PULMONARY ZYGOMYCOSIS IN A DIABETIC PATIENT

K Anuradha,* V Lakshmi, P Umabala, MN Rao

Abstract

We report a case of pulmonary zygomycosis in an adult male diabetic patient who presented with fever and altered sensorium initially and later developed streaky haemoptysis. Bronchoscopy showed picture of necrotizing pneumonia. Sputum was negative for fungal elements on admission but later bronchial wash and repeat sputum samples were positive by microscopy and culture showed growth of *Rhizopus* species. Immediately the patient was put on amphotericin B but had a bout of massive haemoptysis and succumbed. A high index of suspicion is needed for an early diagnosis and aggressive treatment of this infection in view of the high mortality rate.

Key words: Aggressive treatment, diabetes mellitus, rhizopus

The term zygomycosis describes in the broadest sense any infection due to a member of zygomycetes. It is an aggressive and opportunistic infection first described in 1885 by Paltauf. Zygomycosis, earlier considered a rare entity, is being reported with increasing frequency in recent years possibly due to the increase in immunocompromised patients and increased awareness among the clinicians and microbiologists. Zygomycosis in the debilitated patient is the most acute and fulminant fungal infection known. Pulmonary involvement is the second most common presentation after rhino cerebral disease and carries a high mortality rate. We report a case of pulmonary zygomycosis in a diabetic patient as such cases have been sparsely reported in literature.

Case Report

A 48 year old male, a known diabetic since 5 years on oral hypoglycaemics, chronic smoker, alcoholic and a sportsperson by profession, presented with high grade fever with chills and rigors, altered sensorium of seven days duration and streaky haemoptysis of one day duration. These symptoms were associated with headache, bodyache, nausea and vomiting. Prior to this admission patient was in another hospital and was treated as dengue fever since his IgG and IgM antibodies for the virus were positive by ELISA. Since his platelet count started falling he was referred to our hospital, a tertiary care hospital, for further management. On examination at admission, patient was well built, afebrile, conscious but slightly confused and mild conjunctival congestion was present, with no icterus. All the systems were found to be normal.

At admission, laboratory findings were as follows: random blood sugar 365 mg/dL, serum urea 59 mg/dL, serum creatinine 1.4 mg/dL, sodium 117 m eq/L, potassium 5.4 m eq/L, haemoglobin 14.9 g%, total leucocyte count 17,700/cumm with neutrophils 70%, lymphocytes 25%, monocytes 2%, eosinphils 3% and platelet count 10/cumm, urine sugar 3+ and ketone bodies were positive. A chest roentgenogram showed consolidation in left lingular lobe (Fig. 1). Expectorated sputum was sent for microbiology evaluation for Gram stain, KOH mount, ZN stain, aerobic, fungal and mycobacterial cultures. The patient was given insulin and steroids for uncontrolled diabetes, Amikacin 500 mg IV once daily, imipenem 500 mg and metrogyl 500 mg thrice a day for six days.

Patient was afebrile and apparently normal but on the sixth day of admission he had spikes of fever and recurrent small bouts of haemoptysis with chest pain in the left mammary region on inspiration. Fiberoptic bronchoscopy revealed left lingular segmental pneumonia and extension of infection to right lower lobe and bronchus with a necrotising area extending in the anterior aspect. A diagnosis of necrotizing pneumonia with a suspicion of underlying malignancy was made. Bronchial wash was sent to microbiology for analysis and, no organisms could be demonstrated. Next day, an expectorated sputum sample was sent. A potassium hydroxide wet mount revealed broad aseptate thin walled hyphae with focal bulbous dilatation and irregular branching suggestive of Zygomyces (Fig. 2).

Immediately the treating unit was informed and requested to repeat early morning sample on two consecutive days. Based on the microscopy findings the patient was started on amphotericin B immediately with 20 mg in 500 mL of 5% dextrose. Two subsequent sputum samples were also found to be positive for fungal elements by microscopy and culture of all the three sputum samples as well as the bronchial wash on SDA at 28°C showed growth of *Rhizopus* species on the second day of inoculation, colony being white initially, later

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turned grey with black spots and microscopy of culture showed sporangia with sporangiospores and rhizoids opposite to the sporangiophores. Aerobic culture of all the sputum samples also showed growth of *Acinetobacter baumannii* with similar sensitivity pattern as the pre bronchial sputum. The chronological evaluation of the samples received by the microbiology laboratory and their results are shown in the table. A contrast enhanced computerized tomography (CECT) chest showed fresh infiltrates in right lung and cavitary consolidation in left lung (Fig. 3).

On the fifth day of antifungal therapy, patient had a massive bout of haemoptysis upto one litre and succumbed to the disease.

**Discussion**

Zygomycosis is described almost exclusively in patients with compromised immune systems or metabolic abnormalities. Pulmonary involvement has been uncommon, but the incidence has been increasingly recognized especially in patients with lymphoma, leukaemia and diabetes. However, the disease has also been described in patients without any underlying disease in various studies. Pulmonary zygomycosis results by inhalation of sporangiospores into the bronchioles and alveoli, leading to pulmonary infarction and necrosis with cavitation.

In immunocompromised host the illness begins as an acute pneumonia with fever and cough along with blood vessel invasion, followed by pulmonary infarction with haemoptysis and pleuritic pain with rapidly progressive downhill course. Our patient presented with similar complaints and later developed chest pain, haemoptysis and deteriorated. The first sputum sample of this patient sent at the time of admission was negative for fungal elements but bronchial wash and the repeat sputum samples sent after the patient developed small bouts of haemoptysis and chest pain were positive by microscopy and culture. Sputum smear and culture are rarely helpful; open lung biopsy may be required if bronchoscopy findings are negative. As a rule, a positive direct microscopy, especially from a sterile site should be considered significant, even if the laboratory is unable to culture the fungus. And, in patients with any of the predisposing conditions, the isolation of any Zygomycete fungus should be regarded as potentially significant. The more usual radiographic findings

![Figure 1](image1.png)  
**Figure 1:** Chest roentgenogram showing consolidation in left lingular lobe

![Figure 2](image2.png)  
**Figure 2:** 10% KOH preparation showing broad thin walled aseptate hyphae with irregular branching (500x)

![Figure 3](image3.png)  
**Figure 3:** CECT chest showing cavitary consolidation in left lung and fresh infiltrates in right lung

<table>
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<tr>
<th>Specimen</th>
<th>Microscopy (10% KOH)</th>
<th>Fungal culture</th>
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<tr>
<td>First sample</td>
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<tr>
<td>Second sample</td>
<td>Bronchial wash</td>
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</tr>
<tr>
<td>Third sample</td>
<td>Sputum</td>
<td>Broad aseptate hyphae</td>
</tr>
<tr>
<td>Fourth sample</td>
<td>Sputum</td>
<td>Broad aseptate hyphae</td>
</tr>
<tr>
<td>Fifth sample</td>
<td>Sputum</td>
<td>Broad aseptate hyphae</td>
</tr>
</tbody>
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Table: Microbiological evaluation of respiratory specimens

Aerobic culture of all the samples showed growth of *Acinetobacter baumannii* sensitive to tobramycin, netilmicin and imipenem (API-bioMerieux). ZN stain and mycobacterial cultures were negative for mycobacteria.
of pulmonary zygomycosis represents a spectrum that comprises a normal chest radiograph, a lung abscess, subacute and chronic pneumonia that often evolves into a lung abscess or to a rapidly progressive fatal pneumonia.\textsuperscript{6} Our patient initially showed only consolidation on one side but later on necrotizing picture extending to adjacent areas was seen on bronchoscopy and CECT chest. A similar case has been reported from Brazil\textsuperscript{9} with the similar clinical presentation and course, whose chest X-ray was unremarkable initially but later showed enlarging multiple round lesions. Among seven cases of pulmonary zygomycosis reported from Hong Kong\textsuperscript{10} over 18 year period, all patients presented with lobar consolidation either alone or with pleural effusion or multiple masses. Pulmonary manifestations in the form of a fungus ball\textsuperscript{6} and multiple pulmonary nodules\textsuperscript{9} have also been reported. The pulmonary form of the disease is difficult to diagnose due to the several non-specific radiological patterns presented and the usual necessity of an invasive approach to obtain clinical material for histology and culture.\textsuperscript{10}

Almost 50 to 75\% of patients have a poorly controlled diabetes mellitus and ketoacidosis\textsuperscript{2} as was also seen in our patient. Various studies have shown diabetes mellitus as one of most important predisposing factors for pulmonary zygomycosis.\textsuperscript{3,5,8-10} Diabetic patients are predisposed because of the decreased phagocytic function of their neutrophils. Furthermore, the acidosis and hyperglycemia provide an excellent environment for the fungus to grow.\textsuperscript{2}

Despite advances in diagnosis and treatment, a high mortality still exists for zygomycosis.\textsuperscript{2} Though antifungal treatment was started immediately in this patient after the diagnosis was made, he could not be revived as it was a rapid deterioration. Other studies\textsuperscript{3,9,10} have also shown a high mortality after treatment with amphotericin B alone. Mortality rates are elevated because, by the time disease is suspected and diagnosed, it frequently has spread diffusely and produced extensive tissue destruction.\textsuperscript{7} Some studies have shown a better prognosis when amphotericin B was coupled with surgical resection.\textsuperscript{4,7} Death may occur within two weeks if untreated or unsuccessfully treated.\textsuperscript{5} The management of zygomycosis should be aggressive parenteral administration of amphotericin B, coupled with extensive surgical debridement and rapid control of underlying medical conditions, which can improve survival rate.\textsuperscript{3} The overall survival rate of pulmonary zygomycosis is 44\%, depending on underlying predisposing conditions and extent of the lesion.\textsuperscript{9} Timely medical and/or surgical intervention significantly improves the survival rate.\textsuperscript{3}

A high index of suspicion is needed, in appropriate clinical settings, to diagnose and aggressively treat this infection in view of the high mortality rate for susceptible patients.\textsuperscript{9} Zygomycosis should be included in the differential diagnosis when patients with diabetes mellitus, leukaemia or lymphoma or immunocompromised patients present with or develop perplexing pulmonary abnormalities.\textsuperscript{8} A concerted effort amongst the clinician, mycologist, histopathologist and radiologist\textsuperscript{5} is necessary to counter the potential threat of saprophytic zygomycetes.\textsuperscript{5}

References


