

A Good View of Brain through the Optic Nerve Window

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Received: April 19, 2020

Published: May 18, 2020

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Optic nerve is developmentally derived from an outpouching of diencephalon leaving the cranial cavity through the optic canal. The most anterior portion of the optic nerve called the optic disc is directly visible through the eye. With modern techniques, the integrity of the optic nerve fibers can be visualized, and the structure and function of the nerve fiber layer can be precisely quantified.

Since the optic nerve is actually considered to be part of the central nervous system (CNS), many congenital and acquired disorders of the optic nerve are associated with CNS abnormalities. A few examples of CNS abnormality-associated optic neuropathies will be provided. Morning glory disc anomaly is an example of congenital disc abnormality which is associated with CNS vascular anomalies. Among acquired abnormalities, papilledema provides an evidence for intracranial hypertension. Furthermore, unilateral disc edema with simultaneous contralateral optic nerve atrophy might be secondary to an intracranial mass leading neuro-ophthalmologists to suspect the true Foster Kennedy syndrome. Additionally, infiltrative optic neuropathies might be associated with intracranial inflammation, infection, or neoplasia making physicians evaluate simultaneous CNS lesions. Moreover, toxic and nutritional optic neuropathies like that induced by methanol or dietary deficiency of vitamin B12 alert us to other neurological dysfunctions in the brain. The list of CNS abnormality-associated optic neuropathies is quite long.

Brain neural degenerations might affect the optic nerve and peripapillary retinal nerve fiber layer (RNFL) providing clues to make the diagnosis. In addition, the peripapillary RNFL abnormality may serve as a surrogate to enable clinicians to monitor patients during the follow-up period and assess the success or failure of therapeutic interventions. Researchers have been investigating the optic nerve to find abnormalities in cases with Alzheimer's or Parkinson's disease using techniques such as confocal scanning laser ophthalmoscopy (CSLO) and optical coherence tomography (OCT). It is of particular interest if the early signs of brain degeneration is detected in the optic nerve. They will help clinicians to screen sus-

picious cases at the early stages of the disease and start appropriate therapies as early as possible before further disease progression to the advanced stages when prognosis is poor. Moreover, structural and functional assessments of the optic nerve and peripapillary RNFL may provide insights into the underlying mechanisms of the brain pathologies. The optic nerve makes CNS pathologies more easily accessible for further examination. Hopefully, the optic nerve adds an important piece of the brain pathology puzzle and helps us to solve the riddle of brain disorders. The fairly strong association between the optic nerve and brain abnormalities inspires us to conclude that the optic nerve metaphorically as a window provides a great miniature view of brain.

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