

# The place of clinical features and standard chest radiography in evaluation of mediastinal masses

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## Summary

One hundred and five primary mediastinal masses were seen between 1975 and 1998, at the Cardiothoracic surgical Unit of the University College Hospital Ibadan. These were studied to establish the importance of clinical features and plain chest radiography in preoperative evaluation of these masses. The sources of information were unit's record, cancer registry and the patients case note. The age range of the 75 male patients was 3 to 80 years (mean  $35.2 \pm 22.1$  year) and for the 30 female patients was 2.5 to 70 years (mean  $30.9 \pm 18.6$  years). Anterosuperior mediastinal masses were the most common (63.8%) followed by posterior mediastinal masses (22.9%). Middle mediastinal masses made up the remaining (13.3%). The most common primary mediastinal tumour was lymphoma (21.9%) next to which were thymus gland neoplasia and thymus cysts/hyperplasia (18.1%). Endocrine tumours (mainly goiters) constituted 17.1% of the masses.

On the whole, 45 (42.9%) of the mediastinal tumours were malignant and 60 (57.1%) were benign. Eighty one patients (77.1%) were symptomatic at presentation, 24 patients (22.9%) were asymptomatic. Malignancy was more associated with symptoms in this series (82.2%) and benign lesion were more frequently (70.8%) asymptomatic.

Cervical lymphadenopathy (78.6%), was more frequent in patients with malignant lesion. Tracheal deviation (60.3%) and neurological signs (78.9%) were more frequent in benign disease. Superior vena cava syndrome was more frequently associated with primary malignant mediastinal tumours.

All masses (100%) were visualized on plain chest x-ray. On the basis of clinical features and chest x-ray, majority of patients (76.2%) with primary mediastinal masses had exploratory thoracotomy, sternotomy or biopsy of their mediastinal mass.

**Keywords:** *Clinical features, Chest radiographs, Evaluation, Mediastinal masses.*

## Résumé

Cent cinq masses médiastinites primaires ont été vues entre 1975 et 1998 au service cardiothoracique chirurgicale du Collège hospitalo universitaire (UCH) d'Ibadan, ceux-ci ont été étudiées afin de décider l'importance des traits cliniques et la radiographie de la poitrine simple dans l'évaluation préopératoire de ces masses. Les sources d'information étaient sur les dossiers du service, bureau du cancer et les dossier médicaux des patients. La tranche d'âge de 75 patients mâle étaient de 3 à 80 ans (moyen  $35,2 \pm 22,1$  ans) et la tranche d'âge pour 30 patientes femmes était de 2,5 à 70 ans (moyen  $30,9 \pm 18,6$  ans). Masses médiastinites antérosupérieures étaient les plus fréquentes (63,8%) suivi par masses médiastinites postérieures (22,9%). Masses médiastinites moyenne sont l'ensemble de restant

(13,3). La tumeur médiastinite primaire la plus fréquente était le lymphome (21,9%). Après lequel nous avons la petite glande thymus néoplasie et thymus cystite/hyperplasie (18,1%). Tumeurs endocrine (goitre en particulier) constituent 17,1 de ces masses.

Dans l'ensemble, 45 soit (42,9%) de ces tumeurs médiastinites étaient malignes et 60 soit (57,1%) était bénignes. Quarante-vingt-un patients soit (77,1%) étaient symptomatiques pendant l'admission, 24 patients soit 22,9% étaient asymptomatiques. La malignité était plus associée avec des symptômes dans ces séries. (82,2%) et les lésions bénignes étaient plus souvent asymptomatique (70,8%).

lymphadénopathie cervicale (78,6%) était plus fréquente chez des patients atteints de la lésion malignante. Déviation trachée (60,3%) et des signes neurologiques (78,9%) était plus fréquents dans la maladie bénigne. Syndrome vena cava supérieur était plus souvent associé avec des tumeurs médiastinites maligne primaire.

Toutes les masses (100%) ont été vues à travers la radiographie simple de la poitrine et chez 23,8% des patients. Le CT examen au scanner a complété le rôle de la radiographie simple de la poitrine. D'après des traits cliniques et radiographie de la poitrine, le plus grand nombre des patients (76,2%) avec des masses médiastinites primaire avaient la thoracotomie exploratoire, sternotomie ou la biopsie de leur médiastinite.

## Introduction

Mediastinal masses comprise a diverse population of pathological entities and are a relatively common medical problem but many of the lesions prove to be secondary mediastinal masses<sup>1,2</sup>. Primary mediastinal masses are those which arise from tissues and organ systems present within the mediastinum<sup>3</sup>. These masses may affect all ages, and there are considerable overlaps in anatomic regions of the mediastinum in which they occur<sup>2</sup>. In the spectrum of patients seen by the average thoracic surgeon, up to two thirds of them will have some type of symptom<sup>4,5</sup>. However a larger number of mediastinal masses in clinical practice are incidental findings<sup>3,6</sup>. It appears that the presence of symptoms has a higher correlation with malignancy than was observed<sup>3,6,7,8</sup>. Also it is generally true that both the age of the patient and the anatomic location of the mass are of considerable help in predicting the probable diagnosis<sup>2</sup>.

Patients in our clinical setting do not present early for medical care. We reviewed the clinical picture in 105 patients with primary mediastinal masses in an attempt to determine the place of symptoms, signs and standard chest radiograph in the documentation of the presence and type of masses.

## Materials and methods

The hospital records (unit's record, cancer registry and case notes) of all patients with mediastinal masses referred to the Cardiothoracic Surgical Unit (CTSU) at the University College Hospital, Ibadan, Nigeria, were reviewed for the years

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1975 through 1998. One hundred and five cases of primary tumours were considered after exclusion of metastatic tumours, primary tumours of the lung and all vascular lesions.

Demographic data of the patients, presenting symptoms and signs, diagnostic radiological procedures used in evaluation of the lesions and the histology of tissue biopsies were extracted from these sources.

**Results**

Seventy-five (71.4%) of the 105 primary mediastinal tumour occurred in males whose ages ranged between 3 years and 80 years (mean 34.2 ± 21.8 years) and 30 of the cases (28.6%) occurred among females aged between 2.5 years and 70 years (mean, 30.9 ± 18.6 years). The sex ratio of male to female was 2.5:1. All patients were Nigerians.

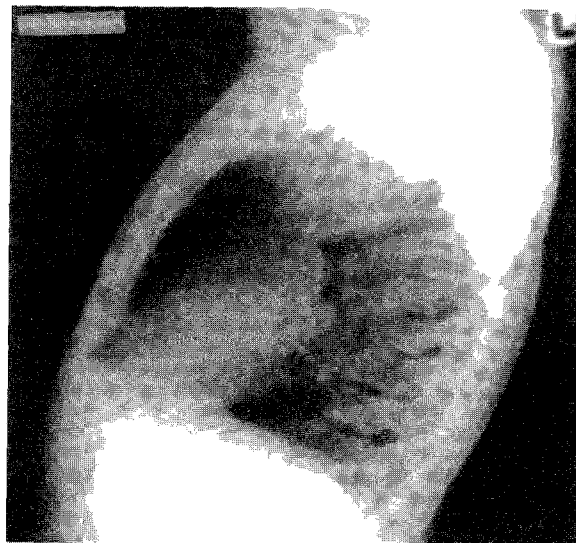
**Symptoms**

Table 1 summarises the clinical features among the symptomatic patients. Eighty-one patients (77.1%) presented with symptoms while 24 patients (22.9) were diagnosed on routine check up. Thirty-seven (82.2%) out of the 45 malignant lesions

**Table 1 Clinical features in 81 symptomatic patients with primary mediastinal masses**

| Symptoms                 | n(%)     | Malignant Benign |             |
|--------------------------|----------|------------------|-------------|
|                          |          | n(%)             | n(%)        |
| Pain and fullness        | 55(67.9) | 32(58.2)         | 23(41.8)    |
| Dysnoea                  | 40(49.4) | 25(62.5)         | 15(37.5)    |
| Weight loss              | 34(41.9) | 28(82.4)         | 6(17.6)     |
| Cough                    | 22(27.2) | 18(81.8)         | 4(18.2)     |
| Neurological             | 19(23.5) | 4(21.1)          | 15(78.9)    |
| Hoarseness of voice      | 17(21.0) | 12(70.6)         | 5(29.4)     |
| Dysphagea                | 15(18.5) | 2(13.3)          | 13(86.7)    |
| Myasthenia               | 5(9.9)   | 3(60.0)          | 2(40.0)     |
| Symptoms                 | n(%)     | Malignant n(%)   | Benign n(%) |
| Tracheal deviation       | 58(71.6) | 23(39.7)         | 35(60.3)    |
| Palpable Cervical mass   | 44(54.3) | 22(50.0)         | 22(50.0)    |
| Cervical lymphadenopathy | 28(34.6) | 22(78.6)         | 6(21.4)     |
| *SVC Obstruction         | 27(33.3) | 19(70.4)         | 8(29.6)     |
| Neurological signs       | 19(23.5) | 4(21.1)          | 15(78.9)    |
| Myasthenial features     | 5(6.2)   | 3(60.0)          | 2(40.0)     |

\*SVC - Superior vena cava.



**Fig. 1 (b) Lateral view. The mass is seen in the posterior aspect of antero-superior mediastinum extending into the posterior mediastinum.**

were symptomatic, 44(73.3%) of 60 benign lesions were symptomatic. Seventeen patients (70.8%) out of the 24 asymptomatic patients had benign disease while the remaining 7(29.2%) had malignant disease. Pain either alone or in association with the feeling of fullness in the chest were most common and occurred in 55 patients (67.9%) and was the presenting symptom in 32 patients (58.2%) with malignant masses. While dyspnoea, weight loss, cough, hoarseness and myasthenial symptoms were more frequently associated with malignancy, neurological symptoms and dysphagia were seen more in benign disease.

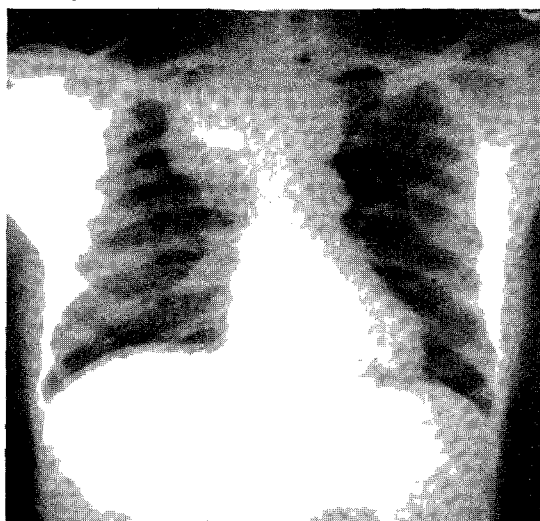
**Signs**

The most common clinical sign was tracheal deviation (71.6%). Tracheal deviation and neurological signs which included wasting of the muscles of the lower limbs, loss of muscle power, ankle clonus, exaggerated ankle jerk, were more associated with benign mediastinal disease. The presence of cervical lymphadenopathy, was more frequently associated with primary malignant mediastinal tumours than with benign tumours. Nineteen patients (23.5%) had the combination of cervical lymphadenopathy and SVC syndrome.

**Diagnostic radiological features**

We performed biplane chest radiographs – Posteroanterior (PA) and lateral views; linear tomography, superior vena cavogram and aortography; computed tomography with or without contrast enhancement; upper gastrointestinal series and bronchoscopy. Table 2 summarises radiological procedures used in evaluation of primary mediastinal masses. The biplane chest radiograph documented the presence and the location of mediastinal masses in our series in all the patients. In 80 patients (76.2%), exploratory thoracotomy/sternotomy or biopsy were based on chest radiographs and clinical features. The CT was useful in the exclusion of vascular lesions and in determination of the extent of local invasion. In the 25 patients of this study (23.8%). CT complemented the role of biplane chest x-rays.

Figure 1 shows biplane chest x-ray presentation of poste-

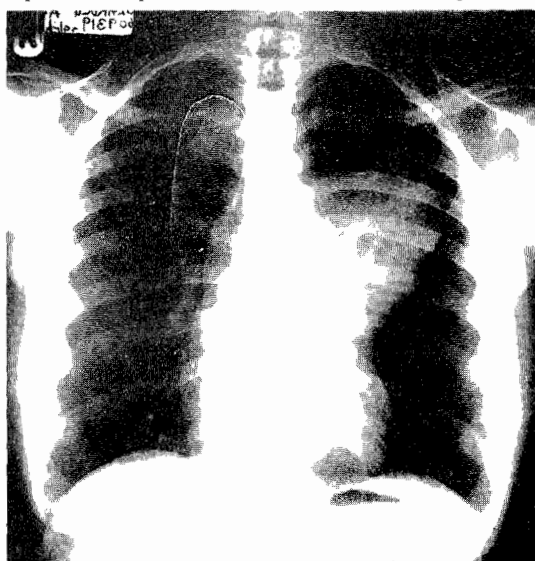


**Fig. 1 (a) Posteroanterior (PA) view of a posterior (retrotracheal) intrathoracic goiter seen as bilateral superior mediastinal widening.**

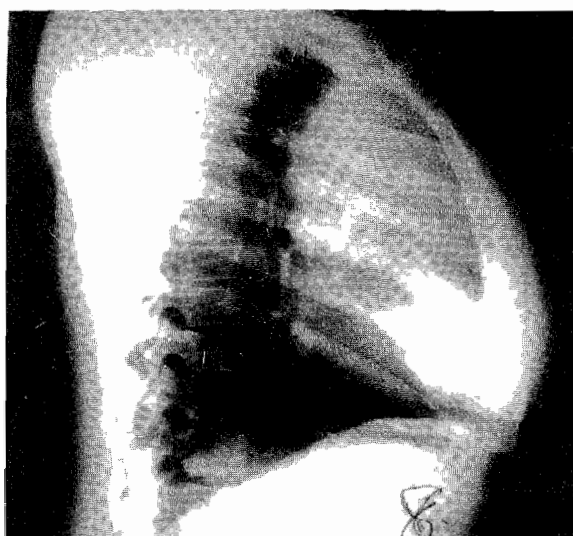
**Table 2** Diagnostic radiological procedures used in evaluation of 105 primary mediastinal

| Procedure                     | No Performed | Number Positive n(%) |
|-------------------------------|--------------|----------------------|
| Biplane chest raddiograph     | 105          | 105(100)             |
| computed tomography           | 25           | 25(100)              |
| Upper Gastrointestinal series | 26           | 21(80)               |
| Linear tomography             | 16           | 10(62.5)             |
| Superior vena cavogram        | 8            | 5(62.5)              |
| Aortography                   | 35           | 16(45.7)             |

rior (retrotracheal) intrathoracic goiter and figure 2 shows a biplane chest x-ray of an anterior mediastinal mass. In both instances and in similar cases, thoracotomy or sternotomy or biopsies were performed without additional diagnostic radio-



**Fig. 2(a)** The mass is seen on the postero-anterior (PA) view as a left hilar lesion with a Convex lateral border.



**Fig. 2(b)** Lateral view shows the mass as an opacity in the antero-superior mediastinum

logical investigations.

**Distribution of tumours**

Table 3 summarises the distribution of 105 primary mediastinal masses. There were 67 lesions of the anterosuperior mediastinum of which lymphomas and thymic lesions were the most common. Half of middle mediastinal masses consisted of cysts and about a half of the remaining were made up of lymphoma. Posterior mediastinal tumours were more frequent than middle mediastinal tumours. More than 60% of the posterior mediastinal tumours were neurogenic.

On the whole, the most common primary mediastinal tumour was lymphoma, which occurred in 23 patients (21.9%). Thymus gland neoplasia (14 patients) and Thymus cyst/hyperplasia (5 patients) were the next most common (18.1%).

**Table 3** Distribution of 105 primary mediastinal masses seen in Ibadan

| Location                          | Number of Patients |      |
|-----------------------------------|--------------------|------|
|                                   | n                  | (%)  |
| <b>Anterosuperior mediastinum</b> | 67                 | 63.8 |
| Lymphoma                          | 19                 | 28.4 |
| Non-Hodgkins                      | 12                 |      |
| Hodgkins                          | 7                  |      |
| Thymus Noeplasia                  | 14                 | 20.9 |
| Benign                            | 8                  |      |
| Malignant                         | 6                  |      |
| Thymus cyst/hyperplasia           | 5                  | 7.5  |
| Germ cell tumours                 | 11                 | 16.4 |
| Seminoma                          | 3                  |      |
| Teratoma                          | 7                  |      |
| Benign                            | 5                  |      |
| Malignant                         | 2                  |      |
| Embryonal                         | 1                  |      |
| Endocrine                         |                    |      |
| (Intrathoracic goiters)           | 13                 | 19.4 |
| Cysts (pericardia)                | 3                  | 4.5  |
| Mesenchymal tumours               | 2                  | 2.9  |
| <b>Middle Mediastinum</b>         | 14                 | 13.3 |
| Cysts                             | 8                  | 57.1 |
| Bronchogenic                      | 4                  |      |
| Enteric                           | 4                  |      |
| Lymphoma                          |                    |      |
| Hodgkins                          | 4                  | 28.6 |
| Endocrine (Intrathoracic goiters) | 2                  | 14.3 |
| <b>Posterior mediastinum</b>      | 24                 | 22.9 |
| Neurogenic                        | 15                 | 62.5 |
| Benign                            | 11                 |      |
| Malignant                         | 4                  |      |
| Paravertebral abscess             | 4                  | 16.7 |
| Endocrine                         |                    |      |
| (Intrathoracic goiters)           | 2                  | 8.3  |
| Cysts (Lymphatic)                 | 3                  | 12.5 |

Intrathoracic goiters (18 patients, 17.1%), neurogenic (15 patient, 14.3%) and germ cell (11 patients, 10.5%) tumours were other common primary mediastinal tumour.

**Discussion**

Primary tumours and cysts present with a wide variety of clinical signs and symptoms<sup>1,2</sup>. The natural history of mediastinal tumours and cyst varies from a slow, benign growth with

minimal symptoms to an aggressive, invasive neoplasm<sup>3</sup>.

In Nigeria, from this study, the majority of patients (77.1%) with primary mediastinal mass present with symptoms. This frequency of symptomatic patients is higher than the 56 – 65% in the literature because many patients in Nigeria come to the hospital after the failure of native traditional medical practitioners. Eighty two percent of symptomatic patients in this series have primary malignant mediastinal lesion and 70.8% of asymptomatic primary mediastinal lesion are benign. Though different percentages abound in the literature, the consensus is that symptoms are more associated with malignant mediastinal lesions and absence of symptoms in the presence of mediastinal lesion related with benign disease<sup>5-10</sup>.

The symptoms and signs are caused by local compression or invasion of adjacent mediastinal structures by the lesion<sup>3</sup>. Chest pain and its location suggest site of compression or invasion of chest wall or intercostal nerves<sup>3</sup>. In this report and others<sup>3,6,7</sup>, pain is the most common symptom and is more frequently associated with malignancy. Weight loss and hoarseness of voice when present are usually associated with malignancy<sup>6,7</sup>, this accords well with our findings; Dyspnoea and dysphagia were frequently due to compression produced by primary benign mediastinal tumour. Apart from the finding that neurological symptoms and signs could be due to either benign or malignant lesion we also corroborated the fact that the presence of the neurological features do not preclude surgical extirpation<sup>2,3,8</sup>. However, the presence of superior vena cava syndrome, palpable cervical masses when associated with a primary mediastinal mass, increase the possibility of extensive malignancy and may preclude resection<sup>2,3,6,11</sup>. History and physical examination are not capable of precise demonstration of presence and nature of primary mediastinal mass<sup>2,3,6</sup>. Routine posteroanterior and lateral chest radiographs revealed the presence of all primary mediastinal masses in our study. We therefore agree with many other authors who consider it the most basic diagnostic tool<sup>2,12,13</sup>, useful for the determination of size, density, location and presence of calcification<sup>3</sup>. In many of the patients we studied, there was no need for further diagnostic procedure prior to surgery. This diagnostic exploration or biopsy after plain chest radiograph was useful in diagnosis of benign causes of superior vena cava syndrome and majority of primary benign mediastinal lesions in this series. This approach has been advocated in several series<sup>3,6</sup>.

Certain lesions, however, such as asymptomatic pericardial cysts, lymphomas and seminomas are best managed without surgical exploration. In cases where such lesions are suspected, further diagnostic investigation is warranted. The usefulness of CT has been well established in evaluation of mediastinal masses<sup>14,19</sup> and occasionally, will detect a mass not seen by routine chest radiograph. Magnetic resonance imaging (MRI) is a recently developed diagnostic modality which functions like CT, the major difference is that MRI provides high contrast between rapidly moving blood and surrounding stationary soft tissue. It therefore does not need contrast enhancement to detect vascular lesions<sup>20-22</sup>. Though both the CT and MRI may not be available in many centers, the thoracic surgeon can help most of the symptomatic patients in his practice from information obtained from clinical features and plain chest radiograph. These other modalities will be reserved for their specific indications.

In conclusion 105 primary mediastinal masses managed were reviewed to determine the place of symptoms, signs and simple diagnostic tests in documentation of presence and type of masses. While clinical picture is suggestive, plain chest radi-

ography is a simple tool to enhance evaluation of primary mediastinal mass before surgery especially where more sophisticated facilities are not available or are not affordable.

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