Different Patterns of Subcortical White Matter Disease in Patients with Cerebral Amyloid Angiopathy and Hypertensive Intracerebral Hemorrhage

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Abstract:
Objective: We aimed to identify the potential contributions of cerebral amyloid angiopathy (CAA) and hypertensive microvasculopathy on periventricular (PV) and subcortical (SC) white matter disease (WMD). Methods: Total, SC and PV WMD volumes of 359 CAA patients and 102 patients with hypertensive intracerebral hemorrhage (htn-ICH) were quantitatively measured on FLAIR MRI. The presence of 6 different subcortical WMD patterns (detailed under Results and Figure 1) was recorded. The independent predictors of each of these WMD variables were explored using multivariate models that included the diagnosis (CAA vs htn-ICH), age, gender, ApoE genotype, vascular risk factors, total WMD volume as well as lobar and deep microbleed (MB) counts from T2*MRI. Results: CAA patients were older (mean 74 vs 68, p<0.001) with a higher WMD burden (p<0.05 for total, PV and SC WMD) than htn-ICH cases. Older age, higher lobar and deep MB counts were independent predictors of both total and PV WMH (p<0.01 for all predictors) whereas only high lobar MB count was independently associated with SC WMD (p=0.001). CAA-related covariates (CAA diagnosis and/or lobar MB counts) were independently associated with large posterior SC WMD (Fig 1a, frequency 16% in CAA vs 5% in htn-ICH, p<0.001) and anterior SC WMD (Fig 1b. 46% vs 24%, p<0.01). Peri-basal ganglia WMD (Fig 1c) pattern was more frequent in htn-ICH (29% vs 10%, p<0.001) and independently associated with deep MB count. The SC spots (Fig 1d, p=0.16), U-shaped SC WMD pattern (Fig 1e, p=0.17) and severe-coalescent WMD (Fig 1f, p=0.5) were not independently related to CAA or htn-ICH. Conclusions: Our results show that CAA pathology is associated with the severity of both PV and SC WMD as well as presence of severe posterior and anterior SC disease. A pattern of deep peri-basal ganglia WMD is mostly associated with hypertensive disease. Recognition of these patterns might help understand the dominant type of microvasculopathy in older individuals with WMD.


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