Yield of Different Diagnostic Modalities in the Diagnosis of Exudative Pleural Effusion in Abassia Chest Hospital During Period from January 2011 to December 2011

Thesis

Submitted For the Partial Fulfillment of Master Degree In
Chest Diseases and Tuberclosis

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Acknowledgment

First and above all, my deepest gratitude and thanks to ***Allah*** *for achieving any work in my life.*

Words stand short when coming to express my deep gratitude and great thanks to ***Prof. Taher Abd El Hamed El Naggar,*** *Professor of Chest Diseases, Faculty of Medicine Ain Shams University for his continuous encouragement, sincere advice, and co-operation in all steps of this work.*

I am deeply grateful to ***Prof. Ahmed Abd El Gawad El Masry,*** *Assistant professor of Chest Diseases, Faculty of Medicine, Ain Shams University, who devoted his time, effort and experience to facilitate the production of this work.*

Nihad Mohammed Mahmoud Mohammed Eid

حصيله الطرق المستخدمه لتشخيص حالات الانسكاب البلوري النضحي بمستشفى صدر العباسية من الفترة يناير٢٠١١ الى ديسمبر ٢٠١١

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آية (١١٣)

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LIST OF ABBREVIATIONS

AIDS	: Acquired Immunodeficiency Syndrome
ANA	: Antinuclear Antibodies
C.T	: Computed Tomography
CA-125	: Cancer Antigen 125
CO_2	: Carbon Dioxide
CRP	: C-reactive Protein
CYFRA21-1	: Cytokeratin-19 Fragments
EPTB	: Extra Pulmonary Tuberculosis
FVC	: Forced Vital Capacity
HIV	: Human Immunodeficiency Virus
IFN-γ	: Interferon gamma
IgA	: Immunoglobulin A
IgG	: Immunoglobulin G
IgM	: Immunoglobulin M
IL	: Interleukin
LDH	: Lactate Dehydrogenase
LE cells	: Lupus Erythematosus Cells
MMP	: Matrix Metallo Proteinaseases
MPE	: Malignant Pleural Effusion
MPE	: Malignant Pleural Effusion
MRI	: Magnitic Resonance Imaging
PAF	: Platlet Activating Factor
PCO_2	: Partial Pressure of Carbon Dioxide
PE	: Pleural Effusion
PGE	: Prostaglandin E
PMN	: Polymorph Nuclear Leucocytes
PND	: Paroxysmal Nocturnal Dyspnea
SLE	: Systemic Lupus Erythematosus
TB	: Tuberculosis
TLC	: Total Lung Capacity
TNF-α	: Tumour Necrosis Factor Alpha
TPE	: Tuberculous Pleural Effusion
TU PPD	: Tubercline unit purified protein derivative
VATS	: Video Assisted Thoracic Surgery
VEGF	: Vascular Endothelial Growth Factor

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INTRODUCTION

In human anatomy, the pleural cavity is the body cavity that surrounds the lungs. ***The pleura*** is a serous membrane which folds back onto itself to form a two-layers, membrane structure. The thin space between the two pleural layers is known as the pleural cavity; it normally contains a small amount of pleural fluid the outer plura (parietal Pleura) is attached to the chest wall. The inner pleura (visceral pleura) covers the lungs and adjoining structures, blood vessels, bronchi and nerves. The parietal pleura is highly sensitive to pain, while the visceral pleura is not, due to its lack of sensory innervations ***(Moor et al , 2006).***

Pleural effusion is an abnormal collection of fluid in the pleural space from excess fluid production or decreased absorption ***(Diaz-Guman & Dweik, 2006).*** Pleural effusion is an indicator of an underlying disease process that may be tranudative or exudative in orining and may be a cut or chronic **(*Sahn, 1006 ; light, 2006*).**

***Fluid is considered exudative if it meets one or more of the following criteria*:**

The absolute pleural fluid lactate dahydrogenase **(LDH)** level is >200

The pleural: serum LDH ratio is > 0.6 ; and/or the pleural:serum protein ratio is > 0.5 ***(Light at al, 1972)***

The most common causes of ***transudative*** pleural effusion are left ventriclar failure, and cirrhosis, nephrotic syndrome ***(Porcel & Light , 2008).***

The most common causes of **exudative** pleural effusions bacterial pneumonia, cancer (with lung cancer, breast cancer, and lymphoma causing approximately 75% of all malignant pleural effusions), viral infection, and pulmonary embolism ***(Lyra ,1997)***.

A diagnostic thoracentesis should be performed early in the course of investigation. Cytology is positive is approximately 60 percent of malignant pleural effusions ***(Maskell & Butland, 2003).*** A pleural fluid ADA level greater than 40 U per L has a sensitivity of 90 to 100 percent and a specificity of 85 to 95 percent for the diagnosis of tuberculous pleural effusion ***(Light, 2001; Porcel & Light 2004; Porcel & Vives, 2003; Greco et al, 2003).*** The specificity rises above 95 percent if only lymphocytic exudates are considered ***(Porcel &Vives, 2002; Jimenez Castro et al, 2003).*** Cultures for both aerobic and anaerobic bacteria will identify the responsible microorganism in about 40 percent of parapneumonic effusions ***(Porcel & light, 2004).*** Closed-needle biopsy of the pleural for histopathological examination classically has been

recommended for undiagnosed exudative effusions when tuberculosis or malignancy is suspected. The combination of histopathology (80 percent sensitivity) and culture (56 percent sensitivity) of pleural biopsy tissue establishes the diagnosis of tuberculosis in up to 90 percent of patients ***(Light, 2001; Poreel & Light, 2004).*** However, this diagnosis is strongly suggested by a high ADA level in the pleural fluid, as detailed above, thus avoiding the need for a confirmatory biopsy in most patients. The diagnostic yield form pleural biopsy is higher when it used with some from the image guidance to identify areas of particular thickening or nodularity ***(Maskell et al, 2003).***

Despite thoracentesis and pleural biopsy, 10%-20% of patients with maliganant pleural effusions will still not have a diagnosis ***(Fenton & Richardon 1995; pass, 1997).*** In such patients thoracoscopy will be needed for diagnosis. ***(Fenton& Richardson, 1995; Colt, 1995)***.

AIM OF WORK

This retrospective study will show yield of different methods (thoraosentesis, ADA, cultures, closed needle biopsy, thoracoscope and open pleural biopsy) for reaching the final diagnosis of exudative pleural effusion.

ANATOMY OF THE PLEURA

The pleura is a thin, glistening, slippery serous membrane. Embriologically, the pleural membrane is developed from mesenchyme ***(Gray and Skandalakis, 1985)***, it lines the thoracic wall and diaphragm, where it is known as the parietal pleura. It is reflected onto the lung, where it is called the visceral pleura. The visceral pleura envelopes and invests the entire surface of the lungs, mediastinum and diaphragm. At the lower border of the hilum, the pleural reflections from the dorsal and ventral surface of the lung usually extend to the diaphragm as a double layer of mesothelial tissue; the pulmonary ligament ***(Johnston and Green, 1983).***

The pleural cavity entangling a very thin layer of fluid, thus making it easily slippery during lung movement ***(Gray and Skandalakis, 1985).*** The facing surfaces of the parietal and visceral pleura slide smoothly against each other during respiration. The contact between the parietal and visceral pleura depends on the atmospheric pressure on the outside of the chest wall and inside the alveoli (which are connected to the exterior by the bronchial tree). On the other hand, the two pleural layers tend to be separated by the elasticity of the thoracic wall (directed outward) and the lungs (stretched by inspiration). Pleural membranes facilitate the movement of the lungs within the thorax during breathing. Another function is coupling the lungs to the chest wall ***(Sheldon et al, 1981)***

BLOOD SUPPLY TO THE PLEURA:

The parietal pleura receives its blood supply from the systemic capillaries. Small branches of the intercostal arteries supply the costal pleura, whereas the mediastinal pleura is supplied principally by the pericardiacophrenic artery. The diaphragmatic pleura is supplied by the superior phrenic and musculophrenic arteries. The venous drainage of the parietal pleura is primarily by the intercostal veins, which empty into the inferior vena cava or the brachiocephalic trunk. The venous drainage of the diaphragm is either caudally into the inferior vena cava through the inferior phrenic veins, or cranially into the superior vena cava through the superior phrenic veins ***(Peng and Wang, 2003)***.

Humans have a thick visceral pleura, which is probably why it is also supplied by the bronchial artery ***(Bernaudin and Fleury, 1985)***. All investigators agree that the bronchial artery supplies most of the visceral pleura facing the mediastinum, the pleura covering the interlobular surfaces, and a part of the diaphragmatic surface. The blood supply for the remaining portions of the visceral pleura is less understood and is thought by some to be through the pulmonary artery ***(Peng and Wang, 2003)***.

The venous drainage of the visceral pleura is through the pulmonary veins ***(Light, 2007).***

PLEURAL LYMPHATICS:

The lymphatic plexuses in the costal pleura are mainly confined to the intercostal spaces and are absent or minimal over the ribs ***(Peng and Wang, 2003).***

The lymphatic vessels of the costal pleura drain ventrally toward nodes along the internal thoracic artery and dorsally toward the internal intercostal lymph nodes near the heads of the ribs. The lymphatic vessels of the mediastinal pleura pass to the tracheobronchial and mediastinal nodes, whereas the lymphatic vessels of the diaphragmatic pleura pass to the parasternal, middle phrenic, and posterior mediastinal nodes ***(Parungo et al, 2005).***

The visceral pleura has extensive lymphatics, but they do not connect to the pleural space ***(Albertine et al, 1982).***

The parietal pleural lymphatics connect to the pleural space via stomas, holes of 8 to 10 μm in diameter that are formed by discontinuities in the mesothelial layer where mesothelium joins to the underlying lymphatic endothelium ***(Li and Li, 2003).***

The stomas can accommodate particles as large as erythrocytes. In various experimental studies, these lymphatics have been shown to be the major route of exit of liquid from the pleural space ***(Broaddus et al, 1988).*** From the stomas, liquid