RESEARCH PAPER

Breaking into the Pleura: Pulmonary Tuberculosis Presenting as Hydropneumothorax from Bronchopleural Communication

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ABSTRACT

Hydropneumothorax is an uncommon but significant presentation of Pulmonary Tuberculosis, usually resulting from rupture of a cavitary lesion into the pleural space with bronchopleural communication. We report a 57-year-old man with poorly controlled Type 2 Diabetes Mellitus and significant smoking history who presented with fever, productive cough, and progressive dyspnoea. Chest radiograph demonstrated right-sided hydropneumothorax. Contrast-enhanced computed tomography revealed right middle lobe cavitary consolidation with a thin communicating tract to the pleural cavity, associated pneumothorax, bilateral upper lobe cavitary lesions, and centrilobular nodules. Sputum CBNAAT confirmed rifampicin-sensitive *Mycobacterium tuberculosis*. Pleural fluid analysis showed an exudative effusion with neutrophilic predominance and elevated adenosine deaminase levels. The patient was managed with pigtail pleural drainage, intrapleural streptokinase, and standard anti-tubercular therapy under the National Tuberculosis Elimination Programme. He showed marked clinical and radiological improvement, allowing drain removal and discharge. This case highlights the importance of considering tuberculosis in spontaneous hydropneumothorax and demonstrates the value of early CT diagnosis with combined minimally invasive pleural intervention and definitive medical therapy

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INTRODUCTION

Tuberculosis remains one of the leading infectious causes of morbidity and mortality worldwide, with pulmonary tuberculosis accounting for the majority of reported cases. Despite significant advances in molecular diagnostics and standardized treatment protocols, tuberculosis continues to impose a major public health burden, particularly in high-incidence countries such as India [1]. In addition to parenchymal lung disease, pleural involvement is a common extrapulmonary manifestation and may occur either in isolation or in association with active pulmonary infection [2].

Pleural tuberculosis most frequently presents as pleural effusion resulting from a delayed hypersensitivity response to mycobacterial antigens in the pleural space. Other recognized pleural complications include empyema, pleural thickening, fibrothorax, spontaneous pneumothorax, and, less commonly, Hydropneumothorax [2,3]. Hydropneumothorax is defined by the simultaneous presence of air and fluid within the pleural cavity and represents an important but uncommon clinical entity. In tuberculosis, it is most often caused by rupture of a peripheral caseating focus or cavitary lesion into the pleural space, leading to bronchopleural communication or fistula formation [3,4].

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Patients may present with acute dyspnoea, cough, chest pain, fever, or progressive respiratory distress. Because these manifestations overlap with bacterial necrotizing pneumonia, lung abscess, malignancy, and secondary spontaneous pneumothorax, diagnosis may be delayed unless a high index of suspicion is maintained. Chest radiography can demonstrate the characteristic pleural air–fluid level, whereas computed tomography provides superior delineation of cavitary lesions, pleural collections, endobronchial spread, and direct fistulous communication, thereby guiding management [4,5].

Prompt recognition is clinically relevant, as untreated hydropneumothorax may result in persistent air leak, secondary infection, trapped lung, chronic pleural morbidity, and prolonged hospitalization. Management typically requires pleural drainage in addition to definitive anti-tubercular therapy, with fibrinolytic or surgical intervention in selected cases.

We report a rare case of cavitary pulmonary tuberculosis presenting as hydropneumothorax secondary to bronchopleural communication, successfully managed with pigtail drainage, intrapleural fibrinolysis, and standard anti-tubercular therapy.

CASE PRESENATION:

A 57-year-old man presented with fever for one week, productive cough for six days, and progressively worsening dyspnoea corresponding to modified Medical Research Council grade 3–4. Sputum was yellowish-white, non-foul smelling, and non-blood stained. There was no history of pleuritic chest pain or hemoptysis. He was a known case of Type 2 Diabetes Mellitus and systemic hypertension for five years, with significant tobacco exposure (smoking index ~600). There was no prior history of Tuberculosis or known contact.

On examination, he was conscious and oriented, with blood pressure of 150/80 mmHg, pulse rate of 120 beats/min, and oxygen saturation of 98% on 3 L/min oxygen. Respiratory examination revealed bilateral crepitations with reduced breath sounds over the right hemithorax.

Laboratory investigations showed leukocytosis with elevated ESR and C-reactive protein. HbA1c was markedly elevated at 12.53%, indicating poor glycemic control. Sputum CBNAAT detected rifampicin-sensitive *Mycobacterium tuberculosis*. Pleural fluid analysis revealed an exudative effusion with neutrophilic predominance and elevated adenosine deaminase levels.

Chest radiograph demonstrated right-sided Hydropneumothorax with underlying consolidation. Contrast-enhanced CT thorax showed right middle lobe consolidation with cavitation and a thin tract communicating with the pleural space, resulting in pneumothorax. Additional bilateral upper lobe cavitary lesions, centrilobular nodules, and mild pleural effusion were also noted.

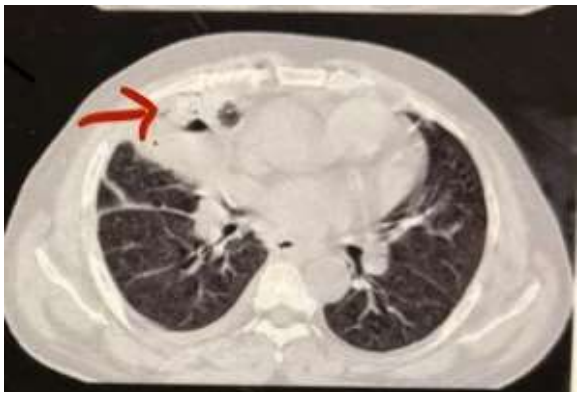

FIGURE 1: CT thorax - Right middle lobe cavity consolidation and a thin tract communicating with the pleural space

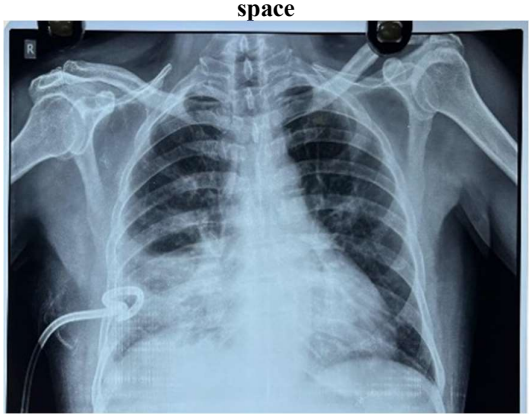

FIGURE 2: Chest Xray – Right sided Pigtail pleural catheter in-situ

The patient was initially managed with oxygen therapy, broad-spectrum antibiotics, and supportive care. A pigtail pleural catheter was inserted, draining approximately 770 mL fluid, followed by intrapleural streptokinase for two days due to residual collection. Standard anti-tubercular therapy under the National Tuberculosis Elimination Programme (HRZE regimen) with pyridoxine was initiated. He showed gradual clinical and radiological improvement, following which the drain was removed. The patient was discharged in stable condition with advice for follow-up and treatment adherence.

FIGURE 3: Follow up Chest Xray showing radiological resolution

DISCUSSION:

Hydropneumothorax is an uncommon but clinically significant manifestation of Pulmonary Tuberculosis and usually represents advanced cavitary disease with pleural rupture. The most widely accepted mechanism is rupture of a peripheral caseating focus or subpleural cavity into the pleural space, creating bronchopleural communication with simultaneous accumulation of air and inflammatory fluid [6,7]. Although pleural effusion and spontaneous pneumothorax are recognized complications of tuberculosis, hydropneumothorax remains rare and may be under-recognized, especially in endemic regions where bacterial parapneumonic disease is often considered first.

The present case is particularly noteworthy because contrast-enhanced computed tomography directly demonstrated a thin tract connecting the cavitary right middle lobe lesion to the pleural cavity, thereby confirming the mechanism of disease. In many published reports, bronchopleural fistula is inferred from persistent air leak or recurrent pneumothorax rather than directly visualized. CT thorax therefore provides substantial diagnostic value by defining cavity location, pleural collections, loculations, endobronchial spread, and fistulous anatomy, all of which influence intervention planning and prognosis [8,9].

Another notable feature was the pleural fluid profile. Tuberculous pleural effusions are classically lymphocyte-predominant exudates, yet our patient demonstrated neutrophilic predominance with elevated adenosine deaminase levels. Recent literature suggests that neutrophilic tuberculous effusions may occur in early pleural inflammation, intense immune response, or with concomitant bacterial infection, and should not exclude tuberculosis when microbiological or radiological findings are supportive [10,11].

The coexistence of poorly controlled Type 2 Diabetes Mellitus and heavy tobacco exposure likely amplified disease severity. Diabetes is associated with impaired macrophage and lymphocyte responses, delayed sputum conversion, higher bacillary burden, and more extensive cavitary disease. Smoking further compromises mucociliary clearance and pulmonary host defense, increasing susceptibility to severe pulmonary infection and structural lung damage [12,13]. These factors likely contributed to the bilateral cavitary lesions and aggressive presentation observed in our patient.

Management strategies in reported tuberculous bronchopleural fistula cases range from prolonged tube thoracostomy to decortication, thoracotomy, or pulmonary resection in refractory disease [14,15]. In contrast, our patient responded favorably to a minimally invasive approach comprising small-bore pigtail drainage, adjunctive intrapleural streptokinase, and early anti-tubercular therapy. This resulted in effective pleural evacuation, lung re-expansion, and clinical recovery without surgical morbidity. Increasing evidence suggests that selected patients with controlled air leak and preserved lung expansion may be managed conservatively with image-guided drainage and close monitoring [16].

This case reinforces several clinically important lessons. First, tuberculosis should remain a key differential diagnosis in spontaneous hydropneumothorax, particularly in high-burden settings. Second, CT imaging can be decisive in identifying bronchopleural communication when plain radiography is inconclusive. Third, prompt combined pleural intervention with definitive anti-tubercular therapy can yield excellent outcomes even in structurally complicated disease and may obviate the need for surgery [17,18].

LEARNING POINTS:

- Hydropneumothorax may be a rare presentation of Pulmonary Tuberculosis, especially in endemic regions.

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- Cavitary rupture into the pleural space can cause bronchopleural communication.
- CT thorax is valuable for confirming fistulous communication and disease extent.
- Neutrophilic pleural effusion does not exclude tuberculosis.
- Early pigtail drainage, selected fibrinolysis, and prompt anti-tubercular therapy can lead to favorable outcomes.

CONCLUSION:

This case highlights a rare and clinically significant presentation of pulmonary tuberculosis as hydropneumothorax secondary to bronchopleural communication. Direct radiological demonstration of the fistulous tract emphasized the pivotal role of computed tomography in early diagnosis and treatment planning. Timely multimodal management with pleural drainage, adjunctive intrapleural fibrinolysis, and standard anti-tubercular therapy resulted in successful clinical and radiological recovery. Clinicians should maintain a high index of suspicion for tuberculosis in patients presenting with spontaneous hydropneumothorax, particularly in high-burden regions, as early recognition can prevent major pleural morbidity and the need for surgery

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