

A Case Report of Mucormycosis in a Diabetic Patient and an Approach to its Management in a Tertiary Care Centre of Central India

Manoj Gupta*, Sudhakar Vaidya

Background: Mucormycosis is one of the most rapidly progressing and fulminant forms of fungal infection which usually begins in the nose and paranasal sinuses following inhalation of fungal spores.

Case details: This is a case report of a 65 year old male admitted in our hospital with a long history of Type 2 diabetes with pain and swelling on the right side of nose and signs and symptoms indicating Rhino-orbital-Cerebral-mucormycosis.

Methodology: The level of involvement like the nasal cavity, septum, turbinates, sinuses, palate, orbit involvement, was noted and the protocol of medical and surgical management was decided in accordance to that. Post-surgery KOH mount and HPE report after every debridement, CT and MRI findings were the mainstay.

Conclusion: We here report a case of mucormycosis in a diabetic patient that shows aggressive and alarming mortality, which can be reduced by rapid diagnosis, surgical debridement and administration of drugs like amphotericin B.

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Introduction

Mucormycosis (phycomycosis, zygomycosis) is a rare opportunistic angio-invasive fungal infection caused by fungi belonging to the Mucorales order and the Mucoraceae family. Mucormycosis is transmitted by inhalation, ingestion or direct inoculation of spores and was first described by Furbinger in 1876¹ which are naturally found in air, water and even food. It enters in the body through inhalation of fungal spores from the air and commonly affects sinuses and lungs. It infects the nose, orbit of eye, oral cavity and can even spread to the brain. Symptoms mainly seen are headache, nasal congestion, nasal discharge, bleeding nose, crusting in nose, swelling on face, lack of sensation on face and skin discoloration. Pulmonary and cutaneous variants are also seen. The fatality rate with mucormycosis was pretty high. Rhinocerebral mucormycosis is an infection of paranasal sinus origin caused by inhalation of Mucor spores and their spread to the orbit or the brain. Successful management of this fatal infection requires early identification of the disease and aggressive and

prompt medical and surgical interventions to prevent high morbidity and mortality associated with this disease process. We report here with a case of rhino orbital mucormycosis in a diabetic patient. The occurrence of mucormycosis in the general population was previously cited as 0.005 to 1.7 per million population before COVID. However, in India, the incidence of mucormycosis was reported to be 0.14/1000 in diabetic patients, which is 80 times higher than reported in other parts of the world. The large number of diabetic patients in India of, almost 62 million mucormycosis, has caused a large public health burden in India. Immunocompromised states like uncontrolled diabetes, lymphomas and leukemias, renal failure, organ transplant, long term corticosteroid and immunosuppressive therapy, cirrhosis, burns and Acquired Immuno Deficiency Syndrome (AIDS), hematological and other malignancies, organ transplantation, prolonged neutropenia, iron overload or hemochromatosis, deferoxamine or desferrioxamine therapy.² Diabetics with ketoacidosis are more prone as Rhizopus species prefer a hyperglycemic environment.

Department of ENT, RD Gardi Medical College, Ujjain, Madhya Pradesh, India

Correspondence to: Manoj Gupta, Department of ENT, RD Gardi Medical College, Ujjain, Madhya Pradesh, India. E-mail: manojguptamhow5@gmail.com

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In diabetics, the acidic pH produces more free iron by reducing its binding to transferrin which impairs neutrophilic function thus producing suitable conditions for fungal multiplication. Mucormycosis infection in diabetes may result from tooth extraction, intramuscular injections and Surgeries. Mucorales have a ketone reductase enzyme, so, they thrive in hyperglycemic and diabetic ketoacidosis states generally associated with poor prognosis.

Case Report

A 65 year old male patient, k/c/o diabetes mellitus type 2 and hypertension for 15 years, came to our outpatient department with chief complaints of pain and swelling on the right side of the nose, face and periorbital region for 15 days .

On Examination

Face diffuse swelling over the right middle third of face extends from the nose's lateral aspect to the inner canthus of the eye and right periorbital region with blackish pigmentation near right medial canthus. On palpation, the swelling was soft in consistency, non-tender with no local rise of temperature (Figures 1-4).

Nasal examination

Anterior rhinoscopy showed black crusting in right nasal cavity

Oral cavity

Black eschar over hard palate.

Ophthalmic examination

Right pupil was non-reactive.

Management

The general management comprises of radical debridement and excision of the infected tissues with a high-dose therapy of amphotericin B.⁵ The first and



Figure 1: Pain and swelling over nose and right side of face and with surrounding edema on hard palate



Figure 2: Black necrotic eschar blackening near right medial canthus



Figure 3: Post-operative day 3 Invasive lesion seen on right medial canthus on the right maxillary sinus

most important surgical steps following the diagnosis for successful infection management and improved survival rates is an aggressive surgical debridement. The procedure involves the removal of all the necrotic tissue until perfused tissue is encountered. This surgical intervention might be required to be repeated until improvement is observed. In many severe cases, orbital exenteration may be inevitable. In several other severe cases excision of the nasal cartilage and the palate may also be required.

Investigations

KOH mount revealed numerous broad aseptate fungal hyphae.

Histopathology Report

Broad aseptate obtusely branched fungal hyphae with angioinvasion suggestive of invasive mucormycosis (Figure 5). CT PNS showed swelling in right side of face. soft tissue density with air pockets in right nasal cavity, maxillary, sphenoidal, ethmoidal and frontal sinuses and appears to be infiltrating the inferior wall of right orbit.

MRI brain, orbit and PNS Showed right maxillary, ethmoidal and sphenoidal sinusitis, absorbed right middle and inferior turbinates, inferomedial wall of orbit fuzzy, and findings favor rhino-orbital mucormycosis (Figure 6).

Surgical Procedure

Surgical debridement was done by removal of black crusting with microdebrider from right nasal cavity

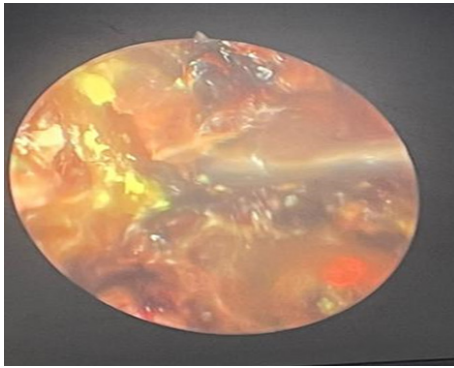


Figure 4: Endoscopic image of black crust and lower lip

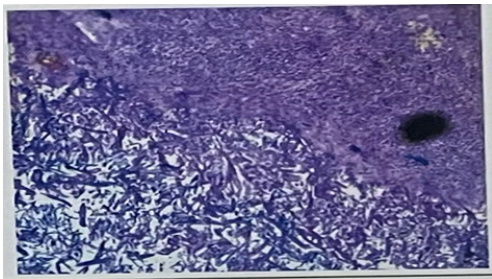


Figure 5: Histopathology report

and septum then inferior turbinectomy with partial middle turbinectomy, right medial maxillectomy with orbital decompression were done by removing lamina papyracea, preorbital and fat, amphotericin ointment put in right nasal cavity. Endoscopic suction and clearance done in every 2nd day with daily nasal douching with normal saline. Repeated endoscopic debridement was done with local application of amphotericin ointment.

Treatment

Inj. Liposomal amphotericin B was started as per dosage 50 mg/kg (6 vials) in 500 mL, 5% dextrose along with Inj imipenem + cilastatin in dosage of 1 gm i/v every 12 hourly, Tab Posaconazole was given as 100 mg every 12 hourly along with supportive treatment. CBC was repeated every 2nd day and daily monitoring of serum sodium, potassium and creatinine was done, daily physician check up was done for raised blood sugar levels and high BP which was being managed simultaneously.

Discussion

In this case Provisional diagnosis of mucormycosis of the maxilla was made the differential diagnosis for which includes Neoplasia, aspergillosis, osteomyelitis, chronic granulomatous infection, and deep fungal infections. On lab investigations, elevated blood sugar levels and neutrophilic leucocytosis were found. Rapid, extensive debridement of the whole necrotic tissue was the key for faster healing of this condition and it reduced the

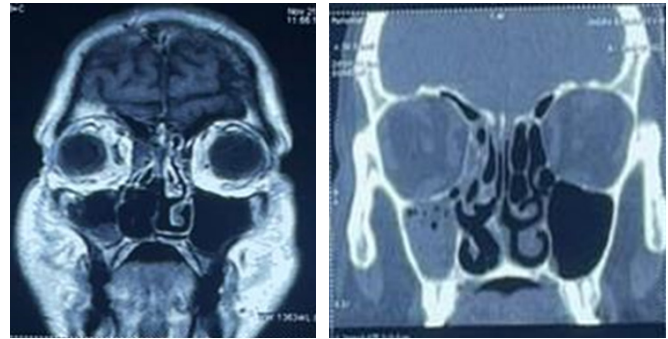


Figure 6: MRI BRAIN, ORBIT and PNS CT PNS

fungal load and halted the progression of the disease. Antifungals were empirically started as the disease had a fast progression rate. In general medical treatment of liposomal Amphotericin B has led to a survival rate of upto to 72%. The universal risk factor is diabetes. According to Global guidelines for the diagnosis and management of mucormycosis, any diabetic patient with facial pain, sinusitis, proptosis, or ophthalmoplegia, is at risk of mucormycosis and warrants a CT or MRI of the head. Surgical debridement with clean margins should be achieved in parallel to antifungal treatment. Liposomal amphotericin B is preferred compared to conventional amphotericin B as it is better associated with fever breakthrough fungal infection, less infusion-related toxicity, and less Nephrotoxicity.³ After infecting the para nasal sinuses, spores spread inferiorly to involve the palate, posteriorly into the sphenoid sinus or cranially to attack the brain. Repeated suction & cleaning is the mainstay for this disease. The middle meatus antrostomy window created is large enough to secure drainage and ventilation of the maxillary sinus, enabling the patient to irrigate the maxillary sinus with a saline solution.^{4,5}

Conclusion

The first step in the management of mucormycosis is to have a high index of clinical suspicion, especially in those with diabetes mellitus, COVID- 19 and on systemic corticosteroids. Early diagnosis, aggressive surgical debridement, injectable liposomal amphotericin B, topical Amphotericin therapy, control of underlying comorbidities and another supportive measure with close monitoring can remarkably achieve low mortality in patients with sinonasal mucormycosis.⁵

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