



Case report

Empyema Necessitans: A Case Report

El Mawla Zeinab ^{a,*}, Zoghaib Dima ^b, Al Saylami Haji ^b^a Faculty of Medicine, Department of Pulmonary & Critical Care, Lebanese University, Beirut, Lebanon^b Faculty of Medicine, Department of Internal Medicine, Lebanese University, Beirut, Lebanon

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ABSTRACT

Introduction: TB is a well-recognized cause of pulmonary infection. Empyema Necessitans is a rare complication of untreated empyema, mainly caused by mycobacterium tuberculosis. It mainly affects immunocompromised individuals.

Case presentation: We present a case of 28 years old gentleman, Sudanese, with intermittent fever, non-productive cough, weight loss and night sweats. Chest X-ray then CT chest revealed a large right pleural collection invading the chest wall. Chest tube was inserted, fluid analysis was taken, and a bronchoscopy was done. A diagnosis of Empyema Necessitans was confirmed and patient was started on anti-TB regimen with clinical improvement.

Conclusion: Empyema Necessitans is a severe disease, complicating pulmonary tuberculosis. Diagnosis can be a challenge. Surgical and medical approaches are both crucial in the treatment of EN. This case highlights the importance of early recognition and diagnosis of this rare but aggressive condition particularly in TB endemic area.

Introduction

Tuberculosis (TB) is a well-recognized cause of pulmonary infection. Worldwide, TB comes in the 13th position as a cause of death, and in the second among the infectious causes, as reported by WHO [1]. Around 10.6 million individuals became infected with TB in 2021, worldwide [1].

Empyema is a particular uncommon extrapulmonary manifestation of TB [2,3]. Without adequate treatment, spontaneous extravasation of the pleural purulent fluid can lead to Empyema Necessitans (EN). The latter can occur through a fistula extending from the pleural cavity to the chest wall [3,4].

Although more frequently seen with *Mycobacterium Tuberculosis*, EN can be seen with other medical conditions such as necrotizing pneumonia and pleural abscesses caused by *actinomyces*, *Staphylococcus aureus*, *streptococcus pneumonia*, *Enterobacteriaceae*, *P. aeruginosa*, etc [5, 6]. It is also common in immunocompetent.

Case presentation

Case of 28-year-old male patient, without significant past medical history, presented to the emergency department complaining of intermittent fever, non-productive cough, night sweats and unintentional

weight loss (10 kg) over the past month. He is non-smoker, not sexually active, and denies substance abuse. The patient is Sudanese, arrived to Lebanon 3 years ago upon which tuberculin skin test (PPD) test was done and was negative.

Upon arrival, vital signs were within normal limits. Physical exam was insignificant except for decreased right-sided air entry. PCR covid-19 was negative. Laboratory tests showed leukocytosis with elevated CRP, otherwise non-relevant. PPD test repeated returned negative. HIV test was negative. A chest X-ray revealed a 10 × 8.5 cm opacity overlying the right upper lobe, with mild right pleural effusion and enlarged left hilum (Fig. 1).

A CT scan chest was done and showed miconodular infiltrates with tree in bud appearance with adjacent consolidation in the superior segment of the left lower lobe. Loculated right apical pleural collection with pleural enhancement is seen measuring 9×7.5 cm, dissecting the adjacent lateral chest wall and eroding the posterior arch of the 3rd right rib (Fig. 2).

28 F chest tube was inserted, and approximately 700 ml of turbid, purulent fluid were drained. Chest X-ray post chest tube insertion showed resolution of empyema, with subsequent small right apical pneumothorax (Fig. 3).

Fluid analysis showed elevated white count 108,000 cells with 90% neutrophil predominance and normal protein and glucose level. Culture

* Corresponding author.

E-mail address: mawla.zeinab@hotmail.com (E.M. Zeinab).<https://doi.org/10.1016/j.idcr.2024.e01939>

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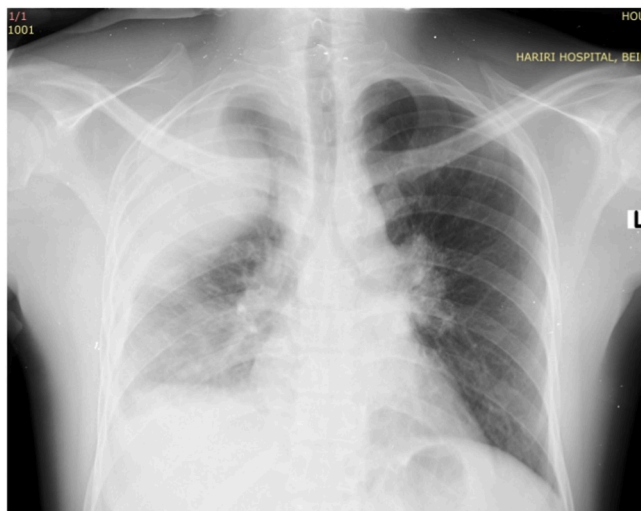


Fig. 1. A chest X-ray revealed a 10 × 8.5 cm opacity overlying the right upper lobe, with mild right pleural effusion and enlarged left hilum.

was taken, returned negative for any bacteria after 48 h. Therefore a bronchoscopy was done with bronchoalveolar lavage taken. PCR TB was sent and turned back positive, same for culture which confirms the presence of mycobacterium tuberculosis, rifampicin and isoniazid sensitive.

A diagnosis of tuberculous empyema, and specifically Empyema Necessitans was confirmed. Patient was started on anti-TB medications, quadruple therapy (Isoniazid, rifampin, pyrazinamide, and ethambutol). Thoracic surgery team was consulted, advised against any surgical intervention at the moment. Chest tube was removed after few days, and patient was discharged home on anti-TB drugs with follow up in clinics.

Discussion

Empyema Necessitans is a rare complication of untreated empyema, mainly caused by *mycobacterium tuberculosis*. It occurs following the invasion of the parietal pleura by the exudative fluid that extends to the extra pleural space toward the chest wall through a fistula [4]. This

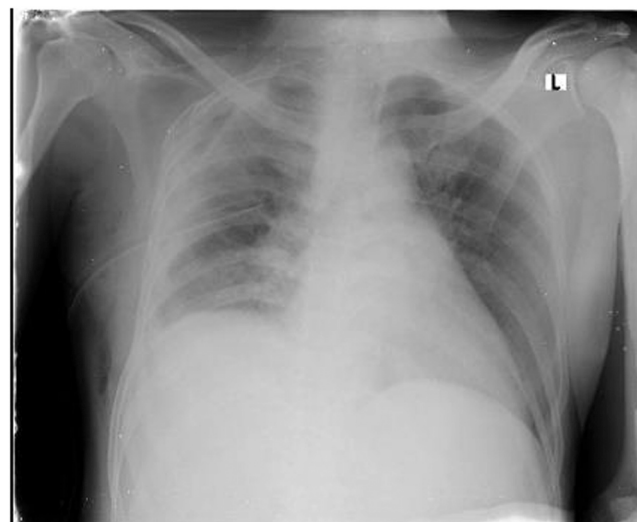


Fig. 3. Chest X-ray showed right chest tube, resolution of empyema, with subsequent small right apical pneumothorax.

condition can occur in immunocompetent individuals, but it is more found in the immunocompromised population [4].

EN can invade any structure adjacent to the pleura, including muscles, bones, soft tissues, and particularly the ribs [4]. As seen in the case above, EN invades the chest wall.

Clinical presentation varies from asymptomatic to nonspecific symptoms, such as pleuritic chest pain and cough [7]. Palpable chest wall masses, with or without pain, can also be present.

Diagnosis can be a challenge. It is based on several criteria including clinical, laboratory, radiologic and histopathologic findings [4]. Although requested in the primary workup, classic chest radiography may show normal result in 70% of cases [7]. CT scan is superior in evaluating this condition, particularly in identifying ribs erosions, and abscess buildup [7]. It can also show pleural and rib thickening. In addition, CT scan aids in the assessment of the lung function [4].

In TB pleural effusion, fluid analysis shows increased cell count with lymphocytic predominance [8]. Neutrophil cell type is usually predominant when TB effusion shifts to empyema; low glucose and pH are

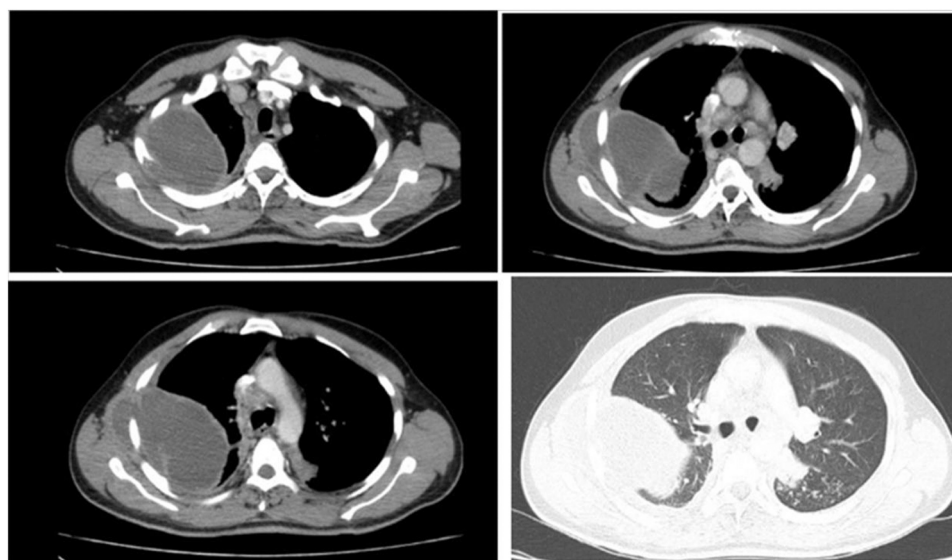


Fig. 2. A CT scan chest showed micronodular infiltrates with tree in bud appearance with adjacent consolidation in the superior segment of the left lower lobe. Loculated right apical pleural collection with pleural enhancement is seen measuring 9 × 7.5 cm, dissecting the adjacent lateral chest wall and eroding the posterior arch of the 3rd right rib.

also present [8].

PCR is of great importance due to its rapid identification of even a small amount of Mycobacterium Tuberculosis genomes [8]. It has a sensitivity ranging from 21 to 48% and a good specificity; thus, it correlates well with the histological findings [7]. Nevertheless, culture remains the gold standard for diagnosis [3,9]. It can be isolated from pleural fluid or biopsied pleural tissue [8]. Histopathology has also a significant role, it can show caseating granulomas [8].

Surgical and medical approaches are both crucial in the treatment of EN [3,4].

Medical therapy consists mainly of anti-TB medications (Isoniazid, Rifampin, Ethambutol, and Pyrazinamide). Anti TB regimen is usually guided by mycobacterial sensitivity in the culture specimen [8]. Duration of therapy is usually extended beyond 6 months [8].

Surgical interventions include chest tube drainage, pleural decortication through open thoracotomy or video assisted thoracic surgery (VATS) [8]. When ribs are involved, aggressive debridement may be required [2–4]. To note that the aim of surgical approach is to expand lung volume, control infection and avoid fibrothorax [4,8].

Conclusion

In conclusion, it is evident that empyema necessitans is a severe disease, usually complicating pulmonary tuberculosis. If the latter underlying disease does not seriously affect the prognosis in itself, the empyema may be completely cured or at least considerably improved using both surgical and medical treatments. EN remains a topic for active research and a high degree of clinical and radiological precision for differential diagnosis is warranted.

Ethical approval

Ethical approval was not applicable.

Financial disclosure

The authors declared that this study has received no financial support.

CRedit authorship contribution statement

El Mawla Zeinab: Conceptualization, Methodology, Supervision, Validation, Writing – original draft, Writing – review & editing. **Zoghaib**

Dima: Writing – original draft. **Al Saylami Haji:** Writing – original draft.

Consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review upon request by the Editor-in-Chief of this journal.

Provenance and peer review

Not commissioned, externally peer reviewed.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Not applicable.

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