

# Diagnostic Value of Endobronchial Ultrasonography in Lung and Mediastinal Lesions

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## ABSTRACT

EBUS (Endobronchial Ultrasonography) is a highly invasive diagnostic method with high rate of diagnosis by needle aspiration from mediastinal lymph nodes or masses, extremely low complication rate and costly compared to other invasive methods.

In this study, we aimed to determine the contribution of endobronchial ultrasound guided needle aspiration to the diagnosis of lung and mediastinal diseases.

Patients with mediastinal masses, mediastinal lymph nodes and lung parenchymal masses who underwent Fine-Needle Aspiration Biopsy (FNAB) accompanied by EBUS between January 2016 and January 2018 were evaluated retrospectively.

170 (65.1%) of 261 patients who underwent aspiration biopsy with EBUS were male; 91 (34.9%) patients were female. While the diagnosis was reached in 154 (90%) of 170 male patients who underwent EBUS, it was observed that the diagnosis was reached in 81 (89.0%) of 91 female patients. There was no statistically significant difference between gender and diagnosis (p value 0.685). The average age of the patients was 59.8. There was no statistical difference between age and diagnosis (p: 0.836). While 73 (31.06%) of 98 (41.7%) malignant patients were non-small cell, 20 (8.51%) patients had small cell lung cancer, 5 (2.12%) patients had metastatic tumor. 137 Benign lesion was detected in the patient (58.3%). Of the 28 patients with granulomatous inflammation, 14 (5.95%) were found to have sarcoidosis and 14 (5.95%) had tuberculosis. In addition, anthraxis in 52 (22.12%) patients, inflammation in 45 (19.14%) patients, and normal tissue in 12 (5.1%) patients. The remaining patients were non-diagnostic.

As a result; EBUS distinguishes between malignant/benign masses and granulomatous disease with material taken from leucions in lung and mediastinum. The diagnosis rate is high, the complication rate is low and the cost is cheaper compared to other invasive methods and now it is used more frequently.

**Key Words:** Endobronchial Ultrasound, Malignant, Granulomatosis

## Introduction

EBUS (Endobronchial Ultrasonography) is a highly invasive diagnostic method with high rate of diagnosis by means of needle aspiration from mediastinal lymph nodes or masses, extremely low complication rate and cost in comparison to other invasive methods. Endobronchial ultrasound-guided Fine-Needle Aspiration Biopsy (EBUS-FBNA) is a minimally invasive technique for sampling hilar/mediastinal lymph nodes and can increase diagnostic yield by direct imaging of lymph nodes beyond the tracheobronchial wall, thus allowing real-time sampling of lymph nodes (1).

Tumors or other lung diseases do not always take place in the airways, so in the bronchi. The first precursor of lung-borne diseases is sometimes the lymph nodes in the lung. EBUS, lymph nodes by scanning, suspicious lymph nodes biopsy taken to

diagnose cancer, again staging of cancer, helps. EBUS method; is a highly developed diagnostic method that can save the person from advanced surgery (2,3).

In this study, we aimed to determine the contribution of endobronchial ultrasound guided needle aspiration to the diagnosis of lung and mediastinal diseases.

## Materials and Methods

Patients who underwent EBUS-guided FNAB for diagnosis of mediastinal mass, mediastinal lymph nodes, parenchymal mass or primary lung masses in our clinic between January 2016 and January 2018 were evaluated retrospectively.

Ethical Committee Approval was obtained for the study. In the bronchoscopy unit, 'Information Forms veren giving detailed information about the interventional procedure were obtained from all

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**Table 1.** Relationship Between Diagnosis Rate and Gender, Age

	Diagnosis		P
	Diagnostic	Nondiagnostic	
Age(mean)	56±12,82	59±11,65	0,836
Women	81	10	0,685
Men	154	16	

**Table 2.** Diagnosis of Patients

Diagnosis	Number	Rate
MALIGNANT	98	%41,7
Small-cell Lung Cancer	20	%8,51
Non-Small-cell Lung Cancer	73	%31,06
Others	5	%2,12
BENIGN	137	%58,3
Normal Tissue	12	%5,1
Tubercukosis	14	%5,95
Sarcoidosis	14	%5,95
Anthracosis	52	%22,12
Inflamation	45	%19,14
TOTAL	235	%100,00

patients and their consent was accepted before the procedure.

#### Exclusion Criteria

- Unconsciousness of the patient can not sign
- Uncontrolled coagulopathy or bleeding diathesis
- Uncontrolled congestive heart failure
- The presence of uncontrollable angina, severe arrhythmia
- Myocardial infarction in the last 6 months
- Cerebrovascular event in the last 6 months

SPSS 21.0 version was used in the study statistics. Descriptive frequency tables were extracted in EBUS patient rooms. Chi-square analysis was used to determine the relationship between nominal variables. 95% confidence was accepted as  $P < 0.05$ .

#### Results

Of the 261 patients who underwent EBUS-guided aspiration biopsy, 170 (65.1%) were male; 91 (34.9%) patients were female. While the diagnosis was reached in 154 (90.0%) of 170 male patients who underwent EBUS, the diagnosis was reached in 81 (89.0%) of 91 female patients. There was no statistically significant difference between gender and diagnosis ( $p=0.685$ ). (Table 1) Patients in the study ranged from 18 to 92 years. The mean age of the patients was 59.8. There was no statistical

difference between age and diagnosis ( $p=0.836$ ). (Table 1) We examined the cytopathological results of the patients. 26 non-diagnostic, 12 normal tissues, 45 non-specific inflammation, 28 granulomatous inflammation, 52 anthracosis, 98 malignancies were reported by the pathology. Of the 98 malignancies, 73 were non-small cell, 20 were small cell lung cancer and 5 were metastatic tumors. Of the 28 patients with granulomatous inflammation, 14 had sarcoidosis and 14 had tuberculosis (Table 2).

Of the 261 patients included in the study, 120 had a mass or nodule on CT. 94 patients had parenchymal findings (consolidation, ground glass, cavitory lesion pleural effusion). Approximately 47 patients had only mediastinal lap. 235 patients were diagnosed. 113 (48.1%) had suspected nodules/masses; 85 (36.2%) patients had parenchymal radiological findings. Approximately 37 (15.7%) patients had only mediastinal lap.

It was observed that aspiration can be performed in our clinic from stations 2R(Right), 2(Left), 4R, 4L, 7, 10R, 10L, 11 with the convex probe EBUS. A total of 443 different stations were aspirated from 261 patients. The total number of aspirates taken from 261 patients was 980. (Table 3 and Table 4)

EBUS patients were examined according to Positron Emission Tomography (PET) involvement. Involvement was detected in 45 right

**Table 3.** Lymph Node Stations and Numbers

Location	Aspiration Number	Rate
Paratracheal	197	%44,46
Subcarinal	185	%41,76
Hiler	32	%7,22
11 No. Interlober	29	%6,54
Total	443	%100

**Table 4.** Lymph Node Stations and Numbers

Lymph Node Stations	Numbers	Rate
2R	54	%12,18
2L	40	%9,02
4R	58	%13,09
4L	45	%10,15
7	185	%41,76
10R	21	%4,74
10L	11	%2,48
11	29	%6,50
Total	443	%100

upper paratracheal, 38 left upper paratracheal, 69 right lower paratracheal, 49 left lower paratracheal, 60 subcarinal, right hilar 66 patients, left hilar 48, and 2 patients 11R. PET/CT mediastinal involvement was detected in 96 patients and parenchymal involvement in 78 patients. The lowest measured mass SUVmax was reported to be 1.8 and the highest SUVmax was reported as 26. SUVmax of the parenchymal masses did not have any effect on the diagnosis of needle aspiration biopsy with EBUS. (p: 0,772).

## Discussion

Invasive methods such as transthoracic needle aspiration biopsy (TTNA), conventional TBNA, mediastinoscopy and VATS (video assisted thoroscopic surgery) are used under computerized tomography for biopsy of pathological lymph nodes in mediastinum. EBUS-TBNA is a minimally invasive method that can be performed without deep sedation and low morbidity and mortality rates. It is used safely in the evaluation of mediastinal lymph node enlargement and lesions close to the bronchi (1-3). In the studies performed, because of the low complication rate and cost, and the high diagnostic rate, mediastinoscopy and VATS are mostly used in EBUS-TBNA (4,5). In addition, it was started to be used more frequently in order to evaluate the metastases of extra-thoracic malignancies. Sensitivity in studies conducted in

our country varies between 85% and 100% (6-8). In our study, diagnosis was reached in 113 (94%) of 120 patients with lung mass used in EBUS-TBNA (4,5). In addition, it was started to be used more frequently in order to evaluate the metastases of extra-thoracic malignancies. Sensitivity in studies conducted in our country varies between 85% and 100% (6-8). In our study, diagnosis was reached in 113 (94%) of 120 patients with lung mass.

One of the etiologic causes of mediastinal lymphadenitis is granulomatous diseases. The most common diseases are tuberculosis and sarcoidosis (9). Especially in cases with isolated mediastinal TB lymphadenitis and sarcoidosis without parenchymal lesions, the diagnostic value of conventional methods is quite low. In a study of 72 cases by Çağlayan et al., The diagnostic value of EBUS-TBNA was reported to be 84.2% in TB, 79.5% in sarcoidosis, and 83.3% in granuloma (10). In another study performed in 321 cases, Çetinkaya et al. Reported EBUS-TBNA and TB rate as 79% (11). Navani et al. Examined 156 isolated mediastinal lymph node TB cases in four different centers; 146 (94%) patients were diagnosed with TB by EBUS-TBNA. Diagnosis was made by histopathology in 86% of the cases and microbiologically in 47% of the cases (12). In our study, 28 of 30 cases were diagnosed as tuberculosis or sarcoidosis. Since EBUS is performed for staging purposes in our patients diagnosed with lung cancer, our rate of

granulomatous diseases is low. However, 28 of 30 cases we performed EBUS with only granulomatous lung prediagnosis were diagnosed.

One of the factors that increase the sensitivity of the technique is the number of aspirations from the lymph node station. In the patient who underwent EBUS, it is first performed to hilar lymph node stations, then to subcarinal and paratracheal lymph node stations. The lymph nodes with the highest diagnostic value are the paratracheal and subcarinal lymph nodes (13). Lee et al. in studies aiming to determine the minimum number of aspirations required for maximal diagnosis rate; They sampled 162 lymph nodes in 102 cases and aspirated 4 times in each case. When the diagnostic accuracy is examined, the rates were 89.7%, 94.4% and 98.4%, respectively (14). A study by Chin and colleagues included 79 patients. The sensitivity of each of the successive aspirates obtained from these patients was examined and it was observed that tumor positivity was detected in the first aspirate in 42% of the patients and this rate progressed to the seventh aspirate and reached 57% (15). In our study, the most common sample was taken from the right paratracheal and subcarinal regions. However, it was observed that the diagnosis rate of the patient was increased in more than one sample.

In terms of complications, EBUS procedure is very safe. In a study of 16181 patients, the rate of serious complications (pneumothorax, pneumomediastinum, esophageal perforation, bleeding, infection, esophageal fistula development) was 0.14% and simple complication rate was 0.22% (16). The most common serious complication was infection with 0.07%. In another study, 25 serious adverse events (0.15%) and 7 procedure-related deaths were reported (0.04%). The majority of serious adverse events were also found to be infection (17,18). In conclusion, mediastinal endosonographic evaluation and biopsy methods can be used safely in the diagnosis and staging of lung cancer. Complications of EBUS are the same as the complications of bronchoscopy. In our study, except for cough, desaturation and minimal bleeding during the procedure, only one case had pneumonia after the procedure.

As a result; EBUS differentiates between lung and mediastinal lesions between malignant/benign masses and granulomatous disease. The diagnosis rate is high, the complication rate is low and the cost is cheaper than other invasive methods and is now used more frequently. In addition, EBUS

method; It is a diagnostic method that protects against surgical intervention. Using this method, patients can be protected from surgery and a diagnosis and staging of lung diseases can be achieved through a painless procedure for 15-20 minutes without hospitalization. Mild side effects such as shaking, coughing and bleeding may occur in the needle area.

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