Correlation between Computed Tomography of the Chest and Medical Thoracoscopic Findings in Primary Pleural Tumors

Thesis

Submitted for partial fulfillment of the master degree in chest disease

By: **Suzan Mohamed Abdelmaged**
M.B., B. Ch.

Supervised by

Professor. Tarek Mohamed Aziz Safwat
Professor of Pulmonary Medicine
Faculty of Medicine, Ain Shams University

Doctor. Samar Hassan Sharkawy
Assistant professor of Pulmonary Medicine
Faculty of Medicine, Ain Shams University

Doctor. Amr Mounir Shoukri
Lecturer of Pulmonary Medicine
Faculty of Medicine, Ain shams University

Faculty of Medicine
Ain Shams University
2014


بسم الله الرحمن الرحيم
قَالُوا سُبْحَانَكَ لاَ عِلْمَ لَنَا إِلاَّ مَا
عَلَّمْتَنَا إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ
صدق الله العظيم
سورة البقرة آية (32)

Acknowledgement

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

*Words stand short when coming to express my deep gratitude and great thanks to **Prof. Tarek Aziz Safwat** 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 **Dr.Samar Hassan Sharkawy** assistant prof of Chest Diseases, Faculty of Medicine Ain Shams University, who devoted her effort and experience to facilitate the production of this work.*

*I would like to express my deepest thanks and gratitude to **Dr. Amr Mounir Shoukri** lecturer of Chest diseases,Faculty of Medicine, Ain Shams University for his valuable knowledge, great help, and guidance during this work and reviewing my work till the end. Words of thanks are little to express my gratitude to him for giving me the chance to learn something new and useful.*

*I am very grateful to the thoracoscopist **Dr. Emad Edward**, **Dr. Ehab Thabet** and **Dr. Wael Emara** for their cooperation and support.*

Finally, I'd like to express my deep thanks to my family who were beside me giving me support to complete this work

Suzan Mohamed Abdelmaged

Contents

List of Abbreviations

ARBPD	:	Asbestos related benign pleural disease.
µm	:	Micrometer.
cm	:	Centimeter.
CALGB	:	Cancer and leukemia group B.
CEA	:	Carcino embryonic antigen.
CT	:	Computerized tomography.
CT-CNPB	:	CT scan-guided cutting-needle pleural biopsy.
ECG	:	Electrocardiogram.
EORTC	:	European organization for research and treatment of cancer.
EPP	:	Extrapleural pneumonectomy.
FDG	:	Fluorodeoxy glucose.
FEAT	:	Florescin enhanced autofluorescence thoracoscopy.
IMIG	:	International Mesothelioma Interest Group.
LDH	:	Lactate dehydrogenase.
MARS	:	Mesothelioma and radiology surgery.
MPD	:	Malignant pleural disease.
MPM	:	Malignant pleural mesothelioma
MRI	:	Magnetic resonance imaging.
NBI	:	Narrow band imaging.
PET	:	Positron emission tomography.
PSP	:	Primary spontaneous pneumothorax.
RECIST	:	Response evaluation criteria in solid tumor.
SD	:	Standard deviation.
SEER	:	Surveillance Epidemiology and End Result.
SUV	:	Standardized uptake value.
TB	:	Tuberculosis.
VATS	:	Video assisted thoracoscopic surgery.
VEGF	:	Vascular endothelial growth factor.
WLT	:	White light thoracoscopy.
WT1	:	Wilms tumor 1.

List of tables

List of Figures

List of Figures (Cont.)

Introduction

Pleural effusion is excess fluid that accumulate in the pleural space ***(1)***.

Malignant pleural effusion is one of the leading causes of exudative effusion. Studies have demonstrated that 42% to77% of exudative effusions are secondary to malignancy ***(2).***

The response of the pleura by an infiltrating disease process is manifested radiologically by effusion, thickening or nodularity. Several imaging modalities can be used to evaluate pleural masses, and the common non invasive methods include chest radigraph, Computed tomography (CT), and magnetic resonance imaging (MRI). Computed tomography of the chest provides greater detail in imaging and clinical staging of malignant pleural mesothelioma(MPM) compared with chest radiography ***(3)***.

Thoracoscopy has been the procedure of choice in various chest diseases**.** Thoracoscopy allows visualization of the pleural cavity including the diaphragmatic, visceral pleura and the lung. The procedure does not only give information on the extent of the disease itself but also allows adequate tissue biopsy sampling which helps to distinguish between viable tumors and other lesions as for example fibrotic reaction ***(4).***

In patients with only fluid appearance on CT scan, thoracoscopy should be the first method used in order to improve the chance for final diagnosis. Also, if benign asbestos pleurisy or any other benign disease other than TB is suspected, the first method for diagnosis should preferentially be thoracoscopy for exclusion of malignancy. For example in cases where no pleural thickening is detected, procedures other than thoracoscopy, which are performed without seeing the pleural space may increase the risk of vascular injury, especially in patients with high hydrostatic vascular pressure in parietal pleura, for some cases an additional advantage of thoracoscopy is that diagnostic and therapeutic aims, such as drainage and pleurodesis can be achieved in a single session ***(5).***

Aim of the Work

The aim of this study is to correlate and compare the findings of computed tomography of the chest and medical thoracoscopic findings in primary pleural tumors.

Malignant Pleural Mesothelioma

Malignant pleural mesothelioma (MPM) is an aggressive tumor, usually associated with a poor prognosis. The incidence of MPM is increasing throughout most of the world, and it is expected to rise in the next 10-20 years as a result of widespread exposure to asbestos in the past decades ***(6).***

It develops from transformed cells originating in the mesothelium, the protective lining that covers many of the internal organs of the body. The most common anatomical site for the development of mesothelioma is the pleura (the outer lining of the lungs and inner chest wall), but it can also arise in the peritoneum (the lining of the abdominal cavity), and the pericardium (the sac that surrounds the heart), or the tunica vaginalis ***(7).***

Epidemiology of malignant mesothelioma*:*

Asbestos

Asbestos is the principal aetiological agent of MPM. This term refers to a group of six silicate minerals of very thin fibers: chrysotile, crocidolite, amosite, anthophyllite, tremolite and actinolite. Chrysotile belongs to the serpentine group and the others to the amphibole group of minerals. Chrysotile is

less biopersistent in the lungs than amphiboles. Chrysotile, amosite and crocidolite have all been widely used for industrial purposes. The first studies on the association between asbestos and MPM were published in the 1960s ***(8).***

As most asbestos exposure is work-related, mesothelioma is an occupational disease in the majority of cases. The background incidence is very low. Because past exposure to asbestos was more common in occupations with a predominantly male workforce, the current incidence of MPM is higher among males than females. For example, according to the French National Mesothelioma Surveillance Program, the risk fraction attributable to occupational asbestos exposure is 80% in males and 40%in females ***(9).***

Over the last decades, a shift has been observed in the exposure history of mesothelioma cases, from primary asbestos workers (handling raw asbestos material) to end-users often exposed when installing asbestos products or handling asbestos materials that are still in place, e.g. construction workers, electricians, plumbers and heating workers. Even if the occupations with the highest risk of mesothelioma belong to the first group, the number of subjects at risk of MPM is presently much larger in the latter group. Environmental mesotheliomas are either linked to ‘‘natural’’exposure in areas

of the world where asbestos (generally tremolite) exists as a geological component of the soil (Turkey,Corsica, Cyprus and New Caledonia) or where it is often used for white-washing walls of houses, or to neighbourhood exposures in people living close to asbestos mines or factories ***(10).***

Para-occupational cases are described in households of asbestos workers, mainly because of domestic exposure via clothes used at work. A dose-effect relationship has been demonstrated, but it is impossible to define a threshold of cumulative exposure below which there is no increased risk. Therefore, all individuals who have been exposed to asbestos are considered to be a population at risk ***(11).***

The global attributable proportion of MPM to asbestos is 80%in males but much less in females. A dose-response relationship is clearly established for asbestos and MPM, but the disease may be observed in subjects having low-dose cumulative exposures ***(12).***

MPM is mainly observed following asbestos exposure from occupational origin, but it is also observed in para-occupational and environmental exposures to asbestos. Most amphibole fibers, particularly crocidolite but also amosite and tremolite have a higher carcinogenic pleural potency than chrysotile fibres. Most workers have experienced mixed

exposure to various asbestos types. Mesothelioma has been associated with chrysotile exposure, but in most cases chrysotile was contaminated or associated with amphibole fibres. At present, the carcinogenic potency of short asbestos fibres cannot be ruled out. In most cases, pleural plaques are a sign of previous asbestos exposure ***(12).***

MPM may be observed in exposed individuals without any other asbestos-related disease (lung or pleural fibrosis). In most cases, pleural plaques are a sign of asbestos exposure in the past, and it has been reported that they are associated with a greater risk of mesothelioma. Indeed, it is expected that mesothelioma is more frequent in subjects with pleural plaques than in the general population because both diseases are strongly associated with asbestos exposure There is no clear evidence that pleural plaques alone would increase the risk of MPM. MPM may be observed in exposed individuals without any other asbestos related disease ***(13).***

Other factors

Agents other than asbestos are considered to be recognised or potential risk factors or cofactors for MPM, namely exposure to other natural (erionite and fluoro-edenite) or man-made (refractory ceramic) fibers, ionising radiation