the treatment of acute stroke, which has a good development prospect. This method can greatly reduce the risk of death in patients with vascular recanalization and the clinical prognosis is usually good<sup>[5]</sup>. However, despite the reduced risk of mortality associated with thrombolytic bridging arterial embolectomy, there are many potentially important factors that affect the outcome of surgery, such as age, sex, race, severity of infarction, complications and certain clinical variables, that require further study and analysis. After the introduction of new medical technology, it can also promote the improvement of nursing technology. Therefore, it is necessary to accurately grasp the risk factors of imaging prognosis in order to formulate more scientific preventive nursing measures, so as to further improve the prognosis of patients and further reduce the mortality rate<sup>[6]</sup>. In this study, by giving full play to the advantages of the stroke unit, the emergency department opened a green channel. After acute cerebral infarction patients were admitted to the hospital, the green channel was started immediately, CT examination was completed quickly and the criteria for cerebral hemorrhage were excluded and then they entered the stroke unit ward<sup>[7]</sup>. After completing the relevant examinations, intravenous thrombolytic therapy was adopted. Then CTA examination was performed to confirm the specific effect of intravenous thrombolysis. If the patient's clinical sign and symptom is aggravated or not significantly improved after thrombolysis, emergency arterial thrombectomy is needed<sup>[8]</sup>. After the operation, the patient was sent to the Intensive Care Unit (ICU) of the Department of Neurology for comprehensive monitoring to ensure the safety of the patient. In the ICU, the advantages of comprehensive monitoring were brought into full play and the prognosis of patients with acute cerebral infarction after mechanical thrombectomy of bridging artery by intravenous thrombolysis with alteplase

was analyzed and the related risk factors and clinical variables were comprehensively collected. In view of these factors, effective preventive nursing interventions were taken to improve the prognosis of patients<sup>[9]</sup>. This study shows that by searching for prognostic risk factors, taking targeted preventive nursing measures and actively controlling risk factors, the prognosis of patients with cerebral infarction can be improved, the recurrence rate, disability rate and mortality rate can be reduced and the burden of patients families and society can be reduced, which reflects the important application significance and clinical value<sup>[10]</sup>. To sum up, in acute cerebral infarction patients with intravenous thrombolytic bridging artery thrombectomy, the stroke unit and emergency department are seamlessly connected and postoperative neurology intensive care is strengthened, which can collect the risk factors affecting the prognosis of the operation, analyze the relationship between the risk factors and the prognosis of the operation, and propose preventive nursing measures to reduce postoperative complications and improve the prognosis.

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#### **Conflict of interests:**

The authors declared no conflict of interest.

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