Case Report

Mycobacterium chelonae empyema in an immunocompetent patient

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Thoracic empyema caused by rapidly growing mycobacteria (RGM) and complicated with bronchopleural fistula is rarely reported, especially in immunocompetent patients. A 53-year-old healthy woman presented initially with a productive cough and intermittent fever. The patient received a complete treatment course following an initial diagnosis of pulmonary tuberculosis. After the anti-tuberculosis agents were discontinued, a right thoracic empyema with bronchopleural fistula occurred, and the pathogens from both pus and sputum were identified as *Mycobacterium chelonae*. Thoracotomy with decortication and wedge resection of the right middle lung was performed, followed by clarithromycin plus ciprofloxacin therapy for 36 months. This patient has not suffered a relapse in the last 3 years. In addition to the experience of successful treatment, this case indicates that RGM such as *M. chelonae* can emerge as causative pathogens of thoracic empyema, even in healthy persons.

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Introduction

Non-tuberculosis mycobacteria (NTM) are ubiquitous organisms that rarely cause disease in immunocompetent individuals. They are not transmissible from person to person. However, over the past two decades, there has been an increase in the number of cases of mycobacterial infections caused by non-tuberculous species, especially by rapidly growing mycobacteria (RGM) such as *Mycobacterium chelonae*, *Mycobacterium abscessus* and *Mycobacterium fortuitum*. The clinical features of NTM disease are indistinguishable from those of tuberculosis, so diagnosis requires culture and identification of the bacilli (American Thoracic Society, 1997). Patients with RGM pulmonary disease tend to be middle-aged or older, female and non-smokers (Griffith *et al.*, 1993). Specific underlying diseases, such as prior mycobacterial infection, gastro-oesophageal disorders with chronic vomiting and bronchiectasis, occur in approximately 20% of RGM patients (Griffith *et al.*, 1993; Wallace *et al.*, 1983). Only two cases of empyema of the pleural cavity caused by RGM (*M. abscessus* and *M. fortuitum*) have been reported (Aronchick *et al.*, 1986; Fairhurst *et al.*, 2002). Here, we report a rare case of thoracic empyema and bronchopleural fistula caused by *M. chelonae* in an immunocompetent woman. These case experiences indicate the emergence of RGM as causative pathogens of thoracic empyema, even in healthy persons.

Abbreviations: NTM, non-tuberculosis mycobacteria; RGM, rapidly growing mycobacteria.

Case report

A 53-year-old healthy female, without underlying disease or a history of tobacco use or immunosuppressant therapy, initially presented with a 4 week history of a severe cough with sticky yellowish sputum and no haemoptysis. She was treated as a pneumonia case by intravenous ampicillin (2 g, six times daily) and gentamicin (180 mg, once daily) in a community hospital for 1 week and her fever subsided. No pathogen was isolated from either sputum or blood specimens. However, the patient's fever recurred shortly after discharge and she was sent to a medical centre. As a result of the recurrence of pneumonia and right middle lung infiltration with atelectasis, as shown by chest X-ray, bronchoscopy was performed, and revealed right B6 orifice stenosis and swelling with redness. Acid-fast staining of smears and cultures from biopsy, bronchial lavage and three consecutive specimens of sputum were carried out. One specimen of biopsy revealed granulomatous inflammation with positive acid-fast bacilli (Fig. 1). *Mycobacterium* sp. was isolated from another sputum specimen. The patient received a complete course of anti-tuberculosis treatment for 9 months with isoniazid, rifampicin and ethambutol, according to the susceptibility results.

Six months later, the patient again presented with a productive cough, haemoptysis and an intermittent fever. She was admitted to our hospital and acid-fast bacilli were again found in her sputum. An initial chest X-ray was suggestive of a right pleural effusion and a high level of

Fig. 1. Granulomatous inflammation characterized by infiltration of epithelioid histiocytes in the ulcerated mucosa (haematoxylin and eosin stain, magnification $\times 40$). Inset, several mycobacteria demonstrated by an acid-fast stain (magnification $\times 100$).

infiltration of the right lower lobe. This finding led to a computed tomography examination of the chest, which revealed a right-sided empyema, ipsilateral pleural thickening with several calcified patches, and multiple bronchiectasis with linear interstitial-pattern lesions in the right lung. A chest tube was subsequently inserted and about 200 ml dark-reddish pus was retrieved. The empirical regimen was changed to isoniazid plus rifampicin, ethambutol and ciprofloxacin to prevent the potential emergence of multidrug-resistant *M. tuberculosis* after the full course of anti-tuberculosis therapy. Because of the longer disease duration and unknown immune status, further evaluation was carried out and revealed no human immunodeficiency virus infection, and normal CD4 cell counts and immunoglobulin levels.

Two weeks later, *M. chelonae* was cultured from both pleural effusions and sputum on Lowenstein–Jensen medium, and identified by PCR/restriction enzyme pattern analysis (Telenti *et al.*, 1993). We performed a thoracotomy with decortication and wedge resection of the right middle lung, as air leakage was found in this lobe, and a bronchopleural fistula was found during the operation. As there was no previous treatment experience reported in the literature, we prescribed oral clarithromycin plus ciprofloxacin therapy for 36 months until there were no symptoms/signs and negative sputum studies were observed for 6 months. The patient has not suffered a relapse in the 3 years since the cessation of treatment.

Discussion

This was a rare case of pulmonary empyema and bronchopleural fistula induced by *M. chelonae* in a healthy female, followed by successful treatment. *M. chelonae* can infect numerous tissues, including the skin, soft tissues, skeleton and regions in contact with a catheter. Among these,

soft-tissue and cutaneous diseases are the most common. The characteristic presentation in immunocompromised patients is a disseminated cutaneous infection (Wallace *et al.*, 1992), and in immunocompetent patients it is localized cellulitis or abscesses (Brown-Elliott & Wallace, 2002; Zaleznik & Quinn, 1996). Whilst *M. abscessus* and *M. fortuitum* commonly cause pulmonary diseases, *M. chelonae* is not associated with these. Griffith *et al.* (1993) reported that, of 154 patients who presented with chronic lung diseases due to RGM, only 1 out of 146 isolates that were identified to the species level was *M. chelonae*. However, according to a study of pulmonary *M. chelonae* infection, all 14 patients were middle-aged or elderly women (range 40–85 years, mean 60 years) who did not have any other co-existing parenchymal lung disease (Hazelton *et al.*, 2000). None was overtly immunocompromised. To date, there is no significant evidence to suggest why pulmonary disease caused by *M. chelonae* would occur in immunocompetent patients.

Chronic pulmonary disease is the most common localized clinical manifestation of NTM. *Mycobacterium avium* and *Mycobacterium kansasii* are the two most common pathogens in the USA (American Thoracic Society, 1997). The isolation of an NTM species from a respiratory sample is insufficient for a diagnosis of NTM lung disease. Instead, the diagnosis is based on clinical, radiographic and bacteriological criteria (American Thoracic Society, 1997). In addition, NTM cutaneous infection caused by surgical procedures (especially augmentation mammoplasty or median sternotomy) and accidental trauma, disseminated disease with multiple nodular skin lesions, positive blood cultures, cervical lymphadenitis, keratitis and endocarditis associated with a prosthetic valve have also been reported (Wallace *et al.*, 1983).

Our patient was initially diagnosed as having tuberculosis by positive acid-fast staining and by the presence of *Mycobacterium* sp. in the sputum. The patient's symptoms resolved following a complete course of multiple anti-tuberculosis drugs. However, the disease eventually recurred and presented with a more complicated pulmonary infection. This might be attributed to an incomplete response and failure of the traditional anti-tuberculosis treatment. Although the initial episode of this patient as tuberculosis could not be excluded completely, it is possible that the initial *Mycobacterium* sp. infection was caused by *M. chelonae*, and the complicated nature of this infection suggested a prolonged course of treatment. Therefore, we pursued a more careful identification of the microbial species and their drug susceptibilities. In addition, because *M. chelonae* can be isolated from the water of bronchoscope washers (Kressel & Kidd, 2001), we could not completely exclude the possibility of superinfection by a contaminated bronchoscope or water used during the procedure. However, we surveyed other patients receiving a bronchoscopy for 1 month before and after the date that our patient received this examination, and

none of these patients developed a disease related to *M. chelonae*.

Complicated pulmonary diseases caused by RGM are rare. Such diseases are more typically caused by *M. abscessus* or *M. fortuitum* (Griffith *et al.*, 1993). Patients who have chronic pulmonary disease, bronchiectasis, cystic fibrosis or chronic obstructive pulmonary disease are always predisposed to develop RGM pulmonary infections. Only two cases of thoracic empyema caused by RGM have been reported. These cases were a lung transplant recipient infected with *M. abscessus* (Fairhurst *et al.*, 2002) and an achalasia patient infected with *M. fortuitum* (Aronchick *et al.*, 1986). Both patients had underlying disorders that predisposed them to infection. We report here what is believed to be the first case of severe pulmonary disease combined with empyema and bronchopleural fistula caused by *M. chelonae* in a healthy patient.

In most cases of pulmonary tuberculosis, the lesions are present in the apical or posterior segment of the upper lobes or the superior segment of the lower lobes. However, in NTM pulmonary diseases, the radiological picture is that of nodular bronchiectasis, involving predominantly the middle lobe and lingula (Chalermkulrat *et al.*, 2002). In our patient, the initial lesion was involved in the right middle lobe and the bronchoscope revealed B6 orifice redness and stenosis. It was difficult to differentiate between tuberculosis and NTM infection, as both the right middle lobe and the superior segment of the right lower lobe were involved. However, in the later complicated pulmonary disease stage, the clinical and radiological presentations were compatible with NTM infections.

In the study by Hazelton *et al.* (2000) of computed tomography findings of pulmonary *M. chelonae* infection, bronchiectasis (93%), nodules (93%), consolidation (79%), atelectasis (71%), lymphadenopathy (57%) and cavities (43%) were found in 14 patients. In addition, in all but two patients, the presence of bronchiectasis was evenly distributed in the lung lobes. However, in our patient bronchiectasis was discovered only in the right lung. According to this study, *M. chelonae* may affect patients with diffuse bronchiectasis rather than cause bronchiectasis, although the latter was more compatible with our patient's presentation.

A treatment strategy for complicated pulmonary diseases has not yet been established. Only one clinical trial on the successful treatment of *M. chelonae* skin infection used clarithromycin (Wallace *et al.*, 1993). We effectively employed a prolonged therapy with clarithromycin plus ciprofloxacin, which was shown to be effective in another patient with cutaneous infection (Chalermkulrat *et al.*, 2002). However, a high prevalence of drug resistance in *M. chelonae* clinical isolates was recently reported in northern Taiwan (Yang *et al.*, 2003). In that study, 100% (39) isolates of *M. chelonae* were susceptible to amikacin, 82% to linezolid, 49% to clarithromycin and none to ciprofloxacin. Other literature also supports the use of

multidrug therapy for the treatment of NTM infections (Driscoll & Tying, 1997; Franck *et al.*, 1993; Wallace *et al.*, 1993; Zahid *et al.*, 1994). Therefore, prolonged therapy for a complicated pulmonary infection caused by *M. chelonae* may be necessary in our experience, and combination therapy of clarithromycin with either amikacin or linezolid would be suggested in the future, following our regional resistance report (Yang *et al.*, 2003) and published treatment studies for *M. abscessus* (Mushatt & Witzig, 1995) and *M. fortuitum* (Dalovisio *et al.*, 1981; McFarland & Kuritzkes, 1993). However, the treatment strategy for *M. chelonae* pulmonary diseases still needs more prospective studies for reference.

Conclusion

In summary, NTM have emerged recently as significant clinical pathogens. Accurate diagnosis and identification of the mycobacterial species are critical for effective treatment of NTM. In addition, *M. chelonae* should be considered as a causative pathogen for complicated thoracic empyema with bronchopleural fistula, even in healthy patients. Furthermore, for treating this type of infection, prolonged combination therapy with the choice of drugs determined by regional susceptibility may be considered, although this requires further research.

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