

Empyema Necessitans (EN): Critical Care Importance of Appropriate Pleural Drainage

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Citation

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Abstract

INTRODUCTION

Sir William Osler, the father of modern medicine, died in 1919 at age 70 from a once common complication of pneumonia in the pre-antibiotic era: Haemophilus influenza empyema.

Reportedly identified by Hippocrates in 460 B.C, though first reported in the literature by Guillain de Baillon in 1640 (Mizzell), empyema is one of the oldest and severest pulmonary diseases that results from inadequate drainage of any pleural space infection (Sindel). Empyema typically begins as a pulmonary infection that deteriorates to a simple exudative parapneumonic effusion, then to a complicated fibropurulent parapneumonic effusion, and ultimately into an organized collection of pus in the pleural space.

If empyema is neglected or inadequately treated, the infected fluid may rupture the pleural cavity, extending into the chest wall and soft tissues, resulting in the now rare complication of EN, also known as Empyema Necessitatis or Empyema Necessitasis.

Despite improved antibiotics and multiple options for drainage of the infected pleural space, the optimal management of infected parapneumonic effusions has yet to be defined. As these infections are often indolent, parapneumonic effusions may have already organized into empyemas by the time patients seek treatment. Most cases of EN occur in the setting of necrotizing pneumonia or lung abscesses secondary to slow-growing Mycobacterium tuberculosis and Actinomyces spp.

As the case presented herein illustrates, EN continues to cause significant morbidity in even immunocompetent adults. We present a patient with methicillin sensitive

Staphylococcus aureus pneumonia who developed EN, highlighting the value of appropriate outpatient follow-up and surgical drainage.

“Empyema needs a surgeon and three inches of cold steel, instead of a fool of a physician.”

--Aphorisms of Sir William Osler (Bean)

CASE REPORT

An otherwise healthy 47-year-old male developed a left parapneumonic effusion following outpatient therapy of a left lower lobe community acquired pneumonia (Fig 1). He had received a single dose of ceftriaxone 1g IM, and completed a course of amoxicillin/clavulanate and azithromycin. One month later, he presented to the ICU with fever, severe sepsis and a palpable left chest wall mass. A 10cm tender, non-erythematous mass occupied the axilla, displacing the scapula. Laboratory examination revealed a WBC of 21,000/mm³, hemoglobin of 9.2g% A contrast computed tomography scan demonstrated a large left pleural effusion and a 15x13x7cm chest wall fluid collection (Fig 2). The radiographic differential diagnosis included abscess versus neoplasm. Catheter drainage of the chest wall abscess and tube thoracostomy yielded foul-smelling exudative fluid, which cultured Methicillin-sensitive Staphylococcus aureus. Following prolonged antimicrobial therapy and drainage, the axillary abscess and pleural effusion resolved. Subsequent chest radiographs and respiratory function tests were normal (Fig 3).

Figure 1

Chest radiograph showing the initial pleural effusion that was not drained

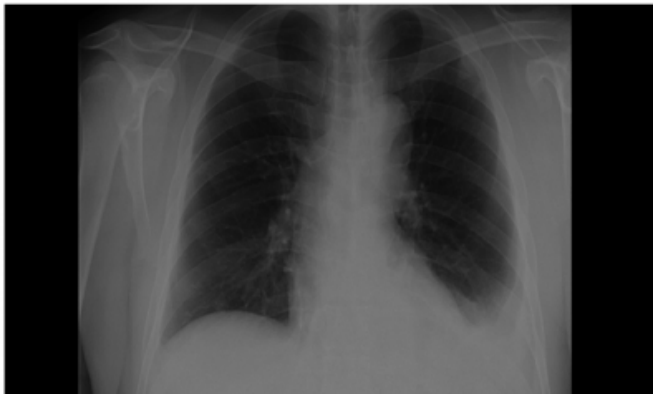


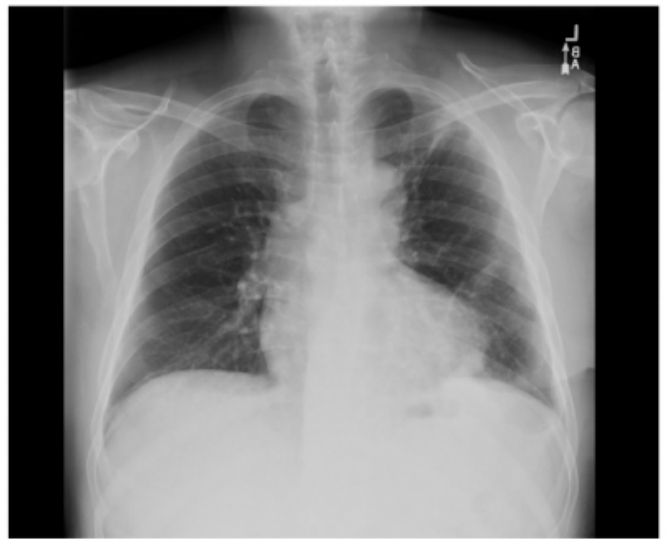
Figure 2

CT Angiogram on admission showing the Empyema Necessitans



Figure 3

Chest radiograph after treatment and drainage, showing no lesions or effusion



DISCUSSION

Since the advent of antibiotics, empyema has become a relatively rare diagnosis, complicating less than 1 percent of pneumonias (Strachan). Nonetheless, pleural infections are increasing in incidence in pediatric and adult populations, with a mortality rate between 10 and 20 percent (Rahman). At least 40 percent of case of pneumonia have an associated parapneumonic pleural effusion, and as many as 10 percent of these patients have more complicated parapneumonic pleural effusion, with a handful deteriorating into EN (Ahmed).

Although the median age at diagnosis of EN is 44.5 years, with a range of 3 months to 81 years (Mizell), this problem has frequently occurred among the elderly and those with underlying comorbidities: Neoplasms, chronic pulmonary diseases, cardiac disorders, diabetes mellitus, alcoholism, drug abuse, and immunosuppression (Akgul).

Mycobacterium tuberculosis remains the most common organism responsible for EN, followed by *Actinomyces* spp., and *Streptococcus* spp. (Mizell). A sensitive-organism such as MSSA in an immunocompetent host is very infrequent, as this patient demonstrates. Less common etiologic organisms have been described: methicillin-resistant *Staphylococcus aureus*, *Fusobacterium nucleatum*, *Mycobacterium avium*, *Mycobacterium intracellulare*, *Burkholderia cepacia*, and *Blastomyces* spp. (Mizell).

EN is essentially an uncontrolled parapneumonic effusion that has been able to erode through the thorax. Following the

path of least resistance, the pleural infection often extends into the anterior chest wall between the midclavicular and midaxillary line as the lung is more adherent posteriorly at the apex and base (Mizell, Ahmet). EN has also been reported in the abdominal wall, paravertebral space, vertebrae, esophagus, bronchus, mediastinum, diaphragm, pericardium, flank, breast, and retroperitoneum (Sakamoto).

Classically, EN presents in patients with underlying pulmonary disease and a soft tissue swelling over the aforementioned areas. Clinicians should have a high index of suspicion, as patients may or may not exhibit typical signs of inflammation (e.g., erythema, swelling, heat). Moreover, the extent of the infection can be overlooked or mistaken for cellulitis in an immunocompetent individual (Tonna).

If cellulitis of the chest wall is found in the setting of underlying pulmonary disease, further imaging should be obtained. In this regard, computed tomography images are very useful diagnostic tools.

The goals of treatment are the same as that of a parapneumonic effusion: Sterilize the pleural cavity, control the infection, drain the fluid, expand the lung, and restore normal lung function.

Thoracentesis should be done early in the management of the disease to help direct antibiotic therapy. Chest tube drainage, organ drainage and decortication are typical steps in surgical management. Antibiotics with actual removal of the EN are usually successful if the organism is sensitive, and multiorgan failure or malignancy are not complicating factors.

As Osler observed more than a century ago, surgery has a critical role in the treatment of not only empyema, but also EN. However, with proper initial assessment and complete treatment of otherwise common pulmonary infections, this

rare complication can usually be avoided.

EN is a possible complication of any pneumonia, affecting all ages and immune states. The thickness of the pleura and injury to the underlying lung correlates with the duration of disease. Delayed and inadequate treatment may cause irreparable harm to the lung and subsequent life-threatening complications, including EN. This case of MSSA EN in an immunocompetent patient demonstrates the importance of appropriate management of parapneumonic effusions.

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