ENDOBRONCHIAL ULTRASONOGRAHY FOR LUNG CANCER STAGING IN NEGATIVE MEDIASTINUM ON COMPUTED TOMOGRAPHY

Thesis

Submitted for partial fulfillment of M.Sc. degree in

Chest disease and tuberculosis

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2009

Acknowledgement

Before and above all, all thanks to **“ALLAH”** who makes every thing and supports any one return to hem.

I wish to express my deepest gratitude to Prof. **Nariman Abdel Rahman Helmy,** Professor of Chest Diseases, faculty of Medicine, Cairo University, for her support, sincere guidance, kind supervision, and continuous encouragement and advices to me through the whole work.

My sincere gratitude and appreciation to Dr. **Khaled Mahmoud Kamel,** Assistant Professor of Chest Disease, faculty of Medicine, Cairo University. I’m truly thankful for his time and support and I cannot deny gaining my benefit from his great experience in bronchoscopy and endobronchial ultrasonography.

I am very grateful to Dr. **Naglaa Bakry Ahmed,** Lecturer of Chest Disease, faculty of Medicine, Cairo University, for her constant assistance and valuable support.

Lastly I wish to express my great thanks to my **mother** for her support and always being my backbone.

ABSTRACT

Lung cancer is the leading cause of death from malignancy world wide. The TNM (T = primary tumor, N = regional lymph nodes, M = distant metastasis) staging system for this type of cancer subdivides patients into anatomic groups. This system is central to determining treatment options and prognosis and to comparing survival among therapeutic trials. In the absence of distant metastasis, mediastinal lymph node metastasis in non-small-cell lung cancer is a critical issue. Almost half of patients with this type of cancer present with metastasis to the mediastinal lymph nodes, a characteristic that is the major obstacle to cure.

To evaluate the mediastinal lymph nodes, computed tomography of the thorax with intravenous contrast scanning should be done in patients suspected of having lung cancer. The diagnostic accuracy of computed tomography for detecting lymph node metastasis in lung cancer is about 60% in non-small-cell lung cancer, the risk for metastasis to the mediastinal lymph nodes increases with lymph node size.

Key Words:

Lung Cancer, **lung cancer Staging, Endobronchial ultrasonography**

CONTENTS

List of Abbreviations

ACTH	:	Adrenocorticotrophic hormone
BAL	:	Bronchoalveolar Lavage
CP	:	convex probe
CT	:	Computed tomography
EBUS	:	Endobronchial ultrasound
EBUS-TBNA	:	Endobronchial ultrasonography-Trans bronchial needle aspiration
EP	:	echo probes
FDG	:	Fluorodeoxyglucose
FNA	:	Fine needle aspiration
FOB	:	Fiberoptic bronchoscopy
H&E	:	Hematoxylin and eosin
HRCT	:	High resolution Computerized tomography
Hz	:	Hertz
IASLC	:	International Association for the Study of Lung Cancer
KHz	:	Kelo hertz
LN	:	Lymph node
Lt	:	Left
MHz	:	Mega hertz
MRI	:	Magnetic resonance imaging
NSCLC	:	Non small cell lung cancer
P-A	:	Postero-Anterior
P.A	:	pulmonary artery
PET	:	Positron emission tomography
Rt	:	Right
SCLC	:	Small cell lung cancer
SIADH	:	syndrome of inappropriate secretion of antidiuretic hormone
SVC	:	Superior Vena Cava
TBLB	:	Transbronchial lung biopsy
TBNA	:	Transbronchial needle aspiration
TNM	:	Tumor, Node, Metastasis
TTNA	:	Transthoracic needle aspiration
UT	:	Ultrasonic Testing
VATS	:	Video-assisted thoracoscopic surgery
Vs.	:	Versus
W H O	:	World Health Organization

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INTRODUCTION

Lung cancer continues to be a major health problem, it is the most common cause of cancer-related deaths in men and women worldwide ***(Finkelstein et al., 2003).***

Accurate staging in patients with lung cancer is of paramount importance. It will guide choices of treatment and determine prognosis and outcome ***(*Edward *et al., 1999).***

Computed tomography (CT) scanning is the standard imaging modality widely used to staging, planning treatment, evaluating response, and estimating prognosis of lung cancer ***(Kazuya et al., 2000).***

Conventional radiologic tools such as chest CT scan and chest tomography are frequently unreliable in staging mediastinal lymph node metastases of lung cancer, with limited diagnostic accuracy since interpretation relies principally on lesion size ***(Oliver et al., 2005).***

Because the mediastinal and hilar lymph nodes are adjacent to the pulmonary artery or vein, and movement and partial volume effects of these vessels occur, it is occasionally difficult to differentiate lymph nodes from vascular structures. Therefore, the diagnosis of lymph node metastasis by CT scan and chest tomography is usually less reliable in the hilum and in the mediastinum. ***(Hiroaki et al., 2002).***

The technique of endobronchial ultrasonography (EBUS) has improved significantly in the last years. However, it has been used in very

few studies to determine the mediastinal and hilar lymph node metastases ***(Herth et al., 2002).***

EBUS offers a unique way of imaging airway and parabronchial structures during a bronchoscopic procedure. The procedure is safe, minimally invasive and does not require general anesthesia or hospitalization. The complication rate is extremely low (***Koji et al., 2005).***

EBUS may be superior to conventional radiologic tools in detection of mediastinal and hilar lymph node metastases. Clinically, it should be considered in the staging of all patients without mediastinal lymph node enlargement on CT scan. It could be an obvious choice for the primary procedure, to know whether lymph node metastases are present prior to treatment. In order to improve the accuracy of diagnosis of lymph node metastases (***Gerard et al., 2007)***

AIM OF THE WORK

To evaluate the role of Endobronchial Ultrasonography in staging lung cancer in patient without mediastinal lymph nodes on chest computed tomography.

LUNG CANCER

Lung cancer is one of the most important diseases in respiratory medicine. Worldwide, it is the commonest cancer in men, virtually the commonest in women, and has a greater total incidence than that of colorectal, cervical, and breast cancer combined ***(Stephen and Joanna, 2002).***

Epidemiology of lung cancer:

Incidence:

As detected by age adjusted morality rate, in males it increases steadily then it is plateaued then started to decline, for women the incidence is still increasing world wide. The rate of increase is 0.5% per year. Male/female ratio is 1.4:1 ***(Greenlee et al., 2001).***

Mortality rates:

Lung cancer has a median survival of 6-12 months from the time of diagnosis with an overall 5-year survival of 5-10% ***(Stephen and Joanna, 2002).***

Lung cancer is the leading cause of cancer death in the United States, with an annual incidence of 170,000 cases ***(Pankaj et al., 2007).***

Lung cancer remains the leading cause of cancer death in both men and women even though an extensive list of risk factors has been well-characterized. Far and away the most important cause of lung cancer is exposure to tobacco smoke through active or passive smoking. The reductions in smoking prevalence in men that occurred in the late 1960s through the 1980s will continue to drive the lung cancer mortality rates

downward in men during the first portion of this century. This favorable trend will not persist unless further reductions in smoking prevalence are achieved ***(Anthony et al., 2003).***

The prognosis of lung cancer is poor, with less than 15% of patients surviving 5 years after diagnosis. The poor prognosis is attributable to lack of efficient diagnostic methods for early detection and lack of successful treatment for metastatic disease. Most patients (>75%) present are rarely curable with current therapies. Within the last decade, rapid advances in molecular biology, pathology, bronchology, and radiology have provided a rational basis for improving outcome ***(Fred et al., 2001).***

Pathology of Lung Cancer:

The distinction between SCLC and NSCLC is critical, both clinically and in terms of tumor genetics and biology. Small cell lung cancer (SCLC) was first described as a tumor of the bronchus, as opposed to a round cell sarcoma. The World Health Organization (WHO) and International Association for the Study of Lung Cancer (IASLC) have sponsored workshops to develop standardized morphologic classifications of lung cancer and SCLC subtypes. Although the subtypes of SCLC are not clinically useful in determining therapy, the recognition that mixed tumors containing two or more elements of SCLC, adenocarcinoma, or squamous cell carcinoma has promoted the concept that the major forms of lung cancer are closely related, perhaps arising from a common stem cell. Bronchogenic carcinomas are 95% all primary lung tumors. The remaining 5% of primary lung cancers are of other various origins and either benign or malignant.The revised WHO classification of lung cancer included: