Ophthalmic Manifestations Associated with Multiple Sclerosis

William R. Rhoades, Aniruddha Agarwal, Mohamed Kamel Soliman, Sachin Kedar, Rana K. Zabad, Neil Jouvenat, and Quan Dong Nguyen

Contents

Introduction

Multiple sclerosis (MS) is a chronic demyelinating disease primarily affecting the central nervous system. It often involves episodic reversible neurologic dysfunction with eventual progression of disease. The clinical course is a variable and unpredictable course with four major categories: relapsing-remitting (85%), secondary progressive, primary progressive (10%), and progressive-relapsing (5%). Diagnosis is based on history, physical examination, the timing between episodes, MRI, and CSF analysis. The pathophysiology of MS shows perivascular cuffing, edematous nerve sheaths, and loss of myelin. In 15–20% of patients, optic neuritis is the presenting feature of their disease, and up to 50–75% of patients with MS will develop optic neuritis during their lifetime. Most commonly, optic neuritis is unilateral with bilateral cases occurring about 10% of the time. On ocular examination, patients often have a relative afferent pupillary defect and central scotomas. Patients can have classic disc swelling; however, a retrobulbar optic neuritis may have a normal fundus examination. While disc elevation from optic neuritis is a common sign, only 35% of patients in the Optic Neuritis Treatment Trial had disc edema. Slit lamp and fundus biomicroscopy may show granulomatous or non-granulomatous anterior uveitis, intermediate uveitis/pars planitis, retinitis, and periphlebitis. Retinal vasculitis has been reported in 11% of cases. Fluorescein angiography can show perivascular and optic disc leakage. Most patients have excellent visual recovery, though permanent vision loss can

W. R. Rhoades
Associated Retinal Consultants, Grand Rapids, MI, USA
e-mail: williamrobertrhoades@gmail.com

A. Agarwal
Advanced Eye Centre, Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh, India
e-mail: aniruddha9@gmail.com

M. K. Soliman
Department of Ophthalmology, Assiut University Hospital, Assiut, Egypt

S. Kedar
Stanley M. Truhlsen Eye Institute, University of Nebraska Medical Center, Omaha, NE, USA

Department of Neurological Sciences, University of Nebraska Medical Center, Omaha, NE, USA

R. K. Zabad · N. Jouvenat
Department of Neurological Sciences, University of Nebraska Medical Center, Omaha, NE, USA

Q. D. Nguyen (✉)
Spencer Center for Vision Research, Byers Eye Institute at Stanford University, Palo Alto, CA, USA
e-mail: ndquan@stanford.edu

V. Gupta et al. (eds.), *The Uveitis Atlas*,
https://doi.org/10.1007/978-81-322-2410-5_89

happen to variable degrees, along with permanent scotomas, and possible recurrences of disease. This chapter illustrates relevant ocular findings among patients diagnosed with MS.

Case 1: Optic Neuritis in a Case of Multiple Sclerosis

A 45-year-old Caucasian female complained of numbness and weakness involving the right side of her body. There was no history of previous such episodes. She also complained of facial paresthesia and right-sided blurry vision along with headache. The best-corrected visual acuity (BCVA) was 20/100 in the right eye and 20/20 in the left. She had relative afferent pupillary defect in the right eye. Ocular examination revealed no significant findings in the anterior segment of both the eyes. Fundus examination revealed presence of right-sided optic nerve head edema (Fig. 1). There was no evidence of intraocular inflammation. Color vision evaluation was abnormal and visual fields were markedly depressed in the right eye (Fig. 2). Neuroimaging was performed and the patient was evaluated by a neurologist in view of her systemic complaints.

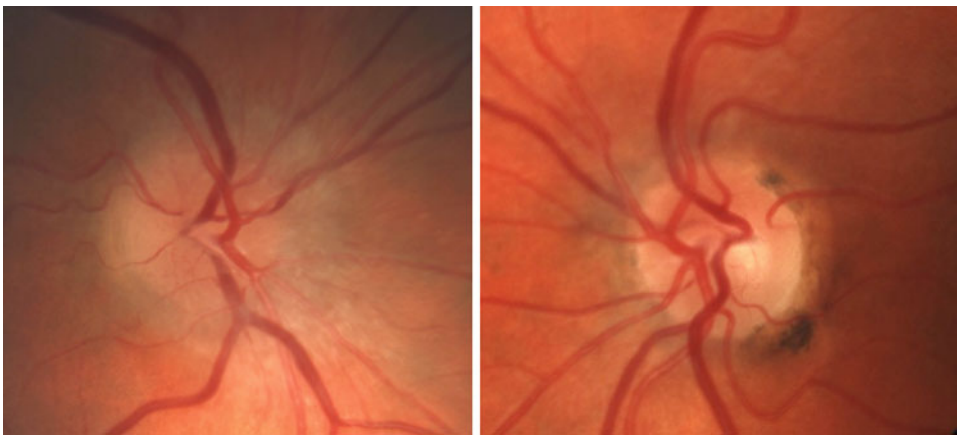

Fig. 1 Optic disc photographs (both eyes) of a female with multiple sclerosis. Right eye shows presence of significant optic nerve head edema, obliteration of the physiological cup, and hyperemic disc

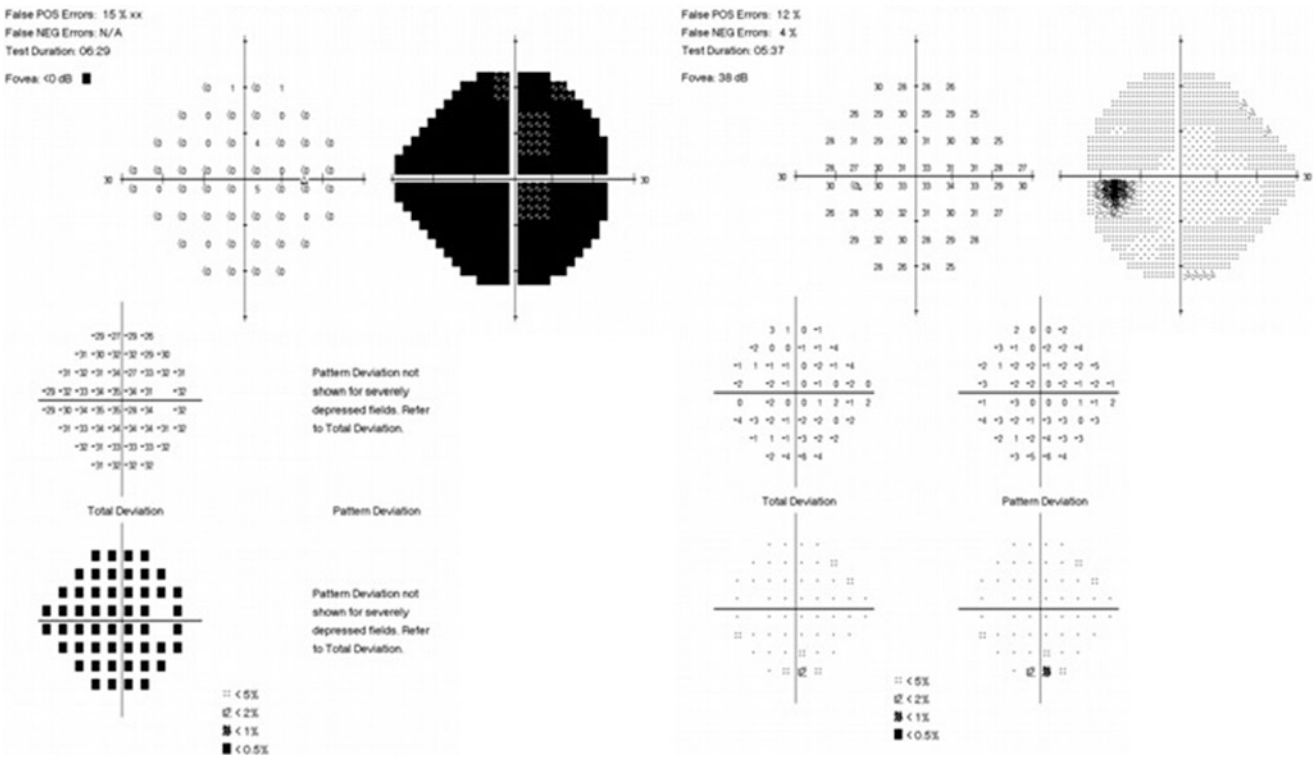

Fig. 2 Visual field evaluation (central 24-2; SITA standard with size III stimulus and white background) of the same patient as in Fig. 1 shows markedly depressed visual fields in the right eye and normal findings in the left

Magnetic resonance imaging with gadolinium contrast showed focal periventricular white matter lesions suggestive of demyelinating disease. The diagnosis of MS was established and the patient was started on intravenous methylprednisolone. At the time of presentation, additional ocular imaging using optical coherence tomography (OCT) was performed which showed significant edema of the optic nerve head in the right eye (Fig. 3).

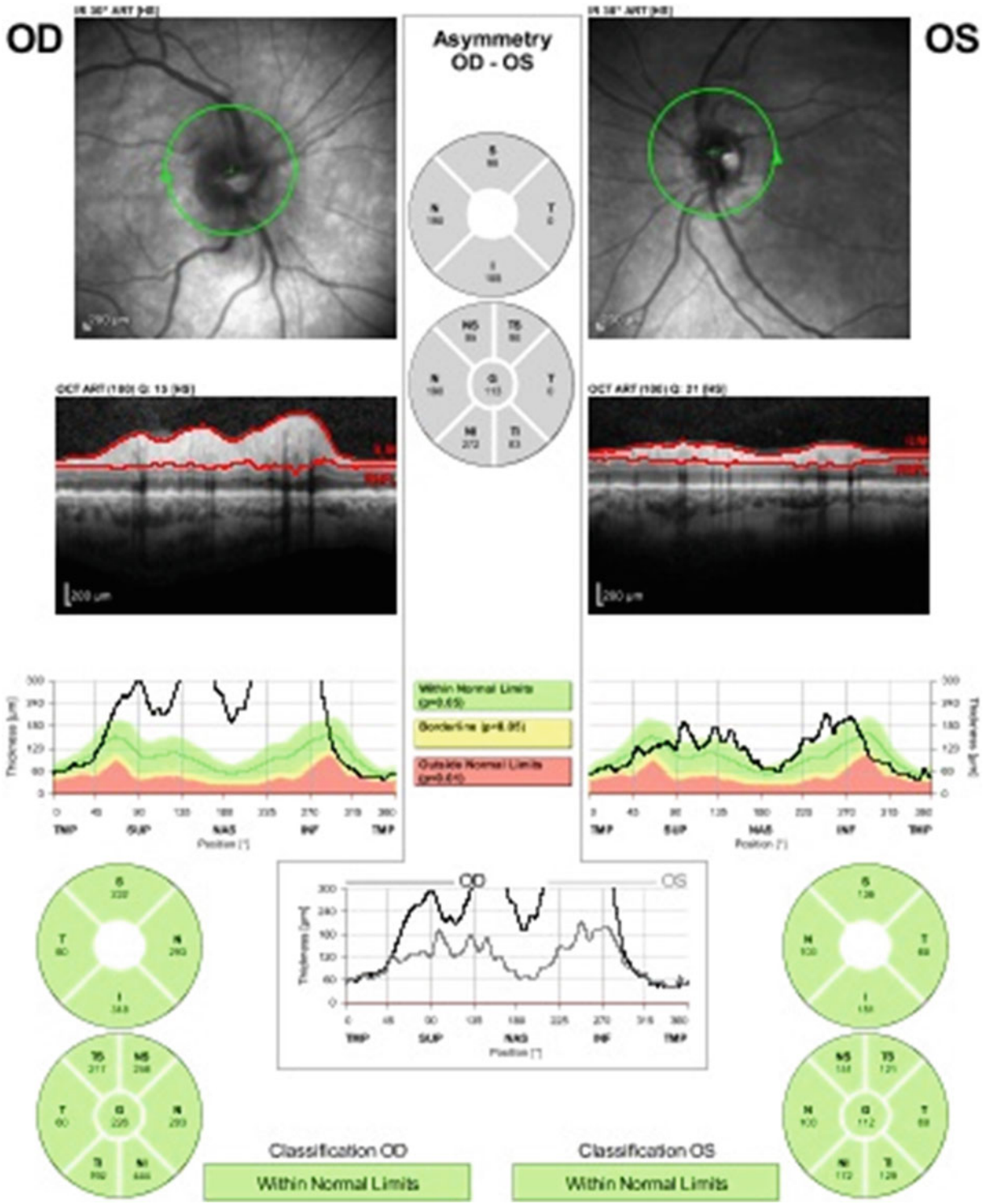

Fig. 3 Optic nerve head optical coherence tomography (OCT) scan (both eyes) of a patient diagnosed with multiple sclerosis. There is significant optic nerve head edema and retinal nerve fiber layer thickening in the right eye and normal findings in the left eye

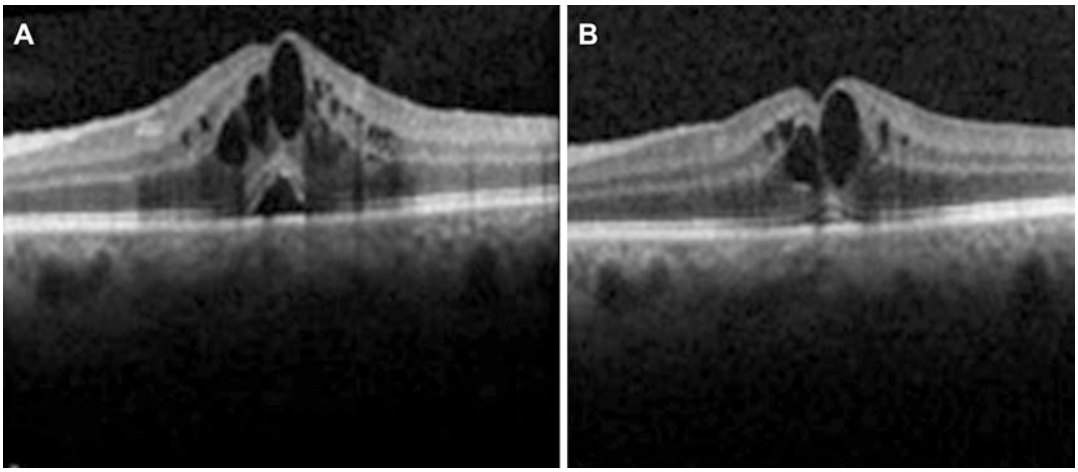

Fig. 4 Optical coherence tomography of the left eye of a patient with multiple sclerosis. Macular scan demonstrates presence of macular edema which decreased on cessation of fingolimod therapy

Case 2: Macular Edema in a Patient with Multiple Sclerosis

A 42-year-old Caucasian male presented with a history of relapsing-remitting multiple sclerosis. The patient received injectable interferon beta-1a (IFN-β1a) soon after the diagnosis and did not have any major relapses or significant side effects from IFN-β1a since then. He was shifted to fingolimod (sphingosine-1-phosphate receptor modulator) therapy. However, 24 h after the first dose of fingolimod therapy, the patient noticed a decrease in visual acuity. On examination, the BCVA decreased from 20/20 to 20/30 in the left eye. While the slit-lamp examination was unremarkable for the anterior segment, posterior segment examination revealed presence of macular edema which was also evident on optical coherence tomography (OCT) (Fig. 4). Fingolimod therapy was discontinued and the patient was started on anti-inflammatory therapy (NSAIDs) along with topical dorzolamide, which was added after 4 weeks. There was a marked decrease in the central retinal thickness (Fig. 4). Systemic carbonic anhydrase inhibitor (acetazolamide) was added (500 mg twice a day), which helped in resolution of the macular edema after 6 weeks.

Key Points

- Optic nerve involvement is an important component of multiple sclerosis and may be associated with optic disc edema and subsequent optic nerve dysfunction.
- Patients with multiple sclerosis may also develop signs of intraocular inflammation such as macular edema and intermediate uveitis.
- While most patients have an excellent recovery, there may be progressive damage and permanent visual deficit in a subset of patients.
- Ocular side effects, such as macular edema, may be related to systemic medications employed in the management of multiple sclerosis (i.e. fingolimod).

Suggested Reading

Arnold AC. Evolving management of optic neuritis and multiple sclerosis. Am J Ophthalmol. 2005;139:1101.

Balcer LJ. Clinical practice. Optic neuritis. N Engl J Med. 2006;354:1273.

Engell T, Andersen PK. The frequency of periphlebitis retinae in multiple sclerosis. Acta Neurol Scand. 1982;65:601–8.

Foroozan R, Buono LM, Savino PJ, Sergott RC. Acute demyelinating optic neuritis. Curr Opin Ophthalmol. 2002;13:375.

Frohman EM, Frohman TC, Zee DS, et al. The neuro-ophthalmology of multiple sclerosis. Lancet Neurol. 2005;4:111.

The clinical profile of optic neuritis. Experience of the Optic Neuritis Treatment Trial. Optic Neuritis Study Group. Arch Ophthalmol. 1991;109:1673.

Vine AK. Severe periphlebitis, peripheral retinal ischemia, and preretinal neovascularization in patients with multiple sclerosis. Am J Ophthalmol. 1992;113:28–32.