

# A case of tubercular empyema with pyopneumothorax

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## ABSTRACT

Pyopneumothorax is a common complication associated with tuberculosis, especially in patients with lung parenchymal cavitary lesions. In this publication, we highlight the case of a 43-year-old female patient who presented with chief complaints of dry cough, left-sided chest pain, and dyspnea on exertion. An X-ray of the chest posteroanterior (PA) view, revealed a left-sided moderate pleural effusion with pneumothorax. Immediate intercostal chest drain (ICD) insertion was done and a pleural fluid cytology sample was sent which was suggestive of tubercular empyema and the patient was promptly initiated on anti-tubercular treatment to which she responded well and showed clinical and radiological improvements.

**Keywords:** Adenosine deaminase, anti-tubercular therapy, intercostal chest drain, pyopneumothorax, tubercular empyema, tuberculosis

## Introduction

Pyopneumothorax is a common complication of tubercular empyema.<sup>[1]</sup> Tubercular empyema is representative of an active, long-standing pleural space infection containing a significant quantity of *Mycobacterium tuberculosis* (Mtb). Empyema is rare in contrast to tubercular pleural effusions, which arise from an exaggerated inflammatory reaction to a localized paucibacillary infection of the pleura by Mtb.<sup>[2]</sup> An empyema can form when pneumonia fails to fully respond to anti-microbial treatment in a conventional way.

The symptoms of empyema can include the following: pleuritic type of chest pain that worsens on deep inspiration,

non-productive cough, fever with chills and night sweats, dyspnea on exertion or at rest, and weight loss.<sup>[3]</sup>

Patients with this condition may initially present to the primary care physician with complaints of gradually progressive breathlessness, chest pain, and dry cough. A proper history taking for the same is essential for a primary care physician to diagnose this condition early and enable early specialist referral.

## Case Presentation

A 43-year-old female patient presented to the Department of Respiratory Medicine, with chief complaints of dyspnea on exertion, left-sided pleuritic chest pain, and non-productive cough since 20 days. She also had other constitutional symptoms of tuberculosis such as weight loss, appetite loss, and fever with chills associated with an evening rise in temperature. She had no history of any comorbid conditions or any previous history of tuberculosis.

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A detailed clinical examination was done which revealed left-sided decreased breath sounds on chest auscultation. The rest of the vitals of the patient were within normal limits. A chest X-ray posteroanterior (PA) view was done which revealed the presence of a right-sided moderate pleural effusion with hydropneumothorax [Figure 1].

Due to the radiological findings of a left-sided hydropneumothorax and clinical findings of worsening dyspnea of the patient, an urgent intercostal chest drain (ICD) insertion was done and approximately 1 L of yellowish thick pus-like fluid was drained and pleural fluid samples were sent for all routine pleural fluid investigations. A post-ICD insertion X-ray of the chest demonstrated the resolution of the pleural effusion and pneumothorax [Figure 2].

An ultrasonography (USG) of the thorax was done which revealed a multi-loculated pleural fluid collection with thick internal septations noted in the left pleural cavity and an impression of left-sided empyema was given by the radiologist.

Routine blood investigations of the patient were done and the important findings were as follows:

- Total leukocyte count (TLC): 19500 per mm<sup>3</sup>
- Erythrocyte sedimentation rate (ESR): 45 mm per hour
- Arterial blood gas (ABG) analysis: Suggestive of hypoxia with a partial pressure of oxygen (paO<sub>2</sub>) of 60 mm Hg and pH of 7.36.

Routine pleural fluid investigations of the patient were done which were as follows:

- Pleural fluid total white blood cell count – 440 cells/cmm
- Pleural fluid lactate dehydrogenase – 1261 IU/L (Normal range – 105 to 333 IU/L)
- Pleural fluid adenosine deaminase (ADA) – 130 IU/L (Normal range - Less than 40 IU/L)
- Pleural fluid differential cell count: Lymphocyte-predominant pleural effusion (60% lymphocyte)

- Pleural fluid Xpert MTB/RIF assay (Cartridge-based nucleic acid amplification testing –CBNAAT) – Mycobacterium tuberculosis (Mtb) – Not detected
- Pleural fluid cytology: diffuse sheets of neutrophils seen with few mesothelial cells present. Features suggestive of an acute suppurative lesion such as an empyema with the most likely etiology of tuberculosis.

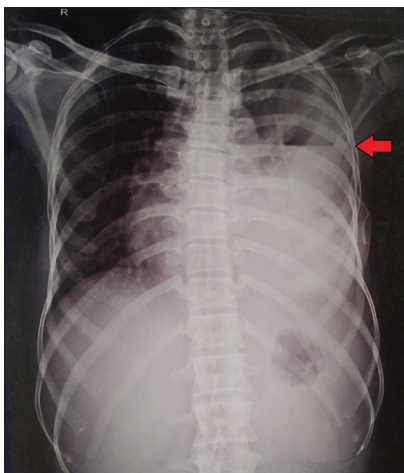
The patient was initiated on an anti-tubercular therapy regimen with a standard four-drug regimen consisting of isoniazid (H), rifampicin (R), pyrazinamide (Z), and ethambutol (E). The ICD was removed after 7 days and the patient was discharged on regular anti-tubercular therapy to be taken for 6 months and was asked to follow-up in the Respiratory Medicine outpatient department (OPD) after 15 days.

The chest X-ray PA view done on follow-up after 15 days showed significant resolution of the left-sided pleural effusion after starting anti-tubercular treatment [Figure 3].

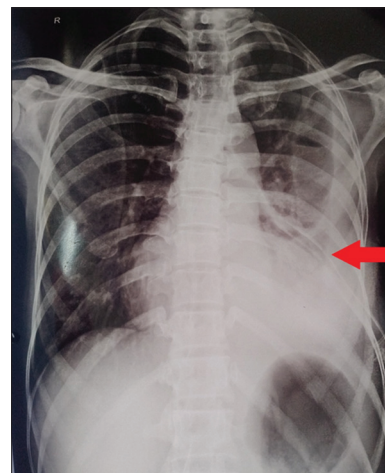
The chest X-ray PA view done after 4 months of anti-tubercular therapy showed excellent radiological improvement with respect to the right-sided pleural effusion [Figure 4].

## Discussion

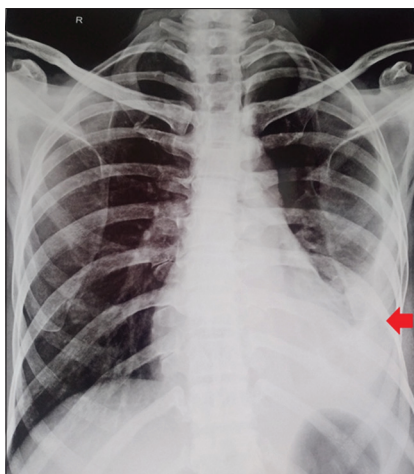
Mycobacterium tuberculosis frequently leads to thoracic empyema as was shown in a study that reviewed 100 cases of empyema thoracis, in which it was found that the etiology was tubercular in about 21% of the cases.<sup>[4]</sup> Pyopneumothorax can be frequently found in patients with pulmonary tuberculosis, especially those with cavitary pulmonary lesions.<sup>[5]</sup> Such complications in patients of tuberculosis can add to the suffering of the patient and can lead to further complications affecting the quality of life of the patient.<sup>[5]</sup> It has been found that greater than 95% of pleural effusions of tubercular etiology are usually unilateral.<sup>[6]</sup> It is usually tough to differentiate and



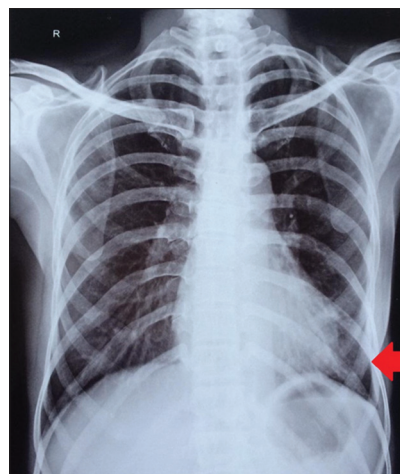
**Figure 1:** Chest X-ray PA view on admission showing right-sided moderate pleural effusion with hydropneumothorax (red arrow showing air-fluid level)



**Figure 2:** Chest X-ray PA view done post-ICD insertion and drainage of 1000 mL of pleural fluid showing resolution of the left-sided pleural effusion and hydropneumothorax (red arrow)



**Figure 3:** Chest X-ray PA view on follow-up showing significant resolution of the left-sided pleural effusion after starting anti-tubercular treatment (red arrow)



**Figure 4:** Chest X-ray PA view after 4 months of anti-tubercular therapy showing near-complete resolution of the left-sided pleural effusion (red arrow)

classify the various etiologies of pleural effusion due to the wide-ranging clinical and radiological presentations, and a detailed pleural fluid analysis is essential.<sup>[7]</sup> Prompt and early initiation of anti-tubercular treatment in such patients of empyema can improve the prognosis of the patient and reduce the risk of complications associated with long-standing pleural infections such as pleural thickening. Our case report highlights the significant and progressive radiological improvement that can be achieved after initiating appropriate anti-tubercular therapy.

### Summary of key points and take-home message

1. Tuberculosis is associated with a wide spectrum of sequelae that worsens the prognosis for the patient.
2. Pyopneumothorax is one such important complication of pulmonary TB leading to an accumulation of pus and air inside the pleural cavity, which requires urgent insertion of an ICD tube for symptomatic resolution of the patient.
3. Tuberculosis patients often present first to the primary care physicians before consultation with a respiratory physician. Therefore, a better understanding of this complication associated with TB can contribute to a multi-disciplinary approach to patient management enhancing the prognosis of the patient.

### Conclusions

Pyopneumothorax can be a potentially serious complication associated with tubercular empyema, which needs urgent ICD insertion. A comprehensive pleural fluid diagnostic analysis should be done to reach towards a diagnosis with respect to the etiology. Early initiation of anti-tubercular therapy can lead to a faster recovery and an improved prognosis for the patient. Regular follow-up of these patients with chest X-rays can help to give an idea about the radiological improvement after starting anti-tubercular treatment.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

### Conflicts of interest

There are no conflicts of interest.

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