Retrospective study in the prevalence of mesothelioma during the last 10 years

A big centre study in Cairo University Hospitals

Thesis

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LIST OF CONTENTS

LIST OF TABLES

	RESULTS	
1	Total number of cases every three years.	**112**
2	Cases classified according to Age.	**113**
3	Cases classified according to sex.	**113**
4	Cases classified according to residence.	**114**
5	Cases classified according to occupation.	**116**
6	Cases classified according to clinical presentation.	**116**
7	Cases classified according to radiological presentation.	**117**
8	Cases classified according to procedure of taking biopsy.	**117**
9	Cases classified according to histopathological type.	**118**
10	Effect of pathological type on the OAS.	**119**
11	Modalities of treatment recieved.	**120**
12	Effect of different modalities of treatment on the OAS.	**120**
13	Effect of chemoth. vs. chemoth. + Surgery on the OAS.	**121**
14	Effect of surgery vs. chemoth. + Surgery on the OAS.	**121**
15	Effect of surgery vs. chemoth. On the OAS.	**122**
16	Effect of supportive vs. chemoth.+ Surgery on the OAS	**122**
17	The OAS of all cases.	**124**

LIST OF FIGURES

LIST OF ABBREVIATIONS

ADA	Adenosine Deaminase.
B.C	Before Christ.
B.C.G	Bacilli – Calmette – Guerin.
CA 15-3	Cancer Associated Antigen.
CA 19-9	Carbohydrate Antigen.
CEA	Carcino-emberionic Antigen.
CALGB	Cancer and Leukemia Group B.
CK5/6	Cytokeratine 5/6.
CD	Cluster of lymphocyte differentiation.
CT	Computed tomography.
DLco	Diffusion Lung Capacity.
DMM	Diffuse Malignant Mesothelioma.
DNA	Deoxyribonucleic acid.
ECOG	Eastern Cooperative Oncology Group.
EGF	Epidermal Growth Factor.
EORTC	European Organization for Research and Treatment of Cancer.
EPP	Extrapleural Pneumonectomy.
FDG	Fluorodeoxyglucose
FRC	Functional Residual Capacity.
F/ml	Fiber / milliliter.
GCV	Ganciclovir.
G	Gouge.
HSV*tk*	Herpes Simplex Virus thymidine kinase
IGF	Insulin Growth Factor.
IHC	Immunohistochemistry.
IL-2	Interleukin 2.
IL-6	Interleukin 6.
IMIG	International Mesothelioma Interest Group.
IMRT	Intensity Modulated Radiation Therapy.
IFN- γ	Interferon gamma.

IFN- α	Interferon alpha.
Leu M1	Leukocyte M1.
LDH	Lactate Dehydrogenase.
MAb	Monoclonal Antibody.
MPF	Megakaryocyte Potentiating Factor.
MPM	Malignant Pleural Mesothelioma.
MRI	Magnetic Resonance Imaging.
NCI	National Cancer Institute.
NF2	Neurofibromatosis type 2.
ODN	Oligodeoxyneocleotide
OAS	Overall survival.
PAO_2	Alveolar Oxygen tension.
PAS-D	Periodic Acid Schiff after diastase digestion.
PCO_2	Carbon dioxide tension.
PDGF	Platelet Derived Growth Factor.
P/D	Pleurectomy / Decortication.
PET	Positron Emission Tomography.
PH_2O	Water tension.
PN_2	Nitrogen tension.
PPDs	Personal Protective Devices.
Rb	Retinoblastoma.
SMRP	Soluble Mesothelin Related Peptides.
SOB	Shortness of breath.
SV-40	Simian Virus 40.
T-Ag	T- Antigen.
TGF-β	Transforming Growth Factor β.
TNF	Tumor Necrotic Factor.
T.T.	Tuberculin test.
TTF-1	Thyroid Transcription Factor 1.
VATS	Video Assisted Thoracoscopic Surgery.
WTp53	Wilde Type of P53.
WT1	Wilm's Tumor 1.

ABSTRACT

Asbestos has been recognized in Egypt since a long time as ancient Egyptians were using it in mummification. Mesothelioma in Egypt is mainly attributed to environmental origin, although there may be many other causes such as SV-40 infection and genetic predisposition ***(Gaafar and Ally Eldin, 2005)***. Also there is high frequency of SV40 in Egyptian patients could be attributed to the polio vaccines that were prepared in Eastern Europe and distributed in many countries including Egypt ***(Abderahman et al., 2007).***

The incidence of mesothelioma is rising in Egypt. Epidemiological data for 584 malignant pleural mesothelioma (MPM) patients over the last 10 years in the third Millennium were collected from the National Cancer Institute (NCI) and Cairo University. This number is more than four times the number diagnosed in the previous 11 years at NCI ***(Gaafar, Aly Eldin, 2005)***.

Whole Egypt is in a great danger and asbestos in Cairo is a silent killer and measures toward eliminating it entirely or at least strictly controlling human contact with this dangerous carcinogen have to be taken in order to combat the coming epidemic of mesothelioma in Egypt.

Key Words

Malignant Pleural Mesothelioma, Epidemiology, Asbestos.

INTRODUCTION

Before 1960 malignant mesothelioma was regarded as a very rare tumor of unknown aetiology ***(Hillerdal, 1983)***. Now there is a great concept that the incidence of mesothelioma depends on exposure to asbestos and the risk increases with specific types of asbestos fibers and increasing the dose of exposure to asbestos ***(Bolton et al., 1982)***.

There is study that has shown DNA sequence resembling that of a monkey virus in human mesothelioma tissue. This virus contaminated some of the injected Salk poliomyelitis vaccine used in 1950s ***(Carbone et al., 1996 and Pepper et al., 1996).***

Approximately thousands of people each year die of mesothelioma in UK and this figure is rising annually. Unfortunately, the continued extensive use of asbestos for at least 20 years after the association with mesothelioma was described, together with the fact that once in place the mineral remains a threat to those who are required to remove or work with it, means that the epidemic of mesothelioma is likely to continue rising for further 20 years and even may be responsible for about 3000 death in UK each year ***(Peto et al., 1995).*** Mesothelioma is now the most common of the serious dust-related diseases, as well as being the most fatal and even so there is no clear documented studies that explain the prevalence of mesothelioma in Egypt.

According to the site ***Elmes and Simpson*** in ***1976*** classified mesothelioma to either pleural, peritoneal or pericardial. The last two sites are much less common than the first one which will be the main axis in our study.

According to histological type ***Whitwell et al.,*** in ***1977*** classified mesothelioma into epithelial type, , sarcomatous type or mixed epithelial and sarcomatous type.

Diagnosis of mesothelioma depends on:

1. History of exposure to asbestos.
2. Radiographic features which are usually of large unilateral pleural effusion and if the pleura can be seen pleural nodules may be visible.
3. Biopsy from the pleura either by needle biopsy, thoracoscopic biopsy, open pleural biopsy or aspiration of pleural fluid which is usually difficult due to thick pleura.

The clinical course of mesothelioma is steady deterioration to death over one to two years although there is some evidence that patients with epithelial pattern have some what better prognosis over the other patterns ***(Hillerdal, 1984)***.

The prospects for curative treatment are not good: Management is either by surgery, radical radiotherapy and chemotherapy. Surgery is popular in USA and has a high mortality rate. Radiotherapy may produce some regression and also complications. Single agent chemotherapy and multiple regimens had been tried ***(Boutin et al., 1994).***

AIM OF THE WORK

This work is aiming to detect the increasing incidence of mesothelioma in Egypt over the last decade, and role of new techniques in diagnosis and management.

Chapter (1); Pleura

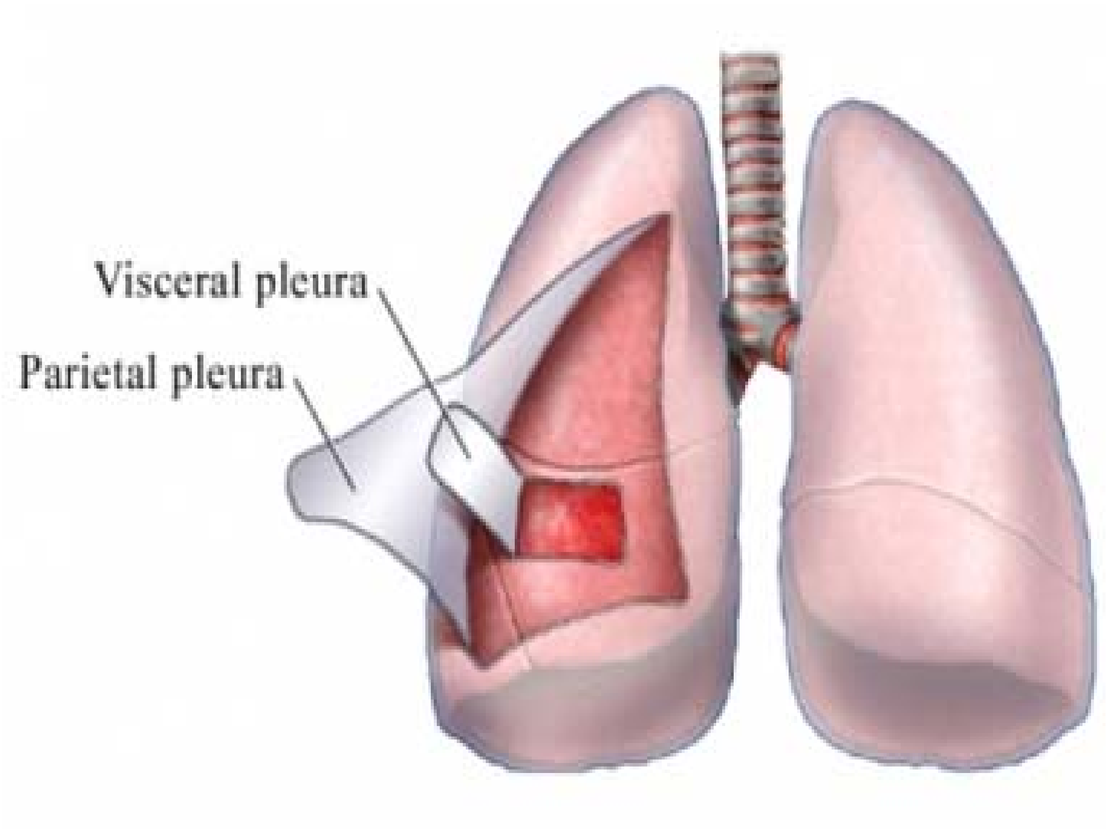

Fig (1-1); The Pleura

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PLEURA

Anatomy of the Pleura

The pleura is the serous membrane that covers the lung parenchyma, the mediastinum, the diaphragm and the rib cage. This structure is divided into the visceral pleura and the parietal pleura. The visceral pleura covers the lung parenchyma, not only at its points of contact with the chest wall, diaphragm, and mediastinum, but also in the interlobar fissures. The parietal pleura lines the inside of the thoracic cavities. In accordance with the intrathoracic surfaces that it lines, it is subdivided into the costal, mediastinal, and diaphragmatic parietal pleura. The visceral and the parietal pleura meet at the lung root. At the pulmonary hilum, the mediastinal pleura is swept laterally onto the root of the lung. Posterior to the lung root, the pleura is carried downward as a thin double fold called the pulmonary ligament ***(Gray and Skandalakis, 1985).***

A film of fluid (pleural fluid) is normally present between the parietal and the visceral pleura. This thin layer of fluid acts as a lubricant and allows the visceral pleura covering the lung to slide along the parietal pleura lining the thoracic cavity during respiratory movements. The space or potential space between the two layers of pleura is designated the pleural space. The mediastinum completely separates the right from the left pleural space. As previously mentioned only a thin layer of fluid is normally present in this space so it is a potential rather than an actual space ***(Light, 2007).***

Embryology of the pleura and pleural space

The body cavity in the embryo, the celomic cavity, is a U-shaped system with the thick bend cephalad. The cephalad portion becomes the pericardium and communicates bilaterally with the pleural canals, which in turn communicate with the peritoneal canals.

As the embryo develops, the celomic cavity becomes divided into the pericardium, the pleural cavities, and the peritoneal cavity through the development of three sets of partitions: (a) the septum transversum, which serves as an early, partial diaphragm; (b) the pleuropericardial membranes, which divide the pericardia and pleural cavities: and (c) the pleuroperitoneal membranes, which unite with the septum transversum to complete the partition between each pleural cavity and the peritoneal cavity. This newly formed pleural cavity is fully lined by a mesothelial membrane, the pleura.

When the primordial bronchial buds first appear, they and the trachea lie in a median mass of mesenchyme cranial and dorsal to the peritoneal cavity. This mass of mesenchymal tissue is the future mediastinum and separates the two pleura cavities. In humans, no communication normally exists between the two pleura cavities. As the growing primordial lung buds bulge into the right and left pleural cavities, they carry with them a covering of the lining mesothelium, which becomes the visceral pleura. As the separate lobes evolve they retain their mesothelial covering. This covering becomes the visceral pleura in the fissures. The lining mesothelium of the pleural cavity becomes the parietal pleura ***(Gray and Skandalakis, 1985).***