

Clinicopathological profile of mediastinal masses in a tertiary care hospital of Eastern India

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Abstract

Introduction: The Mediastinum is the central part of thorax where various organs are located which gives rise to various neoplastic and non- neoplastic lesions. Accurate diagnosis is important to formulate proper therapeutic strategy and predict prognosis. Studies are very few in this part of the country. **Objective:** To analyse presentation of patients with Mediastinal Mass and to classify according to the location of mass. Also, to document Malignant versus Non-malignant nature of lesions. **Methods:** Total 33 patients with mediastinal masses diagnosed by Imaging and Histopathological study were taken up consecutively in the study during one year of study. **Results:** of the 33 cases, 21 were male (63.6%) and 12 were female (36.4%), Male; female ratio being 1.8: 1. Age ranged from 14 years to 72 years maximum of 8 Patients (24.2%) in the 12-20 years of age group. 57% of the masses were malignant and 43% were benign. Most common lesion was Lymphoma in 10 cases (30.3%) followed by 8 cases of Thymic tumours (24.2%). Metastatic Carcinoma was found in 6 patients (18.2%) followed by 3 patients of Germ cell tumours. One case each of Neurofibroma, Neurolipoma and 6 are of different less common category. Compartment wise, 9 cases (27.3%) were in Anterior Compartment, 1 (3%) case in Post Compartment, 3 case in superior mediastinum, 6 case in Middle mediastinum. Maximum cases, 14(42.5%) were occupying Multiple Compartments. Most common symptom was cough (72%). Pleural and Pericardial effusions were common complication of malignant lesions contributing 7 out of 19(36%) and 3 out of 19(17%) respectively. **Conclusion:** Mediastinal masses creates a diagnostic dilemma to the clinician. Uncommon cause of common symptoms like cough and common presentation of pleural or pericardial effusion may have Mediastinal mass behind the screen.

Key words: Mediastinal Mass, Lymphoma, Thymoma, Seminoma, Malignant effusions.

Introduction

Diseases of Mediastinum include primary tumors, metastatic tumors, cysts or acute and chronic infections. Primary mediastinal tumors are rare accounting for 3% of tumours occurring within the chest [1]. Mediastinal mass is a term for mass (es) in the mediastinum.

The mediastinal space is narrow and cannot be expanded, thus a growth in this space will compress adjacent organs and cause a life-threatening emergency. Most mediastinal masses grow slowly, and thus patients often seek medical attention as the mass gets large enough, accompanied by signs of symptoms due to the compression of the mass to adjacent organs.

In comparison with reports from abroad, data regarding mediastinal mass in India is still scarce particularly in this part of the country. Mediastinal masses are relatively uncommon lesions that some times pose an interesting diagnostic and the therapeutic problem for the clinician [2]. The likelihood of malignancy is influenced primarily by the following three factors: mass location; patient age; and the presence or absence of symptoms.

Although more than two thirds of mediastinal tumours are benign, masses in the anterior compartment are more likely to be malignant. Age is an important predictor of malignancy as many of the lymphomas and germ cell tumours (GCTs) presents between the second and fourth decade of life. Last, symptomatic patients are more likely to have a malignancy.

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The most common symptoms at presentation are cough, chest pain, fevers/ chills and dyspnoea. Most symptoms can be categorized into the following two groups: localizing symptoms and systemic symptoms. Localizing symptoms are secondary to tumour invasion. Common localizing symptoms include respiratory compromise, dysphagia, paralysis of the limbs, diaphragm, and vocal cords, Horner syndrome, and superior vena cava syndrome. Systemic symptoms are typically due to the release of excess hormones, antibodies, or cytokines.

The initial workup of a suspected mediastinal mass involves obtaining posteroanterior and lateral chest radiographs. This can provide information pertaining to the size, anatomic location, density, and composition of the mass.

CT scanning is used to further characterize mediastinal masses and their relationship to surrounding structures as well as to identify cystic, vascular, and soft-tissue structure.

The role of MRI is primarily in ruling out or evaluating a neurogenic tumor. MRI is also valuable to evaluate the extent of vascular invasion or cardiac involvement.

Although nuclear scans and biochemical studies can be used to further characterize a lesion, tissue diagnosis is almost always required. If a mass is likely to be benign after initial workup, it can be removed surgically without biopsy. Otherwise, a diagnostic biopsy specimen can be obtained by transthoracic or transbronchial needle aspiration, mediastinoscopy, anterior mediastinotomy, or video-assisted thoracic surgery, depending on the anatomic location and radiographic appearance of the lesion.

Objectives

1. To analyse age, sex and other socio-epidemiological factors in patients presenting with mediastinal mass.
2. To record presenting symptoms and physical findings of these patients.
3. To classify according to the location of the mass.
4. To record histopathological diagnosis and benign or malignant character of these masses.

Results and Analysis

Out of 36 patients followed, 3 were excluded based on presence of various exclusion criteria (e.g. cardiac tumour-1 patients, oesophageal tumor 2 patient). Rest 33 patients of mediastinal mass, satisfying the inclusion criteria were analysed. Mediastinal masses has heterogeneous pathology. In this study the following diagnoses were obtained.

Methods

a) Study Type: Hospital based Cross-sectional Observational study.

b) Sample Size: Total 33 patients with mediastinal masses were enrolled.

c) Sampling technique: Consecutive non probability technique used.

d) Inclusion Criteria: Patient diagnosed to have mediastinal mass clinically and radiologically. Both males and females above the age of 12 yrs attending OPD or admitted in Indoor of Medical College Hospital

e) Exclusion Criteria: a) Patients having primary oesophageal and cardiac tumours b) Patients unwilling to join the study.

f) Study Procedure: The study commenced after obtaining permission from Institutional Ethical Committee and written informed consent from patients. Patients were selected with a provisional diagnosis of Mediastinal mass by CXR PA and Lat view, CT Scan of Chest. A detailed history and thorough clinical examination was done. Collection of laboratory data, imaging plates with reports and pathological reports were done.

Place of study: a) OPD and Indoor, Dept of Medical Oncology and Dept of Radiation Oncology Medical College Hospital, Kolkata b) OPD and Indoor, Dept of Medicine, Medical College Hospital, Kolkata c) OPD and Indoor, Dept of CTVS, Medical College Hospital, Kolkata.

Data analysis: All data gathered were tabulated on a master chart and analyzed using charts, diagrams and application of standard statistical techniques using latest SPSS software.

Statistical Methods- Categorical variables were expressed as Number of patients and percentage of patients. Continuous variables were expressed as Mean \pm Standard Deviation and compared across the groups using One- Way ANOVA test.

The statistical software SPSS version 20 has been used for the analysis. An alpha level of 5% has been taken, i.e. if any p value is less than 0.05 it has been considered as significant.

Table-1: Final diagnoses of Mediastinal masses.

Final Diagnosis	No of Cases (N)	Percent
HL mixed cellularity	1	3.0
Anaplastic large cell Lymphoma	1	3.0
Large B cell Lymphoma	3	3.0
Bronchial cyst	1	3.0
Follicular Dendritic cell carcinoma	1	3.0
HL NS Type	2	6.1
Lymph node metastasis primary Lung	5	15.1
Lymph node metastasis primary Breast	1	3.0
Mature Cystic Teratoma	1	3.0
Multi septate Thymic Cyst	1	3.0
Neurofibroma	1	3.0
Pericardial Cyst	1	3.0
Retrosternal Goitre	1	3.0
Seminoma	2	6.1
Spindle cell sarcoma	1	3.0
T Cell Lymphoblastic Leukaemia	1	3.0
Inconclusive	1	3.0
TB Lymphadenitis	1	3.0
Thymic Carcinoma	1	3.0
Thymic Lipoma	1	3.0
Thymoma	5	15.1
Total	33	100.0

Table-2: Age and sex distribution of patients:

Age distribution of the patients shows most number of cases are in younger age group 12- 20 yrs (8) followed by 21- 30 yrs and 31- 40 yrs (6) followed by 41- 60 yrs, 51- 60 yrs and 61-70 yrs, all have 4. There is just one patient above the age of 70 yrs. Of the 33 patients 12 were female and 21 were male with male female ratio 1.8:1

Age(Yrs)	Cases	Percent
12-20	8	24.2
21-30	6	18.2
31-40	6	18.2
41-50	4	12.1
51-60	4	12.1
61-70	4	12.1
71-80	1	3.0
Total	33	100.0

SEX	No of Cases	Percent
Female	12	36.4
Male	21	63.6
Total	33	100.0

Table-3: Analysis of symptoms

Out of the 33 patient only one (3%) patient was incidentally detected with mediastinal mass. Symptoms were classified as Local and Systemic.

a) Local: Among the local symptoms cough was the most commonest. 24 out of 33 (72.7%) patients had complaint of cough. Dyspnea is the second common symptoms. 17 out of 33 (51.5%) had dyspnea. Next symptoms in descending order are Chest pain (39%), dysphagia (39%), hoarseness of voice (21.2%), bulging of chest wall (12.1%) .

Symptoms	Cases	Frequency(%)
Cough	22	72.7
Dyspnoea	17	51.5
Chest pain	13	39.4
Dysphagia	13	39.4
Dysphonia	7	21.2
Bulging of chest wall	4	12.1

b) Systemic Symptoms: Weight loss is the most common systemic symptom. 13 out of 33 cases (39.4%) had history of weight loss. History of fever was present in 12 patients (36.4%). Fatigue was complained by 10 patients (30.3%). Complaint of excessive sweating was there in 6 patients (18.2%).

Symptoms	Cases	Frequency (%)
Weight loss	13	39.4
Fever	12	36.4
Fatigue	10	30.3
Excessive sweating	6	18.2

Table- 4: Complications

Pleural effusion was present in 6 (18.2%), pericardial effusion was present in 3 (9.1%). There was features of Myasthenia Gravis in 3(9.1%) patient. Superior Mediastinal Syndrome was present in 4 (12.2%) patients and Horner Syndrome was present in 1(3%) patient.

Complications	Cases	Frequency(%)
Pleural effusion	6	18.2
Pericardial effusion	3	9.1
Sup Mediastinal syndrome	4	12.2
Horner syndrome	1	3
Myasthenia Gravis	3	9.1

Table-5: Location of masses in CT scan

Anterior and antero-superior compartment of the mediastinum is most common location of mass followed by middle and posterior compartment.

Compartment	Cases	Percent
Anterior	9	27.3
Posterior	1	3
Superior	3	9.1
Middle	6	18.2
Mixed	14	42.5
Total	33	100.0

Table-6: Pathological Character

19 (57.6%) of the total 33 cases were malignant lesion as revealed by radiological features, FNAC and Biopsy. Rest 14(42.4%) were benign in nature.

Group	Cases	Percent
Benign	14	42.4
Malignant	19	57.6
Total	33	100.0

Table-7: Types of Mediastinal Masses

Mediastinal masses are diagnosed clinically radiologically and by histology. 10 (30.3%) patients were diagnosed as having lymphoid malignancy. 8 (24.2%) had tumours of thymic origin. 3(9.1%) had Germ cell tumours and 6 (18.2%) had metastatic carcinoma.

Types of mediastinal masses	Cases	Percent
Thymic tumours	8	24.2
Lymphoma	10	30.3
Germ cell tumours	3	9.1
Metastasis	6	18.2
Others	6	18.2
Total	33	100.0

Thymic Tumors: Among thymic tumours 5 were thymoma (62%), 1 thymic cyst (13%), 1 thymic lipoma (13%) and 1 thymic carcinoma (13%).

Myasthenia in Thymic Tumours: Myasthenia Gravis was diagnosed in 3 patients (37.5%) among thymic tumours

Lymphomas: Among 10 patients (30.3%) of lymphomas 6 were NHL (60%) and 3 were HL(30%) and 1 was indeterminate (10%).

Germ cell tumours: Among 3 cases of germ cell tumours 2 were seminomas and 1 mature cystic teratoma.

Metastatic carcinoma: Among Metastatic Carcinoma, Lung carcinoma was found to be in 4 patients and Breast Carcinoma was found to be in 1 case.

Others: Beside these there is 1 Retrosternal goiter, 1 TB lymphadenitis, 1 neurofibroma, and 1 spindle cell sarcoma was found

FNAC: Fine needle aspiration cytology or core biopsy been done in 21 cases (63%) cases.

Discussion

Most common cause found in this study is lymphoid malignancy. There were 10 lymphoma cases (30.3%) of which 4 were having isolated mediastinal lymphadenopathy. Among these 10 patients, 6 were NHL and 3 were HL and 1 unspecified. Among 6 NHL patients Diffuse large B Cell Lymphoma was commonest with 3 cases, T cell lymphoblastic lymphoma/ leukemia was present in 2 patients. Second most common type of tumours found were thymic tumours, 8 cases (24.2%). Most of the thymic tumour

were benign with stage I and stage II disease. There was one thymic cyst and one thymic carcinoma. Metastatic carcinoma of lymph node was detected in 6 patients (18.2%). Primary was mostly lung carcinoma (5 patients). Among 3 cases (9.1%) of germ cell tumour two were seminomas and one was mature cystic teratoma proven by histopathology. There was one case of neurofibroma with multiple lesion in mediastinum and lung, one case of mediastinal lymphadenopathy along with cervical lymphadenopathy. Two cystic

lesions were found one was pericardial cyst and another was bronchogenic cyst. There was one case of retrosternal goiter proved by FNAC and thyroid scan and one case of spindle cell sarcoma. Most of the masses were malignant in character. 19 (57.6%) of total 33 cases were malignant and rest 42% were benign, this is somewhat similar to study of Vaziri et al [3]. However, benign lesions were more common in study conducted by Adegboye et al., (57%) [4] and Davis et al., (58%) [5].

This would reflect the increasing incidence of malignancy over the years. Mediastinal masses are most common younger age group which is in comparable to studies done by Dubashi et al [6]. Most cases were found in the age group of twelve to twenty. Metastasis was common in older age group. 5 out of 6 patient was above age 50. Thymic tumours occurred most commonly in the thirty to forty years age group. 4 out of 8 (50%) was in this group. Among the lung carcinoma with mediastinal metastasis cases 4 out of 5 were smoker.

However there is no significant association between smoking with other malignant masses. The median time of duration of symptoms was 19 weeks for benign lesions and 7 weeks for malignant lesions, significantly lesser in malignant group. 32 (97%) patient with mediastinal mass was symptomatic, while only in 1(3%) the mass was detected incidentally while doing a x ray for pre anesthetic assessment for a surgery, which is in comparison with study done by Singh et al., (94.7%) [7] and Dubashi et al., (97%).

Higher incidences of asymptomatic cases were found in study by Vaziri et al., (12%), Adegboye et al., (22.9%) and Davis et al., (38%). This observation may be due to the fact that many of our patients visit the hospital for their symptoms rather than for routine evaluation. As majority of our cases were malignant, this may reflect the fact that malignant tumours are more symptomatic than benign tumours.

Location of mass is diagnosed by CT scan imaging of thorax. Thymoma (40%) was the commonest tumour in the anterior mediastinum, followed by lymphoma (33.3%). Middle mediastinal involvement was seen in 11.43% cases, which is comparable with other studies [5,9]. However, the incidence of tumour in the posterior mediastinum (8.57%) was much less in comparison with other studies by Adegboye et al [4] (22.9%) and Davis et al [5] (26%). This could be due to the lack of neurogenic tumours in our study. Multiple

compartments involvement by malignant lesions is more commonly encountered due to local spread of tumour. A Retrospective Study conducted by Dubashi B et al [6] showed Primary mediastinal tumours were seen common in males with mean age of 37.48 ± 17.04 years. About 97% of patients were symptomatic at presentation.

Superior venacaval obstruction (SVCO) was seen in 28% of the patients. About 50% of the patients were diagnosed by a fine-needle aspiration or True-cut biopsy, while 28% of the patients required thoracotomy for a diagnosis. Majority of the tumours had anterior mediastinal presentation. Pleural effusion was seen in 20% of the patients, but diagnosis was obtained in only 1%. In adults, thymoma (39%), lymphoma (30%) and germ cell tumor (15%) were the common tumours.

A study done by Jitendra G Nasit et al [8] concluded that the rates of nonsurgical tumours such as lymphoma are higher and the rates of traditionally surgical diseases such as thymomas are lower. Prompt and correct diagnosis of anterior mediastinal masses is the key process in therapeutic decision. The precise nature of anterior mediastinal masses cannot be determined without histology examination of the tissue.

Chandra P Shrivastava et al [9] showed in their study Ages ranged from 6 months to 62 years, with peak incidence in the third and fourth decade of life (56%). The male to female ratio was 1.9:1. The anteriosuperior mediastinum was involved in 76 patients (72%), middle mediastinum in 13 (12%), and posterior mediastinum in 17 (16%). Myasthenia gravis was present in 27% of cases. Histopathologically, 41 (39%) patients had thymic pathology, 31 (29%) had lymphoma, 14 (13%) had germ cell tumors, 12 (11%) had neurofibroma, 4 (4%) had ganglioneuroma, 2 (2%) had bronchogenic cyst, and 1 each had thymic cyst and mesothelioma.

In a study done by Blegvard S et al [10] of 129 operated mediastinal tumours, Intrathoracic goitre, neurogenic lesions and thymomas comprised 62% of all the tumours. Fifty lesions (39%) were found at routine radiographic examination and were asymptomatic. Eight of these 50 lesions were malignant. Chest pain, fatigue, weight loss and fever were significantly more common in malignant than in benign disease.

Analysis of 139 cases of mediastinal lesions by FNAC and/or Biopsy by R Dixit et al [11] showed 93 cases were neoplastic in nature (67%), 32 were nonneoplastic (23%), and 14 remained inconclusive (10%). Among

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neoplastic mediastinal lesions, metastatic carcinoma (37.4%) was the most common neoplastic lesion, followed by non-Hodgkin's lymphoma (12.2%), Hodgkin's lymphoma (7.1%), thymic lesions (3.5%), etc. Among nonneoplastic conditions, tuberculosis was the most common lesion (20.1%).

In a small review of 16 operated cases by Malatani TS [12] showed Anterior mediastinal tumours included retrosternal goitre (2), benign cystic teratoma (1), benign thymoma (1), malignant thymoma, spindle cell type (1) and Hodgkin's lymphoma, nodular sclerosing type (1). Mid-mediastinal tumours included bronchial cyst (1), mediastinal granuloma (1), and pulmonary arterio-venous fistula (1). Neurilemmoma (2), neuroblastoma (1), ganglioneuroma (1), Askin tumour (1), neurofibroma (1) and benign histiocytoma (1) constituted the tumours of the posterior mediastinum.

Abebe Bekele et al [13] studied patterns of mediastinal tumours operated in a Saudi Arabia teaching Hospital and reported a different types of presentations. He showed that in a six years review of 73 patients who were operated, 49 (67.1%) were males, the and male to female ratio being 2.04:1. The mean age of patients was 35.9 +/- 10.5 years (range 14 to 74). Forty-five (61.6%) had lesions of the anterior mediastinum, 23 (31.5%) in the posterior mediastinum and 5 (6.8%) in the middle. The commonest anterior mediastinal tumors were thymic origin (24/45), and thymic lesions were found more common in females (17:7 ratio). From the 23 patients with posterior mediastinal tumors, 18 had benign neurogenic tumors (4 of which were dumbbell tumors). Chest pain and shortness of breath (dyspnea) were the two most common symptoms in 31 (42.4%) of the patients. Twenty three patients (31.5%) were asymptomatic, and all had benign lesions. None of the malignant lesions were asymptomatic. The rate of malignancy in this study was 24 (32.8%), of which 19 (79.1%) were in the anterior compartment.

Conclusions

1. In our study, the most common tumour in mediastinum was lymphoid malignancy. Thymoma is the second most common tumours. There are other diverse group of masses and cysts in mediastinum including germ cell tumours, cysts, metastatic carcinoma, sarcoma and nerve sheath tumours.

2. In our study lymphomas were distributed among younger age groups and thymomas and germ cell tumours and cysts in the middle age group and metastatic tumours in the older age group.

3. Most common presentation was cough followed by dyspnea, chest pain, fever, malaise, dysphagia, weight loss. Constitutional symptoms were more common in lymphoid malignancy and metastasis.

4. Physical sign was unremarkable in many cases. Most common findings were pallor, cervical lymphadenopathy, dull mediastinal percussion note

5. Most common complication is pleural effusion- followed by pericardial effusion and horner's syndrome.

Limitations- To make sample size significant we need longer duration of study or conduct a retrospective study from the hospital register, but extracting data from remote past was difficult in our setting. In case of lymphoid malignancy there is no cut off value for size of the lymphnode to call it a mass.

It is based on the observation of radiologist. In case of thymic tumours there is no distinct differentiation between size of normal thymus, thymic hyperplasia and thymic tumours. In some cases biopsy could not be done before surgery. Video assisted thoracoscopy and Video assisted mediastinoscopy facilities are not always available in our institute.

Though this study is not a new in the field, there is no review of present occurrences of mediastinal masses and their nature particularly in this part of the country. In view of increasing occurrence of malignant disorders, we planned for this study to see if there is any changing pattern of types of diseases.

Contribution by authors

1. Bikram Krsaha and Biswajit Saha: Concept Design, conducting the study and writing the manuscript.
2. D. Srakar: Conducting study and writing Manuscript.
3. S. Chakabarti: Histopathological studies.
4. S. Bhattacharya and R Bandyopadhyay: Guiding the study procedure and preparing the manuscriptsuitable for publication.

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