Diagnostic Brain Medicine

CLINICAL RESEAPCH

Analysis of Influencing Factors Influencing the prognosis of Patients with First-episode Acute Cerebral Infarction

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Keywords

first-episode acute cerebral infarction, prognosis, influencing factors

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Received: 6 December 2020; Accepted: 7 January 2021; Published online: 3 February 2021

Diagnostic Brain Medicine 2021; 2(1): 133–137

Abstract

Objective To investigate the factors influencing the prognosis of patients with first-episode acute cerebral infarction, and provide the theoretical basis for clinical treatment. **Methods** 120 patients with first-episode acute cerebral infarction were selected from our hospital between Feb. 2018 and Jun. 2019. The clinical data of the patients were collected, the modified Rankin Scale (mRS) was scored at discharge. Patients with mRS≤2 points were divided into favorable prognosis group, patients with 3≤mRS≤6 points were divided into poor prognosis group. Logistic multiple regression analysis was used to explore the influencing factors of prognosis of patients with first-episode acute cerebral infarction. **Results** In the 120 patients, 82 patients (68.3%) developed favorable prognosis and 38 patients (31.7%) had poor prognosis. Logistic multivariate regression analysis showed that the level of uric acid, NIHSS score, infarct volume were the main factors affecting the prognosis of patients with first-episode acute cerebral infarction (P<0.05). **Conclusion** Evaluation and treatment should be decided by considering the imaging examination, laboratory examination and NIHSS score to improve the prognosis of patients with first-episode acute cerebral infarction.

Introduction

Changes in lifestyle and diet increased the incidence of acute cerebral infarction, leading to high rate of disability that seriously affects the life quality of patients [1]. Therefore, reducing the incidence and disability rate of acute cerebral infarction has become the focus of clinical research. Acute cerebral infarction is often caused by multiple factors. Controlling risk factors is of great significance for preventing and treating diseases, reducing the disability rate and improving the prognosis of patients [2]. In this study, first-episode acute stroke patients admitted to our hospital were selected as the research objects, and the prognostic factors were discussed in order to provide a basis for clinical treatment. The report is as follows.

Materials and methods

General information

A total of 120 first-episode acute cerebral infarction patients who were diagnosed and treated in our hospital between February 2018 and June 2019 were recruited. There were 78 males and 42 females aging 49-73 years old, with an average age of 60.71±11.51 years, body mass index (BMI) of 20.2~29.8kg/m^2 (average BMI (24.8±5.1) kg/m^2). Inclusion criteria were as follows: 1) patients met the diagnostic criteria for acute cerebral infarction by imaging examination; 2) aged 45 to 75 years old; 3) without blood system disease. Exclusion criteria were as follows: 1) patients with severe abnormal functions of heart, liver or kidney; 2) patients with previous acute cerebral infarction; 3) patients with immune system diseases. This study was approved by the Ethics Committee of the hospital, and all the patients signed an informed consent form.

Methods

The modified Rankin Scale (mRS) [3] was used for prognostic evaluation, and the mRS score at discharge was recorded. With a total score of 0 to 6, mRS $\leq$ 2 points indicate a favorable prognosis, and 3 $\leq$ mRS $\leq$ 6 points indicate a poor prognosis. Neurological functions were evaluated and scored by The National Institutes of Health Stroke Score Scale (NIHSS) [4], which includes 15 items, with a total score of 0 to 42 points. Higher score indicates more severe neurological damage. The level of homocysteine (Hcy) was determined by high performance liquid chromatography. Sysmex CHEMIX-180 automatic biochemical analyzer and Siemens 64-slice spiral CT were used to determine the level of blood uric acid (BUA) and the lesion, respectively. The infarct area was calculated according to Tada's formula.

Statistical analysis

SPSS 20.0 software was used for statistical analysis. The measurement data were expressed by mean±standard deviation ($\bar{x}\pm s$), the comparison is by t test. The count data were compared by $\chi 2$ test and expressed by rate, the prognostic factors were analyzed by Logistic multiple regression and compared by $\chi 2$ test. $P<0.05$ was seen as a statistically significant difference.

Results

General information of the patients

At the time of discharge, of the 120 patients, 82 (68.3%) developed a favorable prognosis and 38 (31.7%) had a poor prognosis. The analysis of single factors that may affect the prognosis of patients showed that age, Hcy level, BUA level, NIHSS score, and infarct volume were factors influencing the prognosis of the patients with first-episode acute cerebral infarction ($P<0.05$). See Table 1.

Logistic multiple regression analysis of prognostic factors

Logistic multiple regression analysis was performed by taking prognostic results as dependent variables and age, Hcy level, BUA level, NIHSS score, and infarct volume as independent variables. The results showed that BUA level, NIHSS score, and infarct volume are the main factors affecting the prognosis of patients ($P<0.05$). See Table 2.

Table 1 General information of the patients

Influencing factors	Favorable prognosis group (n=82)	Poor prognosis group (n=38)	χ^2/t	*P*
Age (years old)	57.8±10.7	67.0±12.1	4.202	0.000
BMI(kg/m^2)	24.5±4.7	25.4±5.2	0.943	0.348
Gender(male/female)	54/28	24/14	0.083	0.773
Smoking history [n(%)]	45(54.9)	22(57.9)	0.096	0.757
Drinking history [n(%)]	47(57.3)	23(60.5)	0.110	0.740
Family history [n(%)]	35(42.7)	18(22.0)	0.231	0.631
Hcy level (μmol/L)	12.0±1.9	13.5±2.0	3.957	0.001
BUA level (μmol/L)	315.7±50.6	479.8±89.5	12.798	0.000
NIHSS scores(points)	10.1±2.0	14.6±2.8	10.052	0.000
Infarct volume (mL)	71.4±11.8	97.3±18.6	8.276	0.000
Infarct location (case)			0.043	0.998
Brain stem	25(30.5)	12(34.2)		
Basal ganglia	22(26.8)	10(26.3)		
Brain lobe	21(25.6)	10(26.3)		
Multi-site	14(17.1)	6(15.8)		

Table 2 Logistic multiple regression analysis of prognostic factors

Influence factors	*β*	*S.E*	*Wals*	*P*	*OR*	*95%CI*
BUA level	0.010	0.004	6.988	0.008	1.010	1.003~1.017
NIHSS score	0.266	0.122	4.758	0.029	1.304	1.027~1.656
Infarct volume	0.052	0.023	5.335	0.021	1.054	1.008~1.101

Discussion

Acute cerebral infarction, also known as ischemic stroke, is mostly caused by ischemia of brain tissues resulted from blood circulation disorders. Insufficient blood supply can cause irreversible damage to nerve function, leading to permanent loss of cognitive and motor functions [5] that seriously affect the life quality of patients. Patients with first-episode acute cerebral infarction tended to have a short disease course, and effective prevention and treatment can significantly reduce its incidence and restore the patient's neurological functions. Therefore, studying the risk factors for the prognosis of acute cerebral infarction has become an important part of its prevention and treatment.

The results of this study showed that older age was related to higher Hcy level and poorer prognosis (P<0.05). Patients with acute cerebral infarction often have atherosclerotic lesions, which can increase blood viscosity, slow blood flow, and aggravate degree cerebral ischemia [6]. With aging, gradually, the patients' body regulation capacity declines, atherosclerosis and cerebral ischemia deteriorate. Hcy is an independent risk factor for atherosclerosis [7].

Elevated level of Hcy can cause hyperhomocysteinemia, which leads to damage to vascular endothelial cells, aggravates the inflammatory response of ischemic tissues, and promotes atherosclerosis. The formation of plaque-like sclerosis further will further case thrombosis. Therefore, more attention should be paid to elderly patients and regularly their Hcy level.

Logistic multiple regression analysis showed that BUA level, NIHSS score, and infarct volume were the main factors affecting the prognosis of patients with first-episode acute cerebral infarction ($P<0.05$). Some scholars [8] have shown that serum level of BUA is closely related to the development and prognosis of cerebrovascular diseases in the elderly. Under hypoxia, BUA will transform from antioxidants to pro-oxidants, causing excessive oxidation of red blood cell lipids, oxidative damage, increasing blood viscosity, accelerating thrombosis, and promoting blood circulation disorders. Therefore, the key to the treatment of acute cerebral infarction is to restore the blood supply to the ischemic area, timely improve the collateral circulation in the ischemic penumbra, which will facilitate the recovery of the damaged neuron cells and restore nerve function. The NIHSS score is a standardized evaluation for assessing the degree of neurological damage in patients, with a higher NIHSS score indicating a better neurological function and a more favorable prognosis of the patient [9]. In addition, nerve function is also closely related to the infarct volume, with a smaller the infarct volume relating to a smaller area of tissue necrosis, less damaged neuronal cells, and a better recovery of nerve function. At the same time, the reduction of infarct volume can increase the rate of vascular recanalization and promote blood circulation and blood supply, thus promoting patient recovery [10]. Therefore, in clinical treatment, imaging examinations, laboratory examinations and NIHSS scores should be applied in combination to closely monitor patients' conditions and promote their recovery.

In summary, BUA level, NIHSS score, and infarct volume are the main factors affecting the prognosis of patients with first-episode acute cerebral infarction. Clinical treatment should be combined with imaging examinations, laboratory tests and NIHSS scores to closely monitor the patients' condition and effectively improve their prognosis.

Declaration of conflict-of-interest

The authors declare no conflict-of –interest.

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