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Infiltrative Optic Neuropathy in Acute Lymphoblastic Leukemia with Negative Bone Marrow Biopsy

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Introduction

Infiltrative optic neuropathy, characterized by progressive vision loss within days to weeks, is a rare but serious consequence of acute lymphocytic leukemia (ALL).[1] Occasionally, optic nerve involvement may occur before the onset of central nerves system (CNS) and hematologic relapse, serving as an early warning sign of systemic recurrence.[2,3] Timely diagnosis and therapeutic intervention play an important role in preserving visual function and achieving a favorable outcome. Herein, we present a case of a patient with a history of ALL, where infiltrative optic neuropathy served as the initial indication of disease recurrence.

Case Report

A 46 year old woman with history of ALL in remission was receiving maintenance therapy with 6-Mercaptopurine + Vincristine + Methotrexate + Prednisone (POMP) for 7 months. She was admitted to the hospital for pancytopenia and cytomegalovirus (CMV) enteritis. A bone marrow biopsy performed 5 days prior to admission revealed no evidence of malignant cells. Upon admission, the patient experienced right eye pain, intermittent blurry vision, and discomfort with eye movement. The visual acuity (VA) was 20/25 in each eye, Ishihara color plates were full, and there was no afferent pupillary defect. The dilated fundus examination was significant for mild blurring of the nasal optic disc margin in the right eye and a single cotton wool spot in the left eye. Magnetic resonance imaging (MRI) showed enlargement and enhancement of the right optic nerve (Figure 1).

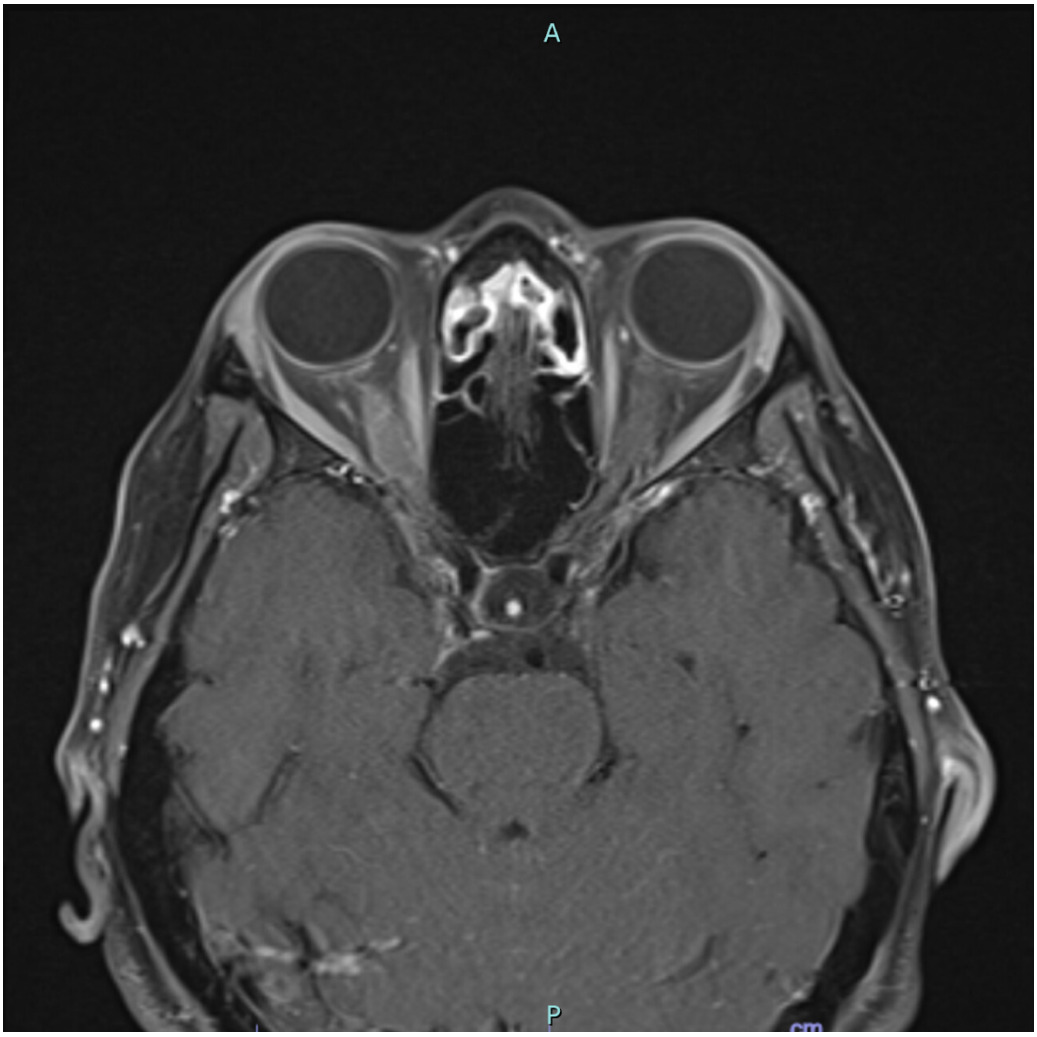

Figure 1. Axial magnetic resonance images demonstrating asymmetric, irregular enhancement and enlargement of right optic nerve in the retrobulbar region.

The patient's systemic symptoms improved with intravenous ganciclovir. However, she reported worsening blurry vision and transient positional vision loss in the right eye with a decline in VA to 20/40. A repeat dilated fundus examination showed grade 2 optic disc edema with peripapillary flame hemorrhage and chalky irregular papillary infiltration in the right eye, and increased number of cotton wool spots with a small area of intraretinal hemorrhage in the left eye (Figure 2). Extensive investigation for infectious and inflammatory etiologies, including an anterior chamber tap for CMV yielded negative on polymerase chain reaction (PCR) results. The lumbar puncture, however, revealed 94% blast cells. A repeat bone marrow biopsy confirmed the disease recurrence with 9% blasts one week after the initial ophthalmic symptoms. Systemic corticosteroids, blinatumomab, and weekly intrathecal chemotherapy via an Ommaya reservoir were initiated. Following one session of intrathecal chemotherapy, the optic disc edema and infiltrates improved. A repeat examination conducted after 3 monthly sessions of intrathecal chemotherapy demonstrated improved VA to 20/25 in the right eye, with residual mild temporal optic disc pallor (Figure 2).

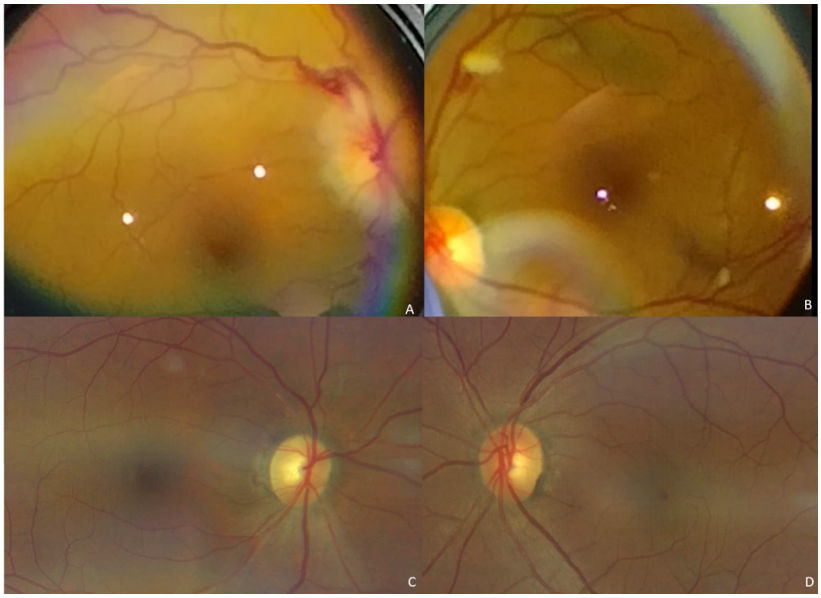

Figure 2. Fundus photos captured by an Android cell phone camera and 20 diopter lens demonstrated optic disc edema, chalky white, irregular peripapillary infiltrates, and flame hemorrhage in the right eye (A) and cotton wool spots and intraretinal hemorrhage in the left eye (B). Optos color fundus images after 3 monthly intrathecal chemotherapy treatments showed the resolution of the infiltrative peripapillary lesions with remaining mild temporal pallor in the right eye (C) and the disappearance of cotton wool spots and intraretinal hemorrhages in the left eye (D).

Discussion

This case highlights the importance of maintaining a high index of suspicion for optic nerve infiltration in patients with ALL who present with visual symptoms, as it can precede CNS and hematologic involvement. Negative CNS and hematologic studies can suggest an alternative to the diagnosis of optic nerve infiltration.[3] MRI is a useful diagnostic tool in the evaluation of patients.[4] In the presented case, MRI showed enlargement and contrast enhancement of the right optic nerve, which was a key finding that raised suspicion of infiltrative optic neuropathy. The presentation of this case was further complicated with concurrent systemic CMV infection. Although rare, CMV may cause optic neuritis in immunocompromised patients.[5,6] Our patient's systemic symptoms improved with intravenous ganciclovir, but ocular symptoms and clinical signs continued to worsen despite antiviral therapy. Frequent monitoring, high suspicion, and multidisciplinary care contributed to the prompt diagnosis and treatment.

Treatment of infiltrative optic neuropathy in ALL involves timely initiation of systemic and intrathecal chemotherapy, along with corticosteroids. In the presented case, the optic disc edema and the infiltrative lesions improved after intrathecal chemotherapy, demonstrating the effectiveness of this treatment approach.

Conclusion

Infiltrative optic neuropathy is a rare but potentially devastating consequence of ALL that can lead to progressive vision loss. High suspicion, prompt diagnosis with appropriate studies, and early initiation of treatment with systemic and intrathecal chemotherapy and corticosteroids may maximize the chance of visual function preservation and management the underlying disease.

References

1. Myers KA, Nikolic A, Romanchuk K, et al. Optic neuropathy in the context of leukemia or lymphoma: diagnostic approach to a neuro-oncologic emergency. Neurooncol Pract. Mar 2017;4(1):60-66. doi:10.1093/nop/npw006
2. Lin YC, Wang AG, Yen MY, Hsu WM. Leukaemic infiltration of the optic nerve as the initial manifestation of leukaemic relapse. Eye (Lond). May 2004;18(5):546-50. doi:10.1038/sj.eye.6700701
3. Hu A, Chan AT, Micieli JA. Complete Recovery of Vision after Optic Nerve Relapse of Acute Lymphoblastic Leukemia. Can J Neurol Sci. May 2020;47(3):431-433. doi:10.1017/cjn.2020.31
4. Birnbaum FA, Meekins LC, Srinivasan A, Murchison AP. A lot of nerve. Surv Ophthalmol. Mar-Apr 2020;65(2):272-277. doi:10.1016/j.survophthal.2019.04.005
5. De Silva SR, Chohan G, Jones D, Hu M. Cytomegalovirus papillitis in an immunocompetent patient. J Neuroophthalmol. Jun 2008;28(2):126-7. doi:10.1097/WNO.0b013e3181782fed
6. Mansour AM. Cytomegalovirus optic neuritis. Curr Opin Ophthalmol. Jun 1997;8(3):55-8. doi:10.1097/00055735-199706000-00010

Informed Patient Consent
Informed consent was obtained prior to performing the procedure, including permission for publication of all photographs and images included herein.

Statement of Ethics
This case report was conducted in accordance with the Declaration of Helsinki. The collection and evaluation of all protected patient health information was performed in a Health Insurance Portability and Accountability Act (HIPAA) – compliant manner.

Conflict of Interest Statement
The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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