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**Radiological Predictors of Visual Outcome in Myelin Oligodendrocyte Glycoprotein-Related Optic Neuritis**

Armin Handzic<sup>1</sup>, MD, Jim Xie<sup>2</sup>, BHSc, Nanthaya Tisavipat<sup>3</sup>, MD, Jonathan Micieli<sup>1</sup>, MD CM, Edward Margolin<sup>1</sup>, MD,

<sup>1</sup>Department of Ophthalmology and Vision Sciences, University of Toronto, Toronto, Ontario, Canada <sup>2</sup>Michael G. DeGroote, School of Medicine

<sup>3</sup>Department of Neurology, Mayo Clinic

**Introduction:** A subset of patients with myelin oligodendrocyte glycoprotein-related optic neuritis (MOG-ON) experiences a poor visual outcome, but no prognostic factors have been identified. This study aimed to determine whether magnetic resonance imaging (MRI) biomarkers are associated with visual prognosis in MOG-ON.

**Methods:** Design, Setting, and Participants: A cross-sectional analysis of patients seen for first episodes of MOG-ON at three tertiary neuro-ophthalmology practices between January 2012 and July 2023 was conducted. Adult patients were included if they had positive anti-MOG antibody titers obtained through cell-based assay, met the 2023 diagnostic criteria for MOG antibody-associated disease, and demonstrated optic nerve enhancement on MRI brain and orbits within one month of symptom onset. Patients were excluded if they met McDonald criteria for multiple sclerosis or had positive aquaporin-4 antibody titers.

Exposures: Degree of orbital, canalicular, and intracranial or chiasmal enhancement (none, mild, moderate, or severe compared to the lacrimal gland) on orbital T1-weighted, contrast-enhanced, fat-suppressed sequences.

Main Outcomes and Measures: Visual acuity (VA) and visual field mean deviation (VFMD) at 3 months or more of follow-up. Poor visual outcome was defined as VA or VFMD worse than 20/40 or -5.0 dB, respectively.

**Results:** A total of 129 eyes of 92 patients (median [IQR] age 37.0 [20.8-51.3], 65.2% female) were included. Poor VA outcome was seen in 6.2% of cases and poor VFMD outcome in 16.9%. Compared to eyes with moderate-severe enhancement, eyes with mild orbital optic nerve enhancement (30.8% vs. 9.1%,  $P=.02$ ) and mild canalicular optic nerve enhancement (32.3% vs. 7.1%,  $P=.02$ ) had a higher proportion of poor VFMD outcome. These associations remained consistent in subgroup analysis of MRIs performed before initiation of treatment but were not seen in analysis of MRIs performed after treatment. No radiologic characteristic was associated with poor VA outcome.

**Conclusion:** In eyes with first MOG-ON episodes, milder optic nerve enhancement in the canalicular and orbital segments is associated with poorer VF recovery. Prospective and mechanistic studies are needed to confirm the prognostic utility of MRI in MOG-ON.