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RESEARCH ARTICLE OPEN ACCESS

BILATERAL CENTRAL RETINAL VEIN OCCLUSION IN A 40-YEAR-OLD MAN WITH SEVERE CORONAVIRUS DISEASE 2019 (COVID-19) PNEUMONIA

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ABSTRACT

The authors are commenting on the study entitled**:** "Bilateral central retinal vein occlusion in a 40-year-old man with severe coronavirus disease 2019 (COVID 19) pneumonia" published by Waqar *et al.* in Am J Case Rep 2020;21:e927691-1-e927691-5, which reported the first case of bilateral central retinal vein occlusion in a 40-year old man with severe coronavirus disease 2019 (COVID-19) pneumonia. The authors concluded that the COVID-19 pneumonia combined with hypertension and morbid obesity led him to an inflammatory state that resulted in bilateral central retinal vein occlusion. The lack of performing fluorescein angiography is the great limitation of this article. Fluorescein angiography would have been required in the presented case to make the complete diagnosis of disease, to establish the occlusion type (a milder form called nonischemic or a severe form called ischemic) of the bilateral central retinal vein occlusion, and to explain why the final visual acuity to the left eye remained significantly low (e.g., half the normal value) when discharged from the clinic.

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INTRODUCTION

The article by Waqar *et al*. (2020) reported the case of a 40-year-old man who presented with a 3-day history of shortness of breath, cough, fever,right calf pain, and blurring of vision in both eyes. The patient was found to have severe COVID 19 penumonia on high-resolution computed tomography of the chest, right leg deep venous thrombosis on Doppler ultrasonography, and bilateral central retinal vein occlusion (CRVO).The authors concluded that the COVID-19 pneumonia combined with hypertension and morbid obesity led him to an inflammatory state that resulted in bilateral CRVO. I would like to address several challenges that have arisen from this study, which can be specifically summarized below.

First, taking into account the findings of clinical and systemic examinations e.g., the patient's age, the blurring of vision reported in both eyes, the decreased visual acuity (6/9 in the left eye and 6/18 in the left eye), the fundus changes (bilateral dilated and tortuous veins, widespread cotton wool spots, dot and blot intraretinal hemorrhages, and optic disk edema), and the existence of the systemic viral infection, we interpreted this case as a COVID-19 infection-emergent bilateral papillophlebitis more pronounced in the left eye, considering that the patient's extensive thrombophilia workup was negative. Papillophlebitis is a rare subtype of CRVO encountered in patients younger than 50 years with a hyperviscosity syndrome and/or inflammatory condition, but it differs from traditional CRVO in that the underlying cause of venous insufficiency is presumed to be central retinal vein inflammation at the optic nerve head. Patients with papillopblebitis have a healthy circulatory system in comparison with patients with retinal vein occlusion, where microcirculation is clearly damaged by hypertension. Unlike the vast majority of patients with papillophlebitis at which the specific cause or even the contributing causes remain unknown, the reported case in this article is part of the unusual cases in which the etiology is known (Fong *et al*., 1993).

Second, the authors documented only the systemic framework of the emergence of venous thromboembolism in severe COVID-19 infection, namely, the elevated inflammatory markers that may have triggered a hyperinflammatory response and cytokine cascade as well as the systemic risk factors including controlled hypertension, morbid

obesity, and right ventricular dilatation. However, the likely local underlying mechanism of transmission of the systemic hyperinflammatory state to the central retinal vein (central retinal vein–related inflammation) was not highlighted by the authors of this article. In this context, the following risk factors should be considered (Călugăru *et al*. 2016): the natural constriction of central retinal vein at the site of the lamina cribrosa, the lamina cribrosa rigidity, and the inflammation of the optic disc leading to compression and inflammation of the central retinal vein (focal phlebitis/periphlebitis) and venous insufficienty resulting in decreased blood flow, increased blood viscosity, local turbulence, and endothelial lesions with intimal proliferations at the level of lamina cribrosa (inflamed optic nerve head-sited CRVO).

Table 1. Conditions that should be differentiated from the reported case

Diabetic retinopathy	Inflammatory optic neuropathy
Hypertensive retinopathy	Behcet's disease
CRVO in patients older than 50 years	Sarcoidosis
Eales disease	Systemic lupus erythematosus
Sickle cell disease	Tuberculosis
Ischemic optic neuropathy	Syphilis
Optic disc swelling	Lyme disease
Papillary drusen	Purtscher retinopathy
Antiphospholipid antibody syndrome	Dysproteinemias
Hyperhomocysteinemia	Aquired immunodeficiensy syndrome
Retinal vein prethrombosis	Radiation retinal vasculopathy
Carotid artery disease	Medications (oral contraceptives, diuretics, sympathpmimetics)

Third, the differential diagnosis of this case had to be done with other diseases that cause intraretinal hemorrhages and disc swelling (Table 1) (Călugăru *et al.* 2016). The differentiation was quite easy taking into account the age as well as the clinical, hematologic and hypercoagulability evaluations of this reported case.

Forth, the lack of performing fluorescein angiography (FA) is the great limitation of this article. Even if the importance of FA as an invasive procedure has declined in daily clinical practice, it is indispensable in assessing the dynamics of retinal capillaropathy, which is present immediately after the onset of occlusion, involving the entire retina and including the macular region (e.g., normal retinal arterial and choroidal filling, delayed retinal venous filling, variable staining of the large walls of the retinal veins, and variable retinal vascular leakage resulting in retinal and macular edema (Călugăru *et al.* 2016a; 2016b).

FA would have been required in the presented case to make the complete diagnosis of disease, to establish the occlusion type (a milder form called nonischemic or a severe form called ischemic) of the bilateral CRVO/ papillophlebitis, and to explain why the final visual acuity to the left eye remained significantly low (e.g., half the normal value) when discharged from the clinic.

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