Vascular Dementia: Cerebrovascular Injury, Clinical Syndromes, Neuroimaging, and Interaction with Alzheimer Pathology

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Received: November 2025. Accepted: December 2025; Published: January/February 2026.
Citation: Abyad A. Vascular Dementia: Cerebrovascular Injury, Clinical Syndromes, Neuroimaging, and Interaction with Alzheimer Pathology. World Family Medicine. January/February 2026; 24(1): 22 - 38. DOI: 10.5742/MEWFM.2026.2401022

Abstract

Vascular dementia (VaD) represents a heterogeneous group of cognitive disorders caused by cerebrovascular disease and remains the second most common cause of dementia worldwide after Alzheimer's disease. Rather than a single disease entity, VaD encompasses multiple pathophysiological mechanisms, including large-vessel infarction, small-vessel disease, strategic infarcts, hypoperfusion-related injury, and hemorrhagic lesions. Advances in neuroimaging and neuropathology have refined the understanding of how cerebrovascular injury disrupts distributed neural networks, leading to executive dysfunction, slowed processing speed, and impaired attention that distinguish VaD from primary neurodegenerative dementias. Increasingly, evidence demonstrates that vascular pathology rarely occurs in isolation; instead, mixed dementia, particularly the coexistence of vascular brain injury with Alzheimer-type pathology, is the most common substrate underlying late-life cognitive impairment.

This narrative review provides a comprehensive synthesis of updated literature on vascular dementia, focusing on types of cerebrovascular injury, clinical syndromes, neuroimaging correlates, and interactions with Alzheimer pathology. Emphasis is placed on mechanistic pathways, clinico-radiologic correlations, and implications for diagnosis, prognosis and prevention.

Key words:
Vascular dementia, cerebrovascular injury, clinical syndromes, neuroimaging, Alzheimer pathology