Scholars Journal of Medical Case Reports
Abbreviated Key Title: Sch J Med Case Rep
ISSN 2347-9507 (Print) | ISSN 2347-6559 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Radiology

Empyema Necessitatis Due to *Streptococcus pneumoniae:* Case Report

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DOI: 10.36347/sjmcr.2022.v10i08.023 | **Received:** 21.07.2022 | **Accepted:** 16.08.2022 | **Published:** 27.08.2022

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Abstract | **Case Report**

Empyema necessitatis is a rare complication of empyema characterized by extension of suppuration from the pleural space through the chest wall. The most common etiologies are tuberculosis and actinomycosis. We describe a 60-year-old woman with *Streptococcus pneumoniae* empyema necessitatis. Empyema necessitans should be kept in the differential diagnosis of patients with left chest masses or abscesses.

Keywords: Empyema necessitates, *Streptococcus pneumoniae*, *Actinomyces* spp, actinomycosis.

INTRODUCTION

Lower respiratory tract infections can cause increased interstitial fluid production and pleural effusions. An empyema can subsequently develop due to inflammation in the pleural space, resulting in the formation of turbid fluid containing pus. Rarely, this process can be complicated by the purulent material dissecting through the pleura into the soft tissues of the chest and skin; this is known as an empyema necessitans [1]. In 1940, Sindel reported that the majority of cases of EN were caused by *Mycobacterium tuberculosis* (73%), followed by *Streptococcus pneumoniae* and *Actinomyces* spp. The overall mortality rate was 66% (87% for *M. tuberculosis*, 28% for pyogenic organisms) in that era [2].

CASE REPORT

A 60-year-old woman presented to the emergency department with progressive left-sided anterior chest pain of 2 week duration. Associated symptoms included nocturnal dry cough and tenderness to touch .One month before this presentation, she was treated for otitis with an unknown antibiotic.

On examination, the patient was found to be febrile with a temperature of 38.5 °C, tachycardic (118 beats per minute), and tachypneic (28 breaths per minute). Her oxygen saturation on room air and blood pressure were within normal limits. She was noted to have a swelling in the left anterior chest wall. The swelling was firm, tender to palpation. The rest of the examination was unremarkable. Laboratory testing revealed normocytic anemia with hemoglobin of 7.5 g/dl and leukocytosis with a white blood cell count of 19 x 10^9/L with a neutrophil predominance of 15 x 10^9/L. A chest radiograph described a mass in the upper left lung and/or pleural space. Computed tomography (CT) imaging of the chest revealed the diagnosis. Thorax CT scan showed in the right chest wall 8.7 × 3.5 cm sized peripheral enhancing cystic lesion that enveloped the right first and second rib.

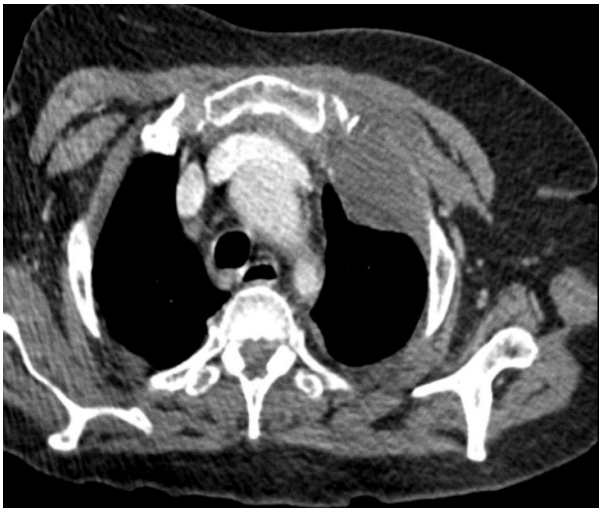

Figure 1: Chest computed tomography with intravenous contrast (Axial section) demonstrating in the right chest wall 8.7 × 3.5 cm sized peripheral enhancing cystic lesion that enveloped the right first and second rib

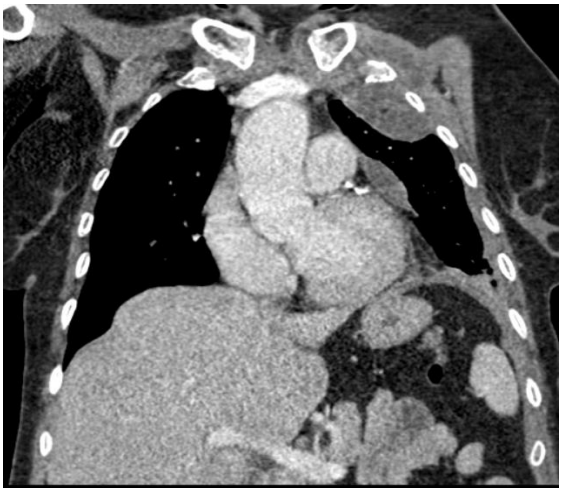

Figure 2: Chest computed tomography with intravenous contrast (Coronal section) demonstrating in the right chest wall 8.7 × 3.5 cm sized peripheral enhancing cystic lesion that enveloped the right first and second rib

The patient subsequently underwent a CT-guided placement of a drainage catheter in the left anterior pleural abscess. Approximately 25 mL of purulent fluid was aspirated when the drain was placed. Culture of the aspirate was positive for Streptococcus pneumonia, He received intravenous antibiotics for 4 weeks, initially ceftriaxone as empiric therapy, then penicillin G.

At 1 month follow-up, the patient had returned to his usual good health and had a normal chest radiograph.

DISCUSSION

Empyema necessitatis is a rare complication of lung abscess and empyema due to rupture of pus in the pleural space into adjacent tissue. Although it is unclear why, the anterior chest wall between the anterior axillary line and midclavicular line is the most common site of involvement. *Mycobacterium tuberculosis* and *Actinomyces* species are the most common pathogens [3]. Other reported pathogens include *Blastomycosis*, *Aspergillus*, *Nocardia*,and *Mucormycosis*, . To our knowledge, only a few cases of empyema necessitatis due to *Streptococcus pneumonia* have been reported [4]. Chest wall infection could be from direct extension of pulmonary infection or from spread of the pathogens to the chest wall through the lymphatic system. Risk factors include immunocompromised states, including diabetes and alcoholism, and recurrent aspiration [5].

Empyema remains a serious complication of infection within the pleural space. The evolution of an empyema can be divided into 3 stages: exudative, fibropurulent, and organization. The organization stage is characterized by the formation of an inelastic membrane, the pleural peel, which may encase the lung and restrict normal ventilatory function. At this stage, if untreated, the fluid may erode and drain spontaneously through the chest wall, termed empyema necessitatis, often leading to sepsis and multiple organ system failure [6].

Pleural fluid should be obtained through thoracocentesis, chest tube thoracostomy, or surgical drainage of the collection. Sample fluid should be analyzed by cytology to exclude an underlying neoplastic process (such as lymphoma, bronchogenic carcinoma, and mesothelioma), biochemistry to demonstrate the exudative nature of the fluid, and microbiology for mycobacterial, bacterial, and fungal cultures. The treatment goal of empyema necessitans is to control the pleural infection through drainage of purulent material and antibiotic therapy. A case-by-case approach based on the clinical situation should be undertaken to reach this goal. Local antibiotic guidelines and susceptibility testing should guide the choice of antibiotic therapy. Surgical input, such as video-assisted thoracoscopic surgery, open drainage, decortication, or surgical removal of a lobe or lung, may be required in severe cases [7].

Chest radiography is commonly the first imaging study performed to accurately identify thoracic fluid collections; yet, the preferred imaging modality is CT. It provides further diagnostic information, identifies associated lymphadenopathy, and accurately distinguishes between lung abscesses, cavitary lesions, and empyema. CT scan additionally demonstrate the spread of the empyema necessitans into neighboring structures with previous case studies describing invasion into both extra and intra-thoracic structures, such as the bronchus, vertebrae, diaphragm, mediastinum, and retroperitoneum organs [8].

Early identification and treatment of this rare complication of empyema will prevent progression and long term sequelae. Complete evacuation and elimination of the infectious cavity with control of the source organisms form the basis of treatment.

CONCLUSION

Empyema necessitatis should be suspected in any patient with pulmonary symptoms presenting with a chest wall mass as well as in patients with known skin and soft tissue infections of the chest wall. Imaging studies and sampling of the lesions by aspiration or biopsy are the keys of diagnosis. Appropriate antimicrobial therapy and surgical drainage of the empyema are the mainstays to a successful outcome in cases of empyema necessitatis.

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