RHINOCEREBRAL MUCORMYCOSIS IN A PATIENT WITH DIABETES MELLITUS: A CASE REPORT AND REVIEW OF LITERATURE

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Abstract

Background: Rhinocerebral mucormycosis is a rare but severe life threatening infection that occurs in patients with diabetes mellitus and other immune deficiency conditions. A high index of suspicion is required to make early clinical diagnosis as the disease progresses very rapidly with high fatality. We present here a case of Rhinocerebral Mucormycosis which affirms the fact that though a rare disease it could present in patients with diabetes mellitus in our setting. Early recognition and treatment are essential to reduce the mortality.

Keywords: Rhinocerebral mucormycosis, diabetes mellitus, saprophytic fungi.

INTRODUCTION

Rhinocerebral mucormycosis is a rare opportunistic infection of the sinuses, nasal passages, oral cavity, and brain caused by saprophytic fungi.¹ It is rapidly progressive and more often than not, fatal. It commonly affects immunocompromised patient as the immune system protects against this infection in normal individuals.² Well-recognized risk factors for the disease include diabetes mellitus, leukemia, aplastic anemia, myelodysplastic syndrome, blood dyscrasias, immunosuppressive therapy in organ transplantation, renal disease, sepsis, and severe burns. Immunocompetent people can have rhinocerebral mucormycosis following trauma, surgery, or burns.² Early recognition and treatment are essential to reduce the mortality.

CASE REPORT

A 45 year old male patient who presented with a history of high grade continues fever and cough of nine days, polyuria and polydypsia of seven days and impaired level of consciousness of two days. He is not known to have diabetes mellitus. Examination revealed a middle aged man in respiratory distress (respiratory rate = 36cpm), confused (GCS 10/15), dehydrated, febrile (temperature = 38.3°C) with facial puffiness and bilateral pitting pedal oedema. Pulse rate was 116bpm and blood pressure 70/40 mmHg. Chest examination revealed coarse crepitations at the left lower lung zone. Other systems were normal.

His random blood glucose was unrecordably high (>33mmol/l with glucometer), sodium was 135mmol/L, potassium was 4.0mmol/L., urea was 33.2mmol/L, creatinine was 5.0mg/dL and haemoglobin was 12gm%. Urinalysis revealed presence of glycosuria and haematuria but no ketone. His complete blood count was 12x10⁹/L, differential count was Neutrophils-88%, Lymphocytes-10%, eosinophils-02% and his platelet count was 156x10⁹/L. His HIV screening was negative.

A diagnosis of hyper-osmolar hyper-glycemic state precipitated by sepsis and complicated by acute kidney injury in a newly diagnosed type 2 diabetes mellitus patient was made. Patient was placed on intravenous fluids, antibiotics and insulin therapy combined with 2 sessions of hemodialysis. On the seventh day of admission, he complained of pain in the face. Examination revealed worsening of his initial periorbital oedema to involve the

nasal bridge. A few hours later he developed eschar around the nasal bridge which rapidly progressed to involve the entire crura of the nose and nasal bridge and extended close to the orbit (figure 1). A clinical diagnosis of rhinomucomycosis was made. The patient was to have a computed tomographic scan of the brain and sinuses, start parenteral amphotericin B and planned for debriment. However, the patient rapidly deteriorated, lost consciousness and died before the above measures were commenced.

Figure 1: Black eschar involving almost entire nose and nasal bridge.

DISCUSSION

Rhinocerebral mucormycosis is a rare opportunistic invasive fungal infection of the sinuses, nasal passages, oral cavity, and brain caused by saprophytic fungi.¹ Mucormycosis is a fungal infection caused by a member of the filamentous fungi family Mucoraceae. The most common species isolated from patients with mucormycosis are *Rhizopus*, *Mucor* and *Absidia*.³ The saprophytic fungi are commonly found colonizing the oral and nasal mucosa. In individuals who are immunocompromised, germination and hyphae formation occur, and this allows the organism to invade the patient's blood vessels. This results in the formation of blood clots and surrounding tissue death by loss of blood supply.¹

Most of these patients have poorly controlled diabetes mellitus as is reported in this case. The fungal organism grows in patients with ketoacidosis because acidosis disrupts iron binding to transferrin, this results in increased in free iron that promotes growth of the fungus.^{4,5} Hyperglycemia and acidosis are additional risk factors for rhinocerebral mucormycosis in patients with diabetes mellitus. *Rhizopus* species have an active ketone reductase system that enables them to thrive in an acidic pH and

glucose-rich medium. Hyperglycemia enhances fungal growth and impairs neutrophil chemotaxis; therefore, individuals with diabetic ketoacidosis are commonly affected.^{1,6}

Rhinocerebral mucormycosis generally progresses in stages.⁷ The first stage occurs through fungal spore inhalation and infection of the paranasal sinuses, resulting in formation of necrotic lesions in the nasal mucosa, turbinates, or hard palate. The second stage is characterized by direct extension of the disease into the maxillary sinus or invasion of the surrounding vasculature. During the last stage, the fungus spreads into the orbit and the retro-orbital area and in the brain (cerebro-rhino-orbital mucormycosis). Death may occur due to the cerebral abscesses.^{2,8} Symptoms of the disease are initially non specific consisting of headache, fever, nasal congestion and generalized malaise. This may progress to facial pain, swelling, parasthesias and cranial nerve palsies (especially the II, III, IV, V and VI nerves). There is eventually darkening then blackening of the skin from necrosis. Altered mental status, stroke or coma are indicative of cerebral involvement. These clinical features may develop over a period of several days or may occur as a fulminating process within hours as seen in the index patient.³ In our patient the initial presentation of facial swelling was masked by the facial puffiness. As swabs of tissue or discharge are generally unreliable, the diagnosis of Mucormycosis tends to be established by a biopsy specimen of the involved tissue. A computed tomographic scan of the brain and sinuses is also needed to determine the extent of the disease.⁹

Treatment of rhinocerebral mucormycosis consists of reversing underlying immunocompromised states, administering systemic antifungals and performing urgent surgical debridement.^{10,11} The index case rapidly deteriorated and died before the management could be instituted. Previous studies have reported mortality rate of >63% in untreated patients and 17% in patients that received aggressive amphotericin B therapy in addition to surgery.⁴ The mortality rate of mucormycosis is generally poor especially in patients with cerebral involvement.¹ The need for early diagnosis and management cannot therefore be overemphasized because of the aggressive nature of the disease.

CONCLUSION

Rhinocerebral mucormycosis is a rare but severe life threatening fungal infection that occurs predominantly in patients with diabetes mellitus. It is associated with high

mortality rate. The clinical diagnosis is often difficult and usually delayed, as in our patient. An early diagnosis, combined with medical and surgical treatments, is necessary to improve the outcome.

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