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CASE REPORT: HYDROPNEUMOTHORAX DEXTRA CAUSED BY TUBERCULOSIS, MODERATE EXACERBATION COPD ON COPD GROUP B, POSSIBLE LUNG MICOSIS, AND MALNUTRITION

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ABSTRACT

Background: Hydropneumothorax is a rare TB complication exacerbated by COPD, mycosis, and malnutrition in endemic areas. **Objective:** To describe dinical management and outcomes of right hydropneumothorax in recurrent TB with comorbidities. **Method:** Qualitative descriptive case report. **Population and Sample:** Adult pulmonary patients at Abdoel Moeloek Hospital; purposive sample of one 55-year-old male cassava farmer (BMI 17.9 kg/m², Brinkman Index 560). **Instruments and Data Analysis:** History, exams, labs (GeneXpert, Gram stain), imaging (X-ray, ultrasound), chest tube monitoring; thematic content analysis with triangulation. **Results:** Negative GeneXpert but dinical diagnosis confirmed via 34.9% right lucency, barcode sign; chest tube showed oscillation drop (16-4 cm), resolved bubbling post-therapy (4FDC, antifungals, nutrition). **Conclusion:** Multidisciplinary intervention yields rapid improvement; advocates nutritional screening in TB-COPD care.

Keywords : Chest Tube, Copd, Hydropneumothorax, Pulmonary Tuberculosis, Water-Seal Drainage

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INTRODUCTION

Hydropneumothorax represents a critical complication of pulmonary tuberculosis (TB), where rupture of a subpleural cavity allows air and fluid to accumulate in the pleural space, often stemming from parenchymal damage during active or recurrent infection (Al-Neyadi et al., 2023; Kim et al., 2024). This condition disrupts pulmonary ventilation, leading to acute respiratory distress and heightened mortality risk if untreated. Globally, TB remains a leading infectious cause of such pleural emergencies, with hydropneumothorax occurring in up to 1-5% of cases, particularly in endemic regions where delayed diagnosis exacerbates outcomes (Deng et al., 2022, Bharti et al., 2023).

In patients with underlying chronic obstructive pulmonary disease (COPD), especially moderate exacerbations in Group B, hydropneumothorax compounds existing airflow obstruction

and chronic inflammation, amplifying hypoxia and symptom burden (Hogea et al., 2020; Chen et al., 2023). Smoking history further accelerates alveolar destruction, creating a vulnerable lung architecture prone to secondary pleural leaks during TB reactivation.

Persistent respiratory symptoms in these patients often signal overlapping pathologies, such as possible pulmonary mycosis from fungi like Aspergillus or Cryptococcus, which thrive in TB-damaged lungs and mimic or worsen TB progression (Koegelenberg et al., 2024). Malnutrition, prevalent in chronic lung disease, impairs immune recovery by depleting alveolar macrophage function and cytokine responses, thus prolonging vulnerability to infections and complications (Wu et al., 2024; WHO, 2024; Chakraborty et al., 2021, Park et al., 2023).

Diagnosis challenges persist, as negative GeneXpert results in paucibacillary recurrent TB necessitate reliance on clinical and radiographic clues, while comorbidities like COPD and mycosis demand nuanced differentiation to avoid mismanagement (Al-Neyadi et al., 2023; Suardamana et al., 2023; Lee et al., 2022).

This case report aims to describe the clinical presentation, multidisciplinary management, and outcomes of right-sided hydropneumothorax secondary to recurrent pulmonary TB in a COPD Group B patient with possible lung mycosis and malnutrition. Its urgency lies in addressing high recurrence risks in resource-limited settings like Indonesia, where integrated care gaps contribute to poor prognosis (Kim et al., 2024; Kementerian Kesehatan RI, 2023). The novelty stems from illustrating empirical antifungal and nutritional strategies alongside pleural drainage and anti-TB therapy in a paucibacillary case, offering practical insights for similar complex pulmonary overlaps underrepresented in current literature (Hogea et al., 2020; Mustofa et al., 2023; Hung et al., 2024).

METHOD

Types and Methods Of Research

This study employed a qualitative descriptive case report design, focusing on a single complex clinical case of right-sided hydropneumothorax secondary to recurrent pulmonary tuberculosis (TB), moderate COPD exacerbation in Group B, possible lung mycosis, and malnutrition, as per standard protocols for rare pulmonary complications (Al-Neyadi et al., 2023; Kim et al., 2024). This approach allows in-depth exploration of clinical presentation, diagnostic challenges, and multidisciplinary management in paucibacillary TB scenarios, aligning with narrative case study methodologies that emphasize contextual richness over statistical generalization (Sugiyono, 2021, Creswell & Poth, 2022). Such designs are particularly suited for documenting treatment responses in comorbid lung diseases, providing actionable insights for clinical practice (Emzir, 2021).

Instruments and Data Analysis Techniques

Data collection instruments included clinical history taking, physical examinations, laboratory tests (e.g., complete blood count, sputum Gram staining, GeneXpert MTB/RIF, culture), imaging (chest X-ray, thoracic ultrasound), and chest tube monitoring tools (e.g., water-seal drainage assessments for bubbling, oscillation, output), alongside treatment response evaluations (Hogea et al., 2020; Chen et al., 2023). Analysis techniques involved thematic content analysis of clinical, radiological, and laboratory findings, cross-referenced with WHO and Indonesian TB guidelines to interpret paucibacillary TB diagnosis and comorbidities like mycosis and malnutrition (WHO, 2024; Kementerian Kesehatan RI, 2023; Sudaryono, 2022). Triangulation of multimodal data ensured validity, with pattern matching to literature on pleural complications for interpretive rigor (Creswell & Poth, 2022, Sugiyono, 2023).

Population and Sample

The population comprised adult patients (aged >18 years) with chronic respiratory diseases treated at Abdoel Moeloek Hospital's pulmonary ward, specifically those with histories of TB, smoking-related COPD, and pleural complications in densely populated, low-ventilation environments typical of South Sumatra, Indonesia. The purposive sample was a single 55-year-old male cassava farmer with recurrent right hydropneumothorax (34.9% lucency), BMI 17.9 kg/m²

(malnutrition), Brinkman Index 560 (moderate COPD risk), negative GeneXpert, and sputum evidence of hyphae/yeast suggesting mycosis, selected for its rarity and representativeness of overlapping pathologies (Koegelenberg et al., 2024; Wu et al., 2024; Emzir, 2021). This non-probability sampling suits case reports by prioritizing depth in exceptional cases over population breadth (Sudaryono, 2022).

Research procedure

Procedures followed ethical standards with informed consent, beginning September 23, 2025, at the Emergency Department: initial assessment (vitals, history, physical exam), diagnostics (labs, X-ray, ultrasound confirming barcode sign and infiltrates), chest tube insertion at right ICS 8 with daily WSD monitoring (oscillation reduced from 16 cm to 4 cm), and multifaceted therapy (4FDC anti-TB, azithromycin, N-acetylcysteine, corticosteroids, fluconazole, nutritional support, physiotherapy, smoking cessation) per clinical guidelines (Al-Neyadi et al., 2023; Kim et al., 2024). Follow-up spanned seven days, evaluating clinical/radiological improvement (e.g., no bubbling, lung re-expansion), with data synthesis via iterative review for thematic patterns in outcomes (Sugiyono, 2021, Creswell & Poth, 2022,). All steps adhered to multidisciplinary protocols, ensuring chronological integrity and bias minimization through documented serial assessments.

RESULT AND DISCUSSION

CASE

On September 23, 2025, a 55-year-old male patient was brought to the Emergency Department of Abdoel Moeloek Hospital with the chief complaint of shortness of breath for the past month, which had worsened one day prior to admission. The dyspnea was accompanied by wheezing. The patient also reported intermittent productive cough with whitish yellow sputum for the past two months, which had similarly worsened one day before hospital admission. There was no history of hemoptysis. The patient complained of right sided chest pain for the past month, which intensified with coughing or deep inspiration. The chest pain did not radiate to the arm or back. The patient did not experience fever but reported night sweats unrelated to physical activity or weather changes. He also reported loss of appetite accompanied by unquantified weight loss over the past month. Bowel and urinary habits remained normal.

The patient had a history of pulmonary tuberculosis (TB) in 1993 and had been declared cured based on sputum evaluation after treatment completion. On September 12, 2025, the patient experienced sudden onset of cough and dyspnea. He was taken to Hospital A and diagnosed with pneumothorax, after which he was referred to RSAM for further management. The patient was evaluated in the pulmonary inpatient ward at RSAM. Two days later, due to lack of clinical improvement, a right chest tube was inserted for evaluation. After clinical improvement was noted characterized by absence of bubbling and fluid output and minimal oscillation the chest tube was removed, and the patient was discharged. On September 23, 2025, the patient returned to RSAM with worsening dyspnea accompanied by right sided chest pain. He reported no known contact with TB patients. The patient was an active smoker, consuming 16 cigarettes per day for 35 years, corresponding to a Brinkman Index of 560, classified as moderate risk. A risk factor for HIV was identified, namely the presence of tattoos.

Environmental assessment revealed that the patient lived in a densely populated area with poor home ventilation. His home had ceramic flooring and tile roofing, with no industrial exposure nearby, no use of mosquito coil smoke, and no history of waste burning. The patient worked as a cassava farmer.

Physical examination revealed the patient to be alert, oriented, and cooperative, with a Glasgow Coma Scale (GCS) score of E4V5M6 (15). Vital signs showed a blood pressure of 133/82 mmHg, heart rate of 112 beats/minute, respiratory rate of 28 breaths/minute, and oxygen saturation of 95% on room air, improving to 98% with 5 L/min via nasal cannula. Body temperature was 36.5°C. He weighed 50 kg and measured 165 cm in height, resulting in a Body Mass Index (BMI) of 17.9 kg/m², classified as underweight. Head and neck examination revealed no conjunctival pallor and no

scleral icterus. Jugular venous pressure (JVP) was 5+0 cm H_2O. No cervical lymphadenopathy was detected. Cardiovascular examination revealed regular S_1 and S_2 heart sounds without murmurs or gallops. Respiratory examination showed asymmetric chest wall movement with reduced expansion of the right hemithorax during inspiration and expiration. Palpation demonstrated decreased tactile fremitus on the right side. Percussion revealed hyperresonant sounds over the right hemithorax. Auscultation revealed diminished vesicular breath sounds on the right side, accompanied by right sided rhonchi and bilateral wheezing. Laboratory evaluation demonstrated leukocytosis **Table 1. Laboratory Examination Results On 23rd of September 2025**

	Laboratory Findings	Normal Values
Complete Blood Count:		
Hemoglobin (Hb)	15.8	13,2 -17,3
Hematocrit (Hct)	49.8	40-52
Leukocytes (WBC)	**13.510***	3.800-10.600
Platelets	341.000	150.000-440.000
Differential Leukocyte Count:		
Lymphocytes	31	25-40
Monocytes	5	2-8
Segmented Neutrophils	64	50-70
Eosinophils	0	2-4
Basophils	0	3-5
K/Na/Cl	4.2/140/**106***	3,5-5,0/135-147/8,95-105
Urea / Creatinine	52/1.2	18-55/0,6-1,2
Albumin	4.1	3.5-5.2
Random Blood Glucose	151	70-200

***= Abnormal**

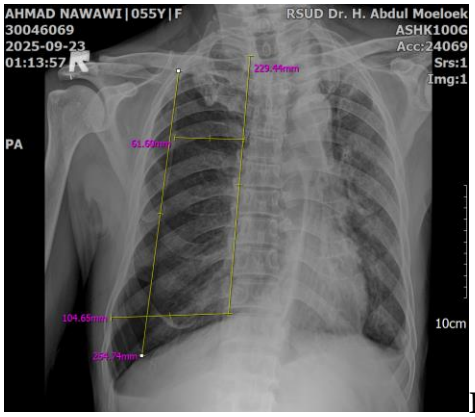


Figure 1. Chest X-ray prior to chest tube insertion shows the measured thoracic dimensions and also demonstrates infiltrates within the lung fields, (23 September 2025)

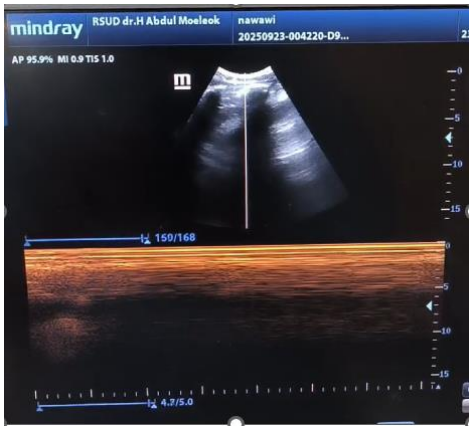


Figure 2. Thoracic ultrasound prior to chest tube insertion (23 September 2025)

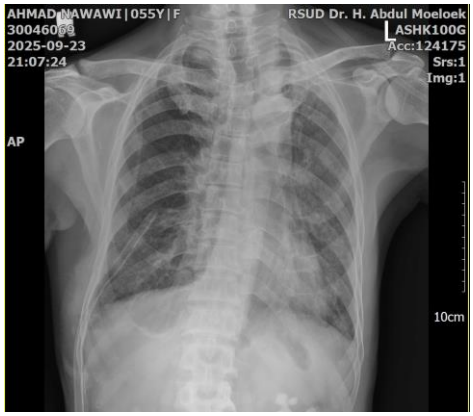


Figure 3. Chest X-ray after chest tube insertion (23 September 2025)

On the chest radiograph (Figure 1), a right hemithorax lucency measuring 34.9% is observed, along with infiltrates in the left lung, consistent with right sided pneumothorax and left sided pneumonia. Thoracic ultrasound (Figure 2) demonstrates a barcode sign on the right hemithorax. A chest tube was inserted, and subsequent radiologic evaluation (Figure 3) shows the chest tube with its tip projected at the right eighth intercostal space (ICS 8).

Table 2. Chest Tube Evaluation Results

Date	23/9	24/9	25/9
Bubble	*Force expiratory bubble* +	*Bubble* +	-
Undulation	16cm	10cm	4cm
Output (Drainage Production)	-	-	10cc

The chest tube was evaluated daily, including assessment of bubbling, oscillation, and drainage output. On the first day, forced expiratory bubbling was observed along with an oscillation height of 16 cm. On September 24, 2025, bubbling persisted with an oscillation height of 10 cm. On September 25, 2025, oscillation measured 4 cm with a drainage output of 10 mL.

Table 3. Results of Gram Staining, GeneXpert, and Sputum Culture

Examination	Result

Gram Staining (23/9/25)	Epithelium 1–5 / HPF Leukocytes 0–3 / HPF Gram positive cocci Gram negative bacilli Hyphae Yeast morphology
Examination	**Result**
GeneXpert MTB/RIF Sputum (23/9/25)	MTB NOT DETECTED
Sputum Culture (23/9/25)	*Enterococcus faecium*

Gram staining revealed leukocytes 0–3/HPF, Gram positive cocci, Gram negative bacilli, hyphae, and yeast morphology. GeneXpert MTB/RIF testing of the sputum sample showed *Mycobacterium tuberculosis* (MTB) NOT DETECTED. Sputum culture demonstrated *Enterococcus faecium*. Based on anamnesis, physical examination, and supporting investigations, the patient was diagnosed with right hydropneumothorax due to pulmonary TB (dd/ COPD), with a chest tube in situ on day 7, recurrent pulmonary TB clinically diagnosed and currently in the first month of the intensive treatment phase with negative HIV status, moderate COPD exacerbation in COPD Group B, possible pulmonary mycosis, and malnutrition.

Management for this patient included oxygen therapy at 2 L/min via nasal cannula, IV infusion of NaCl 500 mL/12 hours, oral fixed dose combination (FDC) anti tuberculosis regimen (4-drug FDC) 1×4 tablets, oral vitamin B6 10 mg once daily, oral N-acetylcysteine 200 mg three times daily, oral azithromycin 500 mg once daily (administered for 7 days, then discontinued), nebulized salbutamol 3.01 mg plus ipratropium bromide 0.5 mg every 8 hours, IV methylprednisolone 30 mg every 8 hours, oral fluconazole 150 mg once daily, oral paracetamol 500 mg three times daily, oral zinc 20 mg once daily, and oral vitamin D 1000 IU twice daily.

Non-pharmacological management included right chest tube insertion connected to a water-seal drainage (WSD) system (with monitoring of drainage output, oscillation, bubbling, subcutaneous emphysema, and lung expansion), consultation with a clinical nutrition specialist (due to malnutrition), administration of a high-calorie and high-protein diet via liquid feeds totaling 2×150 kcal, consultation with a physical medicine and rehabilitation specialist for chest physiotherapy, and smoking cessation counseling.

DISCUSSION

Hydropneumothorax is a rare but serious complication of pulmonary tuberculosis (pulmonary TB), characterized by the accumulation of air and fluid within the pleural cavity. This condition typically arises from the rupture of a tuberculous cavity into the pleural space, leading to air leakage and the release of exudative fluid containing *Mycobacterium tuberculosis* (Kim dkk., 2024; Light, 2023). In this patient, a prior history of pulmonary TB in 1993, along with recurrent chronic respiratory symptoms, strongly supports the likelihood that TB-related pathological processes contributed to the development of hydropneumothorax. Rupture of a subpleural cavity in lungs damaged by TB allows air from the alveoli to enter the pleural cavity (bronchopleural fistula). Concurrently, the immune response to MTB infection in the pleura triggers the formation of protein rich exudative fluid. The combination of these two mechanisms leads to the simultaneous accumulation of air and fluid (Li dkk., 2024). According to Rahman dkk. (2025), longstanding chronic inflammation can cause progressive parenchymal destruction and fibrotic tissue formation, thereby increasing the risk of recurrent pneumothorax or pleural effusion in patients with chronic or remote TB.

This patient presented with progressive dyspnea, productive cough, right sided chest pain, and characteristic physical findings including hyperresonance on percussion and decreased breath sounds on the right hemithorax. Radiographic evaluation demonstrated 34.9% right hemithorax lucency with infiltrates in the left lung, consistent with right sided hydropneumothorax and left-sided pneumonia. Thoracic ultrasonography revealed a barcode sign, a hallmark finding indicative of pneumothorax (Zhang dkk., 2024).

GeneXpert MTB/RIF testing of the patient's sputum showed MTB not detected; however, this result does not exclude active TB due to the paucibacillary nature of chronic or recurrent disease. Clinical diagnosis of pulmonary TB in patients with prior TB may still be established based on clinical features, radiologic findings, and treatment response to anti-tuberculosis therapy, as outlined in the WHO 2024 guidelines and the Indonesian Ministry of Health 2023 recommendations. Sputum culture identified *Enterococcus faecium*, which may indicate secondary bacterial infection a finding commonly observed in patients with structurally damaged lungs due to chronic TB or COPD (Chen dkk., 2023).

The patient also had a history of smoking, with a Brinkman Index of 560, classified as a moderate risk for COPD. Chronic inflammation caused by cigarette smoke contributes to alveolar destruction and hyperinflation, which further impair gas exchange. In this patient, a COPD exacerbation was suggested by bilateral wheezing and leukocytosis, both of which may worsen respiratory status in the setting of hydropneumothorax (Global Initiative for Chronic Obstructive Lung Disease, 2024). Mustofa dkk. (2023), emphasized that systemic inflammation from TB, combined with comorbid cardiometabolic conditions, may worsen overall clinical severity.

Systemic corticosteroids such as intravenous methylprednisolone were administered to reduce bronchial inflammation and improve pulmonary function. Nebulized salbutamol ipratropium bromide provided dual bronchodilatory effects through β_2 adrenergic stimulation and muscarinic antagonism (Poty dkk., 2024). Sputum examination showing hyphae and yeast like morphology raised suspicion of secondary pulmonary mycosis, such as *Aspergillus* or *Candida*. Opportunistic fungal infections are frequently observed in patients with structurally compromised lungs or impaired immunity (Koegelenberg dkk., 2024). Malnutrition further exacerbates immune dysfunction, particularly by reducing alveolar macrophage activity and cytokine production (WHO, 2024).

Management of this patient adhered to the principles of combined therapy addressing TB, COPD, and pleural complications. Pharmacologic treatment included first-line anti-TB regimen 4FDC (rifampicin, isoniazid, pyrazinamide, ethambutol). Azithromycin was used for secondary bacterial infection, while N-acetylcysteine served as a mucolytic and antioxidant to improve mucociliary clearance (Poty dkk., 2024). Oral fluconazole was administered empirically in response to the microscopic findings of hyphae and the patient's poor nutritional status. Non pharmacologic management included the insertion of a chest tube with a water seal drainage (WSD) system, which proved effective in removing air and fluid from the pleural cavity. Serial evaluations demonstrated a decrease in oscillation from 16 cm to 4 cm, indicating resolution of air leakage and improvement in lung expansion. If air leakage persists beyond seven days, chemical pleurodesis with talc or surgical intervention (VATS) may be considered (Rahman dkk., 2025; Koegelenberg dkk., 2024). In this case, however, the clinical response was favorable, and such interventions were not necessary. The patient also received nutritional support through a high-calorie, high-protein diet, along with smoking cessation counseling, which is essential for improving pulmonary function and preventing recurrence.

The patient's prognosis is considered favorable (quo ad vitam) due to the absence of severe systemic infection, negative HIV status, and demonstrated clinical and radiologic improvement following chest tube placement and anti TB therapy. Nonetheless, the risk of recurrence remains if medication adherence is poor or if persistent structural lung damage is present (Light, 2023; Kim dkk., 2024).

CONCLUSION

This case report reveals that right-sided hydropneumothorax as a complication of recurrent pulmonary TB in a 55-year-old smoker with moderate COPD Group B exacerbation, possible lung mycosis, and malnutrition responds effectively to multidisciplinary management, including chest tube drainage with water-seal system, 4FDC anti-TB therapy, bronchodilators, empirical antifungals, corticosteroids, and high-protein nutrition, achieving rapid clinical and radiological improvement within seven days (oscillation reduced from 16 cm to 4 cm, resolved bubbling). Despite negative GeneXpert, clinical diagnosis guided by history, imaging (34.9% lucency, barcode sign), and sputum findings proved pivotal in paucibacillary contexts, underscoring integrated care's role in resource-limited settings like Indonesia.

However, limitations include the single-case design, limiting generalizability, potential diagnostic uncertainty from paucibacillary TB and empirical mycosis treatment without fungal culture confirmation, and short-term follow-up without long-term recurrence data. Future research should employ multicenter cohorts or longitudinal studies to validate outcomes in comorbid populations and assess pleurodesis needs for persistent leaks. Practically, this advocates routine nutritional screening and smoking cessation in TB-COPD patients, alongside clinician training in ultrasound-guided interventions, to enhance prognosis and curb complications in high-burden areas.

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