Case Report

Vascular Occlusions triggered post Covid-19 infection

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Abstract *One of the ophthalmic complications seen following Covid19 infection is occlusive retinopathy. This occurs due to increased coagulopathy and inflammation which in turn is triggering the vascular events. Since end vessels are involved here, vision loss is significant. We report five such cases seen in our setup within a span of one month with varied presentations and deranged systemic parameters.*

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Introduction

COVID-19 infection which is known to be caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), has been linked to inflammation-induced homeostatic alterations that result in a severe coagulopathy with multi-organ involvement.[1] The pathophysiology of retinal vascular occlusions (RVO) is a multifactorial process where inflammation and hypercoagulation state are known risk factors.[2] There have been reports of conjunctivitis[3], or retinal microvascular alterations such as retinal microangiopathy[4], cotton wool spots and haemorrhages[5], acute middle maculopathy and acute macular neuroretinopathy[6], and papillophlebitis[7] in COVID-19 patients. Here we present a case series of five patients who developed vascular occlusion post Covid-19 infection (moderate to severe category) with myriad of presentations.

Case 1

A 62-year-old hypertensive male who experienced sudden decrease in vision in his right eye associated with mild ocular pain 2 days ago, presented to us with no perception of light. He had been admitted for COVID-19 infection 2 weeks back and had recovered from the same. On examination, right eye fundus findings included pale disc, pale retina, cherry red spot at the macula and multiple areas of cattle tracking (Figure 1). Left eye was within normal limits. In view of these findings, we suspected right eye Ophthalmic Artery Occlusion (OAO), advised him an occlusion profile and explained the visual prognosis. He was referred to a cardiologist on urgent basis. His investigation revealed raised D-Dimer levels (2.5 μg/ml) and he was started on oral dual anti platelet therapy by the cardiologist.

Case 2

An 80-year-old hypertensive male presented with sudden painless vision loss in his right eye (Visual Acuity: PL+) since 4 hours. He was diagnosed COVID-19 positive 3 weeks back and underwent home isolation and treatment for the same. His right eye fundus revealed pale central retina with attenuated vessels and cherry red spot at the macula (Figure 2) suggestive of Central Retinal Artery Occlusion (CRAO). Since it was an early presentation, right eye paracentesis was done. He was urgently referred to a cardiology unit where they found a plaque at common carotid artery with 50% lumen narrowing on carotid doppler examination. He was started on oral anticoagulants and dual anti platelet drugs. At 6-weeks follow-up, he presented with mild ocular pain and was noted to have Neovascularisation of Iris (NVI) suggesting early stage of neovascular glaucoma. Thus, an aggressive pan retinal photo coagulation laser was done. On further follow up patient symptomatically got better.

Figure 1: *Fundus photo of right eye showing pale retina, cherry red spot at macula and vascular area of cattle tracking.*

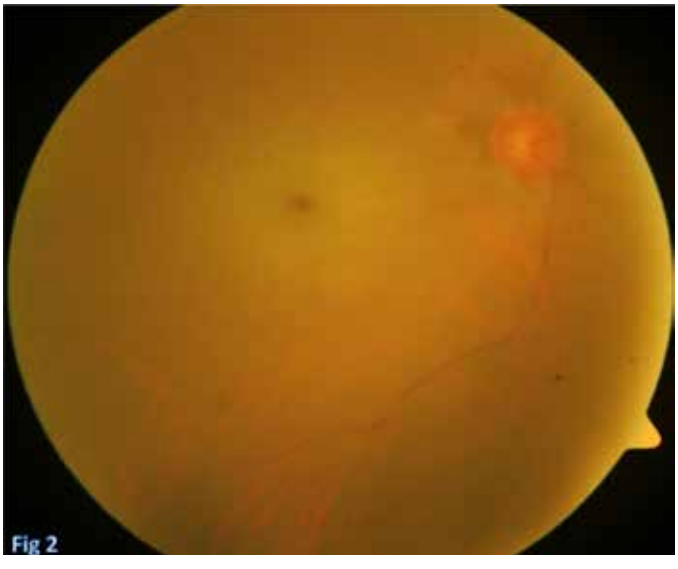

Figure 2: *Fundus photo of right eye showing pale central retina with attenuated vessels.*

Case 3

A 44-year-old diabetic male presented with sudden painless loss of vision in left eye since 3 days. He had history of hospital admission for COVID-19 and got discharged 10 days ago. He presented to us with best corrected visual acuity (BCVA) of 2/60 in left eye. Left eye fundus showed disc edema, dilated and tortous retinal veins, multiple superficial and deep haemorrhages with macular thickening (Figure 3) denoting central retinal vein occlusion (CRVO) with cystoid macular edema. He was investigated further and found to have raised D-Dimer (3 μg/ml) and altered serum homocysteine (34 mcmol/L). He was treated with intravitreal Anti-VEGF injection (Ranibizumab) after strict control of systemic condition. Post 3 loading doses of Anti-VEGF injection, his BCVA improved to 6/60 with macular thinning noted on the optical coherence tomography (OCT).

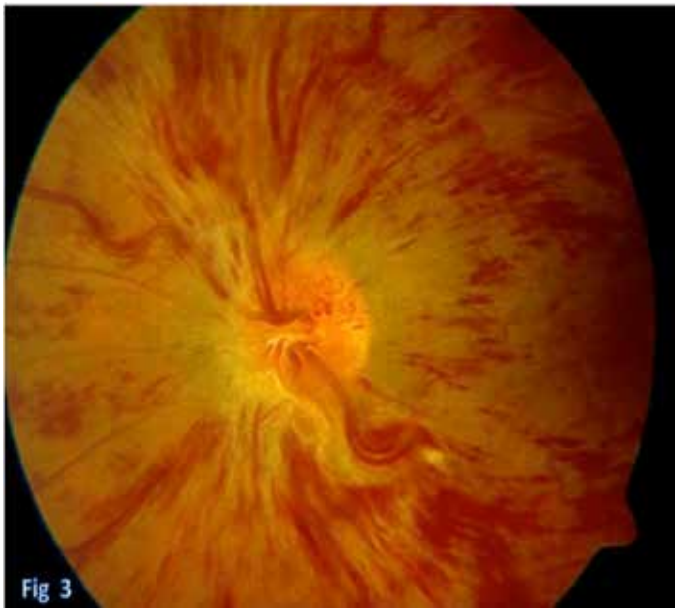

Figure 3: *Fundus photo of left eye showing 360 degree multiple superficial and deep hemorrhages with macular thickening.*

Case 4

A 35-year-old diabetic male had history of hospital admission for COVID-19 six weeks ago. 1 week after the discharge, he was diagnosed with left sided Mucormycosis of the sinuses (Stage 3 ROCM) and underwent Functional Endoscopic Sinus Surgery (FESS). He was then referred to the ophthalmology department for ocular evaluation. He presented to us with history of dimness of vision (BCVA: PL) in left eye with mild ptosis, mild proptosis (Figure 4a) and ophthalmoplegia since 1 week. His fundus showed pale retina with cherry red spot at the macula (Figure 4b) suggestive of CRAO. He was advised to continue oral anti-platelet and systemic antifungal medication as advised by the physician. Poor visual prognosis was explained.

Case 5

A 32-year-old male presented with complaint of sudden appearance of black spot in front of the left eye (BCVA: Right eye: 6/6, Left eye 6/9). He had history of hospital admission for COVID-19 3 weeks back and got recovered from the same. His fundus in the left eye showed area of retinal whitening in the nasal half (Figure 5a) which was appeared like isolated branch retinal arterial occlusion on the OCT (Figure 5b). He was further investigated and found to have raised serum homocysteine (28 mcmol/L) and altered lipid profile (triglycerides 277 mg/dL). He was referred to a cardiologist where he was started on oral anti platelet therapy.

Discussion

COVID-19 infection has been shown to cause inflammation-induced homeostatic abnormalities in the venous and arterial circulation, predisposing to thrombotic disease [1]. The incidence of thromboembolic events in COVID-19 patients is now being investigated, with early findings revealing that patients with more severe illness had considerably longer

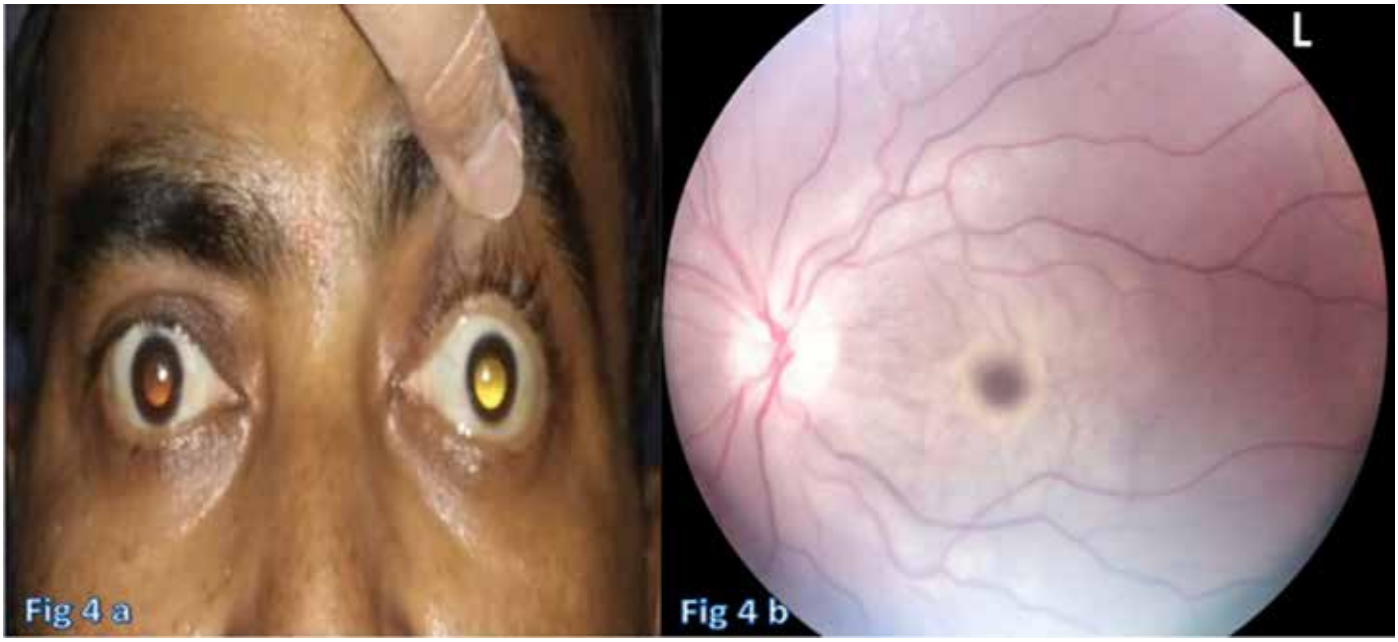

Figure 4: (4a) *Photo showing left eye mild proptosis with yellow fundal glow.* ***(4b)*** *Fundus showing pale retina and cherry red spot at fovea*

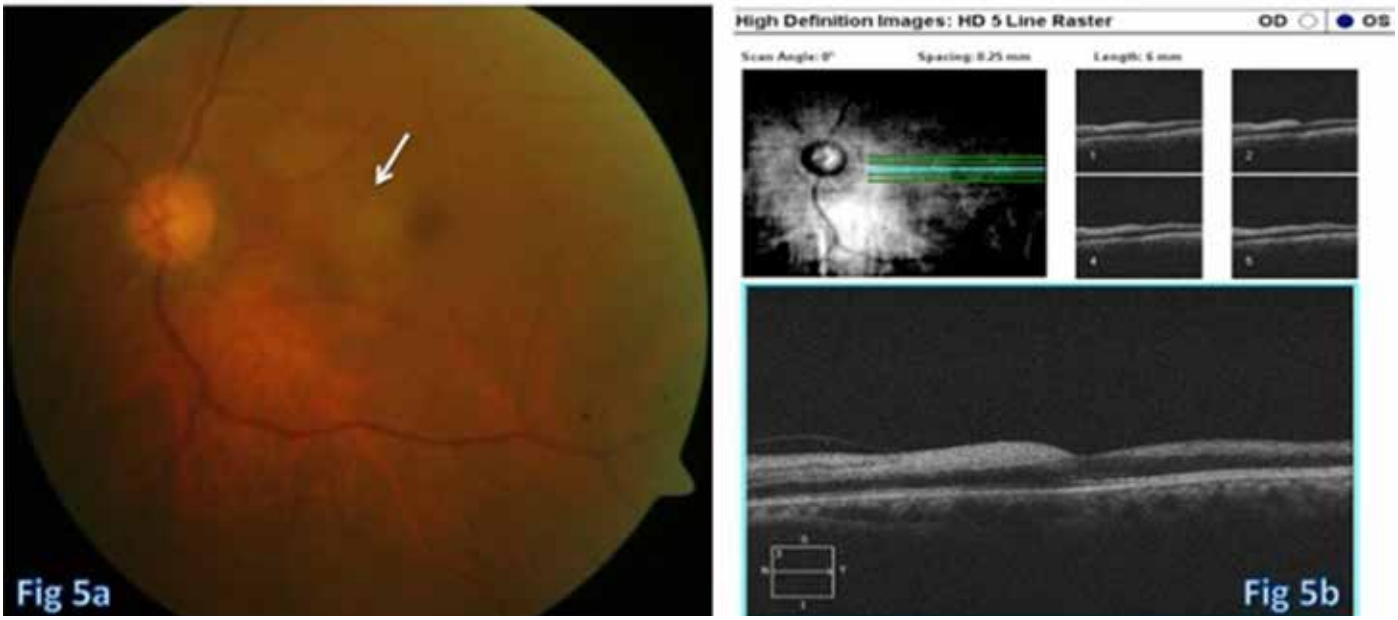

Figure 5: (5a) *Fundus photo of left eye showing small area of retinal whitening near fovea (white arrow).* ***(5b)*** *OCT left eye passing through macula shows hyper-reflectivity in inner retinal layers nasal to the fovea.*

prothrombin times, higher D-dimer and Homocysteine levels, and higher concentrations of proinflammatory cytokines and biomarkers of inflammation like C-reactive protein and Interleukin-6. This clearly indicates the possibility of disseminated intravascular coagulation or thrombotic microangiopathy.[8]

The potential influence of COVID-19 illness on retinal vascular circulation and the formation of retinal vascular disease might be explained by three mechanisms:

1. A pseudo-vasculitis state as a result of viral infiltration of endothelial cells.[9]
2. A hypercoagulable condition triggered by disseminated intravascular coagulation-like events.[10]
3. Posterior compressive retinopathy secondary to fungal inflammation and invasion.

A summary of all 5 cases has been listed in Table 1.

We underline the need of a thorough posterior segment examination in COVID-19 positive cases and lookout for acute visual complaints and indicators of thrombotic consequences such as vascular occlusions. Before initiating treatment in such cases, it is imperative to get a thorough systemic check-up done, especially the coagulation profile. In all our cases, we could find an abnormality either in the coagulation pathway or in the systemic circulation. Hence, simultaneous systemic therapy with anti-coagulants or anti platelets in accordance with a physician is extremely crucial in treatment of these cases.

Conclusion

A thorough systemic evaluation is must before initiating ophthalmic treatment; especially in post COVID occlusive retinopathies. A multidisciplinary approach in cases of vascular occlusions is the way to go ahead.

Table 1: A summary of all 5 cases has been listed below

SR. No.	Age/ Sex	Duration since Covid positivity	Eye involved	Symptoms	Time since onset of ocular symptoms	Systemic history	Vision	IOP mmHg	Diagnosis	Deranged Investigations
1	62/M	2 weeks	Left	Ocular pain & dimness of vision	2 days	Hypertension	No PL	16	Ophthalmic artery occlusion	d-Dimer, lipid profile
2	80/M	3 weeks	Right	sudden painless vision loss	4 hrs	Hypertension	PL	24	Central retinal artery occlusion	Carotid Doppler,d-Dimer
3	44/M	4 weeks	Left	sudden painless vision loss	3 days	Diabetes	2/60	14	Central retinal vein occlusion	HbA1c, d-Dimer, blood pressure
4	35/M	6 weeks	Left	dimness of vision, mild ptosis, mild proptosis, ophthalmoplegia	7 days	Diabetes	PL	16	Central retinal artery occlusion	HbA1c, d-Dimer, Lipid profile
5	32/M	3 weeks	Left	sudden appearance of black spot	7 days	Nil	6/9	12	Branch retinal artery occlusion	Homocysteine, lipid profile

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