Fulminant lobulated lung empyema caused by *Pseudomonas aeruginosa*

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**Introduction**

*Pseudomonas aeruginosa* (*P. aeruginosa*) is a common nosocomial pathogen in patients with underlying diseases and its colonization of the damaged respiratory tract resulting from mechanical ventilation, trauma, or recent viral infection often leads to severe complications. This pathogen can cause lung injury through direct destruction, supported by the exuberant host immune response. However, *P. aeruginosa* pneumonia does not frequently cause formation of air fluid level lung abscess especially with a fulminant course. In acute thoracic empyema, the bacteriology has changed, because of the use of antibiotics, from *Staphylococcus aureus* (S. aureus) between 1955 and 1965 to anaerobic bacteria¹,². Klebsiella pneumoniae (K. pneumoniae) is the most frequently isolated pathogen in acute empyema and is strongly associated with the underlying diabetes mellitus. Here, we present a unique case in which *P. aeruginosa* infection led to lung abscess with fulminant course in a 27-year-old man, who was successfully treated after adequate drainage and antibiotic therapy.

**Case report**

A 27-year-old man with a history of diabetes mellitus presented with fever, conscious disturbance, and stiff neck 3 days after upper respiratory tract infection. He was diagnosed with hospital-acquired pneumonia and then fulminant lung empyema with abscess formation caused by *P. aeruginosa*; to our knowledge, this unusual condition should be considered for its possible presentation with a rapidly progressing course, such in this case.

We report the case of a 27-year-old man with a history of diabetes mellitus who presented with conscious disturbance, fever, and stiff neck after upper respiratory tract infection. Following diagnosis of meningocerebralitis, antibiotic therapy and deamethasone was initiated. He received endotracheal tube intervention under mechanical ventilation in the intensive care unit, and underwent successful weaning on day 4. One week later, he was diagnosed with pneumonia and a rapidly progressing lung empyema with abscess formation was noted. Microbiological culture of the pleural fluid revealed the presence of *Pseudomonas aeruginosa*. Nosocomial pneumonia is often caused by *Staphylococcus aureus* and *P. aeruginosa*; however, the latter often causes bronchopneumonia rather than fulminant empyema or lung abscess formation. The underlying diabetes mellitus and the history of steroid therapy may explain the present condition of this patient. The possibility of *P. aeruginosa* being the causative agent should be considered during differential diagnosis in patients presenting with fulminant lung empyema, especially in immunocompromised patients.

**Key words**: Fulminant lung empyema, *Pseudomonas aeruginosa*.  

**Palabras clave**: Empiema pleural, *Pseudomonas aeruginosa*.

**Discussion**

Lung empyema is defined as the presence of pus in the pleural space and is a typical complication of pneumonia. Clinically, lung empyema often causes severe inflammation and sepsis, which usually require treatment with adequate drainage and antibiotics. Patients with acute lung empyema often present with fever, cough, chest pain, expectoration, and dyspnea. In the present case, the patient was diagnosed with hospital-acquired pneumonia, and then fulminant lung empyema with abscess formation caused by *P. aeruginosa* was noted; to our knowledge, this unusual condition should be considered for its possible presentation with a rapidly progressing course, such in this case.

*P. aeruginosa* does not often cause lung infection in normal hosts, but it is the predominant pathogen responsible for nosocomial pneumonia, especially in immunocompromised patients. In a prospective study, *P. aeruginosa* was the most common gram-negative pathogen implicated in hospital-acquired pneumonia² and was an important cause of nosocomial tracheobronchitis.⁴ In general, when *P. aeruginosa* is the only isolate noted, the pneumonia usually presents as bronchopneumonia, not empyema and abscess formation, but Gluck et al⁵, reported a case in which a patient suffered from nosocomial...
pneumonia due to *P. aeruginosa*, leading to lung abscess formation and acute empyema. The findings on chest radiographs are non-specific for *P. aeruginosa* pneumonia, and the frequencies of cavities and empyema are surprisingly low. To diagnose a *P. aeruginosa* pneumonia-related lung abscess or empyema, bacterial cultures of the pleural fluid, blood, and sputum are important.

The risk factors for acute thoracic empyema include diabetes mellitus, malignancy, lung diseases, and diseases of the central nervous system and renal system. The most common underlying condition is diabetes mellitus, which was present in our patient. *K. pneumoniae* is the most frequently isolated pathogen in such cases. In addition to its virulence factors, the genetic flexibility of *P. aeruginosa* also plays a role in enabling it to survive in various environments; it has a direct destructive effect on the lung parenchyma and host immune response. In this case, fulminant lung empyema formation may be related to the patient’s history of steroid use and presence of diabetes mellitus.

**Conclusion:** Fulminant lung empyema caused by *P. aeruginosa* is a rare clinical condition. This case reminds us *P. aeruginosa* should be included in the possible pathogen when a patient has a rapidly progressive lung empyema. Obtaining a microbiological culture via blood, sputum and pleural effusion is important in order to verify the pathogen. Both adequate antibiotics and drainage intervention are important for the successful outcome of *P. aeruginosa* related lung empyema.

**References**