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Perimetry Pitfalls in the Era of COVID-19

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A 39-year-old woman followed-up in a neuro-ophthalmology clinic for routine monitoring of previously subclinical perineural enhancement in both eyes (Fig. 1) attributed to biopsy-proven neurosarcoidosis. The diagnosis of neurosarcoidosis was established in June 2019 after development of severe, progressive headache leading to recognition of nodular enhancing lesions along the folia of the right cerebellum, multiple cranial nerves, and extensive leptomeningeal enhancement leading to narrowing of the fourth ventricle and displacement of the medulla on the MRI brain. MRI orbits revealed bilateral perineural enhancement. Biopsy of the right cerebellum revealed noncaseating granulomas. She made a full clinical recovery after initiation of corticosteroids and infliximab at a dose of 5 mg/kg every 8 weeks.

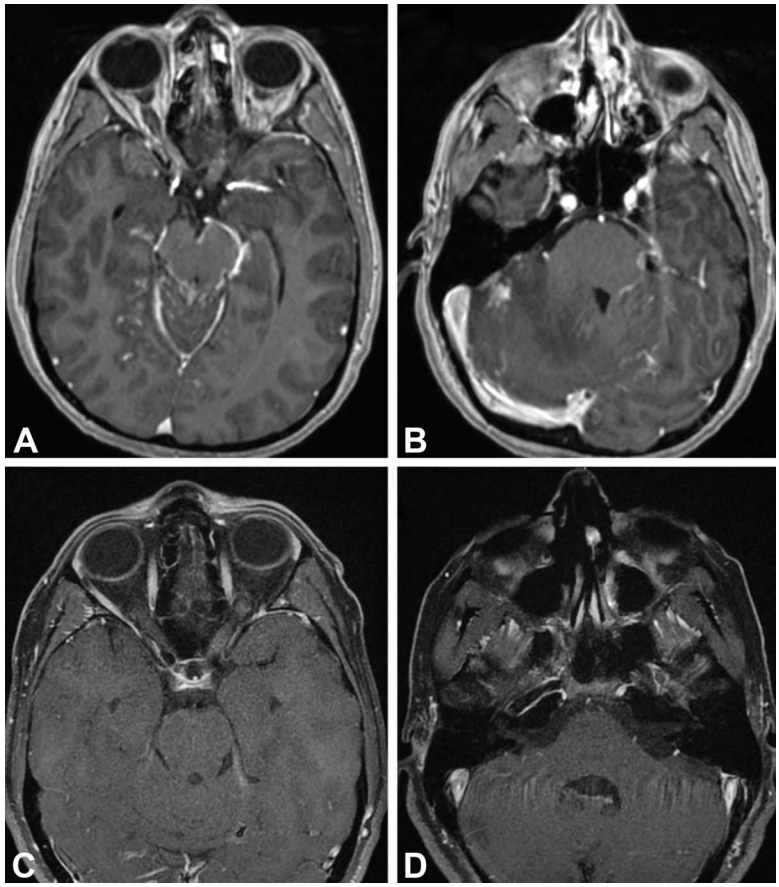

FIG. 1. Postcontrast T1 axial MRI images demonstrating (**A**) bilateral, mild optic nerve sheath enhancement shortly after initial diagnosis, (**B**) nodular enhancing lesions along the folia of the right cerebellum at the time of diagnosis, and (**C**, **D**) significant improvement after 15 months of infliximab treatment.

Five neuro-ophthalmic examinations over the subsequent 14 months revealed normal afferent visual function,

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The authors report no conflicts of interest.

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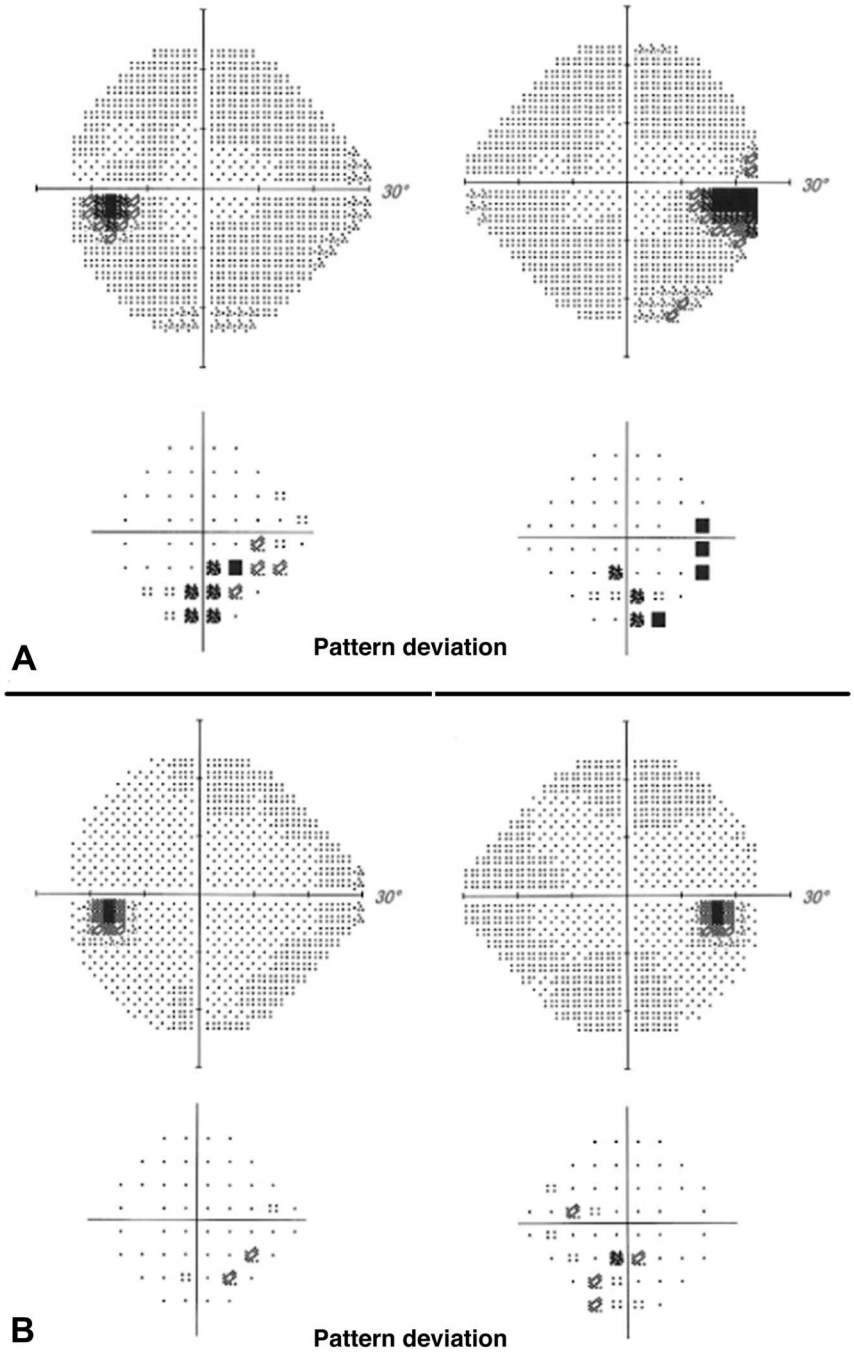

FIG. 2. **A**. Automated visual field 24-2 showing bilateral inferior arcuate defects (while wearing a surgical mask). **B**. Repeated Automated visual field 24-2 showing mild bilateral nonspecific deficits (without wearing surgical mask).

including automated perimetry. At routine follow-up 17 months after symptom onset, she denied ophthalmic and neurologic complaints. Afferent visual function remained normal with the exception of reliably performed automated perimetry (Automated SITA 24-2 fast), which revealed new inferior arcuate defects in both eyes and temporal blind spot enlargement in the right eye (Fig. 2A). Note the importance of examining the total deviation and pattern deviation plots as the grayscale is normal. Funduscopic examination revealed normal appearing optic nerves, unchanged from baseline.

Relapse of neurosarcoid was suspected on the basis of the visual field defects noted in Figure 2A. Infliximab levels returned within normal limits (46 μg/mL, normal <1.0 μg/mL) and repeat MRI of the brain and orbits with and without contrast did not demonstrate any evidence of active sarcoidosis. The patient returned 1 week later for repeat automated perimetry to ensure accuracy of findings before

further diagnostic or therapeutic measures. Repeat perimetry was performed by a neuro-ophthalmologist (M.A.B.); in contrast, the prior study which was performed by an ophthalmic technician. The patient approached the perimeter with her mask on and, within several seconds of appropriate positioning on the chinrest, condensate formed on the trial lens in an inferior arcuate pattern. After removal of her surgical mask, reliably performed automated perimetry was normal through a condensate-free trial lens (Fig. 2B).

This condensate-related visual field artifact underscores the need to adapt usual techniques for visual field testing in the era of COVID-19. Similar phenomena have been reported in glaucoma clinics and it is important to recognize that these findings may be conspicuous enough to mimic neuro-ophthalmic disease, leading to unnecessary testing and even treatment (1,2). Condensate-related "fogging" of the trial lens should be added to the panoply of long-recognized causes of artifactual field defects including improper lens positioning ("rim artifact), ptosis, dermatochalasis (lid artifact), inattention, and fatigue (1,3). Condensate-related artifact may be avoided by taping the superior aspect of the mask to the patient's face, preventing egress of condensate onto the lens. Close, continuous observation of the patient by the ophthalmic technician or physician performing visual field testing is imperative. Mask wearing in public places, including neuro-ophthalmology clinics, is likely to be required for the foreseeable future. Adaptation to this reality and maintenance of a high index of suspicion for artifactual visual field defects will minimize inefficiency in neuro-ophthalmic practice in the era of COVID-19.

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