Case report

*Mycobacterium szulgai* cavitary lung disease progression over a three year period – A case report

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**A B S T R A C T**

*Mycobacterium szulgai* is a slow growing non-tuberculous mycobacterium associated with rare but severe infections. It most commonly presents as pulmonary disease in people with underlying structural lung disease. We report a case of progressive cavitary lung disease over a three year period due to *Mycobacterium szulgai* and the subsequent outcome.

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**Introduction**

Non-tuberculous mycobacteria (NTM) refers to nearly 200 species in the Mycobacterium genus that are not *Mycobacterium tuberculosis*, *Mycobacterium leprae*, or *Mycobacterium ulcerans*. They are ubiquitous in the environment and associated with water and soil sources [1]. Common clinical presentation is pulmonary disease in individuals with underlying lung disease and immunocompromised individuals [2]. NTM are further subdivided into rapidly growing mycobacteria, growing within seven days, and slow-growing. *Mycobacterium szulgai* is a rare, slow-growing NTM first described in 1972 [3]. When isolated, it is considered to be of clinical significance [2]. The most common presentation is that of pulmonary disease typically resembling tuberculosis. We describe a case of *M. szulgai* in Rochester, NY with disease progression over three years prior to treatment.

**Case summary**

A 66 year old male presented in June 2015 with 20 pound weight loss. He had prior asbestos exposure in the Navy from laying asbestos tiles in 1960s and 1970s, and from brake pad dust working as an auto mechanic. He also had 48 pack year smoking history. CT of the chest then demonstrated a large right upper lobe cavity (Fig. 1). Positron emission tomography and computed tomography (PET/CT) scan demonstrated hyper-metabolic activity in the periphery of the cavity and pulmonary function test (PFT) then was consistent with mild obstructive pattern. TB antigen t-cell stimulation test was negative. The patient remained otherwise asymptomatic and was lost to follow up prior to further evaluation.

He presented to his primary care physician in January 2018 with productive cough, shortness of breath, and weakness for five days. Chest radiography demonstrated a right lower lobe opacity and patchy right upper lobe opacity. Repeat Chest CT in February 2018 showed a large, thick walled cavity in the right lung apex increased in size compared to June 2015 with bronchopleural fistula, a new right lower lobe speculated mass, and left upper lobe opacity (Fig. 1). PET/CT in March 2018 again demonstrated peripheral hyper-metabolic activity of the cavity and consolidation extending to the mediastinum. PFT in March showed decrease in FVC (99% from 119%), FEV1 (61% from 96%), FEV1/FVC (62% from 81%), and DLCO (49% from 69%). He underwent video-assisted thoracoscopic surgery (VATS) with decortication of the right upper lobe cavity, wedge resection of the right lower lobe, and pleural biopsies. Acid Fast Bacilli (AFB) staining was positive for four of six specimens from the right upper lobe cavity, wedge resection of the right lower lobe, and pleural biopsies. Acid Fast Bacilli staining was positive for four of six specimens from the right upper lobe cavity, wedge resection of the right lower lobe, and pleural biopsies. Sputum AFB smears two days after VATS were also positive. An Xpert MTB/RIF molecular assayTM (Cepheid Inc., Sunnyvale, CA) was negative and he was discharged while awaiting results of cultures.

He developed drainage at the surgical incision site in April and was prescribed amoxicillin-clavulanate, but worsened and three days later was readmitted and imaging showed multi-loculated right-sided pleural effusion communicating with the cavity and new
bilateral lower lobe consolidations, worse on the right. Chest tube was placed and removed after three days. Initial cultures from VATS specimens grew *Mycobacterium szulgai* and he was transitioned to Rifampin, Ethambutol, and Ciprofloxacin. The pleural fluid specimen obtained during tube placement was AFB smear negative, but culture grew *Mycobacterium szulgai*. Treatment was adjusted to Rifampin, Ethambutol, and Azithromycin after two weeks. Five months into treatment, he developed *Clostridiodes difficile* infection requiring oral vancomycin suppression throughout treatment. AFB sputum was first negative in July 2018. He completed 18 months of therapy in October 2019 with stable CT chest findings noted and antimicrobials were discontinued. As of January 2020, patient continued to have chronic non-productive cough, but without other symptoms. He underwent fecal microbiota transplant in April 2020 due to recurrence of *C. difficile* infection off antimicrobial therapy.

**Discussion**

*Mycobacterium szulgai* is a slow-growing, scotochromogenic NTM causing a minority of mycobacterial infections. In a study of NTM isolates from 14 countries from 1976 to 1996, *M. szulgai* was identified in 0.14% of samples consistent with similar surveillance studies in the United States from 1981 to 1983 and Japan from 1971 to 1984 [4–6]. Although rates of NTM infections have been rising, no recent studies have evaluated the prevalence of *M. szulgai*. A review of pulmonary isolates of NTM in sub-Saharan Africa showed a similar prevalence of 0.2% for *M. szulgai* among 8980 samples reported from 1940 to 2016 [7].

*M. szulgai* was considered to almost always be clinically significant when isolated in cultures as it was rarely recovered from environmental samples [2]. More recently, *M. szulgai* has been identified in several environmental sources including aquariums, drinking water, and swimming pools. The 2020 guidelines for diagnosis of NTM pulmonary disease remain unchanged from the 2007 guidelines; clinical findings of pulmonary or systemic symptoms, radiographic evidence of nodular or cavitary opacities on chest radiograph or high resolution CT showing bronchiectasis with multiple nodules, and at least two positive sputum cultures or positive bronchial lavage cultures or histologic evidence of mycobacterium on biopsy. This has led to studies reevaluating the clinical significance of *M. szulgai*. A study in the Netherlands evaluated 21 patients from 1999 to 2006, and 76% met diagnostic criteria for NTM disease [8]. All respiratory samples of *M. szulgai* at a hospital in South Korea between 2001 and 2010 were reviewed and only 13 of 30 patients (43%) met diagnostic criteria [9]. These reviews suggest that *M. szulgai* may be less pathogenic than previously thought.

*M. szulgai* primarily manifests as pulmonary disease in immunocompromised individuals or those with underlying structural lung damage; however, extra pulmonary manifestations including nodular skin lesions, joint involvement, and keratitis have been reported [8, 10]. Pulmonary disease commonly mimics *M. tuberculosis* infection both in radiographic appearance and clinical symptoms. Laboratory diagnosis was initially made using thin layer chromatographic analysis of cell wall lipids leading to its identification in 1972 [3]. The similarity between *M. szulgai* and other mycobacteria often requires 16S rRNA sequencing for identification.

Successful treatment has previously been reported using standard therapy for *M. tuberculosis* with rifampin, isoniazid, and pyrazinamide given for 6 months, which stands in contrast to most other NTM [2,11]. Susceptibility testing of reference strains of NTM including *M. szulgai* suggests that it is likely susceptible to most antimycobacterial drugs including the recommended macrolide based therapy for NTM disease [12]. Duration of therapy is unknown, but recommendations for pulmonary disease are for 12 months from sputum culture conversion to negative.

Our patient’s tobacco use and COPD were underlying risk factors for pulmonary NTM disease, but he was otherwise immunocompetent. It is unclear whether his underlying asbestos
exposure is a risk factor as this has not been previously reported. Few prior studies have reported patients being untreated for prolonged duration. The longest reported duration without treatment was 9 years during which time the individual developed bilateral cavitary disease [13]. Similarly our patient started with a focal lesion and, after being lost to follow up for 3 years, developed progressive bilateral nodular involvement. He initially was asymptomatic apart from weight loss and over 3 years developed progressive respiratory symptoms with multiple lung specimens growing M. szulgai. Interestingly, although his disease burden was so high, isolates sent for susceptibility testing did not grow sufficiently despite pleural effusion requiring drainage which also grew M. szulgai. He was treated successfully with guideline directed therapy for 18 months.

**CRediT authorship contribution statement**

**Michael Croix:** Data collection, Formal analysis, Writing – original draft, Writing – review & editing. **Sonal Munsiff:** Data collection, Formal analysis, Writing – original draft, Writing – review & editing.

**Ethical approval**

Ethics committee approval not required for this case report.

**Consent**

Patient has provided consent to have case report published. Data will remain deidentified.

**Conflicts of interest**

The authors have no conflicts of interest to report.

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