Official Case Reports Journal of the Asian Pacific Society of Respirology
Respirology Case Reports
OPEN ACCESS

Bronchial artery laceration and haemothorax complicating transbronchial needle aspiration

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Keywords
Bronchial artery, haemothorax, TBNA.

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Received: 13 August 2019; Accepted: 10 October 2019; Associate Editor: John Wrightson.

***Respirology Case Reports*, 8 (1), 2020, e00497**

doi: 10.1002/rcr2.497

Abstract

A 74-year-old woman presented with chest pain and dyspnoea following endobronchial ultrasound (EBUS)-guided transbronchial needle aspiration (TBNA) for presumed malignancy. Computed tomography angiography revealed a left-sided pleural effusion with hypertrophied and tortuous bronchial arteries (BAs) with contrast blush into the left lung hilum. Tube thoracostomy and pleural fluid analysis confirmed the diagnosis of haemothorax. The mechanism of injury was determined to be BA laceration during EBUS-TBNA and drainage led to rapid improvement in the patient's symptoms. This is the first reported case of haemothorax due to BA injury during EBUS-TBNA.

Introduction

Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) is generally a well-tolerated and low-risk procedure, currently considered standard of care in the evaluation of certain inflammatory, infectious, and neoplastic conditions of the thorax [1]. With an estimated overall complication rate of 1.4% [1], haemoptysis and post-procedural bleeding are some of the complications associated with this procedure. However, haemothorax remains a rare complication of EBUS-TBNA, with only two cases reported in the literature [2,3].

Case Report

A 74-year-old woman, with a history of peripheral artery disease requiring therapy with aspirin and clopidogrel (clopidogrel was discontinued one week prior to the procedure), underwent EBUS-TBNA at our institution for evaluation of a left lower lobe (LLL) lung mass associated with bilateral hilar and mediastinal lymphadenopathy. Airway surveillance to the subsegmental level did not disclose any endobronchial lesion. EBUS examination revealed enlarged lymph nodes in stations 11R superior, 4R, 7, 4L, and 11L. EBUS-TBNA was performed at all of these stations consecutively. The LLL mass was subsequently sampled via EBUS-TBNA, which the patient tolerated without complication. Post-procedure chest radiograph did not disclose pneumothorax or pneumomediastinum and the patient was discharged home with instructions to resume clopidogrel the following day. Tissue pathology from the LLL mass confirmed a diagnosis of squamous cell carcinoma of the lung.

After 48 h of discharge, the patient presented to our institution's emergency department with acute-onset sharp left-sided chest pain, shortness of breath, and presyncope. Computed tomography (CT) angiography (CTA) revealed a hyper-attenuated, loculated left pleural effusion and contrast blush within the left lung hilum, originating from a left bronchial artery (BA) (Fig. 1).

Further CT image enhancement revealed increased attenuation in the dependent area of the pleural effusion as compared with the non-dependent area (Fig. 2A). Bedside ultrasonography confirmed the presence of pleural effusion containing an echogenic density suggestive of thrombus formation (Fig. 2B) in the left hemithorax. A 14-F chest tube was placed with 380 mL of bloody fluid evacuated. Pleural fluid analysis revealed total red blood

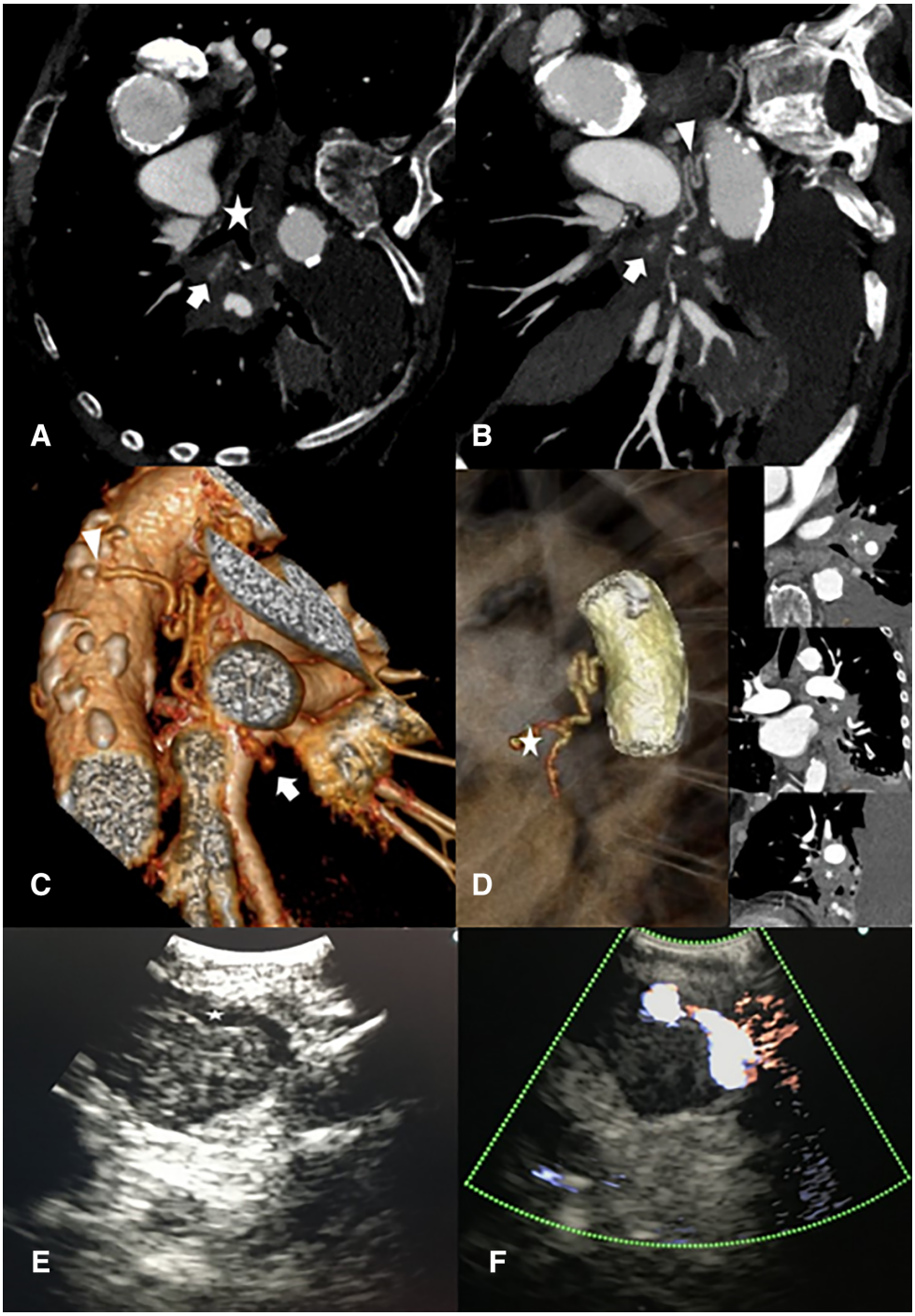

Figure 1. (A) Obliqued off axial contrast-enhanced computed tomography (CT) image demonstrating a left hilar contrast blush (arrow) in association with the left mainstem bronchus (star) as well as a left-sided pleural effusion. (B) Obliqued off axial contrast-enhanced CT image showing the bronchial artery (BA) arising from the aorta, with noted tortuosity (arrowhead) as it courses through the left hilum. There is evidence of bleeding with haematoma formation in the left hilum and contrast blush (arrow). (C) Three-dimensional (3D) volume-rendered CT image showing a left BA arising from the aorta (arrowhead). There is tortuosity of the vessel as it courses through the area of the left hilum and has associated red shadowing indicating blood and arterial blush (arrow). (D) Lateral view of the mediastinum with 3D volume-rendered reconstruction of the descending aorta and the BA. There is evidence of density in the region of the vessel (star) on the reconstructed image, and visualized throughout the reformatted CT images, corresponding to areas of contrast blush (star). Representative endobronchial ultrasound without (E) and with colour doppler (F) demonstrating an enlarged BA (star) coursing between the lymph node and the airway wall.

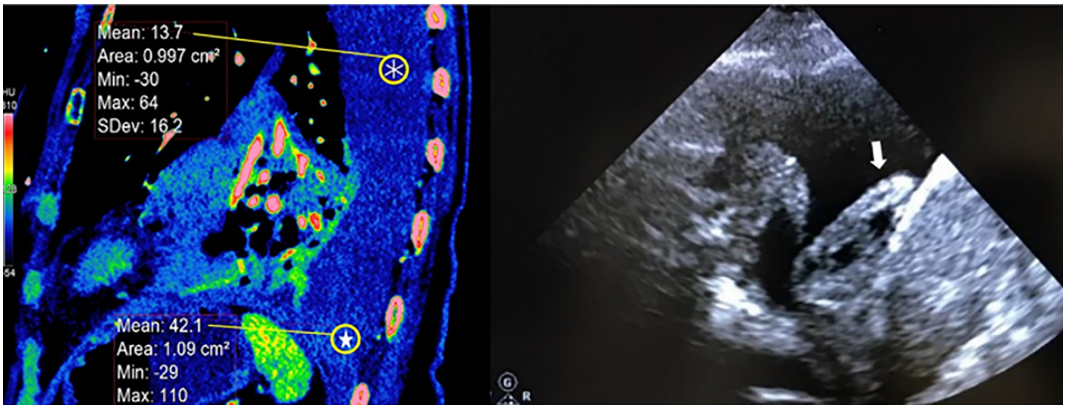

Figure 2. (A) Sagittal reconstructed contrast-enhanced computed tomography demonstrating an increase in the pleural fluid attenuation from a mean of 13.7 (asterisk) Hounsfield units (HU) in the less dependent area to a mean of 42.1 HU (star) in the more dependent area, consistent with haemothorax. (B) Ultrasound of the left pleural space revealing a hyperechoic density within the pleural fluid, representing clot formation (arrow).

cell count of 1,900,000 and haematocrit of 15.6%. Blood haematocrit was 25%, correlating with a pleural-to-serum haematocrit ratio of >0.5, and thus confirming the diagnosis of haemothorax.

During hospitalization, the patient experienced a 2.0-g/dL decrease in haemoglobin from baseline; however, she remained haemodynamically stable and did not require blood product transfusions or further intervention on the bleeding vessel. Repeat imaging two months later showed complete resolution of the hilar haematoma and near-complete resolution of the pleural effusion.

Discussion

The overall complication rate of EBUS-TBNA is approximately 1.4%, with a 0.2% rate of any instance of bleeding requiring intervention [1]. Only two cases of haemothorax attributed to EBUS-TBNA have been previously reported, and BA injury was not identified in either one. Transtracheal TBNA of a right upper lobe mass was performed in the first case with suggestion of injury to a superior intercostal vein [2]. EBUS-TBNA of stations 10L and 7 was performed in the second case in a patient with previously established adenocarcinoma [3]. Additional haemorrhagic complications related to EBUS-TBNA include intramural haematoma formation following puncture of the pulmonary artery and haemomediastinum. To our knowledge, this is the first report of BA laceration resulting in haemothorax due to EBUS-TBNA. In our case, the mechanism of injury is likely inadvertent laceration of an enlarged and hypertrophied BA during needle passage.

In their most common anatomic variation, the BAs arise from the descending thoracic aorta, with a single right artery and two left arteries. They supply oxygenated blood to the trachea, mainstem bronchi, and bronchial branches as well as other structures and carry 1% of the total cardiac output. BA hypertrophy is defined as an arterial diameter greater than 2 mm and can be visualized on multiplanar CT scans as well as EBUS imaging with colour doppler. In cases of hypertrophy, cardiac output to the BAs can increase to 18–30%, leading to increased recruitment and high blood volume. BA hypertrophy commonly occurs in disease states leading to chronic pulmonary ischaemia, decreased pulmonary blood flow, and malignancy. Certain conditions such as chronic thromboembolic disease, fibrosing mediastinitis, primary pulmonary hypertension, and squamous cell carcinoma have been associated with BA hypertrophy [4].

Our patient's diagnosis of squamous cell carcinoma of the lung likely predisposed her to BA hypertrophy and thus injury. Furthermore, there has been evidence suggesting higher rates of delayed bleeding complications occurring in patients on clopidogrel or dual antiplatelet therapy 48 h after EBUS-TBNA [5]. It remains unclear if our patient's antiplatelet regimen was an additional factor contributing to haemothorax development. As the utilization of EBUS-TBNA increases in the evaluation of malignant conditions, especially in patient populations with significant comorbidities, it is of utmost importance to consider more rare complications. This is a unique case of BA injury and haemothorax, influenced by vessel hypertrophy presumably secondary to malignancy. This mechanism of injury illustrates the need for judicious use of doppler to evaluate vascular anatomy during EBUS, in an attempt to identify and avoid hypertrophied vessels during needle entry and biopsy.

Disclosure Statement

Appropriate written informed consent was obtained for publication of this case report and accompanying images.

Acknowledgment

The authors thank Ms. Casey Stork for her kind assistance with the images.

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