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

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**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. Identification is associated with a significantly increased mortality rate in transplant recipients. 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 O2 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 3.11×10⁹/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. The final culture reported *M. 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.

**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
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. 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. 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
was reported in sputum of two patients from Saudi Arabia. NTM infections are relatively rare among solid organ transplant patients and most commonly affect lung transplant recipients. The incidence of NTM in renal transplant recipients is between 0.16% and 0.38%. A retrospective study of solid organ transplant patients by Longworth et al 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 can 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. 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, then from monument sandstones and household potable water. 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. Similar cases were later reported in the literature.

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 if the patient had evidence of lung infection or not. More recently, M. cosmeticum was reported in sputum of two patients from Saudi Arabia. One of them was post lung transplant and fulfilled the criteria of NTM lung disease according to the ATS/IDSA diagnostic criteria.

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.

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Learning points

► Mycobacterium cosmeticum, a rapidly growing nontuberculous 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.
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