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# Bacterial pericarditis as a fatal complication after endobronchial ultrasound-guided transbronchial needle aspiration

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## Abstract

Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) is a safe and effective diagnostic tool for mediastinal evaluation. The guidelines for mediastinal evaluation of lung cancer were recently revised for both endoscopic procedures and surgical medical staging, and EBUS-TBNA is expected to be used more often in lung cancer diagnosis and staging. The major complication rate reported in previous meta-analyses is very low at 0.07–.15%; however, the mortality rate has not been reported. We present 2 cases of acute bacterial pericarditis after EBUS-TBNA, with 1 case resulting in mortality, and we discuss the appropriate management.

**Keywords:** Bronchial endoscopy • Ultrasound • Endobronchial ultrasound • Mediastinal lymph nodes • Mediastinal infection • Pericardium

## INTRODUCTION

Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) has greatly advanced diagnostic bronchoscopy because of its high diagnostic accuracy and very low complication rate (0.07–.15%) [1]. EBUS-TBNA is equivalent to surgical procedures for diagnostic yields and is safer without general anaesthesia [1, 2]. Guidelines for mediastinal evaluation of lung cancer have been recently revised for both endoscopic procedures and surgical medical staging [3].

To the best of our knowledge, the mortality rate has not been reported previously. Since January 2010, 1416 cases of EBUS-TBNA were performed at our hospital. Recently, the authors experienced 2 cases of acute bacterial pericarditis after EBUS-TBNA, with 1 case resulting in mortality (mortality rate: 0.07%). We report the details of these cases.

## CASE REPORTS

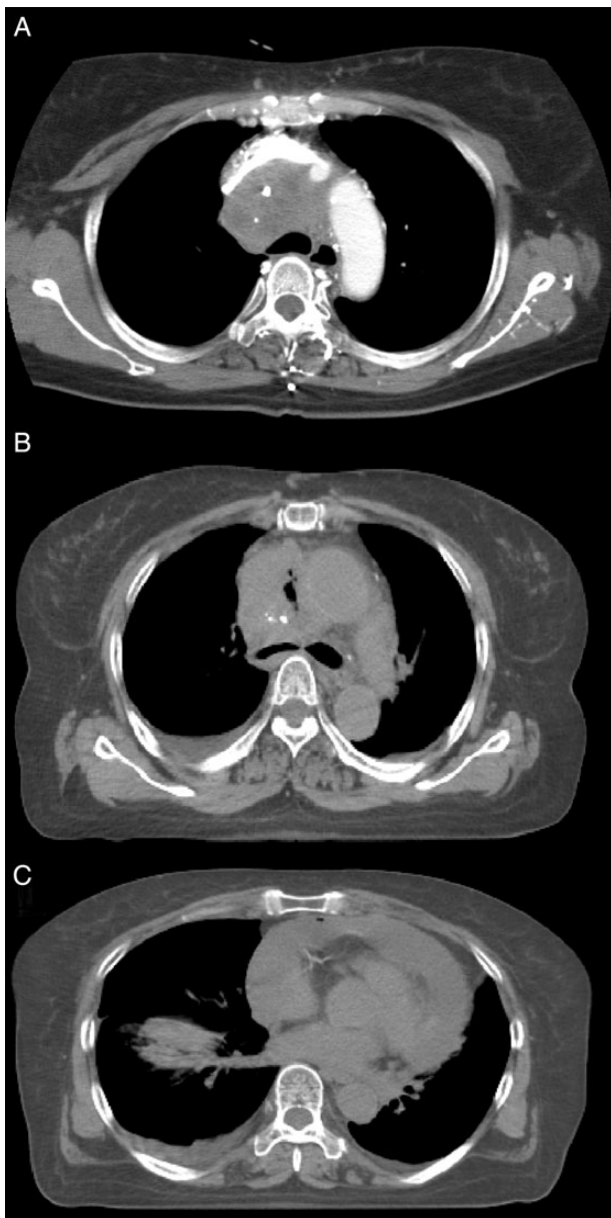
### Patient 1

A 55-year old woman was admitted to the hospital with facial oedema and general weakness persisting for 7 days. Her physical examination revealed normal vital signs and no other abnormality except face and arm swelling. A chest computed tomography (CT) scan showed an ~6 cm diameter mediastinal lymph node encasing the superior vena cava and a newly appeared 1.2 cm nodule in the left upper lung (Fig. 1A).

Diagnostic bronchoscopy revealed extrinsic compression of the distal trachea and proximal right main bronchus. On EBUS, a large heterogeneous round lymph node was seen and TBNA was performed. Histology of the specimen showed non-small-cell carcinoma of primary lung origin. We elected to treat the superior vena cava syndrome caused by the metastatic lymph node with radiotherapy. After 6 days, she developed dyspnoea and cough, but no fever. CT for radiotherapy simulation revealed gas-containing pericardial effusion and a cavitory change in the mass (Fig. 1B and C). An echocardiogram showed moderate pericardial effusion and emergent pericardiocentesis was then performed. The pericardial effusion proved to be purulent and cell block cytology identified large numbers of polymorphonuclear leucocytes without malignant cells; *Streptococcus viridans* was later identified. Despite the pericardiocentesis, she rapidly developed hypotension and respiratory failure. Transfer to the intensive care unit and emergency surgical pericardiotomy were considered, but the patient deteriorated rapidly and died shortly afterward.

### Patient 2

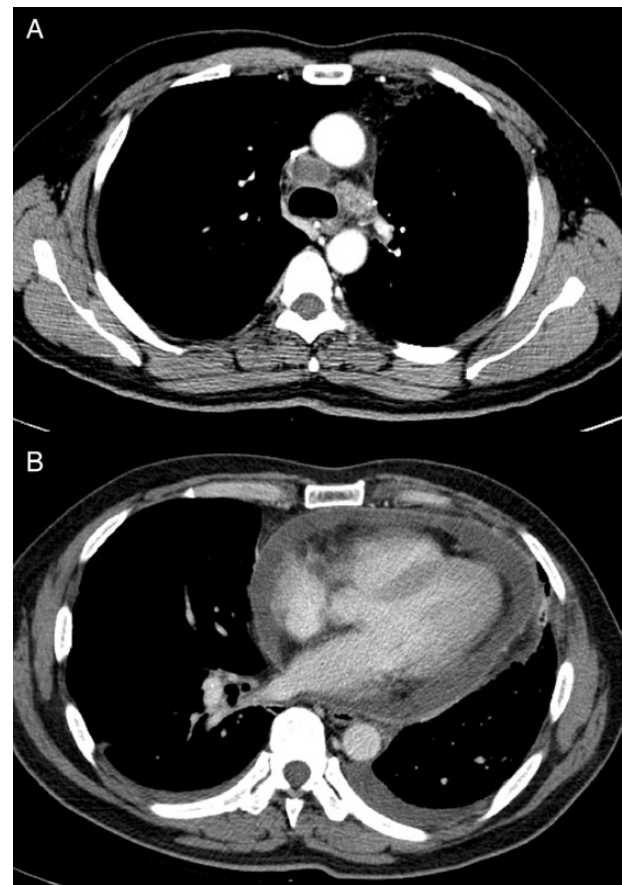
A 54-year old man was referred for evaluation of paratracheal lymphadenopathy on chest CT. Previously diagnosed with rectal cancer, he had been treated with surgical resection followed by adjuvant chemotherapy 4 years earlier. Left upper lobectomy and left lower lobe wedge resection were performed for metastases to the lung 1 year earlier. The follow-up sequential imaging revealed bilateral paratracheal lymphadenopathy on recent chest CT (Fig. 2A). Two large, heterogeneous, low echogenic paratracheal



**Figure 1:** (A) Computed tomography (CT) images from patient 1 before endobronchial ultrasound-transbronchial needle lymph node aspiration. (B) CT scan demonstrating a cavitary mass containing gas after endobronchial ultrasound-transbronchial needle lymph node aspiration (C) Non-enhanced CT scan demonstrating gas-containing pericardial effusion.

lymph nodes were seen using EBUS, and TBNA was then performed. Cell block cytology with immunochemical stains demonstrated metastatic adenocarcinoma from the colon.

Two weeks later, he visited our emergency room for fever, chills and chest pain persisting ~10 days. Chest CT demonstrated newly developed pericardial effusion with pericardial enhancement and peribronchial consolidation in the right lower lobe, suggestive of pericarditis and pneumonia (Fig. 2B). As it was difficult to access effusion by the percutaneous needle approach, an emergent pericardial window operation was performed with pleural drainage. The pericardial fluid showed numerous polymorphonuclear leucocytes without malignant cells, and fibroadipose tissue with inflammation was demonstrated on histology of the pericardium.



**Figure 2:** CT images from Patient 2 before and after endobronchial ultrasound-transbronchial needle lymph node aspiration (EBUS-TBNA). (A) Bilateral paratracheal lymphadenopathy appeared prior to EBUS-TBNA. (B) After EBUS-TBNA, chest CT demonstrated cavitary change in a lymph node and a newly developed pericardial effusion with pericardial enhancement and peribronchial consolidation in the right lower lung lobe.

Group C beta-haemolytic *Streptococcus species* was later identified and the patient was treated with antibiotics and discharged.

## DISCUSSION

EBUS is a minimally invasive technique for mediastinal staging in lung cancer, and several studies on EBUS-TBNA have demonstrated high safety without serious complications. Only 3 cases of infectious complication, including mediastinitis, pericarditis and mediastinal abscess after EBUS have been reported, but all patients recovered completely with surgical or medical therapy. These infectious complications were considered a result of direct inoculation of oropharyngeal flora into target structures by the needle.

Haas reported *Actinomyces odontolyticus* and *Streptococcus mutans* pericarditis following EBUS-TBNA, and suggested that pericarditis could have developed because of full-needle extension, which resulted in unintentional violation of the pericardium, and aspiration of the pericardial sac (recess) [4]. Identification of the pericardial sac can be difficult because the pericardial recess is difficult to differentiate from a lymph node. Unlike previous reports, however, we encountered no direct violation of the pericardium during EBUS-TBNA. We reviewed our cases fully, and confirmed any operator-targeted lymph node and suitable needle

penetration depth, maintaining a safe distance from the pericardium. Interestingly, our cases had two things in common. The site of EBUS-TBNA was 4R (Lower paratracheal lymph node on the Right), close to the superior pericardial recess and these lymph nodes contained large necrotic lesions. Although no direct inoculation of the pericardium occurred from the needle, infection could develop with a simple tissue prick adjacent to the pericardium, especially in cases of necrotic tissue. Also, pericarditis can develop through the contiguous spread of infection from an intrathoracic focus or bacteremia.

According to the guidelines for endoscopic ultrasound (EUS)-guided sampling, prophylactic antibiotics are recommended for EUS-Fine needle aspiration (FNA) with cystic lesions [5]. However, there is no definitive guideline or consensus for the use of prophylactic antibiotics before EBUS. Based on our cases, we recommend antibiotic prophylaxis for EBUS-TBNA with necrotic lesions located in the middle mediastinum, because of the possibility of serious complications such as acute pericarditis, or death.

Similar to previous reports, our patient who died did not develop a fever despite the extent of infection. It was known that low-virulence *S. viridans* might lead to an insidious and widespread infection. Therefore, patients with symptoms or discomfort after EBUS-TBNA should be closely monitored for infectious complications. Also, if the symptoms do not improve after pericardiocentesis, doctors should not hesitate to perform surgical pericardiotomy for purulent pericarditis as guidelines recommend.

## ACKNOWLEDGEMENTS

This report was approved by the ethical review committee of Seoul National University Hospital. No consent was obtained because patients' records and information were anonymized.

**Conflict of interest:** none declared.

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