A Case Study of Leukemic Retinopathy

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ABSTRACT

This case report presents an 8-year-old male with a prior diagnosis of acute lymphoblastic leukemia, presenting with blurred vision in both eyes following chemotherapy. Ophthalmic evaluation revealed a visual acuity of 6/9P in both eyes, alongside clinical features consistent with leukemic retinopathy. Findings included bilateral intraretinal hemorrhages and subhyaloid hemorrhages. Leukemic retinopathy, an uncommon ocular complication of leukemia, typically results from leukemic cell infiltration into retinal tissues and is most frequently associated with acute forms of the disease. It can also be a consequence of leukemia-induced hematologic abnormalities, which manifest as intraretinal hemorrhages (dot-blot hemorrhages, flame hemorrhages, Roth spots), preretinal hemorrhages, and cotton-wool spots. These ocular manifestations may signal systemic disease progression and are prognostic indicators, underscoring the importance of timely interdisciplinary management.

Keywords: acute lymphoblastic leukemia; leukemic retinopathy.

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INTRODUCTION

Leukemia is a malignancy of the bone marrow that arises from the abnormal proliferation and differentiation of hematopoietic stem cells. This results in the accumulation of immature or abnormal blood cells in the marrow and peripheral blood.[1] Leukemia can either arise from the myeloid or lymphoid cells lines. They can be rapidly progressing (acute) or indolent (chronic). The four major types of leukemia include acute myeloid leukemia (AML), most commonly seen in older adults, chronic myeloid leukemia (CML), with a progressive clinical course, acute lymphoblastic leukemia (ALL), most commonly seen in children with fair survival rate, and chronic lymphocytic leukemia (CLL), a slowly progressing disease with better prognosis. Both acute and chronic leukemia can cause ocular complications, while retina is the most common ocular tissue to be involved.[2] Ocular involvement in leukemia can be divided into: 1) primary (or direct) leukemic infiltration of ocular structures by neoplastic cells, and 2) secondary (or indirect) involvement due to hematological abnormalities (anemia, thrombocytopenia and hyperviscosity), central nervous system (CNS) involvement, opportunistic infection, or treatment-related complication. The term leukemic retinopathy is used to describe the retinal manifestation secondary to hematological abnormalities rather than direct leukemic infiltration.[3] Primary infiltration of neoplastic cells can occur virtually in all ocular tissues including the retina (3%), orbit (1%), choroid (0.3%), and optic nerve (0.3%).[4] Hematological abnormalities including anemia, thrombocytopenia lead to retinal hemorrhage at all levels, which may be accompanied by white-centered retinal hemorrhage and perivascular sheathing due to accumulation of leukemic cells.[5]

CASE REPORT

An 8 years old male from Gulmi, Nepal presented in pediatric department of Bharatpur Eye Hospital for ophthalmological assessment as a referral case of B.P Koirala Memorial Cancer Hospital. He, who had symptoms of abdominal pain, fever and vomiting for two months, was diagnosed with Acute Lymphoblastic Leukemia (ALL) two weeks ago and was under first dose of chemotherapy three days back when presented in OPD. He had complain of blurring of vision in both eyes. There was no family history of cancer and other diseases. His visual acuity was 6/9'p' in both eyes and there was no improvement of vision in both eyes with pinhole. Dry retinoscopy revealed no refractive error in both eyes. Hirschberg test showed central reflex, and cover test showed orthophoria in both near and distance. Extra ocular motility was full in all cardinal gazes. Anterior segment examination with slit lamp biomicroscope showed palpebral conjunctival pallor bilaterally, normal ocular adnexa, normal pupillary response, clear cornea, quiet anterior chamber with normal anterior chamber depth, clear lens in both eyes and no vitreous cells in the anterior vitreous face. The intraocular pressure (IOP) of both eyes was within normal limits. Fundus Evaluation under Mydriasis (FEUM) demonstrated subhyloid hemorrhage and multiple blot hemorrhage with Roth spot bilaterally. Retinal vessels were engorged in both eyes. There is no disc edema bilaterally.

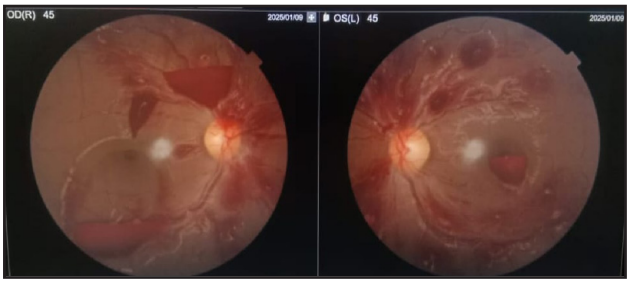

Figure 1. Fundus photo showing normal optic disc with multiple flame shaped, dot and blot hemorrhages, Roth's spot, retinal venous dilatation and subhyaloid hemorrhage in both eyes.

IMPRESSION

Leukemic retinopathy with sub-hyaloid hemorrhage and multiple intraretinal hemorrhages.

MANAGEMENT

The attendant accompanying the patient was counselled about the need of PRP (Pan Retinal Photocoagulation) to minimize further complications like proliferative retinopathy, including retinal fibrovascular proliferation and tractional retinal detachment and also counselled regarding ophthalmic

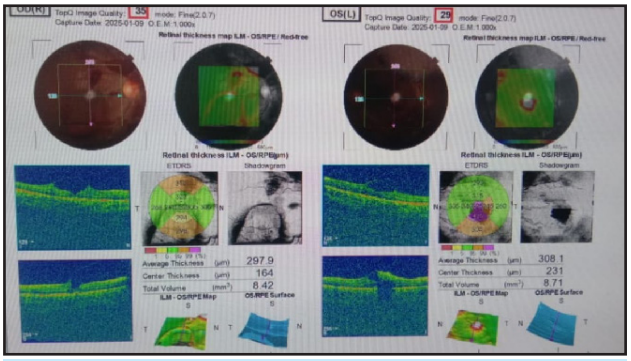

Figure 2. OCT macula of RE and LE.

signs being secondary to systemic disease.

DISCUSSION

Leukemic retinopathy is the term most often used to denote the fundus manifestations of anaemia, thrombocytopenia and hyperviscosity observed in patients with leukaemia.[6] The retina is involved in leukaemia more often than any other ocular tissue. It is estimated that up to 69% of all patients with leukaemia show fundus changes at some point in the course of their disease, although at that time no effective treatments were present.[7] The haemorrhages and infiltrates are found at all levels of the retina, but especially in the inner layers with focal destruction. The infiltrates and aggregates of leukaemic cells are usually but not always seen with surrounding haemorrhage.[8] The eye holds unique diagnostic value in leukemia, as it provides a direct view of leukemic infiltration in blood vessels and nerves. Early detection of fundus abnormalities can lead to quicker diagnosis and intervention, improving outcomes. Even in patients with acute lymphoblastic leukemia (ALL) who are in remission, ophthalmologists must remain cautious for ocular manifestations and consider leukemia as a potential underlying cause of any observed changes. This awareness is critical for timely management and preventing relapse-related complications.

CONCLUSIONS

Effective interdisciplinary coordination between hematology-oncology and ophthalmology specialists is critical for the optimal treatment of leukemic retinopathy. This condition may serve as the initial manifestation of leukemia, necessitating prompt assessment and timely initiation of systemic therapy. Clinical presentations range in diversity and severity, with cases exhibiting mild manifestations typically correlating to more favorable visual outcomes. To track potential complications like proliferative retinopathy or retinal detachment, routine ophthalmic evaluations including dilated fundus examinations are indispensable throughout patient care.

Conflict of interest: None

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