Stroke in moyamoya disease

Moyamoya disease (MMD) is an idiopathic disease with a progressive nature leading to recurrent stroke due to occlusion of the terminal internal carotid arteries ¹⁾.

Epidemiology

A multi-center, nationwide survey for conservative treatment results was conducted in 2007 in Japan. The authors reported the annual stroke rate as 3.2% from the observation of 34 asymptomatic patients conservatively followed over 44 months. A hemodynamic disturbance was revealed to be a risk factor for newly developed stroke²⁾

In a North American series, the rates of annual ischemic and hemorrhagic stroke rate were reported as 13.3% and 1.7%, respectively. Being female and smoking were risk factors for stroke development $_{3)}$

Cho et al. reported an annual stroke rate of 4.5% among 241 hemodynamically stable patients with MMD over 83 months. The annual stroke rate was higher in the hemorrhagic presentation group (5.7%) than in the ischemic presentation group (4.2%) or the asymptomatic group (3.4%). They found familial disease and thyroid disease to be risk factors affecting stroke occurrence ⁴). As for ischemic presenting MMD, 5.6% of the annual ischemic stroke rate also reported that posterior circulation involvement was a strong risk factor for ischemic stroke ⁵).

Diagnosis

see Moyamoya disease diagnosis

It is necessary to find a non-invasive and effective approach to identify the occurrence of stroke.

Zheng et al. aimed to analyze the association between ultrasound parameters and ipsilateral cerebral hemisphere stroke in patients with moyamoya disease by logistic regression analysis.

In a retrospective case-control study, 88 patients with MMD (153 cerebral hemispheres) hospitalized in Beijing Tiantan Hospital, Capital Medical University from November 2020 to October 2021 were analyzed. According to the occurrence of stroke, the 153 cerebral hemispheres were divided into a stroke group and a non-stroke group. Clinical data and ultrasound parameters of the ipsilateral internal carotid artery, superficial temporal artery, maxillary artery, and posterior cerebral artery were recorded. The ultrasound parameters were divided into four groups according to the interquartile range, and then they were compared between the stroke group and the non-stroke group. Those with significant differences were scored by multivariate logistic regression analysis.

There were 75 cerebral hemispheres (49.0%) in the stroke group and 78 cerebral hemispheres (51.0%) in the non-stroke group. Logistic regression analysis showed that the internal diameter of the internal carotid artery, peak systolic velocity of the internal carotid artery and peak systolic velocity of

the posterior cerebral artery were independently correlated factors for stroke in patients with Moyamoya disease MMD. The fourth quartile group of the above three ultrasound parameters was taken as the reference group, and the odds ratio of the first quartile group were 11.679 (95% CI 2.918-46.749, P = 0.001), 19.594 (95% CI 4.973-77.193, P < 0.001), and 11.657 (95% CI 3.221-42.186, P < 0.001), respectively.

Ultrasound parameters are independently correlated with ipsilateral cerebral stroke in patients with Moyamoya disease (MMD). Ultrasound provides a new way to identify stroke in MMD patients. Future prospective cohort studies are needed to verify the clinical value of ultrasound in identifying patients with MMD at high risk of stroke⁶.

Treatment

Revascularization surgery for symptomatic MMD is considered the standard treatment for preventing further stroke ^{7) 8)}.

1)

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