Megaloblastic anemia-associated retinopathy: A rare case

Esra Arican[1], Yusuf Emre Okur[1], Beril Iseri[1], Burak Turgut[2], Ismail Ersan[3]

ABSTRACT

Anemia is a common hematologic disorder that can manifest with retinal involvement. As the severity of anemia increases, the incidence of retinal findings such as flame shape hemorrhages, roth spots, and venous dilatation also increases. In this case, a 51-year-old male patient presented with decreased vision in the left eye. A dilated fundus examination revealed findings consistent with anemic retinopathy. Upon further evaluation, the patient was found to have pancytopenia and was diagnosed with megaloblastic anemia after ruling out other systemic diseases. The aim of this case is to keep in mind the possible causes of retinal hemorrhage and to preserve visual acuity through appropriate treatment.

Keywords: Anemia, retinopathy, haemoglobin.

INTRODUCTION

Anemia is a common condition in the community and it can present with various ocular manifestations.[1] Anemia-associated retinopathy is usually reported as an incidental finding in the literature, its incidence is shown as 28% and it is more common in patients with hemoglobin levels below 8 g/dl.[2] The incidence of retinopathy increases with thrombocytopenia.[2] Venous stasis and angiospasm can be listed as other factors that cause anemic retinopathy.[3] Anemic retinopathy may be asymptomatic or may be associated with retinal hemorrhage involving all layers of the retina, soft exudates, roth spots and venous tortuosity.[4,5]

In this case report, we present a case of megaloblastic anemia with serous macular elevation and diffuse intraretinal hemorrhages accompanied by severe thrombocytopenia.

CASE REPORT

A 51-year-old male patient was admitted to our clinic with decreased vision in the left eye for 3 days. His medical history and family history were unremarkable. In the detailed ophthalmologic examination, the best corrected visual acuity was 10/10 and 1/10 in the right and left eyes respectively. Intraocular pressures were 10-11 mmHg, pupils were isochoric and the light reflexes were normal.

Biomicroscopic examination findings were normal bilaterally. No anterior chamber or vitreous reaction was observed. In the fundus examination, bilateral intraretinal hemorrhages and soft exudates starting around the optic disc and extending to the periphery were seen (Figure 1).

Optic coherence tomography (OCT) showed serous elevation involving the macula in the left eye (Figure 2).

Fundus flouresin angiography also showed blockage due to diffuse haemorrhages and soft exudates (Figure 3).

A complete blood count showed a hemoglobin value of 5.3 g/dl along with pancytopenia. Vitamin B12 was also below the reference limit. At this stage, it was learnt that the patient was not a vegetarian and alcoholic. The patient was also referred for a detailed systemic examination due to abnormalities in his complete blood work. After ruling out malignancies through procedures such as abdominal ultrasound (USG), chest x-ray and bone marrow biopsy, the patient was diagnosed with megaloblastic anemia accompanied by thrombocytopenia. After vitamin B12 injections, platelet infusions, changes in diet visual acuity

1- Asist. MD, Department of Ophthalmology, Çanakkale Onsekiz Mart University, Çanakkale, Türkiye

2- Prof. MD, Department of Ophthalmology, Çanakkale Onsekiz Mart University, Çanakkale, Türkiye

3- Assoc. Prof. MD, Department of Ophthalmology, Çanakkale Onsekiz Mart University, Çanakkale, Türkiye

Received: 29.05.2023
Accepted: 10.02.2024
J Ret-Vit 2024; 33: 152-155
DOI:10.37845/ret.vit.2024.33.24

Correspondence author:
Esra Arican
Email: dresraarican07@gmail.com

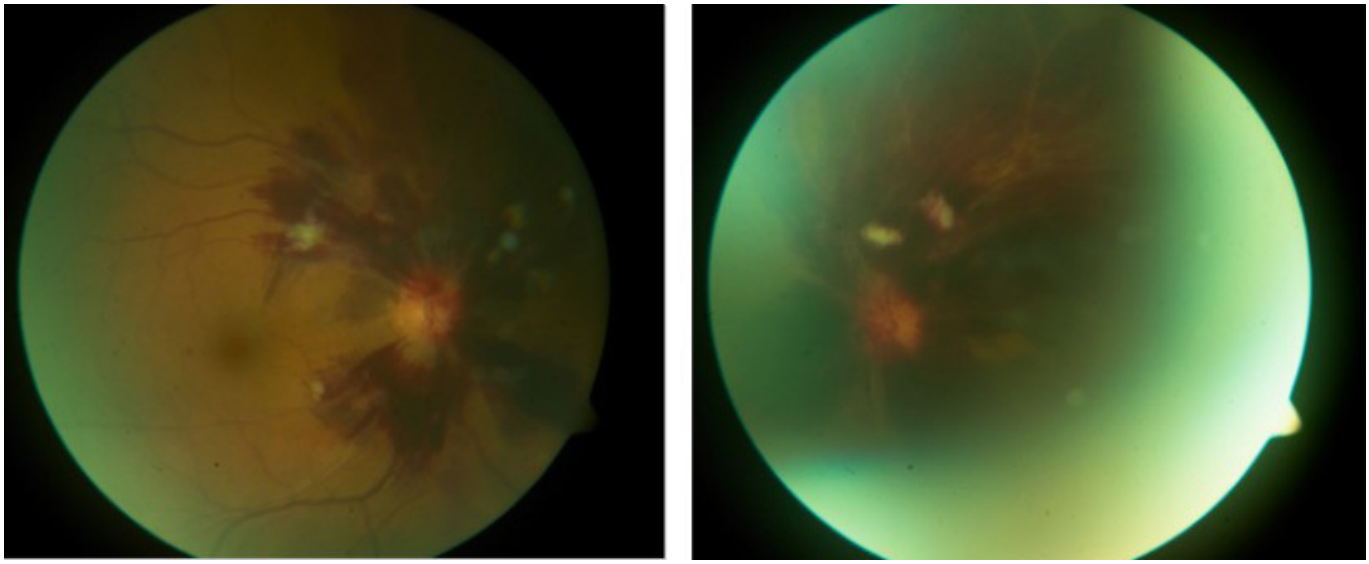

Figure 1: *Extensive retinal hemorrhages and soft exudates in both eyes.*

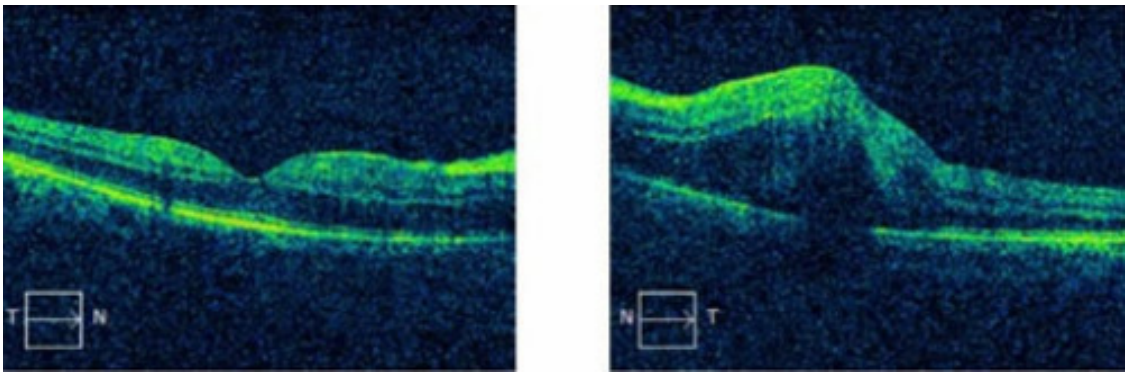

Figure 2: *Serous elevation in the left eye.*

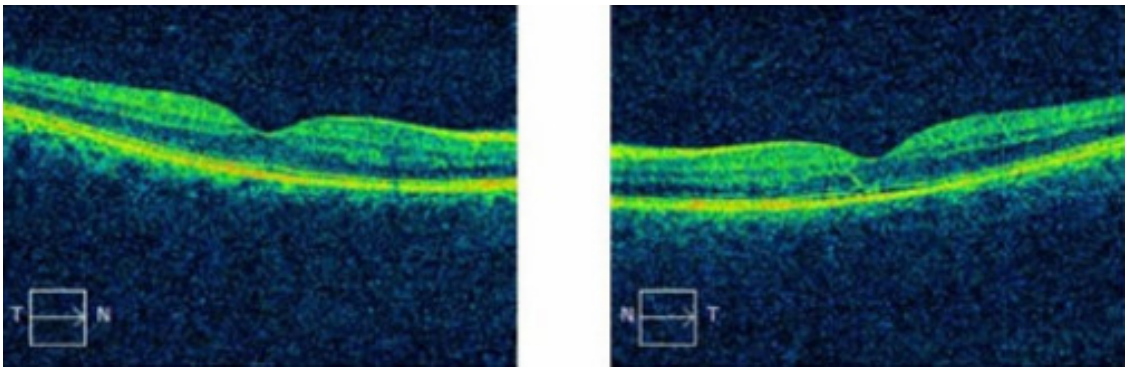

Figure 3: *It is observed that the serous elevation in the left eye has regressed.*

improved with regression of fundus findings and serous elevation in OCT (Figure 4). At the last examination, the best corrected visual acuity was 10/10 in both eyes, respectively, and the funduscopic examination was completely normal.

DISCUSSION

Although most cases are asymptomatic, in some patients retinal edema, exudates or hemorrhages involving the macula may cause a decrease in visual acuity. There are studies showing that disc edema and optic neuropathy also cause a decrease in visual acuity.[6] In our case, extensive hemorrhage involving the macula in the left eye was the main cause of decreased visual acuity.

The main factors involved in the pathogenesis of anemic retinopathy are anoxia and venous stasis.[7] A reduction in the count of blood cells results in a diminished capacity

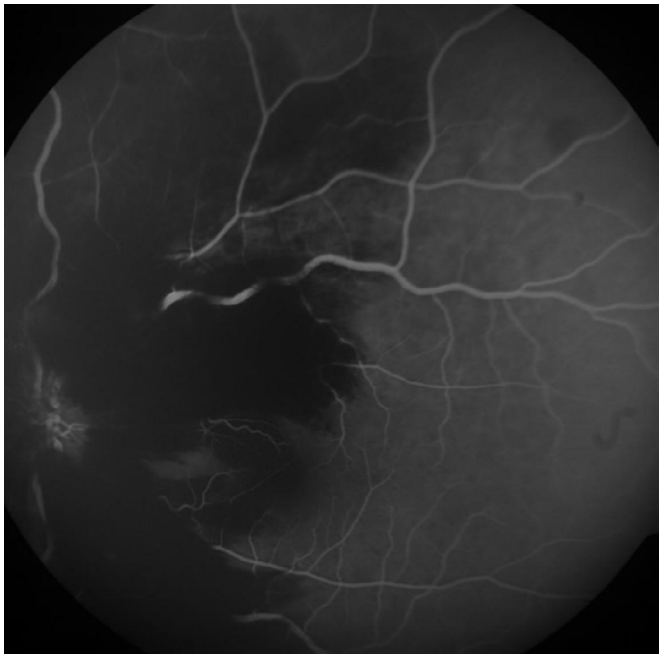

Figure 4: *FFA image shows hemorrhage and blockage due to soft exudates.*

of blood to carry oxygen, leading to tissue hypoxia. When the hemoglobin concentration decreases by more than half of the normal level, retinal hemorrhage, exudates, dilated tortuous vessels, and eventually papilledema can be observed in the retina. These retinal findings can be observed in various types of anemia.

Different types of anemia, such as iron deficiency anemia, aplastic anemia, sickle cell anemia, beta-thalassemia, pernicious anemia, and drug-induced anemia, should be considered in the differential diagnosis. Further investigation should be conducted to explore these potential causes. In patients with sickle cell anaemia, the shape of red cells changes and hard, sickle-shaped red blood cells (RBCs) are formed due to the irreversible conversion of soluble haemoglobin to crystalline haemoglobin. As a result, vascular flow is reduced, leading to congestion in the vessels. The trapping of sickle-shaped red cells in small blood vessels in various structures of the eye leads to characteristic retinal damage. Clinical signs vary depending on the presence or absence of vaso-proliferative changes. In the nonproliferative phase, "salmon patches" representing retinal haemorrhage from superficial blood vessels are seen in the peripheral retina and black sunburst spots develop as a result of migration and proliferation of retinal pigment epithelium (RPE) in response to haemorrhages.[8] In the proliferative stage, retinal neovascularisation, preretinal or vitreous haemorrhage and tractional retinal detachment may occur.[8] In the literature, retinopathy associated with iron deficiency anaemia has been reported as the underlying cause in patients with central retinal vein occlusion, branch retinal artery occlusion.[9,10] However, in patients with conjunctival pallor, especially iron deficiency anaemia should be kept in mind.

Megaloblastic anaemia is typically caused by impaired DNA synthesis due to a deficiency of cobalamin (vitamin B-12) and/or folic acid. Although cell division is slowed down, megaloblastic cells enlarge, and the RNA/DNA ratio increases because cytoplasmic development continues normally. Megaloblastic erythroid precursors are prematurely destroyed before reaching full maturation in the bone marrow. In patients with megaloblastic anaemia, not only the erythroid series but also the myeloid and megakaryocytic series may be decreased, mimicking symptoms of bone marrow failure; vitamin B-12 deficiency may also lead to thrombocytopenia and leucopenia by slowing down DNA synthesis. Thrombocytopenia, coagulation system's primary platelet deficiency, significantly heightens the susceptibility to bleeding in various systems, including the genitourinary and gastrointestinal systems. Moreover, the increased risk extends to potentially severe complications such as intracranial, mucosal, and retinal bleeding. This propensity for bleeding is further exacerbated in the presence of anemia, creating a more pronounced clinical picture. The associated increase in intravascular pressure causes exudation, and thrombocytopenia if any can make it worse. In our case, thrombocytopenia accompanied severe anemia. Incidence and severity of retinopathy is always proportional to severity of anemia. Therefore, as anemia improves, the ocular findings also improve.[11]

Small hemorrhages usually respond to blood transfusions while large hemorrhages threatening vision may require a hyaloidotomy or pars plana vitrectomy.[12] In our case, retinal findings regressed and visual acuity improved with the normalization of blood values after blood transfusion.

The clinical features of anemic retinopathy can mimic many hematologic, infective and oncologic conditions. Symptoms of anemic retinopathy are nonspecific and it should be kept in mind that it may closely mimic hypertensive or diabetic retinopathy.[13] Therefore, comorbidity of systemic disease must be questioned in these patients.

Therefore, the patient should be screened for systemic diseases. Retinopathy due to megaloblastic anaemia has been reported rarely in the literature.[14]

This case, characterized by widespread hemorrhages around the optic disc and serous elevation in the macula, has been diagnosed with megaloblastic anemia accompanied by thrombocytopenia. Consequently, anemias should not be overlooked in the differential diagnosis of retinal hemorrhages. After exclusion diagnoses, it should be known that visual acuity can be preserved with correct diagnosis and treatment in patients diagnosed with megaloblastic anemia.

Consent: written and informed consent was obtained from the patient for publication of this case report.

REFERENCES

1. Holt JM, Gordon-Smith EC. Retinal abnormalities in diseases of the blood. Br J Ophthalmol 1969;53:145-60. https://doi.org/10.1136/bjo.53.3.145
2. Carraro MC, Rossetti L, Gerli GC. Prevalence of retinopathy in patients with anemia or thrombocytopenia. Eur J Haematol 2001;67:238-44. https://doi.org/10.1034/j.1600-0609.2001.00539.x
3. Rubenstein RA, Yanoff M, Albert DM. Thrombocytopenia, anemia, and retinal hemorrhage. Am J Ophthalmol 1968;65:435-9. https://doi.org/10.1016/0002-9394(68)93098-5
4. 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;203:141-4. https://doi.org/10.1620/tjem.203.141
5. Aisen ML, Bacon BR, Goodman AM, et al. Retinal abnormalities associated with anemia. Arch Ophthalmol 1983;101:1049-52. https://doi.org/10.1001/archopht.1983.01040020051008
6. Venkatesh R, Gurram Reddy N, Jayadev C, et al. Determinants for Anemic Retinopathy. Beyoglu Eye J 2023;8:97-103. https://doi.org/10.14744/bej.2023.05658
7. Loewenstein JI. Retinopathy associated with blood anomalies. In: Jakobieck F, editor. Clinical Ophthalmology. Revised ed. Philadelphia: J.B. Lippincott Company, 1995;3: 995-1000.
8. Abdalla Elsayed MEA, Mura M, Al Dhibi H, et al. Sickle cell retinopathy. A focused review. Graefes Arch Clin Exp Ophthalmol 2019;257:1353-64. https://doi.org/10.1007/s00417-019-04294-2
9. Deb AK, Subramaniam S, Sarkar S, et al. Branch retinal artery occlusion as an initial ocular manifestation of severe iron deficiency anemia: A rare case report. Taiwan J Ophthalmol 2021;12:227-30. https://doi.org/10.4103/tjo.tjo_70_20
10. Yang V, Turner LD, Imrie F. Central retinal vein occlusion secondary to severe iron-deficiency anaemia resulting from a plant-based diet and menorrhagia: a case presentation. BMC Ophthalmol 2020;20:112. https://doi.org/10.1186/s12886-020-01372-6
11. Garg P, Agrawal A. Ocular manifestations in patients with anaemia. J Evid Based Med Healthc 2017;4:4646-9.
12. Mansour AM, Lee JW, Yahng SA, et al. Ocular manifestations of idiopathic aplastic anemia: retrospective study and literature review. Clin Ophthalmol 2014;8:777-87. https://doi.org/10.2147/OPTH.S62163
13. Weiss LM. Anemic retinopathy. Pa Med 1966;69:35-6.
14. Gupta V, Bremner FD, Telfer P. Bilateral retinal haemorrhages: an unusual presentation of pernicious anaemia. Br J Haematol 2001;112:831. https://doi.org/10.1046/j.1365-2141.2001.02689.x