Exudative retinal detachment in COVID-19 - associated rhino-orbital mucormycosis – A rare clinical finding

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Rhino-orbital-cerebral mucormycosis is a life-threatening, opportunistic invasive fungal infection. Patients with moderate to severe coronavirus disease 2019 (COVID-19) infection are more vulnerable to it. Varied clinical presentations can be seen in patients with orbital mucormycosis starting from conjunctival chemosis, proptosis, ptosis, restriction of extraocular movements, exposure keratitis, neurotrophic keratitis, and central retinal artery occlusion. Exudative retinal detachment in a patient with orbital mucormycosis is a rare clinical entity. We, hereby, report a case of orbital mucormycosis with exudative retinal detachment in a patient post-COVID-19 infection.

Key words: COVID-19, exudative retinal detachment, orbital mucormycosis

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There is a massive spike of rhino-orbital-cerebral (ROC) mucormycosis in coronavirus disease 2019 (COVID-19) patients during the second wave of the pandemic in India.[1,2] Mucormycosis is an aggressive, opportunistic invasive fungal infection. Patients with moderate to severe COVID-19 illness, uncontrolled diabetes mellitus, nephropathy, and immunosuppressants are more prone to it.[3] Ocular manifestations of mucormycosis can be varied from conjunctival chemosis, proptosis, ptosis, restriction of extraocular movements, relative afferent pupillary defect, exposure keratitis, neurotrophic keratitis, central retinal artery occlusion, and orbital infarction syndrome.[4] Serous retinal detachment (RD) in mucormycosis is a rare clinical finding – one case reported previously by Kim *et al*.[5] We, hereby, report a case of exudative RD secondary to orbital mucormycosis in a patient with COVID-19 infection.

Case Report

A 63-year-old male diabetic patient presented with acute onset of gross diminution of vision and drooping of the upper eyelid in the right eye (RE) associated with headache, retro-orbital

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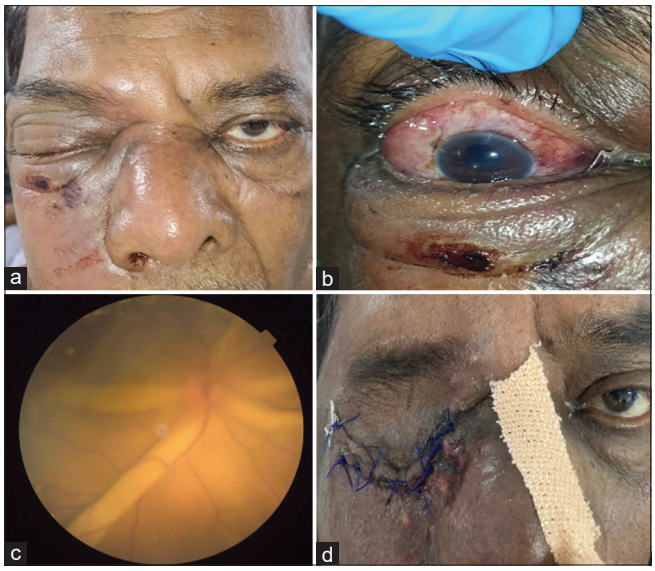

Figure 1: Clinical photographs showing (a) complete ptosis and (b) conjunctival chemosis in the right eye. (c) Fundus image of the right eye showing diffuse disc pallor with total exudative retinal detachment and (d) clinical photograph of the right eye postexenteration

pain, facial puffiness, and blackish nasal discharge for 4 days. He had tested positive for COVID-19 by RT-PCR (reverse transcription polymerase chain reaction) 14 days ago and was advised of home isolation. The patient did not receive systemic steroids for the management of COVID-19 infection.

On examination, diffuse facial edema with periorbital edema, complete ptosis with axial proptosis, and restricted ocular movements in all directions of the RE were noted [Fig. 1a]. Best corrected visual acuity in the RE was light perception with an inaccurate projection of rays in all quadrants, and in the left eye (LE), it was 20/32. Intraocular pressure was measured as 17 mmHg in RE and 13 mmHg in LE. Anterior segment examination of the RE showed diffuse conjunctival congestion with chemosis [Fig. 1b]. The pupil was 4 mm, round, and fixed. Fundus examination of the RE showed diffuse disc pallor with a total exudative RD and retinal folds [Fig. 1c]. The anterior segment and the fundus examinations were normal in the LE.

Systemically, the patient was diagnosed to have acute kidney injury with a blood urea of 108 mg/dL and creatinine of 1.58 mg/dL. Random blood glucose was 508 mg/dL and Hb1AC (glycated hemoglobin) was 17.8, but urine was negative for ketones. Ultrasound B scan of the RE showed exudative RD, thickening of the retina–choroid–sclera (RCS) complex and minimal subtenon fluid suggestive of scleral inflammation [Fig. 2a]. Contrast-enhanced computed tomography showed pansinusitis with bony erosion of the medial orbital wall, with involvement of the medial and inferior extraconal spaces, and bulkiness of the medial and inferior recti [Fig. 2b]. There was no evidence of intraconal involvement or optic nerve involvement. Initial management included intravenous liposomal amphotericin B and functional endoscopic sinus surgery (FESS). But due to the extensive orbital involvement (Stage 3c) and no vision, the patient had to undergo subsequent exenteration [Fig. 1d].[6] KOH (potassium hydroxide) wet mount of the tissue biopsy sample obtained during surgery showed broad aseptate hyphae, which on subsequent culture had grown *Rhizopus* species.

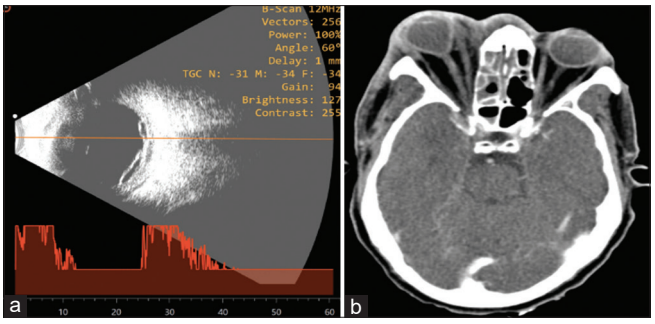

Figure 2: (a) Ultrasound B scan of the right eye showing exudative retinal detachment, thickening of the retina–choroid–sclera (RCS) complex and minimal subtenon fluid suggestive of scleral inflammation, (b) Contrast-enhanced computed tomography image showing pansinusitis with bony erosion of the medial orbital wall, with involvement of the medial and inferior extraconal spaces, and bulkiness of the medial and inferior rectus muscle

Discussion

During the second wave of the COVID-19, there has been a nationwide rise in the cases of rhino-orbital mucormycosis. The major causes responsible for the high incidence of mucormycosis have been hypothesized as the following: Easy germination of the *Mucor* spores in the hypoxic environment, raised blood sugar levels, development of an acidic medium (metabolic acidosis, diabetic ketoacidosis), use of immunosuppressives (systemic corticosteroids), and long duration of hospital stay.[7] Besides, COVID-19 can also cause severe pneumonia and alveolointerstitial disease, which can predispose the sinuses to invasive fungal infections. About half of the patients present with uncontrolled blood sugars, and the majority of them have diabetic ketoacidosis. ROC mucormycosis has been diagnosed in patients with active COVID-19 infection as well as in post-COVID-19 cases.[1,3,6] Our case developed mucormycosis 2 weeks after being tested positive for severe acute respiratory syndrome coronavirus 2 and had uncontrolled blood sugars and acute kidney disease at presentation.

The commonly reported retinal manifestations of orbital mucormycosis include optic disc edema, choroidal folds, and retinal vascular occlusions.[8] Exudative RD in a case of orbital mucormycosis is a rare entity. Kim *et al*.[5] were the first to report a case of orbital mucormycosis with inferior exudative RD and focal necrotic lesions on the retina.[5] Our case also presented with such a rare clinical presentation of mucormycosis with total exudative RD.

Orbital and intraocular manifestations in orbital mucormycosis result due to angioinvasion and intra-arterial spread of the fungus. Ischemic necrosis of the orbital nerves and thrombus formation in the blood vessels are the common pathological findings. Optic disc edema can result from compressive neuropathy secondary to orbital abscess formation. Central retinal artery occlusion results from angioinvasion and thrombus formation within the retinal vessels.[8] Kim *et al*.[5] had proposed a similar possible mechanism for serous RD in mucormycosis. Obstruction of the choroidal vessels by the necrotic fungal material can incite choroidal inflammation resulting in serous RD. The other possibility is that the necrotic fungal material can induce adjacent scleritis and subsequent exudative RD.

Early diagnosis is based on the clinical and radiological findings; prompt intervention with intravenous antifungals

and surgical debridement (FESS); microbiological and histopathological confirmation of the diagnosis are all key factors for better outcomes in terms of vision or globe salvage and patient survival. Our patient needed exenteration despite an initial FESS surgery, thereby reflecting the severity of the orbital involvement.

Conclusion

Exudative RD can be a rare retinal manifestation of orbital mucormycosis. It can indicate an associated choroidal and scleral inflammation and, therefore, an extensive orbital involvement.

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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