Analysis of Risk Factors for Imaging of Intracranial Main Artery Stenosis in Patients with Acute Ischemic Cerebrovascular Disease

Heyi Gu, Yi LU, Yin MO, Zongfang Li, Wei Zhao*, Jihong Hu

Kunming Medical University First Affiliated Hospital, Kunming 650000, Yunnan, China

ghy191062022@163.com

*Corresponding Author

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Abstract: Objective: To study and analyze the risk factors and imaging characteristics of intracranial main artery stenosis in acute ischemic cerebrovascular disease. Methods: 145 patients with acute ischemic cerebrovascular disease treated in our hospital from January 2020 to July 2021 were randomly selected as the research object. 118 cases of intracranial main artery stenosis in patients with acute ischemic cerebrovascular disease were analyzed in terms of etiology and risk factors. The risk factors and imaging characteristics were analyzed. Results: From the results of the study, multiple regression analysis of acute ischemic cerebrovascular disease shows that hypertension and diabetes are independent risk factors for intracranial stenosis, and gender, hypertension, diabetes, coronary heart disease, middle age and old age are independent risk factors for simultaneous extracranial-intracranial stenosis. The results were statistically significant ($P < 0.05$). Conclusion: There are many causes and risk factors of intracranial artery stenosis in patients with acute ischemic cerebrovascular disease. Intracranial artery stenosis is common in patients with acute ischemic cerebrovascular disease. Anterior circulation stenosis is more than posterior circulation stenosis. Intracranial artery is the most common involved vessel. Hypertension and diabetes are independent risk factors for intracranial stenosis.

1. Introduction

Acute ischemic vascular disease is the most common cause. The research results of risk factors of intracranial main artery stenosis are different. Based on patients with acute ischemic cerebrovascular disease, this paper studies the risk factors related to intracranial main artery stenosis of acute ischemic cerebrovascular disease, so as to provide a theoretical basis for the prevention and treatment of cerebrovascular diseases in our hospital in the future. In recent years, with the change of people's diet and habits, the incidence rate of acute ischemic cerebrovascular disease has also been rising rapidly, which has affected family and individual, and even seriously affected the public health safety [1]. In this paper, 145 patients with acute ischemic cerebrovascular disease treated in our hospital were selected for research. The causes and risk factors of intracranial main artery stenosis of acute ischemic cerebrovascular disease were analyzed, and the distribution characteristics of intracranial artery stenosis and occlusion in patients with ischemic cerebrovascular disease were evaluated by CT angiography or whole brain angiography, and the risk factors and imaging characteristics of intracranial artery stenosis were analyzed. The results are as follows.

2. Data and Methods

2.1 General Data

145 patients with acute ischemic cerebrovascular disease treated in our hospital from January 2020 to July 2021 were randomly selected as the research object. There were 76 males and 69 females, aged from 20 to 74 years old, with an average age of (46.7 ± 6.0) years. The basic data were not statistically significant ($P > 0.05$). Inclusion criteria: (1) informed and agreed to the study

and signed the letter of intent; (2) meet the diagnostic criteria of acute ischemic cerebrovascular disease after CT / MRI contrast examination; (3) normal mental state without mental history; (4) no ischemic infarction. Exclusion criteria: (1) unable to communicate normally; (2) accompanied by severe organic diseases of important organs such as heart, liver and kidney; (3) incomplete or missing clinical data; (4) pregnant and lactating female patients; (5) patients with other unknown brain lesions [2].

2.2 Method

All 145 subjects underwent routine examination: (1) comprehensive examination of nervous system; (2) contrast examination, MRI and CT examination; (3) urine routine examination, blood routine examination, etc; (4) ECG, arterial ultrasound, chest radiography, etc. The purpose of ultrasonography is to predict the condition of the patient's intracranial artery, explore the location of the lesion, understand the specific shape, location and size of the plaque in the intracranial artery, and observe it; (5) understand the daily living habits of patients, such as whether they smoke, drink, stay up late for a long time, hyperglycemia, hypertension, hyperlipidemia and other basic medical history, which may lead to the occurrence of acute ischemic cerebrovascular disease [3].

2.3 Evaluation Index

Analyze the causes of intracranial main artery stenosis in patients with acute ischemic cerebrovascular disease, and analyze its risk factors and imaging characteristics.

2.3.1 Based on Toast Classification [4]

(1) cardiogenic cerebral embolism; (2) atherosclerosis in the main arteries; (3) occlusion of arterioles; (4) other potential causes; (5) unknown causes. MRA and static artery ultrasound or transcranial Doppler can be used for general research and judgment of main artery atherosclerosis. If the blood flow velocity of intracranial artery is increased or there is spectrum disorder and noise, the patient's vascular stenosis is obvious, and the degree of more than 50.0% can be judged. If the blood flow rate slows down significantly, the patient's vascular stenosis has reached a very serious degree.

2.3.2 Classification and Definition of Risk Factors

For acute ischemic cerebrovascular disease, the common risk factors are: (1) hypertension: the standard systolic blood pressure (SBP) is 140mmHg or above after onset (including recovery period), or diastolic blood pressure (DBP) is 90mmHg or above; (2) diabetes: requiring postprandial 2h blood glucose at 11.2mmol/L or above, or fasting blood glucose level at 7.1mmol/L or above; (3) hyperlipidemia: triglyceride index level is at 2.05mmol/L or above, or total cholesterol index level is at 5.71mmol/L or above; (4) smoking history: have a smoking history of more than one year, consume an average of 11 cigarettes or more per day, and smoke continuously in the last three months; (5) drinking history: the daily continuous intake of alcohol shall not be less than 40g, and the duration shall reach 6 months or more; (6) history of cerebrovascular disease: it can be clear that there is a history of cerebrovascular disease in the patient's immediate family [5].

2.4 Statistical Methods

SPSS 25.0 software package was used for statistical analysis of data. Use χ^2 to test or Fisher exact test to analyze counting data. Multivariate logistic regression analysis was used to determine the risk factors of intracranial artery stenosis.

$P < 0.05$ was statistically significant.

3. Results

3.1 Analysis of Location and Severity of Intracranial Artery Stenosis

118 (81.13%) of 145 patients with acute ischemic vascular disease had extracranial-intracranial artery stenosis. In the intracranial artery stenosis group, 48.27% were located in the anterior

circulation and 22.5% in the posterior circulation. Therefore, intracranial anterior circulation stenosis is more common than posterior circulation stenosis. Among them, the middle cerebral artery was the most common involved vessel (17.6%), followed by the intracranial segment of intracranial artery (17.2%) and the posterior cerebral artery (14.8%). The intracranial segment of carotid artery (13.6%) was the most common in the mild stenosis group, and middle cerebral artery was the most common in moderate and severe stenosis or occlusion groups, (3.2%) and (8.2%) respectively. Some (68.2%) were located in intracranial arteries (Table 1). Among these patients, 46 cases (31.72%) were simple intracranial artery stenosis; 52 cases (35.86%) had simultaneous stenosis of extracranial-intracranial arteries. It can be concluded that intracranial artery stenosis is more common, the difference is statistically significant (P < 0.05), and the incidence of simultaneous extracranial-intracranial stenosis is the highest.

3.2 Analysis of Risk Factors of Acute Ischemic Stroke and Cerebrovascular Stenosis

Multivariate logistic regression analysis showed that gender, age, smoking, drinking, hypertension, diabetes, hyperhomocysteinemia and coronary heart disease are risk factors for intracranial and extracranial atherosclerotic stenosis in patients with ischemic stroke (P < 0.05). Among them, hypertension, 103 cases (71.03%), is the most common risk factors, followed by 89 cases of hyperhomocysteinemia (61.37%) and 47 cases of hyperlipidemia (32.41%). The incidence of acute ischemic cerebrovascular intracranial artery stenosis in men is higher than that in women, accounting for 64.8% of the total. It can be seen from the age stratification that the incidence of acute ischemic cerebrovascular intracranial artery stenosis in elderly patients is the highest, accounting for 69.72% of the total. The second is middle-aged, accounting for 28.44% of the total. Intracranial artery stenosis is common in young and middle-aged patients, while intracranial and extracranial artery stenosis is common in elderly patients.

Table 1 Location and Severity of Intracranial Artery Stenosis

Location	Mild	Moderate	Severe or occlusion	Total
Intracranial artery stenosis				118(81.13)
Anterior circulation				57(48.27)
ACA	11(7.5)	3(2.3)	2(2.0)	16(10.2)
MCA	12(7.8)	4(3.1)	13(8.3)	29(17.8)
ICA	21(13.8)	2(2.3)	2(2.0)	25(17.3)
Posterior circulation				27(22.5)
PCA	13(9.5)	3(2.3)	3(2.3)	19(16.1)
BA＆V4	5(4.3)	2(2.0)	1(1.4)	8(6.8)

Table 2 Analysis of risk factors of intracranial artery stenosis in patients with acute ischemic cerebrovascular disease [cases (%)]

Features	Simple intracranial stenosis	Simultaneous intracranial and extracranial stenosis	$x2$	P
number of patients	118(81.1)	44(34.6)		
male	73(64.8)	47(32.4)	9.468	＜0.001
female	45(35.2)	19(14.8)	8.627	＜0.001
middle-aged	37(28.44)	5(5.4)	6.151	＜0.001
elderly	81(69.7)	68(74.6)	6.192	＜0.001
smoking	79(68.5)	80(87.9)	4.153	＜0.05
drinking	58(55.7)	69(75.8)	5.997	0.001

hypertension	103(71.0)	90(99.3)	12.439	＜0.001
diabetes	89(67.5)	88(98.6)	15.263	＜0.001
hyperlipidemia	47(32.4)	90(92.6)	12.184	＜0.001
hyperhomocysteinemia	89(61.37)	70(76.8)	9.243	＜0.05
coronary heart disease	86(72.3)	84(90.8)	4.678	＜0.05

4. Discussion

This study found that the incidence of cerebrovascular intracranial artery stenosis in patients with ischemic cerebrovascular disease was 81.13%. Among them, intracranial artery stenosis was located in anterior circulation (48.27%) and posterior circulation (22.5%). This study found that gender, age, smoking, drinking, hypertension, diabetes, hyperhomocysteinemia and coronary heart disease are all high-risk factors for intracranial arterial stenosis in ischemic ischemic cerebrovascular patients. At the same time, some studies believe that smoking is related to cerebrovascular stenosis, and smoking is also related to intracranial artery stenosis. Most smokers are men, which also makes the proportion of male patients greater than female.

There is no consistent conclusion on the difference of risk factors of intracranial arterial vascular disease. In age stratification, it is found that in recent years, the number of young and middle-aged patients with cerebrovascular intracranial artery stenosis has increased, especially intracranial artery stenosis. However, with the increase of age, the proportion of simultaneous intracranial and extracranial stenosis will gradually increase, which is also observed in the process of this experiment. Moreover, due to the increasing age of patients, the aggravation of necrosis around tissues and the deposition of lipids, the production of elastic fibers and collagen fibers in diseased blood vessels is increasing, which is also the inevitable cause and trend of the middle and late development of intracranial and extracranial atherosclerotic lesions [6].

In this study, hypertension and diabetes are independent risk factors or important factors of all intracranial artery stenosis. We can also conclude that hypertension and diabetes are the two most important risk factors for intracranial artery stenosis.

To sum up, the causes and risk factors of intracranial artery stenosis in patients with acute ischemic cerebrovascular disease are more, especially those with underlying diseases such as hypertension and diabetes. In clinical practice, it is necessary to track and check regularly. Only in this way can we accurately prevent the expansion of risk factors and actively cooperate with the next treatment.

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