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ABSTRACT

Objective: To determine clinical features, anatomic location and histological types of primary mediastinal masses diagnosed and treated in a black African population.

Design: A retrospective study of clinical data collected from patients case notes, the cardiothoracic unit's and pathology records between June 1975 and May 1999.

Setting: University College Hospital, Ibadan, Nigeria which hosts a major cancer center in the West African sub-region, and serves community clinics.

Patients: All patients with primary mediastinal masses referred for evaluation and treatment.

Main outcome measures: Excluded metastatic, oesophageal and vascular- lesions. All patients had radiological evaluation and tissue biopsies. The anatomic subdivision of the mediastinum into anterosuperior, middle and posterior section was used.

Results: One hundred and five consecutive patients were evaluated and treated. The mean age was 34.0 ± 20.4 years. There were 75 males and 30 females. Eighty one (77.1%) were symptomatic, 24 (22.9%) were asymptomatic. Thirty seven (45.7%) of the symptomatic patients had malignant disease while 44 (54.3%) had benign disease. Forty five patients (43%) and 60 patients (57%) had malignant and benign diseases respectively. Incidence of symptoms, was 82.2% for malignant and 73.3% for benign diseases. This difference in incidences is statistically insignificant ($p=0.283$). Majority of asymptomatic patients (70.8%) had benign disease while 29.2% of patients with malignancy were asymptomatic. This difference in incidence was statistically significant ($p=0.0039$). The frequency of mediastinal masses were anterosuperior, in 67 patients (63.8%), posterior mediastinal, 24 patients (22.9%) and middle mediastinal in 14 patients (13.3%). Lymphoma 23 (21.9%), thymus glands tumours 19 (18.1%) and endocrine tumours (goiters) 18 (17.1%) were the commonest types of primary mediastinal masses treated.

Conclusion: Majority of our patients with mediastinal masses (whether benign or malignant) are symptomatic and the absence of symptoms is more associated with benign disease. Majority of lesions are situated in the anterosuperior mediastinum. Lymphoma is the most frequent primary mediastinal mass.

INTRODUCTION

By surgical convention metastatic lesions, tumours secondarily invading the mediastinum from trachea, oesophagus, heart and great vessels are not classified as primary mediastinal masses (1). Excluded also are diseases of the great vessels (2,3). Primary mediastinal tumours and cysts present with a wide variety of clinical signs and symptoms (4-5). The natural history of these lesions vary from a slow benign growth with minimal symptoms to an aggressive invasive neoplasm. Techniques such as computed tomography (CT) (7,8), magnetic resonance imaging (MRI) (9-10), radioimmunoassays (1,6) when available and the increased utilisation of routine biplane chest radiography (6, 11) have allowed earlier diagnosis of these tumours.

Surgical excision has been shown to successfully cure both benign and malignant lesions (6,12). There has also been an increasingly successful utilisation of radiation

(6,13). Therefore observation of a mediastinal mass without an appropriate diagnosis can rarely be accepted (3,14) This study presents the clinical features, the anatomic location and histological types among 105 patients with primary mediastinal masses diagnosed and treated at the University College Hospital, Ibadan over a 24 year period.

MATERIALS AND METHODS

The hospital records of all patients with primary mediastinal masses treated by the Cardiothoracic Surgery Unit (CTSU) of the University College Hospital Ibadan, between June 1975 and May 1999 were reviewed.

These hospital records included patients case notes, Cardiothoracic unit's and pathology records. Demographic data, clinical presentation, histologic diagnosis were extracted from these sources.

These cases excluded pulmonary, metastatic, oesophageal and vascular lesions. Diagnosis in each patient was based on histological appearance in every case.

The anatomic location of the mediastinal mass was determined by plain chest X-rays, barium swallow, linear tomography in the early years, aortography, superior vena cavograms and more recently CT scans when affordable to the patients. In some of the cases, the operation notes assisted in confirmation of the findings from the above investigations.

The anatomic subdivision of the mediastinum into anterosuperior, middle and posterior sections as reported by Burkell *et al.* (15) was used. Statistical analysis was by EPI - INFO software version 6.02 to calculate frequencies, mean and standard deviation. Chi-square analysis was used to check for association between variables. Statistically significant differences were defined as those where $P < 0.05$.

RESULTS

One hundred and five patients with complete investigation reports clinical and management information form the bases of this retrospective study.

The ages of the 105 patients ranged between 2.5 and 80 years, (mean 34.0 ± 20.4 years). There were 75 male patients whose ages ranged between three and 80 years (mean 35.2 ± 22.1 years) and 30 female patients whose ages ranged between 2.5 and 70 years (mean 30.9 ± 18.6 years).

Symptoms were present in 81 patients (77.1%) out of the 105 patients and 24 patients (22.9%) were asymptomatic. Thirty seven of the symptomatic patients (45.7%) had malignant disease while 44 of the symptomatic patients (54.3%) had benign disease. Testing for association between malignancy and symptoms, chi-square was 2.07, p-value was 0.15 (not significant). There were no association between symptoms and in patients with primary mediastinal tumours. There were 45 patients (42.9% with primary malignant mediastinal masses and 60 patients (57.1%) with benign masses. The incidence of symptoms among patients with primary malignant mediastinal masses was 82.2%. The incidence of symptoms among the patients with benign disease was 73.3%. The difference between these incidences is also statistically insignificant (Chi-Square = 1.15 and $p = 0.283$). Seventeen (70.8%) of the 24 asymptomatic patients had benign disease and the remaining patients (29.2%) had primary malignant mediastinal masses. Testing for association between absence of symptoms and benign mediastinal tumours chi-square was 8.33 and p-value was 0.0039. Asymptomatic presentations were more frequently associated with benign mediastinal masses. The distribution of the clinical features among patients with primary mediastinal masses are summarised in Table 1. The commonest symptoms in this series were chest pain/fullness dyspnoea and weight loss.

These symptoms were more frequently associated with malignant disease. While neurological symptoms and dysphagia were more associated with benign mediastinal disease. The commonest clinical signs were

tracheal deviation and the presence of a palpable cervical mass. Presence of cervical lymphadenopathy was expectedly more frequently associated with malignancy. Superior vena cava syndrome was more frequently associated with primary malignant mediastinal tumours than with benign tumours. On the whole 86.6% of anterosuperior mediastinal masses (58 patients), 42.9% of middle mediastinal masses (six patients) and 70.8% of posterior mediastinal masses (17 patients) were symptomatic.

Table 1

Clinical features in 81 symptomatic patients with primary mediastinal masses

Symptoms	No. (%)	Malignant No. (%)	Benign No. (%)
Pain and fullness	55 (67)	32 (58.2)	23 (41.8)
Dyspnoea	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)
Dysphagia	15 (18.5)	2 (13.3)	13 (86.7)
Myasthenia	5 (9.9)	3 (60.0)	2 (40.0)
Signs	No. (%)	Malignant No. (%)	Benign No. (%)
Tracheal deviation	58 (71.6)	23 (39.7)	35 (60.3)
Palpable cervical mass	44 (54.3)	22 (50.0)	22 (50.0)
Cervical	28 (34.6)	22 (78.6)	6 (21.4)
Lymphadenopathy	27 (33.3)	19 (70.4)	15 (29.6)
*SVC Obstruction	19 (23.5)	4 (21.1)	15 (78.9)
Neurological Sign	5 (6.2)	3 (60.0)	2 (40.0)

*SVC= Superior Vena Cava

Table 2

Incidence and anatomical distribution of 105 Primary mediastinal masses

Tumour type and location	No.	%
Anterosuperior mediastinum	67	63.8
Lymphoma	19	28.4
Thymus gland	19	28.4
Neoplasia	14	20.9
Cyst/Hypertension	5	7.5
Endocrine	13	19.4
Germ cell	11	16.4
Cyst (pericardial)	3	4.5
Mesenchymal	2	2.9
Middle mediastinum	14	13.3
Cysts (enteric, bronchogenic)	8	57.1
Lymphoma	4	28.6
Endocrine	2	14.3
Posterior mediastinum	24	22.9
Neurogenic	15	62.5
Abscess	4	16.7
Endocrine	3	12.7
Cyst (Lymphatic)	2	8.3

Table 3*Histological types of 105 primary mediastinal lesions*

Type	No. (%)
Lymphoma	23 (21.9)
Non-Hodgkin's	16
Hodgkins	7
Thymus Gland	19 (18.1)
Benign Thymoma	8
Malignant Thymoma	6
Cysts/hyperplasia	5
Endocrine	18 (17.1)
Simple Goiter	16
Malignant Goiter	2
Neurogenic	15 (14.3)
Benign	11
Ganglioneuroma	4
Neurofibroma	4
Neurilemona	2
Paraganglioma	1
Malignant	4
Neuroblastoma	4
Cysts	13 (12.5)
Bronchogenic	4
Enteric	4
Pericardial	3
Lymphatic	2
Germ cell	11 (10.5)
Teratoma	7
Malignant	4
Benign	3
Seminoma	3
Embryonal	1
Paravertebral Abscess	4 (3.8)
Mesenchymal	2 (1.9)
Malignant (Rhabdomyosarcoma and Fibrosarcoma)	2

The incidence and anatomic location of primary mediastinal masses are summarised in Table 2. The anterosuperior compartment had the largest number of lesions in 67 patients, (63.8%) followed by posterior mediastinum in 24 patients, 22.9%. Lymphomas and thymic lesions were the most common lesions of the anterosuperior mediastinum. The cysts were the most common lesions of the middle mediastinum, and neurogenic lesions were the commonest lesions in the posterior mediastinum.

The histological type of primary mediastinal masses is summarised in Table 3. Lymphoma is the commonest mediastinal lesion in this series. Half of the Lymphoma occurred in children between the ages of 5 and 15 years. The six lymphoblastic Lymphoma (a T- cell type of non- Hodgkin's lymphoma) three other non-hodgkins lymphoma types (histology type unspecified) occurred among children. These along with neuroblastoma (four patients) constitute the commonest (70%) primary childhood malignant mediastinal tumours in this series. In the adult population all the hodgkin's lymphomas were diagnosed in patients whose ages ranged between 25 and 36 years and the seven cases of non-hodgkin's lymphomas were diagnosed in patients whose ages ranged between 20 and 45 years.

Thymic neoplasms were the second most frequent lesions in this series. All the thymomas (benign and malignant lesions)

occured in adult patients. The thymic cysts and hyperplasia occurred in patients aged between 10 and 21 years in our study. Two of the cases of thymic hyperplasia occurred in an 18 year old female and a 21 year old male medical student. No case of thymic carcinoma was found in the series. Five of the adult patients (35.7%) with thymic tumours (three, with benign thymoma and two with malignant thymoma) had myasthenic symptoms. The ages of the patients with thymic tumours ranged between 25 and 54 years. The only endocrine tumours in this series were intrathoracic goiters. Sixteen of the goiters were simple goiters and two were malignant (one was follicular adenocarcinoma and the other was anaplastic). The age range of the patients was between 13 and 74 years (mean 47.3 ± 16.6 years). Neurogenic tumours were mostly benign (11 patients) and in four patients they were malignant. These malignant lesions occurred in children. Ganglioneuroma and neurofibroma were the commonest adult neurogenic tumours found.

Primary cysts and duplications were commoner than germ cell tumours in this study and only three of these cysts were diagnosed in children while all the others were found in adults. The three cases were bronchogenic (two patients) and oesophageal duplication (one patient) cysts. Teratomas were the commonest presentation of germ cell tumours and embryonal tumours were the least frequent. Seminomas constitute about a quarter of the germ cell tumours found in this study. Paravertebral tuberculous abscess featured as posterior mediastinal masses in four patients. Two patients were under 20 years of age and two other patients were in their fourth and fifth decades. Malignant mesenchymal tumours were few in this study. There was a case of fibrosarcoma in a 65 year old female and rhabdomyosarcoma in a 50 year old female.

DISCUSSION

Primary mediastinal tumours are a diverse group of lesions with widely varying histological findings and they continue to represent a severe and often fatal problem if diagnoses are not made early and an organised approach is not applied. In the Nigerian environment, in our experience, majority of hospital consultations are made at advanced stages of most ailments. Alternative medical cares constitute the first line of health care. After hospital consultation, any level of medical care can be aborted to return to the alternative medical care. This response to medical care cannot be discountenanced in interpreting the outcome of conditions such as the primary mediastinal tumours in Ibadan.

Symptoms were present at presentation in 77.1% of our patients. This is higher than the range of 60% to 65 % in the literature (16-20). However, the incidence of symptoms among patients with primary malignant mediastinal masses in our study was 82.2%. This is within the range of 72% to 90% literature (12, 21, 22). The incidence of symptoms among our patients with benign disease was 73.3%. This is higher than 46% to 50% quoted for the large series in the literature (6). Symptomatic benign disease contributes significantly to the number of symptomatic patients in our study. Currently, it is apparent that more benign and malignant neoplasms are diagnosed in the asymptomatic stage (23). Asymptomatic mediastinal masses are benign in 95% of cases, whereas

50% of symptomatic lesions are benign (5, 6). These findings are becoming more universally apparent with increasing use of routine chest X-rays (5). However, in the spectrum of patients seen by the average thoracic surgeon, symptoms are much more common, and up to two thirds of such patients will have some type of symptoms (4, 24). Nevertheless if a patient is symptomatic, the chances are greatly increased that the lesion is malignant (4,5,20). The findings from our study show that the presence of symptoms do not necessarily suggest malignancy but absence of symptoms after positive radiological findings strongly suggest benign disease. Symptoms and signs are caused by local compression or invasion by the lesion of adjacent mediastinal structure (6). Any lesion neglected long enough will be symptomatic.

The anatomical location of the tumours in our study was anterosuperior (63%), middle mediastinal (13.3%), posterior mediastinal (22.9%). This pattern accords well with findings in other reports that range between 49% and 59% for anterosuperior, 18% and 25% for middle mediastinum and 23% to 29% for posterior mediastinal masses (13).

In a large collected series of 2,399 patients with primary mediastinal tumours and cysts, the commonest lesions in order of frequency were, neurogenic, thymoma, lymphoma and germ cell tumours (13). From our study, the tumours in order of frequency of occurrence were lymphoma, thymic lesions, endocrine and neurogenic lesions. The previous order was consistently maintained among 12 of 13 collected series. Could the order of tumour frequency in our series be accounted for by failure to report to hospital? Neurogenic lesions present themselves to superstitious believes in our catchment area. The believe of having stepped on armlet or rings are common experiences in the presentation of pedal or lower limb symptoms. Alternative "medical" care are more likely sources of medical attention of such neurological manifestation of neurogenic tumours. This could be a reason for the relative decrease in number of neurogenic tumours in our series.

This incidence of malignancy in this series of 42.9% falls close to the range of 25% to 35% reported in other studies (16-20). The reported incidence of malignancy in children with primary mediastinal masses ranges from 27% to 76% (9,13) while our incidence was 70%. Most primary malignant masses in the present series were lymphomas and neurogenic tumours. This distribution of lesions among children of our series is comparable to the findings in the literature where malignant neurogenic tumours and lymphomas are also the commonest (24).

In conclusion, 105 primary mediastinal masses are presented in a predominantly black population. Majority of patients either with benign or malignant lesions with symptoms and signs. Majority of the lesions are located in the anterosuperior mediastinal and least frequently in the middle mediastinum. Most of the primary mediastinal masses in paediatric age group are malignant.

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