

Cerebrovascular pathology and cognitive decline

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EDITORIAL

Cerebrovascular disease is one of the leading causes of death and disability, and for many people the vascular pathology is significantly progressed before the condition is sufficiently addressed. Even following transient ischemic attacks and chronic vascular headaches, people rarely receive feedback on cerebrovascular health, even if they've had a TIA. The cerebrovascular system provides oxygen and nutrients to the brain and any abnormalities occurring in the cerebral microvasculature may cause brain dysfunction. This relationship is conceptually referred to as the neurovascular unit (NVU), which comprises multiple cell types, including neurons, vascular smooth muscle cells, endothelial cells, astrocytes, microglia, and pericytes. Various types of dysfunction in these cells may impair the proper control of vascular responses by the NVU. Abnormal neurovascular alterations involve either structural or functional modifications of the cerebrovascular system. Dysfunction in the system may cause subtle signs and symptoms that may go unassessed or minimized. Often by the time symptoms become functionally relevant, the vascular dysfunction and brain damage substantial.

Cerebrovascular disease (CVD) is caused by a multitude of disorders, has diverse clinical manifestations and is a common cause of cognitive impairment and dementia. CVD may involve various congenital and acquired micro and macrovascular types of pathology including: small vessel disease, vasospasms and vasculitis, large and small ischemic infarcts, cerebral amyloid angiopathy, and various other processes. Cerebral vascular pathology often causes some amount of cognitive dysfunction. Some types of vascular pathology such as amyloid angiopathy commonly cause cognitive impairment though is not often discussed outside of the context of intracerebral hemorrhage or Alzheimer's Dementia (1). Strokes and even small cerebrovascular lesions involving microinfarcts and lacunes are strongly associated with cognitive findings (2). Studies suggest that lacunes, deep white matter, and periventricular demyelination also contribute equally to cognitive dysfunction.

Vascular cognitive disorder or impairment (VCI) is the term used to refer to the global diagnostic category encompassing all these disorders. Microinfarcts

are an important correlate of age-related VCI, but are not associated with an increased burden of AD pathology (3). Increased white matter lesions are associated with decreased glucose metabolism and decline in executive function.

Vascular cognitive disorder is etiologically heterogeneous, affects various neuronal networks affecting frontal and basal ganglia structures and pathways connecting these structures with the thalamus, and subfrontal areas. Research suggest pattern of cognitive impairment is consistent with models of disturbed cortical and subcortical circuits in producing cognitive decline (4). What is probably most important for clinicians to consider is that there may be many different types of vascular pathology and related neurocognitive impairments. Some of the mild cognitive impairment may not be readily observable in behavior or even on brief cognitive screening measures, but do often show up on neuropsychological testing. Neuropsychological testing and various types of brain imaging may help identify individuals before the vascular pathology causes significant functional decline or a major stroke. This is a growing public health issue that could be managed before the onset of dementia. Early identification and management in a prodromal, early, or in a mild cognitive impairment stage would seem the most appropriate way to manage CVD.

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