Successful Treatment with Pneumonectomy for Pulmonary 
*Mycobacterium Abscessus* Infection

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**Abstract**

We report a case of pulmonary *Mycobacterium abscessus* (*M. abscessus*) infection with destructive growth in the entire right lung. The patient was 56-year-old woman who had had pulmonary tuberculosis at the age of 40 and had been diagnosed as having pulmonary *Mycobacterium abscessus* infection 4 years prior to admission at our hospital. Although various antibiotics were administered, persistent fever, hemoptysis and weight loss developed. After undergoing a right pneumonectomy, her clinical symptoms improved dramatically and sputum excretions of *M. abscessus* ceased. No relapse of the disease has been observed in the 2 years since surgery. Pneumonectomy was very effective for refractory *M. abscessus* infection that destroyed the right lung.

**Key words:** *Mycobacterium abscessus*, nontuberculous mycobacteria, lung disease, pneumonectomy

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**Introduction**

*Mycobacterium abscessus* (*M. abscessus*) is a rapidly growing mycobacterial species (1). Although it has been well known to cause localized infections of the skin and subcutaneous tissue, lung infection is relatively rare (2). However, the number of patients with pulmonary *M. abscessus* infections has been increasing in recent years (3). Most of these infections are slowly progressive, but in some cases there is a rapidly progressive clinical course (1). Here, we describe a case of pulmonary *M. abscessus* infection that required pneumonectomy because of unilateral destruction of the entire lung and resistance to antibiotics.

**Case Report**

A 56-year-old woman with sequelae of pulmonary tuberculosis since diagnosis at the age of 40 was admitted to our hospital in February 2006 with the complaint of fever, progressive hemoptysis, and weight loss. Beginning in July 2001, she had developed a fever of 37°C and productive cough. She had been admitted to another hospital in November 2002, and the diagnosis of pulmonary *M. abscessus* infection was made on the basis of repeated positive sputum cultures (Gaffky 3). She was administered 600 mg/day of ciprofloxacin (CPFX) and 2 g/day of sulbactam/cefoperazone (SBT/CPZ) intravenously for 1 month, followed by oral administration of 300 mg/day of levofloxacin (LVFX) and 400 mg/day of clarithromycin (CAM). After the initiation of these treatments, clinical symptoms improved temporarily, but her condition worsened and intermittent excretion of Gaffky 1 to 2 of *M. abscessus* in sputum continued in September 2003. Although she was treated with various antimicrobial agents, her clinical condition was unstable and the right lung was shown by imaging modalities to be destroyed (Fig. 1). Until 1 year before admission at our hospital, over a period of 35 years she had a smoking history of
10 cigarettes per day. On physical examination upon admission to our hospital, BMI was 12.4, body temperature 38.5 °C, heart rate 100 beats/minute with regular rhythm and respiratory rate 18/minute. Lung auscultation revealed coarse crackles in the right lung field, and decreased breath sounds and wheeze in the left lung field. Laboratory data on admission revealed anemia, C-reactive protein (CRP) of 3.5 mg/dL and erythrocyte sedimentation rate (ESR) of 68 mm/hour. Arterial blood gas analysis revealed PaO₂ of 73.3 torr and PaCO₂ of 53 torr on room air. Results of pulmonary function testing showed restrictive ventilatory impairment and decreased diffusion capacity as follows; vital capacity of 1.26 L (48.5% of predicted value), forced expiratory volume in 1 second of 0.93 L (79.5% of predicted value) and diffusion for carbon monoxide of 6.37 mL/min/mmHg (49.7% of the predicted value). Sputum cultures isolated Gaffky 2 of M. abscessus but no other common bacteria or fungi. Serum HIV antibody test was negative.

Chest X-ray obtained on admission showed a cavity in the right upper lung field and multiple nodular shadows in the left upper lung field. Chest computed tomography (CT) revealed a cavitary lesion in the entire right lung and multiple small nodules in the left upper lobe and lingular segment (Fig. 2). The patient underwent right pneumonectomy because of persistent fever, hemoptysis, continuous bacterial excretion in sputum and resistance to treatment with antimicrobial agents. A surgically resected specimen of the right lung was composed of a huge thick-walled cavity (Fig. 3). The cavitary wall consisted of necrosis, granulation and fibrous tissue, in which multiple epithelioid cell granulomas with caseous necrosis and multinucleated giant cells were scattered (Fig. 4). Daily doses of 1 g of imipenem/cilastatin (IPM/CS) and 300 mg of amikacin (AMK) were given intravenously for 4 weeks after surgery, followed by oral administration of 400 mg/day of CAM and 400 mg/day of faropenem (FRPM) for 1 year. One month after surgery, clinical symptoms and bacterial excretions in sputum had resolved and ESR and CRP levels as well as anemia improved. Furthermore, chest CT scan revealed improvement of multiple small nodules in the left upper lung field after the administration of CAM and FRPM for 1 year (Fig. 5).

Her clinical conditions markedly improved without relapse of the disease during the 2 years following surgery (Fig. 6).

Discussion

M. abscessus is a rapidly growing nontuberculous mycobacteria that belongs to group IV of Runyon’s classification (1). Similar to other nontuberculous mycobacterium, it is broadly distributed in the natural environment, including in soil and water. It mainly causes skin or soft tissue infections, but rarely pulmonary infections (2). The incidence of M. abscessus has increased recently, but it still accounts for only approximately 5% of the total pulmonary nontuberculous mycobacterial infections in Japan, 10% of those in the U.S.A (4, 5) and 33% of those in Korea (3). Some pulmonary M. abscessus infections are reported to be rapidly progressive and others are resistant to antimicrobial agents, and become refractory (1). In the present case, the
Figure 2. a) Chest X-ray showed a cavity in the right upper lung field and multiple small nodular shadows in the left upper and middle lung fields. b) Chest CT showed a thick-walled cavitary lesion with adjacent pleural thickening in the right upper lobe and multiple small nodular lesions in the left lingular segment.

Figure 3. a) Macroscopic findings of the right lung showed a thick-walled cavity 7 cm in diameter, which was filled with necrotic materials (arrow) (Scale: 1 division=0.5 cm). b) Coronal section showed that the pulmonary parenchyma had almost disappeared and had been replaced by necrotic tissues (Scale: 1 division=0.5 cm).

Patient’s right lung was eventually destroyed in association with an alternating clinical course of remission and exacerbation during the 4 years prior to surgery. Her condition gradually worsened despite the administration of various antimicrobial agents.

Griffith et al (1) described the clinical features of 154 patients with rapidly growing mycobacterial infection and found that 82% of those infections were caused by *M. abscessus*. In their study, the patients were predominantly woman (65%) over the age of 50. Approximately 70% had underlying diseases such as pulmonary tuberculosis, *mycobacterium avium complex*, bronchiectasis, chronic obstructive pulmonary disease, cystic fibrosis and lipid pneumonia. Clinical symptoms included fever, hemoptysis, sputum and weight loss. Han et al (6) reported that the main chest CT findings of *M. abscessus* are bilateral small nodular opacities, bronchiectasis and cavities combined with consolidations and decreased volume in the upper lobes. The present case had sequelae of pulmonary tuberculosis as the underlying disease and developed persistent fever, hemoptysis
and weight loss. Chest CT scan revealed multiple small nodular lesions, bronchiectasis and a huge cavity in the right upper lobe. These clinical and radiological findings were similar to those previously reported in patients with *M. abscessus*. According to the guidelines of the American Thoracic Society, *M. abscessus* is generally susceptible only in vitro to antibiotics such as AMK, CFX and IPM/CS and to the newer oral macrolides such as CAM (7). The recommended treatment is a combination of low-dose AMK and high-dose cefoxitin (CFX) for 2 to 4 weeks (7). Tanaka et al (8) reported that combination therapy consisting of FRPM and CAM was effective in one case. However, one report described conflicting results between drug susceptibility tests and clinical efficacy (9). Consequently, for a localized disease that tends to be resistant to antimicrobial agents, surgical lung resection can be effective in producing long-term conversion of sputum culture to negative (10). Moreover, it has been suggested that pneumonectomy results in the prevention of reactivation and improvement in the outcome of pulmonary nontuberculous mycobacterial infection (11, 12). Although various antibiotics were administered to the present case over a period of 4 years, she developed persistent clinical symptoms, bacterial excretion in sputum and progressive lung destruction. In addition to these findings, multiple small nodular lesions were limited in the left upper lobe and lingular segment. We decided to perform a pneumonectomy of the right lung, which had been severely damaged. Combination therapy using IPM/CS and AMK was
given for 4 weeks after surgical resection, followed by chemotherapy with CAM and FRPM orally for 1 year. As a result, the clinical symptoms, bacterial excretion in sputum and multiple small nodular shadows in the left upper lobe were resolved.

Based on these findings, we suggest that pneumonectomy is an effective treatment for patients with refractory pulmonary *M. abscessus* infection with unilateral lung destruction and resistance to antimicrobial agents who can tolerate surgery.

**References**


