Spontaneous Resolution of Foveal Sub‑internal Limiting Membrane Hemorrhage with Excellent Visual and Anatomical Outcome in a Patient with Acute Myeloid Leukemia

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Abstract:
Sub‑internal limiting membrane (sub‑ILM) hemorrhage is a distinct type of retinal hemorrhage in which the blood accumulates between ILM and nerve fiber layer. Little is known about visual prognosis as well as ideal management of foveal sub‑ILM hemorrhage in patients with acute leukemia. Herein, we presented a case of acute myeloid leukemia with foveal sub‑ILM hemorrhage. Observation alone resulted in complete resolution of hemorrhage with good visual and anatomical outcome.

Keywords:
Acute leukemia, premacular hemorrhage, sub‑internal limiting membrane hemorrhage

Introduction
Leukemia is a heterogeneous group of disorders that arise from immature white blood cells. It is classified into four major types, including (1) acute lymphoblastic leukemia, (2) acute myeloid leukemia (AML), (3) chronic lymphoblastic leukemia, and (4) chronic myeloid leukemia, based on flow cytometry, immunohistochemistry, and cytogenetics.[1] AML is characterized by abnormal proliferation and differentiation of a clonal population of myeloid stem cells. Accounting for around 80% of acute leukemia in adults, it carries guarded prognosis in those above 65 years in whom 70% will succumb to their underlying disease within 1 year of diagnosis.[2] Ophthalmic involvement in leukemia is well‑documented, and nearly every ocular tissue can be affected. Posterior segment involvement in the form of intraretinal hemorrhage is thought to be the most common ophthalmic manifestation.[3] Little is known about the visual prognosis of foveal sub‑internal limiting membrane (sub‑ILM) hemorrhage in patients with acute leukemia. Herein, we present a case of AML with foveal sub‑ILM hemorrhage and describe the natural course of this condition.

Case Report
A 25‑year‑old male previously healthy was diagnosed as a case of AML 1 month before the presentation. High‑intensity induction chemotherapy with cytarabine plus idarubicin was initiated for 10 days. The patient was referred to ophthalmology service after complaining of recent decrease in the visual acuity of the right eye for 3 days. Best‑corrected visual acuity (BCVA) was 20/100 in the right eye and 20/25 in the left eye. The intraocular pressure was
11 and 10 mmHg in the right and left eyes, respectively. Pupils were round, regular, and reactive in both eyes with no relative afferent pupillary defect. Anterior segment structures, i.e., cornea, anterior chamber, angle, iris, and lens, were within normal limits in both eyes. Dilated fundus examination (DFE) showed clear media, normal optic nerve head, and normal vessels in both eyes with foveal sub-ILM hemorrhage in the right eye and multiple small intraretinal hemorrhages in the left eye. Optical coherence tomography (OCT) showed an elevated sub-ILM hyperreflective lesion corresponding with the foveal hemorrhage in the right eye [Figure 1].

Six months after completing the chemotherapy cycles, the patient underwent another thorough ophthalmic assessment. BCVA has improved to 20/25 in the right eye with 20/20 in the left eye. DFE showed a complete resolution of previously noted sub-ILM hemorrhage in the right eye. OCT demonstrated intact foveal contour without disruption of the ellipsoid zone or retinal architecture [Figure 2].

Discussion

Sub-ILM hemorrhage is a distinct type of retinal hemorrhage in which the blood accumulates between ILM and nerve fiber layer. A variety of causes have been implicated in the pathogenesis of sub-ILM, which include Valsalva retinopathy, Terson’s syndrome, ocular trauma, and hematological disorders. There is a paucity of evidence as regards to the best management algorithm for sub-ILM hemorrhage in acute leukemia because the visual prognosis is not well-characterized. A recent prospective small cohort has characterized leukemic retinal hemorrhage evolution (including sub-ILM hemorrhage in AML) and gave valuable insight into its natural course. In this series, two patients with AML developed sub-ILM hemorrhage with one involving the fovea. Both patients had spontaneous complete resolution after 4 months of observation. The author suggested that sub-ILM hemorrhage is self-limited and observation alone is a reasonable management. Rey et al. described a young patient with AML who presented with painless decreased vision in the left eye. Examination revealed 20/200 visual acuity, and fundus examination demonstrated large premacular sub-ILM hemorrhage confirmed by OCT. Observation was offered, and visual acuity has recovered to 20/25 after 6 months with a near-total resolution of blood. In conclusion, our report is in accordance with previously mentioned literature that sub-ILM hemorrhage in a patient with acute leukemia

![Figure 1](image1.png)  
*Figure 1: Colored fundus photograph OD at presentation showing foveal sub-internal limiting membrane hemorrhage. Corresponding optical coherence tomography highlighting foveal sub-internal limiting membrane hemorrhage.*

![Figure 2](image2.png)  
*Figure 2: Colored fundus photograph OD 6 months later showing complete resolution of previously noted sub-internal limiting membrane hemorrhage. Corresponding optical coherence tomography demonstrating intact foveal contour without disruption of the ellipsoid zone or retinal architecture.*
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is a benign condition that carries a favorable prognosis. Observation alone is a viable option, provided that most patients with acute leukemia are not good candidates for surgical intervention. OCT plays a key role in identifying the plane of hemorrhage as well as monitoring its evolution.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

References
1. Juliusson G, Hough R. Leukemia. Prog Tumor Res 2016;43:87-100.
2. De Kouchkovsky I, Abdul-Hay M. ‘Acute myeloid leukemia: A comprehensive review and 2016 update’. Blood Cancer J 2016;6:e441.
3. Bitirgen G, Belviranli S, Caliskan U, Tokgoz H, Ozkagnici A, Zengin N. Ophthalmic manifestations in recently diagnosed childhood leukemia. Eur J Ophthalmol 2016;26:88-91.
4. De Maeyer K, Van Ginderdeuren R, Postelmans L, Stalmans P, van Calster J. Sub-inner limiting membrane haemorrhage: Causes and treatment with vitrectomy. Br J Ophthalmol 2007;91:869-72.
5. Liu TY, Johnson TV, Barnett BP, Scott AW. Evolution of leukemic retinal hemorrhages documented by spectral-domain oct and color fundus photography. Ophthalmol Retina 2018;2:494-501.
6. Rey A, Adán A, Llorenc V, Pelegrín L, Mesquida M. Late spectral-domain optical coherence tomography findings in sub-internal limiting membrane hemorrhage. Retin Cases Brief Rep 2013;7:276-7.