Mild Cognitive Impairment after Lacunar Infarction: Voxel-Based Morphometry and Neuropsychological Assessment

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Vascular dementia represents a heterogeneous syndrome. Older definitions fail to differentiate between cognitive impairment resulting from large cortical infarcts, smaller strategic infarcts and small-vessel disease. This has delayed progress because these different subtypes have different disease mechanisms and cognitive profiles [1]. Considerable recent interest has focused on dementia and cognitive impairment due to cerebral small-vessel disease. This appears to be a relatively homogeneous syndrome with a 'subcortical' cognitive profile including impairment of attention, information speed processing and executive function. Memory impairment is frequently mild or even absent in the early stages. Neuropathologically and radiologically a combination of small discrete lacunar infarcts, and more diffuse areas of chronic ischaemia known as leukoariosis, are seen. The relative contribution of lacunar infarcts, white-matter leukoariosis and brain atrophy in causing the cognitive impairment remains uncertain.

In recent clinical trials cerebral small-vessel disease accounted for more than half of all vascular dementia cases [2]. However, cases meeting the criteria for frank dementia are only the tip of the iceberg. This is for two reasons. Firstly, the criteria for dementia have largely evolved from protocols designed to identify cortical dementias such as Alzheimer's and have required the presence of memory impairment [1]. This excludes the many

patients with significant disability due to subcortical cognitive deficits who have preserved memory. Secondly lacunar stroke, due to small-vessel disease, is common accounting for about 20% of all ischaemic stroke. Furthermore, ischaemic white-matter disease can cause cognitive impairment in the absence of symptomatic stroke, and ischaemic white-matter changes are common with increasing age even in the absence of stroke [3].

The terminology of mild cognitive impairment of the vascular type (MCI-V) has been used to describe this group of patients with cognitive impairment, but not dementia, due to cerebrovascular disease. This has followed from the use of mild cognitive impairment to describe a group of patients with mild Alzheimer's-disease-like cognitive deficit, a significant proportion of whom develop frank Alzheimer's disease during follow-up [4]. The research on MCI-V is still in its infancy and many questions remain about its prevalence and importance, the probability that such patients will progress to dementia, and the best ways to identify it. However, limited data suggest that it does identify a high-risk group. In one study half of the subjects with MCI-V progressed to dementia during a 5-year follow-up period [5].

In their paper presented in this issue, Grau-Olivares et al. [6] studied 40 patients with lacunar infarction within 1 month after stroke. MCI-V was found in 22 of these. This suggests that we may have underestimated the prev-

alence of cognitive impairment in this group. There are some methodological issues, particularly the use of normal control ranges for cognitive testing from the literature, which may influence the results, but it nevertheless emphasises the importance of the condition. Indeed the proportion with MCI-V may represent an underestimate; in the paper, the definition of MCI-V used requires the presence of memory impairment, although this could be mild. If this had not been a requirement the proportion with impairment may be even higher. This is supported by data demonstrating a high prevalence of impairment on tests of executive function in patients with lacunar stroke and radiological leukoaraiosis [7].

The authors also explore with MRI the structural basis underlying the cognitive impairment. MRI subcortical hyperintensities were significantly more frequent in the MCI-V group, consistent with previous studies which have associated leukoaraiosis with cognitive impairment in this patient group. They also found an association with cortical atrophy, and in particular highlighted an association with temporal atrophy. The latter is likely to be a

consequence of the requirement of memory impairment in the definition of MCI-V. However, previous studies have emphasised a strong association between generalised brain atrophy and cognitive impairment in patients with small-vessel disease [8, 9]. Whether this is a primary phenomenon or is secondary to white-matter tract degeneration and disconnection, a process supported by recent diffusion tensor imaging data [8], can only be determined in larger longitudinal studies.

MCI-V is fertile ground for future research. Many challenges remain. More appropriate cognitive screening and assessment tests are required. A number have been suggested [7, 10] and have recently been reviewed [11]. Large-scale studies are required to determine the natural history of the condition and the role of imaging markers, particularly newer MRI techniques, as disease surrogates. One hopes that this will eventually allow us to identify, at an early stage, a group of patients in whom preventative therapy can delay or prevent progression to disabling cognitive impairment and dementia.

References

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