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NEURO SPECIAL EDITION

# Neuroimaging for the diagnostic assessment of optic neuritis

## Exames de imagem no auxílio diagnóstico da neurite óptica

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Optic neuritis (ON) is an acute inflammatory disease of the optic nerve. ON can occur in isolation or in association with other demyelinating diseases of the central nervous system (CNS), such as neuromyelitis optica (NMO), myelin oligodendrocyte glycoprotein antibody disease (MOGAD), and, more commonly, multiple sclerosis (MS). Currently, the diagnosis of ON involves assessing clinical data and conducting complementary examinations, including magnetic resonance imaging (MRI)[1]. Herein, we describe the role and importance of MRI in diagnosing ON and differentiating it from other demyelinating CNS diseases.

ON typically affects young adult women. Visual acuity loss is usually pronounced and progressive over days, with the nadir between 20/40 and counting fingers. Periocular pain that worsens with eye movement and precedes vision loss is reported in 90% of cases. Pupils are isochoric, but the affected eye exhibits an afferent defect. The fundus of the eye may show papillary edema; however, this symptom can also occur in retrobulbar neuritis. Perimetry typically reveals a central or cecocentral scotoma, as shown in Figure 1, in which a patient with ON exhibited a visual acuity of counting fingers in the right eye. Serological tests usually yield normal results, while cerebrospinal fluid analysis may indicate a slight increase in cellularity and the presence of oligoclonal bands in patients with MS. Orbital MRI typically reveals hyperintensity on T2 sequence in the orbital and prechiasmal portions of the optic nerve with contrast enhancement (Figure 2A, right). Brain MRI aids in identifying T2 hyperintense lesions in juxtacortical areas, with hyperintense foci at the callosal–septal junction (Figure 2B). In the example shown in Figure 2, ON was diagnosed in the right eye and signs of multifocal demyelinating disease were observed. A 5-day course of high-dose intravenous methylprednisolone pulse therapy (1 g/day) resulted in significant improvement, elevating the visual acuity of the right eye to 20/25.

Currently, the diagnosis of ON involves the evaluation of clinical and complementary examination data[2]. Among these examinations, MRI plays a central role. This imaging modality exhibits 95% sensitivity in detecting inflammatory processes in the optic nerve[3]. Furthermore, a comprehensive assessment of the distribution, extent, and appearance of inflammatory processes in the optic nerve and orbit contributes to the differential diagnosis of ON.

Bilateral involvement of the optic nerves is more common in NMO and MOGAD than in MS. Lesions

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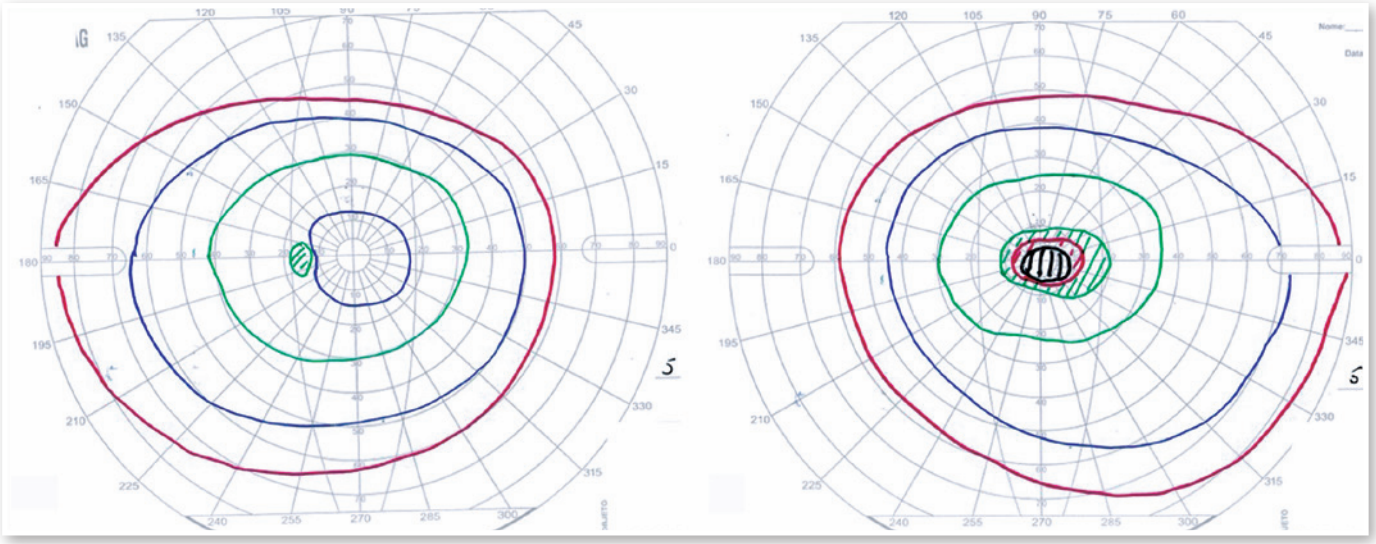

**Figure 1.** The Goldmann perimetry was normal in the left eye (A). right eye, there was a scotoma with V/4e, I/4e, I/3e, and I/2e targets (B) central loss in the patient's visual field.

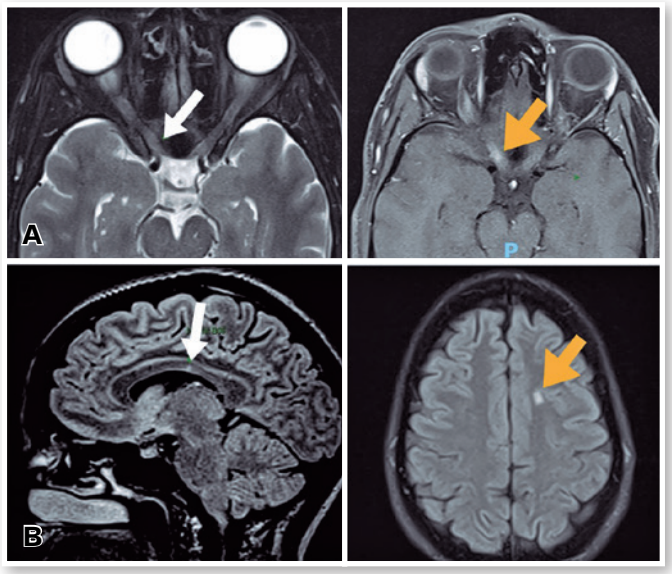


**Figure 2.** In (A), we observe hyperintensity on T2 sequences in the retro-orbital and pre-chiasmatic portions of the right optic nerve (A, white arrow), with enhancement by paramagnetic contrast in the T1-Gad sequence (A, yellow arrow). Hyperintensity observed in the fluid-attenuated inversion recovery sequence at the callosal-septal junction (B, white arrow) and juxtacortical white matter (B, yellow arrow). The presence of characteristic supratentorial lesions indicates spatial dissemination, which makes the diagnosis of multiple sclerosis more likely.

affecting the optic chiasm and tract are more commonly observed in NMO. Longitudinally extensive neuritis, involving >50% of the optic nerve, is more frequently observed in NMO and MOGAD. Perineural involvement of the optic nerve, also known as perineuritis, is more commonly observed in MOGAD[4,5].

In conclusion, advances in imaging techniques, particularly MRI, have become essential for evaluating ON. The high sensitivity of this modality not only facilitates the diagnosis of ON but also enables effective differentiation from other demyelinating diseases resulting in better prognosis and treatment.

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