

Histopathologic Diagnosis of Pleural Metastasis of Renal Cell Carcinoma Using Endobronchial Ultrasound-Guided Transbronchial Needle Aspiration

Yeh Rim Kang, M.D.¹, Byung Woo Jhun, M.D.¹, Kyeongman Jeon, M.D., Ph.D.¹, Won-Jung Koh, M.D., Ph.D.¹, Gee Young Suh, M.D., Ph.D.¹, Man Pyo Chung, M.D., Ph.D.¹, Hojoong Kim, M.D., Ph.D.¹, O Jung Kwon, M.D., Ph.D.¹, Joungho Han, M.D., Ph.D.², Sang-Won Um, M.D., Ph.D.¹

¹Division of Pulmonary and Critical Care Medicine, Department of Medicine, ²Department of Pathology, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea

Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) is a useful, safe diagnostic modality for evaluating mediastinal and hilar lymphadenopathy. We report a 51-year-old male who presented with a left renal mass and multiple pleural masses without lung parenchymal lesions. The pleural masses were thought to be metastatic tumors or malignant mesothelioma. The patient underwent two percutaneous needle biopsies of the pleural mass, but the specimens were insufficient for a histopathological diagnosis. Because one pleural mass was adjacent to the right main bronchus, we decided to perform EBUS-TBNA for the pleural mass. As a result, sufficient core tissue was obtained with no complications, and the histopathological findings were consistent with metastatic papillary renal cell carcinoma. To our knowledge, this is the first case of using EBUS-TBNA for a pleural mass.

Key Words: Biopsy, Fine-Needle; Ultrasonography; Pleura; Neoplasms; Carcinoma, Renal Cell

Introduction

The lung is the most frequent site of breast, renal, colorectal, or melanoma metastasis. However, isolated pleural metastasis without lung parenchymal metastasis also can occur in some cases. In such cases, specimens are usually obtained from pleural fluid aspiration cytology, percutaneous needle biopsy, or surgical resection of the pleura^{1,2}. This case study describes metastatic renal cell carcinoma of the pleura that was diagnosed by endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA). To our knowledge, this is the first case of EBUS-TBNA for a pleural mass.

Case Report

A 51-year-old non-smoking male with no chronic disease presented with a cough and right-side chest pain for 1 month. He visited another institution, where a chest x-ray showed a widened mediastinum and pleural effusion in the right hemithorax. Contrast-enhanced computed tomography (CT) of the chest revealed a small pleural effusion and thickened pleura forming multiple masses (Figure 1A). There was no parenchymal lesion in either lung. On positron emission tomography (PET)/CT, ¹⁸F-fluorodeoxyglucose (FDG) uptake was noted in the pleural masses, which were suspected to be malignant mesothelioma or metastatic tumor (Figure 1B). A left renal mass with FDG uptake was suspicious of renal cell carcinoma (RCC). The patient underwent a percutaneous needle biopsy of the pleura. A few atypical mesothelial cells were seen in the tissue specimen, which was insufficient for immunohistostaining. The percutaneous pleural biopsy was repeated, but again,

Address for correspondence: Sang-Won Um, M.D., Ph.D.
Division of Pulmonary and Critical Care Medicine, Department of Medicine, Samsung Medical Center, Sungkyunkwan University School of Medicine, 50, Irwon-dong, Kangnam-gu, Seoul 135-710, Korea
Phone: 82-2-3410-3429, Fax: 82-2-3410-3849
E-mail: sangwonum@skku.edu

Received: Feb. 20, 2011

Accepted: Mar. 24, 2011

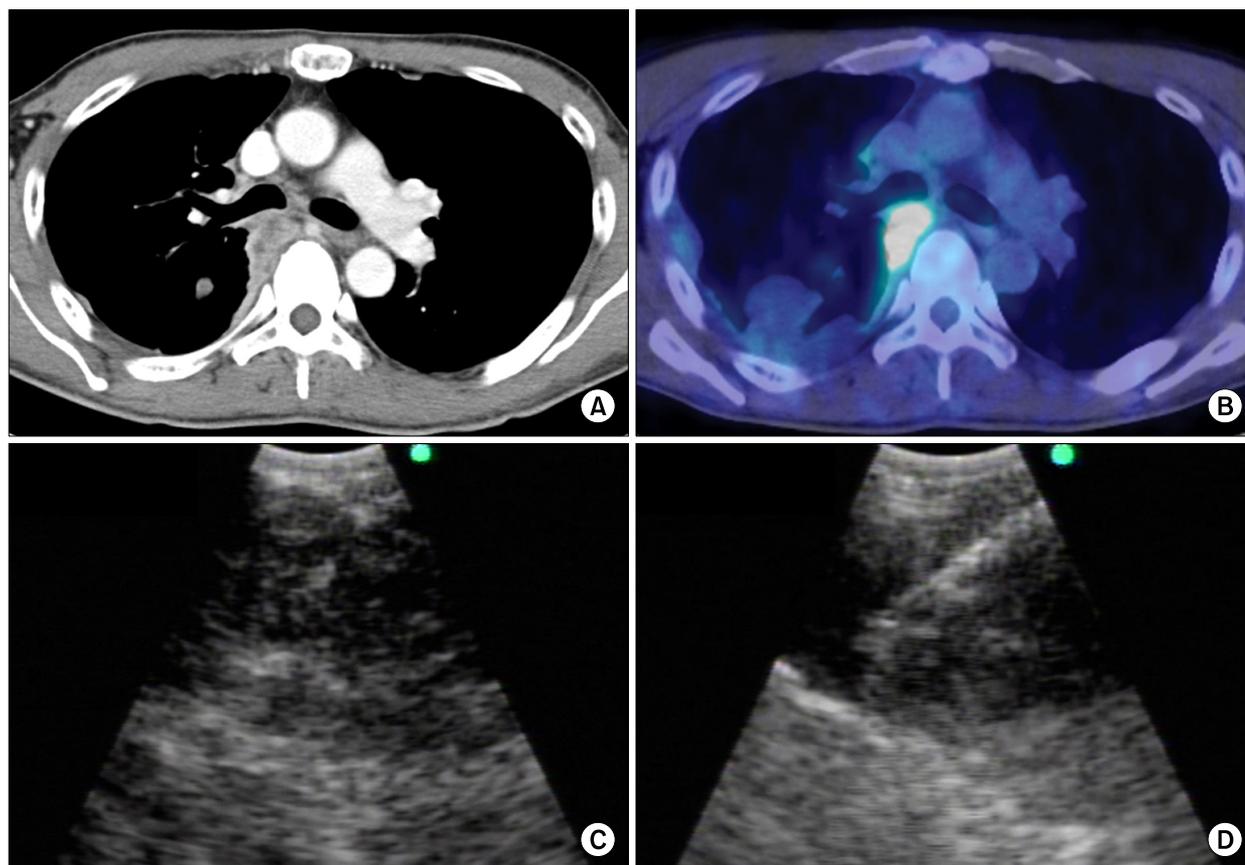


Figure 1. (A) Contrast-enhanced CT of the chest showing the pleural mass adjacent to the right main bronchus. (B) PET/CT shows hypermetabolic pleural masses. (C) EBUS reveals a heterogeneous low-echogenic pleural mass. (D) The transbronchial aspiration needle was inserted into the pleural mass under EBUS guidance. CT: computed tomography; PET: positron emission tomography; EBUS: endobronchial ultrasound.

the specimen was insufficient for a diagnosis. Therefore, the patient was referred to Samsung Medical Center (Seoul, South Korea) for a histopathological diagnosis.

Because one pleural mass was adjacent to the right main bronchus, we decided to perform EBUS-TBNA of the pleural mass using a flexible convex probe ultrasonic puncture bronchoscope with a 7.5-MHz-frequency linear scanning transducer (CP-EBUS, BF-UC206F-OL8; Olympus, Tokyo, Japan). A dedicated ultrasound scanner (EU-C2000; Olympus Tokyo, Japan) was used as the image processor. On flexible bronchoscopic examination, the posterior wall of the right main bronchus was narrowed by extrinsic compression. On EBUS, a huge, heterogeneous, low-echogenic pleural mass was seen at the right main bronchus level (Figure 1C). We per-

formed EBUS-TBNA of the pleural mass and obtained a large tissues core (Figure 1D). The patient did not suffer any complication from the procedure such as pneumothorax, pulmonary infection, or hemoptysis.

The specimens from the pleural mass were sufficient for histopathological examination and showed papillae formation of cells with atypical nuclei (Figure 2A).

Immunohistochemical staining (IHC) was negative for calretinin, Wilm's tumor-1 (WT-1), and Hector Battifora mesothelial cell-1 (HBME-1), which are markers for malignant mesothelioma. It was also negative for IHC staining for transcription termination factor-1 (TTF-1), indicating a low probability of peripheral adenocarcinoma of the lung. The specimen was positive for CD10 (Figure 2B). In this case, the patient was sus-

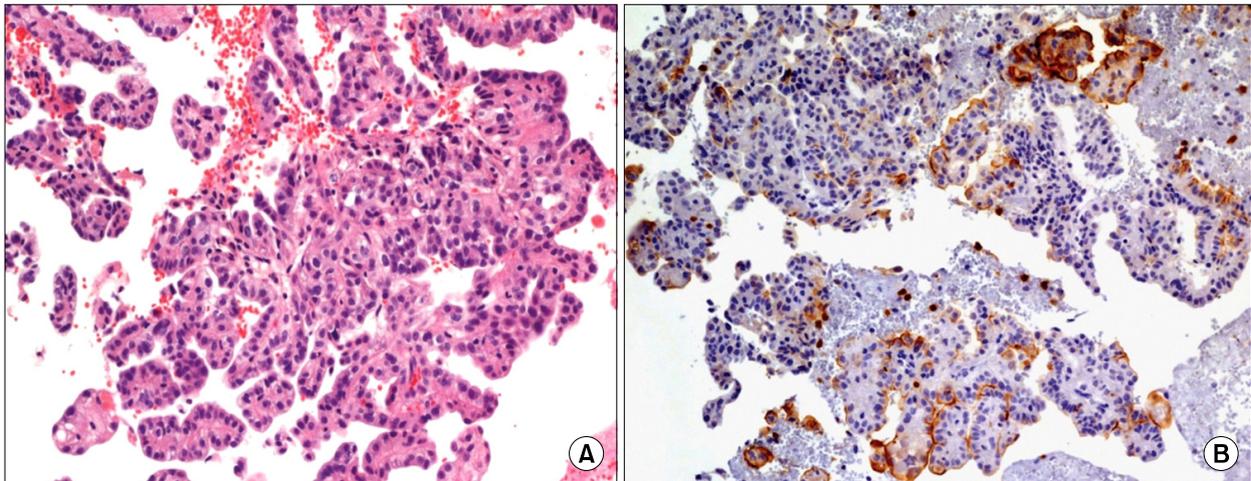


Figure 2. (A) Histopathological examination of the core tissue shows papillae formation by cells with atypical nuclei (pleura, $\times 200$). (B) The cells were immunoreactive for CD10, consistent with papillary renal carcinoma (CD10 stain, $\times 200$).

pected of having RCC on PET/CT, and the positive reaction for CD10 suggested metastatic malignancy from RCC^{3,4}. Four days after the EBUS-TBNA, a renal biopsy was performed, and the pathology indicated papillary-type RCC. Therefore, the patient was diagnosed with papillary RCC with metastasis to the right pleura.

Discussion

Pleural metastasis without lung parenchymal spread from extrathoracic malignancy is rare and difficult to diagnose. As Mitsuhiro et al. reported, it can occur several years after curative resection, especially in patients with RCC. It is often confused with malignant mesothelioma because the CT images are similar^{5,6}. To distinguish metastatic malignancy from malignant mesothelioma, it is important for clinicians to obtain a sufficient specimen for histopathological examination.

Endobronchial ultrasound-guided transbronchial needle aspiration is a very useful procedure for obtaining specimens from mediastinal and hilar lymph nodes or lung masses accessible from airways in both primary lung cancer and metastatic malignancy⁷. It has high diagnostic accuracy and excellent safety profiles, with minimal invasiveness under real-time visualization⁸. EBUS-TBNA can also be performed in other specific

cases. Nakajima et al.⁹ reported a case of central airway stenosis caused by a mediastinal cyst, which improved after cyst aspiration using EBUS-TBNA. Takahiro et al. also reported a diagnosis of spinal chondrosarcoma based on EBUS-TBNA¹⁰; as the protruding posterior mediastinal mass was adjacent to the carina, a histopathological diagnosis could be made using EBUS-TBNA. These cases show the usefulness of EBUS-TBNA for the diagnosis of mediastinal masses and the therapeutic utility of EBUS-TBNA for the aspiration of mediastinal cysts. Nevertheless, there has been no report of EBUS-TBNA for the diagnosis of pleural disease.

This case study reports a renal cell carcinoma with pleural metastasis. What is more unusual about our case is that a specimen was obtained from the pleural mass using EBUS-TBNA. To our knowledge, this is the first case of EBUS-TBNA for a pleural mass. Although the patient underwent percutaneous needle biopsy twice, the specimens were insufficient for IHC staining, which is necessary for a histopathological diagnosis. We decided to perform another diagnostic modality rather than a third percutaneous needle biopsy. EBUS-TBNA, instead of a surgical biopsy such as video-assisted thoracoscopic surgery, ensured that the patient was free from pain and did not require general anesthesia, and the procedure was less invasive. Furthermore, sufficient

tissues from the EBUS-TBNA enabled the IHC examination of multiple markers, which helped make a definite histopathological diagnosis in this patient.

Posterior pleural masses or lesions which are located in the proximity to both main bronchi or right bronchus intermedius can be accessible by EBUS-TBNA. Respiratory physicians should aware that it is possible to obtain an adequate specimen from a pleural mass safely using EBUS-TBNA when the mass is adjacent to an airway.

References

1. Fischer MD, Goodman PC. Pleural effusion and renal cell carcinoma: an angiographic-pathologic correlation. *Chest* 1979;75:647-8.
2. Ohnishi H, Abe M, Hamada H, Yokoyama A, Hirayama T, Ito R, et al. Metastatic renal cell carcinoma presenting as multiple pleural tumours. *Respirology* 2005;10:128-31.
3. Oates J, Edwards C. HBME-1, MOC-31, WT1 and calretinin: an assessment of recently described markers for mesothelioma and adenocarcinoma. *Histopathology* 2000;36:341-7.
4. Ordóñez NG. The diagnostic utility of immunohistochemistry in distinguishing between mesothelioma and renal cell carcinoma: a comparative study. *Hum Pathol* 2004;35:697-710.
5. Azuma T, Nishimatsu H, Nakagawa T, Tomita K, Takeuchi T, Homma Y, et al. Metastatic renal cell carcinoma mimicking pleural mesothelioma. *Scand J Urol Nephrol* 1999;33:140-1.
6. Kamiyoshihara M, Ibe T, Takise A, Itou H, Takeyoshi I. Pleural metastases from renal cell carcinoma 16 years after resection. *J Clin Oncol* 2007;25:4009-11.
7. Tournoy KG, Govaerts E, Malfait T, Doods C. Endobronchial ultrasound-guided transbronchial needle biopsy for M1 staging of extrathoracic malignancies. *Ann Oncol* 2011;22:127-31.
8. Varela-Lema L, Fernández-Villar A, Ruano-Ravina A. Effectiveness and safety of endobronchial ultrasound-transbronchial needle aspiration: a systematic review. *Eur Respir J* 2009;33:1156-64.
9. Nakajima T, Yasufuku K, Shibuya K, Fujisawa T. Endobronchial ultrasound-guided transbronchial needle aspiration for the treatment of central airway stenosis caused by a mediastinal cyst. *Eur J Cardiothorac Surg* 2007;32:538-40.
10. Nakajima T, Yasufuku K, Suzuki M, Sekine Y, Shibuya K, Hiroshima K, et al. Histological diagnosis of spinal chondrosarcoma by endobronchial ultrasound-guided transbronchial needle aspiration. *Respirology* 2007;12:308-10.