RESEARCH PAPER

A Bloody Affair – A Case Report On Retinal Hemorrhage As An Ocular Manifestation Of Anemia

Dr. Smriti Sarathi[1], Dr. Siddhartha Singh[2]

[1]Junior Resident, [2]Assistant Professor
[1,2]Department of Ophthalmology, Saveetha Medical College and Hospital (SIMATS), Chennai, India

ABSTRACT
Retinal hemorrhage, a common feature of anemic retinopathy, requires careful evaluation and management. This case report highlights a 21-year-old female with severe anemia, presenting with heavy menstrual bleeding and bicytopenia, along with bilateral retinal hemorrhages. She was treated with blood transfusions and steroids, but further interventions were deferred due to bleeding risks. Discharged against medical advice, the patient emphasizes the need for early diagnosis and proper management. Timely intervention and interdisciplinary care are crucial in preventing vision loss and improving outcomes for those with anemia-related retinal hemorrhage
Keywords: : Retinal hemorrhage, Anemia, Ocular manifestation, Nerve fibre layer infarction.
How to cite this article: Sarathi S, Singh S, A Bloody Affair – A Case Report On Retinal Hemorrhage As An Ocular Manifestation Of Anemia .Int J Drug Deliv Technol. 2026;16(2s): 276-279; DOI: 10.25258/ijddt.16. 276-279
Source of support: Nil.
Conflict of interest: None

INTRODUCTION

Anemia is a prevalent hematologic disorder with a myriad of systemic manifestations. While anemia primarily affects oxygen transport and utilization, its effects influence other viscera and tissues across the body. Among the extra hematologic manifestations of anemia, ocular involvement is increasingly recognized as a significant clinical entity, with retinal hemorrhage emerging as a notable ocular complication.

Retinal hemorrhage refers to the extravasation of blood into the retinal tissue, often resulting from disruption of retinal blood vessels due to various etiologies. Although retinal hemorrhage can occur in the context of diverse systemic and ocular conditions, its association with anemia has received limited attention in the literature. Nevertheless, emerging evidence suggests a potential link between anemia and retinal hemorrhage, highlighting the importance of recognizing ocular manifestations in the diagnostic workup and management of patients with anemia.

The pathophysiology underlying retinal hemorrhage in the setting of anemia is multifactorial, involving a complex interplay of hemodynamic alterations, vascular fragility, and impaired oxygen delivery to retinal tissues. Anemia-induced tissue hypoxia and subsequent compensatory mechanisms, including increased blood flow and vascular dilation, may predispose retinal vessels to rupture, leading to hemorrhagic events. Furthermore, deficiencies in essential nutrients such as iron, vitamin B12, and folate, common in individuals with anemia, may exacerbate retinal vascular fragility and compromise vascular integrity.

Anemia results in retinopathy in about 28% of patients, and a coexistence of thrombocytopenia increases the risk to 38%. The risk of retinopathy rises with progression in severity of anemia, especially when hemoglobin level falls below 6 g/dl.

Anemic retinopathy may have an asymptomatic manifestation with cotton wool spots, retinal hemorrhage and Roth spots as findings.[1] Anemia produces hypoxia of the retina which in turn causes infarction of the nerve fibre layer and cotton wool spots. An interplay between three factors -Vasodilatation, an increased transmural pressure owing to hypoproteinemia and microtrauma to the vessel walls, leads to retinal hemorrhages and edema.

While retinal hemorrhage is typically asymptomatic or associated with mild visual symptoms, such as floaters or blurred vision, severe or recurrent hemorrhagic events can result in vision loss and permanent retinal damage.[2]

Despite the potential significance of retinal hemorrhage as an ocular manifestation of anemia, its clinical recognition and management remain understudied and underreported. Furthermore, the optimal diagnostic approach and therapeutic strategies for anemia-related retinal hemorrhage are yet to be elucidated, necessitating further research to better understand the pathogenesis and outcomes of this ocular complication.

In light of this, we present a detailed case report of retinal hemorrhage as an ocular manifestation of anemia, highlighting the clinical presentation, diagnostic evaluation, management approach, and outcomes in a patient with underlying hematologic disorder. Through this case report, we aim to raise awareness of the ocular complications of anemia, underscore the importance of early recognition and intervention, and stimulate further research into the

**Author for Correspondence: Dr. Siddhartha Singh*

pathophysiology and management of anemia-related retinal hemorrhage.
Though similar reports exist in the past, a deeper analysis distinguishes between each of them in terms of magnitude of ocular findings and systemic associations, highlighting the uniqueness of each. [3]
With appropriate institutional and ethical consent, we are reporting this case owing to its utility in everyday clinical practice and multispecialty appeal. It is imperative to ensure correction of underlying deficiencies for a favourable outcome.

CASE DETAILS

A 21-year-old female was referred from the General Hospital to the Emergency with complaints of heavy menstrual bleeding since 3 months associated with petechial rash over bilateral lower limbs since 10 days ,1 episode of melena at the time of admission, 2 episodes of syncope in the past 3 months and post 1 unit PRBC transfusion. She had a moderate build and vitals measured at the time of presentation showed blood pressure of 110/80 mm Hg and pulse rate of 102/min.
She was admitted into the Intensive Care Unit and systematically evaluated. Her blood reports showed - Hb 4.1 g/dl, platelet count 4000/cu.mm, PT-12.0 seconds, INR-1.14 seconds, ESR-120 mm /hr and CRP-11.2 mg/L . Dengue was then ruled out.
By a process of exclusion, she was found to have bicytopenia with a mild hemolytic picture (LDH-523, IDB1.76), possible ITP with wet purpura and visceral bleeding. LFT, DCT, ICT, Reticulocyte Count, VIT.B12 and iron profiles, serology and other investigations showed no abnormalities.
Her diagnostics also included a chest X-ray, abdominal ultrasound (USG) showing hematometra and MRI brain showing acute hemorrhage involving vermis and B/L cerebellar hemispheres. Neurology and Rheumatology opinions were also obtained, and anti-edemal decompression measures and BMA was deferred due to low platelet count.

RELEVANT FINDINGS

Her bedside visual acuity was counting fingers close to face in the right eye and > 3/60 in left eye. Anterior segment examination revealed BE Horizontal nystagmus (increasing on right gaze). On performing a dilated fundus exam, the presence of pre-retinal and subhyaloid hemorrhages superior and inferior to disc, disc and macular edema, and Roth spots in both the eyes were noted as shown in Fig. 1a and b.

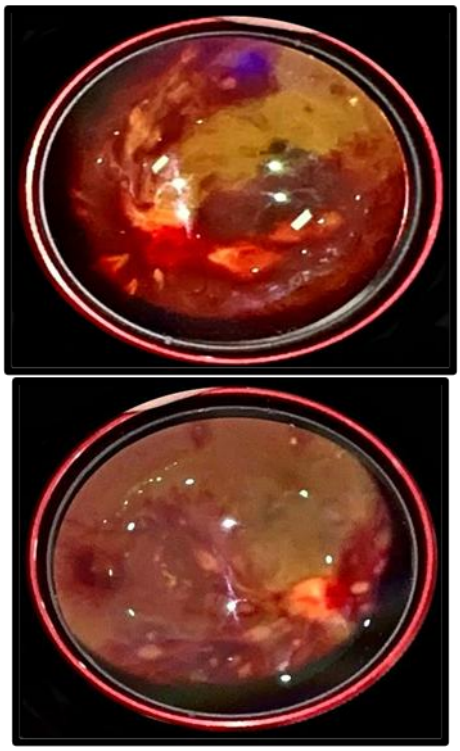

Figure 1a **Figure 1b**

Figure 1: Fundoscopic image showing pre-retinal and sub-hyaloid hemorrhage in (a) Right eye and (b) Left eye along with bilateral disc and macular edema

Through the course of treatment, the patient has received 4 PRBC, 10 RDP and 3 SDP transfusions with 2 doses of pulse steroid therapy. The patient was planned for follow-up with corrective measures but was discharged against medical advice on her own volition due to personal reasons.

DISCUSSION

The case report presented herein illustrates retinal hemorrhage as an ocular manifestation of anemia, shedding light on the clinical significance, diagnostic challenges, and management considerations associated with this rare but potentially vision-threatening complication.
Literature elicits anemic retinopathy as an incidental finding in most cases.
Ocular manifestations include retinal hemorrhages, nerve fibre layer infarctions and venous dilatation. The severity of the same can be worsened by co-existent thrombocytopenia. [4,5]
The diagnostic workup for retinal hemorrhage in the setting of anemia typically involves a detailed ophthalmic examination, assessment of visual acuity, measurement of intraocular pressure, dilated fundus examination and ancillary imaging modalities, such as fundus fluorescein angiography (FFA) and optical coherence tomography (OCT). Laboratory investigations, including complete blood count (CBC), iron studies, and coagulation profile, are essential to identify the underlying etiology of anemia

and guide targeted therapeutic interventions. Collaboration between hematologists and ophthalmologists is crucial to ensure a holistic approach to patient care and optimize treatment outcomes.[6]

We wish to highlight two points of significance by means of our case report.

Firstly, we wish to highlight the distinctiveness of our patient in terms of startling severity of retinal findings, differing from reports in the past where the patients have been alcoholic, had pernicious anemia or other coagulopathies. Our patient was at a risk of developing cardiomegaly and early identification indirectly reduced mortality and wide-reaching consequences.

Secondly, this case report mandates the need for multispecialty vigilance in cases which present with unrelated symptoms but in reality, are manifestations of the same underlying condition. A multipronged effort is the need of the hour for optimal results.

The management of retinal hemorrhage in anemia hinges on addressing the underlying hematologic disorder, optimizing hemoglobin levels, and correcting nutritional deficiencies. Blood transfusion may be indicated in severe cases of anemia to restore oxygen-carrying capacity and alleviate tissue hypoxia. Additionally, supplementation with iron, vitamin B12, and folate may help replenish depleted stores and improve retinal vascular integrity. [7,8]

In anemic retinopathy, hypoxia-induced upregulation of vascular endothelial growth factor (VEGF) contributes to retinal neovascularization and vascular remodeling, highlighting VEGF's central role in pathological ocular changes. [9,10] Ophthalmic interventions such as intravitreal anti-vascular endothelial growth factor (anti-VEGF) injections or laser photocoagulation may be considered for hemorrhagic complications.

The prognosis of retinal hemorrhage in anemia is dependent on various factors- severity of anemia, modality of treatment, presence of underlying retinal pathology, and patient-specific risk factors. While most cases of anemia-related retinal hemorrhage resolve spontaneously with appropriate management, severe or recurrent hemorrhagic events may lead to permanent retinal damage and vision loss. Long-term follow-up is essential to monitor disease progression, assess treatment response, and prevent vision-threatening complications in patients with anemia-related retinal hemorrhage.[11]

Similar parallels are observed in hereditary hemorrhagic telangiectasia, where dysregulated angiogenesis and fragile vasculature lead to recurrent hemorrhages, underscoring the importance of vascular integrity in systemic and ocular disease.[12]

Indian literature shows high rate of prevalence of anemia in the country among the women of child-bearing age as a risk factor for high perinatal and maternal mortality, and prematurity. This study reinforces the need to improve national standards for reproductive and child health.

CONCLUSION

In conclusion, this case report highlights the significant ocular manifestation of retinal hemorrhage in the context of anemia, shedding light on the complexities of diagnosis, management, and prognostic implications associated with this rare but clinically relevant condition.[13]

Our case underscores the importance of recognizing retinal hemorrhage as a potential ocular complication of anemia, particularly in patients presenting with visual symptoms or signs of retinal pathology. Although rare, retinal hemorrhage should be considered in individuals with anemia, necessitating a comprehensive ophthalmic evaluation and collaboration with hematologists to elucidate the underlying etiology and guide appropriate management strategies. [14,15]

Furthermore, our case highlights the diverse etiologies and risk factors contributing to anemia-related retinal hemorrhage, including systemic hypoxia, vascular fragility, and nutritional deficiencies. This underscores the need for a holistic approach to patient care, addressing both the underlying hematologic disorder and associated ocular complications to optimize treatment outcomes and prevent vision-threatening sequelae.

Importantly, our case report emphasizes the potential for favorable visual outcomes with prompt recognition and intervention, underscoring the importance of early diagnosis and targeted therapeutic interventions in mitigating risk of irreversible vision loss in patients with anemia-related retinal hemorrhage. [16,17]

Moving forward, continued awareness, interdisciplinary collaboration, and further research into the pathophysiology and management of anemia-related retinal hemorrhage are warranted to improve our understanding of this condition and enhance patient care. By elucidating the underlying mechanisms, optimizing diagnostic approaches, and refining treatment strategies, clinicians can effectively mitigate the ocular complications of anemia and improve visual outcomes for affected individuals.[18]

SCIENTIFIC REVIEW BOARD:
SRB approval has been granted at the institutional level with number **303/03/2024/PG/SRB/SMCH**

FINANCIAL SUPPORT AND SPONSORSHIP: Nil

CONFLICTS OF INTEREST:
We wish to disclose that there are no conflicts of interest related to this manuscript. All authors have read and approved the final version of the manuscript and agree with its submission to International Journal of Drug Delivery Technology.

ACKNOWLEDGMENTS:
The authors wish to acknowledge that there are no acknowledgments to declare..

REFERENCE

1. Carraro MC, Rossetti L, Gerli GC. Prevalence of retinopathy in patients with anaemia or thrombocytopenia. Eur J Haematol. 2001;67:238–44.
2. Vaggu SK, Bhogadi P. Bilateral macular haemorrhage due to megaloblastic anaemia: A rare case

report. Indian J Ophthalmol. 2016;64:157–9.
3. Lam S, Lam BL. Bilateral retinal haemorrhages from megaloblastic anaemia: Case report and review of literature. Ann Ophthalmol. 1992;24:86–90.
4. Mishra A, Gururaja R, Aggarwal S, Bhargava N, Chaudhary B. Megaloblastic anaemia in a teenage patient. Med J Armed Forces India. 2015;71(Suppl 2) :S435–9.
5. Zhang J, Chen Y, Yu Z, Liu L. Bilateral haemorrhagic retinopathy with roth spots in paediatric-onset systemic lupus erythematosus and associated thrombocytopenia: A case report and review of literature. Ocul Immunol Inflamm. 2018;26:1150–53.
6. Parks S, Hoffman MK, Goudar SS, Patel A, Saleem S, Ali SA, et al. Maternal anaemia and maternal, fetal, and neonatal outcomes in a prospective cohort study in India and Pakistan. BJOG. 2019;126:737–43.
7. Fauci AS, Braunwald E, Kasper DL, et al. Harrison's Principles of Internal Medicine, 17th ed. New York: McGraw-Hill Medical; 2008:360.
8. Rubenstein RA, Yanoff M, Albert DM. Thrombocytopenia, anemia, and retinal hemorrhage. Am J Ophthalmol. 1968;65(3):435-439.
9. Zahedipour F, Hosseini SA, Astaneh M, et al. Application of VEGF/VEGFR peptide vaccines in cancer: A systematic review of clinical trials. Crit Rev Oncol Hematol. 2023;187:103954
10. Selvaraj V, Sekaran S, Rajamani Sekar SK. Surgical intervention as a driver of new angiogenesis in tumors—time to consider minimally invasive surgeries? Int J Surg. 2023;109(10):3222-3.
11. Foulds WS. The ocular manifestations of blood diseases. Trans OphthalmolSoc UK. 1963;83:345-360.
12. Venugopal A. Hereditary haemorrhagic telangiectasia. BMJ. 2022;376:e0657.
13. Kaur B, Taylor D. Fundus hemorrhages in infancy. SurvOphthalmol. 1992;37(1):1-17.
14. Beck RW, Smith CH. Neuro-ophthalmology: A Problem-oriented Approach. Boston: Little, Brown, and Co.; 1988.
15. Biousse V, Rucker JC, Vignal C, et al. Anemia and papilledema. Am J Ophthalmol. 2003;135(4):437-446.
16. Imai E, Kunikata H, Udono T, et al. Branch retinal artery occlusion: a complication of iron-deficiency anemia in a young adult with a rectal carcinoid. Tohoku J Exp Med. 2004;203(2):141-144.
17. Loewenstein JI. Retinopathy associated with blood anomalies. In: Jakobieck F, ed. Clinical Ophthalmology. Revised ed. Philadelphia: Lippincott; 1995:995-1000.
18. Kacer B, Hattenbach LO, Horle S, et al. Central retinal vein occlusion and nonarteritic ischemic optic neuropathy in 2 patients with mild iron deficiency anemia. Ophthalmologica. 2001;215(2):128-131..