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Case Report

Pneumothorax following rupture of lung cavity due to aspergillosis in a critically ill patient

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Abstract:

The incidence of fungal infection in intensive care units have been increasing over the years and Aspergillosis is one of the common fungal infections in the ICUs. It is a challenge for critical care experts to diagnose fungal infections on time and initiate appropriate management strategy to prevent adverse outcomes. Fungal infections may be notorious in not being diagnosed with a chest X ray alone as fungal infections related cavitary lesions may not always be seen in a chest X ray, necessitating the need of a CT Scan early on in the course of the illness. A chest CT scan may further be justified if the patient is not responding to a protracted course of higher antibiotics. Any delay in diagnosis may lead to poor outcome. Here we present a case who underwent subtotal gastrectomy for adenocarcinoma of stomach and presented one month later with fever, cough and shortness of breath. The patient was subsequently managed in the ICU but later expired following pneumothorax due to rupture of lung cavity associated with aspergillosis.

Key Words: *aspergillosis, critically ill, lung cavity, pneumothorax.*

Introduction

There has been a significant increase in the number of fungal infections in intensive care units (ICUs) over the past couple of decades. Aspergillus spp. are ubiquitous fungi and are transmitted by inhalation of airborne spores and may result in a variety of lung manifestations. Infections caused by commonly encountered gram-positive or gram-negative bacteria may result in pulmonary cavities by one of two mechanisms. First, organisms may enter the respiratory cavity through oropharynx/upper airway, bypass host defenses, and cause either a necrotizing pneumonia or lung abscess. And alternatively, organisms may enter the lung via the bloodstream, often in association with fibrin and platelets as septic pulmonary emboli.[1] The radiographic appearance and microbiological etiologies of these two mechanisms are distinct. Aspergilloma is primarily seen in patients with cavitary lung disease, while acute bronchopulmonary aspergillosis (ABPA) is a hypersensitivity disease of the lungs that almost always affects patients with asthma or cystic fibrosis. A multitude of respiratory disorders have been described as a cause of secondary spontaneous pneumothorax. The most frequent underlying disorders are chronic obstructive pulmonary disease with emphysema, cystic fibrosis, tuberculosis, lung cancer and HIV associated Pneumocystis carini pneumonia, followed by more rare but ''typical'' disorders, such as lymphangioleiomyomatosis, histiocytosis X and aspergillosis.[2] Because lung function in these patients is already compromised, secondary spontaneous pneumothorax (SSP) often presents as a potentially life-threatening disease, requiring immediate action.

Pneumothorax due to rupture of lung cavity caused by aspergillosis is a rare occurrence and very few cases have been reported so far. Here we discuss a case of a 50 year old man with no cavitary lesion in chest X ray treated in the line of bacterial pneumonia initially, who gradually deteriorated and later chest CT revealed a cavitary lung lesion and was subsequently diagnosed to have aspergillosis.

Case Description

A 50 years old male presented with the history of loss of appetite, loss of weight and vomiting for 6 months and was diagnosed as adenocarcinoma of stomach. He underwent subtotal gastrectomy. After a month, he presented with the complaint of shortness of breath for 3 days, fever and cough for 2 days. Blood reports showed hemoglobin level of 10 gm/dL, total count of 13000/cu mm and platelets count of 250000/cu mm. LFT and RFT were within normal limits. He was started on Piperacillin + tazobactam and levofloxacin. He did not respond to it even after seven days of therapy. He gradually developed increase in secretion with persistent fever. His counts increased to 20,000/cu mm His admission Chest X ray showed bilateral lung infiltrates. CT scan of chest was performed which revealed a cavitary lesion indicated by arrow (Fig 1). Subsequent Chest X ray showed consolidation in right middle, right lower and left lower lung zones along with chest tube in situ in the right side with residual pneumothorax. (Fig 2). During stay in hospital sputum culture showed Klebsiella Pneumoniae sensitive to Polymyxin B, Colistin and Tigecycline. He was administered Polymyxin B and Tigecycline for 14 days but he still did not respond. Sputum samples for Acid Fast Bacilli and gene Xpert was

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negative in 3 consecutive samples. However, B galactomannan was significantly raised to 20 colony forming units (cfu). Aspergilloma was suspected and injectable voriconazole was started at 6mg/kg 12 hourly for 2 doses followed by 4mg/kg 12 hourly. After 3 days of starting voriconazole, patient developed right sided pneumothorax, which was managed with a chest drain (Fig 2). Patient failed to improve and expired after four days following pneumothorax.

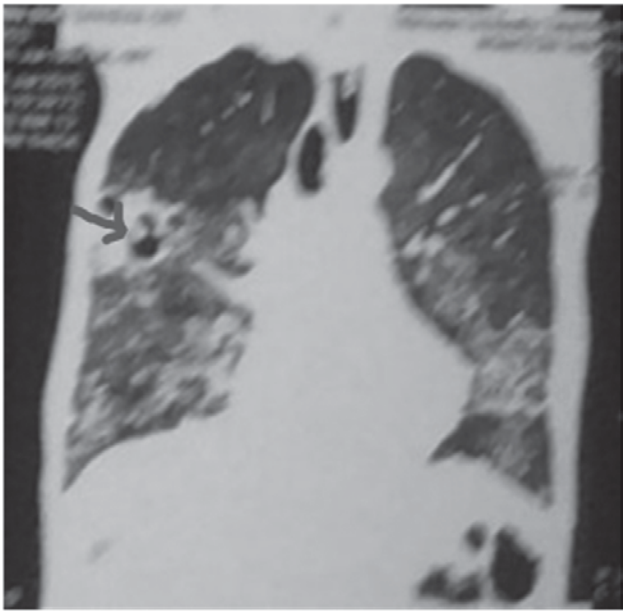

Fig. 1

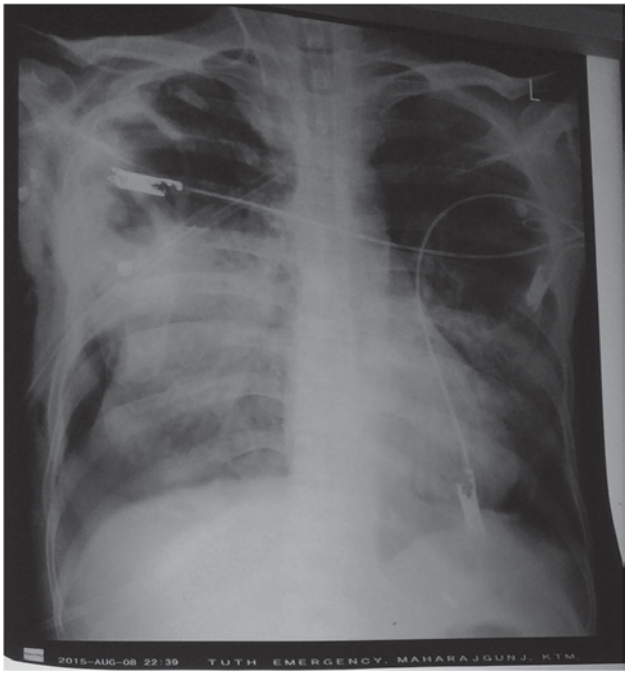

Fig. 2

XRay of the Patient showing consolidation like picture of Right middle and lower lung zones

Discussion

Aspergillus species are environmental molds which may cause a wide range of pulmonary disease in humans. Pulmonary disease is most commonly caused by Aspergillus fumigatus, although it can be caused by other species such as A. flavus, A. niger, and A. terreus, and can manifest as one of four distinct clinical entities, ordered by increasing pathogenicity and tissue invasion: (i) Allergic bronchopulmonary aspergillosis, which afflicts patients with long-standing asthma; (ii) Aspergilloma, which afflicts primarily patients with preexisting lung cavities; (iii) Chronic necrotizing aspergillosis or semi-invasive aspergillosis, which afflicts patients with a history of chronic lung disease; and (iv) Invasive aspergillosis, which afflicts immunocompromised and critically ill hosts.[3] Allergic bronchopulmonary aspergillosis is not generally associated with lung cavitation but the other three manifestations of Aspergillus are all associated with pulmonary cavities. Other aspergillosis manifestations may include thickening of the cavity wall, a new air-fluid level within the cavity, or complete opacification of a previously air-filled cavity. Patients with aspergillosis are frequently asymptomatic, but the most common symptomatic presentation is hemoptysis. Aspergillosis may grow or shrink over time, and a small percentage may also resolve spontaneously. Pneumothorax as the first symptom of aspergillosis is quite rare. Any causal connection between pneumothorax and aspergillus infection may not be distinctly visible. Although pneumothorax may not be a common clinical presentation of aspergillosis, it is quite important to have a high degree of suspicion about possibility of a fungal infection even if the chest X ray does not show a cavitary lesion, especially if the patient is non-respondent to a protracted course of higher antibiotics. In such situations, a chest CT Scan may be considered so that the diagnosis of a cavitary lesion due to a fungal pathology is not missed and appropriate antifungal therapy can be started on time. In our case, we missed the diagnosis of a cavitary lung pathology later diagnosed as aspergillosis which delayed the initiation of antifungal therapy, which eventually ruptured leading to pneumothorax and further deteriorated the clinical status of the patient. Pneumothorax due to rupture of aspergillosis into the pleural space in patients who are not otherwise immunocompromised, is rare. One of the mechanisms of pneumothorax due to aspergillosis may be due to aspergillus colonization and the large amount of hyphae causing partial obstruction of small bronchioles, which acts as a check-valve causing blebs and subsequent progressive hyperinflation. The eventual rupture of hence formed blebs results in pneumothorax. Pneumothorax has been described in patients with pulmonary mycetoma undergoing intensive cytotoxic therapy for hematologic malignancies.[4] A high degree of suspicion of a fungal infection and a CT scan early in the course of the illness would have been useful to change the outcome of the patient. Fungal infection was suspected only when B galactomannan was positive and by then, the cavity had already ruptured leading to pneumothorax. A CT scan chest may also be considered early on to diagnose fungal infection and to initiate appropriate timely antifungal therapy.

The consequences of a pneumothorax in patients with pre-existing lung disease are significantly greater, and the management is potentially more difficult.[5]

To conclude, though rare, cavitary lesions secondary to fungal infection can be a cause for the patients failing to respond to protracted course of antibiotics in ICU. High index of suspicion and CT scan of chest may be helpful to diagnose and timely manage such cases.

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