Flesh-eating Dual-oral Fungal Infection

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ABSTRACT

Context: Mucormycosis is a rare acute opportunistic fungal infection with a high mortality rate. It is commonly seen in immunocompromised individuals.

Aims: Oral manifestation of mucormycosis is rare. When it does occur, it commonly affects the palate followed by alveolus.

Settings and design: The representative tissue received was 10% formalin fixed, 3 × 3 cm in diameter, and floated on the surface of the fixative.

Materials and methods: Sections of 5 microns thick were obtained from paraffin-embedded tissues that were processed and stained with hematoxylin and eosin, periodic acid-Schiff, and Gomori methenamine stains.

Conclusion: Examination of paraffin-embedded sections showed broad aseptate fungal hyphae branching at 90° together with Candida pseudohyphae and yeast forms along with necrotic bone.

Keywords: Aseptate fungal hyphae, Gomori methenamine stain, Mucormycosis, Periodic-acid schiff.


INTRODUCTION

Mucormycosis is an acute life-threatening opportunistic fungal infection with a high mortality rate, occurring predominantly in dehydrated and acidotic patients.1 Mucormycosis, zygomycosis, or phycomycosis was first described by the German pathologist Paulltau in 1885.2 Along with Candidiasis, it is the most common fungal infection of the oral cavity seen in debilitated patients with diabetic mellitus, neutropenia, immunosuppressive therapy, deferoxamine use associated dialysis, leukemia, lymphoma, renal failure, liver cirrhosis, etc. Mucormycosis is caused by fungi under the order mucorales. These fungi are seen in soil containing decaying organic matter. Rhizopus oryzae (Rhizopus arrhizus), a member of the family, is the chief offender although other members of the family like Rhizopus microspores, Rhizomucor pusillus, Mycocladus corymbifer, Apophysomyces elegans can cause similar infections.3,4

Route of exposure may be by inhalation of fungal spores or by direct contact through skin.5

CASE REPORT

A 55-year-old male patient presented with a complaint of inability to eat food normally for the past 3 months together with pain and numbness over the right eye since 2 months. Extraoral examination revealed a 0.8 × 0.7 cm skin nodule along the lateral canthus and periorbital edema of the right eye (Fig. 1). Intraoral examination showed a grayish necrotic mass extending along the posterior left maxillary facial alveolar ridge with an oro-antral communication in relation to 17, 18 (Fig. 2). Pus discharge and pain secondary to infection was noted. Medical history revealed uncontrolled type 2 diabetes mellitus for which he was being treated, chronic alcoholic liver disease, cirrhosis of liver with mild chronic kidney disease, ischemic heart disease, hypertension, and a past history of pulmonary tuberculosis. Routine blood examination showed an elevated erythrocyte sedimentation rate (ESR), increased fasting blood sugar levels, a reduced hemoglobin count, a decreased neutrophil count, and an elevated serum albumin level, thereby confirming the compromised state of the liver and the kidney. Culture of necrotic bone was done. Strict aseptic precautions were
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Hematoxylin and eosin (H&E) staining of the specimen showed necrotic stroma with an intense inflammatory infiltrate comprising neutrophils, plasma cells, and lymphocytes with isolated colonies of fungal hyphae (Figs 3 to 5). These hyphae were broad, with nonparallel sides and irregular branching at 90°. Yeast forms were also noted together with some necrotic bone (Figs 6 and 7).

Fig. 2: Intraoral view

Fig. 3: Necrotic Stroma with an intense inflammatory infiltrate comprising of neutrophils, plasma cells and lymphocytes (H&E 100×)

Fig. 4: Isolated colonies of fungal hyphae (H&E 100×)

Fig. 5: Aspate Fungi branching at 90° of mucor species (H&E 100×)

Fig. 6: Broad aspate fungi branching at 90° of mucor species and yeast form of candida (H&E 100×)

Fig. 7: Broad aspate fungal hyphae with fungal spore along with necrotic bone (H&E 100×)
Special stains, such as Gomori methenamine silver staining confirmed the presence of a *Mucor* species whereas the periodic acid-Schiff (PAS) staining confirmed *Candida* species (Figs 8 and 9). Ziehl–Neelsen staining was negative, thus ruling out tuberculosis. Culture result of Sabouraud-Chloramphenicol-Gentamicin agar for 2 days at 30° was suggestive of fungal infection. A final diagnosis of mixed fungal infection with mucormycosis and Candidiasis was made.

Computed tomography scan of facioaxial and coronal view showed osteolysis of the bilateral zygomaticomaxillary complexes to the orbital floor, thereby indicating its destruction. Patient was put on liposomal amphotericin B 30 mg/kg. Deteriorating liver and renal functions prevented surgery. Local debridement of involved maxilla under local anesthesia was done. Fifteen days of hospital stay helped recovery of the patient who is currently under follow-up.

**DISCUSSION**

The incidence of mucormycosis in diabetic patients is increasing.6 *Mucor* belongs to the class Zygomycetes, a ubiquitous fungus whose commonest route of entry into the human body is through the respiratory tract. The most common symptom of mucormycosis infection is fever, occurring in 51% of patients. Based on clinical presentation, this infectious disease can be randomly divided into separate entities: Rhinocerebral, pulmonary, cutaneous, gastrointestinal, central nervous system related, and miscellaneous, in addition to a disseminated disease resulting from progression of localized infection. Rhinocerebral mucormycosis is the most common form of mucormycosis in patients with diabetes mellitus.7,8 The various clinical entities of mucormycosis are tabulated in Table 1.

The predisposing conditions for being infected by this fungus include neutropenia or neutrophil dysfunction, malignancy, and desferrioxamine mesilate therapy.9 Roden et al showed that diabetic patients represented 36% of 929 reported cases. Early studies by Chinn et al and Artis et al have proven that diabetic ketoacidosis impairs chemotactic and phagocytic activity of neutrophils and increases the availability of serum iron.10

Hyperglycemia and acidosis are known to impair the ability of phagocytes to move toward the organisms and kill them by oxidative and nonoxidative mechanisms. This patient had a serious localized rhinomaxillary

![Fig. 8: Gomori methylamine silver staining for mucor species (100×)](image)

![Fig. 9: PAS staining for candida species (100×)](image)

<table>
<thead>
<tr>
<th>Clinical type and prevalence</th>
<th>Rhinocerebral 44–49%</th>
<th>Pulmonary 10–11%</th>
<th>Cutaneous 10–16%</th>
<th>Disseminated 6–11%</th>
<th>Gastrointestinal 6–7%</th>
<th>Miscellaneous 5% CNS type</th>
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<tbody>
<tr>
<td>Predisposing factor</td>
<td>Uncontrolled diabetic patients</td>
<td>Leukemia, receiving chemotherapy</td>
<td>Cases of burns</td>
<td>Pulmonary mucormycosis</td>
<td>Malnourished children</td>
<td>Intravenous drug abusers</td>
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<td>Clinical feature</td>
<td>Periorbital cellulitis and facial numbness, conjunctival suffusion, blurry of vision</td>
<td>Dyspnea, cough, and chest pain</td>
<td>Cutaneous and subcutaneous necrotizing fasciitis</td>
<td>Focal neurological deficits or coma</td>
<td>Nausea and vomiting are the most common symptoms. Fever and hematochezia intraabdominal abscess</td>
<td>Virtually any body site</td>
</tr>
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Table 1: Various clinical entities of mucormycosis
form of mucormycosis. Early diagnosis and treatment are of extreme importance for successful eradication of infection and for patient survival. The Grocott-Gomori methenamine silver stain is the most effective for identifying fungi. However, hematoxylin and eosin, periodic-acid Schiff, or calcofluor white stains may also be used. The fungi observed are nonseptate hyphae with a right-angled branching. Because initial cultures of diseased tissue may be negative, histopathological examination is essential for early diagnosis. The initial medical treatment of mucormycosis comprises aggressively treating any underlying predisposing factors like diabetes followed by surgical management. In some cases, radical resection may be required including partial or total maxillectomy, mandibulectomy, and orbital exenteration. Debridement of all infected tissues should also be done.

Hyperbaric oxygen therapy (HBO) has been considered as a mode of treatment but retrospective study has shown no significant difference between the effectiveness of therapy with and without HBO.

CONCLUSION

Probability of fungal infection should always be considered in cases of diabetes mellitus. Diagnosis should be based mainly on clinical manifestation and morphological findings of Mucor hyphae in the tissue specimen. As mortality rate is 50 to 70%, early detection of the organism is imperative to institute timely surgical and antifungal treatment.

PATIENT CONSENT

Verbal informed consent was obtained from the patient for publication of this case report and accompanying images.

AUTHORS’ CONTRIBUTIONS

The oral surgeon performed the surgical debridement of the lesion. The two authors have contributed in analyzing, reading, writing, and researching this article.

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REFERENCES