

CASE REPORT

Spontaneous Massive *Streptococcus constellatus* Empyema Thoracis in a Healthy Individual: A Case Report

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ABSTRAK

*Empiema torasis biasanya dicirikan sebagai pengumpulan nanah dalam ruang pleura dan dikaitkan dengan kadar kematian yang tinggi. Punca kadar kematian yang tinggi tidak diketahui, tetapi risiko ini mungkin meningkat disebabkan oleh kes radang paru-paru atau pesakit imunokompromi. Kajian ini melibatkan seorang lelaki berusia 50 tahun tanpa penyakit bersamaan kronik, didiagnosis sepsis sekunder kepada radang paru-paru yang diperoleh komuniti dan dirawat dengan ceftriaxone. Selepas itu, dia mengalami empiema paru-paru kanan secara spontan yang besar dan memerlukan torakotomi segera dan dekotikasi kanan yang komprehensif. Kemudian, antibiotik spektrum luas, meropenem diberikan kepadanya. *Streptococcus constellatus* ditemui dalam kultur cecair pleura dan ujian sensitiviti. Pada hari yang kesepuluh, pesakit menjalani torakotomi dan kortikasi. Pesakit telah diekstubasi pada hari kedua selepas pembedahan dan pulih pada hari-hari berikutnya. Dia dibenarkan keluar pada hari ke-30 selepas pembedahan. Kami melaporkan kes empiema torasis secara spontan dalam kalangan pesakit dewasa dengan beberapa faktor risiko iaitu dia tidak mengalami gangguan imun, tidak mempunyai penyakit kronik dan tidak mempunyai interaksi dengan pesakit tuberkulosis.*

Kata kunci: empiema torasis secara spontan, kortikasi, *Streptococcus constellatus*

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ABSTRACT

Empyema thoracis is a well-known condition that is characterised by a collection of pus in the pleural space and has historically been related to high mortality rate. The cause of high mortality rate is unknown, but it may have higher risk in pneumonia cases or immunocompromised patients. This case study presented a 50-year-old man with no chronic co-morbidities, admitted with the diagnosis of sepsis secondary to community-acquired pneumonia, which was covered with ceftriaxone. Subsequently, he developed massive spontaneous right lung empyema, necessitating an urgent thoracotomy and comprehensive right decortication. Broad-spectrum antibiotics, meropenem, was then given to him. *Streptococcus constellatus* was discovered in the pleural fluid's culture and sensitivity test. On his tenth day of stay, the patient had a right thoracotomy and decortication. The patient was extubated on day two post-operative and recovered on subsequent days. He was then discharged at 30 days post-operatively. We reported a case of adult spontaneous empyema thoracis from a patient with few risk factors: he was not immunocompromised, had no chronic illnesses and had no interaction with tuberculosis patients.

Keywords: decortication, spontaneous empyema thoracis, *Streptococcus constellatus*

INTRODUCTION

Empyema thoracis is characterised by a collection of pus in the pleural space and is a well-known condition that has been linked to high mortality rate. The mortality rate from empyema thoracis is still high, ranging from 6-24% in global population (Ahmed & Yacoub 2010). The cause of this high mortality rate is unclear, but the risk may be increased in pneumonia cases or in immunocompromised patients. The exudative, fibrinopurulent and organising phases had been identified earlier as empyema's natural course.

A kind of pleural effusion known as parapneumonic effusion (PPE) causes empyema thoracis. It is divided into three types; simple, complicated and

frank empyema. Up to 57% of patients admitted to the hospital with bacterial pneumonia acquired PPE. Patients with PPE had a three- to six-fold increase in death. From intensive management (open drainage, thoracotomy with the breakdown of adhesions and decortication, thoracoscopy with the breakdown of adhesions or decortication, intrapleural instillation of fibrinolytics, tube thoracostomy or therapeutic thoracentesis) to a simple observation are the options for pleural fluid management in patients with PPE (Light 2006).

Streptococcus constellatus is a Gram-positive cocci in small chain that present as one of the commensal bacteria, and mostly found in gastrointestinal and urogenital tracts

(Chrastek et al. 2020). When PPE and abscesses have been reported, intravenous antibiotics and modest surgical procedures such as chest drainage are usually used to treat them.

We presented the case of a healthy 50-year-old man who developed massive spontaneous right lung empyema, requiring thoracotomy and extensive right decortication. The pleural fluid's culture and sensitivity test revealed *Streptococcus constellatus*.

CASE REPORT

A 50-year-old man, presented to Emergency Department with a month history of intermittent fever, productive cough, shortness of breath, lethargy, night sweats, loss of appetite and loss of 8 kg of his body weight. He had no history of chest pain, nausea and vomiting. He also denied close contact with COVID-19 infected individual. He is a social smoker who has never drunk alcohol, has no history of asthma, has never been exposed to respiratory pathogens and had never travelled abroad. He was recently diagnosed with type 2 diabetes mellitus and hypertension, with good compliance to the medications.

On examination, his vital signs showed low-grade fever, tachypnoea, and tachycardia. His oxygen saturation was 95% in room air. Lung's examination revealed crepitation with reduced air entry over his right side, which was dull upon percussion. Other systemic examinations were unremarkable. Blood investigations revealed raised infective markers and normal sugar level. Chest X-ray

(CXR) showed right lung homogenous opacity.

He was admitted with the diagnosis of sepsis secondary to community-acquired pneumonia. He was covered with ceftriaxone for two days. On the next day, the patient exhibited worsening respiratory distress and was transferred to the intensive care unit (ICU) for ventilator support. His repeated CXR revealed opacities on his middle and lower right lobes with tracheal deviation to the left (Figure 1). He was intubated in view of his lung's impending collapse. Pleural tapping was performed, however yielded a dry tap. Sputum for *Mycobacterium tuberculosis* and COVID polymerase chain reaction (PCR) test were negative. Computed tomography (CT) scan revealed loculated pleural effusion with enhancing pleura seen at right hemithorax (Figure 2). There was no evidence of pulmonary artery embolism.

The patient underwent right

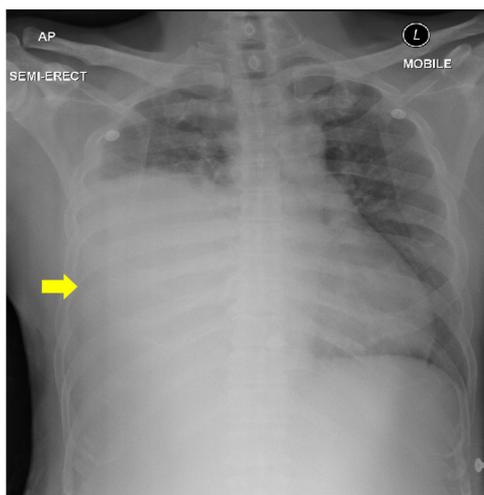


Figure 1: Chest X-ray showed the opacities of the right mid and lower zone (yellow arrow) with trachea deviated to the left.

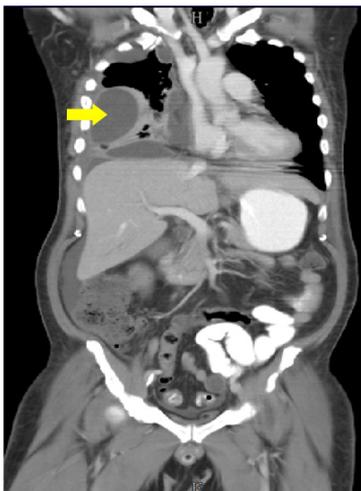


Figure 2: CT scan of thorax showed loculated right pleural effusion with pleura enhancement suggestive of empyema thoracis (yellow arrow). Right lower lobe was completely collapsed. Areas of aerated right upper lobe and middle lobe were seen in between the locules.

thoracotomy and decortication on his tenth day of admission. The intra-operative course was uneventful. Later, his pleural fluid's culture and sensitivity test revealed *Streptococcus constellatus*. The antibiotic susceptibility test was performed which sensitive to penicillin G. He was then treated with broad-spectrum antibiotic, intravenous meropenem for two weeks. The patient was extubated on day two post-operative and recovered on subsequent days (Figure 3). Patient was allowed to discharge after six weeks completion of the antibiotics.

DISCUSSION

We herein present a case of an adult spontaneous empyema thoracis from a patient with minimal risk factors – not in an immunocompromised status, no

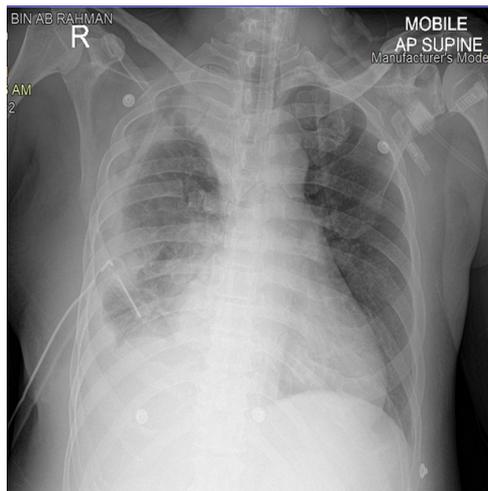


Figure 3: Chest X-ray showed marked improvement of right pleural effusion, with chest tube in situ.

history of any chronic illnesses and no contact with tuberculosis (TB) patients (Amare et al. 2010). The patient, with well-controlled sugar level and no other co-morbidities, developed pneumonic symptoms which is typically manifested in paediatric patients (Gupta & Crowley 2006). Computed tomography scan was also utilised to assess the position and size of pleural collections, as in this case. It could be used to rule out cancer, distinguished pleural empyema from parenchymal lung abscess, and to plan intervention and surgery (Abd Karim et al. 2021). As a result, this case was a one-of-a-kind and fascinating clinical scenario. Many instances of empyema were secondary to community- or hospital-acquired pneumonia, however some cases were caused by iatrogenic factors or developed without pneumonia, as in this patient (Ahmed & Yacoub 2010). This finding was clearly explained by a prior study showing that male patients

and those over the age of 70 years old had the highest incidence rates (Johnson et al. 2021). Furthermore, the male incidence rate grew from about 8.0-12.5 per 100 000 people during the study period, whereas the female incidence rate climbed from 3.0-5.0 per 100 000 people. PPE occurs in nearly half of all pneumonia patients who are admitted to the hospital, and they are associated with a four-fold increase in mortality.

Pleural fluid bacteriology, pleural fluid chemistry and pleural space anatomy, are used to divide the patients into four risk ranges for the outcome; high, moderate, low and very low risk (Colice et al. 2000). However, the presentation of spontaneous bacterial empyema thoracis is commonest in the early adulthood (Mandai & Thadepalli 1987). The presence of a massive empyema without any primary sources of infection in this patient is also rare (Kim et al. 2004). If the underlying lung was unable to expand due to a thick inflammatory coat as in this patient, decortication is the treatment of choice. Both vital capacity and forced expiratory volume in the first second were significantly improved by decortication (Anstadt et al. 2003; Rzyman et al. 2002). Simple PPE is likely to be treated with antibiotics adequately and pleural fluid drainage is unlikely to be required. Some patients acquire complex PPE as a result of their initial treatment. However, in this patient, bacterial penetration of basic PPE sped up the immunological response, causing neutrophils to migrate further and activate the coagulation cascade

(Ahmed & Yacoub 2010).

Decortication is the process of removing all fibrous tissue from the visceral and parietal pleura, as well as all pus and debris from the pleural space. Decortication, which allows the underlying lung to expand, is used to treat pleural fibrous tissue. Even though decortication is a major procedure, the benefit of post-surgical hospitalisation is short, as it is in this case. Furthermore, decortication should only be explored for the control of acute phases pleural infected individuals (Light 2006). In order to control empyema thoracis, three stages have been recognised. This patient had Stage II empyema thoracis (absence of homogeneous echogenic loculations, thicker parietal ring or fibrinous septation on ultrasonography). The surgery's goals were to conduct a complete debridement and sustain complete lung re-expansion without residual gaps or air leaks. This technique will further allow the intrapleural instillation of fibrinolytic drugs, which can break down the septa and improve chest tube drainage efficacy (Sokouti et al. 2017). Failure to identify a causative organism can lead to Stage II or even Stage III illness (Carey et al. 1998).

In the absence of positive culture findings, antibiotics such as ceftriaxone are used to cover the pathogens that are most likely to cause pleural space infection (Davies et al. 2003). Surprisingly, *Streptococcus constellatus* was cultured from this patient without any primary infection sources (Bouziri et al. 2011). Study showed that aerobic bacteria predominated in most community-acquired pneumonia

cases, such as *Staphylococcus aureus* and *Streptococcus pneumoniae*. Gram-negative bacteria such as *Escherichia coli*, *Haemophilus influenza* and *Klebsiella pneumoniae* are examples of the commonest aerobic species (Brook & Frazier 1993).

The patient was informed initially, that data from the case would be submitted for publication and informed consent was obtained from the patient. Hence, no ethical clearance was required. There was no conflict of interest available for this study to be published and no funding was received for this study.

CONCLUSION

We described a case of adult spontaneous empyema thoracis in a patient who had few risk indicators, including that he was not immunocompromised, had no chronic illnesses and had no contact with tuberculosis patients. In his pleural fluid culture and sensitivity test, *Streptococcus constellatus*, was discovered.

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