

Unilateral Purtscher-like retinopathy post-COVID-19

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A 32-year-old male with no known systemic illness presented with unilateral Purtscher-like retinopathy in his left eye 2 weeks after recovering from a severe COVID-19 infection. Fundus examination revealed areas of intraretinal whitening and few cotton wool spots. Multimodal imaging findings were consistent with embolic occlusion of capillaries seen in Purtscher-like retinopathy. The case highlights the effect of virus-directed coagulation cascade activation leading to unilateral microvasculopathy in our patient. The case adds to the spectrum of COVID-19 retinopathy and presses that retina screening strategies should be established for patients suffering from or recovering from severe COVID-19 infection.

Key words: COVID-19, COVID-19 retinopathy, Purtscher-like retinopathy

Into the third year of the pandemic and the ophthalmic manifestation of COVID-19 keeps expanding. The initial ocular spectrum of COVID-19 were conjunctivitis and occasional cotton wool spots. But now COVID-19 retinopathy associated with microvascular alteration is a well-known spectrum. These vaso-occlusive^[1] and embolic spectrums have been attributed to the activation of complement pathways causing enhanced clot formation and altered vascular bed resistance, leading to a pro-inflammatory and platelet aggregation state. This in turn leads to micro thrombosis and infarctions.

It has been observed that COVID-19 retinopathy is more in patients who have suffered severe COVID-19 pneumonia. The SERPICO 19^[2] study reported a direct correlation of COVID-19 severity with retinal vein diameter.

We report a case of unilateral Purtscher-like retinopathy in a 32-year-old male 2 weeks after getting treated for severe COVID-19 pneumonia for which he was on life support. The case adds to the spectrum of COVID-19 retinopathy and

stresses the correlation between severe COVID-19 diseases and the vaso-occlusive spectrum of the retina.

Case Report

A 32-year-old male with no known past systemic illness presented to us with blurring of vision in his left eye (OS). The patient had suffered severe COVID-19 pneumonia in the preceding weeks. The patient was on a life support care system for 1 week. His D-dimer, LDH, and serum ferritin levels were 2.0g/l, 1300 IU, and 910 ug/L, respectively, at the time of intensive care unit (ICU) admission. The patient was on remdesivir and steroids. He also received fresh frozen plasma during his hospital stay.

The patient observed a diminution of vision in his left eye after 2 weeks of being discharged from the ICU. He presented to us with 20/20 N6 (OD) and 20/160 N48 (OS). Relative afferent pupillary defect (RAPD) was noted in the left eye. Fundus evaluation revealed mild temporal disc pallor, cotton wool spots (CWS), and areas of ill-defined retinal whitening located near the posterior pole [Fig. 1a]. No dot-blot hemorrhages were noted at the posterior pole or in the periphery.

A 6 × 6 mm SS-OCTA (PLEX® Elite 9000; Carl Zeiss Meditec, Inc, Dublin, CA) scan revealed areas of dropped vessels and flow void areas corresponding with areas of CWS and retinal whitening [Fig. 1b]. A structural En Face image revealed corresponding areas of whitening on the posterior pole [Fig. 1c]. An HD 51OCT scan showed areas of thickening and hyperreflectivity of the nerve fiber layer (NFL) [Fig. 1d]. Fundus fluorescein angiography revealed multiple areas of hypofluorescence, especially temporal to optic nerve, which corresponded with retinal thickening and hyperreflectivity of NFL [Fig. 1e]. An Humphrey Visual Field (HVF) 24-2 revealed generalized field depression.

Given recent COVID-19 hospitalization, steroids were restrained. The patient was counselled and started on non-steroidal anti-inflammatory drugs (NSAIDs) and reviewed after 2 months. The patient recovered with best-corrected visual acuity (BCVA) 20/20 N10 (OS). HD 51 scan revealed decreased inner retinal edema and whitening [Fig. 1f] compared to previous visit in the area of papillomacular bundle.

Discussion

With over 5 billion cases worldwide, the spectrum of SARS-CoV-2 has expanded from respiratory to multiorgan involvement. Casagrande *et al.*^[3] in May 2020 confirmed the presence of SARS-CoV-2 nucleic acid in the human retina and aqueous humor. Tao *et al.*^[4] confirmed that ACE2 receptor activation leads to an inflammatory response in human retinal pigment epithelial (RPE) cells. The list of varied spectrums of

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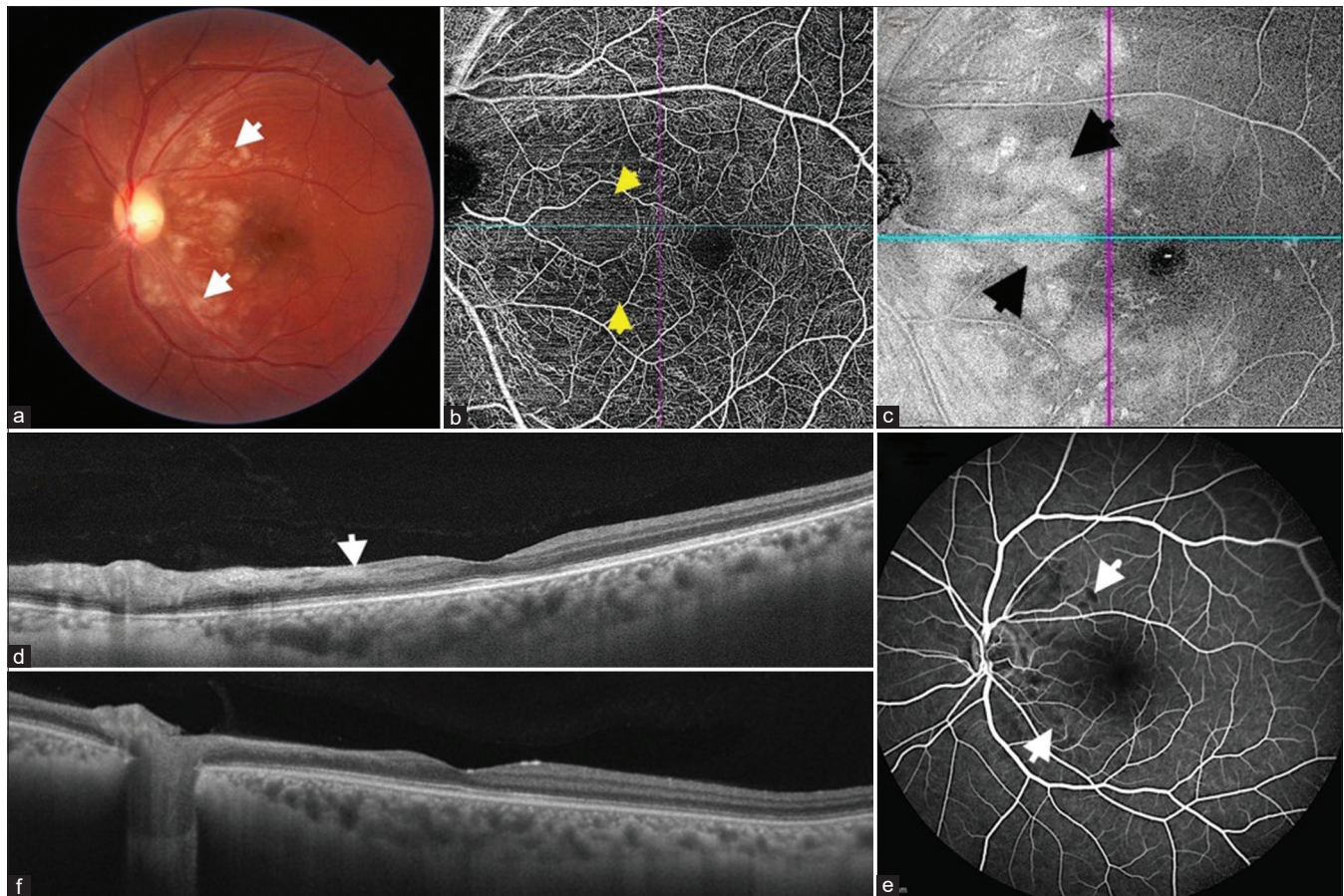


Figure 1: (a) Color photo cotton wool spots (CWS) and areas of ill-defined retinal whitening (arrows) located near the posterior pole. (b) 6×6 mm swept-source optical coherence tomography angiography (SS-OCTA) superficial slab shows corresponding areas of dropped vessels and flow void areas (yellow arrow). (c) Structural En Face image reveals areas of retinal whitening on the posterior pole (arrow). (d) HD 51OCT scan showing areas of thickening and hyperreflectivity of the nerve fiber layer (NFL) (white arrow). (e) FFA showing areas of hypofluorescence (arrow). (f) HD 51 scan revealed decreased inner retinal edema and whitening on follow up

the retina of COVID-19 from CWS to occlusive retinopathy keeps getting longer. The proposed pathogenesis for these pathologies is either the COVID-19-induced coagulation abnormalities or direct viral infection of the vascular endothelium leading to vasculitis and hence the outcomes.^[5]

We report a case of unilateral Purtscher-like retinopathy in a patient who recovered from severe COVID-19 pneumonia. The patient was on a life support system with high levels of inflammatory markers. The patient was in a cytokine storm which is a result of abnormally high concentrations of C5a.^[6] This further leads to a prothrombotic and embolic environment. Purtscher-like retinopathy has been related to the embolic phenomenon of capillary arterioles.^[7]

Rehman^[8] reported a case of bilateral Purtscher-like retinopathy in a patient of severe COVID-19 and disseminated intravascular coagulation. Bottini^[9] reported a case of bilateral Purtscher-like retinopathy (PLR) post severe COVID-19. Our patient had a unilateral ocular involvement post-COVID-19. The previous case reports of Purtscher-like retinopathy were reported in older individuals who also had other comorbidities like diabetes and hypertension. Hence the association of Purtscher-like retinopathy with COVID-19 was obscure. However, in this case, the patient was an otherwise healthy individual with no comorbidities. The patient with no ocular

symptoms pre-COVID-19 presented with specific retinal findings and visual loss post-COVID-19 infections, which directly correlate the association of the presentation to COVID-19 infection.

The absence of intraretinal hemorrhages or pathognomic fleckens^[10] were not reported in our patient. We suggest due to the delay in reporting, these findings might have been resolved. Since the beginning of this pandemic, when the initial case reports described only a few ocular pathologies like conjunctivitis there has been a marked change in observation. Initially a disease that seemed to have only a limited impact on the eye, COVID-19 later on was found to be associated with disastrous cases of endophthalmitis, vascular occlusions,^[1] and even mucormycosis. Thus, it becomes increasingly important to report any new pathology that would add to this spectrum.

Such cases also emphasize the importance of retina screening protocol to be made as a part of regular post-COVID-19 monitoring especially in patients who have been admitted to the ICU. This evaluation will reduce ocular morbidities and possibly prevent significant visual loss

Conclusion

Spectrum of post-COVID-19 ocular comorbidities has been increasing ever since the onset of the pandemic. Initially

thought to be benign, this pandemic later emerged as a potentially sight-threatening one leading to blindness and mutilation as well. The case highlights the importance of retina screening and an unmet need for the establishment of retina screening protocols to be established especially in those with moderate-to-severe illness.

Author contribution and consent

We were all involved in the care or decisions about the care of the patient. We were all involved in writing and approved the final manuscript. Written consent for publication was obtained from the patient.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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