Evaluation of mediastinal lymph nodes with endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA): A retrospective study.

Adil Can Güngen[1*], Hikmet Çoban[2]

[1]Department of Pulmonology, Istinye University Hospital, Istanbul, Turkey

[2]Department of Pulmonology, Sakarya Education and Research Hospital, Sakarya, Turkey

Abstract

Background and objective: Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) is a safe and minimally invasive procedure that yields accurate results in the evaluation of mediastinal lymphadenopathies. The aim of our study was to retrospectively evaluate EBUS-TBNA procedures performed in our clinic and to reveal the value of EBUS-TBNA in terms of mediastinal lymph node diagnoses.

Methods: A total of 52 patients with mediastinal lymph node enlargement (short axis >1 cm) who underwent thoracic computed tomography and EBUS-TBNA were retrospectively included in this study.

Results: The mean age of the patients was 51.3 ± 15.5 (range: 18-74) years and there were 23 (44.2%) females and 29 (55.8%) males. The sizes of the sampled lymph nodes ranged from 10 mm to 30 mm. Of the 52 patients who underwent EBUS-TBNA, 43 (82.7%) had a final diagnosis. Mediastinoscopy was performed in nine (17.3%) patients who reached a negative cytological outcome. As a final diagnosis, sarcoidosis was found in 23 patients, tuberculosis in 3 patients, squamous cell lung cancer in 6 patients, small cell lung cancer in 9 patients, lung adenocarcinoma in 1 patient and a benign diagnosis in 10 cases. No complications were observed in any of the cases.

Conclusion: TBNA is a safe interventional procedure under EBUS guidance that provides a high adequacy and diagnostic rate for mediastinal lymph nodes and reduces the need for invasive surgery.

Introduction

Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) is an ultrasound method used to diagnose diseases that involve mediastinal lymph nodes, especially lung cancer. In conventional bronchoscopy, the bronchoscopist can only observe the internal surface and lumen of the airways. However, with endobronchial ultrasound, they can observe the tracheobronchial wall and surrounding structures. Peribronchial structures, such as veins and masses, can be assessed through ultrasonic probes developed to fit the bronchoscope processing channel, and the location of the lesion can be clearly identified, and safer and more appropriate samples can be obtained [1-3]. The purpose of this study was to assess the importance of TBNA with EBUS guidance in the diagnosis of mediastinal or hilar lymph nodes by sharing our clinical experiences.

Materials and Methods

In this study, we analysed patient results from the Yedikule Chest Diseases and Chest Surgery Training and Research Hospital 4th Clinic between January 2012-february 2013, and from the Sakarya University Education and Research Hospital Chest Diseases Clinic from 2016. We retrospectively analysed patients with a hilar or mediastinal lymph node over 1 cm in size, as determined by computerized tomography (CT), without a pathologic diagnosis. In all patients, TBNA was indicated for diagnosis and lymph node sampling with a 22-gauge cytology needle in a convex probe (CP)-EBUS. The patient sample was comprised of 23 (44.2%) females and 29 (55.8%) males. Lymph nodules were classified according to the international staging system reported by Mountain and Dressler [4]. Patients with a mediastinal lymph node accessible with EBUS-TBNA in the axial thoracic CT and those whose lymph nodes' short diameter was between 10 and 30 mm were included in the study. Permission for this study was obtained from the ethics committee of Sakarya University Medical Faculty.

EBUS-TBNA was performed under deep sedation with midazolam and propofol. CP-EBUS was used to examine the lymph nodes and evaluate the ultrasound image. Lymph node sampling was performed with 22-gauge needles.

Results

Of the 52 patients, 23 (44.2%) were female and 29 (55.8%) were male. The age range of the patients was 18-74 years with a mean age of 51.3 ± 15.5 years (Table 1).

Table 1. Demographic data of patients who underwent EBUS-TBNA.

EBUS-TBNA	Male	Female	Total
N (%)	29 (55.8%)	23 (44.2%)	52 (100%)
Age (years)	57.4 ± 13.2	43.7 ± 14.1	51.3 ± 15.5

Areas where lymph node sampling performed in these areas: 32 times from the subcarinal lymph node (7), 22 times from the right paratracheal lymph node (4R), 12 times from the right hilar lymph node (10R), 7 times from the left hilar lymph node (10L), 2 times from the right interlobar lymph node, 2 from the left interlobar lymph node (11L), 2 from the left lower paratracheal lymph node (4L), 2 from the left upper paratracheal lymph node (2L) and 1 from the right upper paratracheal (2R).

The most frequently sampled sites were the subcarinal (7) lymph nodes (61.5%) and right paratracheal (4R) lymph nodes (42.3%) (Table 2).

Table 2. Lymph node sizes and number of samples by location.

Lymph Node Localization	N (%)	Mean Lymph Node Size (mm)	Mean Number of Samplings
Right lower paratracheal (4R)	22 (42.3%)	20.7 ± 7.4	2.3 ± 0.4
Left lower paratracheal (4L)	2 (3.8%)	15 ± 7.07	2
Right upper paratracheal (2R)	1 (1.9%)	30	3
Left upper paratracheal (2L)	2 (3.8%)	30	3
Subcarinal (7)	32 (61.5%)	23.4 ± 7.2	2.4 ± 0.5
Right hilar (10R)	12 (23.07%)	2.4 ± 0.5	2.4 ± 0.5
Left hilar (10L)	7 (13.4%)	14.8 ± 4.7	2.2 ± 0.4
Right interlobar (11R)	2 (3.8%)	27.5 ± 3.5	3
Left interlobar (11L)	2 (3.8%)	20 ± 7.07	2.5 ± 0.7

A total of 43 cases (82.7%) were diagnosed and 9 (17.3%) cases were diagnosed by mediastinoscopy. The diagnostic distribution in 43 cases diagnosed with EBUS-TBNA included: sarcoidosis in 20 cases, tuberculosis in 3 cases, squamous cell lung cancer in 5 cases, small cell lung cancer in 7 cases, lung adenocarcınoma in 1 case and benign masses in 7 cases.

Mediastinoscopy was performed in nine (17.3%) patients who had a negative cytologic outcome. The final diagnosis in 52 patients was sarcoidosis in 20 cases, tuberculosis in 3 cases, squamous cell lung cancer in 6 cases, small cell lung cancer in 9 cases, lung adenocarcinoma in 1 case and benign masses in 10 cases (Table 3).

Table 3. Diagnostic evaluation of patients diagnosed with EBUS-TBNA, and those diagnosed by mediastinoscopy without being diagnosed with EBUS-TBNA.

	EBUS-TBNA (n)	Mediastinoscopy (n)	Total Patients (n)
Sarcoidosis	20	3	23
Tuberculosis	3	-	3
Squamous cell cancer	5	1	6

Small cell cancer	7	2	9
Adenocarcinoma	1	-	1
Benign	7	3	10
Total	43	9	52

The sarcoidosis diagnosis was made according to the criteria of the absence of significant necrosis in 23 cases of cytology detected with chronic granulomatous inflammation, absence of contact with tuberculosis, clinic compatibility and bilateral hilar involvement radiologically. Tuberculosis was diagnosed with the presence of a contact history in three cases, the presence of unilateral hilar or mediastinal involvement, the presence of marked necrosis in the cytology and the presence of antituberculosis treatment response. No complications developed in any of the cases.

Discussion

EBUS-TBNA is an ultrasound method developed to visualize structures of unknown hilar origin, mediastinal lymphadenopathies and masses that can be used to sample masses. There are two EBUS devices, radial and CP. The most important advantage of the CP-EBUS is the simultaneous imaging [1-3]. It can be used as a guide in the evaluation of invasion of mediastinal structures, in the diagnosis of mediastinal and hilar lymph nodes, in the diagnosis of lung cancer, and in the staging and endobronchial treatment of lung cancer [5,6]. CP-EBUS can also be used in the evaluation of benign central airway stenosis to make treatment decisions, such as laser ablation or stent placement [7].

Although the assessment of mediastinal and hilar lymph node involvement performed with TBNA in 1983 by Wang et al. became a main topic of conversation, however, more recently, less attention has been given to this process [8-10]. The studies that showed EBUS-guided TBNA increased the lymph nodes detected in pathologically-sized CT compared to conventional TBNA, by Herth et al. were the first studies showing the significance of EBUS guidance in TBNA [11]. Several studies have shown the sensitivity and specificity of TBNA in the presence of EBUS in the diagnosis of lymph nodes. Wong et al. diagnosed 61 of 65 sarcoıdosis patients with EBUS-TBNA [12].

Çetinkaya et al. diagnosed 10 sarcoidosis (stage I and stage II) in their study performed with fiberoptic bronchoscopy. Eight patients (87.5%) were diagnosed with TBNA using 19-gauge needles [13]. The diagnostic value of EBUS-TBNA in sarcoidosis was reported as 79.5% in a study performed by Çağlayan et al. [14].

In our study, 20 of 23 patients were diagnosed with EBUS-TBNA. The diagnostic value of EBUS-TBNA for sarcoidosis was 86.9%.

Yasufuku et al. found the sensitivity of EBUS-TBNA as 95.7%, the specificity as 100% and the accuracy of benign and malignant lymph node differentiation as 97.1% [6]. Based on these studies, EBUS-TBNA has been accepted as a reliable method for the diagnosis and staging of lung cancer [15]. In our study, 12 of 15 malignant patients were diagnosed and the diagnostic value was 86.6%. Diagnosis was made specifically in 43 patients (82.7%) out of 52 who underwent EBUSTBNA. Nine (17.3%) cases with a negative cytologic diagnosis were diagnosed by mediastinoscopy. Our findings are consistent with the results of previous studies. As a result, EBUS-TBNA seems to be a safe diagnostic method. Diseases, such as lung cancer, sarcoidosis and tuberculosis, can be diagnosed by EBUS without the need for more invasive procedures, such as mediastinoscopy, and it is recommended it be performed before mediastinoscopy in mediastinal staging of lung cancer. The advantages of this procedure are being minimally invasive, no hospitalization, only local anaesthesia and sedation are used and it has a high diagnostic yield. However, the disadvantages are that the subaortic and paraesophageal lymph nodes cannot be sampled, and the micrometastases can be overlooked because only small needles are used in the procedure [16,17]. EBUS-TBNA is an interventional procedure that reduces the surgical need in patients and all pulmonary medicine specialists should be aware of its advantages.

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*Correspondence to

Adil Can Güngen

Istinye University Hospital

Istanbul

Turkey