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ABSTRACT

Introduction: Genus *Rhodococcus* is a rare cause of infection in human. *Rhodococcus equi* has been reported as a cause of majority of these infections. However, *Rhodococcus rhodochrous* has never been reported as an etiologic agent in human diseases.

Case Report: A 45-year-old female was admitted with cough with yellowish sputum production, fever, chills and shortness of breath for three days. Patient had significantly decline in her functional capacity. Over past three months, patients had recurrent admissions for pneumonia and developed increasing numbers of skin nodules. Blood cultures sent from previous admissions were reported as *Corynebacterium* species. Lung and skin biopsy showed *Rhodococcus rhodochrous* species confirmed by high performance liquid chromatography. Later in the course of disease, patient developed brain abscesses.

Conclusion: *Corynebacterium* species in blood should be carefully reviewed in an immunocompromised patient and *Rhodococcus rhodochrous* species infection should be considered as one of the differential diagnosis.



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CASE REPORT

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INTRODUCTION

Rhodococcus species is a rare cause of infection in humans. Most of the reported human infections are due to be *Rhodococcus equi* [1–3]. *Rhodococcus rhodochrous* is rarely reported as an etiology in humans [4]. *Rhodococcus* species usually causes disease in immunocompromised individuals [5, 6]. *Rhodococcus equi* infection in an immunocompetent persons have been reported, though such reports are very few [7–9]. We present a case of a 45-year-old HIV patient who had recurrent pneumonia for three months. Blood cultures reports of *Corynebacterium* species were considered as contaminated samples. However, lung and skin biopsy specimen showed *Rhodococcus rhodochrous* species infection.

CASE SERIES

A 45-year-old HIV positive female (CD4 cell count- 15 cells/mm³) was brought to the emergency department with complaints of fever, cough, and shortness of breath

of three days duration. Cough was productive of yellowish sputum with no associated hemoptysis or chest pain. Fever was intermittent with chills but no night sweats. Patient's functional capacity decreased from a prior walking distance of half a block. Review of symptoms was significant for multiple painful skin bumps which were increasing in number. Her past medical history revealed multiple admissions in the last three months, two of which were for pneumonia. Patient was not on antiretroviral therapy and signed out against medical advice from hospital each time she felt better. She was a chronic smoker (1–1.5 packs per day for 25 years) and active cocaine abuser. She denied any history of occupational exposure and never had pets.

On examination, patient was chronically ill looking with low grade fever of 100.4 °F, tachypnea (RR 21/min), tachycardia (HR 128/min). Oxygen saturation was 97% on room air. Other significant findings on examination were poor oral hygiene, oral thrush and right middle lung and basal crackles. Multiple subcutaneous nodules sparsely distributed on the thigh, face, abdomen and upper arm were noted (Figure 1). The nodules were tender, of varying sizes (5– 10 mm), with some erythema but non blanching.

Pertinent laboratory findings were as follows: white blood cell count of 14.5 with neutrophil count of 91.7. Basic metabolic panel was essentially normal. Liver profile showed hypoalbuminemia (1.2 g/dL), mildly elevated alkaline phosphatase (193 IU/L) and lactate dehydrogenase (231 IU/L). Coagulation profile was normal and blood culture was negative. X-ray revealed right middle lobe infiltrate (Figure 2). Computed tomography (CT) scan revealed nodule with cavitation in right middle and lower lobe (Figure 3). Echocardiography showed normal ejection fraction with moderate pericardial effusion but no evidence of vegetation.

Sputum acid fast bacilli test came negative five times;

transbronchial biopsy was negative for malignancy, acid fast bacilli stain, and fungal smear. Blood cultures drawn during previous admissions were reported to positive for *Corynebacterium* spp. on three different occasions. These reports were considered as contamination during past admissions. Culture drug susceptibility reports were requested for previous blood cultures because of patient's persistent and new symptoms. Patient also agreed for surgical biopsy and specimens were taken from the skin of right buttock, right upper thigh and lung (right lower and upper lobes). Both specimens showed the same findings: acute suppurative and chronic inflammation and fibrohistiocytic granulomatous proliferation with



Figure 2: Right middle lobe reticulonodular infiltrate (X-ray of chest).



Figure 3: Nodular infiltrate in right middle lobe with central cavity formation (computed tomography scan of the chest).



Figure 1: Subcutaneous nodule on the thigh.

no evidence of malignancy. Gomori methenamine silver stain and Gram stains show long filamentous branching, beaded Gram-positive organisms distributed in large aggregates (Figure 4). Morphology was said to be highly suggestive of Nocardia-type organisms. Same specimen was sent out to city department of health where the organism was identified as Genus *Rhodococcus* and species *Rhodochrous* by high performance liquid chromatography.

Patient again signed out against medical advice. Patient was given prescriptions for clarithromycin and bactrim, along with antiretroviral therapy. However, the patient was very noncompliant with the treatment. Four weeks later, she presented with headache, vomiting, fever. Computed tomography scan of the brain showed hypodense areas in the left parietal lobe. Magnetic resonance imaging scan with contrast showed multiple ring enhancing lesions scattered throughout both cerebral hemispheres (Figure 5).

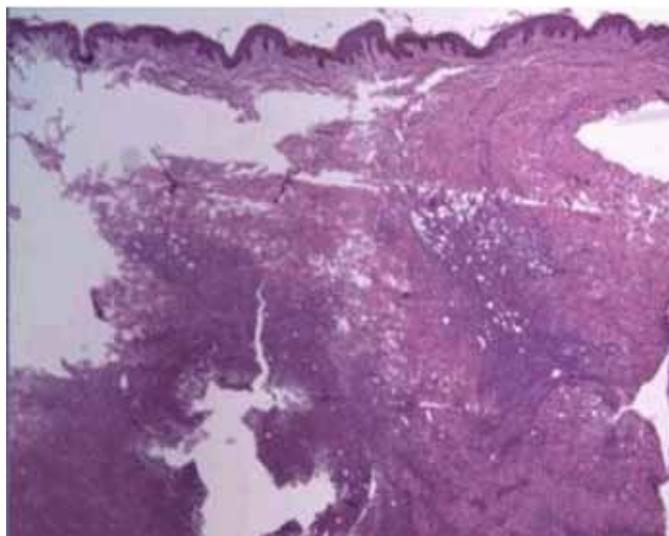


Figure 4: Skin biopsy GMS stain: Low power magnification showing filamentous branching organism in aggregates.

DISCUSSION

The genus name *Rhodococcus*, first used by Zopf in 1891 [10], was revived and redefined in 1977 to accommodate the 'rhodochrous' complex which comprised a number of strains that resembled but did not belong to the established genera of *Nocardia*, *Corynebacterium* and *Mycobacterium* [11]. *Rhodococci* are described as aerobic, Gram positive, non-motile, mycolate-containing, nocardioform actinomycetes [12]. The term 'nocardioform' is morphologically descriptive and refers to mycelial growth with fragmentation into rod-shaped or coccoid elements [13]. This morphological similarity may pose a problem in the preliminary differentiation and identification of the organism.

Various species of genus *Rhodococcus* have been recovered from a variety of sources [14, 15]. Most of the species are saprophytes [16], but occasionally *Rhodococcus* species have been isolated from humans. In some cases, *Rhodococcus* has been linked to human infection [17, 18].

It has been suggested that other *Rhodococcus* species may be of more importance in human disease than previously thought. Osoagbaka described the isolation of a number of *Rhodococci* and related bacteria from the sputum of patients with respiratory illnesses [19]. Schaal and Lee also reported the isolation of various rhodococcal species from clinical samples [20]. The identification of other *Rhodococcus* species in clinical samples is more problematic and it is possible that some cases of non *Rhodococcal equi* species infection go unrecognized. *Rhodococcus rhodochrous* was isolated in two patients with pneumonia during autopsy in lung and blood [21]. *Rhodococcus rhodochrous* species has been isolated from a chronic corneal ulcer [4]. Ventricular peritoneal shunt infection by *Rhodococcus rhodochrous* was described in a five-month old infant [14]. Most

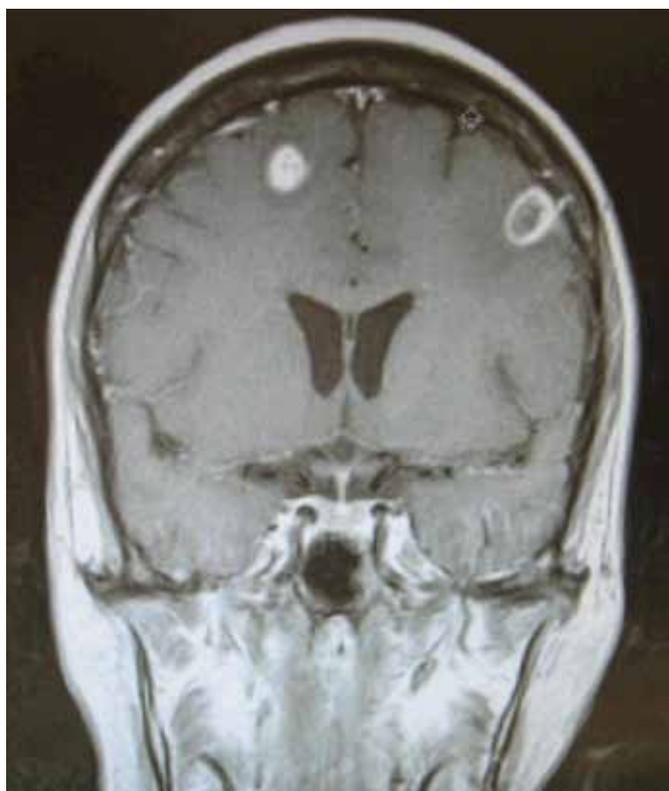


Figure 5: Magnetic resonance imaging of brain showing abscesses.

of the cases of *Rhodococcus rhodochrous* infection described in literature occurred in immunocompromised or debilitated patients [21, 22]. Treatment protocol for the infections caused by *Rhodococcus* genus is not established. Different studies have noted response to ampicillin, methicillin and intraventricular cephalothin [23]. Our patient was treated based on the available report of the drug susceptibility.

CONCLUSION

Rhodococcus rhodochrous is a rare cause of human infection. When cultures are reported as *Corynebacterium* species, *Rhodococcus rhodochrous* should be considered as a differential diagnosis. Primary manifestations of this infection range from pneumonia to skin and brain abscessed. There is no consensus on treatment, but beta lactams and tetracycline derivatives appear to be an effective treatment.

Author Contributions

Setu Patolia – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Eneh Kennedy – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Zahir Mehjabin – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Neerja Gulati – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Swati Patolia – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Dharani Narendra – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Rakesh Vadde – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Saurav Pokharel – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Frances Schmidt – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Joseph Quist – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Danilo Enriquez – Analysis and interpretation of data, Revising it critically for important intellectual content, Final approval of the version to be published

Guarantor

The corresponding author is the guarantor of submission.

Conflict of Interest

Authors declare no conflict of interest.

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