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Diagnostic Yield and Safety Analysis of Combining Endobronchial Ultrasound Transbronchial Needle Aspiration and Endobronchial Ultrasound Transbronchial Forceps Biopsy Compared to Endobronchial Ultrasound Transbronchial Needle Aspiration Alone: A Case Series of 14 Patients

Aftab GM*, Ngo D and Frenia D

Department of Pulmonary Medicine, Saint Peter's University Hospital, USA

Abstract

Endobronchial Ultrasound Transbronchial Needle Aspiration (EBUS-TBNA) has a high diagnostic accuracy for lung cancer; however, it is much lower in benign conditions such as sarcoidosis. Performing EBUS Transbronchial Forceps Biopsy (EBUS-TBFB) in patients undergoing EBUS-TBNA may improve the diagnostic yield. We present a case series of 14 patients who had undergone EBUS-TBNA followed by EBUS-TBFB. We conducted a retrospective review of patient charts and evaluated the diagnostic yield. A safety analysis was also conducted. Our results showed that combining EBUS-TBNA with EBUS-TBFB helps increase the diagnostic yield especially in benign conditions. It also has a good safety profile.

Keywords: Endobronchial ultrasound transbronchial needle aspiration; Endobronchial ultrasound transbronchial forceps biopsy; Mini forceps; Lung cancer; Sarcoidosis

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Correspondence:
Ghulam Mustafa Aftab, Department of Pulmonary Medicine, Saint Peter's University Hospital, 254 Easton Avenue, New Brunswick, NJ, 08901, USA, Tel: +6466710119;
E-mail: mustafa_aftab1@hotmail.com

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Introduction

Endobronchial Ultrasound-Guided Transbronchial Needle Aspiration (EBUS-TBNA) is used to visualize structures adjacent to the larger airways and allows sampling of the hilar and mediastinal lymph nodes. EBUS-TBNA has a high diagnostic accuracy for staging mediastinal lymph nodes in non-small cell lung cancer with a diagnostic yield of greater than 90% [1]. The diagnostic accuracy however is much lower in benign conditions such as sarcoidosis with one study showing a diagnostic yield of 74.5% [2]. This may be because of the limited tissue obtained from the needles used for EBUS-TBNA [3]. Performing EBUS Transbronchial Forceps Biopsy (EBUS-TBFB) in patients undergoing EBUS-TBNA has shown to increase the diagnostic yield of EBUS-TBNA alone [4]. We present a case series of 14 patients who had undergone EBUS-TBNA followed by EBUS-TBFB. We evaluated the diagnostic yield along with a safety analysis.

Methods

We conducted a retrospective analysis, from January 2021 to April 2021, of patients who underwent EBUS-TBFB following EBUS-TBNA in the same procedure at our community hospital. This time frame was chosen as we started performing EBUS-TBFB at our facility in January 2021. The diagnostic yield of both sampling techniques, EBUS-TBNA and EBUS-TBFB, was compared with EBUS-TBNA alone. A safety analysis of the study period was conducted. Complications in the safety analysis included bleeding of greater than 20 mL, pneumothorax, respiratory failure and hospital admission due to the procedure.

An Olympus EBUS-TBNA scope connected to an ultrasound machine was used. All procedures were performed under general anesthesia with a laryngeal mask airway. The bronchoscopy was performed by a board-certified pulmonologist and a pulmonary fellow. The pulmonologists were experienced in performing EBUS-TBNA, however, were not formally trained in interventional pulmonology. EBUS-TBNA was performed first with a 19- or 21-gauge needle which helped form

a tract. Once a tract was created, the needle was removed and Boston Scientific CoreDx mini-forceps was used for intranodal forceps biopsies.

Results

A total of 14 patients underwent EBUS-TBFB following EBUS-TBNA at our center from January to April 2021. EBUS-TBNA had a diagnostic yield of 71.4% (10 out of 14 cases). Combination of both techniques increased the diagnostic yield to 92.9% (13 out of 14 cases).

The three cases which were not diagnostic by EBUS-TBNA alone, but were diagnosed after performing EBUS-TBFB, had histology showing non-caseating granulomas. No complications were seen. The diagnostic yield is listed in Table 1.

EBUS-TBNA was performed in 36 hilar and mediastinal lymph nodes. A combination of EBUS-TBNA and EBUS-TBFB was performed in 28 of those 36 lymph nodes. A total of 193 passes were made using the EBUS-TBNA needle and 139 passes were made using the Boston Scientific CoreDx mini-forceps. Lymph node size was mentioned in only 5 cases. Mean size of the lymph nodes sampled by EBUS-TBNA needle was 12.9 mm. The mean size of the lymph nodes sampled by the Boston Scientific CoreDx mini-forceps was 21 mm.

Discussion

Combining EBUS-TBFB with EBUS-TBNA is a safe sampling technique and helps increase the diagnostic yield of the procedure, especially in benign conditions. The reason for the increased diagnostic yield from EBUS-TBFB may stem from the ability to obtain larger tissue specimens for pathological evaluation. EBUS-TBNA has long been associated with a high diagnostic yield, especially with non-small cell lung cancer [3,4]. In our case series, EBUS-TBNA alone had an 87.5% diagnostic yield for lung cancer (7 out of 8 cases), consistent with previously reported studies [4]. The one case that was not diagnosed with EBUS-TBNA was successfully diagnosed on surgical lung biopsy. All 3 cases that were diagnosed with EBUS-TBFB and not by EBUS-TBNA alone showed epithelioid cells and granuloma. These patients were later diagnosed with sarcoidosis. Our study shows that there was one case where the diagnosis of squamous cell carcinoma was made on EBUS-TBNA; however, the sample obtained from EBUS-TBFB was insufficient to make a diagnosis. It is important to note that only one pass with the forceps was made, which may not be sufficient to make a diagnosis. Performing EBUS-TBFB following EBUS-TBNA is a two-step process and may increase the time of the procedure. A large enough tract has to be created with a 19- or 21-gauge needle, after which, mini-forceps is used to penetrate the bronchial wall. This increased time of the procedure should be weighed against the benefit of an increased diagnostic yield. Considering the increased tissue volume and yield, physicians may perform EBUS-TBFB in addition to EBUS-TBNA when benign conditions such as sarcoidosis are high on the differential [3-7]. Multiple studies demonstrating this had a greater mean size of the lymph nodes sampled or involved sampling only the subcarinal lymph node [6,7]. Our study illustrates the safety of mini-forceps for biopsy of mediastinal and hilar lymph nodes. In a study by Chrissian et al. [5], the mean size of the nodes sampled ranged from 27 mm for the hilar lymph nodes and 30 mm for the mediastinal lymph nodes. Our study shows that it is safe to sample much smaller lymph nodes, as illustrated by our mean lymph node size of 21 mm and smallest node size of 8 mm. There were no episodes of bleeding, respiratory failure, pneumothorax or hospital admission due to the procedure.

Table 1: Diagnostic yield.

	EBUS TBNA	EBUS TBNA AND MFB
Overall Yield	71.4% (10/14)	92.9% (13/14)
Malignant Disease (Lung Cancer)	87.5% (7/8)	87.5% (7/8)
Squamous Cell Cancer	100% (3/3)	100% (3/3)
Adenocarcinoma	100% (1/1)	100% (1/1)
Small Cell Cancer	75% (3/4)	75% (3/4)
Non Malignant Conditions		
Granulomatous Disease	40% (2/5)	5/5 (100%)
Non Granulomatous Conditions	100% (2/2)	100% (2/2)

Conclusion

EBUS-TBFB following EBUS-TBNA, is a safe and effective sampling technique. Clinicians should perform combination sampling, especially if benign conditions are high on the differential.

Future studies should compare the time difference between EBUS-TBNA alone *vs.* EBUS-TBNA with EBUS-TBFB. Studies should also evaluate if having Rapid on-Site Evaluation (ROSE) available will be of benefit.

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