



Post Dengue Rhino-Orbital Mucormycosis in a Non-Diabetic Immunocompetent Adult - A Case Report

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Abstract

We report the case of 49 years old non-diabetic immunocompetent male with a history of dengue fever followed by sudden onset decreased vision and swelling in one eye. Nasal endoscopy and imaging revealed rhinosinusitis. KOH mount of pus and tissue from nose showed fungal elements. Endoscopic sinus surgery with debridement was done. Histopathology confirmed the diagnosis of mucormycosis. Invasive fungal rhinosinusitis is an opportunistic fungal infection occur usually in diabetic and immunosuppressed patients. It can rarely occur as opportunistic fungal infection in immunocompetent patients of dengue probably due to abnormal T-cell mediated immunity.

Keywords: Dengue; Mucormycosis; Non-diabetic; Immunocompetent

Introduction

Mucormycosis is a fatal fungal infection caused by Mucorales order of fungi and *Rhizopus oryzae* is isolated in most of the cases [1]. Rhino-orbital-cerebral mucormycosis is the most common form of mucormycosis as nose and sinuses (maxillary) are the main source of infection [2]. The most common risk factor of mucormycosis is uncontrolled diabetes mellitus and state of immunosuppression [3,4]. The progression of the disease is very rapid and hence any delay in diagnosis of the disease can involve orbit and brain after invading skull base.

Mucormycosis is almost always associated with some underlying risk factors and/or concurrent or past medical illnesses. As per review of literature, cutaneous/subcutaneous form of mucormycosis is the most common form seen amongst immunocompetent individuals [2]. Herein, we report a case of rhino-orbital mucormycosis in an immunocompetent non-diabetic male patient 15 days after recovery from dengue fever with no history of COVID-19 infection and corticosteroid use.

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Case Presentation

A 49-year-old male patient presented to our tertiary center with chief complaints of loss of vision in left eye in the last 15 days which was progressively worsening and was not able to perceive even light. It was associated with numbness of left side of face. Patient gave past history of dengue one month before presentation which fully recovered in 15 days. Platelet count had dropped to 22,000 and he had 2 episodes of nasal bleeding which subsided by itself and had no history of nasal packing. There was no history of corticosteroid use during the management of dengue.

A nasal endoscopy was done which showed black middle turbinate and thick mucopus coming from middle meatus (Figure 1). KOH fungal mount was sent and showed broad, sparsely septate, branching fungal hypha. Urgent Contrast Enhanced Magnetic Resonance Imaging (CEMRI) of face and Computed Tomography (CT) of nose and Paranasal Sinus (PNS) was done. CEMRI showed diffuse polypoidal enhancing circumferential mucosal thickening in left maxillary, frontal, ethmoid and sphenoid sinuses. Extension of disease process in intraorbital region through the medial orbital wall with resultant stranding of the retroorbital and extraconal fat on left side was seen (Figure 2). The inflammatory thickening extended up to the orbital apex with involvement of the optic nerve. CT PNS showed mucosal thickening in left frontal, ethmoid, maxillary and sphenoid sinus with rarefaction and thinning of the bony walls of sinuses. Disease extended across the lamina and posterior ethmoid sinus wall till pterygomaxillary and inferior orbital fissure of left side.

An endoscopic sinus surgery and debridement was performed in which maxillary sinus, ethmoids and frontal sinus disease was cleared and medial orbital wall was removed (orbital decompression). Meanwhile under the guidance of infectious disease specialist, anti-fungal therapy was started on the basis of clinical findings. Intravenous amphotericin B 250 mg was started and given for 4 weeks

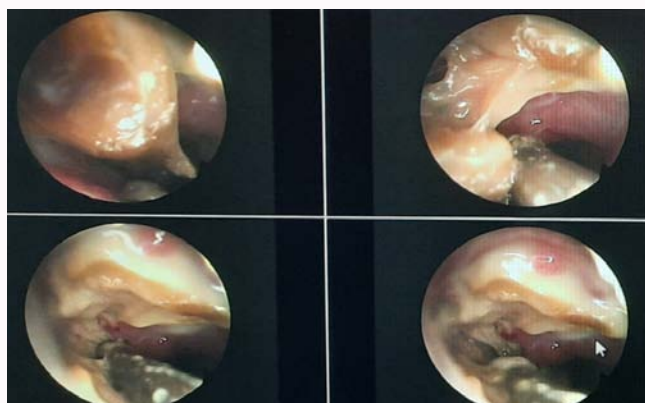


Figure 1: Endoscopic images showing black turbinate (left middle turbinate) and thick mucopus in left middle meatus. KOH fungal mount from the pus showed broad, sparsely septate, branching fungal hyphae.

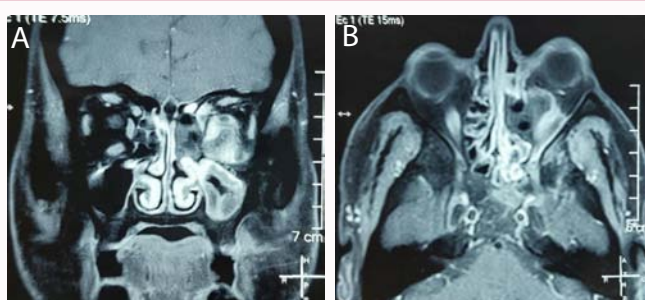


Figure 2: (A- coronal and B- axial): CEMRI PNS, Orbit and Brain showing diffuse polypoidal enhancing circumferential mucosal thickening with mucoid impaction seen in left maxillary, frontal, ethmoid and sphenoid sinuses. There is extension of disease process in intra orbital region through the medial orbital wall with resultant stranding of the retro-orbital and extraconal fat on left side. The inflammatory thickening is extending up to the orbital apex with involvement of the optic nerve seen as enhancement along the periphery of nerve causing optic neuritis.

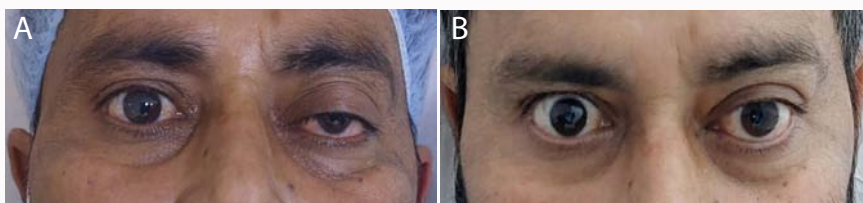


Figure 3: A) showing clinical image at presentation having left side mild proptosis and ptosis with conjunctival congestion and restricted ocular movements. B) showing clinical image after 4 weeks of surgical debridement and antifungal therapy. There is improvement in ptosis and proptosis and ocular movements but there was no improvement in the vision (PL negative).

accounting for cumulative dose of 7 grams. Oral Posaconazole was also started (300 mg twice on day one followed by 300 mg once daily).

Interestingly patient did not have any known underlying disease, COVID-19 infection, corticosteroid treatment/therapy, hyperglycemia (no known diabetes history) or immunosuppression. Random blood sugar level was within normal limits. Hb1Ac was 5.4, viral markers were negative, CD4 and CD8 levels were normal. Other laboratory tests were within normal limit including neutrophil counts.

During 4 weeks treatment course, patient showed improvement in proptosis (Figure 3) and ocular movements; nasal cavity and sinuses showed healthy mucosa. Although there was no improvement in the vision, the patient was discharged on the basis of general condition improvement. Follow up was done for 3 months. Regular nasal endoscopy was done once a week and oral Posaconazole (300 mg once a day) was continued for 6 months.

Discussion

Invasive fungal Rhinosinusitis (mucormycosis) can involve orbit (rhino-orbital) and brain (rhino-orbital-cerebral) depending on host and disease progression. It causes thrombosis, tissue necrosis and invasion of adjacent tissues including bones. Mucormycosis is an acute opportunistic fungal infection which usually occurs in state of metabolic acidosis (most commonly uncontrolled diabetes mellitus) after long duration of high dose of corticosteroid therapy, in post bone marrow or organ transplant patients, immunodeficiency, trauma or burn patients, neutropenia (impaired phagocytic function), renal failure and in hematological malignancies [5-7].

In uncontrolled diabetes with Diabetic Ketoacidosis (DKA), the serum free iron is found in high levels which supports fungal (*R. oryzae*) growth [1]. In such type of patients, this invasive fungal infection can prove fatal. Fungal hypha invade tissue causing infarction and necrosis. The infection begins in the nasal cavities then

involves sinuses, orbit and brain. The patient usually presents with headache, blackish nasal discharge with or without nasal stuffiness, fever, orbital swelling with or without pain, vision loss, one sided facial pain or heaviness [8,9].

In 2021, during the second wave of COVID-19 in India a large number of Rhino-orbital-cerebral mucormycosis were discovered. Almost all patients had history of corticosteroids therapy and majority of them had uncontrolled diabetes mellitus, but there are reports of rhino-orbital-cerebral mucormycosis in non-diabetics, immune competent patients in which high dose of corticosteroid were given for management of COVID-19 infection [10]. When it comes to dengue, corticosteroids are used as a treatment during the late recovery phase of dengue in selected scenarios [11]. Furthermore, intracranial thrombosis is also noted during the intermediate recovery phase of dengue. The present case did not reveal corticosteroid use or any thromboembolic event.

In a case report by Nasa et al., invasive pulmonary aspergillosis was seen in an immunocompetent non-diabetic patient with severe dengue fever [12]. Dengue fever is well known for bone marrow suppression and T-cell abnormality [13,14]. This T-cell abnormality can predispose to invasive fungal infections [15]. So, in this case the dengue might have caused abnormal T-cell mediated immunity leading to invasive rhino-orbital mucormycosis. Despite the best treatment in the form of surgical debridement and intravenous anti-fungal therapy, the mortality rate remains high (>50%) [5,16]. Fortunately, in our case the patient was non-diabetic, did not have any underlying disease and the intracranial involvement was absent. The presence of diabetes could have complicated the management of the patient. In a comparative study by Abdolalizadeh et al. [17], between diabetic and non-diabetic rhino-orbital-cerebral mucormycosis a relative better outcome is seen amongst non-diabetics in respect to globe and vision survival. The early diagnosis and the timely treatment with antifungal therapy and surgical debridement proved beneficial in early recovery of the patient.

Conclusion

Rhino-orbital or rhino-orbital-cerebral mucormycosis can rarely occur as an opportunistic infection in immunocompetent patients after common viral infections like dengue probably due to abnormal T-cell mediated immunity. Furthermore, the progression can be slow and prognosis is better in non-diabetic immunocompetent patients as compared to immune compromised or diabetic patients.

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