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Original article

Utility of cell blocks obtained by catheter aspiration via a guide sheath during endobronchial ultrasonography

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ABSTRACT

Background: The demand for adequate tissue samples for both morphological assessment and molecular studies on lung cancer treatment has increased. The aim of this study was to evaluate whether cell blocks (CBs) prepared from endobronchial ultrasonography with guide sheath (EBUS-GS) rinsing following catheter aspiration provide additional information.

Methods: We produced CBs from rinse fluid obtained from washing the inside of the sheath with saline after conventional EBUS-GS between May 2012 and April 2013. During the first 7 months, the sheath was aspirated with 20 mL of negative pressure while moving the catheter back and forth [aspiration group (Asp)]. During the next 5 months, the sheath was not aspirated, but only rinsed out [conventional group (Con)]. Patients diagnosed with lung cancer by EBUS-GS and/or CBs were identified and evaluated. The diagnostic rate of each sampling method was compared between the two groups. The number of tumor cells was also compared between the CB and EBUS-guided transbronchial lung biopsy (EBUS-TBB) groups.

Results: EBUS-GS was performed on 113 patients. Fifty-five patients were included in this study (Asp=30, Con=25). The diagnostic yield of CBs in Asp was higher than that in Con (56.7% vs 32.0%; $p=0.06$). Asp showed no significant difference in the number of tumor cells between CB and EBUS-TBB. One patient who showed negative EBUS-TBB pathological results but positive CB results was diagnosed only by immunohistological staining of CB.

Conclusion: CB prepared from EBUS-GS rinsing following catheter aspiration may provide additional information.

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1. Introduction

The detection of small peripheral lesions has been facilitated by the widespread use of computed tomography. The use of endobronchial ultrasonography guide sheath (EBUS-GS) is becoming increasingly common in the diagnosis of peripheral pulmonary lesions. The current diagnostic rate of EBUS-GS is approximately 80% [1–5]. To collect a sufficient amount of tissue, several samples must be collected, increasing the burden on patients and clinicians.

Diagnostically useful tumor cells may remain in the guide sheath after EBUS-GS. In our hospital, tumor cells in the guide sheath were washed out with saline and collected. These fluid samples are used in gene mutation analysis and cytological evaluation. An effective use of the sheath lavage has not been established.

Cell blocks (CBs) are often prepared using fine needle aspiration specimens from several organs, such as the breast and thyroid [6–10]. CB is also helpful for diagnosing serous effusion specimens [9]. However, there have been few studies on the utility of CB in bronchoscopy [11–13]. Particularly, there have been no reports of the utility of CBs prepared from sheath lavage fluid after EBUS-GS. We hypothesized that CBs prepared from sheath lavage fluid serve as pathological samples.

2. Patients and methods

2.1. Patients

This retrospective study was approved by the institutional review board of Kobe University Graduate School of Medicine (No. 1543) on February 6, 2014. Between May 2012 and April 2013, consecutive patients who underwent EBUS-GS at Kobe University Hospital were included in the study. Between May 2012 and November 2012, the distal sheath was aspirated with 20 mL of negative air pressure for 20 s while pushing back and forth [aspiration group (Asp)] after conventional EBUS-GS methods (forceps, brush, and/or curette). From December 2012 to April 2013, the sheath was not aspirated, but only rinsed [conventional group (Con)] after EBUS-GS. Patients diagnosed with lung cancer by EBUS-GS and/or CBs were enrolled in the study. Informed consent was obtained from all patients.

2.2. EBUS-GS

Local anesthesia of the upper airway was achieved using 2% lidocaine. Bronchoscopes with a working channel diameter of 2.0 mm were used (BF-260, BF-P260F, and BF-P240; Olympus, Tokyo, Japan). EBUS-GS was performed using an endoscopic ultrasound system (EU-ME1; Olympus) equipped with a 20-MHz mechanical radial-type probe (UM-S20-17S; Olympus) with an external diameter of 1.4 mm and a guide sheath kit (SG-200C; Olympus). The diameter of the EBUS-transbronchial lung biopsy (TBB) forceps was 1.5 mm (FB-233D; Olympus). The probe with the guide sheath was inserted into the target lesion as indicated by the EBUS image through the working channel of the bronchoscope. After confirming the tumor, the probe was removed, and the sheath remained attached to the target lesion. Under guidance of the sheath, the devices [EBUS-TBB forceps, brush, and/or curette] were inserted into the lesion, and tumor specimens were collected. Forceps biopsy specimens were fixed in formalin. Cytology specimens obtained by brushing were immediately smeared onto a glass slide to prevent drying artifacts. Biopsy forceps were performed until at least three histological samples were obtained. The brushing cytology technique was conducted twice.

2.3. Device wash

After every step such as brushing, curette, and TBB, cells adhered to the devices were rinsed in the same vial with 5 mL saline and collected. The device wash was used for cytology.

2.4. CB preparation

The rinse fluid specimens were collected by washing out the guide sheath with 5 mL of saline (sheath lavage). CBs were prepared from the sheath lavage fluid. After centrifugation of the sheath lavage fluid, cellular materials were fixed with 10% buffered neutral formalin. They were then processed with alcohol, chloroform, and xylene and embedded in paraffin. One day later, the samples were cut into sections. The sections were stained with hematoxylin and eosin.

2.5. Diagnostic yield

The diagnostic yield of each sampling method during EBUS-GS was compared between the Asp and Con groups. The correlation of the positive rates between CB and EBUS-TBB was examined. Specimens containing atypical cells were defined as negative. All specimens were evaluated by an experienced cytopathologist.

2.6. Comparison of tumor cell numbers between EBUS-TBB and CB preparation

Tumor cell clusters were scored as follows. A score of 1 was given to clusters of ≤ 20 cells, a score of 2 was given to

Abbreviations: ALK, anaplastic lymphoma kinase; CB, cell block; EBUS-GS, endobronchial ultrasonography with guide sheath; EBUS-TBB, endobronchial ultrasonography-guided transbronchial lung biopsy; TBB, transbronchial lung biopsy

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