CASE REPORT

Mycobacterium shimoidei: an uncommon non-tuberculous infection in a UK patientDarryl A Braganza Menezes,¹ Martin J Dedicoat,² Alastair Robertson³

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Accepted 10 January 2018

SUMMARY

We present the case of a 69-year-old man with significant respiratory comorbidities who presented with slow growing pulmonary nodules which cavitated. Subsequent sputum sampling grew *Mycobacterium shimoidei*, a non-tuberculous mycobacterium species and an uncommon cause of infection in the UK. We describe the diagnostic process and subsequent treatment regimen.

BACKGROUND

This case is of particular relevance due to the often overlooked significance of non-tuberculous species and *Mycobacterium shimoidei* is not a commonly recognised cause of infection in the UK having never been previously described in a UK patient. We describe the diagnostic approach and treatment options for this uncommon species.

CASE PRESENTATION

A 69-year-old man presented 6 years ago while under follow-up with the occupational lung disease team due to his background of asbestos-related pleural plaque and chronic obstructive pulmonary disease, ischaemic heart disease and osteoarthritis. He had a moderate alcohol intake and was a life-long smoker with a 60 pack-year smoking history. He was widowed and had lost his son several years earlier. Retired at presentation, he previously worked as a decorator and gardener and continues the latter as a hobby.

Due to a persistent worsening cough with increased sputum production, an associated weight loss and failure to respond to antimicrobial therapy for presumed lower respiratory tract infections, a high-resolution CT was requested which demonstrated three new nodules as well as progressive bronchiectatic changes (figure 1). Multidisciplinary team involvement and further radiological follow-up demonstrated progressive enlargement and subsequent cavitation of one of the nodules necessitating biopsy. Histopathological examination of the specimen demonstrated mostly necrotic debris with adjacent inflammation and concomitant immunohistochemistry did not reveal cellular infiltrate. Further radiological follow-up was pursued which continued to demonstrate slow enlargement and spiculation of the nodular lesions and due to the necrosis from the biopsy, mycobacterial sputum cultures were requested and demonstrated growth.

These samples then underwent whole-genome sequencing¹ which demonstrated a non-tuberculous species, *M. shimoidei*, and referral to an infectious diseases team and the TB service was sought.

Follow-up in the infectious diseases clinic and retesting demonstrated subsequent negative sputum cultures 4 months later with a commiserate improvement in symptoms and radiological appearances (figure 2). No treatment was given at this stage and no further follow-up was arranged. Nine months later, the patient presented again with a worsening cough and sputum production. Repeat mycobacterial sputum cultures again tested positive for *M. shimoidei*, and treatment was commenced by the infectious diseases team.

TREATMENT

- Ethambutol 700 mg daily;
- Rifabutin 300 mg daily;
- Azithromycin 500 mg daily.

Treatment was commenced following repeat growth of *M. shimoidei* and proceeded for 2 months before the patient reported intractable nausea, vomiting and diarrhoea. These adverse effects prevented ongoing therapy and the patient opted for observation.

Figure 1 High-resolution CT imaging performed in December 2011 demonstrating mild bronchiectasis on a background of emphysema and benign asbestos-related pleural disease as well as several nodules within the apicoposterior segment left upper lobe and apical segment left lower lobe. These were not noted on X-ray imaging 4 months previously.

To cite:

Braganza Menezes DA, Dedicoat MJ, Robertson A. *BMJ Case Rep* Published Online First: [please include Day Month Year]. doi:10.1136/bcr-2017-221764

Figure 2 High-resolution CT imaging 4 years later (May 2015): reduction in size of the left upper lobe cavitating lesions. Stable left lower lobe and right upper lobe lesions.

Extensive sensitivities were not done; however, the isolate was sensitive to clarithromycin. The treatments selected correlated well with reported therapies demonstrating success in the literature.

OUTCOME AND FOLLOW-UP

Our patient had a symptomatic improvement but failed to tolerate treatment. He remains symptom free and is undergoing follow-up by the infectious diseases team. It is unlikely that the initial *M. shimoidei* infection has been cleared.

DISCUSSION

M. shimoidei was first described in the literature by Tsukamura, Shimoide and Shaefer in 1975 having isolated several specimens as early as 1962 (Tsukamura) and subsequently isolating further specimens from a 56-year-old man with a pulmonary infection and cavitary pulmonary lesions.² This organism gained species status in 1982.³

Since this time, *M. shimoidei* has been implicated as a causative organism for pulmonary disease predominately affecting middle-aged men,^{2,4-9} with immunosuppression¹⁰ and/or pre-existing pulmonary disease including smoking-related emphysema, occupationally acquired lung disease (silicosis), previous tuberculosis (TB) and lung cancer.^{4,5,7,9,11,12} This slow-growing non-tuberculous mycobacterium has also been described in younger women with pre-existing tuberculous cavitary lung disease as a complicating feature.^{9,12} More recently, there are reports of *M. shimoidei* affecting middle-aged women with relative pulmonary immunosuppression.¹³

The presenting features of *M. shimoidei* mirror those of mycobacterium TB with common features including a productive cough^{6,8,9,12,14} and weight loss.^{5,6,12} Fever,¹¹ night sweats⁶ and haemoptysis¹² are also reported, though less frequently. Radiologically, the presentation is predominantly with cavitations on thoracic imaging. While predominately a pulmonary disease, disseminated infection with positive blood cultures has been reported in a patient with AIDS.¹⁰ Renal complications have also

Learning points

- ▶ Consider the possibility of non-tuberculous mycobacterial (NTM) species causing deterioration in a patient with chronic lung disease.
- ▶ Send appropriate samples early and keep in mind the need to repeat if needed.
- ▶ NTMs are not all treated the same and new genomic techniques can differentiate species to a high resolution.

been described in the literature with *M. shimoidei* implicated as a cause of membranous glomerulonephritis which responded with treatment of the causative organism.⁸

M. shimoidei has been reported worldwide including Japan, Germany, Australia, Canada, Croatia and Italy. To our knowledge, no case reports of *M. shimoidei* have been reported in the UK. While causing lung disease, there does not appear to be any evidence for human-to-human transmission and no clear environmental source.^{2,5} To date, 17 patients have been described in the literature with *M. shimoidei* infection.^{2,4-19}

Our patient demonstrated the American Thoracic Society (ATS) and Infectious Diseases Society of America (IDSA) criteria for the establishment of non-tuberculous infection which involves microbiological and radiological confirmation of disease as well as exclusion of TB as a causative agent.²⁰

There is no clearly established therapeutic regimen,⁸ and treatment is often based on sensitivities. From antibiotics sensitivity data, all reported isolates were resistant to isoniazid and most (7 of 11) were resistant to rifampicin. Isolates were sensitive in the majority of cases to clarithromycin, pyrazinamide, ethambutol and rifabutin and triple drug regimens consisting of clarithromycin, rifabutin and ethambutol have been proven effective.^{7,8,11,13,18} The duration of treatment is variable, but a 6-month regimen seems to be effective^{7,8,18} with symptomatic relief noted as early as 3 months into the course of therapy.^{8,9} More broadly, the ATS and IDSA guidelines recommend 6-month to 12-month treatment regimens for non-tuberculous mycobacterial organisms.²⁰

Our patient did not tolerate therapy very well and side effects proved prohibitive to ongoing therapeutic intervention. Given the lack of an adequate treatment course, with symptomatic and radiological (figure 2) improvement, we opted to monitor our patient with regular follow-up and hold off further treatment for now.

Our case highlights the pitfall of disregarding a poorly recognised cause of infection in patients with pre-existing pulmonary disease and the need to assess for non-tuberculous species. *M. shimoidei* also appears to be unique as a non-tuberculous species in its ability to cause renal complications.

Contributors MJD conceived the concept. DABM drafted the manuscript. AR and MJD improved the manuscript and provided input as to the structure and discussion.

Competing interests None declared.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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