Rhinocerebral mucormycosis: a rare fungal infection linked to diabetes

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Abstract

Introduction Rhinocerebral mucormycosis is a rare life-threatening infection caused by fungi from the family of mucoraceae. Here we report a rare case of Rhinocerebral mucormycosis in a 67-year-old diabetic patient.

Case Report A previously healthy 67-year-old male presented with swelling and pain over the left side of the face, deviation of the angle of the mouth to the right side and drooling of saliva from left angle of mouth. CT scan of the brain suggested cavernous sinus thrombosis. Diagnosis of mucormycosis was confirmed by microbiological investigations on the nasal washing. The patient responded well to injectable Amphotericin B.

Conclusion Rhinocerebral mucormycosis although is a rare entity, it should be kept in mind when handling cases with cavernous sinus thrombosis especially in patients with diabetes as they are associated with a high mortality rate.

Introduction

Mucormycosis is a rare but aggressive opportunistic fungal infection caused by the family of mucoraceae (Mucor, Rhizomucor, Rhizopus, Absidia species) that are commonly found in soil and among decaying vegetation. These ubiquitous fungi become pathogenic in man under certain conditions like immunosuppression, diabetic acidosis, antibiotic, corticosteroid and cytotoxic therapy, with other predisposing factors like malignancy, burns, malnutrition, renal failure and blood dyscrasias. Rhinocerebral type is the most common and is subdivided into rhinomaxillary, rhinoorbital and rhinoorbitocerebral. Direct extension and dissemination via blood leads to orbital and intracranial complications. Among the intracranial structures, involvement of cavernous sinus and internal carotid artery is well known. Disease extending beyond the sinus mucosa and associated Diabetic ketoacidosis (DKA) on initial presentation are poor prognostic indicators. The diagnosis is confirmed histologically and culture is used to identify the specific species. The treatment of mucormycosis includes aggressive surgical debridement and systemic antifungal therapy. Early diagnosis and prompt initiation of treatment is essential for a successful outcome.

Case Report

A previously healthy 67-year-old male presented to the Medicine OPD of Dr. Ram Manohar Lohia Hospital & PGIMER with a complaint of swelling and pain over the left side of the face, deviation of the angle of the mouth to the right side and drooling of saliva from the left angle of the mouth for 2 days. The patient was unable to open his left eye with protrusion of eyeball associated with pain behind the left eye. There is history of high grade fever associated with chills and rigors and headache for 5 days. There was no history of fall, trauma, seizures, loss of consciousness, vomiting. On examination, the patient was conscious, oriented to time, place and person, febrile (temperature −100 °F), pulse rate was 120/min, his blood pressure was 110/70mmHg. His forehead crease was decreased in the left side; there was complete ptosis of the left eye. Left eyelid was oedematous, left pupil was fixed and nonreactive. No movement of external ocular muscles were seen. Vision was finger count 3m with no perception of light. Right eye was normal. There was decreased sensation on the left side of the face, deviation of the angle of the mouth to the right side and drooling of saliva from the left angle of the mouth. There were no signs of meningeal irritation or cerebellar signs. Scaly debris was seen on the left nostril. CT of the brain showed left cavernous sinus hyperdense with a mild bulge in the lateral wall of the sinus, prominent superior ophthalmic vein with preseptal thickening suggestive of left cavernous sinus thrombosis. Laboratory findings showed: white blood cell count was 18.5 × 10⁹/L (Polymorphs 92%, Lymphocytes 8%, Eosinophils 0%), Haemoglobin was 12.6 gm% and platelet count was 200 × 10⁹/L. His random blood sugar was 530mg/dl and HbA1c was 13.9%. Serum Na⁺, K⁺, Ca²⁺, total bilirubin, direct bilirubin, AST, alkaline phosphatase total protein, and BUN were all within normal limits. His HIV status was non-reactive & HBsAg and HCV were negative. The patient was started on Vancomycin & Metronidazole. But the
patient could not respond to treatment. Nasal washing was sent for bacterial & fungal culture. KOH mount showed hyaline wide, non septate, ribbon like hyphae with wide angle branching at regular intervals (Figure 1). No bacterial element was visualised in the wet mount. Nasal washing was inoculated on to the blood agar, MacConkey agar & Sabouraud Dextrose agar. The next day, there was no growth on blood agar & MacConkey agar. After 72hrs of incubation on Sabouraud Dextrose agar, white, floccose, dense and cottony mycelial growths were seen. On Lactophenol cotton blue (LPCB) mount hyphae were broad, non-septate, without rhizoids, sporangiophores were branched bearing spherical sporangia at the tip of each branch (Figure 2). Biopsy was performed from the lateral wall of the left nasal cavity of the lesion, which revealed characteristic broad, non-septated, empty appearing hyphae with wide angle branching compatible with mucormycosis. Injection amphotericin B therapy was started and continued for 21 days. The patient responded well to Amphotericin B and is on follow up.

Discussion
Mucormycosis has been reported from various parts of the world which includes both developed and developing countries. This is an acutely fatal fungal infection in humans and has a fatality rate of 50–100%. Rhinocerebral mucormycosis [RCM] is the most common form of the disease. About 70% of rhinocerebral cases are diabetic patients with ketoacidosis. Macrophages play a very important role in preventing infection in normal hosts by phagocytosis and oxidative killing of spores. But in people with uncontrolled diabetes mellitus, these cells are dysfunctional and have decreased phagocytic activity due to impaired glutathione pathway. Another reason may be because of release of iron into

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the serum from binding proteins in ketoacidosis. The fungal hyphae produce a substance called rhizoferrin (siderophores) which when liberated into the serum binds iron avidly at low pH and the iron-rhizoferrin complex facilitates their growth by promoting major intracellular processes. RCM usually begins in the nasal mucosa or palate and extends to the paranasal sinus and retro orbital region. Because the disease provokes diffuse tissue necrosis, the fungi can easily invade the wall of blood vessels, leading to thrombosis and tissue ischemia. Therefore, it is not uncommon to find the infection spreading to the cavernous sinus or the central nervous system. The successful management of mucormycosis depends on four major elements: early diagnosis, appropriate, aggressive antifungal therapy, surgical debridement and resolution of the underlying condition. Histopathological examination and fungal culture helps in early diagnosis of mucormycosis. The mainstay of treatment is systemic amphotericin B and the highest possible tissue levels should be achieved. As the drug is nephrotoxic, careful monitoring of the renal functions is the essential part of therapy. Liposomal amphotericin B has better results and is less toxic but it is quite expensive.

**Conclusion**

Rhinocerebral mucormycosis although is a rare entity, it should be kept in mind when handling cases with cavernous sinus thrombosis especially in patients with diabetes as they are associated with a high mortality rate. Thus an early recognition by using simple microscopy can assist in prompt initiation of appropriate antifungal therapy.

**Consent**

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal.

**References**