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New Discussion of Factors and Treatment of Coronary Heart Disease

JianXuan Xu

[1]Department of Neurology, Shenzhen Bao'an District Songgang People's Hospital, Shenzhen, China

[2]Department of Neurology, Institute of Neuroscience, The Second Affiliated Hospital of Guangzhou Medical University, Guangzhou, China

*Corresponding author: JiaXuan Xu, Institute of Neuroscience, The Second Affiliated Hospital, Guangzhou Medical University, 250# Changgang East Road, Guangzhou, 510260, China, Tel (Fax): +86 20 34153003; E-mail: qcgao@263.net

Abstract

The relationship between cerebral artery stiffness (CAS) and cerebrovascular disease (CVD) is unclear. A new method was constructed to evaluate the stiffness of cerebral artery directly by carotid-cerebral pulse wave velocity (ccPWV), and a single-center and prospective clinical trial was designed. The results show that ccPWV is independently associated with cerebral large artery atherosclerosis and has a good diagnostic value in the early stages. The value of ccPWV is also related to the initial severity and prognosis of acute ischemic stroke. This short commentary reviews the relationship between CAS and CVD based on the previous studies.

Keywords: Cerebral arterial stiffness; Large artery atherosclerosis; Acute ischemic stroke

Introduction

Cerebrovascular disease (CVD) is still the main cause of premature mortality and morbidity worldwide [1]. Numerous studies demonstrated that the stiffness of both central and peripheral arteries is closely associated with CVD, but few studies were designed to discuss the relationship between cerebral arterial stiffness (CAS) and CVD [2-4]. Recently, Fu et al. constructed a method to evaluate the human CAS directly by carotid-cerebral pulse wave velocity (ccPWV) using transcranial Doppler, and systematically examine the relationship between CAS and CVD, including cerebral large artery atherosclerosis and acute ischemic stroke [5-10].

CAS and Large Artery Atherosclerosis

In the studies, Eighty one patients of acute ischemic stroke were enrolled, and 154 segments between common carotid artery and ipsilateral middle cerebral artery (C-M segment) were evaluated with catheter angiography and ccPWV [7-9]. First, they observed that not only is ccPWV independently related to the presence of C-M segment atherosclerosis (CMSA) in multivariate analysis, but also closely related to the burden of CMSA [9]. They also observed that in the group with more lesions and severer stenosis, the ccPWV value had a tendency to increase and was positively correlated with the number of lesions and the degree of stenosis in CMSA [9]. Furthermore, when evaluating the validity of ccPWV in detecting early CMSA, the receiver operating characteristic (ROC) curve of ccPWV has good diagnostic value in this study [7]. The results suggested that CAS is independently related to the presence of cerebral large artery atherosclerosis, and may become a new marker of its early stage.

CAS and Acute Ischemic Stroke

To examine the relationship between CAS and acute ischemic stroke, a single-center and prospective clinical trial was designed Fu et al. prospectively studied the consecutive patients with first-ever acute ischemic stroke undergoing multimodal brain magnetic resonance imaging and ccPWV examination during admission [5,6,8]. All subjects had received follow-up for 1 year. From the early results, They observed that in multivariate logistic regression analysis, ccPWV was an independent determinant of the severity of severe initial stroke and was significantly correlated with the National Institutes of Health Stroke Scale (NIHSS) score, while the value of ccPWV was the most correlated with the NIHSS score of subjects with small vessel occlusion in all stroke subtypes [6]. Furthermore, in their study, ccPWV $\geq$ 6.66 m/s is considered as an independent predictor of poor prognosis. ROC curve showed that the area under the ccPWV curve predicting the prognosis at 3 months after acute ischemic stroke was 85.27% (95% CI, 80.95-89.58; p<0.001) [8]. The results suggested that CAS is independently related to the initial severity of ischemic stroke and has value as an independent prognostic factor for predicting the long-term functional outcome of patients with acute ischemic stroke.

Conclusion

In conclusion, CAS is independently related to the presence of cerebral large artery atherosclerosis, and may become a new marker of its early stage. It is also related to the initial severity of ischemic stroke and is an independent prognostic factor for predicting the outcome of acute ischemic stroke. However, these conclusions need to be further confirmed in the study of larger sample size and multi-center. In the follow-up study, we should focus on the relationship between CAS and cerebral small vascular disease.

Conflict of Interest

The authors declare no conflict of interest.

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