A Community-acquired Lung Abscess Attributable to *Streptococcus pneumoniae* which Extended Directly into the Chest Wall

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**Abstract**

We herein report the case of 75-year-old Japanese female with a community-acquired lung abscess attributable to *Streptococcus pneumoniae* (*S. pneumoniae*) which extended into the chest wall. The patient was admitted to our hospital with a painful mass on the left anterior chest wall. A contrast-enhanced chest computed tomography scan showed a lung abscess in the left upper lobe which extended into the chest wall. Surgical debridement of the chest wall abscess and percutaneous transthoracic tube drainage of the lung abscess were performed. A culture of the drainage specimen yielded *S. pneumoniae*. The patient showed a remarkable improvement after the initiation of intravenous antibiotic therapy.

**Key words:** chest wall abscess, *Streptococcus pneumoniae*, lung abscess

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**Introduction**

*Streptococcus* species are the second most common pathogens for a community-acquired lung abscess (CALA) reported in the West (1), and the most common pathogens of CALA in Japan. Among adult patients with CALA due to *Streptococcus* species, *Streptococcus mitis* is the most frequently identified strain - *Streptococcus pneumoniae* is much less common (2). To our knowledge, this is the first report of a patient with CALA attributable to *S. pneumoniae* in which the abscess extended into the chest wall.

**Case Report**

A 75-year-old Japanese female was admitted to our hospital with a painful mass on the left anterior chest wall for eight days without any other symptoms. She presented at another hospital with left chest pain 3 days previously without any features suggestive of pneumonia including cough, sputum or dyspnea. Chest computed tomography (CT) obtained at the other hospital showed a mass in the left upper pulmonary lobe without any chest wall abnormalities (Fig. 1). As a result, lung cancer was suspected. She had no significant past medical history, nor did she have any history of smoking or alcohol consumption. She had no known tuberculosis exposure, and had not traveled outside Japan. She had not previously received a pneumococcal vaccine. Her vital signs were within the normal limits. A physical examination revealed a palpable, pink erythematous, warm and tender mass measuring 8 cm in size located close to the sternum overlying the left first to third intercostal spaces (Fig. 2). Her breath sounds were slightly decreased over the left upper zone, but there were no rales. A laboratory test revealed a high white blood cell count (14,310 cells/mm³ with 87.9% of neutrophils) and an elevated C-reactive protein level (33.35 mg/dL). Moreover, she was diagnosed with diabetes mellitus because of her elevated HbA1c level (7.5%).
Figure 1. Three days before admission, chest CT showed a mass in the left upper pulmonary lobe without any chest wall abnormalities (arrows).

Figure 2. A palpable, pink erythematous, warm and tender mass measuring 8 cm in size was located on the left anterior chest wall.

Figure 3. A chest X-ray obtained on admission demonstrated a 7×5 cm mass in the left upper lung field.

A chest X-ray obtained on admission demonstrated a 7×5 cm mass in the left upper lung field (Fig. 3). Chest contrast-enhanced CT showed a gas-containing lung abscess in the left upper lobe and a chest wall abscess (Fig. 4). There was some air in the first sternocostal joint and no pleural effusion. These findings were thought to indicate that lung abscess had directly extended into the chest wall through the sternocostal joint. Chest ultrasonography showed almost the same findings as those obtained from CT. Surgical debridement of the subcutaneous and intramuscular fluid collection was carried out under local anesthesia (Fig. 5). Then, under ultrasonographic guidance, an 8-Fr aspiration catheter (Argyle™ Aspiration Catheter; Covidien, Japan) was percutaneously inserted into the lung abscess, and odorless pus was drained (Fig. 6). Gram staining of the pus revealed numerous Gram-positive cocci, and empiric antimicrobial therapy with intravenous meropenem and clindamycin was initiated. On the 5th day, the culture specimens obtained from the lung and subcutaneous abscess grew *S. pneumoniae*. Mycobacterial and anaerobic cultures of the same specimens and two sets of blood cultures were all negative. Antibiotic susceptibility testing was performed by lung and subcutaneous drainage cultures. The isolate was susceptible to penicillin, ceftriaxone, and vancomycin, and resistant to erythromycin. The patient was considered to have a lung abscess attributable to *S. pneumoniae* which had directly extended into the chest wall. The antibiotic therapy was changed to intravenous ampicillin/sulbactam according to the results of antimicrobial susceptibility testing. After 16 days of antimicrobial therapy, the catheter was removed because the drainage had become serous and chest CT showed a remarkable improvement (Fig. 7A and B). Oral amoxicillin/clavulanic acid was used for 1 week after 3 weeks of intravenous antibiotic therapy, and the patient was discharged on the 25th day of hospitalization. At a follow-up examination at 1 month after the patient’s discharge, she was asymptomatic and demonstrated normal chest radiography findings (Fig. 7C).

Discussion

A lung abscess is defined as a localized area of liquefactive necrosis of the lung parenchyma which is caused by a microbial infection. *Streptococcus* species are the most common cause of CALA in Japan. Takayanagi et al. retrospectively reviewed 205 CALA patients, and reported that the four most common aetiopathological pathogens were *Streptococcus* species (59.8%), anaerobes (26.2%), *Gemella* species (9.8%), and *Klebsiella pneumoniae* (8.2%). *S. mitis* was the most common organism in patients in whom *Streptococcus* species were isolated. However, *S. pneumoniae* was only found in 3 patients (2.12%) of those patients (2). The common aetiopathological pathogens of the intrathoracic infectious diseases extending into the chest wall are *Mycobacterium tuberculosis* (3) and *Actinomyces* spp. (4), and such conditions have not been previously reported to be caused by *S. pneumoniae*. This condition is thought to have occurred by two mechanisms: first, pathogens of the lung or pleura may flow into the chest wall through the lymphatic network which is
The characteristic radiographic finding of a lung abscess is an air-fluid level. On chest CT, a lung abscess appears as a rounded intrapulmonary mass that forms an acute angle with the chest wall and contains central necrosis or cavitation (6). In our patient, the chest radiographic and CT findings were consistent with those of a lung abscess, and the lung abscess seemed to directly extend into the chest wall through the first sternocostal joints without any pleural effu-

Figure 4. Chest contrast-enhanced CT showed a gas-containing lung abscess in the left upper lobe (A) and a chest wall abscess (arrows on A and arrow on B). There is some air in the first sternocostal joint (arrows on A and C) without pleural effusion (D) and the abscess extended between the lung and the chest wall.

Figure 5. Surgical debridement of the subcutaneous and intramuscular fluid collection was carried out under local anesthesia.

Figure 6. Chest CT (A) after drainage therapy under ultrasonographic guidance. An 8-Fr aspiration catheter was percutaneously inserted into the lung abscess, and odorless pus was drained (B).
to severe pneumococcal infection and a higher mortality rate was a known risk factor associated with an increased susceptibility to the disease. Currently, over 46 serogroups and 97 pneumococcal serotypes have been documented and not all serotypes are equally virulent (10-12). Fletcher et al. reported that serotypes 1, 19A, 3, 14, and 7F predominated as causes of complicated pneumococcal pneumonia (13). In our patient, the pneumococcal serotype was unclear because no serotype testing was done.

Reports published from 1968 to 2008 show that lung abscesses are associated with a mortality rate of approximately 1-4% (2, 14). Although 80-90% of lung abscess are now successfully treated with antibiotics, this conservative therapy may occasionally fail. Thus, 11-21% of lung abscess patients require surgical or percutaneous drainage (14, 15). Wali et al. reported that the overall success rate of percutaneous tube drainage (PTD) was 84% with a complication rate of 16%. PTD is a safe and effective method for treating lung abscesses, and this treatment modality is associated with less morbidity and mortality than surgical resection. Moreover, the other advantages include the rapid clinical and radiological improvement of the lung abscess which may avoid the complications that can occur with prolonged and conservative treatment (16). Mengoli et al. advocated that surgical drainage is required in patients with lung abscesses larger than 8 cm in diameter (17). In our case, the size of lung abscess was relatively large (8 cm in diameter); however, PTD was safely performed under ultrasonographic guidance and it proved to be effective.

In conclusion, we should consider the possibility that community-acquired lung abscesses which occur due to S. pneumoniae may extend into the chest wall in the differential diagnosis of infectious diseases of the chest wall. To our knowledge, this is the first case report of such a condition.

The authors state that they have no Conflict of Interest (COI).

References


