Case Reports in Ophthalmology

Case Rep Ophthalmol 2023;14:535–539
DOI: 10.1159/000531999
Received: April 18, 2023
Accepted: June 29, 2023
Published online: October 11, 2023

Case Report

Bilateral Optic Disc Swelling with Persistent Visual Loss in Anemia: Case Report

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Keywords
Bilateral optic disc swelling · Anemia · Non-arteritic anterior ischemic optic neuropathy · Case report

Abstract
A 56-year-old man with a medical history of alcoholic cirrhosis presented with acute bilateral loss of vision. On admission, the patient had pale skin and low arterial pressure. Ophthalmic examination demonstrated a visual acuity of 6/9 in the right eye and the absence of light perception in the left. Automated perimetry revealed a superior altitudinal defect in the right eye. Optic disc swelling, flame-shaped hemorrhages, and several cotton-wool spots were evident in both eyes on fundoscopy. Lab results confirmed severe anemia. Following prompt correction of the anemia, the altitudinal defect remained unchanged. However, visual acuity in the right eye improved significantly in a few days. The potential association of anemia with both papilledema and non-arteritic anterior ischemic optic neuropathy (NA-AION) is discussed, with a focus on possible pathophysiological mechanisms. The necessity for routine anemia screening, encompassing complete blood count, serum iron, and vitamin B12 levels, and subsequent rapid correction in these patients, is emphasized.

Introduction

The occurrence of painless bilateral optic disc swelling accompanied by vision loss may prove a diagnostic challenge. The differential diagnosis is extensive and includes intracranial hypertension (idiopathic, due to venous sinus thrombosis, or a mass lesion), optic neuritis (inflammatory, infectious, or demyelinating), toxic-metabolic optic neuropathy, and anterior

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ischemic optic neuropathy. In this case report, clinical characteristics narrowed the differential diagnosis down to intracranial hypertension and bilateral non-arteritic anterior ischemic optic neuropathy (NA-AION). During the workup, however, anemia seemed to have played a pivotal role in the occurrence of the bilateral optic disc swelling and outcome.

Case Report

A 56-year-old man with a medical history of alcoholic cirrhosis (Child-Pugh A5) and chronic pancreatitis with pseudocysts was admitted because of acute painless vision loss in the left and right eyes for 5 and 3 days, respectively. Prior, he had experienced intermittent palpitations, a tingly sensation in the left hand, and a solitary episode of melena on the same day that he experienced vision loss in the left eye. Physical examination showed pale skin, normal hydration, and normal heart tones. Tenderness was detected in the epigastric area upon abdominal examination. Blood pressure was 89/61 mm Hg and heart rate 93 beats per minute. Electrocardiogram was normal.

On presentation, visual acuity was 6/9 in the right eye and no light perception in the left eye, accompanied by an afferent pupillary defect on the left side. Anterior segments were unremarkable. Fundoscopic examination revealed bilateral hyperemic swollen discs, hemorrhages at the disc margins, macular edema, tortuous swollen retinal veins, narrow arteries, several cotton-wool spots, and flame-shaped hemorrhages in all four quadrants (shown in Fig. 1, 2). Fluorescence angiography showed no delayed filling of the veins and confirmed bilateral optic disc leakage. Automated perimetry revealed a superior altitudinal defect in the right eye.

There were no signs of giant cell arteritis. Lab results showed severe anemia with a hemoglobin level of 3.8 g/dL and low mean corpuscular volume of 82.4 fL, a high platelet count of 596,000/mm^3, an iron level of 11 µg/dL, and a ferritin level of 9 µg/L. Both CRP and ESR were within normal range. Gamma glutamyl transferase was elevated (78 U/L). Vitamin B12 deficiency was ruled out (0.39 µg/L). Folate was within normal range (>20 µg/L) as well.

Computed tomography angiography of the brain and carotid arteries showed no space-occupying lesion, significant stenosis, or recent infarction. Computed tomography of the abdomen displayed pre-existing chronic pancreatitis with pseudocysts, without bleeding or signs of infection. Both gastroscopy and colonoscopy were normal. Subsequently, a video

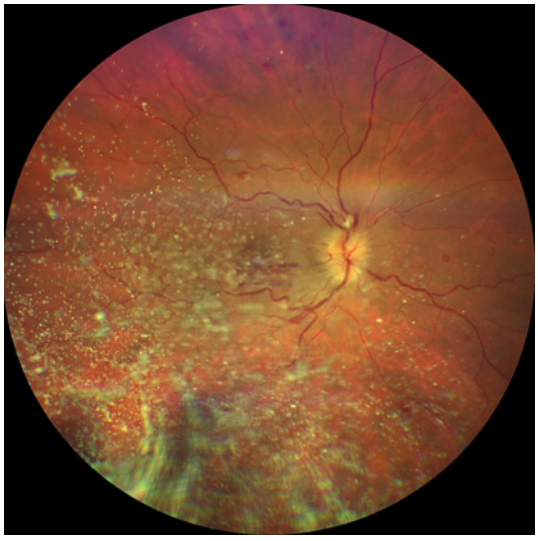

Fig. 1. Fundus picture of the right eye showing asteroid hyalosis, optic disc swelling, several cotton-wool spots, dilated and tortuous veins and flame-shaped hemorrhages in all four quadrants.

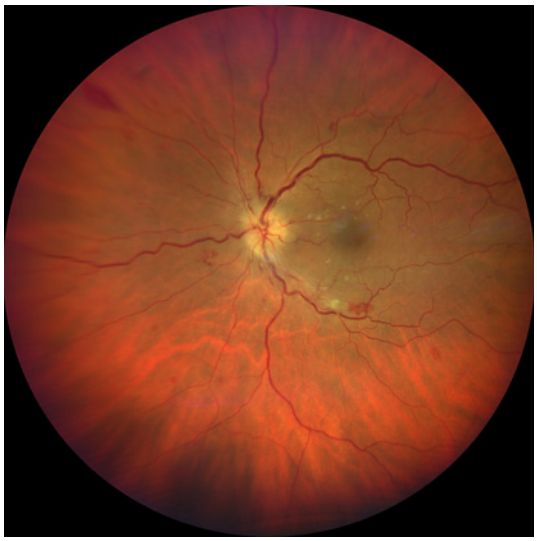

Fig. 2. Fundus picture of the left eye showing optic disc swelling, dilated and tortuous veins, several cotton-wool spots and flame-shaped hemorrhages.

capsule identified a recently healed antral ulcer without blood clots or active bleeding. Severe anemia resulting from a gastric ulcer causing bilateral optic disc swelling with possible hypoperfusion and NA-AION was retained as a working diagnosis.

Following blood transfusion, hemoglobin increased to 8.1 mg/dL. Optic disc swelling waned; vision in the right eye improved but did not recover in the left eye.

Discussion

The present case shares features of both NA-AION, i.e., an altitudinal visual field defect in the right eye, and anemic retinopathy displaying swollen optic discs, macular edema, and hemorrhages. Both papilledema due to intracranial hypertension and NA-AION may result from anemia.

Anemia and intracranial hypertension may be causally associated through several pathophysiological mechanisms. Anemia increases erythropoietin levels which trigger thrombocytopoiesis. As a result, thrombocytosis increases viscosity and clot formation [1]. Microcytic anemia due to iron deficiency may also increase viscosity with reduced cell deformability due to inhibition of thrombopoiesis by iron. This may be associated with both arterial and venous thrombosis [2, 3]. Hyperviscosity may subsequently increase venous pressure which then decreases cerebrospinal fluid resorption and increases intracranial pressure [2, 4].

Treatment of anemia in itself may improve optic disc swelling and vision, suggesting a direct association between optic disc swelling and anemia [2, 5]. In the case presented, correction of anemia improved vision in the right eye drastically in the short term. Since such improvement is less likely to occur in NA-AION, anemia seems to play a pivotal role in the present case.

The pathogenesis of NA-AION may encompass hypoperfusion of the optic nerve head and, more rarely, an embolic lesion. Bilateral NA-AION is most often reported after hypotension and/or anemia following dialysis and surgery [6]. In 2 cases of unilateral NA-AION, isolated anemia without hypotension was found [6, 7], and 2 cases of bilateral NA-AION revealed severe anemia [8, 9]. In animal models, anemia causes reduced oxygen delivery to the optic nerve [10]. The subsequent events in NA-AION are subclinical ischemia of the optic nerve head causing axoplasmic flow stasis in the optic nerve fibers which leads to axonal swelling

and disc edema. This causes compression of the capillaries in a crowded disc, and a vicious cycle is set in motion [11]. A crowded disc was not substantiated in the present case. However, in the presence of optic disc swelling caused by anemia, as stated before, a superimposed NA-AION, especially bilateral, seems more likely to develop.

Limitations in the present case: since the patient was hemodynamically unstable, a lumbar tap and magnetic resonance venography were impossible to perform. In order to objectify possible intracranial hypertension and exclude cerebral venous sinus thrombosis, respectively, both would have been helpful.

In conclusion, a review of literature suggests that both papilledema and NA-AION may be associated with anemia and always need to be included in the differential diagnosis of a patient presenting with bilateral optic disc swelling and painless loss of vision. Routine workup should include a complete blood count, serum iron, and vitamin B12. If anemia is present, prompt correction is crucial as it may limit optic nerve damage and enhance visual outcome. The CARE checklist has been completed by the authors for this case report, attached as online supplementary material (for all online suppl. material, see https://doi.org/10.1159/000531999).

Statement of Ethics

Written informed consent was obtained from the patient for publication of this case and images. Ethical approval is not required for this study in accordance with local or national guidelines.

Conflict of Interest Statement

The authors have no conflicts of interest to declare.

Funding Sources

The authors have no funding or sponsorship to disclose.

Author Contributions

Kim Van Langenhove wrote the paper. Marcel Ten Tusscher revised and edited the paper.

Data Availability Statement

All data are included in this article and its supplementary material files. Further inquiries can be directed to the corresponding author.

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