A Baffling Case of Bilateral Disc Edema

Aashna Rani* is a 62-year-old homemaker who lives in a rural village in Northern India. She experienced sudden diminished vision in both eyes and, two weeks later, presented to us.

We Get a Look

Ms. Rani told us that there was no associated ocular pain, no history of trauma, and no fever. She did, however, mention that two weeks before the visual loss she had been vaccinated for COVID-19 with ChAdOx1-S, a recombinant vaccine.

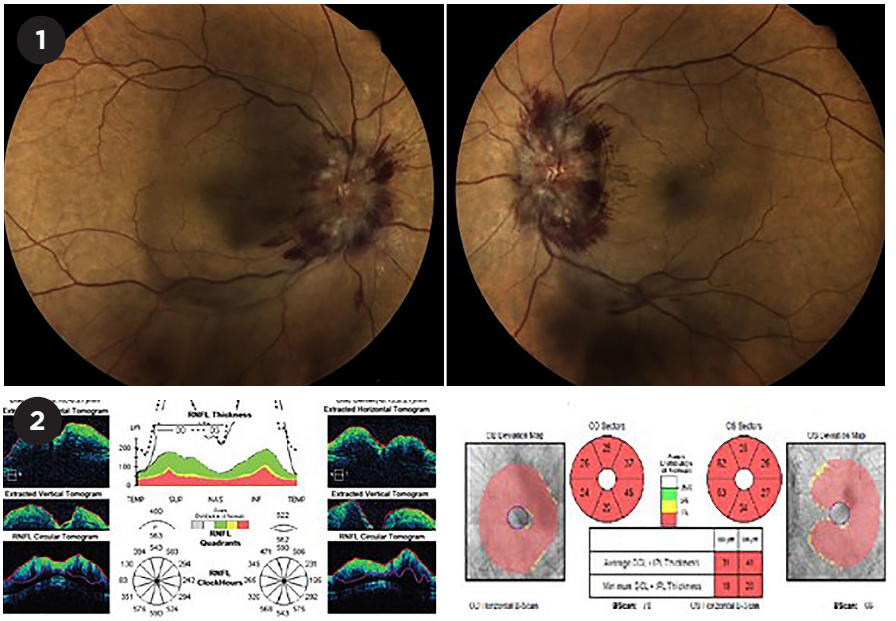
VA. On examination, her visual acuity (VA) was 20/200 in both eyes.

Slit-lamp exam. The anterior segment exam was unremarkable, but the pupillary light reflex was sluggish in both eyes.

IOP. Her IOPs were 17 mm Hg and 18 mm Hg, by applanation, for the right eye and left eye, respectively.

Fundus exam. The fundus exam showed bilateral disc edema with vitreous hemorrhage (Fig. 1). Her optic discs were elevated and showed numerous peripapillary hemorrhages, which pointed toward a leukemic etiology. The arteries appeared narrowed, and veins were dilated and tortuous. The remaining fundus examination was within normal limits.

Visual fields. We planned to perform a visual field analysis, but we found that the patient was unable to perform it with adequate reliability.



WE GET A LOOK. *(1) Fundus images showing bilateral disc edema and vitreous hemorrhage. (2) OCT RNFL and macular GCL-IPL map.*

SD-OCT. SD-OCT of the peripapillary retinal nerve fiber layer (RNFL) and macular ganglion cell–inner plexiform layer (GC-IPL) was performed to aid in diagnosis. Peripapillary RNFL showed significant thickening, whereas the GC-IPL map showed severe thinning of all quadrants (Fig. 2) compared with age-matched controls.

Initial Differential Diagnosis

At this stage, a provisional diagnosis of bilateral disc edema with vitreous hemorrhage was made.

Based on the fundus appearance and OCT reports, our differential diagnosis was as follows:

- Vitreous hemorrhage and optic neuropathy secondary to malignant hypertension
- Terson syndrome
- Postvaccine optic neuritis
- Bilateral anterior ischemic optic neuropathy
- Coagulopathies and blood dyscrasias

Narrowing the Differential

Ms. Rani's blood pressure was recorded as 150/90 mm Hg, thus making malignant hypertension less likely. Also, she gave a clear history of having had no head injury; hence, Terson syndrome was also considered less likely.

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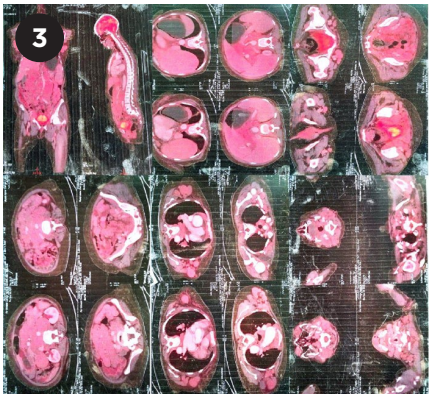
Additional history. On further probing, the patient gave a history of significant weight loss over the previous two months.

Another look at the imaging. We reviewed the fundus images again. On careful reexamination, we found a white-centered hemorrhage (Roth spots) in the right eye along the inferotemporal arcade, and the background retina appeared pale. Now, our diagnosis was pointing more toward a hematological disorder, and we ordered a complete blood count and a peripheral smear.

Lab results. Ms. Rani's hemoglobin was 9.6g/dL (normal range: 12-14g/dL), total white blood cells were 220,700/mm^3 (normal range: 7,000-9,000/mm^3), and platelets were marginally low (130,000/mm^3; normal range: 150,000-400,000/mm^3). A differential blood count revealed lymphocytosis with 88% of the white blood cells being lymphocytes. The peripheral smear revealed sparsely distributed red blood cells, with anisopoikilocytosis, numerous macrocytes, and smudge cells. These features suggested a chronic lymphoproliferative disorder. As a result, we made an ophthalmic diagnosis of leukemic optic neuropathy and retinopathy and referred her to an oncologist for further follow-up.

Additional imaging. A positron emission tomography (PET) scan was done at the oncology service, which showed multiple metabolically active lymph nodal masses in the cervical, mediastinal, internal mammary, abdominal, retroperitoneal, mesenteric, pelvic, and inguinal regions. There was also an increased radiotracer uptake in the axial and appendicular skeleton with evidence of increased marrow soft tissue component caused by infiltration by tumor cells (Fig. 3).

An ultrasound-guided biopsy was performed of the cervical lymph nodes. It showed features of non-Hodgkin lymphoma, strongly positive for CD3, CD5, CD20, and BCL2, and variably positive for cyclin D1 and MUM1. A final diagnosis of marginal zone lymphoma was established. Ms. Rani was advised to undergo an MRI brain and cerebral spinal fluid analysis, but she could not complete them due to financial constraints.



ADDITIONAL IMAGING. *PET scan showing multiple areas of radiotracer uptake.*

A new differential. Based on the above findings, we were left with only two differentials for this case of leukemic optic neuropathy with retinopathy:

- Papilledema due to leptomeningeal involvement by the tumor
- Bilateral infiltrative optic neuropathy by the lymphoma cells

Our final diagnosis. In our effort to differentiate between papilledema and infiltrative optic neuropathy, GC-IPL analysis helped us to arrive at a conclusive diagnosis of infiltrative process of the discs. Although GC-IPL thinning may be seen in papilledema, it is of a lesser grade.[1] In Ms. Rani's case, there was severe thinning. Infiltrative etiology is also supported by a decrease in VA and sluggish pupillary responses.

Discussion

Infiltrative optic neuropathy closely mimics other causes of disc edema. The etiology of infiltrative optic neuropathy can range from benign to malignant causes, and from infectious to autoimmune causes.[2] Leukemic optic neuropathy may be considered as a subset of infiltrative optic neuropathy and is characterized by direct infiltration of the optic nerve by tumor cells.[3]

In this case, we first noted the bilateral disc edema along with dark hemorrhages on the disc surface and the thinned GC-IPL complex, which was suggestive of an ischemic process. The pale retinal background, presence of Roth spots, and dilated-tortuous veins prompted us to look for a hematological cause and helped us diagnose a life-threatening malignancy.

We hypothesized that severe GC-IPL thinning, as seen in this case, may indicate severe axonal loss by disc infiltration of the tumor cells; however, we did not find any data in the literature supporting our hypothesis.

GC-IPL analysis is emerging as a promising tool in various aspects of neuro-ophthalmology. It is found to correlate with VA in cases of optic neuritis,[4] ischemic optic neuropathy,[5] and chiasmal compression.[6]

Conclusion

In this case, the optic discs were a harbinger of a more sinister systemic disease. A high level of suspicion and a meticulous ophthalmic examination and investigative process is required to establish a complete diagnosis. The role of GC-IPL thinning in infiltrative optic neuropathies needs to be elucidated.

* Patient name is fictitious.

1 Aghsaei Fard M et al. *J Neuroophthalmol.* 2019; 39(1):28-34.

2 Takkar A et al. *Neuroophthalmology.* 2017;41(5): 279-283.

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