COVID-19 and orbital mucormycosis

Dear Editor,

The 2019 novel coronavirus (2019-nCoV) or severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) first reported in Wuhan, Hubei province in China, quickly spread to other parts of the world forming a global pandemic.[1] The disease pattern of COVID-19 can range from mild to life-threatening pneumonia with associated bacterial and fungal coinfections.[2] Due to the associated comorbidities (e.g., diabetes mellitus, chronic obstructive pulmonary disease) and immunocompromised conditions (e.g. corticosteroid therapy, ventilation, intensive care unit stay), these patients are prone to develop severe opportunistic infections. There are reports of the development of severe opportunistic infections such as oropharyngeal candidiasis, pneumocystis jiroveci pneumonia, pulmonary aspergillosis, bloodstream candida infections, etc., in patients affected with COVID-19 disease.[3,4] There are also few isolated case reports of rhino-orbital mucormycosis in COVID-19 disease.[2,5] Sen *et al*. recently reported a series of six cases of COVID-19 disease with rhino-orbital mucormycosis. One patient in this series had concurrent COVID-19 and mucormycosis at admission, while five other patients developed mucormycosis during treatment with systemic steroids for COVID-19.[6] We, hereby, report a cluster of 10 cases of clinically diagnosed orbital mucormycosis with concurrent COVID-19 illness at our institute over the last 2 months (October and November 2020). They presented to us with clinical features of orbital mucormycosis and COVID-19 was diagnosed on routine screening. Demographic and clinical profiles of the patients are provided in Table 1. Microbiological and radiological diagnosis along with treatment received and final outcome are provided in Table 2. Potassium hydroxide (KOH) wet mount and fungal culture/sensitivity were done from biopsy obtained during debridement or from nasal swab obtained during diagnostic nasal endoscopy. Microbiological diagnosis of mucormycosis was proven in six patients. Reverse transcriptase-polymerase chain reaction (RT-PCR) tests for COVID-19 were positive in all the patients. All patients in our series were known diabetics. Diabetic ketoacidosis (DKA) was evident in four patients during admission while five more patients developed DKA after the initiation of corticosteroid therapy for COVID-19 disease. All patients in our series had received intravenous dexamethasone for COVID-19 disease as per The National Institute of Health recommendations[7] and Liposomal Amphotericin B for mucormycosis. Besides, four patients received an injection of Remdesivir, and nine patients required ventilatory support during their hospital stay. The use of steroids, monoclonal antibodies, and broad-spectrum antibiotics for the management of COVID-19 illness can increase the chances of new-onset fungal infection or exacerbate a preexisting one.[2] All patients in our series had received intravenous dexamethasone

Table 1: Demographic and clinical profiles of the patients

Case No.	Age/ Sex	Eye involved/ BCVA at presentation	CRAO at presentation	CORADS Diagnosis	Diagnosis of DKA
1	67/M	LE/NA	NO	5	At presentation
2	49/M	RE/PL+	YES	5	At presentation
3	23/M	RE/NPL	YES	5	During stay
4	59/F	RE/NA	YES	5	At presentation
5	27/F	LE/NPL	NO	4	During stay
6	45/M	RE/CFCF	NO	5	During stay
7	48/M	RE/3/60	YES	5	At presentation
8	62/M	LE/NPL	YES	4	During stay
9	43/M	RE/6/9	NO	4	NONE
10	32/M	LE/NPL	YES	5	During stay

LE=Left eye, RE= Right eye, NA=Not available, BCVA=best-corrected visual acuity, CRAO=central retinal artery occlusion, PL=perception of light, NPL=no perception of light, CFCF=counting fingers close to face. CORADS=COVID-19 Reporting and Data System, DKA=diabetic ketoacidosis

Table 2: Radiological and microbiological diagnosis, treatment, and final outcome of the patients

Case No.	Radiological Diagnosis	Sample sent/ Microbiological Diagnosis	Treatment received	Final Outcome
1	Pansinusitis with apex involvement	Tissue biopsy/NEGATIVE	Mechanical ventilation Liposomal Amphotericin B Dexamethasone, Remdesivir Exenteration + debridement	Exenteration
2	Pansinusitis with extraconal involvement	Tissue biopsy/NEGATIVE	Mechanical ventilation Liposomal Amphotericin B Dexamethasone Not fit for surgery	Death
3	Pansinusitis with extraconal involvement	Tissue biopsy/RHIZOPUS	Mechanical ventilation Liposomal Amphotericin B Dexamethasone FESS + debridement	Death
4	Maxillary and ethmoidal sinusitis with apex involvement	Nasal swab by DNE/ MUCOR	Mechanical ventilation Liposomal Amphotericin B Dexamethasone Remdesivir Not fit for surgery	Death
5	Sphenoidal sinusitis with apex involvement	Tissue biopsy/RHIZOPUS	Mechanical ventilation Liposomal Amphotericin B Dexamethasone Maxillectomy	Unchanged
6	Ethmoidal sinusitis with extraconal involvement	Tissue biopsy/MUCOR	Mechanical ventilation Liposomal Amphotericin B Dexamethasone Maxillectomy	Unchanged
7	Pansinusitis with intracranial (bilateral cavernous sinus) and apex involvement	Nasal swab by DNE/ RHIZOPUS	Mechanical ventilation Liposomal Amphotericin B Dexamethasone Not fit for surgery	Death
8	Pansinusitis with extraconal involvement	Tissue biopsy/RHIZOPUS	Mechanical ventilation Liposomal Amphotericin B Dexamethasone Remdesivir Maxillectomy	Unchanged
9	Ethmoidal sinusitis with extraconal involvement	Tissue biopsy/NEGATIVE	Liposomal Amphotericin B Dexamethasone Remdesivir FESS+ debridement	Improved
10	Pansinusitis with apex involvement	Tissue biopsy/NEGATIVE	Mechanical ventilation Liposomal Amphotericin B Dexamethasone Remdesivir Maxillectomy	Unchanged

FESS=functional endoscopic sinus surgery

for COVID-19 disease and Liposomal Amphotericin B for mucormycosis. Four patients in our series expired within 1 month of the diagnosis, five patients had satisfactory systemic outcomes, but with irreversible vision loss, while only one patient had both ocular and systemic favorable outcomes.

COVID-19 disease has a propensity to cause extensive pulmonary disease and subsequent alveolo-interstitial pathology. This by itself may predispose to invasive fungal infections of the airways including the sinuses and the lungs.[2,8] Furthermore, there is an alteration of the innate immunity due to COVID-19-associated immune dysregulation characterized by decreased T cells, including CD4 and CD8 cells.[2,6] All physicians including ophthalmologists should, therefore, be mindful of the probability of development of fungal infections such as mucormycosis in patients with COVID-19 illness, especially in those with comorbidities and on immunosuppressive agents in the coming future.[6]

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Conflicts of interest

There are no conflicts of interest.

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