

The role of lymphatic system in neurodegeneration: A semiquantitative analysis of brain imaging in patients with neck dissection

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Background: Recently, research into the role of meningeal lymphatic vessels in the drainage of the central nervous system (CNS) has highlighted the importance of lymphatic system in neuroinflammation and neurodegenerative disorders. Studies of how changes in CNS lymphatic drainage affect human brain are limited. In patients undergoing cervical lymph node dissection (CLND) for a variety of reasons, the main draining lymph nodes of the meningeal lymphatics could be disrupted. In this study, we aimed to evaluate whether preceding CLND affects imaging markers of neurodegeneration.

Methods: We selected patients who received CLND in the form of modified radical neck dissection (MRND), and who then underwent at least two brain magnetic resonance imaging (MRI) spaced at least 1 year apart. Controls were patients who received neck operations other than neck dissections with two MRIs performed postoperatively. Patients with space-occupying lesions, large destructive lesions, and clinically evident hydrocephalus that may affect measurements were excluded from the analysis. Evan's ratio, third ventricle diameter, medial temporal lobe atrophy (MTA) scale, global cerebral atrophy (GCA) scale, and Fazekas scale were measured for each MRI scan and the rate of change compared between the two groups.

Results: We included 30 patients with a history of MRND and 50 patients with other neck operations. Significantly fewer patients with MRND (12%) showed a greater than average increase in the Evans ratio (5%) than patients without (39%, $p=0.013$). The rate of increase in the third ventricle diameter, MTA scale, GCA scale, and Fazekas scale were not different significantly between the two groups.

Discussion: Patients with a history of MRND had a slower increase in Evan's ratio compared to patients without MRND. Our results suggest that alteration of the cervical lymphatic system in humans affects the age-related increase in cerebrospinal fluid space, indicating a key role of meningeal lymphatics in the regulation of neurodegeneration.