CASE REPORT

NECROTIZING PNEUMONIA DUE TO *RHODOCOCCUS HOAGII* IN A PATIENT WITH ADVANCED RETROVIRAL DISEASE

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Rhodococcus hoagii is a well-known zoonotic disease, especially in foals. Its occurrence in humans is uncommon and usually occurs in immunocompromised patients. We present a case of Rhodococcus hoagii infection resulting in necrotizing pneumonia in a patient with advanced retroviral disease who had defaulted treatment. Effective treatment of *Rhodococcus hoagii* infection requires a combination of antibiotics. We also highlighted the importance of effective communication between clinicians and microbiologists so that prompt treatment can be initiated to improve patient outcomes.

Keywords Necrotizing pneumonia; *Rhodococcus hoagii*; Retroviral disease

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INTRODUCTION

Rhodococcus hoagii is a gram-positive, encapsulated, intracellular bacillus that causes a wide range of clinical manifestations, the most common being pulmonary infection.[1] *Rhodococcus hoagii* primarily affects immunocompromised individuals, and its prevalence has increased in parallel with the HIV pandemic. Diagnosis of *rhodococcus* infection requires a high level of clinical suspicion, and effective communication between clinicians and microbiologists is essential to ensure timely diagnosis.

CASE REPORT

A 26-year-old man with retroviral disease presented with a one-month history of unproductive cough, fever and poor appetite. He had not been taking his antiretroviral medications for a year. He denied having haemoptysis, night sweats or chest pain. He works in a restaurant as a waiter.

On examination, he appeared pale and cachexic. He was afebrile with a blood pressure of 104/40 mmHg and a pulse rate of 98 beats per minute. He was mildly tachypneic, breathing at a rate of 24 breaths per minute, and his oxygen saturation was 95% when measured by pulse oximetry while breathing ambient air. On systemic examination, coarse crepitation was heard over the left lung on auscultation. The cardiovascular and abdominal examinations were otherwise unremarkable.

The full blood count revealed white blood cell counts of $12x10^9$/L, haemoglobin of 5.9 g/dL, and platelet counts of $59x10^9$/L. The renal profile was normal, but the liver function test showed mildly elevated transaminases and alkaline phosphatase. The arterial blood gas showed pH of 7.52, partial pressure of oxygen of 88 mmHg and carbon dioxide of 27 mmHg. The bicarbonate ion was 22 mEq/L. A chest radiograph revealed consolidation in the left middle zone. Sputum acid fast bacilli direct smear was negative. The CD4 count and HIV viral load were 1 cells/mm^3 and 54509 copies/ml, respectively.

He was initially given intravenous amoxicillin-clavulanate 1.2 g every 8 hours and azithromycin 500 mg once daily as empirical antimicrobial therapy for community-acquired pneumonia. In the ward, he was also transfused with 2 units of packed cells. Despite treatment, he remained unwell with a persistent fever and on day 3 of admission, the aerobic and anaerobic blood cultures revealed gram-positive rods that resembled diphtheroid, which were initially suspected to be a contaminant (Figure-1). Because of the patient's immunocompromised state, the infectious disease and microbiology teams discussed the possibility of *rhodococcus* infection (concurrent bacteraemia and pulmonary infection). As a result, intravenous imipenem, oral levofloxacin, and linezolid were started immediately as empirical antibiotics while waiting for the final blood culture result.

A computed tomography (CT) scan of the thorax revealed consolidation of the left lower lobe, low attenuation of the lung parenchyma, and pleural enhancement, all of which suggested necrotizing pneumonia (Figure-2). Later, *Rhodococcus hoagii* was isolated from both the aerobic and anaerobic blood cultures by using matrix-assisted laser desorption ionization time-of-flight (MALDI-TOF) mass spectrometry method. The isolate was susceptible to amoxicillin-clavulanate, ceftriaxone, and trimethoprim-sulfamethoxazole. During his

hospital stay, his fever and thrombocytopenia resolved, and his cough and appetite improved.

His antiretroviral therapy, which included tenofovir-emtricitabine and efavirenz, was restarted three weeks later. Imipenem, levofloxacin, and linezolid were given for a total of two months, followed by a combination of two oral antibiotics – levofloxacin and trimethoprim-sulfamethoxazole. A repeat CT of the thorax revealed improved left lung consolidation, and he was discharged home with an outpatient scheduled review.

Figure-1: Gram stain from the blood cultures showing Gram-positive rods with diphtheroid morphology.

Figure-2: CT scan of the thorax showing left lower lobe consolidation with low attenuation within the lung parenchyma, indicating necrotizing pneumonia; and right pleural effusion.

DISCUSSION

Rhodococcus hoagii is an aerobic, gram-positive, encapsulated, intracellular bacteria that varies in shape from coccoid to bacillary depending on the nutrient and growth environment.[2] It is typically found in environments associated with horse farms, such as soil and horse faeces. In most cases, transmission occurs through inhalation of the bacteria or ingestion of contaminated soil. It rarely infects humans, and when it does, the majority of cases occur in immunocompromised hosts, such as those with retroviral disease or taking immunosuppressive medications.[3]

Necrotizing pneumonia is a common manifestation in immunocompromised patients infected with *Rhodococcus hoagii*, and our case is a classic example. Other pulmonary manifestations include lung abscess and cavitating lung lesions. Extrapulmonary diseases such as subcutaneous abscess, brain abscess, lymphadenitis, and endophthalmitis have also been reported infrequently. Varotti *et al.* described a case of *Rhodococcus* infection with multiple abscesses involving soft tissues and muscle in a renal transplant patient on immunosuppressive therapy.[4]

Rhodococcus infection rarely occurs in humans, so its prevalence has been documented primarily in foals and other forms of animals. The majority of known human cases were documented through case reports or retrospective studies. Torres-Tortosa *et al.* conducted a multicenter observational study in Spain and found a 34.3% mortality rate in HIV-infected patients. In the same study, factors that contributed to a poorer outcome included multilobar involvement, the absence of antiretroviral therapy, and the use of inappropriate antibiotics.[5] In contrast, Gundelly *et al.* found that the mortality rate of HIV-infected patients while on antiretroviral medications with *rhodococcus* infection was only 8% in a literature review.[6]

Antimicrobial therapy is the mainstay of treatment for *Rhodococcus hoagii* infection. Due to concerns about the emergence of resistance, immunocompromised patients are treated with a combination of at least two agents. The first line of treatment is usually a macrolide or fluoroquinolone in combination with rifampin, or in combination with two of the following antibiotics: vancomycin, imipenem, linezolid, or an aminoglycoside.[7] In some cases, surgical intervention such as drainage/resection, in combination with antimicrobial therapy, may be required in patients with abscesses/empyema.[3]

Rhodococcus hoagii can appear on gram stain as beaded to solidly staining coccobacilli, and because of their gram stain morphology, they are easily dismissed as "diphtheroid," which is usually considered a contaminant.[8] The importance of effective communication between the microbiologists and the infectious disease team is highlighted in this case. Since most communication between clinicians and microbiologists are in written form such as by writing laboratory request forms for blood cultures, the proper summary and indication should be written so that the microbiologists can interpret the results more accurately based on individual cases.[9]

CONCLUSION

This case demonstrates a rare case of *Rhodococcus hoagii* bacteremia with the classic presentation of necrotizing pneumonia, which typically occurs in immunocompromised patients. It also recognised the significance of effective communication among healthcare workers (clinicians and laboratory personnel) in improving outcomes in patients with *Rhodococcus* infection.

Conflicts of interests:

The authors declare there are no competing interests.

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