Required thoracic drainage through the respiratory tract during transbronchial biopsy using EBUS-GS

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Abstract
A 71-year-old woman was referred to our department due to an abnormal chest shadow. Imaging revealed a pulmonary nodule shadow in the left S6 segment, multiple small nodule shadows in the left pleura, and left pleural effusion. Transbronchial biopsy using endobronchial ultrasonography (EBUS) with a guide sheath was conducted. EBUS showed the probe of the sheath located in the lesion and biopsy was performed in this area. A yellow turbid fluid appeared in the sheath and vacuum aspiration resulted in collection of 200 mL of this fluid. We suspected that drainage occurred because the sheath tip had ruptured the pleural cavity. The pathological diagnosis was adenocarcinoma. It is likely that the EBUS images reflected pleural effusion adjacent to the lesion, and that the complication occurred because the biopsy was performed without awareness of these findings. This complication may be prevented by closer examination of echo findings and rotation of the X-ray source to ensure performance of the biopsy directly under the pleura.

Introduction
Biopsy of the peripheral lung using endobronchial ultrasonography with a guide sheath (EBUS-GS) has been shown to be effective and safe in many reports, since Kurimoto et al. [1] first described this procedure in 2004. Here, we report a rare complication of this procedure, in a case in which pleural effusion drainage through the respiratory tract was required during transbronchial biopsy using EBUS-GS.

Case Report
A 71-year-old woman was referred to our department in March 2015 because of an abnormal chest shadow. She had neither a smoking history nor a history of work in a dusty environment. Blood tests showed serum carcinoembryonic antigen 7.27 ng/mL (normal range <5.0 ng/mL), cytokeratin fragment 0.8 ng/mL (normal range <3.5 ng/mL), and pro-gastrin releasing peptide 48.4 pg/mL (normal range <46.0 pg/mL). Computed tomography (CT) revealed a pulmonary nodule shadow in the left S6 segment, multiple small nodule shadows in the left pleura, and left pleural effusion (Fig. 1A).

Thoracic ultrasonography revealed a small pleural effusion, which precluded a safe thoracentesis. Therefore, bronchoscopy was performed to confirm diagnosis of peripheral lung cancer with pleural dissemination and malignant pleural effusion, which was suspected on chest imaging. EBUS images confirmed that the tip of the guide sheath was adjacent to or within the lesion (Fig. 2A), and a lung biopsy was performed in this area. Apparition of a yellow fluid in the guide sheath was observed. Vacuum aspiration using an empty injector resulted in collection of 200 mL of a pale yellow and slightly turbid fluid (Fig. 2B). The biopsy was discontinued because of rupture of the pleural cavity by the guide sheath, which caused pleural effusion drainage through the sheath in the respiratory tract.

Plain chest X-ray after discontinuation of the biopsy did not indicate pneumothorax as a complication. Chest CT taken a few days later (Fig. 1B) also did not indicate the presence of pneumothorax, but showed decreased pleural effusion. Pathological examinations of both the pleural effusion and lung biopsy specimens indicated adenocarcinoma, which permitted a definitive diagnosis of primary lung cancer.
Kurimoto et al. described transbronchial biopsy using EBUS-GS for peripheral lung lesions in 2004 [1] and found no serious complications, except for moderate bleeding in 1% of cases. Another study in 965 patients undergoing transbronchial biopsy with EBUS-GS for peripheral lung lesions [2] found 13 cases with complications (1.3%). Of these 13 patients, eight had pneumothorax (0.8%), including three (0.3%) who required drainage procedures and five with pulmonary infection (0.5%). There were no other serious complications, and the efficacy [3] and safety [4] of the procedure have been established.

The current case demonstrates a complication of EBUS-GS that has not been described previously. The EBUS images in this case had two distinct areas: a region with a slightly high degree of echogenicity indicating the presence of a peripheral lung lesion and a region of consistent echogenicity around the lesion, which was subsequently revealed to reflect pleural effusion adjacent to the peripheral lung lesion. We believe that the guide sheath ruptured the pleural cavity during placement, and that this caused pleural effusion drainage through the sheath. This complication occurred because the biopsy was performed without a clear interpretation of the imaging findings.

An accurate reading of the ultrasonic images of pleural effusion adjacent to the tumor might have avoided rupture of the pleural cavity in this case. Furthermore, the lesion was located adjacent to the pleura of S6. The biopsy was performed under EBUS guidance to prevent pneumothorax as a complication, but it was not confirmed that the tip was inserted into the correct area. This case suggests that both close examination of echo findings and rotation of the X-ray source are required to check that a biopsy is performed directly under the pleura.

In conclusion, we have reported a rare case that required thoracic drainage through the respiratory tract for a complication that arose during transbronchial biopsy using EBUS-GS.

Figure 1. (A) Chest computed tomography (CT) before bronchoscopy showed left pleural effusion and nodule shadows in an area adjacent to the descending aorta and directly under the pleura. (B) Chest CT after bronchoscopy showed a decreased amount of left pleural effusion.

Figure 2. (A) Endobronchial ultrasound (EBUS) images showed a lesion with a slightly high degree of echogenicity to the probe and a hypoechoic lesion with an even internal echo around this lesion. (B) Vacuum aspiration under EBUS with a guide sheath using an empty injector resulted in collection of a yellow and slightly turbid fluid.

Discussion

Kurimoto et al. described transbronchial biopsy using EBUS-GS for peripheral lung lesions in 2004 [1] and found no serious complications, except for moderate bleeding in 1% of cases. Another study in 965 patients undergoing transbronchial biopsy with EBUS-GS for peripheral lung lesions [2] found 13 cases with complications (1.3%). Of these 13 patients, eight had pneumothorax (0.8%), including three (0.3%) who required drainage procedures and five with pulmonary infection (0.5%). There were no other serious complications, and the efficacy [3] and safety [4] of the procedure have been established.

The current case demonstrates a complication of EBUS-GS that has not been described previously. The EBUS images in this case had two distinct areas: a region with a slightly high degree of echogenicity indicating the presence of a peripheral lung lesion and a region of consistent echogenicity around the lesion, which was subsequently revealed to reflect pleural effusion adjacent to the peripheral lung lesion. We believe that the guide sheath ruptured the pleural cavity during placement, and that this caused pleural effusion drainage through the sheath. This complication occurred because the biopsy was performed without a clear interpretation of the imaging findings.

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Disclosure Statements

No conflict of interest declared.

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

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