OPEN ACCESS

Pneumonia due to *Mycobacterium cosmeticum* in a renal transplant recipient

Ahmed Aljishi ,[1] Marwan Jabr Alwazzeh,[2] Mar Kristjansson[1]

[1]Department of Medicine, King Fahad Specialist Hospital, Dammam, Saudi Arabia
[2]Department of Medicine, King Fahd Hospital of the University, Imam Abdulrahman Bin Faisal University, Al Khobar, Saudi Arabia

Correspondence to
Dr Ahmed Aljishi;
ahmed.jishi1@gmail.com

Accepted 27 January 2021

To cite: Aljishi A, Alwazzeh MJ, Kristjansson M. *BMJ Case Rep* 2021;**14**:e234800. doi:10.1136/bcr-2020-234800

SUMMARY

A 69-year-old man renal transplant recipient for 4 years, presented with 4-day history of cough and dyspnoea. He was diagnosed with community-acquired pneumonia and treated accordingly. He deteriorated requiring intensive care unit admission and intubation. Mycobacterial culture from bronchoalveolar lavage grew colonies within 7 days of incubation while *Mycobacterium tuberculosis* PCR was negative. The antibiotic regimen was adjusted to cover for rapidly growing mycobacteria with imipenem, amikacin and clarithromycin. The final culture reported *Mycobacterium cosmeticum*. He improved on the antibiotic regimen given which the organism turned to be sensitive to. We reported the second case with *M. cosmeticum* that fulfilled the diagnostic criteria for non-tuberculous mycobacterial lung infection. Improvement of patient's lung infection on appropriate antibiotics points to a causal relationship.

BACKGROUND

Although relatively rare, non-tuberculous mycobacterial (NTM) infections remain clinically relevant, especially in immunosuppressed patients. Among solid organ transplant recipients, they are most prevalent among lung transplant recipients with lung and pleura being the most common sites of infection.[1 2] Identification is associated with a significantly increased mortality rate in transplant recipients.[3] Timely identification and diagnosis will help direct appropriate management of these patients. As NTM are ubiquitous in the environment, diagnostic criteria were developed to help differentiate true infection from contamination or colonisation.

Mycobacterium cosmeticum is a rapidly growing NTM. It has been rarely reported in the literature as a cause of different infections mostly in immunocompromised patients. Its role as a cause of lung infection has been reported only once. We report herein a case of a renal transplant recipient who developed pneumonia secondary to *M. cosmeticum*. This adds to the growing literature about this rarely reported organism.

CASE PRESENTATION

A 69-year-old man presented to the emergency department with 4-day history of dry cough, progressive shortness of breath, fever with chills and progressive fatigue. The patient had a history of urinary schistosomiasis complicated with reflux nephropathy and end-stage renal failure. He was on haemodialysis for 6 years before he underwent a successful living-related renal transplant 4 years before presentation with good graft function. The patient was hypertensive and also had a history of empyema secondary to parapneumonic effusion and right lung decortication 3 years ago.

He was on nifedipine 120 mg once daily, lisinopril 10 mg once daily, mycophenolate 750 mg two times per day, prednisolone 5 mg once daily and tacrolimus 0.5 mg two times per day (all orally).

On admission, he was pale, tachypneic (22 breaths/min), had O_2 saturation of 92% on room air and had bilateral fine crackles, more in the right lower zone.

His initial investigations showed leucopenia with white cell count of 3.31×10^9/L, neutrophils 45.1%, lymphocytes 38.2%, monocytes 7.1% and eosinophils 8.4%, anaemia with haemoglobin of 93 g/L, hyponatremia of 130 mEq/L and an erythrocyte sedimentation rate of 51 mm/hour. Screening of viral pathogens and sputum culture were negative. HIV serology was negative. Our patient was presented before the COVID-19 pandemic. Chest X-ray (CXR) revealed diffuse reticulonodular infiltrates with opacity in the right lower zone (figure 1).

The patient was treated for community-acquired pneumonia with levofloxacin. Over the next few days, the patient's condition worsened. Repeated CXR showed worsening bilateral infiltrates (figure 2). Chest CT showed a diffuse bilateral airspace consolidation, reticulation and ground glass appearance with lower lobes predominance (figure 3). Piperacillin/tazobactam was added, and the patient was shifted to the intensive care unit (ICU), intubated and ventilated.

Bronchoalveolar lavage (BAL) and new microbiological investigations were performed. The results for gram stain, bacterial and fungal cultures, cytology for *Pneumocystis jiroveci*, acid-fast bacilli (AFB) staining, respiratory viruses and *Mycobacterium tuberculosis* PCR were negative. However, on the seventh day of incubation, AFB were noted in BAL mycobacterial culture. Assuming rapid growing NTM infection, he was started on imipenem, amikacin and clarithromycin. Cultures were sent for species identification (at Mayo Clinic Laboratories, Rochester, Minnesota, USA). *M. cosmeticum* was identified. It was sensitive to clarithromycin and amikacin.

OUTCOME AND FOLLOW-UP

The patient improved markedly (figure 4), extubated and shifted from ICU after 26 days. He was treated with this antibiotic regimen for 4 weeks and discharged home on oral antibiotics and home oxygen after 36 days of hospitalisation. Repeated

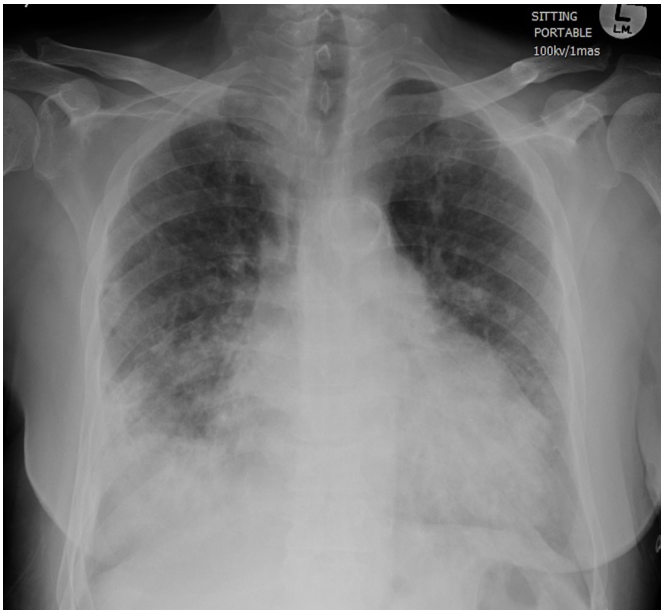

Figure 1 Chest X-ray on admission showed diffuse reticulo-nodular infiltrates with irregular opacity in the right lower zone.

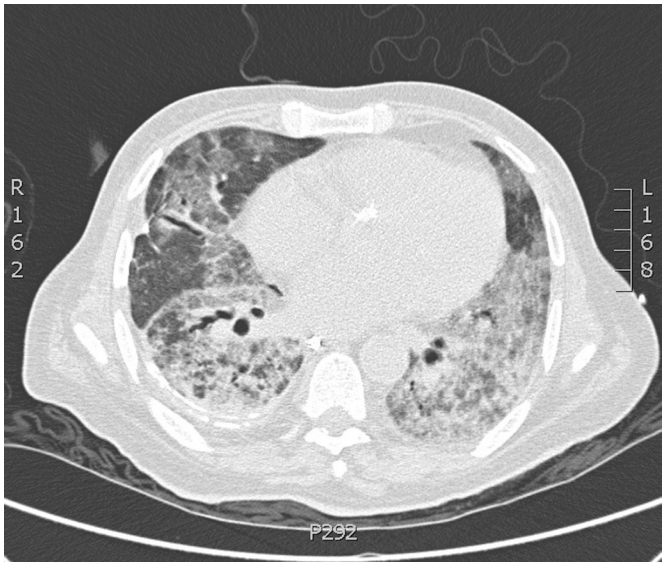

Figure 3 CT chest showed a diffuse bilateral air space consolidation, reticulation and ground glass appearance with lower lobes predominance.

mycobacterial culture from BAL 6 weeks after starting treatment was negative which suggests a good response.

DISCUSSION

NTM comprise more than 150 different species and are distributed worldwide.[4] Many of these bacteria can lead to opportunistic infections with different clinical manifestations. According to Runyon classification, NTM are divided into slowly growing mycobacteria and rapidly growing mycobacteria.[5] Rapidly growing mycobacteria form colonies within 7 days of inoculation in solid culture media.

As NTMs are ubiquitous environmental organisms, diagnostic criteria were developed to distinguish true infection from contamination or colonisation. The American Thoracic Society and Infectious Disease Society of America (ATS/IDSA) definition of NTM pulmonary disease require clinical and microbiological criteria to be fulfilled. Clinical criteria include pulmonary symptoms, nodular or cavitary opacities on chest radiograph, or a high-resolution CT scan that shows multifocal bronchiectasis with multiple small nodules and appropriate exclusion of other

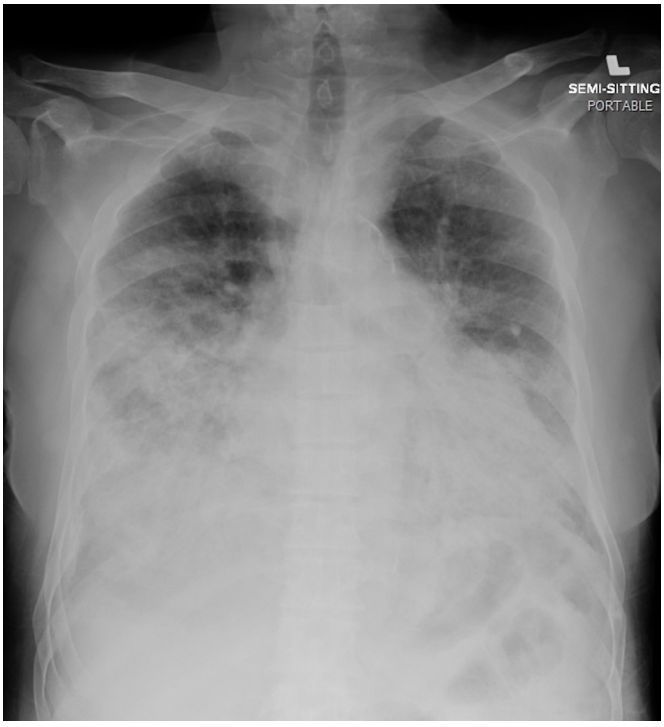

Figure 2 Chest X-ray on fourth day of admission showed increase of bilateral pulmonary infiltrates.

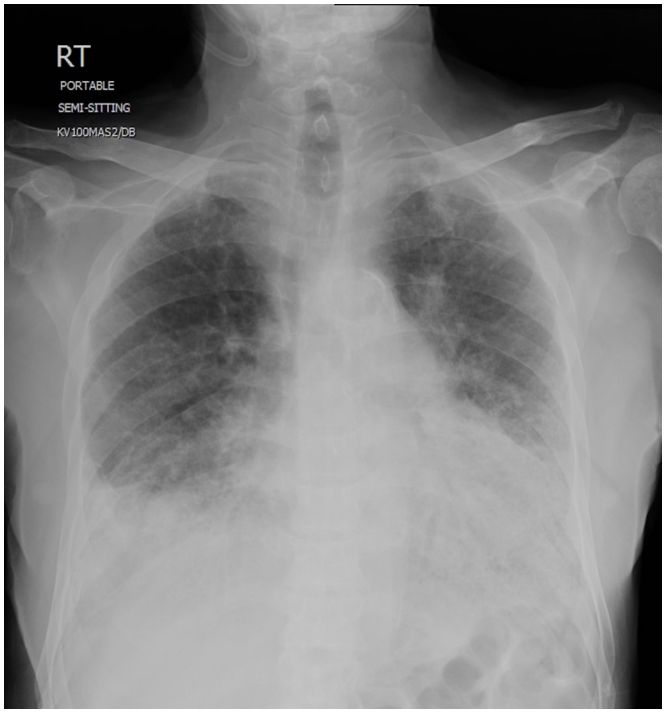

Figure 4 Chest X-ray after treatment showed improvement of bilateral pulmonary infiltrates.

diagnoses. Microbiological criteria include at least two positive sputum cultures, at least one bronchial wash/lavage or biopsy with compatible histopathological features and positive culture.[6]

Transplanted patients are more susceptible to opportunistic and atypical infections as they are immunosuppressed. NTM infections are relatively rare among solid organ transplant patients and most commonly affect lung transplant recipients.[1 2] The incidence of NTM in renal transplant recipients is between 0.16% and 0.38%.[7] A retrospective study of solid organ transplant patients by Longworth *et al*[2] found that *Mycobacterium avium* complex and *Mycobacterium abscessus* to be the most prevalent NTM infections with lung and pleura to be the most common site of infection.

In case of non-resolving or atypical infections, NTM infections have to be suspected and investigated in transplant recipients as they are associated with significantly increased mortality, 50% at 3 years versus 13% in solid organ transplant recipients without NTM infection.[3] Patients with NTM infections typically need a prolonged course of antibiotics which differ depending on the organism and site of infection.

M. cosmeticum is a rapidly growing mycobacterium that was first isolated from a sink in a nail salon in the USA,[8] then from monument sandstones[9] and household potable water.[10] Its role as a human pathogen was first described in 2004 after the isolation from a granulomatous subdermal lesion of a female patient in Venezuela.[8] Similar cases were later reported in the literature.[11 12]

M. cosmeticum has been described to cause other infections as catheter-related bloodstream infection,[13] granulomatous colitis,[14] ascites,[15 16] and was described to cause bacteremia in a preterm patient.[17]

The role of *M. cosmeticum* as a respiratory pathogen is not well established. It was isolated first from the sputum of an HIV patient in addition to *Mycobacterium scrofulaceum*. It was not mentioned in the report by Cooksey *et al*[13] if the patient had evidence of lung infection or not. More recently, *M. cosmeticum* was reported in sputum of two patients from Saudi Arabia.[18] One of them was post lung transplant and fulfilled the criteria of NTM lung disease according to the ATS/IDSA diagnostic criteria.[6]

We report the second case of *M. cosmeticum* pneumonia that has fulfilled the diagnostic criteria. First, the patient had symptoms and signs of pulmonary infection. Second, all routine tests for common pathogens were negative and the patient did not respond to initial broad-spectrum empiric antimicrobial therapy. Third, the culture of BAL was positive for *M. cosmeticum*. The combination of being a transplant recipient on immunosuppressive medications and possibly previous lung decortication surgery have contributed to his lung NTM lung infection.

In our patient, *M. cosmeticum* was the only organism that was isolated, and the improvement following appropriate antibiotic therapy points to a causal relationship. Differential diagnosis includes infection with a resistant unidentified organism that was covered with increasing the spectrum of antibiotic coverage. Use of culture-independent techniques as sequencing could have detected a potentially pathogenic microorganism as they are associated with increased sensitivity.[19 20]

Learning points

- *Mycobacterium cosmeticum*, a rapidly growing non-tuberculous mycobacterium (NTM), that was initially described to cause skin and soft tissue infection, can be a cause of lung infection.
- Although relatively rare, NTM lung infection should be suspected and investigated in immunocompromised patients who do not improve on initial empiric therapy.
- Rapidly growing mycobacteria form colonies within 7 days of incubation in solid culture media.
- Clinical and microbiologic diagnostic criteria have to be fulfilled to diagnose NTM lung disease.
- More research is needed regarding the clinical use of culture-independent techniques in respiratory infections to improve the diagnostic yield, especially in critically ill patients.
- Improved basic science understanding is needed to better identify factors that cause NTM infections to be pathogenic in some patients.

Contributors AA contributed to planing, reviewing and reporting. MK contributed to planning and review of the article. MA contributed to review and reporting of case.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Next of kin consent obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

ORCID iD
Ahmed Aljishi http://orcid.org/0000-0002-2193-8618

REFERENCES

1 George IA, Santos CAQ, Olsen MA, *et al*. Epidemiology and outcomes of nontuberculous mycobacterial infections in solid organ transplant recipients at a midwestern center. *Transplantation* 2016;100:1073–8.
2 Longworth SA, Vinnard C, Lee I, *et al*. Risk factors for nontuberculous mycobacterial infections in solid organ transplant recipients: a case-control study. *Transpl Infect Dis* 2014;16:76–83.
3 Longworth SA, Blumberg EA, Barton TD, *et al*. Non-tuberculous mycobacterial infections after solid organ transplantation: a survival analysis. *Clin Microbiol Infect* 2015;21:43–7.
4 van der Werf MJ, Ködmön C, Katalinić-Janković V, *et al*. Inventory study of non-tuberculous mycobacteria in the European Union. *BMC Infect Dis* 2014;14:62.
5 Runyon EH. Anonymous mycobacteria in pulmonary disease. *Med Clin North Am* 1959;43:273–90.
6 Griffith DE, Aksamit T, Brown-Elliott BA, *et al*. An official ATS/IDSA statement: diagnosis, treatment, and prevention of nontuberculous mycobacterial diseases. *Am J Respir Crit Care Med* 2007;175:367–416.
7 Doucette K, Fishman JA. Nontuberculous mycobacterial infection in hematopoietic stem cell and solid organ transplant recipients. *Clin Infect Dis* 2004;38:1428–39.
8 Cooksey RC, de Waard JH, Yakrus MA, *et al*. *Mycobacterium cosmeticum* sp. nov., a novel rapidly growing species isolated from a cosmetic infection and from a nail salon. *Int J Syst Evol Microbiol* 2004;54:2385–91.
9 Kusumi A, Li XS, Katayama Y. Mycobacteria isolated from angkor monument sandstones grow chemolithoautotrophically by oxidizing elemental sulfur. *Front Microbiol* 2011;2:104.
10 Perez-Martinez I, Aguilar-Ayala DA, Fernandez-Rendon E. Occurrence of potentially pathogenic nontuberculous mycobacteria in Mexican house hold potable water: a pilot study. *BMCRes* 2013;6:531.
11 Rivera-Olivero IA, Guevara A, Escalona A, *et al*. [Soft-tissue infections due to non-tuberculous mycobacteria following mesotherapy. What is the price of beauty]. *Enferm Infecc Microbiol Clin* 2006;24:302–6.
12 Beer K, Waibel J. Disfiguring scarring following mesotherapy-associated Mycobacterium cosmeticum infection. *J Drugs Dermatol* 2009;8:391–3.
13 Cooksey RC, de Waard JH, Yakrus MA, *et al*. *Mycobacterium cosmeticum*, Ohio and Venezuela. *Emerg Infect Dis* 2007;13:1267–9.

14 Boschetti G, Cotte E, Moussata D, *et al*. Identification of *Mycobacterium cosmeticum* sp. as a novel colitogenic infectious agent in a nonimmunocompromised patient. *Inflamm Bowel Dis* 2011;17:E128–30.
15 Addley J, McKeagney P, Turner G, *et al*. Mycobacterium cosmeticum as an unusual cause of ascites. *BMJ Case Rep* 2010;2010:bcr0420091733.
16 Anand AS, Kuriakose VG, Govindan K. Multicentric Castleman's disease with *Mycobacterium cosmeticum* infection. *Arch Surg Oncol* 2017;3:1.
17 Koay WLA, Aigbivbalu L, Patel J. A neonate born with *Mycobacterium cosmeticum* bacteraemia. *BMJ Case Rep* 2015;2015:bcr2015213452.
18 Varghese B, Enani M, Shoukri M, *et al*. Emergence of rare species of nontuberculous mycobacteria as potential pathogens in Saudi Arabian clinical setting. *PLoS Negl Trop Dis* 2017;11:e0005288.
19 Dickson RP, Erb-Downward JR, Prescott HC, *et al*. Analysis of culture-dependent versus culture-independent techniques for identification of bacteria in clinically obtained bronchoalveolar lavage fluid. *J Clin Microbiol* 2014;52:3605–13.
20 Mancini N, Carletti S, Ghidoli N, *et al*. The era of molecular and other non-culture-based methods in diagnosis of sepsis. *Clin Microbiol Rev* 2010;23:235–51.