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Isolated Optic Nerve Infiltration Revealing Lymphomatous Involvement in an Adolescent: A Case Report

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ABSTRACT

- **Background:** Optic nerve infiltration by lymphoma is an uncommon but sight-threatening complication that can occur in patients with systemic lymphoma during active chemotherapy.

- **Case Description:** We report a 16-year-old patient with a history of lymphoma under active chemotherapy who presented with sudden left eye blindness and a relative afferent pupillary defect. Brain and orbital MRI demonstrated diffuse swelling, T2 hyperintensity, restricted diffusion, and contrast enhancement of the left optic nerve without intracranial parenchymal or meningeal involvement, highly suggestive of optic nerve neurolymphomatosis.

- **Conclusion:** This case highlights the imaging features of isolated lymphomatous optic neuropathy and emphasizes the critical role of prompt contrast-enhanced MRI with diffusion-weighted imaging in oncologic patients presenting with acute vision loss.

KEYWORDS

optic nerve infiltration, lymphoma, diffusion restriction, pediatric oncology, case report

MAIN ARTICLE

INTRODUCTION:

Central nervous system involvement by lymphoma most commonly affects the brain parenchyma, leptomeninges, or, less frequently, the optic pathways.[1] Isolated infiltration of the optic nerve is a rare event that can occur as the presenting manifestation of lymphoma, as a sign of relapse in a patient already under treatment, or as an unusual pattern of disease progression during chemotherapy. Because visual prognosis is closely tied to the speed of diagnosis and treatment initiation, optic nerve infiltration is increasingly recognized as a neuro-oncologic emergency.[1] We present a pediatric case that adds to a limited body of literature on this entity and highlight the imaging features that support the diagnosis

PATIENT AND OBSERVATION:

Patient information:

A 16-year-old adolescent with a history of systemic lymphoma, currently undergoing active systemic chemotherapy, presented to the ophthalmology and radiology departments with a sudden, painful loss of vision in the left eye lasting for two days. The patient had no prior history of ocular pathology or traumatic injury.

Clinical findings:

On physical examination, visual acuity was 20/20 in the right eye, with no light perception (NLP) in the left eye. Ocular adnexa were unremarkable bilaterally. Pupillary examination revealed equal pupils at baseline with a pronounced left relative afferent pupillary defect (RAPD). Extraocular muscle movements were completely preserved, and ocular alignment was normal. Visual field testing by confrontation demonstrated a full visual field in the right eye. Slit-lamp biomicroscopy and intraocular pressure measurements were within normal limits in both eyes. Ophthalmoscopy revealed a normal right optic disc and fundus, while the left eye demonstrated mild optic disc edema with blurring of the disc margins. The remainder of the systemic and neurological examination was unremarkable.

Diagnostic approach:

Laboratory investigations, including a complete blood count, inflammatory markers, and metabolic panels obtained after the onset of vision loss, were within normal limits.

To evaluate the optic pathways, magnetic resonance imaging (MRI) of the brain and orbits was performed using dedicated protocols: axial and coronal T2-weighted sequences, axial FLAIR, sagittal T1-weighted imaging, diffusion-weighted imaging (DWI) with apparent diffusion coefficient (ADC) mapping, gradient-echo sequences, and high-resolution CISS/FIESTA, followed by post-contrast T1-weighted fat-suppressed sequences.

Brain parenchyma and leptomeninges showed no signal abnormalities or abnormal enhancement. However, orbital sequences demonstrated diffuse swelling and mild tortuosity of the intraorbital segment of the left optic nerve. The nerve displayed intermediate signal intensity on T1- and T2-weighted images, hyperintensity on FLAIR images, and clear restricted diffusion (high signal on DWI with corresponding low signal on ADC maps). Post-contrast images demonstrated marked, diffuse enhancement of the left optic nerve sheath and parenchyma without an individualizable mass lesion. The right optic nerve, both globes, and the extraocular muscles were entirely normal (Figure 1).

Therapeutic Intervention and Follow-Up:

Based on the patient's oncologic context and imaging characteristics, a diagnosis of optic nerve neurolymphomatosis (lymphomatous optic nerve infiltration) was established. The patient was immediately referred to the pediatric oncology section for urgent protocol adjustment. Intravenous high-dose corticosteroids were initiated along with salvage intrathecal chemotherapy. At the 4-week follow-up, disease progression was stabilized, although visual recovery remained limited due to early axonal insult.

Patient Perspective:

The patient expressed anxiety regarding the abrupt visual loss but appreciated the rapid imaging diagnostic pathway and clear communication from the multidisciplinary team regarding the diagnosis and systemic treatment adjustments.

Patient Consent:

Written informed consent was obtained from the patient's legal guardians (parents) for the publication of this case report and any accompanying images.

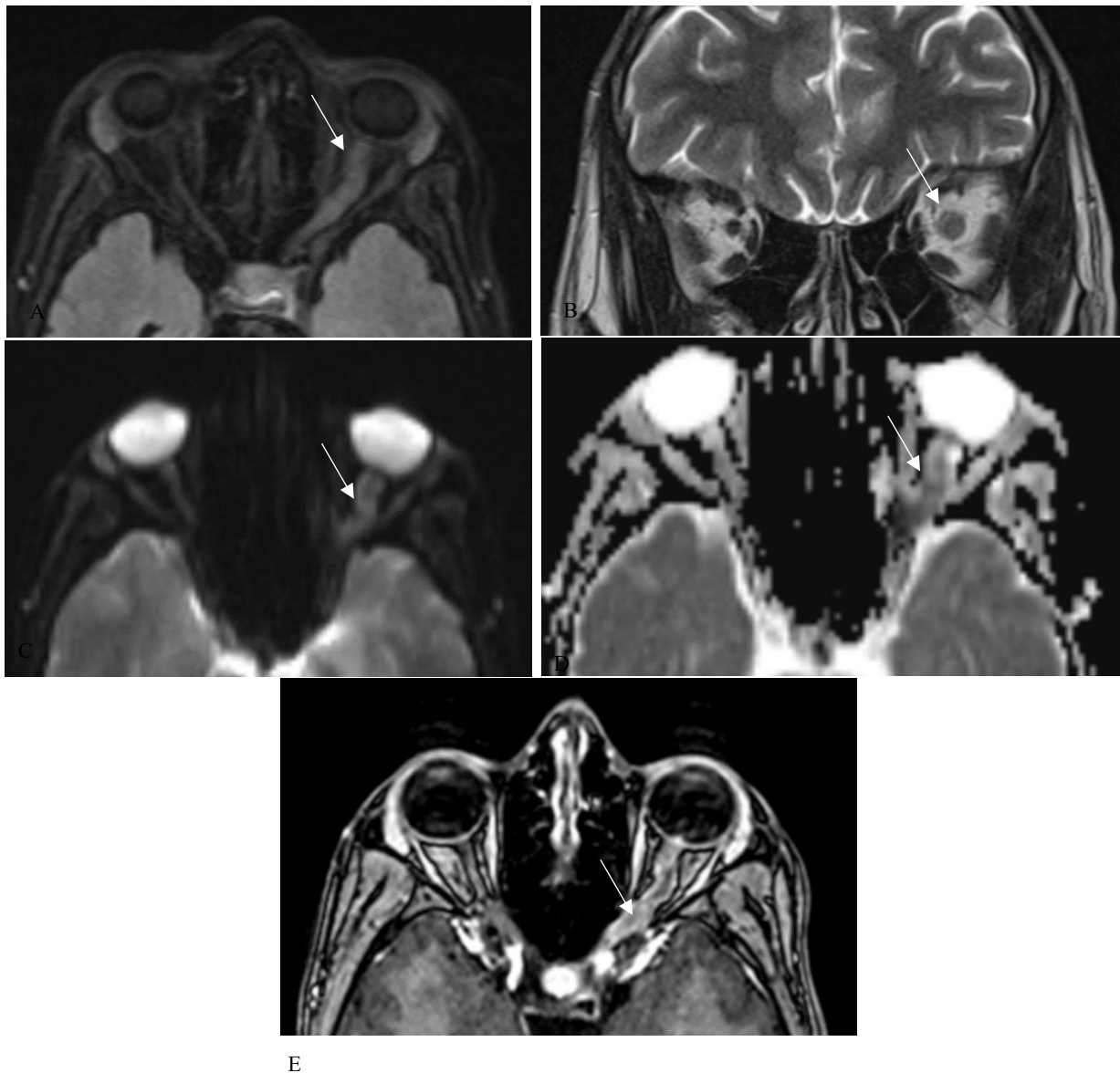


FIGURE. 1. MRI obtained at initial presentation. **(A)** Axial FLAIR image demonstrating high signal intensity within the left intraconal space (arrow). **(B)** Coronal T2-weighted image showing enlargement/swelling of the left optic nerve relative to the contralateral side. **(C)** Axial diffusion-weighted image (DWI) revealing restricted diffusion within the intraorbital segment of the left optic nerve (arrow). **(D)** Corresponding apparent diffusion coefficient (ADC) map demonstrating a matching area of low signal (arrow), confirming true diffusion restriction. **(E)** Postcontrast axial T1-weighted image showing enhancement of the intraorbital segment of the left optic nerve (arrow).

DISCUSSION:

Optic nerve infiltration by lymphoma is rare, and most of the available evidence comes from isolated case reports rather than large series. In a retrospective review of 22 published cases of optic nerve lymphoma, [2] the majority represented infiltration of the nerve by systemic lymphoma, with a minority corresponding to primary CNS lymphoma or lymphoma isolated to the optic nerve itself; abnormal enhancement of the optic nerve was the most consistent imaging finding across cases. This supports the value of contrast-enhanced MRI as the primary imaging tool when lymphomatous optic neuropathy is suspected, as illustrated in the present case.

A particularly notable feature of our case is the presence of restricted diffusion within the affected nerve. Diffusion restriction in the optic nerve has classically been associated with ischemic or inflammatory optic neuropathy rather than infiltrative neoplastic disease. Sudhakar et al. [3] described a middle-aged man with recently diagnosed B-cell non-Hodgkin lymphoma who developed acute left optic neuropathy with diffusion restriction on the affected side that persisted on follow-up imaging months later, a course atypical for infarction and instead attributed to tumor infiltration. Our findings are consistent with this observation and support the idea that restricted diffusion, when seen in the context of a known hematologic malignancy, should not be dismissed as purely ischemic but should raise suspicion for infiltrative disease.

Isolated optic nerve involvement as an initial or relapse manifestation of lymphoma, without an associated parenchymal mass, has also been described in adults. Reyes et al. [4] reported a case of primary CNS lymphoma presenting with bilateral optic nerve sheath enhancement, ultimately diagnosed after an incidentally discovered frontal lobe mass was biopsied; the authors noted that isolated optic nerve infiltration as the initial presentation of primary CNS lymphoma had previously been reported only a handful of times. Unlike this case, our patient's infiltration was strictly unilateral and occurred in the setting of already established, treated lymphoma rather than as the initial diagnostic clue, which is itself notable given how uncommon optic nerve relapse under active chemotherapy appears to be in the literature. Similar patterns of infiltrative optic neuropathy have also been documented in Burkitt lymphoma, where bilateral optic nerve and leptomeningeal involvement with cerebrospinal fluid pleocytosis were associated with a poor outcome despite chemotherapy, [5] underscoring that lymphomatous optic nerve disease can carry a guarded prognosis when

diagnosis is delayed or when disease is more extensive at presentation.

The differential diagnosis in a young oncologic patient with acute unilateral visual loss is broad and should be considered systematically. It includes inflammatory or demyelinating optic neuritis, infectious optic neuropathy in an immunocompromised host, toxic optic neuropathy related to chemotherapeutic agents such as vincristine, and, in patients with a leukemic component or overlapping hematologic disease, leukemic infiltration of the optic nerve. This last entity has been well described in pediatric acute lymphoblastic leukemia, including cases of unilateral optic nerve infiltration presenting as the first sign of relapse despite apparent hematologic remission.[6] A recent pediatric series further emphasized that early recognition and treatment of optic nerve infiltration in leukemia are associated with substantially better visual recovery than delayed diagnosis, which can progress to irreversible vascular occlusion and poor visual outcome. [7] Although these reports concern leukemia rather than lymphoma, the imaging principles and the urgency of the diagnostic approach are directly applicable to lymphomatous optic nerve infiltration.

From a practical standpoint, this case reinforces several teaching points. First, any new visual disturbance in a patient with known lymphoma, even one already receiving chemotherapy, warrants urgent dedicated MRI of the orbits and brain rather than being attributed by default to treatment-related toxicity. Second, the MRI protocol should specifically include diffusion-weighted imaging and post-contrast T1-weighted sequences, since enhancement and diffusion changes are the most informative findings for distinguishing infiltrative disease from other causes of optic neuropathy. Third, the absence of a discrete mass does not exclude lymphomatous infiltration; diffuse tissue thickening with the signal and enhancement pattern described here can be sufficient to raise strong suspicion, prompting further work-up such as cerebrospinal fluid analysis, orbital biopsy when feasible, and close multidisciplinary follow-up with oncology and ophthalmology.

CONCLUSION

Isolated lymphomatous infiltration of the optic nerve is a rare but clinically important cause of acute visual loss in patients with known lymphoma. The imaging pattern of nerve swelling, restricted diffusion, and contrast enhancement, should prompt consideration of infiltrative disease even during active chemotherapy. Early recognition through dedicated MRI is essential, as prompt diagnosis and treatment initiation are the main determinants of visual outcome in this setting.

ANNEX:

CARE checklist

CARE Checklist of information to include when writing a case report			
			
Topic	Item	Checklist item description	Reported on Line
Title	1	The diagnosis or intervention of primary focus followed by the words "case report"	1
	2	2 to 5 key words that identify diagnoses or interventions in this case report, including "case report" . . .	1
	3a	Introduction: What is unique about this case and what does it add to the scientific literature?	1
	3b	Main symptoms and/or important clinical findings	1
Abstract (no references)	3c	The main diagnoses, therapeutic interventions, and outcomes	1
	3d	Conclusion—What is the main "take-away" lesson(s) from this case?	1
	4	One or two paragraphs summarizing why this case is unique (may include references)	1
	2		2
Introduction	5a	De-identified patient specific information.	2
	5b	Primary concerns and symptoms of the patient.	2
	5c	Medical, family, and psycho-social history including relevant genetic information	2
	5d	Relevant past interventions with outcomes	2
Patient Information	6	Describe significant physical examination (PE) and important clinical findings.	2
	7	Historical and current information from this episode of care organized as a timeline	2
	8a	Diagnostic testing (such as PE, laboratory testing, imaging, surveys).	2
	8b	Diagnostic challenges (such as access to testing, financial, or cultural)	2
Clinical Findings	8c	Diagnosis (including other diagnoses considered)	2
	8d	Prognosis (such as staging in oncology) where applicable	2
	9a	Types of therapeutic intervention (such as pharmacologic, surgical, preventive, self-care)	3
	9b	Administration of therapeutic intervention (such as dosage, strength, duration)	3
Timeline	9c	Changes in therapeutic intervention (with rationale)	3
	10a	Clinician and patient-assessed outcomes (if available)	2
	10b	Important follow-up diagnostic and other test results	3
	10c	Intervention adherence and tolerability (How was this assessed?)	3
Diagnostic Assessment	10d	Adverse and unanticipated events	3
	11a	A scientific discussion of the strengths AND limitations associated with this case report	5
	11b	Discussion of the relevant medical literature with references.	5
	11c	The scientific rationale for any conclusions (including assessment of possible causes)	6
Therapeutic Intervention	11d	The primary "take-away" lessons of this case report (without references) in a one paragraph conclusion	6
	12	The patient should share their perspective in one to two paragraphs on the treatment(s) they received	6
	13	Did the patient give informed consent? Please provide if requested	Yes ☐ No ☒
Follow-up and Outcomes			
Discussion			
Patient Perspective			
Informed Consent			

ACKNOWLEDGEMENTS

Patient perspectives: Given the patient's young age and the acute clinical context, the patient's and family's perspective was not formally collected as part of this case report.

Competing Interests

The authors declare no competing financial or personal interests.

Authors' Contributions

All authors contributed significantly to this work. [Author Initials 1] performed the radiological analysis and drafted the manuscript. [Author Initials 2] managed the clinical clinical follow-up and revised the manuscript. All authors read and approved the final version of the manuscript.

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REFERENCES

- [1] K. A. Myers et al., « Optic neuropathy in the context of leukemia or lymphoma: diagnostic approach to a neuro-oncologic emergency », *Neuro-Oncol. Pract.*, vol. 4, no 1, p. 60-66, mars 2017, doi: 10.1093/nop/npw006.
<https://doi.org/10.1093/nop/npw006>
- [2] M. Yang, J. Zhao, H. Song, S. Wei, H. Zhou, et Q. Xu, « Orbital Magnetic Resonance Imaging May Contribute to the Diagnosis of Optic Nerve Lymphoma », *Front. Neurol.*, vol. 11, p. 301, 2020, doi: 10.3389/fneur.2020.00301.
<https://doi.org/10.3389/fneur.2020.00301>
- [3] sudhakar, « MRI Restricted Diffusion in Lymphomatous Optic... : Journal of Neuro-Ophthalmology », Ovid. Consulté le: 31 juillet 2026. [En ligne]. Disponible sur: <https://www.ovid.com/jnls/jneuro-ophthalmology/fulltext/10.1097/wno.0b013e31821ee581~mri-restricted-diffusion-in-lymphomatous-optic-neuropathy>
<https://doi.org/10.1097/WNO.0b013e31821ee581>
- [4] T. F. B. Reyes, R. Or, et D. C. Gochioco, « Primary Central Nervous System Lymphoma Presenting as Optic Nerve Infiltration: A Case Report », *Cureus*, vol. 15, no 3, p. e36969, doi: 10.7759/cureus.36969.
<https://doi.org/10.7759/cureus.36969>
- [5] N. Kwang Sheng, W.-H. Wan Hitam, et N. A. Masnon, « Infiltration of Bilateral Optic Nerves in Burkitt Lymphoma: A Case Report », *Cureus*, vol. 14, no 5, p. e25515, doi: 10.7759/cureus.25515.
<https://doi.org/10.7759/cureus.25515>
- [6] H. Khalil, C. Strohmaier, et M. Bolz, « Case report: atypical, unilateral optic nerve infiltration as the first sign of acute lymphoblastic leukemia (ALL) relapse », *BMC Ophthalmol.*, vol. 22, p. 195, avr. 2022, doi: 10.1186/s12886-022-02421-y.
<https://doi.org/10.1186/s12886-022-02421-y>
- [7] Y. Li et al., « Clinical characteristics of leukemic optic nerve infiltration in pediatric acute lymphoblastic leukemia: 3 cases and a literature review », *Front. Med.*, vol. 13, mars 2026, doi: 10.3389/fmed.2026.1786820.
<https://doi.org/10.3389/fmed.2026.1786820>