International Journal of Medicine Research
www.medicinesjournal.com
ISSN: 2455-7404
Received: 16-01-2026, Accepted: 15-02-2026, Published: 02-03-2026
Volume 11, Issue 1, 2026, Page No. 44-45

The eye as a window to hematologic malignancy: Acute myeloid leukemia presenting with retinal hemorrhages

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Abstract
Ocular manifestations are common in leukemia and may occasionally represent the first sign of an underlying systemic malignancy. These findings may result either from direct leukemic infiltration or from secondary hematologic abnormalities such as anemia, thrombocytopenia, and hyperviscosity. We report a 32-year-old male who presented with floaters and blurred vision and was found to have multiple bilateral preretinal hemorrhages with Roth spots on fundus examination. Systemic evaluation revealed severe anemia, thrombocytopenia, hepatosplenomegaly, and bone marrow findings consistent with acute leukemia, later confirmed as acute myeloid leukemia (AML) by flow cytometry. During follow-up after systemic chemotherapy, the patient developed reduced vision in the left eye with macular changes detected clinically and on optical coherence tomography. This case highlights the importance of comprehensive ophthalmic examination in detecting life-threatening systemic disease and emphasizes the role of ophthalmologists in early diagnosis and monitoring of leukemia.

Keywords: Acute myeloid leukemia, retinal hemorrhage, Roth Spots, leukemic retinopathy, ocular manifestations

Introduction

Acute myeloid leukemia (AML) is a malignant clonal disorder of hematopoietic stem cells characterized by uncontrolled proliferation of immature myeloid precursors, resulting in bone marrow failure and systemic manifestations [1]. Patients commonly present with symptoms related to anemia, infection, or bleeding due to pancytopenia, while extramedullary involvement may affect organs such as the liver, spleen, lymph nodes, central nervous system, and eyes [2].

Ocular involvement occurs more frequently in acute leukemias than in chronic leukemias and may involve nearly any ocular structure including the orbit, anterior segment, and posterior segment [3]. The reported prevalence of ophthalmic manifestations in acute leukemia ranges from approximately 32 to 35.5 per cent [4-6]. Ocular findings may arise from direct leukemic infiltration or secondary hematologic abnormalities such as anemia, thrombocytopenia, leukostasis, or treatment effects [3].

Posterior segment manifestations are most common and include retinal hemorrhages, Roth spots, cotton wool spots, venous tortuosity, and optic nerve involvement [7]. In some patients, ocular findings may precede systemic diagnosis or indicate relapse, making ophthalmic evaluation crucial in early detection of disease [8-11]. We report a case of AML presenting initially with bilateral retinal hemorrhages and Roth spots, with subsequent macular involvement documented on OCT.

Case Report

32-year-old male presented with floaters in the right eye for 20 days and blurring of vision in both eyes for 10 days. He also reported low-grade fever, generalized weakness, and easy fatigability. There was no history of trauma, diabetes, hypertension, or prior ocular illness.

On general examination, pallor and mild fever were noted. Abdominal examination suggested mild hepatosplenomegaly. Ocular examination showed unaided visual acuity of 6/6 in both eyes. Pupillary reactions were normal, intraocular pressure was within normal limits, and slit-lamp examination revealed a quiet anterior segment in both eyes.

Dilated fundus examination demonstrated multiple deep and superficial preretinal and intraretinal hemorrhages in both eyes with Roth spots near the optic disc and posterior pole. The macula appeared relatively spared initially, and optic discs were normal. No vitreous hemorrhage or retinal detachment was seen. B-scan ultrasonography was unremarkable.

Considering bilateral retinal hemorrhages with systemic symptoms, hematological evaluation was advised. Investigations revealed severe anemia and thrombocytopenia. Peripheral smear showed anisocytosis, teardrop cells, and circulating immature cells suspicious for leukemia. Abdominal ultrasonography confirmed mild hepatomegaly with moderate splenomegaly.

Bone marrow aspiration revealed hypercellular marrow with predominance of myeloid blasts suggestive of acute leukemia. Flow cytometry confirmed acute myeloid leukemia. The patient was referred for systemic chemotherapy and advised regular ophthalmic follow-up. Topical nepafenac eye drops were prescribed for symptomatic relief.

At three-month follow-up, the patient reported reduced vision in the left eye. Visual acuity was 6/6 in the right eye and 6/36 in the left eye, improving to 6/24 with pinhole. Fundus examination showed resolving hemorrhages in the right eye, left eye showed macular pigmentary changes. Optical coherence tomography demonstrated a hyper-reflective lesion involving the macular region. Continued systemic therapy and close monitoring were advised.

Fig 1: Fundus Image on First Visit

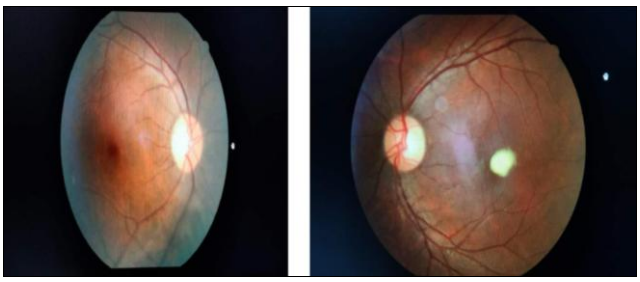

Fig 2: Fundus Image on Second Visit

Fig 3: Left Eye Oct Showing Hyper Reflective Lesion Over Macula

Discussion

Leukemia produces wide spectrum of ocular manifestations that may involve any part of the eye. These are broadly categorized into primary leukemic infiltration, secondary hematologic changes, and treatment-related complications. Secondary changes are more common and typically result from anemia, thrombocytopenia, or hyperviscosity.

Retinal hemorrhages are among the most frequent ocular findings and are often bilateral. Roth spots represent retinal hemorrhages with pale centers composed of fibrin, platelet aggregates, or cellular debris. Although classically associated with infective endocarditis, they are also seen in leukemia and severe anemia.

The pathogenesis of leukemic retinopathy is multifactorial. Retinal hypoxia due to anemia, vascular fragility, thrombocytopenia-related bleeding, and microvascular stasis contribute to retinal changes. Ocular findings may appear at diagnosis, during treatment, or at relapse, and occasionally serve as the first clue to systemic disease.

Optical coherence tomography is a valuable non-invasive modality for identifying macular involvement, documenting structural abnormalities, and monitoring disease progression or treatment response. Recognition of ocular signs enables early systemic evaluation and multidisciplinary management, which may improve both visual, systemic outcomes.

Conclusion

Ocular manifestations may represent the initial presentation of systemic leukemia. Recognition of bilateral retinal hemorrhages and Roth spots should prompt urgent systemic evaluation. Comprehensive ophthalmic examination, OCT imaging, and coordinated care with hematology are essential for early diagnosis and preservation of vision.

References

1. Lowenberg B, Downing JR, Burnett A. Acute myeloid leukemia. N Engl J Med,1999:341(14):1051–1062. doi:10.1056/NEJM199909303411407
2. Skarsgård LS, Andersson MK, Persson M, *et al*. Clinical and genomic features of adult and paediatric acute leukaemias with ophthalmic manifestations. BMJ Open Ophthalmol,2019:4(1):000362. doi:10.1136/bmjophth-2019-000362
3. Soman S, Kasturi N, Srinivasan R, Vinod KV. Ocular manifestations in leukemias and their correlation with hematologic parameters at a tertiary care setting in South India. Ophthalmol Retin,2018:2(1):17–23. doi: 10.1016/j.oret.2017.05.009
4. Dhasmana R, Prakash A, Gupta N, Verma SK. Ocular manifestations in leukemia and myeloproliferative disorders and their association with hematological parameters. Ann Afr Med,2016:15(3):97–103. doi:10.4103/1596-3519.188887
5. Reddy SC, Jackson N, Menon BS. Ocular involvement in leukemia–a study of 288 cases. Ophthalmologica,2003:217(6):441–445. doi:10.1159/000073077
6. Eze BI, Ibegbulam GO, Ocheni S. Ophthalmic manifestations of leukemia in a tertiary hospital population of adult Nigerian Africans. Middle East Afr J Ophthalmol,2010:17(4):325–329. doi:10.4103/0974-9233.71599
7. Ohkoshi K, Tsiaras WG. Prognostic importance of ophthalmic manifestations in childhood leukaemia. Br J Ophthalmol,1992:76(11):651–655. doi:10.1136/bjo.76.11.651
8. Ridgway EW, Jaffe N, Walton DS. Leukemic ophthalmopathy in children. Cancer,1976:38(4):1744–1749. doi:10.1002/1097-0142(197610) 38:4<1744::aid-cncr2820380449>3.0.co;2-3
9. Cavdar AO, Babacan E, Gözdaşoğlu S, *et al*. High-risk subgroup of acute myelomonocytic leukemia (AMML) with orbito-ocular granulocytic sarcoma (OOGS) in Turkish children. Retrospective analysis of clinical, hematological, ultrastructural and therapeutical findings of thirty-three OOGS. Acta Haematol,1989:81(2):80–85. doi:10.1159/000205531
10. Curto ML, Zingone A, Acquaviva A, *et al*. Leukemic infiltration of the eye: results of therapy in a retrospective multicentric study. Med Pediatr Oncol,1989:17(2):134–139. doi:10.1002/mpo.2950170212
11. Bitirgen G, Belviranli S, Caliskan U, Tokgoz H, Ozkagnici A, Zengin N, *et al*. Ophthalmic manifestations in recently diagnosed childhood leukemia. Eur J Ophthalmol,2016:26(1):88–91. doi:10.5301/ejo.5000647