

Pulmonary Mucormycosis in End Stage Renal Disease Patients: Successful Outcome Due to Rapid Diagnosis

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Abstract

Mucormycosis is a devastating fungal infection which usually occurs in patients with diabetic ketoacidosis, chronic renal failure, haematological malignancies, or solid organ transplant recipients. Pulmonary mucormycosis may present as an unresolving pneumonia, multiple nodules, or a cavitating abscess, and is associated with an overall 80% mortality. The probable diagnosis of mucormycosis requires the combination of various clinical data and the isolation of the fungus from clinical samples. Treatment requires a rapid diagnosis, correction of predisposing factors, surgical resection, debridement and appropriate antifungal therapy. We are reporting a successfully treated case of culture proven pulmonary mucormycosis in non-diabetic ESRD patient.

Keywords: ESRD; Haemodialysis; Mucormycosis; Non-diabetic; Pulmonary

Introduction

Patients with end-stage renal disease (ESRD) are more susceptible to systemic infections with worse outcome [1,2]. Due to their compromised immune statuses, clinical signs for infection in these patients are often subtle and nonspecific and the conventional laboratory markers are often influenced by uremia. Mucormycosis term is used for infections caused by fungi which belong to the order mucorales, first described by Paltauf [3,4]. Mucor is found in soil and organic debris. The spores released by them can become airborne and inhalation can lead to germination and hyphae formation, leading to variety of infections for example rhinocerebral, pulmonary, cutaneous, gastrointestinal and disseminated forms [5,6].

This case report illustrates that early detection and instant aggressive therapy leads to a successful outcome in non-diabetic ESRD male diagnosed by rapid microbiology analysis of broncho alveolar lavage (BAL).

Case Report

A 48 years old male with a history of hypertension leading to ESRD was on regular Haemodialysis with GAMBRO machine 4008S through AV fistula with S6 dialyzer (fresenius surface area 1.6 square meter, thrice a week since five years. He was anuric. He received 6 blood transfusions at different intervals in last 4 years of HD. As per his iron profile indicated he received intravenous Iron and never had iron toxicity. He was HIV, HbsAg and HCV negative.

Before admission he had non-productive cough, vague chest discomfort, loss of appetite, low grade fever, no history of pleuritic chest pain. On admission, physical examination revealed temp of 99.9F, SpO₂ 85%, BP 160/70, RR 28/mt and PR 102/mt in state of euvolemia.

Chest examination revealed decreased breath sounds, crackles off and on, and occasional rhonchi. There was no clinical finding in lobular pattern without pleural rib trachea was central. X-ray showed infiltration of 3-4 mm shadows all over lung fields scattered bilaterally but more collected in hilar and bibasal region with cardiomegaly. We requested for Bronchoscopy and BAL findings on urgent basis. Investigations were sent immediately to the labs.

Bronchoscopy revealed mucoid plaques at bifurcation of carinal angle and bronchial mucosa was inflamed with purulent secretions. Microscopy of bronchial lavage and scraping revealed fragments of necrotic tissue, inflammatory exudates in which broad aseptate

entangled hyphae were identified and rhizoids were not observed in any field. Acid fast bacilli were not identified. Cytology was negative for malignant cells.

Serum procalcitonin level was 3.8 ng/ml, white blood cell counts were 14000 cells/cumm with 90% neutrophils and 10% of lymphocytes. Microscopy of sputum revealed occasional gram positive cocci, conidia and hyphae like structures on gram staining, lacto phenol cotton blue film confirmed the presence of fungal elements, acid fast bacilli were negative. These findings were similar in three consecutive days. On the second day he had cough with streaky haemoptysis. Mantoux was negative. Urine and preliminary blood culture were sterile after 48 hours of incubation at 37°C. After third day sabourad dextrose agar showed tiny white colonies of Mucor.

Patient was started with 2.25 gram piperacillin tazobactam intravenous thrice a day and 3 mg/kg/day liposomal Amphotericin B once a day within 8 hours of diagnosis of pulmonary mucormycosis on the basis of BAL findings up till 14 days along with other appropriate medication. On the day of dialysis medication was given at the end of dialysis session. Haemodialysis intensified to control of volume, electrolytes and acid base statuses. Patient was put on non-invasive positive pressure ventilation to maintain the SPO₂ near about 100%. On fourth day of therapy he became bipap independent maintaining SPO₂ 100% on room air (Figure 1).

Discussion

Mucormycosis is the third invasive mycosis in order of importance after candidiasis and aspergillosis and is caused by fungi of the class Zygomycetes. The incidence of mucormycosis is approximately 1.7 cases per 1000,000 inhabitants per year, and the main risk-factors for the development of disease are ketoacidosis (diabetic and other), iatrogenic immunosuppression, use of corticosteroids or deferoxamine, disruption of mucocutaneous barriers by catheters and other devices, and exposure to bandages contaminated by these fungi. Mucorales

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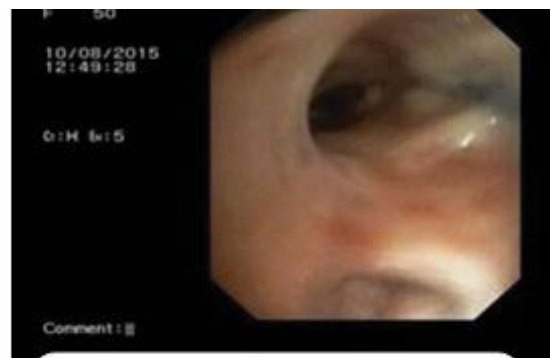
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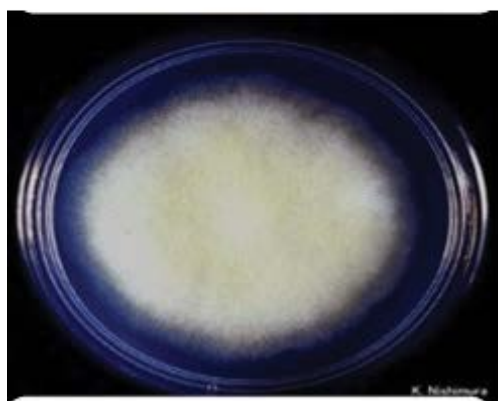
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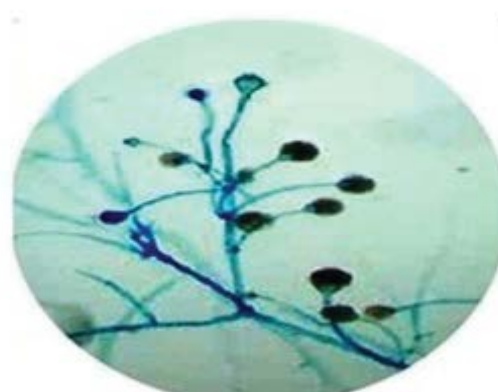
X-ray chest showing 2-4 mm scattered opacity



Bronchoscopic view shows plaque at carinal angle



Macroscopic picture shows white Mucor colony



Microscopic picture shows aseptate nonbranching hyphae

Figure 1: Clinical observation of Mucormycosis.

invade deep tissues via inhalation of airborne spores, percutaneous inoculation or ingestion and most commonly manifests in the sinuses (39%), lungs (24%), skin (19%), brain (9%), and gastrointestinal tract (7%), in the form of disseminated disease (6%), and in other sites (6%) [7].

Pulmonary mucormycosis may develop as a result of inhalation or by hematogenous or lymphatic spread. Symptoms include dyspnea, cough, and chest pain. In a recent series of 32 cases of pulmonary mucormycosis, fever was present in majority of patients. In our case patient had low grade fever [8].

Angioinvasion results in necrosis of tissue parenchyma, which may ultimately lead to cavitation and/or haemoptysis, which may be fatal if a major blood vessel is involved. On the second day of incubation our patient had cough with streaky haemoptysis [9].

Sputum in patients with pulmonary mucormycosis may be white, yellow, blood-tinged, or grossly bloody. Tedder et al. documented haemoptysis in 22 (16%), and it was fatal in 19 (13%) of the 146 patients who had died. Patient produced white blood tinged sputum on second day of admission [8].

Radiographically, a variety of findings may be present, including, in descending order of frequency: lobar consolidation, isolated masses,

nodular disease, and cavitation. Wedge-shaped infarcts of the lung may also be seen, particularly following thrombosis of the pulmonary vessels due to fungal angioinvasion. High-resolution chest CT scan is the best method of determining the extent of pulmonary mucormycosis and may demonstrate evidence of infection before it is seen on the chest X-ray. One suggestive finding is expansion of a mass or consolidation across tissue planes, in particular towards the great vessels in the mediastinum [10].

The diagnosis of mucormycosis is challenging. In a review of 185 cases of disseminated mucormycosis, Ingram et al. found that an ante mortem diagnosis was made in only 9% of cases. In pulmonary mucormycosis, 28-74% of cases were diagnosed while patients were alive. In the largest reported single institutional series of mucormycosis cases, Chakrabarti et al. observed that rhino-orbito-cerebral (91%) and cutaneous (100%) mucormycosis were most reliably diagnosed ante mortem, compared to pulmonary (31%), renal (44%), gastrointestinal (0%) and disseminated (0%) forms [3].

Morito et al. reported an autopsy case of pulmonary mucormycosis in a chronic Haemodialysis patient [11]. Jayakrishnan et al. also reported pulmonary mucormycosis case with fatal outcome in 26 year old male with chronic renal failure [12]. However we reported successful outcome of pulmonary mucormycosis in hypertensive,

nondiabetic ESRD male.

According to Chamilos delayed amphotericin B based therapy (i.e., initiating treatment \geq 6 days after diagnosis) resulted in a 2-fold increase in mortality rate at 12 weeks after diagnosis, compared with early treatment (82.9% vs. 48.6%) [13]. In our study we started aggressive therapy within 8 hours of the diagnosis and that was the reason of successful outcome.

We report this case because of the prompt detection and early treatment of the pulmonary mucormycosis. Our patient was treated with Liposomal Amphotericin B.

Conclusion

It concludes that if identified, diagnosed and treated promptly with the help of X-ray, bronchoscopy, direct microscopy of the specimen patient may lead to better outcome which is relatively uncommon but not impossible.

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