Fungal pneumonia concealing bacterial pneumonia: a diagnostic dilemma

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Abstract

We describe the case of a 61-year-old diabetic man affected by *Achromobacter denitrificans*. He was immunocompetent and did not have any past history of chronic lung disease. The patient was treated with sensitive antibiotic meropenem 1 g, three times daily. To our knowledge, only one case of *A. denitrificans* pneumonia has been reported from the Indian subcontinent in an individual with underlying lung disease and none in a healthy person.

Introduction

Achromobacter denitrificans is a gram-negative, mobile rod that uncommonly causes clinical symptoms when compared to its clinically significant co-species, *A. xylosoxidans*. Despite an increasing number of published case reports and literature reviews suggesting a global increase in achromobacterial disease, most clinicians remain uncertain of the organism's significance when clinically isolated [1]. In addition, treatment is often challenging due to its inherent and acquired multidrug resistance patterns. We present a case report of a 61-year-old male with diabetes mellitus and bilateral multi-lobar lung cavities with consolidation due to *A. denitrificans*.

Case Report

A 61-year-old male farmer by occupation, hailing from southern Tamil Nadu, presented to our hospital with a productive cough with brownish sputum, shortness of breath, and hemoptysis of 2 weeks duration. Hemoptysis was mild, with blood-streaked sputum. He had no complaints of fever or chest pain. He was a reformed alcoholic and an ex-smoker with a pack year of 10. He was a known case of diabetes mellitus for the last 6 years, not on any medications, with no other co-morbidities. He had no history of recurrent pneumonia, sinusitis, or foul-smelling greasy stools. He had a pulse rate of 98 beats/minute, blood pressure of 110/68 mmHg, and respiratory rate of 16-20 rate/minute on admission. His respiratory system examination revealed no abnormality on inspection, palpation, and percussion with cavernous bronchial breath sounds in the bilateral axillary and infra-scapular areas on auscultation. His total leucocyte count was 13500/cu mm, neutrophils predominant with hemoglobin 12.5 g/dL, and platelets 188000/cu mm. Serum electrolytes and renal and liver function tests were within normal limits. Arterial blood gas analysis at admission showed a pH of 7.48, partial pressure of carbon dioxide of 32.8, partial pressure of oxygen of 64.9, SO_2 of 93.9, and HCO_3 of 24.9.

Chest roentgenograph at admission (Figure 1A) showed bilateral lower zone non-homogenous opacities with cavities. Sputum

was sent for gram stain and culture, fungal staining with potassium hydroxide (KOH), culture, and acid-fast bacilli (AFB) staining. He was empirically started on injection piperacillin-tazobactam. A contrast-enhanced computed tomography (CT) thorax showed multiple bilateral thick-walled cavities with surrounding consolidation in bilateral apical lobe posterior segments, lingula, right middle lobe, and bilateral lower lobe apical segments (Figure 1B). There were no nodules or associated pleural effusion. Radiological features were suggestive of mucormycosis with a background of deranged random blood sugar and hemoglobin A1C of 18. Hence, injectable liposomal amphotericin was started in view of suspected mucormycosis. His reverse transcription-polymerase chain reaction for COVID-19 was negative, and he did not give any history of admission due to COVID-19 in the recent past. The blood cultures drawn were sterile. KOH and AFB stainings and fungal and mycobacterial cultures were negative. Sputum pyogenic culture grew *A. denitrificans* sensitive to piperacillin-tazobactam; hence the same was continued. However, repeat X-rays and CT thorax on the eighth day showed an increase in the cavitary lesions (Figure 1 C,D).

Therefore, a decision to perform a fiber-optic bronchoscopy was made. Bronchoscopy showed whitish, purulent secretions in the trachea and the left bronchial tree with no other abnormalities. Bronchoalveolar lavage (BAL) was taken from bilateral lower lobes, which showed the growth of *A. denitrificans*, sensitive to meropenem and resistant to piperacillin. BAL fluid was negative for fungus, AFB staining, and culture. BAL fluid cartridge-based nucleic acid amplification test did not detect *Mycobacterium tuberculosis*. Hence, antibiotics were hiked up to meropenem 1 g thrice daily, and amphotericin B was stopped. However, he continued to have episodes of hemoptysis despite antifibrinolytics and cough suppressants, and serial X-rays showed an increase in the size of the cavitary lesions. He was not a surgical candidate because of bilateral cavitary lesions and received meropenem for 2 weeks. Following a prolonged stay in the hospital, he had an episode of massive hemoptysis with hemodynamic instability, went into cardiac arrest, and could not be revived.

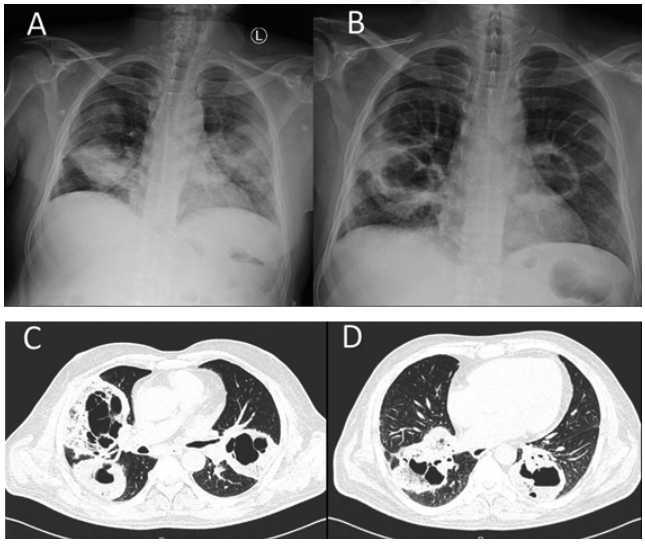

Figure 1. A,B) Chest roentgenograph at admission and 8 days later; C,D) computed tomography thorax showing bilateral cavities with peri-cavitary consolidation.

Discussion

A. denitrificans is a rare clinical isolate compared to its co-species, *A. xylosoxidans*. A gram-negative, mobile, strictly aerobic, ubiquitous bacterium not fermenting glucose, oxidase, and catalase positive, *A. denitrificans* inhabits soil and aquatic environments, including well water, intravenous fluids, and water in humidifiers [2].

There are only around five case reports of pulmonary infections by *A. denitrificans* worldwide [3]. In all previous cases of pulmonary infections by *A. denitrificans* except one [3], the presence of pre-existing lung disease has been noted to be a predisposing factor. Whereas *A. xylosoxidans* is a known pathogen in individuals with cystic fibrosis (CF), bronchiectasis or immunosuppression was the predisposing factor in all cases of *A. denitrificans* reported. The other case reported from India, of a 45-year-old male, had a previous history of pulmonary tuberculosis with a right upper lobe cavity and bilateral bronchiectasis [4]. He too presented with hemoptysis, and two separate samples showed the presence of *A. denitrificans* without any contamination. He was managed with meropenem for 14 days and showed clinical improvement. Pneumonia and bacteremia are the two most common clinical presentations of *Achromobacter* infections in non-CF hosts. In our case, the patient presented with bilateral cavitary consolidation. The usual causes of the same, such as pulmonary tuberculosis and fungal infection (in view of uncontrolled diabetes), were worked up for and came negative. As sputum cultures were taken on two separate occasions and BAL grew *A. denitrificans* without any contamination, the lung lesions could not be attributed to any other cause. A similar picture of right upper lobe ground glass and cavitary opacities has been reported with septic arthritis with septic pulmonary emboli [5]. No features of other foci of infection could be identified in our patient.

Achromobacter infections are notorious for antibiotic resistance. In our case too, although the initial sputum culture sensitivity showed piperacillin-tazobactam sensitivity and the injectable drug was continued for 11 days, BAL, done because of radiological worsening, isolated the same organism, sensitive to meropenem alone. The response of the organism to carbapenems is well documented in the literature [6].

We theorize that the progressive lesions in our patient could have been due to this antibiotic resistance. This is supported by the fact that all *Achromobacter* isolates were of good quality, no other organism was isolated, and he received prophylactic antifungals and worsened despite the same. *Achromobacter* pneumonia has been reported to have a case fatality rate of 64% [7].

Conclusions

Despite the worldwide focus on emerging pathogens following the COVID-19 pandemic, organisms such as *A. denitrificans*, being an uncommon isolation, are either overlooked or discarded as a contaminant. Given its high fatality rate in serious infections and multi-drug resistance pattern, all such cases need to be documented and studied for better clinical decisions and outcomes.

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