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MCA plaque enhancement on high resolution MR imaging and ischemic stroke

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PURPOSE: High-resolution MRI (HR-MRI) is the useful modality to evaluate the characteristics of intracranial arterial atherosclerotic plaque. The purpose of this study was to evaluate the relationship between the enhancement of middle cerebral artery (MCA) plaque on post-contrast HR-MRI and ischemic stroke.

MATERIALS AND METHODS: Twenty-seven patients (14 females, 13 males, mean age: 69.0 years $\pm$ 12.1) with isolated MCA stenosis of 50% or more were enrolled in this study. Post-contrast axial 3 dimensional T1-weighted VISTA sequence (TR, 350 ms; TE, 19.51 ms; matrix, 360 $\times$ 299; field of view, 113 $\times$ 180; section thickness, 1 mm; total scan time, 3 min 4 sec) was acquired for assessment of the plaque enhancement. The subjects were divided into two groups (symptomatic or asymptomatic), based on the presence of recent ischemic stroke in the same ipsilateral MCA territory as the MCA stenosis. The signal intensity of plague in the stenotic segment and the CSF were measured by ROI on T1-VISTA. It is subdivided the MCA stenosis into moderate stenosis and severe stenosis by the stenotic degree of 80% on MRA. The plaque-to-CSF contrast ratio, the stenotic degree, and the clinical parameters (age, sex, atherosclerotic risk factors, ESR) between two groups were compared. Multivariate logistic regression analysis was used to test for the association of contrast ratio, stenotic degree, and the clinical parameters with ischemic stroke.

RESULTS: Sixteen patients had symptomatic MCA stenosis, and eleven patients had asymptomatic lesion. The plaque-to-CSF contrast ratio was a statistically significant difference between the symptomatic group (mean 5.29 $\pm$ 1.78) and asymptomatic group (3.67 $\pm$ 1.38). And in the symptomatic and asymptomatic group, the proportion of patients with severe MCA stenosis was 62.5% and 18%, respectively. In the multivariate logistic regression analysis, stenotic degree was only independent factor for ischemic stroke (OR = 7.5, $p < 0.05$). The contrast ratio of severe stenosis (n) were significantly higher than that of moderate stenosis (5.3 vs. 3.9; $p < 0.05$).

CONCLUSION: The results of our study showed that the enhancement of plaques were significantly higher in symptomatic groups than in asymptomatic groups. However, it is assumed that the enhancement of symptomatic plaques could not be related with the vulnerability but be related with the severity of stenosis.