• Letter to the Editor •

Purtscher-like retinopathy associated with COVID-19: a case report

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Dear Editor,

We report a case of Purtscher-like retinopathy in a patient with coronavirus disease 2019 (COVID-19). Fundus examination revealed extensive peripapillary white retinal patches (Purtscher's flecken) and cotton-wool spots (CWS) with minor hemorrhage bilaterally, consistent with Purtscher-like retinopathy. Optical coherence tomography angiography (OCTA) showed multiple irregular areas of capillary nonperfusion. Remarkably, the patient had normal coagulation function, hemorheology, and general condition. The retinopathy resolved spontaneously after two months, with improved vision. The study adhered to the Declaration of Helsinki guidelines. Written informed consent has been obtained from the patient to publish this paper.

CASE PRESENTATION

A patient presented with reduced visual acuity after recovering from COVID-19, 10d post-initial symptoms. The right eye had best corrected visual acuity of 20/400, while the left eye was 20/25, with normal intraocular pressure. Fundus examination revealed peripapillary white retinal patches (Purtcher's flecken), CWS, and minor hemorrhage, indicative of Purtscher-like retinopathy (Figure 1). OCTA and spectral domain-optical coherence tomography (SD-OCT) scans confirmed capillary nonperfusion, inner retinal hyperreflectivity, and subretinal fluid. Rheumatic immunity tests and pathogen screenings were normal, ruling out other causes. Diagnosis of Purtscher-like retinopathy associated with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was made based on clinical findings and history of COVID-19.

Given the absence of coagulation abnormalities, no medication was prescribed. At the 2-month follow-up, best corrected visual acuity improved to 20/20 in both eyes, with fading of retinal lesions and complete absorption of subretinal fluid, confirmed by SD-OCT imaging. The nerve fiber layer was thinned in the areas previously affected by Purtscher's flecken, confirming the ischemic nature of the edema (Figure 2).

DISCUSSION

COVID-19, declared a pandemic in March 2020, has resulted in over 700 million confirmed cases and 6 million deaths globally. China saw a surge in infections by late 2022, coinciding with policy adjustments for prevention and control. During this period, a patient exhibited Purtscher-like retinopathy post-COVID-19 recovery.

The virus primarily affects the respiratory system and triggers a hyperinflammatory response, leading to multiorgan complications due to angiotensin-converting enzyme 2 (ACE2) receptor presence in various organs. To date, many ocular diseases have been reported to be associated with COVID-19, including posterior ischemic optic neuropathy, central retinal artery and vein occlusion, and acute macular neuroretinopathy[1-2]. This thromboembolic sequela is associated with thrombo-inflammation and endothelial cell injury and is believed to be mediated by excessive inflammatory cytokine production. The primary receptor for SARS-CoV-2 is determined to be ACE2, an important enzyme located in cell membranes[3-4]. ACE2 is mostly found in arterial and venous endothelium cells, arterial smooth muscle cells in most organs, lung type II alveolar cells, and retina cells[5-6]. As a result, SARS-CoV-2 can infect microvessels of the human eye *via* ACE2. We assume that SARS-CoV-2 enters cells through ACE2 and causes microthrombosis within precapillary arterioles of the retina, resulting in the appearance of Purtscher-like retinopathy.

Purtscher-like retinopathy characterized by Purtscher's flecken, CWS, and few retinal hemorrhages, focused at the

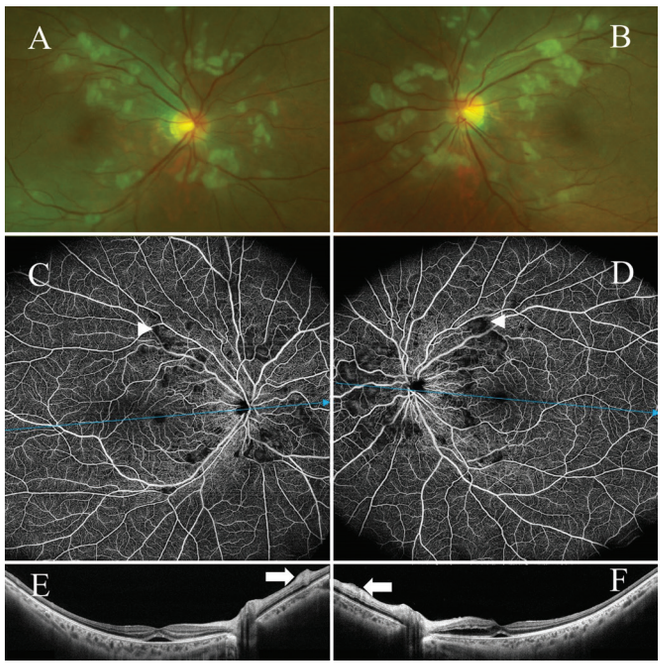

Figure 1 Ophthalmic examination of the patient's first visit Fundus photographs (A, B) show polygonal areas of retinal whitening and intraretinal hemorrhage around the optic disc. OCTA (C, D) displays irregular areas of capillary nonperfusion (white arrowheads) associated with the observed retinal changes, including Purtcher's fleckens and CWS. SD-OCT (E, F) reveals hyperreflectivity of the inner retinal layer (white arrows) surrounding the optic disc with subretinal fluid in the right eye and hyperreflectivity and thickening of both the inner and middle retinal layers (white arrows) with subretinal fluid in the left eye, indicating more severe ischemia. OCTA: Optical coherence tomography angiography; SD-OCT: Spectral domain-optical coherence tomography; CWS: Cotton-wool spots.

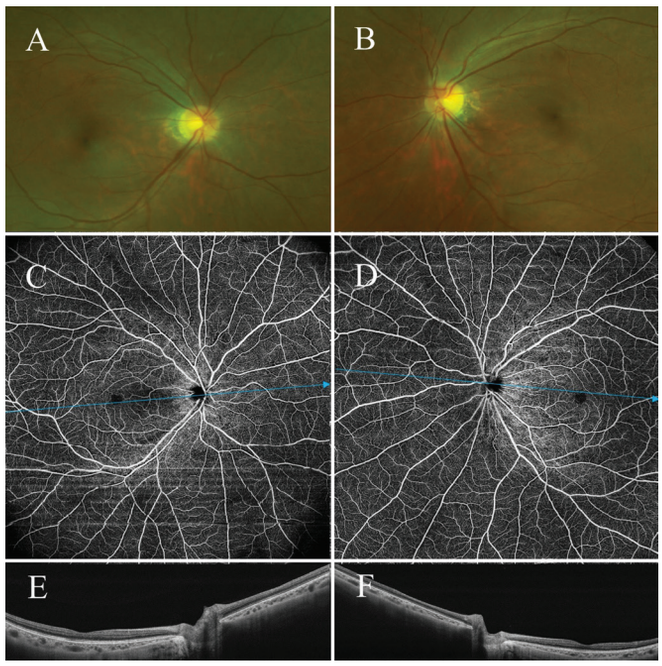

Figure 2 Ophthalmic examination of the patient two-month follow-up Fundus photographs (A, B) show fading of Purtscher's fleckens, cotton wool spots, and intraretinal hemorrhage. OCTA (C, D) demonstrates disappearance of areas of capillary nonperfusion. SD-OCT (E, F) reveals normal retinal structure in both eyes. OCTA: Optical coherence tomography angiography; SD-OCT: Spectral domain-optical coherence tomography.

posterior pole, is the term used to describe cases not associated with trauma. Purtscher's fleckens are polygonal, well-defined areas of retinal whitening because of occlusion of the precapillary arterioles in the intermediate and deep capillary plexuses, which was demonstrated in the fundus photos of the case we have presented here (Figure 1A and 1B). SD-OCT showed areas of hyperreflectivity of the inner layers consistent with ischemia of the deep capillary bed. This contrasted with CWS, which had ill-defined edges and were located superficially over vessels. OCTA in our case confirmed retinal ischemia (Figure 1C and 1D).

Mbekeani *et al*[7] reported a case of Purtscher-like retinopathy in a patient with COVID-19. However, the D-dimer, fibrinogen, and C-reactive protein levels were markedly elevated, indicating preceding prothrombotic and proinflammatory states, which is markedly different from our patients' presentation. In addition, Rahman *et al*[8] described a 58-year-old male who developed Purtscher-like retinopathy after being discharged from the hospital for severe COVID-19 pneumonia and disseminated intravascular coagulation (DIC). Our patient did not have particularly serious manifestations of COVID-19 infection and abnormalities in coagulation function when she came for ophthalmological examination. A possible hypothesis is that SARS-CoV-2 could still cause a primary occlusive event within retinal precapillary arterioles when significant coagulation dysfunction disappears, leading to the appearance of Purtscher-like retinopathy. This is also the reason why our patient has a relatively good prognosis. However, further research is needed to confirm this hypothesis.

In summary, a young female patient with COVID-19 developed Purtscher-like retinopathy, characterized by Purtscher's fleckens near the optic disc in both eyes. Although rare, this complication can pose a threat to vision. Visual prognosis varies based on initial ischemic severity, with potential for improvement over time, as observed in our patient without therapeutic intervention.

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Conflicts of Interest: Liu WB, None; **Cai Y,** None; **Zhou M,** None; **Kinji H,** None; **Zhao MW,** None; **Shi X,** None.

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