SURGICAL EXPERIENCE WITH POSTERIOR MEDIASTINAL MASSES

Thesis
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by

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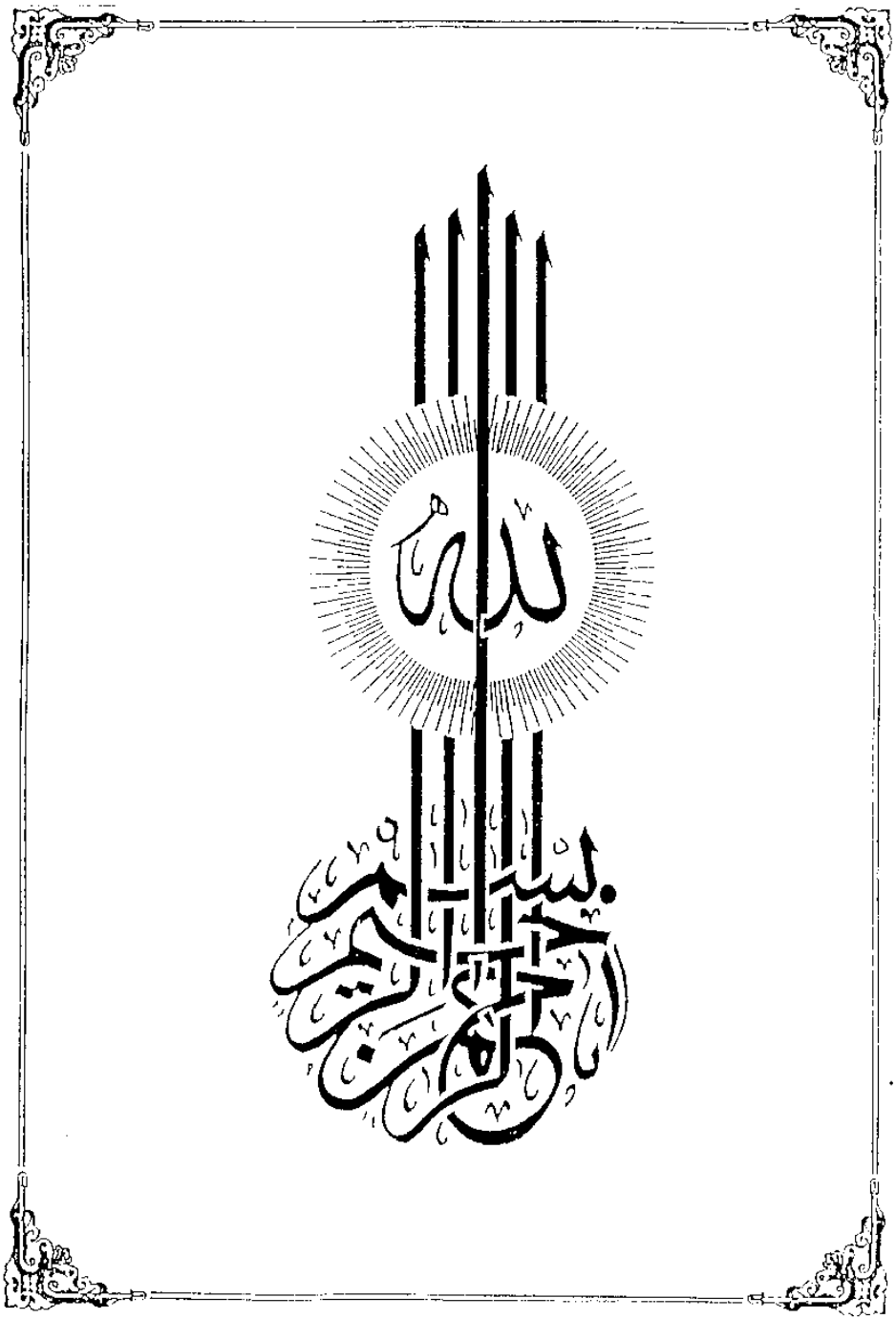

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INTRODUCTION

In thoracic surgery, the mediastinum is an extremely important and complex part of the thorax. It may be the site of both primary and metastatic tumors.

Approximately 75 percent of all mediastinal tumors are benign, and surgical removal is usually curative; with some exceptions. The prognosis is poor for the remaining 25 percent of patients with malignant tumors.

Mediastinal masses are asymptomatic in at least half the patients who are discovered to have them. The range is from 28% to 65% depending upon the patient population studied. Under these circumstances, the mass is usually detected when a chest roentgenogram is obtained for a reason unrelated to the mediastinal tumor.

One can expect asymptomatic patients to harbor a benign lesion since 90% of benign lesions occur in asymptomatic patients. Symptoms occur in 28% to 41% of patients with malignant lesions.

Some patients with benign tumors of the mediastinum are at risk of disability or death if the lesion's size or position interferes with cardiopulmonary functions. Because of the high incidence of malignant tumors, and the potential hazards of harboring a benign tumor in the mediastinum, a mass lesion in this location can not be passively observed or

treated by radiation without benefit of a specific diagnosis, as was occasionally the practice. The lesion must be diagnosed with precision and treated appropriately.

ANATOMY

The mediastinum is the partition between the two lungs and therefore, includes the mediastinal pleura of both sides, but it is generally defined as the interval between the two pleural sacs.

It extends from the sternum infront to the vertebral column behind and from the thoracic inlet above to the diaphragm below.

It is divided into two parts, an upper, which is named the superior mediastinum and a lower which is subdivided into the anterior, middle and posterior mediastina.

The Superior Mediastinum

It is continuous with the lower part at the plane passing through the manubriosternal joint infront and the lower surface of the fourth thoracic vertebra behind. Above by the plane of the thoracic inlet, and laterally by the mediastinal pleurae.

It contains the origins of the sternohyoid and sternothryoid and the lower ends of the longus colli muscles, the aortic arch, the brachiocephalic, left common carotid and

left subclavian arteries, the brachiocephalic veins and the upper half of the superior vena cava, the left superior intercostal vein, the vagus, cardiac, phrenic and left recurrent laryngeal nerves, the trachea, oesophagus and thoracic duct, the remains of the thymus and the paratracheal, brachiocephalic and some of the tracheobronchial lymph nodes.

The Anterior Mediastinum

It lies between the body of the sternum infront and the pericardium behind. Above the level of the fourth costal cartilages, it is exceedingly narrow, owing to the close approximation of the two pleural sacs.

It contains some loose areolar tissue, the sterno-pericardial ligaments, two or three lymph nodes and a few small mediastinal branches of the internal thoracic artery.

The Middle Mediastinum

It is the broadest of the subdivisions. It contains the heart enclosed in the pericardium, the ascending aorta, the lower half of the superior vena cava, the terminal part of the azygos vein, the bifurcation of the trachea, the two bronchi, the pulmonary trunk dividing into right and left pulmonary arteries, the right and left pulmonary veins, the phrenic nerves, the deep part of the cardiac plexus and some tracheobronchial lymph nodes.

The Posterior Mediastinum

It is bounded infront by the bifurcation of the trachea, the pulmonary vessels, the pericardium and by the posterior part of the upper surface of the diaphragm; behind by the vertebral column from the lower border of the fourth to the twelfth thoracic vertebrae; on each side by the mediastinal pleura.

It contains the descending thoracic aorta, the azygos and hemiazygos veins, the vagus and splanchnic nerves, the oesophagus, the thoracic duct and the posterior mediastinal lymph nodes.

THE AIM OF THE WORK

The object of this thesis is to review the literature and to analyze the cases of posterior mediastinal masses operated upon in the cardiothoracic unit of Ain Shams University Hospital and Abbasia Chest Hospital during the period between Jan. 1st, 1980 to Dec. 31st, 1984.

The study will include:

1. A review of literature.
2. Clinical presentations and examinations.
3. Laboratory findings and chest x-ray findings.
4. Pathological findings.
5. Operative techniques and findings.
6. Results of surgery.
7. Discussion.

8. Conclusion and summary.

9. Arabic summary.

Mediastinal Masses

The mediastinal masses in the adult are fairly equally distributed through the mediastinal compartments. Twenty percent are in the anterior compartment, 20% in the superior division, 20% in the middle mediastinum and 30% posteriorly. The remaining 10% cannot be localized because of their large size or indistinct margins.

In children, the posterior mediastinum will contain 63% of the lesions, 26% in the anterior mediastinum and 11% in the middle compartment.

Mediastinal Masses and their Distribution

Superior med.	Anterior med.
1. Lymphomas	Lymphomas
2. Thyroid masses	Teratomas
3. Thymic tumors or cysts thymoma thymolipoma carcinoid	Thymic tumors or cysts thyroid masses parathyroid tumors germinal cell neoplasms
4. Lung cancers	Lung tumors
5. Parathyroid tumors	Lipomas
6. Aneurysm or ectasia of innominate or subclavian arteries.	Lymphangiomas fibromas
7. Myxomas	Hemangiomas.
8. Cylinderomas of trachea	Chondromas.
9. Bronchogenic cysts	Rhabdomyosarcomas.
10. Tumors arising in posterior mediastinum.	Morgagni hernias. paragangliomas from carotid body. Pericardial cysts.

Table N° 1

Middle med.	Posterior med.
1. Lymphomas	Neurogenic tumors.
2. Bronchogenic cysts.	Lymphomas.
3. Pericardial cysts.	Bronchogenic cysts.
4. Sarcoidosis	Enteric cysts
5. Lipomas	Xanthogranulomas.
6. Lung cancers	Oesophageal masses and
7. Plasma cell myeloma	diverticula.
8. Vascular tumors.	Lung cancers
9. Epicardial fat pads	Thyroid masses
10. Hiatal hernias	Hiatal hernias.
	Paravertebral abscesses.
	Fibrosarcomas.
	Meningoceles.
	Myxomas.
	Chondromas.
	Pheochromocytomas.
	Aneurysms of descending aorta.
	Enlargement of azygos and hemiazygos veins.
	Thoracic duct cysts.
	Tumors of spinal column.

Table N° 2

Classification of Mediastinal Tumors

I. Neurogenic:

* *Arising from peripheral nerves:*

1. Neurofibroma.

2. Neurilemnoma (Schwannoma).

3. Neurosarcoma.

* *Arising from sympathetic ganglia:*

1. Ganglioneuroma.

2. Ganglioneuroblastoma.

3. Neuroblastoma.

* *Arising from paraganglionic tissue*

1. Pheochromocytoma.
2. Chemodectoma.

II. Thymic:

* *Thymoma*

1. Benign.
2. Malignant.

* *Carcinoid.*

* *Thymolipoma.*

III. Lymphoma:

The malignant lymphomas are classified into:

1. Lymphosarcoma

Which may be nodular or diffuse and subdivided into:

A. Mature lymphocytic lymphosarcoma.
B. Immature lymphocytic or lymphoblastic.
C. Mixed, i.e., lymphocytic and reticulum cell lymphosarcoma.
D. Reticulum cell, i.e., histiocytic and stem cell lymphosarcoma.

2. Hodgkin's disease:

Its types are:

A. Lymphocytic predominance; nodular or diffuse, "para-granuloma" or lymphohistiocytic.
B. Nodular sclerosis.
C. Mixed cellularity "diffuse granuloma".
D. Lymphocytic depletion, diffuse "sarcoma", reticular or diffuse fibrosis.

IV. Germ cell tumors:

An interesting type of tumor found in the mediastinum is composed of multiple tissues foreign to that location, all those tumors arise from a common germ cell and can be categorized as extragonadal germ cell tumors, which are classified into:

1. Teratoma: Benign cystic and malignant solid.
2. Seminomas.
3. Nonseminomatous cell tumor.
4. Pure embryonal cell tumor.
5. Mixed embryonal cell tumor:
   a. With endodermal sinus (yolk sac) tumors and choriocarcinoma.
   b. With seminomatous elements.
   c. With trophoblastic elements.
   d. With teratoid elements.

V. Mesenchymal tumors:

1. Fibroma and fibrosacroma.
2. Lipoma and liposarcoma.
3. Mesothelioma.
4. Leiomyoma and leiomyosarcoma.
5. Rhabdomyosarcoma.
6. Xanthogranuloma.
7. Mesenchymoma.
8. Hemangioma.
9. Hemangioendothelioma.
10. Hemangiopericytoma.

11. Lymphangioma.
12. Lymphangiomyoma.
13. Lymphangiopericytoma.

VI. Endocrinal tumors:

1. Thyroid gland tumors.
2. Parathyroid gland tumors.

VII. Cysts:

1. Pericardial cyst.
2. Bronchogenic cyst.
3. Enteric cyst.
4. Thymic cyst.
5. Thoracic duct cyst.
6. Meningoceles.

VIII. Hernias:

May be congenital or acquired; the acquired most probably traumatic or post-operatively. The most common hernias at the mediastinum are:

1. Oesophageal hiatus hernia which may be congenital or acquired.
2. Hernia through foramen of Morgagni, the defect lies between the sternal and costal attachments of the diaphragm and more common on the right side.

POSTERIOR MEDIASTINAL MASSES

The posterior mediastinum contains the oesophagus, lymph nodes, thoracic duct, spinal cord, vertebral column, descending aorta, and sympathetic and intercostal nerves. Each of these structures may develop a lesion that presents as a posterior mediastinal mass. However, neurogenic tumors compose the vast majority of these lesions and will be the focus of attention in this section. Tumors and cysts of the other structures occur much less commonly. It should be noted that from one fourth to one third of all mediastinal tumors are malignant, and thus careful diagnostic evaluation is mandatory, and surgical intervention is usually indicated.

Neurogenic tumors are among the most common tumors of the mediastinum, and in a recent collective series including 1000 patients they composed 24 percent of the entire group *(Oldham et al., 1976).*

The malignant neurogenic tumors usually occur in childhood but, fortunately, are less common than the benign tumors *(Vangham et al., 1979).* The frequency of malignancy has been reported to be between 10 and 20 percent *(Silverman et al., 1977).* The majority of these tumors arise from intercostal and sympathetic nerves, but a few arise from the vagus or phrenic nerve *(Wychulis et al., 1971).*

These tumors may be divided into two groups, depending on their origin, nerve sheath and nerve cells. Tumors of

nerve sheath or fiber origin are either neurofibromas, neurilemomas or neuroblastomas. These usually arise from differentiated Schwann cells.

Characteristically, neurogenic tumors are found in the posterior costovertebral gutter, and one of th unique aspects of these lesions is the possibility that they may extend through an intervertebral foramen to assume a dumbbell shape. In the Mayo clinic experience with 706 patients with mediastinal neurogenic tumors, 10 percent presented in this manner *(Akwari et al., 1978)*. IN such cases, myelography is mandatory, since it is important to excise the intraspinal portion surgically first to lessen the chance of cord injury.

Most patients with neurogenic tumors are asymptomatic and the lesion is discovered on a routine chest x-ray. Although tomograms have been useful in the past, the CT scan provides far greater definition of the characteristics and extent of the lesion, and is now the diagnostic technique of choice.

Staging of malignant neurogenic tumors has been advocated by "Adam and coworkers" "Adam A and Hochholzal: Cancer, 1981: 47-373". But the usefulness of this is uncertain until a more uniform terminology in classifying these lesions is accepted.