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CASE REPORT

Mycobacterium iranicum pulmonary disease in an elderly patient with extensive usual interstitial pneumonia: Case report

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Abstract

We report the first case of *Mycobacterium iranicum* pulmonary disease in an elderly patient with extensive usual interstitial pneumonia and traction bronchiectasis. He was treated with oral doxycycline, ciprofloxacin, and sulfamethoxazole/trimethoprim daily for 9 months. This was associated with eradication of the microorganism in the sputum and steady weight gain.

KEYWORDS

bronchiectasis, drug susceptibility, macrolide resistance, nontuberculous mycobacteria, rapid grower, sputum culture

1 | INTRODUCTION

Mycobacterium iranicum is an emerging rapidly growing (less than 7 days), acid-fast, Gram-positive, non-motile, scotochromogenic nontuberculous mycobacterium species first isolated in Isfahan, Iran, from bronchoalveolar lavage fluid of a 60-year-old woman with chronic pulmonary disease.[1] It is an environmental bacterium that apparently evolved into a human pathogen as a result of horizontal gene transfer.[1]

However, only sporadic human infections at various sites, including lung, have been reported worldwide thus far.[1–6] This notion is important because clinical features and ant-infective treatment of *Mycobacterium iranicum* pulmonary disease have not been reported thus far.[6] Accordingly, we report the first case of *Mycobacterium iranicum* pulmonary disease in an elderly patient with extensive usual interstitial pneumonia (UIP) and traction bronchiectasis. He responded favorably to combination oral therapy consisting of doxycycline, ciprofloxacin, and sulfamethoxazole/trimethoprim that was administered daily for 9 months.

2 | CASE HISTORY

A 79-year-old African American male resident of Chicago, Illinois, USA, with a 12-year history of extensive UIP and traction bronchiectasis visualized on computed tomography (CT) imaging of the chest (Figure 1) and treated with nintedanib 100 mg twice daily was recently hospitalized for *Streptococcus pneumoniae* pneumonia. He reported no travel history or exposures to animals, insects, and water. The patient quit smoking cigarettes ~7 years prior hospitalization. Pre-admission pulmonary function tests revealed forced vital capacity 2.49 L (80% predicted), forced

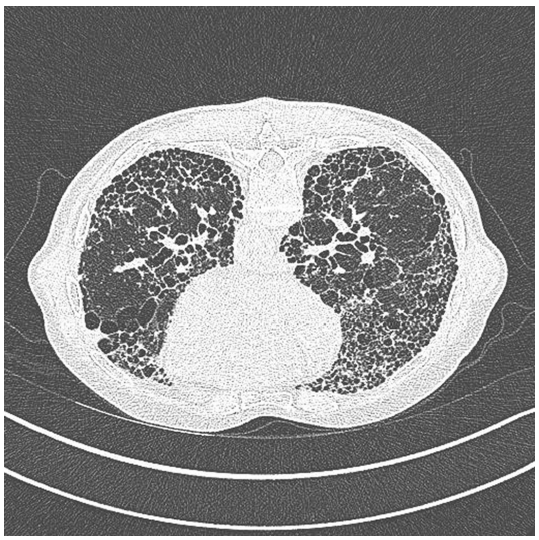

FIGURE 1 Computed tomography imaging of the chest displaying extensive usual interstitial fibrosis and traction bronchiectasis.

expiratory volume in 1 s 2.22 L (95% predicted), total lung capacity 4.40 L (63% predicted), and single-breath diffusion capacity for carbon monoxide 5.27 ml/min/mmHg (22% predicted). In the hospital, he was treated with intravenous ceftriaxone and azithromycin and his clinical condition improved and he was discharged. Given persistent symptoms of gastroesophageal reflux during hospitalization, *Helicobacter pylori* gastritis was diagnosed, and treatment with oral clarithromycin, amoxicillin, and omeprazole for 14 days was initiated.

During follow-up clinic visit in June 2019, the patient reported persistent exertional dyspnea, productive cough, and appreciable weight loss from body mass index (BMI) of 22 to 13 kg/m^2. Extensive diagnostic work-up, including CT of the chest and various blood chemistry and hematology tests, to determine possible cause(s) of his appreciable weight loss was unyielding except for two consecutive sputum cultures that grew *Mycobacterium iranicum*. The organism was identified using the MALDI Biotyper® system (Bruker Daltonics GmbH & Co. KG). A possible environmental source(s) of the infection was not identified. Using broth dilution antimicrobial susceptibility testing, the isolate was found to be sensitive to doxycycline, ciprofloxacin, moxifloxacin, cefoxitin, imipenem, linezolid, and amikacin with intermediate sensitivity to clarithromycin. Given the constellation of clinical, chest imaging, bacteriologic and susceptibility testing, and previous reports in the literature, the patient was treated with a combination of oral doxycycline, 100 mg twice daily, ciprofloxacin, 500 mg twice daily, and sulfamethoxazole/trimethoprim, 800/160 mg twice daily, for a planned duration of 6 months.[1–3,6] However, sputum cultures at that time still grew *Mycobacterium iranicum*. Accordingly, combination anti-infective therapy was extended for three additional months and resulted in eradication of the microorganism in sputum cultures and treatment discontinuation. Eight months thereafter, steady weight gain from 13 to 19 kg/m^2 BMI was noted supporting the pathogenic role of *Mycobacterium iranicum*. Repeat sputum cultures showed no microorganism growth. No changes were noted on CT of the chest that time.

3 | DISCUSSION

In 2013, *Mycobacterium iranicum* was categorized as new species and human pathogen in previously healthy individuals and in immunocompromised patients.[1,2] However, in most cases with positive cultures of *Mycobacterium iranicum*, no anti-infective therapy was initiated because these cases were deemed clinically insignificant. Nonetheless, combination therapy with aminoglycosides, fluoroquinolones, and tetracyclines for three (standard treatment used in Iran for infections caused by rapidly growing mycobacteria) to 6 months has been used successfully in few reported cases of *Mycobacterium iranicum* infections.[1–3,5,6] However, optimal anti-infective drug combinations and doses, and treatment duration along with the extent of macrolide resistance have not been established thus far for *Mycobacterium iranicum* pulmonary disease.[6]

To the best of our knowledge, this is the first reported case of *Mycobacterium iranicum* pulmonary disease in a patient with extensive UIP and traction bronchiectasis. The patient was treated with oral doxycycline, ciprofloxacin, and sulfamethoxazole/trimethoprim daily for 9 months. This was associated with eradication of the microorganism in the sputum and a steady weight gain. Whether intermediate sensitivity of this isolate to clarithromycin was related, in part, to earlier azithromycin- and clarithromycin-based treatment of pneumonia and *Helicobacter pylori*, respectively, is uncertain.

Mycobacterium iranicum was identified using the MALDI Biotyper® system. This widely used, efficient, and accurate matrix-assisted laser desorption/ionization-time of flight (MALDI-TOF) mass spectrometry technique has identified within minutes the microorganism in expectorated sputum samples obtained from of the patient. Further confirmation of *Mycobacterium iranicum* infection by sequencing the 16S rRNA gene and 65-kilodalton heat shock protein gene 65 was not performed.[1,2]

Our case along with those reported in the literature suggest that *Mycobacterium iranicum* could represent an emerging environmental health threat for patients with underlying chronic pulmonary diseases, such as UIP and traction bronchiectasis.[1–6] Accordingly, we suggest that pilot clinical trials should be conducted to devise treatment

recommendations for patients with *Mycobacterium iranicum* pulmonary disease, and to determine the spectrum of macrolide resistance of this microorganism. The latter could have important implications for clinical management and ultimate outcome of these patients.

AUTHOR CONTRIBUTIONS

Salil Kalra conceived the case report, abstracted clinical data from the medical record, performed literature search, and wrote the manuscript. Israel Rubinstein conceived the case report, reviewed the clinical data, and reviewed the manuscript.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

CONSENT

Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

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