Community-Acquired Lung Abscess Caused by *Legionella micdadei* in a Myeloma Patient on Thalidomide

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Abstract

*Legionellae* cause 2-14% of community-acquired pneumonia (CAP). *Legionella micdadei* constitutes < 1% of these infections. We describe a case of cavitary *L. micdadei* CAP in a myeloma patient on thalidomide treatment. The importance of considering, and problems in diagnosing pneumonia caused by *L. micdadei* in this patient population is reviewed.
**Case Report**

A 51-year-old male presented with fever with 2 weeks of cough and increasing shortness of breath. On the night prior to the admission, the patient described rigors and night sweats. There were no other symptoms, and no recent history of travel or animal exposure. Coincident with the onset of the patient’s illness, family members also developed fevers with mild upper respiratory tract symptoms and malaise. The patient had stage IIIa myeloma diagnosed in 2001 and was initially treated with autologous bone marrow transplantation. Disease recurrence in 2002 was managed with velcade. Due to progression therapy was changed to thalidomide 200mg daily and prednisone 10mg daily. The myeloma was described as being stable over the preceding three months, and there was no history of hospital admission for over 6 months. The patient had a documented severe allergy to fluoroquinolones.

On admission the patient had a temperature of 38.6°C, a heart rate of 48/minute, a respiratory rate of 22/minute, and an oxygen saturation of 88% on room air. The chest examination revealed bronchial breath sounds and crackles to the left upper lobe. The remainder of the exam was normal with the exception of the presence of oral thrush. The patient was admitted for investigations and started on vancomycin and ceftriaxone. Blood tests were normal with the exception of a mild anemia (hemoglobin 119 g/L) and a lymphopenia (lymphocyte 0.2 x 10⁹/L). The patient was not neutropenic. Chest x-ray revealed a large opacification consistent with lung consolidation or abscess (Fig. 1A). Computerized axial tomography of the chest confirmed a large left upper lobe cavitating lesion (Fig. 1B). Bronchoalveolar-lavage fluid was negative on Gram’s stain, acid-fast stain (done at a reference laboratory for mycobacteriology), and immunofluorescent stain for *P. carinii*. Since the initial blood cultures and respiratory samples were culture-negative, the infectious disease service was consulted. Vancomycin therapy was discontinued and azithromycin was started. Testing for legionella urine antigen was negative. Transthoracic needle aspiration of the lesion, and chest tube drainage of the effusion were performed. The effusion was exudative with a lactate dehydrogenase of 2450 IU/l. Modified acid-fast staining (8) of BAL fluid and lung aspirate was
requested by the infectious diseases service. Both samples were positive with this stain for small coccusbacilli (figure 2) and subsequently grew \textit{L. micdadei} (confirmed with partial 16S rRNA gene sequencing).

The patient improved 6-7 days after initiation of azithromycin therapy, and made a complete recovery. Due to the family syndrome similar to Pontiac fever, further questioning identified the use of a portable humidifier that was rarely cleaned. Samples for legionella culture from the humidifier were sent to a reference water testing laboratory but results were reported as unreliable due to overgrowth of multiple bacteria in the sample. Testing of the home water system was not performed.

Legionella cause 2-14\% of community-acquired pneumonia (CAP)\,(6,28,30). In a recent study, \textit{Legionella micdadei} was present in less than 1\% of cases of community-acquired pneumonia (32). \textit{L. micdadei} is more commonly identified as a cause of nosocomial pneumonia (19,26). Cavitary pneumonia is reported in transplant patients (10,13,22) or HIV infected individuals (16,25). In a case series of renal transplant recipients with \textit{L. micdadei} pneumonia, 18.5\% (5 of 27) developed a lung abscess (29). There is one prior case of \textit{L. micdadei} infection described in a patient with multiple myeloma (20), and one case of nosocomial \textit{L. micdadei} pulmonary abscess and empyema formation in a non-transplant patient (14).

This case is unique in that we describe the first case of community-acquired cavitary, \textit{L. micdadei} pneumonia in a patient whose only known risk was underlying myeloma and the use of low dose prednisone. More importantly, there are no other cases in the literature that describe \textit{L. micdadei} infections in the setting of thalidomide therapy for multiple myeloma. Thalidomide and its immunomodulatory analogues are being used increasingly to treat malignancies (4) and for treatment of other diseases(12). Thalidomide has been associated previously with lung toxicity (7), which may in itself predispose patients to pulmonary infections. Whether this drug alone or in combination with steroids increases the risk of opportunistic infections remains to be proven. However, \textit{Nocardia farcinica} infection has been reported in patients on thalidomide during treatment of leprosy (3), and \textit{Pneumocystis} pneumonia has been reported in patients receiving thalidomide in combination with temozolomide (21).
This case also demonstrates some of the pitfalls in diagnosing legionellosis. It is important to note that the urinary antigen test only reliably detects \textit{Legionella pneumophila} serogroup 1, and many commercial direct fluorescent antigen kits detect only \textit{Legionella pneumophila} species. Thus, culture or nucleic acid detection methods are required to definitively diagnose infection with Legionella strains other than \textit{L. pneumophila}. In this case, the findings of coccobacilli in the modified-acid fast stain allowed a rapid presumptive diagnosis of infection with \textit{L. micdadei}. The use of carbol fuchsin, instead of safranin, as the counterstain in the Gram’s stain would also have resulted in the detection of these bacteria.

On presentation, the patient was bradycardic. “Bradycardia is reported in legionella infections (15). In this case there was pre-existing evidence of bradycardia prior to the development of pneumonia. Thalidomide use for myeloma has been associated with bradycardia, in up to 50% of cases (11). There is at least a theoretical risk that the fluoroquinolones and thalidomide could interact to worsen bradycardia (9,18,24). While current evidence support fluoroquinolones as first line therapy for \textit{Legionella} pneumonia (5,23,27), due to his allergy, azithromycin was used with a complete response.

We suspect the source of infection was the home humidifier. Family members described an acute febrile illness at the same time as our patient became sick. Transmission of \textit{Legionella} from humidification systems has been documented previously (2,17,31,33). There are specific recommendations to prevent nosocomial legionellosis in bone marrow transplantation patients (1). It may also be wise to advise other immunocompromised patients about the risks of and appropriate measures to prevent infection with \textit{Legionella}.

This is the first case of a lung abscess caused by \textit{L. micdadei} described in a patient on thalidomide for refractory myeloma. The probable source of infection was a portable home humidifier. Whether the use of thalidomide in the treatment of myeloma predisposes these patients to legionellosis and other opportunistic infections remains to be determined. Legionellosis including non-pneumophila species should be considered as a possible cause of pulmonary abscess, even in ambulatory immunosuppressed patients.
Competing Interests

The authors declare they have no competing interests

Author Contributions

LG and DG both contributed to the concept of this paper. LG wrote the initial draft. DG and LG made subsequent revisions to the manuscript and approved its final version.

Reference List


Figure 1: Chest x-ray (A) and CT scan (B) at admission showing a large left upper lobe infiltrate.
Figure 2. Modified acid-fast stain of pleural fluid showing short acid-fast rods subsequently identified as *L. micdadei*. 