

Perfusion MR Imaging with Correlation to SPECT in Symptomatic Carotid Artery Occlusion

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Purpose: Perfusion MR imaging and SPECT are clinically available imaging methods to evaluate hemodynamic status in chronic occlusive cerebrovascular disease. These methods rely on different underlying physiologic mechanisms, and therefore the data may not be correlative to each other. We studied the relationship between hemodynamic parameters obtained with these two methods.

Materials and Method: We performed perfusion MR imaging and SPECT in 10 patients with symptomatic unilateral internal carotid artery occlusion. Cerebral blood volume (CBV) and mean transit time (MTT) were obtained with dynamic contrast-enhanced T2*-weighted MR imaging. Cerebral blood flow (CBF) and vascular reserve capacity were measured with ^{99m}Tc-HMPAO SPECT scans; vascular reserve capacity was calculated by the difference of CBF between before and after the use of acetazolamide. Relative ratios of these hemodynamic parameters between affected and contralateral vascular territories were then calculated and compared to each other.

Results: Normal-to-increased CBV, prolonged MTT, decreased CBF, and variable vascular reserve capacity were observed in the affected vascular territories. Vascular reserve capacity correlated well only with MTT ($r = 0.69$, $p < 0.05$), but not with CBF and CBV. The CBF, CBV and MTT did not correlate with each other.

Conclusion: These results are consistent with previous knowledge that CBF and CBV do not change linearly to reduced perfusion pressure, and MTT is a more sensitive parameter in estimating the vascular reserve capacity than others. This relationship between parameters obtained from perfusion MR imaging and SPECT should be considered in assessing the hemodynamics of chronic occlusive cerebrovascular disease.