Mediastinitis after endobronchial ultrasound with transbronchial needle aspiration resulting in post-pneumonectomy empyema

Running title: Post-pneumonectomy empyema after EBUS guided FNA

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Central Message: Endobronchial ultrasound guided sampling of paratracheal lymph nodes seeded with bacteria led to a mediastinal infection with resultant abscess and progression to post-pneumonectomy space empyema.

Central Picture Legend: Illustrative diagram of clinical scenario depicting process of infection development

Key Words: empyema, endobronchial ultrasound, pneumonectomy

Abbreviations: EBUS: Endobronchial ultrasound; TBNA: Transbronchial needle aspiration

Informed consent and IRB: The patient provided verbal and written consent for this case to be reported and published. This case report is IRB exempt.

Introduction

Endobronchial ultrasound with transbronchial needle aspiration (EBUS-TBNA) has been proven safe and effective for invasive mediastinal staging or sampling of mediastinal lesions. Infectious complications after EBUS-TBNA have been observed in 0.19% of procedures. Herein, we present a case of post-pneumonectomy space empyema secondary to mediastinitis following EBUS-TBNA. The Institutional Review Board (IRB) or equivalent ethics committee of the Mayo Clinic did not approve this study as it was deemed exempt. The subject provided informed written consent for the publication of the study data.

Case Presentation

A 63-year-old male underwent right pneumonectomy and 4 cycles of adjuvant platinum doublet chemotherapy for stage IIIA (pT3N1M0) squamous cell carcinoma. Sixteen months later, surveillance imaging identified enlarged, FDG avid, mediastinal lymph nodes in stations 2R and
7 concerning for recurrence. EBUS-TBNA was performed via a 22 gauge needle and the lymph nodes in station 2R and 7 were noted to be 15 mm and 25 mm respectively. Final pathology confirmed recurrence in both stations.

Ten days later he presented to the Emergency Department with atrial fibrillation, fevers, cough, and nausea. CT of the chest was read as normal during this presentation at an outside institution. In retrospective review, however, there was a small fluid collection in the right upper paratracheal space (Fig 1a). One week following persistent symptoms additional imaging identified gas in the right post-pneumonectomy space and an air-fluid collection in the mediastinum (Fig 1b). Thoracentesis confirmed empyema and chest tube insertion drained two liters of purulent fluid. Culture directed antibiotic therapy and alteplase/dornase instillations were initiated before transfer to our institution. Of note, the patient was not immunosuppressed or on steroids and was not smoking. The note from bronchoscopy and EBUS noted no abnormal secretions.

In the operating room, flexible bronchoscopy rule out a bronchopleural fistula. VATS exploration revealed diffuse fibrinopurulent pleuritis atypically focused at the apex of the thoracic cavity (Fig 1c). A right upper paratracheal mediastinal abscess with spontaneous drainage into the right post-pneumonectomy space was discovered (Fig 1d). This correlated with the radiographic mediastinal collection at the site of the biopsied station 2R lymph node. Debridement of the post-pneumonectomy space was performed. A drain was placed in the mediastinal abscess and pigtail drains were placed in the apex and base of the chest for planned postoperative irrigation of the post-pneumonectomy space. Pleural fluid cultures identified myriad aerobic and anaerobic oral flora including streptococcus anginosus, haemophilus
Postoperatively, the right post-pneumonectomy space was irrigated with 400 mL of modified DABs (20 mcg/mL gentamycin and polymyxin B 500 units/mL in 0.9% NaCl solution) twice daily for 10 days through the pigtail drains allowing incubation and drainage. Pleural fluid cultures on post-operative day 5 and 10 were negative. The post-pneumonectomy space was filled with modified DABs and drains were removed on post-operative day 13. He was discharged with IV ceftriaxone and PO metronidazole to complete 4 weeks of therapy. After 7 months of follow up, he has not experienced recurrence of empyema and is undergoing treatment for recurrent lung cancer with definitive chemoradiation to include 6000 cGy in 30 fractions total with concurrent carboplatin and paclitaxel.

Discussion

Mediastinitis as a complication of EBUS is rare and reported at 0.1%, but consequences can be severe. In this case, the associated fluid filled post-pneumonectomy space presented an increased risk and became secondarily infected after a mediastinal abscess ruptured into the right chest (Fig 2). Furthermore, it has been reported that approximately 7% of patients undergoing EBUS experience bacteremia with oropharyngeal flora, raising the possibility of potential hematogenous dissemination into a fluid-filled post-pneumonectomy space. Although prophylactic antibiotics are not recommended routinely when performing EBUS-TBNA, prophylactic antibiotics should be considered when sampling ipsilateral mediastinal lymph nodes in such high-risk patients with a persistent fluid-filled post-pneumonectomy space. In this report, a myriad of bacteria were present. A single dose of pre-EBUS-TBNA prephylactic antibiotics that cover oropharyngeal flora may not have covered every possible infectious organism, but in
our opinion, is a reasonable consideration to prevent mediastinitis and abscess formation given the implications of the potential complications as shown in the present case. Pleural debridement and irrigation of the post-pneumonectomy space, resembling a modified Claggett procedure, has been described for early infections complicated by bronchopleural fistulae with good results.

This also proved effective in our case.

Conclusion

EBUS associated infections in the post-pneumonectomy patient can have profound consequences requiring surgical intervention. Infectious complications should be suspected in the setting of invasive mediastinal testing after pneumonectomy and treated early and aggressively. Prophylactic antibiotic administration for EBUS in high-risk situations, such as patients with fluid-filled post-pneumonectomy space, should be considered.

References

Figure 1. Radiographic and intraoperative clinical findings
A) Contrast enhanced axial CT 10-days post procedure identifying right paratracheal fluid collection. B) Contrast enhanced axial CT 17-days post procedure identifying progression of right paratracheal fluid collection and post-pneumonectomy space gas. C) Intraoperative photograph of the right thoracic cavity with diffuse fibropurulent material throughout the chest. Arrow indicates the paratracheal mediastinal abscess before irrigation. D) Intraoperative photograph of the right paratracheal mediastinal abscess cavity in communication with the right pleural cavity.

Figure 2. Illustrative diagram of clinical scenario. Schematic of endobronchial ultrasound guided sampling of paratracheal lymph node with resultant abscess and progression to post-pneumonectomy empyema.