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Case Report

Encysted Pleural Effusion Managed Conservatively: A Case Report And Literature Review.

Nijmeh Hammoud [1], Yosor Alqudeimat [2], Salah Termos [2].

Affiliations:

1. Department of Pulmonary and Intensive Care Medicine Dar AlShifa Hospital.

2. Department of Surgery, Amiri Hospital, Kuwait.

Abstract

Encysted pleural effusion (EPE) is a rare, complex condition characterized by fluid accumulation in the pleural space, often associated with infectious etiologies such as pneumonia, empyema, and tuberculosis. Traditionally, the management of EPE has involved invasive procedures, including drainage and decortication. However, recent studies suggest that antibiotics, when appropriately tailored to the infectious etiology, may effectively resolve EPE without the need for intervention.

This article reviews the pathophysiology, diagnosis, and management of encysted pleural effusion caused by infections treated solely with antibiotics. We explore the role of broad-spectrum and targeted antimicrobial therapy based on culture and sensitivity results, as well as the clinical outcomes associated with this approach.

In our manuscript we believe that antibiotic therapy can lead to significant improvements in fluid resolution and clinical recovery in selected patients, particularly those with uncomplicated bacterial infections. The article highlights the importance of early diagnosis, appropriate antimicrobial selection, and close monitoring of patients receiving antibiotic-only treatment. Further research is needed to determine the optimal antibiotic regimens and patient profiles most likely to benefit from non-invasive management of EPE caused by infection.

Keywords : Encysted Pleural Effusion (EPE); Antibiotics; Conservative Management.

INTRODUCTION

Encysted pleural effusion (EPE) is a rare form of pleural effusion in which fluid accumulates within a fibrous encapsulation, resulting in a loculated mass (pseudotumor). This type of effusion poses diagnostic and therapeutic challenges, often being mistaken for other pleural diseases or malignancies due to its complex presentation. The middle lobe, being the smallest lobe, has the greatest tendency to retract, and therefore the horizontal fissure is more prone to developing a pseudotumor. The biconvex or lenticular appearance and the location along the fissure are characteristic radiographic features suggestive of encysted pleural effusion, which were clearly present in our chest X-ray imaging [1].

Pseudotumors almost always occur with transudates caused by conditions such as congestive heart failure, hypoalbuminemia, cirrhosis, or renal insufficiency. On the other hand, loculated pleural effusions can occur after chest infections-tuberculosis being the most common cause, followed by pyogenic infections [2]

In our case, the patient was previously healthy and presented with a clinical picture suggestive of chest infection, increasing the likelihood of parapneumonic effusion. All investigations conducted to rule out active pleural tuberculosis were negative, despite the patient's origin from a high-risk country. The fact that the patient showed complete clinical improvement with only broad-spectrum antibiotics supports this theory.

CASE REPORT

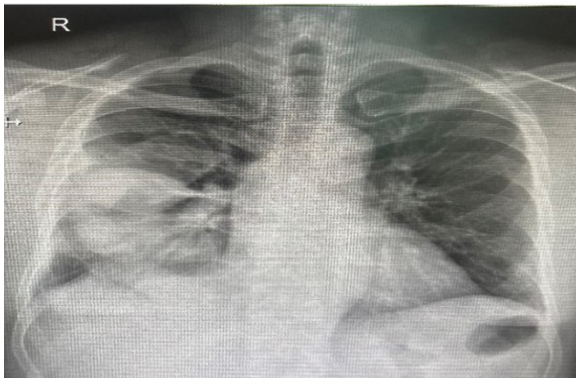
A 45-year-old male patient, previously healthy and of Indian nationality, who had arrived in Kuwait two months earlier for administrative work, presented to the outpatient department with a one-month history of generalized fatigue, decreased oral intake, weight loss, and night sweats. After two weeks, his condition progressed to a severe productive cough, followed by high-grade fever and right-sided pleuritic chest pain three days prior to presentation.

On examination, the patient was febrile (oral temperature

***Corresponding Author:** **Salah Termos MD FACS**, Department of Surgery, Amiri Hospital, Kuwait, **Email:** salahtermos@gmail.com.
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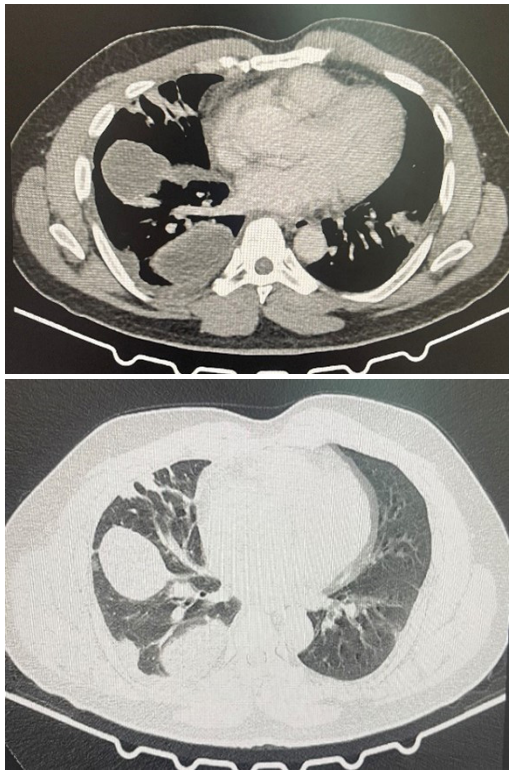
38.3 Celsius), but hemodynamically stable with a blood pressure of 135/82mmHg and an oxygen saturation of 96% on room air. Chest auscultation revealed decreased vesicular breath sounds and dullness to percussion on the right side. A chest radiograph was notable for a right-mid zonal elliptical opacity suggestive of minor fissure effusion, as well as a right-lower zonal parenchymal opacity (**Figure 1**). Laboratory investigations revealed a white blood count of 15.3x109, consistent with leukocytosis, and a C-reactive protein (CRP) level of 33mg/L, indicating significant inflammation.

Figure 1. Chest x-ray demonstrating
Right mid zonal elliptical opacity suggestive of small fissure effusion (arrow)
Right lower zonal parenchymal opacity, with right basal atelectasis.
Left lower zonal pleural based opacity consistent with consolidation.



The patient was admitted with a provisional diagnosis of either a chest infection or parapneumonic effusion, with a strong suspicion of pulmonary tuberculosis. Empiric intravenous Ceftriaxone 2g once daily was initiated. Due to persistent fever, the antibiotic regimen was escalated on day 3 to Meropenem 1g intravenously every eight hours. All sputum studies-including gram stain, culture, and two acid-fast bacilli (AFB) smears-were negative, with AFB culture results pending at that time. Given the persistent symptoms and inconclusive microbiological results, a contrast-enhanced chest CT was obtained to further evaluate the extent and nature of the disease. The scan revealed multiple loculated pleural collections, including a sacculated effusion in the right interlobar fissure measuring 84x51x31mm, another in the lesser fissure measuring 66x54x24mm, and additional collections posterior to the right lower lobe, the largest of which measured 107x88x42mm. An enhancing peripheral pleural-based lesion was also seen in the left lower lobe (27x21x38mm), with clear contents and a smooth, enhancing pleural wall. Subsegmental areas of consolidation were noted in the right lung (**Figures 2-5**).

Figures 2, 3, 4: Computed tomography chest revealing accumulated pleural effusion in the right interlobar fissures and behind the right lower lobe, Bilateral consolidative lesions.



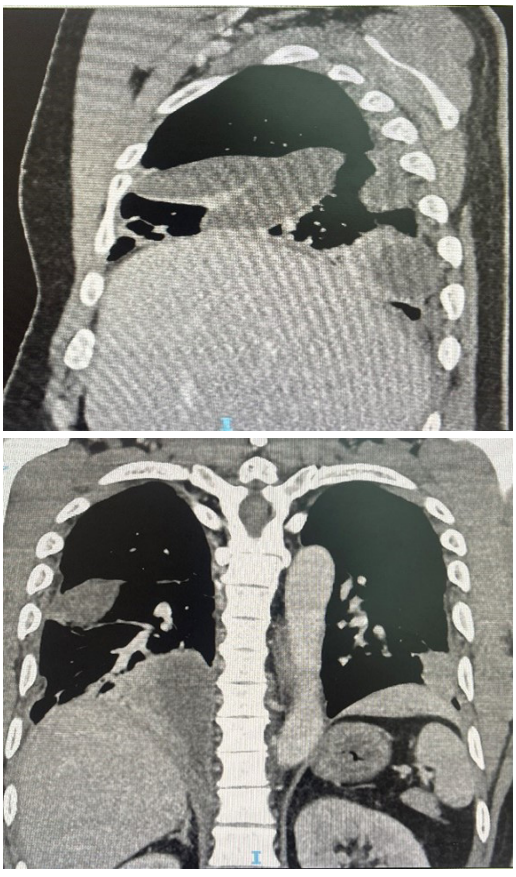
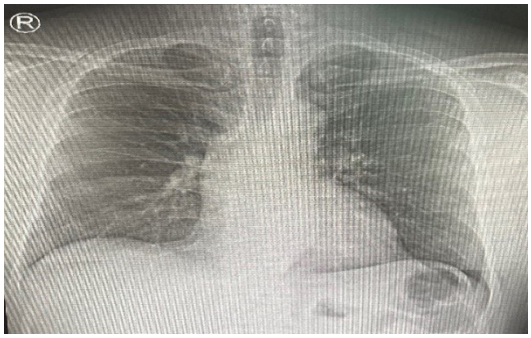


Figure 5: Chest x ray showing complete resolution after treatment.



We planned diagnostic and therapeutic thoracocentesis to rule out pyogenic and tuberculosis infections; however, the patient completely refused the procedure. Instead, a bronchoscopy was performed. Bronchoalveolar lavage from the right middle lobe was negative for all studies (Gram stain, AFB smear, TB PCR, fungal culture), most likely due to prior bread-spectrum antibiotic use. TB culture was also negative on follow-up.

The patient's hospital stay was uneventful. He completed a 7-day course of intravenous Meropenem, to which he responded well, becoming afebrile and clinically stable. He was discharged on oral Levofloxacin 750mg daily for an additional week to complete a 14-day total course of antibiotics. At one-month follow-up visit, he remained asymptomatic with complete resolution of respiratory symptoms, and his chest X-ray had returned to normal (figure 5).

PATHOPHYSIOLOGY

In encysted pleural effusion (EPE), fluid accumulates within the pleural cavity and becomes encapsulated by fibrous tissue, forming a thickened, loculated pleural space. This encapsulation can obstruct normal drainage mechanisms, resulting in persistent symptoms such as dyspnea, chest pain, and cough. Unlike free-flowing effusions, the loculated nature of EPE makes spontaneous drainage more difficult [3]. The fibrous encapsulation also reduces the likelihood of fluid reabsorption, which can prolong the presence of the effusion despite conservative management.

DISCUSSION ON ENCYSTED PLEURAL EFFUSION TREATED MEDICALLY

Encysted pleural effusion (EPE), though complex and often challenging to manage, can be effectively treated with antibiotics alone in selected cases-particularly when the underlying etiology is infectious, such as empyema or parapneumonic effusion. This non-invasive approach offers an alternative to traditional management strategies, which typically involve drainage procedures via chest tubes or video-assisted thoracoscopic surgery (VATS). Studies have demonstrated that, with appropriate antimicrobial therapy, many patients experience complete resolution of the effusion without requiring invasive intervention [1,4].

However, the success of antibiotic therapy depends on early identification of the infectious cause, timely initiation of appropriate antibiotics, and close clinical monitoring for any signs of treatment failure or complications. According to Vitali et al, the choice of antibiotics should be guided by culture and sensitivity results; however, broad-spectrum agents may be initiated empirically when the specific pathogen is unknown [5]. Medical treatment for EPE generally involves targeting the underlying cause while promotinf drainage or reabsorption of the encapsulated fluid.

1. **Antibiotic Therapy for Parapneumonic Effusion**
   In cases of parapneumonic effusion or infection-related EPE, antibiotics form the cornerstone of treatment. Empiric therapy is typically initiated and later tailored based on culture results [6]. In certain cases, loculated effusions can resolve with antibiotic therapy alone, particularly when combined with techniques that promote fluid mobilization.
2. **Intrathoracic Fibrinolysis**
   Fibrinolytic therapy, often using agents like tissue plasminogen activator (tPA) or urokinase, is widely employed in the management of loculated effusions. These agents work by breaking down the fibrin matrix encapsulating the pleural fluid, thereby facilitating drainage into the pleural cavity. Several studies have shown that early fibrinolysis can reduce the need for surgical intervention [7]. This therapy is usually delivered via a chest tube and is most effective when initiated shortly after the formation of the loculated effusion.
3. **Intrapleural Streptokinase**
   Intrapleural streptokinase has shown potential in managing encapsulated effusions, particularly those arising from parapneumonic infections. A study by Light et al. (2016) demonstrated that the use of intrapleural fibrinolytic agents resulted in better outcomes compared to conservative management, especially in patients who were poor candidates for surgical drainage [8].
4. **Corticosteroids and Immunosuppressive Therapy**
   For effusions secondary to inflammatory or autoimmune conditions, corticosteroids or immunosuppressive agents may help reduce pleural inflammation and prevent further encapsulation. However, the role of steroids in managing EPE remains controversial and is generally reserved for cases related to autoimmune diseases such as systemic lupus erythematosus or rheumatoid arthritis [9].
5. **Drainage via Chest Tube**
   Although chest tube drainage remains a standard approach for pleural effusion management, it can be

technically challenging in EPE due to the loculated nature of the fluid. Nonetheless, ultrasound-guided or CT-guided drainage-often in combination with fibrinolytic therapy-can be effective in achieving resolution without the need for more invasive surgical interventions.

While medical management for encysted pleural effusion can be effective, it is not without limitations. The success of fibrinolysis and antibiotic therapy depends heavily on early intervention; the time from effusion onset to treatment initiation is a key factor in determining outcomes [10]. Moreover, potential complications such as infection or bleeding may limit the use of fibrinolytic agents, particularly in high-risk patients.

Patients with malignancy-associated EPE often require a more aggressive approach, including pleurodesis or VATS, due to the recurrent nature of the effusions and the need to manage the underlying malignancy [11]. Additionally, fibrinolysis may be less effective in cases with thick or long-standing pleural encapsulation.

In a 2020 study, Rafailidis suggested the need to assess long-term outcomes to establish the safety and efficacy of antibiotic-only management of EPE [12]

CONCLUSION

While the use of antibiotics alone in the treatment of EPE is promising, it remains an area in need of further research. Future studies should aim to identify the patient populations most likely to benefit from this approach and to refine treatment protocols accordingly.

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