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PHOTO ESSAY

Hyphema in a COVID-associated Angioinvasive Mucormycosis

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Abstract

We report a case of disseminated mucormycosis in a 40-year-old, diabetic female, who presented with complaints of right sided facial pain and swelling. Patient had hyphema and right eye ptosis with proptosis, suggestive of cavernous sinus thrombosis with advanced orbital involvement resulting in loss of vision (Stage IV ROCM). Our case had ethmoidal disease invading medial orbital cavity via ethmoidal vessels. Despite surgical debridement and systemic antifungal treatment, our patient succumbed to ROCM.

Case Report

Mucormycosis is a fungal infection, maiming Coronavirus disease 2019 (COVID 19) patients, affecting the sinuses, eye, and brain, thus being currently called as *"COVID associated Mucormycosis"* (CAM). The etiology of increased incidence of mucormycosis in COVID patients is attributed to compromise in host immunity along with synergistic effect of *Mucorales* in thrombotic microangiopathy.[1] Angioinvasion and hematogenous spread are hallmarks of mucormycosis. The soft-tissue spread of infection occurs through neurovascular pathways rather than by bone erosion.

We report a case of disseminated mucormycosis in a 40-year-old, diabetic female, who presented with complaints of the right-sided facial pain and swelling for 10 days, sudden, marked diminution of vision in the right eye (OD) and left-sided hemiplegia for 6 days. The patient tested positive for COVID 19 on admission. She had not received any steroids in the recent past, but had been taking a Vitamin B-Complex and Zinc supplement since a year. C-reactive protein (45 mg/L) and ferritin (461.8 ng/ml) were markedly elevated. She had an eschar (1.5 × 0.5 cm) on forehead [Figure 1a]. Ocular examination of OD revealed vision no perception of light with mid dilated and non-reacting pupil, no iris neovascularization (NVI), total ophthalmoplegia, severe ptosis, and mild proptosis, which was noted. Cataract obscured the fundus details. Examination of the left eye (OS) was unremarkable with vision of 20/80 and no evidence of diabetic retinopathy. Contrast enhanced Magnetic Resonance Imaging (CEMRI) revealed right maxillary, anterior and posterior ethmoid sinusitis, breach along medial wall of right posterior ethmoid air cells communicating with right orbit, and an "acute infarct in right precentral gyrus. [Figure 1e and f]" KOH wet mount of nasal swab revealed aseptate fungal hyphae suggestive of *Mucor* spp. Endoscopic nasal debridement was done by the otolaryngologist and she completed full course of Liposomal Amphotericin B. Twenty-six days after admission, progressively increasing hyphema was observed in OD [Figure 1c and d], for which topical steroids, cycloplegic, and anti-glaucoma medication (G. Timolol BD) were given. Sabouraud's Dextrose Agar showed "salt and pepper" culture growth [Figure 1b]. Her blood sugar levels were controlled on Insulin.

In our case, right ptosis with proptosis was suggestive of cavernous sinus thrombosis and advanced orbital involvement caused loss of vision (Stage IV ROCM).[2] Infraorbital nerve being the most common nerve to be affected resulted in pain and paresthesia of the malar region. The cause of hyphema in absence of NVI is unclear but may be due to angioinvasive nature

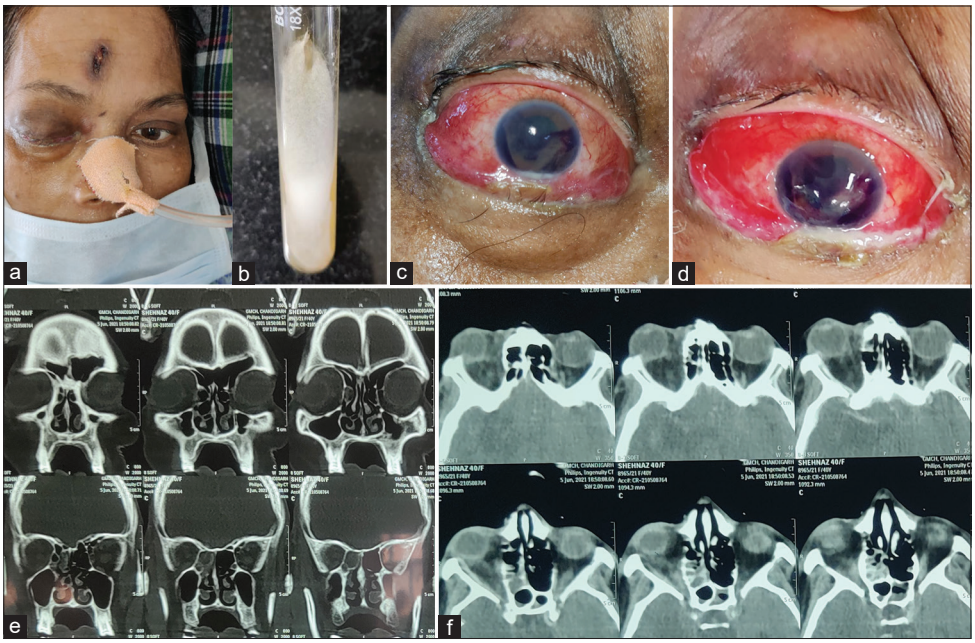

Figure 1: A: Eschar (1.5x0.5cm) on forehead; B: Sabaroud's Dextrose Agar showed 'salt & pepper' culture growth ; C,D: Progressively increasing Hyphema; E,F: Contrast enhanced Magnetic Resonance Imaging (CEMRI) revealed right maxillary, anterior and posterior ethmoid sinusitis, breach along medial wall of right posterior ethmoid air cells communicating with right orbit and an 'acute infarct in right precentral gyrus'.

of the fungus. Intimal hyperplasia and intravascular thrombosis that result in vessel occlusion are caused by the fungal hyphae growing along the internal elastic lamina. A similar thrombotic microangiopathy pathophysiology is also evident in COVID-19 infection, which may interact synergistically with mucormycosis to provide a fulminant outcome and rapid dissemination of infection. Ophthalmic literature search was non-contributory for such a case. The otorhinolaryngology study on mucormycosis and its neurovascular spread[3] explained the pathway for spread of the disease which might contribute to our case. Following inhalation of spores, pterygopalatine fossa acts as the epicenter of the disease in majority cases providing a pathway for dissemination to paranasal sinuses and other sites through neurovascular spread. The probable pathway in our case was ethmoidal disease invading medial orbital cavity through ethmoidal vessels. Anterior ethmoidal artery being a branch of ophthalmic artery supplied anterior and middle ethmoid sinus along with frontal sinus and might served as an access into the eyeball and frontal sinus (eschar on forehead). Despite surgical debridement and systemic antifungal treatment, CAM is a rapid progressing fungal infection that has a high morbidity and mortality. Intracranial extension carries a grave prognosis with death reported in 90% of cases.[4] Unfortunately, our patient expired 2 weeks later during the hospital stay.

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