

Neuro-ophthalmic disorders presenting as a diagnostic surprise during pre-LASIK evaluation

Rohit Shetty, DNB, FRCS, Rajesh B. Babu, MS, Mala Suresh, DOMS, DNB, Arun B. Samprathi, DOMS, DNB, FRCSE, Bhujang Shetty K, MS

We present 2 cases that came to our institute for refractive surgery and were discovered to have serious systemic conditions requiring immediate intervention. On examination, prolactinoma of the pituitary gland was seen in one patient and multiple sclerosis was diagnosed in the other patient. Prompt treatment of the conditions led to improvement in the neuro-ophthalmic disorders. We recommend a thorough physical evaluation of patients having an ophthalmic examination.

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In recent years, laser in situ keratomileusis (LASIK) has become an established surgical procedure to manage low and moderate myopia, hyperopia, and astigmatism.¹ Laser in situ keratomileusis is an elective surgery generally performed in young healthy people who perceive refractive correction by spectacles or contact lenses to be a limitation to their active lifestyles.² Meticulous evaluation of the ocular and systemic health is imperative, not only to avoid poor visual outcomes and resultant poor quality of life but also to perform a thorough workup. We present 2 patients with serious neurological disorders that were diagnosed by careful ophthalmologic evaluation during evaluation for refractive surgery.

CASE REPORTS

Case 1

A 23-year-old healthy woman presented at our refractive surgery center requesting laser refractive surgery. During

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From the Department of Neuro-Ophthalmology and Refractive Surgery (R. Shetty, Suresh, Samprathi, B. Shetty K) and the Department of Uveitis and Ocular Immunology (Babu), Narayana Nethralaya, Bangalore, India.

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Corresponding author: Dr. Rohit Shetty, DNB, FRCS(Glasg), Department of Neuro-Ophthalmology and Refractive Surgery, Narayana Nethralaya, 121/c Chord Road, Rajajinagar 1 R Block, Bangalore 560010, India. E-mail: drrohitshetty@yahoo.com.

the preoperative evaluation for LASIK, the best corrected visual acuity (BCVA) was 20/30 and N6 in both eyes with a correction of $-5.0 -0.50 \times 180$ in the right eye and $-4.75 -0.75 \times 180$ in the left eye. On examination, mild prominence of the right eye compared with the left was noticed, 24.0 mm in the right eye and 22.0 mm in the left eye, with a basal reading of 100.0 mm using Hertel's exophthalmometry, which revealed proptosis of 2.0 mm in the right eye. On pupillometry (Zywave wavefront aberrometer, Bausch & Lomb), the right eye showed anisocoria of 3.0 mm. The anterior segment and fundus examinations were normal in both eyes.

On further evaluation, significant visual field defects were found with finger confrontation. This was confirmed as an incomplete left homonymous hemianopia (Figure 1) using the Humphrey automated visual field analyzer (Carl Zeiss Meditec). Visually evoked potentials (VEP) (Metrovision) showed prolonged P100 latency, suggestive of optic pathway pathology. Magnetic resonance imaging (MRI) of the brain showed a hyperintense mass lesion in the pituitary region extending into the suprasellar space, compressing the chiasm and optic tract and also displacing the lateral ventricles. The coronal T1-weighted image demonstrated a large intrasellar mass compressing the chiasm and optic tract (Figure 2). Laboratory results showed a normal thyroid profile but an elevated serum prolactin level of 6300 mIU/L (normal = 450–580 mIU/L).

The patient was referred to a neurologist for further management. Medical treatment was with the oral dopamine receptor agonist cabergoline, 0.5 mg daily. A visual field test done after 6 months of medical therapy showed improvement in the field defect, and the MRI scan showed a reduction in the tumor.

Case 2

A 29-year-old healthy man with low myopia presented at our refractive surgery center requesting laser refractive surgery. The preoperative evaluation revealed a BCVA of 20/20 N6 in both eyes with a correction of $-2.5 -1.0 \times 150$ in each eye. Anterior segment, pupil, and fundus examinations were unremarkable in both eyes. Color vision testing with the

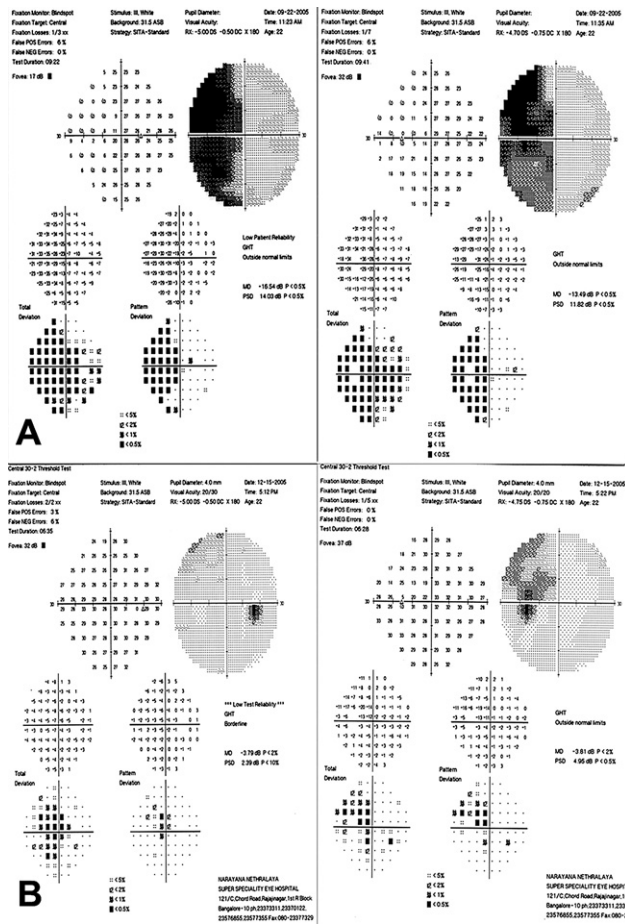


Figure 1. Case 1. *A:* Humphrey visual field chart showed left homonymous hemianopic visual field defects in the patient with giant prolactinoma of the pituitary gland. *B:* Resolution of homonymous hemianopic visual field defects after treatment with cabergoline.

Farnsworth-Munsell D15 test revealed a mild protan-deutan defect in both eyes. However, the patient was not happy with his vision despite having 20/20, N6 acuity in each eye. He complained of reduced contrast in the past 4 months and wanted custom ablation with LASIK to improve his vision.

Further evaluation with contrast sensitivity test (Optec 6500 [FACT]) showed decreased contrast sensitivity at all spatial frequencies (1.5, 3, 6, 12, 18 cycles per degree [cpd]) (Figure 3). The Humphrey automated visual field analyzer (Carl Zeiss Meditec) showed normal visual fields in both eyes. Visually evoked potentials showed decreased amplitude and prolonged latency in both eyes. The MRI revealed hyperintense areas involving the corpus callosum, retrochiasmal right optic tract, and in the periventricular and paraventricular white matter suggestive of demyelinating plaques of multiple sclerosis (MS) (Figure 4).

The patient was treated with systemic steroids and weekly intramuscular Interferon beta-1a (Avonex) under the supervision of a neurologist. At the last follow-up examination, the vision and contrast sensitivity were good.

DISCUSSION

In this paper, we emphasize the importance of a detailed and thorough ocular and systemic evaluation

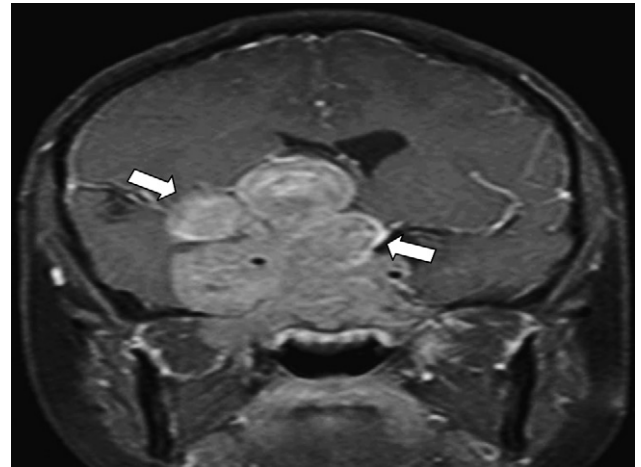


Figure 2. Case 1. The coronal T1 weighted MRI image showed a hyperintense mass lesion in the pituitary region extending into the suprasellar space, compressing the chiasm and optic tract and also displacing the lateral ventricles.

before refractive surgery, which may help detect serious asymptomatic systemic disorders. We were able to find 1 case in the literature in which a neuro-ophthalmic cause of poor visual outcome was identified after a laser refractive procedure.³

The presence of proptosis with anisocoria in Case 1 led to further evaluation that detected visual field defects. Because of the anatomic location of the pituitary gland and its proximity to the optic chiasm and cavernous sinuses, pituitary adenomas can also result in

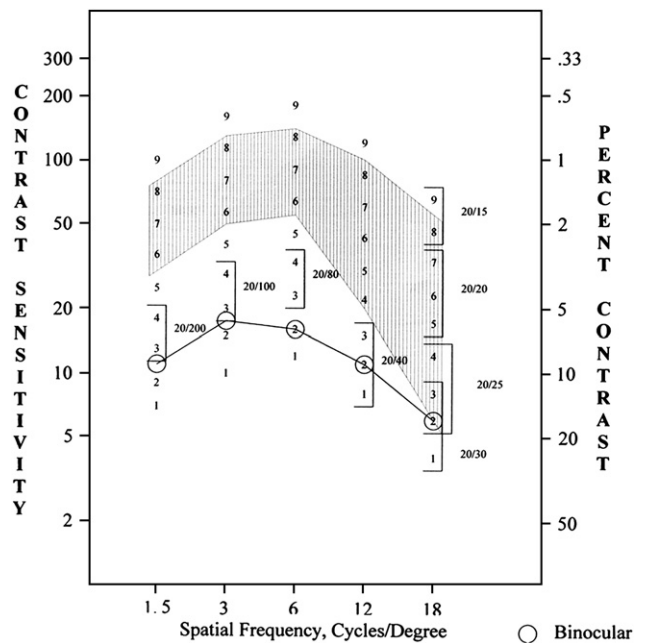


Figure 3. Case 2. Testing with the FACT chart showed decreased contrast sensitivity at all spatial frequencies (1.5, 3, 6, 12, 18 cpd).

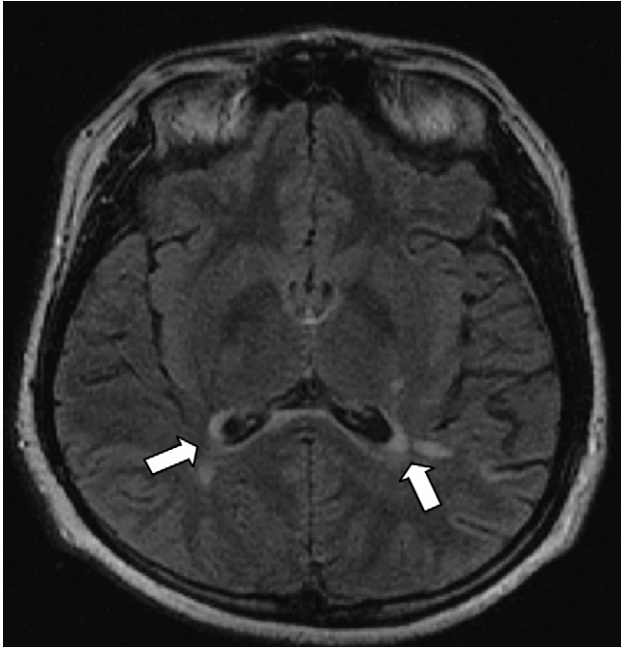


Figure 4. Case 2. Magnetic resonance imaging of the brain revealed hyperintense areas (arrows) involving the corpus callosum, retrochiasmal right optic tract, and in the periventricular and paraventricular white matter, suggestive of the demyelinating plaques of MS.

decreased visual acuity; diplopia; ophthalmoplegia; and optic atrophy. Visual field defects are thought to be due to direct compression on the optic chiasm or the effect on its blood supply. Relative afferent pupillary defect is often present in chiasmal compression, and therefore careful pupillary examination to detect relative afferent pupillary defect should be an integral part of any examination in cases with visual field defects.

Patients with visual pathway compression by pituitary macroadenomas may be asymptomatic despite having field defects. These visual field defects can be detected by manual perimetry⁴ and by automated static perimetry.^{5,6} Perimetry is the most sensitive method of identifying compression, followed by color vision, visual acuity, and the presence of optic atrophy. Automated static threshold perimetry appears to show early field defects better.⁷ The earliest detectable sign of visual field defects of chiasmatic origin is the red desaturation across the midline clinical test, which involves desaturation of the red color of a pin as it is moved from the nasal to the temporal field (temporal desaturation).^{8,9} This is a sensitive diagnostic indicator of the presence of a pituitary mass. Prolactinomas are benign prolactin-secreting neoplasms accounting for 40% of all pituitary tumors.¹⁰⁻¹² The most common symptoms of hyperprolactinoma in premenopausal women are amenorrhea and infertility. Headache and neurological signs are rare.¹⁰⁻¹²

Multiple sclerosis is a common autoimmune neurological disorder. The diagnosis of MS is based on clinical features, laboratory studies, and neuroimaging findings. Early recognition of the disease is important because immunomodulatory therapy is available that might slow progression of the disorder.¹³ Optic pathways are frequently involved in MS.¹³ Ocular involvement may be the initial manifestation, most commonly in the form of optic neuritis. However, in some cases, this could be easily missed if a thorough examination with a contrast sensitivity test and a VEP is not done.

Contrast sensitivity tests a basic visual function, which is not examined by conventional visual acuity testing.¹⁴ It is frequently abnormal in patients with MS and may sometimes be the only abnormality detectable clinically.¹⁵ Magnetic resonance imaging plays an important role in ruling out alternative diagnoses such as spinal canal stenosis and most brain tumors.¹⁶ In patients affected by clinically definite MS without a history of optic neuritis and no visual symptoms, there is a large prevalence of visual pathway involvement that can be diagnosed only by performing multiple tests.¹⁷

This case highlights the importance of preoperative and postoperative patient assessment. The symptoms in our patient would not have been correctable by laser refractive surgery. Patients' symptoms and their reasons for requesting the surgical procedure should be first established to ensure the safety of the common procedure.³ Physicians who are not qualified to perform a simple comprehensive eye examination would not be able to recognize this complication and therefore not competent to provide prompt treatment in the early stages to possibly limit the extent of damage.¹⁸ We recommend that all patients having laser refractive procedures or any intervention have a comprehensive ophthalmologic examination with thorough documentation and full investigation of pre-existing abnormalities as part of the eye examination.

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First Author:
Rohit Shetty, DNB, FRCS

Narayana Nethralaya Postgraduate Institute of Ophthalmology Bangalore, India