

The role of white matter damage on the risk of peri-procedural Diffusion-weighted lesions after carotid artery stenting

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Introduction

White matter hyperintensities (WMH) are a common finding in aged individuals affected by carotid disease and a recognized risk factor for first-ever and recurrent stroke in population-based studies. We evaluated if a pre-existing WMH damage increase the risk of undergoing brain microembolism during carotid artery stenting (CAS) procedure, as evaluated by appearance of a new areas of restricted diffusion on diffusion-weighted images (DWI) MR scan.

Methods

We retrospectively evaluated forty-seven patients (mean age 73 years, SD 7.9; 15 female) with severe carotid artery stenosis, who underwent carotid angioplasty with stent placement. Distal cerebral protection devices were used. Total WMH volume was computed on FLAIR axial images before CAS, after having segmented lesional region of interests (ROIs) through a semi-automated local thresholding approach (Osirix® software V.3.9.4, Fig 1). After CAS DWI was looked over for areas of restricted diffusion (DWI lesions). A first univariate analysis was adopted to compare groups according to the occurrence of post-procedural DWI lesion. The variable DWI lesion was further dichotomized (0=none DWI lesion; 1=at least 1 DWI lesion) and modelled by means of a logistic regression model.

Results

Sixteen out of 49 patients developed at least one new DWI lesion after CAS, without persistent clinical deterioration. Compared with non DWI, DWI patients were more commonly treated in the left internal carotid artery ($p=.007$) and had a more severe WMH lesion load ($p=.027$). When both laterality of internal carotid and WMH lesion load was entered in the logistic model, the risk of a DWI lesion was higher in left vs. right side stenosis (OR=9.0, 95% CI 1.9-42.7, $p=.005$) and increased for each log-unit of WMH lesion load (OR 7.05, 95% CI 1.07-46.49, $p=.042$). Regardless the side of the stenosis, a patient with a WMH lesion load of 5.25 cm^3 has a 50% probability of a new DWI lesion.

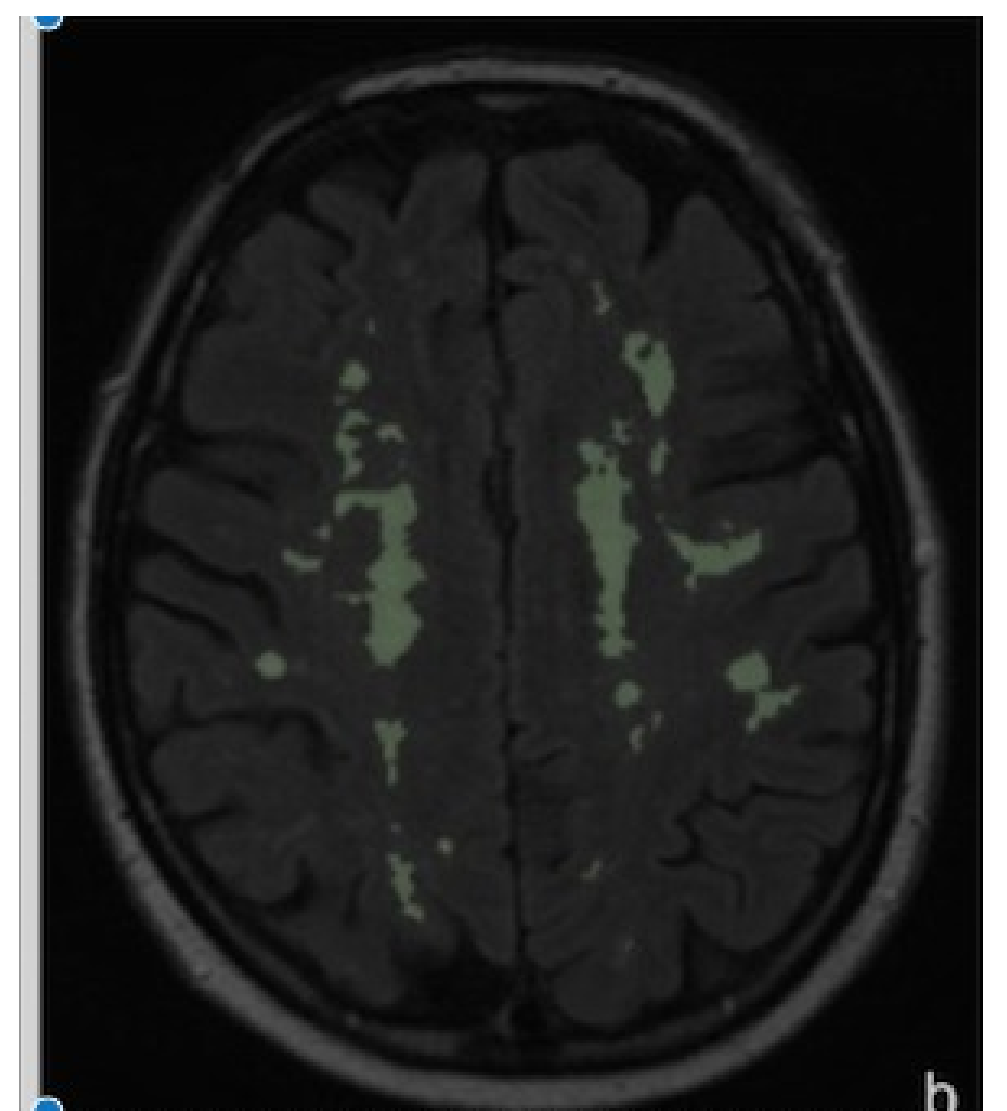


Fig 1. Example of WMH volume computation

Conclusions

Pre-existing white matter damage may influence the risk of peri-procedural micro-embolism during CAS. A reduced wash-out of microemboli due to hemodynamic impairment in WMH regions could be hypothesized.

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