Peak systolic velocity

Peak systolic velocity (PSV) is an index measured in spectral Doppler ultrasound. On a Doppler waveform, the peak systolic velocity corresponds to each tall "peak" in the spectrum window

Internal carotid artery hemodynamics (maximum systolic velocity and average velocity [Vmax, Vavg], average blood flow [Flowavg], and wall shear stress) were analyzed based on 4D flow MRI data. Cerebral infarction, defined as the occurrence of events, in 124 brain hemispheres was determined according to clinical symptoms and conventional Brain magnetic resonance imaging.

Statistical tests: The independent-sample T-test was used to evaluate differences in Internal carotid artery hemodynamics between infarcted and non-infarcted hemispheres. Binary logistic regression was performed to investigate the relationship between ICA hemodynamics and events. A P value < 0.05 was considered statistically significant.

Results: Sixty-one infarcted hemispheres (eight hemispheres with acute ischemic damage, 30 with chronic ischemic damage, and 23 with chronic hemorrhagic damage) had cerebrovascular events and 63 non-infarcted hemispheres did not. The hemodynamic parameters in the infarcted hemispheres (Vmax : P < 0.001; Vavg : P = 0.003; and Flowavg : P = 0.004) were significantly lower than those in the non-infarcted hemispheres. However, Vmax (P = 0.052), Vavg (P = 0.107), and Flowavg (P = 0.074) were not significantly different among hemispheres with acute ischemic lesions, chronic ischemic lesions and chronic hemorrhagic lesions. Vmax (odds ratio 3.033, 95% CI: 1.075-8.562) was independently associated with cerebrovascular events.

Data conclusion: Vmax may be a higher risk factor for cerebrovascular events in MMA patients.

Evidence level: 2 TECHNICAL EFFICACY STAGE: 3¹⁾

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 stroke ²⁾.

1)

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stroke in patients with moyamoya disease: a logistic regression analysis. Chin Neurosurg J. 2022 Oct 11;8(1):32. doi: 10.1186/s41016-022-00300-5. PMID: 36221122.

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