



# Subacute Pulmonary Mucormycosis in an Elderly Chinese Diabetic Patient: A Case Report

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## Abstract

Pulmonary mucormycosis is an opportunistic invasive fungal infection due to the inhalation of orders Mucorales, class Zygomycetes into the bronchioles and alveoli. It commonly occurs in patients with immunocompromised conditions, particularly in chemotherapy-induced neutropenia associated with hematologic malignancy. Pulmonary mucormycosis is often rapidly progressive and fatal, however, it can also perform as subacute or chronic courses. In this article, we present a case of subacute pulmonary mucormycosis in an elderly Chinese diabetic patient, mimicking the lung cancer, obtaining definite pathologic diagnosis through CT-guide transthoracic needle biopsy followed by negative result through flexible bronchoscopy examination.

## Introduction

Mucormycosis is a serious invasive and life-threatening fungal disease and is the second leading cause of invasive mold infection, following aspergillosis [1]. The rhino-cerebral, lung, brain, cutaneous, and gastrointestinal system can be affected. Pulmonary mucormycosis is usually a rapidly progressive infection associated with relatively low morbidity and high mortality. It accounts for about 22% of all mucormycosis and the mortality rate is more than 70% [1,2]. Pulmonary mucormycosis always take place during chemotherapy-induced neutropenia related to hematologic malignancy and usually progress rapidly [3]. However, it can also occur in diabetics and other conditions. Sometimes it can also present as subacute or chronic courses. Early diagnosis and aggressive treatment is the key to patient survival, but it is always hard to differentiate pulmonary mucormycosis from bacterial, viral and other fungal pulmonary infections and lung cancer. We present a Chinese patient with subacute pulmonary mucormycosis and tried to introduce our knowledge about this disease.

## Case Presentation

A 75-year-old man was admitted to the hospital with a two-month history of pleuritic left chest pain, cough, fatigue and weight loss of 10 kg, with no fevers or hemoptysis. Both his blood pressure and glucose were poorly controlled. He had heavy smoking (20 cigarettes per day) for 50 years. The physical examination revealed amphoric breath sounds along the left upper mild collapsed chest. His medical history included type 2 diabetes mellitus for 5 years and hypertension for 10 years. Laboratory and accessory examination revealed neutrophilia, anemia, elevated C-reactive protein, renal insufficiency and pulmonary hypertension. WBC  $21.67 \times 10^9/L$ , N% 0.838, RBC  $2.48 \times 10^{12}/L$ , Hb 65 g/L, PLT  $344 \times 10^9/L$ ; CRP 208 mg/L; Blood biochemical test: BUN 7.8 mmol/L, CREA 194  $\mu\text{mol}/L$ , ALT 16 U/L, AST 22 U/L, CK 53 U/L, CK-MB 9.8 U/L; cTnT negative; D-dimer 1080 ng/L; Electrocardiogram: sinus rhythm and complete right bundle branch block; Echocardiogram: normal heart size, shape and wall movement, moderate tricuspid regurgitation, pulmonary arterial pressure (47 mmHg), LVEF 66%. Sputum cultures grew *Candida albicans*, *Stenotrophomonas maltophilia*, sensitive to Piperacillin sodium/Tazobactam sodium; PPD skin test was negative. A chest radiograph (Figure 1) and subsequent CT imaging (Figure 2) transverse mediastinal window showed a 9.6 cm  $\times$  2.9 cm irregular thick-walled cavity (white arrow) in the left lung apex, with invasion into the rib (black arrow) and homogeneous enhancement on post-contrast images. The neighbor lung around the cavity presented with alveolar sheet consolidation. <sup>99m</sup>Tc-MIBI tumoraffin: positive in the left upper lobe of lung, suspected of "peripheral lung cancer in the left upper lobe involving the pleura" which should be confirmed by needle biopsy. No definite pathologic diagnosis was obtained on flexible bronchoscopy. CT-guided transthoracic needle biopsy was then performed and micrograph

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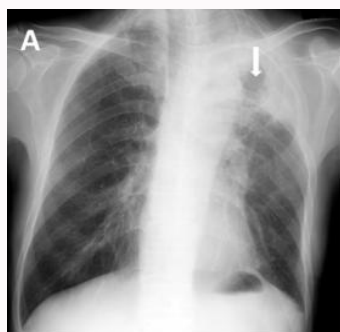
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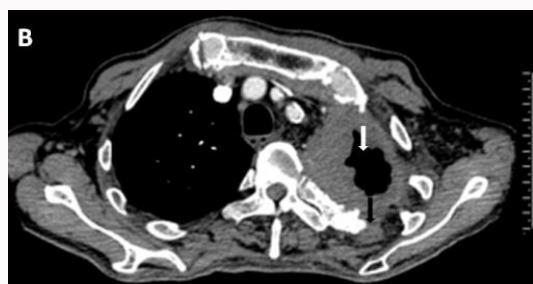
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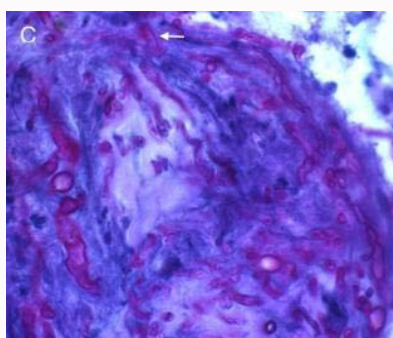
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**Figure 1:** Chest radiograph showed thick-walled cavity and infiltration in the left lung apex.



**Figure 2:** CT imaging showed a 9.6 cm x 2.9 cm irregular thick-walled cavity (white arrow) in the left lung apex, with invasion into the rib (black arrow) and homogeneous enhancement on post-contrast images.



**Figure 3:** Periodic acid-Schiff stain of lung tissue revealed invasion with fungal hyphae of broad, irregular, and non-septate with short stubby side branches at a 90-degree angle (1000X, white arrow).

revealed characteristic mold fungus organisms in tissue, confirming a diagnosis of pulmonary mucormycosis. The hyphae were broad, irregular, non-septate with short stubby side branches at a 90-degree angle (Figure 3), periodic acid-Schiff stain, 1000X, white arrow), Acid-fast staining (-), PAS staining (+) and PM staining (+). The patient was then treated with liposomal amphotericin B and caspofungin, and rapidly deteriorated with a result of death, although the patient was transferred into ICU supported with mechanical ventilation, received liquid resuscitation and vasoactive agent.

## Discussion

Pulmonary mucormycosis is exclusively seen in immunocompromised patients with poorly controlled diabetes, hematologic malignancies, neutropenia, organ or hematopoietic stem cell transplantation [3,4]. Tedder et al. [5] reported that the proportion of malignant blood disease and diabetes in pulmonary

mucormycosis was 37% and 32%, respectively. About 6% patients do not have specific underlying diseases [6]. Although its morbidity is relatively low, several studies suggest that the overall incidence has increased [7,8]. Pulmonary mucormycosis is usually a rapidly progressive infection associated with high mortality. The mortality was related to rapid progression, extensive involvement, underlying diseases, limited available therapy and delayed diagnosis. However, a few pulmonary mucormycosis can present in subacute or chronic courses, particularly in diabetes. Several cases of chronic pulmonary mucormycosis in diabetes were reported, reminding us that the subacute and chronic pulmonary mucormycosis is uncommon but should be considered in patients with diabetes [9]. The host response to mucorales is predominantly by neutrophils and other physical conditions such as hyperglycaemia, acidosis [10]. In this case, the patient had a solitary large, irregular, thick walled cavity, need make a differential diagnosis with tuberculosis, necrotizing bronchial cancer, or pulmonary abscess [11]. The point need to notice was that the patient got the initial false diagnosis for lung cancer after obtaining the positive result by  $^{99m}\text{Tc}$ -MIBI tumoraffin examination.

Pulmonary mucormycosis is usually characterized by acute onset, rapid progress, and high mortality. Respiratory tract is the main pathway of infection. Pulmonary mucormycosis diagnosis could be definitely established in the evidence of characteristic hyphasma by biopsy including transbronchoscopic or CT-guided transthoracic. Currently, the only effective antifungal therapy for pulmonary mucormycosis is Amphotericin B (AMB), echinocandin could be taken as adjunctive therapy. Timely diagnosis and immediately start of appropriate therapy are the main factors for patient survival [12,13]. The diagnosis is mainly based on clinical history, symptoms and signs, high index of suspicion, diagnostic imaging and biopsy. As the symptoms, signs and radiological manifestations of pulmonary mucormycosis are non-specific, physicians should have a high level of suspicion in any immunocompromised patients with persistent respiratory symptoms and inefficiently antibiotic therapy. Indications for invasive examination such as biopsy including transbronchoscopic or CT-guided transthoracic should be performed. Surgical debridement and intravenous amphotericin B is still the main treatment and underlying diseases such as diabetes and neutropenia should also be improved sufficiently.

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