

Case Report

A Case of Post-Endobronchial Ultrasound Polymicrobial Pericarditis and Mediastinitis in Metastatic Renal Cell Carcinoma

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Keywords

Endobronchial ultrasound · Staging · Pericarditis · Mediastinitis

Abstract

Introduction: Endobronchial ultrasound transbronchial needle aspiration (EBUS-TBNA) is a frequently used bronchoscopic method for sampling centrally located tumors and accessible mediastinal lymph nodes. It is widely employed for staging and obtaining tissue diagnosis in lung cancer, but it can also be used for other conditions with mediastinal lymph node metastases. Although the reported complication rate for EBUS-TBNA varies, it consistently remains low, including for severe infectious complications such as pericarditis and mediastinitis. **Case Presentation:** We present a unique case of polymicrobial pyogenic pericarditis, mediastinitis, and death in a patient who underwent EBUS-TBNA for the evaluation of solitary mediastinal lymphadenopathy in the background of previously resected renal cell carcinoma. There were no complications during her procedure and her mediastinal lymph node biopsy confirmed metastatic renal cell carcinoma. However, 23 days after her procedure, she presented to the emergency department with sepsis and cardiac tamponade. Pericardial fluid cultures and computed tomography imaging confirmed polymicrobial pyogenic pericarditis and mediastinitis. **Conclusion:** While complications from EBUS-TBNA are rare, clinicians need to be aware that pericarditis and mediastinitis are possible life-threatening complications in order to facilitate early recognition and interventions.

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Introduction

Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) is widely used and is the standard method for assessing mediastinal and hilar lymphadenopathy. It has nearly replaced mediastinoscopy as the diagnostic and staging modality for both benign and malignant mediastinal and lung masses or adenopathy [1]. The reported complication rate of EBUS-TBNA varies but consistently remains low, including 0.19% for all infectious complications [1]. Currently, there is limited literature detailing post-EBUS mediastinitis and pericarditis. These severe infectious complications necessitate prompt recognition and treatment by clinicians, highlighting the critical need for increased awareness and understanding of these potential risks. We present a unique case of polymicrobial pyogenic pericarditis, mediastinitis, and death in a patient who underwent EBUS-TBNA for the evaluation of solitary mediastinal lymphadenopathy in the background of known renal cell carcinoma (RCC).

Case Report

A 75-year-old woman was referred to our tertiary hospital for evaluation of progressive, solitary right lower paratracheal adenopathy (station 4R) in the context of recently diagnosed pT3aN0 clear cell carcinoma of the left kidney. This was initially treated with left radical cytoreductive nephrectomy. The pathology report indicated renal vein venous thrombosis, with clear margins, and without evidence of regional lymph node involvement. Her past medical history included hypertension, dyslipidemia, type 2 diabetes mellitus, and glaucoma. She was a non-smoker and previously worked as a teacher with no occupational risk factors.

A restaging computed tomography (CT) of her chest, abdomen, and pelvis, obtained 5 months after surgery, revealed that a previously enlarged right paratracheal node (4R) had increased in short axis diameter from 2.2 cm to 2.5. There were no other imaging abnormalities concerning malignancy. Specifically, there appeared to be no evidence of mediastinal inflammation or infection.

At the time of our assessment, her vital signs and physical exam were normal. She underwent EBUS-TBNA of stations 4R and 7 (subcarinal lymph node), using a 22-gauge needle. The Canada Lymph Node score was 3/4 for station 4R, consistent with a malignant lymph node, and 0/4 for station 7, in keeping with a benign lymph node [2]. The patient tolerated the procedure well with no bleeding or hypoxemia. Pathology confirmed poorly differentiated carcinoma of renal origin in station 4R and a benign lymph node in station 7.

Following her procedure, the patient as well as her household developed upper respiratory tract symptoms without documented fevers. Although the patient's symptoms gradually improved, she subsequently developed acute nausea, vomiting, anorexia, and fatigue 3 weeks post-procedure. She presented to the emergency department 23 days after undergoing EBUS-TBNA. Upon arrival at the emergency department, she was hypotensive but not in respiratory distress and in room air. Initial investigations found elevated leukocyte count, lactate, creatinine, and liver enzymes. Her chest X-ray revealed new opacities in the left lower lung field, prompting a diagnosis of pneumosepsis. Despite broad spectrum antibiotics and fluid resuscitation, she subsequently developed unstable, narrow complex tachycardia. A bedside echocardiogram diagnosed a large pericardial effusion and features of tamponade. An emergent pericardial drain was inserted and 350 mL of purulent fluid was evacuated. Cytology from the pericardial fluid was negative; however, the cultures grew *Streptococcus mitis* group, *Actinomyces odontolyticus*, *Prevotella melaninogenica*, and *Lancefieldella rimae*, a combination of oral anaerobes and upper respiratory tract flora.

At the time of this admission, a repeat CT scan of her chest found a large loculated rim-enhancing fluid collection within the mediastinum and pericardium, with multiple internal locules of gas and thickening with enhancement in the pericardium and mediastinal soft tissue (Fig. 1a–d). Despite broad spectrum antibiotics and pericardial fluid drainage, the patient developed progressive septic shock due to inability to obtain source control. The mediastinal fluid collection was not amenable to drainage via interventional radiology and the benefit-to-risk ratio of sternotomy and surgical drainage was deemed limited after consulting with cardiac surgery. The patient subsequently opted for palliative measures and passed away surrounded by her family.

Discussion

Given its high sensitivity and low risk of complications, EBUS-TBNA has become the preferred minimally invasive approach for the diagnosis and staging of mediastinal lymphadenopathy, including for conditions other than non-small cell lung cancer [3, 4]. In a systematic review conducted by Varela-Lema et al. [4], no mortalities or significant infectious complications were observed. In von Bartheld et al. [5], systematic review evaluating the safety of EBUS-TBNA and endoscopic ultrasound fine needle aspiration, the rate of significant infectious complications was 0.07%, and those occurred primarily in patients with cystic lesions and sarcoidosis [5]. A nationwide survey of 455 facilities in Japan reported a risk of infectious complications of 0.19%, with only 0.10% related to mediastinitis [1]. Other documented infectious complications include pneumonia, pericarditis, cyst infection, sepsis, mediastinal abscess, and pulmonary arterial thrombosis associated with intrapulmonary adenitis [1, 6, 7]. Death after EBUS-TBNA continues to be a very rare complication, with a reported mortality rate of 0.01% as per the aforementioned Japanese nationwide survey [1].

Symptoms of mediastinitis after EBUS-TBNA are variable, but typically include fevers and respiratory symptoms, with a median onset time of approximately 12 days [8]. Pericarditis is a particularly rare complication of EBUS-TBNA, with only 1 case report describing an infected pericardial effusion after sampling the subcarinal lymph node [9]. Treatment for these infections typically includes intravenous antibiotics, with some patients requiring image-guided or surgical drainage of the fluid collections.

The presumed mechanism behind mediastinitis and mediastinal abscess is the direct inoculation of oropharyngeal bacteria into deep mediastinal tissue [6]. This mechanism could potentially contribute to the development of pericardial infections; however, this is unlikely to occur following the sampling of right paratracheal lymph nodes given their contralateral anatomical location relative to the pericardium. In our case study, the patient likely developed polymicrobial mediastinitis that later progressed to a large mediastinal abscess and invasion to the pericardium, occurring within 3 weeks of her initial procedure. While it is uncommon for mediastinitis to manifest more than a month after EBUS-TBNA, it is crucial to maintain a low threshold for obtaining a chest CT in patients experiencing persistent fevers and respiratory symptoms [8]. Additional studies are required to further characterize these complications as well as their management. The limitation of this case report includes post-EBUS mediastinitis and pericarditis, having been accumulated by several case reports due to their rarity.

Recent advancements in systemic therapies have significantly influenced oncologic management, including for conditions associated with mediastinal involvement. The identification of novel prognostic biomarkers is crucial in guiding treatment strategies, as highlighted by a meta-analysis evaluating the neutrophil-to-eosinophil ratio as a

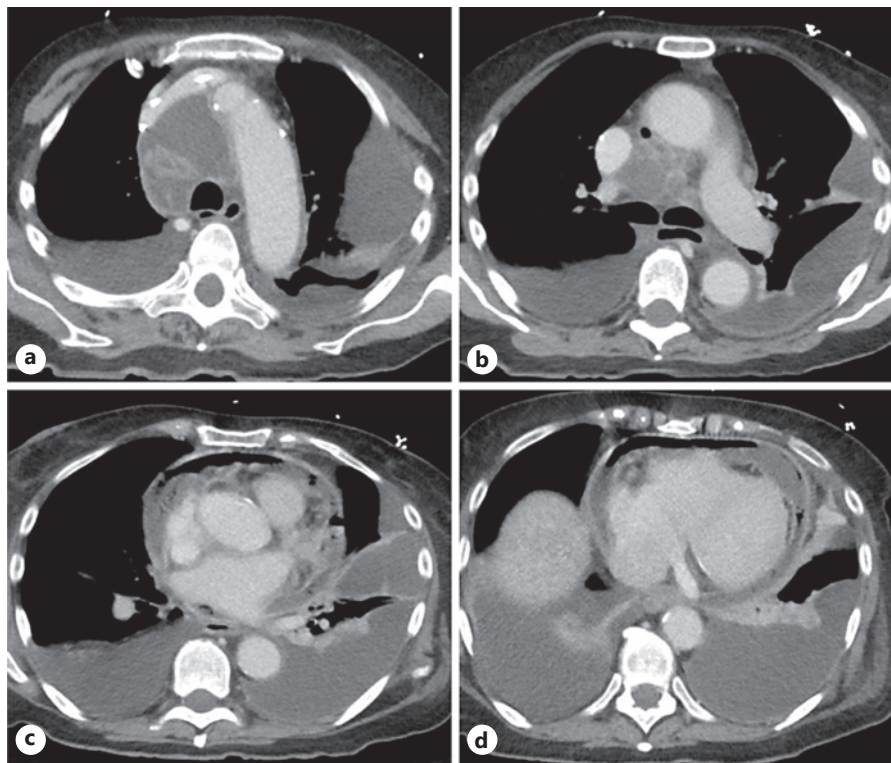


Fig. 1. **a** High-resolution computed tomography (HRCT) of the chest at the level of the aortic arch demonstrating large loculated fluid collection within the mediastinum. The necrotic station 4R appeared indistinguishable from the collection. **b** HRCT of the chest at the level of the carina with visible mediastinal gas and loculations. **c** HRCT of the chest showing multiple internal locules of gas within the pericardial effusion. **d** HRCT of the lower chest demonstrating pericardial thickening and bilateral pleural effusions.

prognostic marker across various cancer types. Elevated neutrophil-to-eosinophil ratio was associated with significantly poorer overall survival and progression-free survival, suggesting its potential role in stratifying patients for more tailored therapeutic approaches [10].

In the field of RCC, the introduction of immune checkpoint inhibitors (ICIs) has revolutionized treatment paradigms. However, the lack of robust predictive biomarkers remains a challenge in optimizing immunotherapy responses [11]. Additionally, as ICIs become more widely used, understanding their associated immune-related adverse events is essential. A recent systematic review identified hearing loss as a rare but potentially reversible immune-related adverse events associated with ICIs, often occurring within the first 3 months of treatment and frequently accompanied by other immune-related toxicities [12].

The role of ICIs has also been explored in the adjuvant setting, with a meta-analysis demonstrating that adjuvant PD-1/PD-L1 inhibitors significantly reduce the risk of relapse in cancer patients, with consistent benefits observed across age and gender subgroups [13]. Moreover, a large retrospective study assessing different first-line immunotherapy combinations for advanced RCC found that intermediate-risk patients had better overall survival and progression-free survival when treated with an immune-oncology and tyrosine kinase inhibitor combination compared to dual immune-oncology therapy, while no significant differences were observed in poor-risk patients [14].

These emerging insights underscore the need for further research to refine patient selection for novel systemic therapies and to optimize the management of associated complications. While post-EBUS mediastinitis and pericarditis remain rare, additional studies are needed to better characterize these complications and their potential interactions with evolving oncologic treatment strategies.

Conclusion

In this case report, rare complications of EBUS-TBNA were highlighted. Pericarditis and mediastinitis can manifest with severe sepsis, leading to death. It is crucial for clinicians to be vigilant and informed about these life-threatening post-procedural complications to facilitate early recognition and proper management thereof.

The CARE Checklist has been completed by the authors for this case report, attached as online supplementary material (for all online suppl. material, see <https://doi.org/10.1159/000544053>).

Statement of Ethics

Written informed consent was obtained from the patient's daughter for publication of the details of their medical case and any accompanying images. Ethical approval is not required for this study in accordance with local or national guidelines.

Conflict of Interest Statement

W.H. is on the advisory board for AZ, BMS, and Medtronic; previously received grants from Intuitive Surgical and Olympus Corporation; sits on the DSMC for Roche-Genentech; provides consultations; and holds equity for Intuitive Surgical. For the remaining authors, none were declared.

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Author Contributions

V.S. and W.H.: conceptualization, data curation, writing – original draft preparation, reviewing, and editing. All authors have read, reviewed, and approved the final version of the manuscript prior to submission, and each author accepts full responsibility for their respective contributions.

Data Availability Statement

All data generated or analyzed during this study are included in this article. Further inquiries can be directed to the corresponding author.

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