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Case Report

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Complications of Tuberculosis: A Case Study on Bronchopleural Fistula and Failed Conservative Management

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Abstract

Bronchopleural fistula (BPF) is a severe complication of pulmonary tuberculosis, particularly prevalent in high TB incidence regions like Indonesia. We managed a 22-year-old male with pulmonary tuberculosis who developed right pyopneumothorax unresponsive to conservative treatment. Despite anti-tuberculosis treatment (ATT), his condition worsened. A thoracic CT confirmed bronchopleural fistula, leading us to perform an exploratory thoracotomy with decortication and fistula closure, resulting in significant clinical improvement. This case underscores the challenges of managing tuberculosis-associated BPF and highlights the necessity for early surgical intervention when conservative treatments fail. The successful outcome emphasizes the importance of a multidisciplinary approach to ensure favourable patient outcomes and prevent complications. Prompt surgical management is crucial in tuberculosis related BPF cases where conservative treatments are ineffective, reinforcing the need for tailored, multidisciplinary strategies in complex TB cases.

Keywords: ***Bronchopleural fistula, Tuberculosis, Pyopneumothorax, Thoracotomy, Anti-tuberculosis therapy (ATT).***

Introduction

Tuberculosis (TB) remains a significant public health challenge in Indonesia [1]. In 2022, there were approximately 724.300 tuberculosis cases reported in Indonesia, indicating a significant increase compare to the previous year [2]. Indonesia ranks second globally in tuberculosis cases, underscoring the urgent need for effective strategies to combat the disease [3]. In tuberculosis-endemic regions, like our country Indonesia, the incidence of bronchopleural fistula (BPF) as a complication of the disease is a significant concern due to the potential development of various pulmonary complications associated with tuberculosis. Pulmonary tuberculosis can lead to conditions such as cavitary lesions, bronchiectasis, and hydropneumothorax, all of which can predispose patients to the formation of BPF [4]. Despite effective treatment, TB can lead to significant short and long term health consequences [5].

Bronchopleural fistula (BPF) is a serious condition characterized by an abnormal communication between the bronchial tree and the pleural space. While BPF can result from various causes such as lung resection, radiation therapy and infections, its occurrence in the context of pulmonary tuberculosis is particularly severe due to the extensive pulmonary destruction, cavitation, and chronic infection associated with tuberculosis [6]. Bronchopleural fistula (BPF) as a complication of tuberculosis is a rare but severe condition that can lead to significant morbidity and mortality rates. The mortality rate associated with BPF in tuberculosis patients varies between 18% to 67% [7]. The formation of BPF in tuberculosis patients can be attributed to factors such as lung tumors, pneumonia, empyema, blunt and penetrating lung injuries, as well as complications from surgical procedures [8].

The management of tuberculous BPF requires an individualized approach tailored to the patients condition and response to treatment. In tuberculosis patients is a complex process that often necessitates a combination of medical, surgical, and interventional approaches. Despite the availability of antituberculosis therapy (ATT), many patients with BPF do not respond adequately to conservative treatments, leading to the requirement for surgical interventions such as decortication and fistula repairs [9]. The complexity of managing BPF in tuberculosis patients is highlighted by the need for a step-up approach involving conservative, operative, and reconstructive techniques for closure in persistent cases [10].

In this case report, we describe the clinical course and management of a young male patient with pulmonary tuberculosis complicated by BPF and pyopneumothorax. We highlights the challenges faced in treating such a severe complication in a

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tuberculosis-endemic setting, emphasizing the importance of early recognition, multidisciplinary intervention, and long-term follow-up to optimize patient outcomes.

The Case

A 22-year-old male presented with a four-week history of progressive shortness of breath and a four-month history of cough productive of greenish sputum. Physical examination revealed hyperresonant percussion in the upper and middle right lung fields, and dullness in the lower right lung field. Laboratory investigations showed leukocytosis.

Microbiological tests revealed that pleural fluid cultures did not show any growth of microorganisms, indicating no secondary bacterial infection. Molecular testing using Xpert/MTBRIF confirmed the presence of Mycobacterium tuberculosis and rifampicin sensitivity, suggesting the absence of multidrug-resistant tuberculosis (MDR-TB). The negative microbial growth ruled out other possible infections that could complicate the patient's condition. The patient had been receiving antituberculosis therapy (ATT) for the past four months.

Initial chest X-rays demonstrated a worsening right hydropneumothorax compared to earlier imaging. The patient was diagnosed with right hydropneumothorax secondary to pulmonary tuberculosis. Despite the insertion of a chest tube for ten days, there was no significant lung expansion. Pleural fluid cultures showed no growth of microorganisms, and despite ongoing ATT and antibiotic therapy, the patient's condition did not improve. Serial chest X-rays indicated the development of empyema at the chest tube site (**Figure 1**).

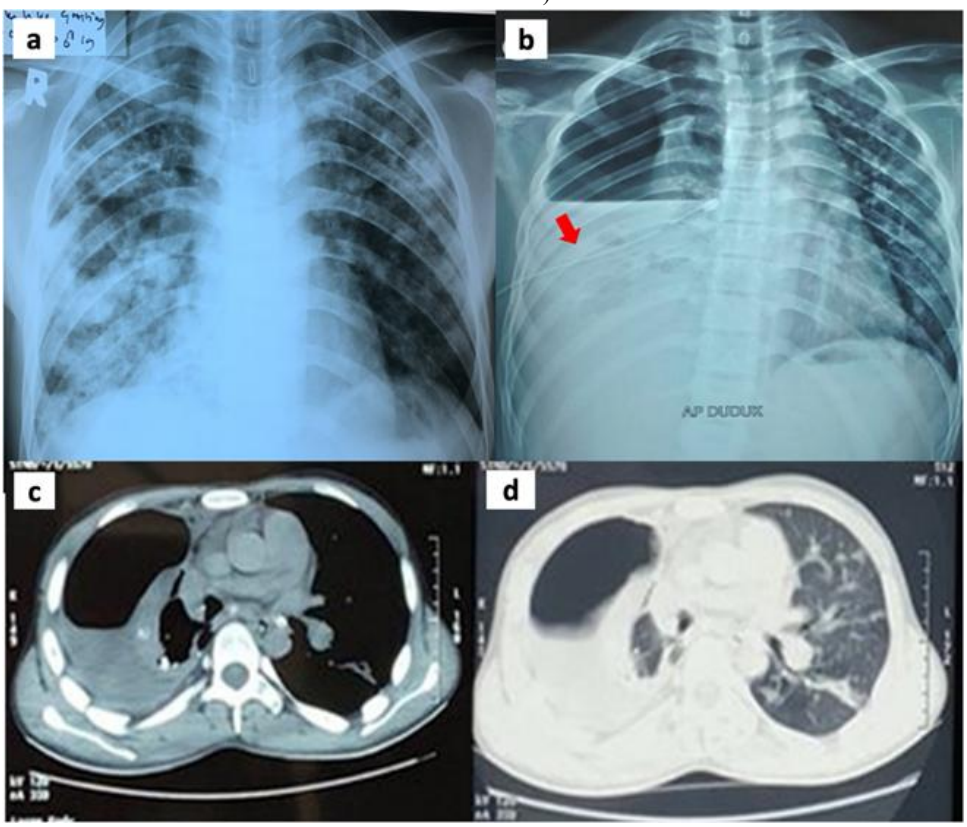

Fig. 1: Chest X-ray: (a) at the start of ATT therapy, (b) after 10 days of chest tube insertion (red arrow) showed persistent hydropneumothorax with no evidence of lung re-expansion. Thoracic CT scan (c, d) revealed right hydropneumothorax with mediastinal shift, right lung compression atelectasis, and fibrosis with bronchiectasis in the left lung.

Fig. 2: Exploration thoracotomy revealed 300 cc purulent fluid, thickened pleura, and a bronchopleural fistula; performed drainage, decortication and fistula closure.

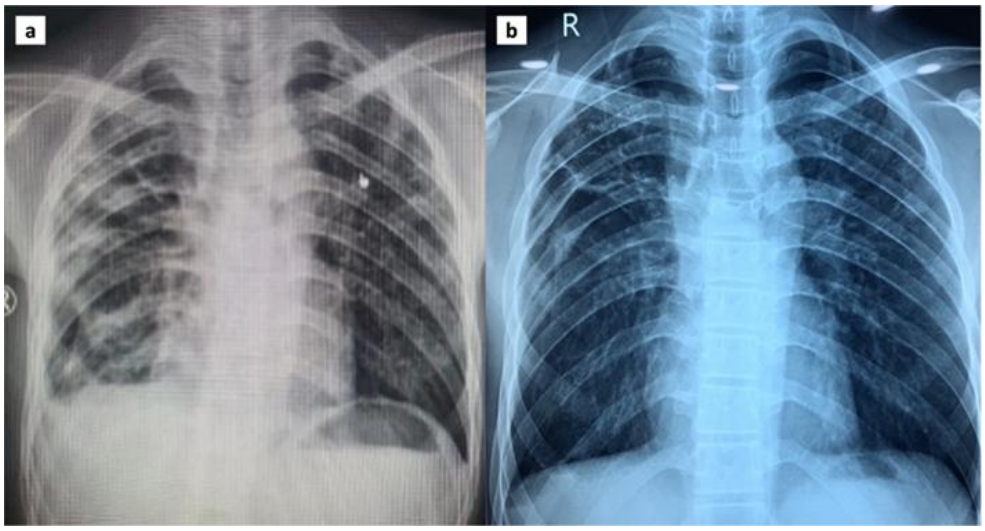

Fig. 3: Follow-up chest X-ray (a) post-surgery showed lung expansion with significant fibrosis and infiltrates, predominantly in the right lung, (b) after six months of ATT revealed well-expanded lungs and significantly reduced infiltrates.

A thoracic CT scan revealed right hydropneumothorax with a dense pleural peel. Given the lack of improvement, we decided to perform an exploratory thoracotomy, which revealed 300 cc of purulent fluid and thickened parietal and visceral pleura. A bronchopleural fistula (BPF) was identified in the right superior lung lobe. The surgical approach included direct drainage, decortication, and suture of the fistula **(Fig. 2)**. Histopathological examination of the tissue showed connective tissue with tubercle structures exhibiting central necrosis, surrounded by epithelioid cells, Langhans giant cells, fibrosis, and heavy lymphocytic inflammation, with no signs of malignancy detected. We continued the patient on standard anti-tuberculosis therapy (ATT) following the surgical intervention.

After completing six months of ongoing ATT, the patient's clinical symptoms showed marked improvement. Follow-up chest X-rays revealed fibrosis and calcifications in the right upper lobe, confirming a favourable response to the treatment (**Figure 3**). The patient's clinical recovery was further supported by the resolution of symptoms such as fever and cough, with no signs of residual infection.

Discussion

Bronchopleural fistula (BPF) is a pathological connection between the bronchial tree and the pleural space, permitting air to leak into the pleural cavity. BPF is most commonly associated with postoperative complications following pneumonectomy or other lung resections, as well as with pulmonary infections that cause tissue necrosis, persistent spontaneous pneumothorax, chemotherapy, radiotherapy for malignancy, and pulmonary tuberculosis [8-11]. In the context of tuberculosis, BPF is a frequent and serious complication, often leading to prolonged hospitalization and increased morbidity, which can range from 25% to 71% [6].

The development of bronchopleural fistula (BPF) in tuberculosis patients is often a consequence of necrotizing pneumonia or empyema, conditions that are more likely to occur in immunocompromised individuals [8]. The chronic infection associated with tuberculosis can result in extensive tissue destruction, including necrosis of lung parenchyma and involvement of both visceral and parietal pleura. This process can lead to the formation of fibrotic pleural peels that hinder lung re-expansion, contributing to the pathogenesis of BPF [12]. We underscores the difficulty in managing BPF, as there are currently no universally accepted guidelines or consensus on the optimal approach to treatment [13].

In considering surgical approaches for BPF, video-assisted thoracoscopic surgery (VATS) may be a less invasive alternative to open thoracotomy in some cases. VATS has the potential to reduce postoperative complications and shorten recovery time compared to traditional open surgery. However, in cases with significant pleural thickening, such as in our patient, VATS may be less effective due to the dense pleural adhesions and extensive disease (14,15). Thus, open thoracotomy was chosen in this case due to the difficulty of re-expanding the lung and addressing the bronchopleural fistula through a minimally invasive approach (16).

The successful management of tuberculosis-related complications, such as bronchopleural fistula, requires a comprehensive approach that combines surgical expertise with ongoing antituberculosis therapy. Timely surgical intervention, in conjunction with appropriate medical treatment, plays a critical role in ensuring positive patient outcomes and preventing disease progression (11).

Effective management of BPF, especially in tuberculosis patients, requires a combination of of surgical intervention and antituberculosis therapy has been shown to be effective in managing complex cases of tuberculosis, emphasizing the importance of a multidisciplinary approach in achieving favorable patient outcomes (8,18).

Declarations

Ethical Approval and Consent to participate

NA and consent taken.

Consent for publication

Taken.

Availability of supporting data

Available on corresponding author upon a responsible request.

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Conflict of interest

All the authors declare that there are no conflicts of interest.

Author Contribution

NNS, HJ, BS and SPT cared for the patient and drafted the case report. AA, NMS, AP conducted this study and wrote the manuscript. AA, NMS, HJ and AP critically revised the entire manuscript for intellectual content. All authors read and approved the final manuscript.

References

[1] Ritonga IL, Setyowati S, Handiyani H, Nursasi AY. Exploring the tuberculosis medication program in Indonesia as perceived by patients and their families: A qualitative study. Belitung Nurs J [Internet]. 2023 Mar 1 [cited 2024 Aug 11];9(2):124–31. Available from: https://pubmed.ncbi.nlm.nih.gov/37469587/

[2] Indonesia: number of tuberculosis cases 2022 | Statista [Internet]. [cited 2024 Aug 11]. Available from: https://www.statista.com/statistics/705149/number-of-tuberculosis-cases-in-indonesia/

[3] Global tuberculosis report 2023 [Internet]. 2023. Available from: https://iris.who.int/.

[4] Prasetyo KW, Jani JRS, Dini RE, Wardhana K. Case Report : Bronchopleural Fistula Dextra With Pyopneumothorax Dextra as Complication of Lung Tuberculosis. Malang Respiratory Journal. 2023;5(1):281–6.

[5] Shah M, Reed C. Complications of tuberculosis. Curr Opin Infect Dis [Internet]. 2014 [cited 2024 Aug 11];27(5):403–10. Available from: https://pubmed.ncbi.nlm.nih.gov/25028786/

[6] Duarte-Ribeiro F, Dias C, Mota M. Bronchopleural and pleurocutaneous fistula in HIV patient with pulmonary tuberculosis. IDCases [Internet]. 2017;9:82–4. Available from: https://www.sciencedirect.com/science/article/pii/S2214250917301105

[7] Shen L, Jiang YH, Dai XY. Successful surgical treatment of bronchopleural fistula caused by severe pulmonary tuberculosis: A case report and review of literature. World J Clin Cases [Internet]. 2023 Apr 6;11(10):2282–9. Available from: https://www.wjgnet.com/2307-8960/full/v11/i10/2282.htm

[8] Yanti B, Hadi S, Harrika F, Shehzad A. Giant Bronchopleural Fistula and Empyema in a Tuberculosis Patient with Diabetes Mellitus: Vista from a High Tuberculosis Burden Country in Southeast Asia. Narra J. 2022;2(2).

[9] Bathobakae L, Shahid A, Wilkinson T, Adalja D, Sanchez J, Agnelli M, et al. Tuberculous Bronchopleural Fistula: A Rare and Life-Threatening Disease. J Investig Med High Impact Case Rep. 2023;11.

[10] Mazzolini KJ, Dzubnar J, Velotta JB. A Step-Up Approach to Management of Complex Bronchopleural Fistula. J Surg Case Rep. 2022;2022(10).

[11] Simmerman EL, Simmerman A, Walsh N, Shafer M, Hao Z, Schroeder C. Management of a Complex Case of a Bronchopleural Fistula. Am Surg [Internet]. 2018 Jan 1;84(1):4–5. Available from: https://doi.org/10.1177/000313481808400103

[12] Ferrer J. Tuberculous Pleural Effusion and Tuberculous Empyema. Semin Respir Crit Care Med. 2001;22(06):637–46.

[13] Hammad W. Results of Surgical Closure of Bronchopleural Fistula with Vascularized Tissues. Journal of the Egyptian Society of Cardio-Thoracic Surgery. 2016 Aug 1;24.

[14] Sindgikar VU, Vallabha T, Patil M, Kullolli G, Reddy S. Empyema Thoracis- the Role of Open Thoracotomy with Decortication in the Era of Video-assisted Thoracoscopic Surgery. Annals of African Surgery. 2022;19(4):175–9.

[15] Duchman B, Cheng GZ. Management of pneumothorax and persistent air leak— a narrative review. Vol. 9, AME Medical Journal. AME Publishing Company; 2024.

[16] Light RW. Parapneumonic Effusions and Empyema. Proc Am Thorac Soc. 2006;3(1):75–80.

[17] Menon P, Rao K, Sethi GR, Gupta AK. Pediatric empyema thoracis — Role of conservative management. Indian Pediatr [Internet]. 2014;51(3):239–40. Available from: https://doi.org/10.1007/s13312-014-0365-4

[18] Wu S, Hu F, Sun B, Yang Y, Zhang W, Ma Y, et al. Diagnosis and Management of Intraspinal Tuberculoma with Osseous Involvement: A Case Report. Annals of Medicine and Surgery. 2024;86(4):2357–60.