The Role of Convex Probe Endobronchial Ultrasound-Guided Transbronchial Needle Aspiration in the Diagnosis of Hilar and Mediastinal lesions

Thesis submitted for partial fulfillment of M.D *in Pulmonary Medicine*

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دور أخذ عينة بإبرة المجس المحدب بالموجات فوق الصوتية من خلال الشعب الهوائية في تشخيص الإصابات الحيزومية

رسالة توطئة للحصول علي درجة الدكتوراة في الامراض الصدرية

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List of abbreviations	
EBUS:	Endobronchial ultrasound
SVC:	Superior vena cava
LN:	Lymph node
LT:	Left
RT:	Right
CXR	chest X-ray
CECT	Contrast enhanced computed tomography
COPD	chronic obstructive pulmonary disease
HIV	human immunodeficiency virus infection
SACE	serum angiotensin converting enzyme
GCT:	Germ cell tumors
WHO:	World Health Organization
ICDO:	International Classification of Diseases for Oncology
CT:	computed tomography
FDG-PET:	Fluorodeoxyglucose-positron emission tomography
SCLC :	small cell carcinoma
NSCLC:	non-small cell carcinoma
MRI:	magnetic resonance imaging
TUS:	transcutaneous ultrasound
TMUS:	transcutaneous mediastinal ultrasound
EBUS-TBNA:	Endobronchial ultrasound combined with transbronchial needle aspiration
EUS-FNA:	endoscopic ultrasound fine needle aspiration
VAM:	video-assisted mediastinoscopy
VAMLA:	video-assisted mediastinoscopy and lymphadenectomy
VATS:	video-assisted thoracoscopic surgery
ECM:	extended cervical mediastinoscopy
TEMLA:	transcervical extended mediastinoscopy
IHC:	immunohistochemistry
cTBNA:	Conventional TBNA

US:	Ultrasound

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ROSE:	rapid on-site cytological evaluation
TB:	Tuberculosis
ERS:	European Respiratory Society
ATS :	American Thoracic Society
ACCP:	American College of Chest Physicians
FOB:	Fibro obtic bronchoscopy
SD:	Stander deviation
DA:	Diagnostic Accuracy
PPV:	Positive Predictive Value
NPV:	Negative Predictive Value
CI:	Confidence interval
TP:	True positive
TN:	True negative
FP:	False positive
FN:	False negative

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Abstract

Background: Endobronchial ultrasound-guided transbronchial needle aspiration (EBUS-TBNA) has been recently introduced as a new technique for sampling the hilar/ mediastinal lesions [lymph node (LN) enlargement or masses] with a potential to improve the diagnostic yield as it allows direct visualization of lesion beyond the tracheobronchial wall allowing real-time sampling. EBUSTBNA diagnostic yield has been satisfactory for both benign and malignant lesions.

Aim To: evaluate the utility of convex probe EBUS-TBNA in the diagnosis of hilar and mediastinal lesions (LN enlargement or masses).

Patients and methods: This is a prospective study in which EBUS-guided TBNA via a real-time ultrasound bronchoscope was used to diagnose 25 patients with mediastinal or hilar LN enlargement or masses

Results: EBUS-guided TBNA was performed on 15 patients with enlarged mediastinal/hilar LNs and 11 patients with mediastinal masses, achieving specific diagnosis in 73.3% (11/15) and 81.8% (9/11), respectively. The overall diagnostic yield of EBUS-TBNA was 76% (19/25). Overall sensitivity was 82.6%, specificity 100%, positive predictive value 100%, and negative predictive value 33.33%. EBUS-TBNA procedure had no complications in 76% of cases.

Conclusion: EBUS-TBNA is a minimally invasive, safe, yet still underutilized diagnostic technique with adequate diagnostic yield. Its nationwide application in the field of diagnostic bronchoscopy should be encouraged.

Keywords: endobronchial ultrasound-directed transbronchial needle aspiration, malignancy, mediastinal lesions, mediastinal lymph nodes, sarcoidosis, tuberculosis

Introduction

In the staging of lung cancer or in the presence of mediastinal lymphadenopathy invasive diagnosis of mediastinal lesions is fundamental. Despite imaging methods advances, tissue samples are essential for diagnostic confirmation and treatment planning ***(Pillot et al., 2006).***

for collecting material for cytology less invasive methods recently have emerged as an alternative endobronchial ultrasound (EBUS), Among these methods, developed in the past decade, as an outpatient method and allows access to hilar stations in addition to paratracheal stations, for detection and collecting material from lymph nodes less than 1 cm ***(Whitson et al., 2007).***

In the outpatient setting under sedation, EBUS-TBNA allows sampling of hilar, paratracheal, subcarinal lymphadenopathy. This technique established sensitivity more than 90% not only in the diagnosis but also in staging of lung cancer, even early in the learning process ***(Navani et al., 2011)****. In the diagnosis of sarcoidosis by utility of EBUS-TBNA Prospective data are now available ***(Tremblay et al., 2009), (Navani et al.,2011)*****,** and in

small series a high diagnostic yield has demonstrated in tuberculous lymphadenopathy ***(Hassan et al.,2011).*** While in the diagnosis of extrathoracic malignancies the role of EBUS-TBNA had a limited data ***(Tournoy et al.,2011).***

Aim of Work

The objective of the present prospective study is to evaluate the role of EBUS-TBNA in the diagnosis of hilar and mediastinal lesions (lymph node enlargement or masses)

1.Mediastinum

1.1Anatomy:

The mediastinum boundaries, the thoracic inlet superiorly, the pleural cavities laterally, and the diaphragm inferiorly. Organs located in the mediastinum include thymus gland, the great vessels, the heart, the chest portion of the trachea, lymph nodes, the esophagus, and important nerves.

Based on structural landmarks it divided into Superior mediastinum and Inferior mediastinum which divided to (Anterior - Middle- Posterior). This important for diagnosing suspected masses.***(Fraser et al.,1994)***

-Superior mediastinum Contains (Thymus- Arch of Aorta - Lt Common carotid artery- SVC- Lt &Rt brachiocephalic veins- Lymph nodes (LN)- Brachiocephalic artery- Lt Subclavian artery-Trachea- Nerves- Esophagus- Thoracic Duct).

-The anterior mediastinum contains: the thymus, fat, and lymph nodes.

-The middle mediastinum contains the pericardium, heart, trachea, bronchi, ascending and transverse aorta, LN and brachiocephalic veins.

-The posterior mediastinum contain thoracic lymph nodes, the descending thoracic aorta, fat, esophagus, azygous vein, nerves, and autonomic ganglia

The likelihood of malignancy is affected primarily by three factors: age of the patient; location of mass; and the presence of symptoms. Although mediastinal tumors are benign in more than two thirds, malignant is more likely in masses in the anterior compartment. **(*Strollo et al., 1997)***

1.2.Mediastinal lesions

In study by ***Davis et al*** malignancy was seen in 59% in anterior, 29% in middle, and 16% in posterior mediastinal masses in 400 patients. Age was an important predictor of malignancy ***(Davis et al., 1987).*** Causes of mediastinal mass by anatomic location at (table 1)

1.3. Symptoms

In Davis et al, symptoms found in 85%, 46% of patients with malignant, and benign tumor respectively. Common symptoms at presentation were; cough (60%) chest pain (30%); fevers/ chills (20%); dyspnea (16%).

The Most symptoms could categorized into: localizing symptoms secondary to tumor invasion (Table 2), and systemic symptoms due to the release of excess