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Case Report

Internal Medicine Section

An Unusual Case of Anaemic Retinopathy Secondary to Iron Deficiency Anaemia

VIGNESSH RAVEEKUMARAN[1], ANANYA BALAJI[2], SETHURAJ SELVARAJ[3], J JENIFER FLORENCE MARY[4]

ABSTRACT

Anaemia has varied ocular presentations, ranging from simple conjunctival pallor to retinal abnormalities. Anaemic Retinopathy (AR) is a secondary retinal pathological symptom that can range from asymptomatic to developing retinal abnormalities. The increase in the severity of anaemia will ultimately increase the risk of retinopathy. While the outcomes might be similar to hypertensive or diabetic retinopathy, further comprehensive systemic and clinical evaluation is warranted. The incidence of AR, its associations with varying degrees of anaemia severity, and other haematological variables is still debated. Visual loss due to retinal abnormalities in anaemia is a rare clinical entity, despite its long-standing existence. Hereby, the authors present a case of a patient presenting with AR. A 19-year-old woman with a history of heavy menstrual bleeding was admitted for a sudden, painless, non progressive loss of vision in her left eye. Upon examination, her fundus revealed several Roth spots affecting all four quadrants and the macula, alongside a large and small preretinal haemorrhage in the nasal region and in the macula. Blood investigations revealed a Haemoglobin (Hb) of 2.4 g/dL and other reports suggestive of iron deficiency. She was diagnosed with iron-deficiency anaemia, with retinopathy as the most remarkable feature. She was treated with blood transfusion and Iron-folic Acid (IFA) supplementation, which showed a prompt response in the resolution of haemorrhage. She was discharged on IFA supplementation with planned follow-up for Ophthalmology and Gynaecology visits along with dietary advice.

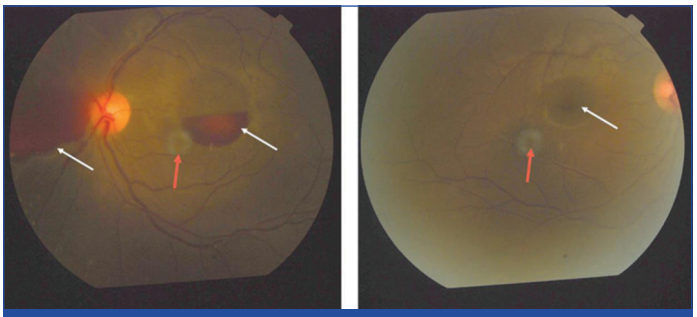
Keywords: Adolescent, Preretinal haemorrhage, Roth spots

CASE REPORT

A 19-year-old female patient presented to the Emergency Department with complaints of sudden, painless, non progressive loss of vision in her left eye (L/E). She also reported a history of dyspnoea on exertion for the past week. There was no history of ocular trauma, known systemic bleeding diathesis, or long-term intake of medication for any systemic illness. Additionally, there was no childhood history of blood transfusions. Upon further questioning, she reported heavy menstrual bleeding with irregular cycles, for which she was referred to the gynaecologist.

The patient's vitals showed a blood pressure of 140/90 mmHg, tachycardia with a heart rate of 120 beats per minute (bpm), a large volume hyperkinetic pulse at a rate of 120 bpm, tachypnoea with a respiratory rate of 36 breaths/minute, and an oxygen saturation of 90% at room air. Additionally, a raised Jugular Venous Pressure (JVP) of 10 cm H_2O was noted. The general examination revealed marked pallor and bilateral pitting pedal oedema [Table/Fig-1a,b]. Further cardiovascular examination revealed normal heart sounds with a systolic murmur of grade 3/6 in the pulmonary area. Ophthalmological examination showed a Best Corrected Visual Acuity (BCVA) of 3/60 in both eyes. The anterior segment findings were unremarkable, except for marked conjunctival pallor. The fundus examination of the L/E showed a large preretinal haemorrhage in the nasal area and a small preretinal haemorrhage in the macula. Dot and blot haemorrhages with multiple Roth spots involving all four quadrants and the macula were also noted. The fundus examination of the right eye (R/E) showed multiple Roth spots in the superior and inferior nasal arcades [Table/Fig-2a,b]. Initial investigations are presented in [Table/Fig-3], and the bleeding time, clotting time, and prothrombin time were normal, ruling out any coagulation abnormalities. Hb electrophoresis and thyroid study were normal. Due to the presence of Roth's spot, an Echocardiogram (echo) was performed to rule out infective endocarditis, and no abnormal findings were found [Table/Fig-3]. Based on the investigations, AR was diagnosed. Furthermore, the diagnosis has been confirmed with the history of heavy menstrual bleeding, which was the primary cause of anaemia.

[Table/Fig-1]: a) Pallor present, b) Bilateral pitting pedal oedema. (Images from left to right)



[Table/Fig-2]: Retinopathy changes in left eye. Red arrows indicate Roth spots and white arrows indicates haemorrhage.

Her treatment commenced with the transfusion of four units of packed cells and oral iron supplementation. Additionally, she received nutritional counselling on locally available iron-rich foods. Following the transfusion, her haematological parameters promptly improved. Her Haemoglobin (Hb) was monitored, and after one week of treatment, it increased to 8.6 g/dL. Over the course of one month, she showed symptomatic improvement, reaching a Best Corrected Visual Acuity (BCVA) of 6/6 in the right eye and 6/36 in the left eye, with complete resolution of preretinal haemorrhages and Roth spots. Her haematological parameters also stabilised

{Hb 12 g/dL and Packed Cell Volume (PCV) 39.2%} [Table/Fig-3]. She was discharged with Iron-folic Acid (IFA) supplementation and scheduled follow-up visits to Ophthalmology and Gynaecology, along with dietary advice. During the follow-up visit, patient's vision had improved.

Test	Findings
Day 1– On admission	
Haemoglobin (Hb)	2.4 g/dL
Haematocrit	9.3%
Red Blood Cell (RBC) count	1.56 cells/mcL
Mean Corpuscular Volume (MCV)	60 fL
Mean Corpuscular Haemoglobin (MCH)	15.3 pg
Mean Corpuscular Haemoglobin Concentration (MCHC)	25.7 gm/dL
Peripheral Blood Smear (PSB)	Microcytic hypochromic anaemia with anisopoikilocytosis with many pencil cells
Reticulocyte Index (RI)	0.09
Serum iron	17.3 µmol/L
Total Iron Binding Capacity (TIBC)	479
Serum ferritin	2.60 ug/L
Transferrin Saturation (TS)	344%
Coagulation abnormalities	No coagulation abnormalities found
Hb electrophoresis	Normal
Thyroid study	Normal
Echocardiogram	Normal cardiac chamber dimension, no regional wall motion abnormalities, normal left ventricular systolic and diastolic function (ejection fraction 62%), trivial mitral, tricuspid, and aortic regurgitation, no aortic stenosis, pulmonary artery systolic pressure (PASP)-32 mm Hg, no clot, no vegetations, no pericardial effusion.
After one month	
Best Corrected Visual Acuity (BCVA)	6/6 – R/E and 6/36 – L/E Complete resolution of preretinal haemorrhages and Roth spots
Haemoglobin (Hb)	12 g/dL
Packed Cell Volume (PCV)	39.2%

[Table/Fig-3]: Laboratory investigation of the patient.

DISCUSSION

In present case report, a 19-year-old woman with a history of heavy menstrual bleeding was admitted for a sudden, painless, non progressive loss of vision in her left eye. Upon examination, her fundus revealed several Roth spots affecting all four quadrants and the macula, alongside large and small preretinal haemorrhages in the nasal region and macula. Blood investigations revealed an Hb of 2.4 g/dL and other reports suggestive of iron deficiency. She was diagnosed with iron-deficiency anaemia, with retinopathy as the most remarkable feature. Treatment with blood transfusion and IFA supplementation showed a prompt response in the resolution of haemorrhage.

Anaemia is a serious global public health problem that particularly affects young children, adolescent girls, women, pregnant and lactating mothers [1]. It is defined as a lower-than-normal number of Red Blood Cells (RBC) or a lower-than-normal Hb concentration within RBC [1]. According to the World Health Organisation (WHO), Hb levels less than 13 g/dL in men and less than 12 g/dL in women are considered indicative of anaemia [1]. Hb serves as an iron-binding, oxygen-carrying protein within the RBC, and the amount required to meet physiological needs varies with age, sex, pregnancy, smoking habits, and even high altitude [2-4]. Early detection of signs and symptoms, along with a multidisciplinary strategy involving dietary changes and pharmaceutical treatment, can enhance quality of life and prevent further complications.

Anaemic Retinopathy (AR) is a secondary retinal pathological symptom of severe anaemia, as noted in various literature and reported to occur when other systemic conditions are present [2,3,5,6]. The reported incidence was 28% when the Hb <6 g/dL, while at the global level, the prevalence varies from 30 to 34%, often concomitant with thrombocytopenia [6]. The increase in the severity of anaemia will ultimately increase the risk of retinopathy [3]. Nevertheless, the incidence of AR, its associations with varying degrees of anaemia severity, and other haematological variables are widely debated.

The presentation of symptoms ranges from simple conjunctival pallor to retinal abnormalities [5-7]. Mostly, it is asymptomatic at the beginning, later developing slowly, ranging from retinal haemorrhage, cotton wool spots, venous tortuosity, and occasionally white-centered haemorrhages known as Roth spots [2,5,6,8]. However, the precise pathology is still not well established. A hypothesis linking low Hb with venous stasis, angiospasm, and enhanced capillary permeability to retinal hypoxia has been proposed [3,6]. While the outcomes might resemble hypertensive or diabetic retinopathy, further comprehensive systemic and clinical evaluation is warranted [3,5].

In present case report, it was found that the Hb was 2 g/dL, indicating a severe form of anaemia that led to the severity of the retinopathy. The findings, primarily the presence of Roth spots, which is a pathognomonic sign of AR, were in concordance with previous literature [3,6,9]. The present report was similar to the case studies done by Jojo V and Singh P, as well as Selvan H et al., where retinopathy was found in patients with severe anaemia with Hb levels of 1.8 g/dL and 2.8 g/dL, respectively [5,10]. Additionally, the present case presented various systemic findings, especially in the cardiovascular system, where the patient developed a systolic murmur, again a classical sign of severe anaemia's cardiovascular manifestation. However, the patient did not develop any infective endocarditis or cardiomegaly, as confirmed by echo. This early identification indirectly reduced the mortality rate in this patient.

For these patients, the core treatment is the correction of the underlying defect, yielding the desired outcome [2,3,7,9,10]. In present case, the underlying cause was iron-deficiency anaemia. Based on this, patient responded to treatment with transfusion and oral supplementation of iron-folic acid to correct the anaemia. During the follow-up visit, the patient's vision had improved, implying that AR can be reversible and responds to treatment, with the underlying systemic condition needing to be addressed. All this suggests that thorough investigation with proper history can identify the issue early. It's also important to note that nutritional deficiency, seemingly simple, can lead to worrisome outcomes with wide-reaching consequences. Therefore, it is essential to identify and treat them to improve overall health standards of the community.

CONCLUSION(S)

A common trend in anaemic patients with low haematocrit and Hb levels is retinopathy. It is proposed that all patients with low haematocrit and Hb levels undergo a dilated fundus examination. Authors concluded that the cause for retinal changes in present patient was due to anaemia, identified using blood tests and a fundal examination. The symptoms reversed following treatment of the underlying cause, which was iron-deficiency anaemia. Although retinopathies might be an uncommon condition, they can start asymptomatic and can even develop into life-threatening situations. A comprehensive, multifaceted team effort is required to ensure that such unusual presentations nevertheless result in a positive outcome and help avoid the emergence of various morbidities and their long-term ramifications.

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PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of General Medicine, Mahatma Gandhi Medical College and Research Institute, Sri Balaji Vidyapeeth (SBVU) (Deemed to be University), Puducherry, India. **ORCID ID: 0009-0006-6283-6542**
2. Intern, Department of General Medicine, Mahatma Gandhi Medical College and Research Institute, SBVU (Deemed to be University), Puducherry, India.
3. Assistant Professor, Department of General Medicine, Mahatma Gandhi Medical College and Research Institute, Sri Balaji Vidyapeeth (SBVU) (Deemed to be University), Puducherry, India. **ORCID ID: 0000-0003-2476-0138**
4. Assistant Professor, Department of Community Medicine, Mahatma Gandhi Medical College and Research Institute, Sri Balaji Vidyapeeth (SBVU) (Deemed to be University), Puducherry, India. **ORCID ID: 0000-0001-8869-2416**

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Vignessh Raveekumaran,
Assistant Professor, Department of General Medicine, Mahatma Gandhi Medical College and Research Institute, Sri Balaji Vidyapeeth (Deemed to be University), Puducherry-607503, India.
E-mail: vignesshravee@gmail.com

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