

# Primary Mediastinal Cysts and Tumours: A 5-Year Single Centre Experience

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## Abstract

**Background.** Primary mediastinal lesions pose a diagnostic and management challenge and the distribution of these lesions vary depending upon the population being studied and the type of the health-care facility.

**Methods.** A prospective, observational study of consecutive patients presenting for the evaluation of widened mediastinum on the chest radiograph was conducted during the period of January 2012 to January 2016. Patients with primary oesophageal, cardiac, pulmonary masses extending into the mediastinum, metastatic disease, infection (tuberculosis, fungal infections) and sarcoidosis were excluded.

**Results.** We studied 89 histopathological proven cases with primary mediastinal lesions; their mean age was 37.5±20.3 years; there were 50 (56.2%) males. There were 52 (58.4%) benign and 37 (41.6%) malignant lesions. In adults, 39/70 (55.7%) of masses were in the anterior, 11.4% (8/70) in the middle, 10% (7/70) in the posterior and 22.9% (16/70) were in multiple compartments of the mediastinum. In children, 36.8% (7/19) of the masses were in the middle, 31.6% (6/19) in anterior, 21.1% (4/19) in multiple compartment and 10.5% (2/19) in the posterior mediastinum. Lymphomas were the most common lesion 34.8% followed by thymic lesions 26.9%.

**Conclusion.** Most of the primary mediastinal lesions could be diagnosed by image guided fiberoptic needle aspiration cytology/core biopsy. [Indian J Chest Dis Allied Sci 2019;61:75-81]

**Key words:** Primary mediastinal lesions, Lymphoma, Thymoma.

## Introduction

The mediastinum is the central compartment of the thoracic cavity and is enclosed on either side by the pleurae. The organs present in the mediastinum include the heart, oesophagus, trachea, thymus, and aorta. For clinical purposes it is conventionally divided into the anterior, middle, posterior, and superior mediastinum. Nevertheless, there are no physical boundaries between compartments that limit the disease.<sup>1</sup>

Although, the primary lesions of the mediastinum are rare yet these include a wide variety of conditions, ranging from tumours (benign and malignant), cysts, vascular anomalies, and lymph node masses which differ with patient age and location of the lesion.<sup>2-5</sup>

The clinical presentation of mediastinal lesions varies from asymptomatic incidental chest radiography abnormality to symptoms caused by compression or invasion of adjacent intrathoracic structures or systemic symptoms. Although the lesions of the mediastinum are diverse, yet these have a single common feature, *i.e.* widening of the mediastinum on chest radiograph. However, this shared feature does not lend itself easily to differential diagnosis. These pose a great diagnostic and management challenge for the pulmonologist, radiologist,

pathologist and thoracic surgeons.<sup>1,3,5</sup> The distribution of primary mediastinal lesions varies depending upon the population and the nature of the facility where it is studied. There is paucity of literature describing the distribution of primary mediastinal lesions from India. The present study was intended to recognise the clinical characteristics and nature of mediastinal lesions amongst North-West Indian population.

## Material and Methods

This was a prospective, observational study carried out in a 1300 bed tertiary care teaching hospital in North-West India from the period of January 2012 to December 2016. The study was approved by the Institutional Ethics Committee and informed consent was taken from each subject. During the 5-year period we could recruit a total of 89 patients with histopathology proven primary mediastinal masses.

Symptomatic/asymptomatic patients presented or referred to us for the evaluation of widened mediastinum on the chest radiograph. Patients with primary oesophageal, cardiac, pulmonary extending into the mediastinum; patients with metastatic disease of the mediastinum; patients with infection (tuberculosis, fungal infections), sarcoidosis, and hernias into the mediastinum and those with traumatic mediastinal lesions were excluded.

[Received: January 30, 2018; accepted: June 01, 2018]

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The data pertaining to demographic characteristics, clinical manifestations, radiological features and histopathological diagnosis were collected on a pre-designed structured performa. The laboratory investigations includes complete blood counts, erythrocyte sedimentation rate, thyroid function test, chest radiograph (postero-anterior view and corresponding lateral views) and thoracic computed tomography (CT). Thoracic CT was done on multidetector scanner (Somatom Volume Zoom plus 128 slice CT scan; Germany Siemens) in supine position. Contrast-enhanced CT was performed using nonionic iodinated contrast. The images were viewed in lung window (level 700 HU [Housefield Unit]; width 1,500 HU), mediastinal window (level 30 HU-50 HU; width 350 HU-500 HU) and bone window (level 2,400 HU; width 200 HU). Two experienced radiologists evaluated the images independently in light of clinical information. The approach for biopsy of the mediastinal lesion was individualised according to the clinical circumstances, location, and size of the lesion.

### Statistical Analysis

The percentages of patients in each category were calculated for categorical variables. Z-test for proportion and Student's t-test were used for comparing the two groups. A p value <0.5 was considered significant. The statistical analyses were performed using Statistical Package for the Social Sciences (SPSS, version 20.0, SPSS, Inc., Chicago, IL, USA).

### Results

Of the 89 patients studied, there were 50 (56.2%) males. Their mean age was 37.5±20.3 years (range 1.5 to 87 years). There was no significant difference in the mean age of males (35.2±19.0 years) and females (38.8±21.3 years) (p=0.396). Nineteen patients were younger than 18 years of age in the study (Table 1).

**Table 1. Distribution of patients according to age and gender**

Age (years)	Total (n=89)	Male (n=50)	Female (n=39)
0-10	13 (14.6)	8 (16.0)	5 (12.8)
11-20	6 (6.7)	4 (8.0)	2 (5.1)
21-30	14 (15.7)	8 (16.0)	6 (15.4)
31-40	19 (21.3)	10 (20.0)	9 (23.1)
41-50	10 (11.2)	5 (10.0)	5 (12.8)
51-60	14 (15.7)	8 (16.0)	6 (15.4)
61-70	10 (11.2)	7 (14.0)	3 (7.7)
71-80	3 (3.4)	---	3 (7.7)

Figures in parentheses indicate percentages

All the patients with malignant disease 37/37 (100%), were symptomatic while 33/52 (63.4%) with benign lesions were symptomatic. Respiratory symptoms were the most common presenting symptom in patients with mediastinal

lesions involving all the compartments (Table 2). Cough (44.9%) and dyspnoea (42.6%) were the most common respiratory symptoms, followed by chest pain (24.7%). Constitutional symptoms were present in 35.9% (32/89) cases and included fever in 29.2% (26/89), night sweats 24.7% (22/89) and weight loss 23.6% (21/89). Symptoms of mediastinal obstruction were present in 17.9% (16/89) cases. Hoarseness of voice was the most common symptom of mediastinal obstruction and was present in 11, followed by dysphagia in six and superior venacaval obstruction in five cases. Thirteen patients with malignant and three with benign lesions had symptoms of mediastinal obstruction. Majority (75%) of the patients with symptoms of mediastinal obstruction had multi-compartmental distribution (anterior and middle).

Lymphomas were the most common cause of hoarseness of voice (62.5%). Constitutional symptoms and features of mediastinal compression were more significantly present in patients with malignant lesions. Amongst 16 cases of thymoma, six had *Myasthenia gravis*. Thirty-one (34.8%) patients had abnormal findings on physical examination with 23 (74.2%) benign and 8 (25.8%) malignant lesions. Systemic examination was normal in 58 (65.2%) cases. Twenty (22.4%) cases had abnormal respiratory findings. Abnormal respiratory findings included parasternal dullness in 14, pleural effusion in eight and positive d'Espine's sign in four cases.

Sixty-two (69.7%) patients were diagnosed by image guided fine needle aspiration cytology (FNAC) or trucut biopsy, 14 (15.7%) mediastinoscopy, 10 (11.2%) thoracotomy and three endoscopic ultrasound (EUS) guided.

In the present study, there were 52 (58.4%) benign and 37 (41.6%) malignant lesions. Forty-five (50.6%) cases had lesions confined to the anterior; 15 (16.9%) to the middle and 9 (10.1%) to the posterior mediastinum. In 20 (22.5%) cases, two or more than two compartments of the mediastinum were simultaneously involved (Table 3). Among the anterior mediastinal lesions, 29 (64.4%) were benign and 16 (35.6%) were malignant. In the middle mediastinum, 11 (73.3%) lesions were benign and four (26.7%) were malignant. Seven (78%) of the lesions in the posterior mediastinum were benign and two (22%) were malignant. Amongst the mediastinal lesions having multi-compartment involvement, 15 (75%) were malignant and five (25%) were benign.

Table 4 shows histopathological diagnosis of various mediastinal lesions. Lymphomas were the most common lesion representing 34.8% (31/89) of the entire cohort. Among these, Hodgkin's disease (21/31) was more common than the non-Hodgkin's lymphoma (11/31). The mean age of patients with lymphomas was 38.9±21.4 years, 61.3% of the patients with lymphomas were males. Lymphomas were the most common malignant lesion in the anterior (14/45), middle (4/4) and in those with multi-compartment involvement (13/20).

**Table 2. Symptoms and signs in patients with primary mediastinal cysts and tumours**

Symptom or Sign	Benign (n=52)	Malignant (n=37)	Total (n=89)
<b>Symptomatic patients</b>	33 (63.4)	37 (100)	70 (78.7)
<b>Respiratory symptoms</b>	29 (55.8)	21 (56.8)	49 (56.2)
Cough	20 (38.5)	20 (54.1)	40 (44.9)
Dyspnoea	18 (34.6)	20 (54.1)	38 (42.6)
Chest pain	7 (13.4)	15 (40.5)	22 (24.7)
<b>Constitutional symptoms</b>	6 (11.5)	26 (70.3)	32 (35.9)
Fever	3 (5.8)	23 (62.2)	26 (29.2)
Night sweats	–	22 (59.5)	22 (24.7)
Weight loss	4 (7.7)	17 (45.9)	21 (23.6)
<b>Mediastinal obstruction</b>	3 (5.8)	13 (35.1)	16 (17.9)
Hoarseness	3 (5.8)	8 (21.6)	11 (12.4)
Dysphagia	1 (1.9)	5 (13.5)	6 (6.7)
SVCS	–	5 (13.5)	5 (5.6)
<b>Backache</b>	8 (15.4)	2 (5.4)	10 (11.2)
<b>Abnormal Examination</b>	15 (28.8)	16 (43.2)	31 (34.8)
<b>Respiratory signs</b>	10 (19.2)	10 (27.1)	20 (22.5)
Parasternal dullness	6 (11.5)	8 (21.6)	14 (15.7)
Pleural effusion	2 (3.8)	6 (16.2)	8 (9)
d'Espine's sign	2 (3.8)	2 (5.4)	4 (4.5)
SVCS signs	–	7 (18.9)	7 (7.9)
Monomorphic wheeze	–	2 (5.4)	2 (2.2)
<b>Paraneoplastic</b>	10 (19.2)	1 (2.7)	11 (12.4)
Myasthenia	6 (11.5)	–	6 (6.8)
PRCA	2 (3.8)	–	2 (2.2)
Gynaecomastia	2 (3.8)	–	2 (2.2)
<b>Endocrinology</b>	6 (11.5)	–	6 (6.8)
Enlarged thyroid	5 (9.6)	–	5 (5.6)
Hypothyroidism	3 (5.8)	–	3 (3.4)
<b>Others</b>			
Pericardial tamponade	2 (3.8)	1 (2.7)	3 (3.4)
Neurofibromatosis	2 (3.8)	–	2 (2.2)
Neurological deficit	–	2 (5.4)	2 (2.2)
Adenopathy	–	2 (5.4)	2 (2.2)

Figures in parentheses indicate percentages

Definition of abbreviations: SVCS=Superior vena cava syndrome; PRCA=Pure red cell aplasia

**Table 3. Distribution of benign and malignant lesions in patients with primary mediastinal cysts and tumours**

	Total (n=89)	Benign (n=52)	Malignant (n=37)
Anterior mediastinum	45 (50.6)	29 (55.8)	16 (43.2)
Middle mediastinum	15 (16.8)	11 (21.2)	4 (10.8)
Posterior mediastinum	9 (10.1)	7 (13.4)	2 (5.5)
Multiple compartments	20 (22.5)	5 (9.6)	15 (40.5)

Figures in parentheses indicate percentages

Thymic neoplasms were the second most common lesion in the series and represented 26.9% (24/89) of the entire group. Histologically, these included thymoma (16/24), squamous cell carcinoma of the thymus (3/24), thymic

**Table 4. Histopathological distribution of primary cysts and tumours of the mediastinum**

Type	Benign	Malignant	Total
<b>Thymic lesions</b>	20	4	24 (27.0)
Thymoma	16	0	16 (18.0)
Thymic hyperplasia	2	0	2 (2.2)
Thymic carcinoma	0	3	3 (3.4)
Thymolipoma	2	0	2 (2.2)
Invasive thymoma	0	1	1 (1.1)
<b>Cystic lesions</b>	10	0	10 (11.2)
Bronchogenic	9	0	9 (10.1)
Pericardial	1	0	1 (1.1)
<b>Neurogenic lesions</b>	9	2	11 (12.4)
Ganglioneuroblastoma	0	1	1 (1.1)
Neuroblastoma	0	1	1 (1.1)
Neurilemoma	6	0	6 (6.7)
Neurofibroma	3	0	3 (3.4)
<b>Lymphomas</b>	0	31	31 (34.8)
Hodgkin's	0	21	21 (23.6)
Non-Hodgkin's	0	10	10 (11.2)
<b>Germ cell tumours</b>	8	0	8 (9.0)
Teratoma	7	0	7 (7.9)
Seminoma	1	0	1 (1.1)
<b>Miscellaneous lesions</b>			
Thyroid	5	0	5 (5.6)

Figures in parentheses indicate percentages

hyperplasia (2/24), thymolipoma (2/24), and invasive thymoma (1/24). The mean age of patients with thymic tumours was 42.0±16.9 years and 62.5% of the patients with thymic neoplasms were males.

Neurogenic lesions represented 10.1% (9/89) of the entire lesions. There were seven (77.8%) benign and two (22.2%) malignant tumours. The neurogenic tumours included neurilemoma (4/9), neurofibroma (3/9), ganglioneuroblastoma (1/9) and neuroblastoma (1/9). Both the malignant neurogenic tumours were in the pediatric age group. The mean age of patients with neurogenic tumours was 35.5±19.4 years and 66% of the patients with neurogenic tumours were females.

There were 10 cystic lesions of the mediastinum representing 11.2% of the entire lesions. These cystic lesions included bronchogenic (9/10) and pericardial (1/10) cysts. The mean age of patients with bronchogenic cyst was 21.5±13.0 years and 66% of the patients with cystic lesions of the mediastinum were males.

There were eight germ cell tumours in the present series representing 9% of entire lesions; seven (87.5%) benign and one (12.5%) malignant. The mean age of patients with germ cell tumours was 22.9±13.6 years and 75% of the patients with germ cell tumours were females. Figures 1-4 depicts the representative chest radiograph, CECT thorax and histopathology of some mediastinal tumours and cysts in our study.

The adult-to-pediatric ratio of patients with primary mediastinal tumours in the present study was 3.7:1. In adults, 55.7% (39/70) of masses were in the anterior, 11.4% (8/70) in the middle, 10% (7/70) in the posterior and 22.9% (16/70) were in the multiple

compartments of the mediastinum. In children, 36.8% (7/19) of the masses were in the middle, 31.6% (6/19) in the anterior, 21.1% (4/19) in the multiple compartment and 10.5% (2/19) in the posterior mediastinum (Table 5).



Figure 1. (A) Chest radiograph (postero-anterior view) shows a large lobulated radio-opaque mass with a broad base towards the mediastinum in the left upper and mid zone; (B) contrast enhanced computed tomography of chest shows a large well-defined heterogeneously enhancing solid cystic lesion in the anterior mediastinum; and (C) photomicrograph shows infiltrating lesion comprised predominantly of lymphocytes along with intersecting fibrotic bands (Haematoxylin and Eosin, x 200).



Figure 2. (A) Chest radiograph (postero-anterior view) shows homogeneous haziness in the left hemithorax with significant mediastinal shift to the right side; (B) contrast enhanced computed tomography shows a large lobulated heterogeneously enhancing lesion in the anterior and middle mediastinum causing vascular encasement and significant left pleural effusion; and (C) photomicrograph shows polymorphous background of lymphocytes and eosinophils along with Reed-Sternberg cells (Haematoxylin and Eosin, x 400).



Figure 3. (A) Chest radiograph (postero-anterior view) shows a well-defined radio-opaque mass in the right upper zone with a broad base towards the mediastinum; (B) contrast enhanced computed tomography section of the mediastinum shows a well-defined, non-enhancing fluid attenuation mass lesion in the middle mediastinum indenting the trachea; and (C) photomicrograph shows cyst lined by pseudostratified ciliated columnar epithelium (Haematoxylin and Eosin, x 200).

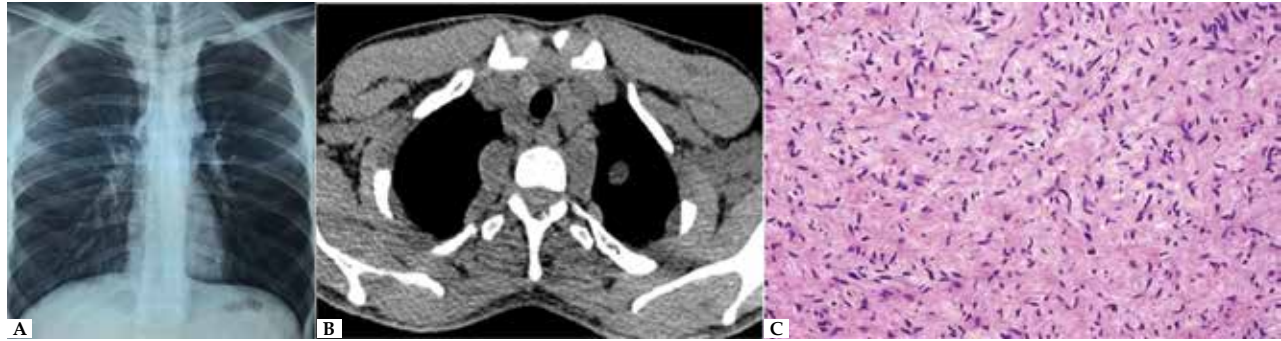


Figure 4. (A) Chest radiograph (postero-anterior view) shows multiple nodular lesions in the paravertebral location; (B) contrast enhanced computed tomography section of the mediastinum shows multiple small nodular soft tissue masses in paravertebral location suggestive of neurofibromas; and (C) photomicrograph shows spindle cells with wavy nuclei arranged in haphazard manner in collagenous stroma (Haematoxylin and Eosin, x 200).

Table 5. Distribution of primary mediastinal cysts and tumours in children and adults

	Total (n=89)	Children (n=19)	Adults (n=70)
Anterior mediastinum	45 (50.6)	6 (31.6)	39 (55.7)
Middle mediastinum	15 (16.8)	7 (36.8)	8 (11.4)
Posterior mediastinum	9 (10.1)	2 (10.5)	7 (10.0)
Multiple compartments	20 (22.5)	4 (21.1)	16 (22.9)

Figures in parentheses indicate percentages

There were 23 (32.9%) lymphomas, 22 (31.4%) thymic lesions, nine (12.8%) neurogenic tumours, six (8.5%) congenital cysts and five (7.1%) each of germ cell and thyroid tumours in adult patients. There were eight (42.1%) lymphoma, four (21%) congenital cysts, three (19%) germ cell tumour and two (18.2%) each of neurogenic tumours and thymic lesions in the pediatric patients. There was a significant lower incidence of thymomas (10.5% versus 31.4%) and thyroid tumours (0 versus 7.1%) in children than adults. The prevalence of malignancy in the pediatric patients was higher than the adults (52.6% versus 38.6%;  $p=0.2713$ ), though it was not statistically significant.

Histology varied with age. In the first decade, cystic lesions (bronchogenic cyst and germ cell tumours) were the most common. From the second to third decades, lymphomas were the predominate lesions. In the fourth to seventh decade thymic lesions, lymphomas and neurogenic lesions were the most common (Table 6).

Amongst 24 thymic lesions, 19 underwent thymectomy (16 for thymoma, 2 thymolipoma and 1 thymic carcinoma), two (thymic hyperplasia) on observational follow up, three referred to other centers (2 thymic carcinoma and 1 invasive thymoma). Twenty-eight cases of lymphoma (19 Hodgkin's and 9 Non-Hodgkin's) underwent chemotherapy. Three patients got referred to other centers. In seven patients complete resection of the bronchogenic cyst was performed and subtotal resection in two patients. Nine cases of benign neurogenic tumour underwent complete excision of the lesion and two cases (one each of ganglioneuroblastoma and neuroblastoma) got referred to other centers. Seven cases of teratoma underwent complete excision of the lesion and one case underwent chemotherapy.

Follow-up data were available for 55 (61.8%) patients; 32 patients had benign disease (16 thymoma, 5 bronchogenic

Table 6. Histopathological diagnoses of patients according to age

Age Distribution	Total (n=89)	Lymphoma (n=31)	Thymic Tumours (n=24)	Bronchogenic Cyst (n=10)	Neurogenic Tumours (n=11)	Germ Cell Tumours (n=8)	Thyroid Lesions (n=5)
1st decade	13 (14.6)	2 (15.4)	2 (15.4)	4 (30.8)	2 (15.4)	3 (23.1)	–
2nd decade	6 (6.7)	6 (100.0)	–	–	–	–	–
3rd decade	14 (15.7)	5 (35.7)	3 (21.4)	3 (21.4)	1 (7.1)	2 (14.3)	–
4th decade	19 (21.9)	4 (21.1)	6 (31.6)	3 (15.8)	4 (21.1)	2 (10.5)	–
5th decade	10 (11.2)	3 (30.0)	4 (40.0)	–	2 (20.0)	1 (10.0)	–
6th decade	14 (15.7)	6 (42.9)	5 (35.7)	–	1 (7.1)	–	2 (14.3)
7th decade	10 (11.2)	3 (30.0)	4 (40.0)	–	1 (10.0)	–	2 (20.0)
8th decade	3 (3.4)	2 (66.7)	–	–	–	–	1 (33.3)

Figures in parentheses indicate percentages



cyst, 4 neurogenic tumour, 4 teratoma, 2 thymolipoma and 1 thymic hyperplasia) and follow-up ranged from two months to four years. There was no recurrence, malignant degeneration or growth of any tumour. Follow-up is available in 23 patients with malignant disease and extended from two months to 3.5 years. All the patients in this group had lymphomas (17 Hodgkin and 6 Non-Hodgkin), 20 had cure and three had refractory disease. The results of comparison of present study with other studies are presented in table 7.<sup>6,8-10,18-21</sup>

like thoracotomy or mediastinoscopy. Similar observations have been made by Dubashi *et al*.<sup>8</sup>

Nearly 80% of patients in our study were symptomatic at the time of presentation compared to 50% to 60% in various Western studies.<sup>3,5,7,9,10</sup> A greater number of symptomatic patients with mediastinal lesions at the time of presentation in our cohort may partly be explained by the lack of availability of computerised tomography as well as a mass population screening at community level.

The distribution of primary mediastinal lesions in the

**Table 7. Comparison of present study with various other studies evaluating the primary mediastinal cysts and tumours**

Author Year Number	Sabiston <i>et al</i> , [18] 1952 (n=101)	Burkell <i>et al</i> , [19] 1969 (n=61)	Rubush <i>et al</i> , [20] 1973 (n=153)	Nandi <i>et al</i> , [21] 1980 (n=74)	Davis <i>et al</i> , [9] 1986 (n=400)	Cohen <i>et al</i> , [10] 1991 (n=230)	Dubashi <i>et al</i> , [8] 2009 (n=91)	Baram <i>et al</i> , [6] 2016 (n=85)	Present study 2017 (n=89)
Neurogenic	20 (19.8)	13 (21.3)	36 (23.5)	27 (36.5)	57 (14.3)	39 (16.9)	6 (6.6)	9 (10.6)	9 (10.1)
Thymoma	17 (16.8)	12 (19.7)	42 (27.5)	18 (24.3)	67 (16.8)	56 (24.3)	28 (30.7)	21 (24.7)	16 (18)
Lymphoma	11 (10.9)	12 (19.7)	14 (9.2)	4 (5.4)	62 (15.5)	36 (15.7)	28 (30.8)	28 (32.9)	31 (34.8)
Germ cell neoplasm	9 (8.9)	3 (4.9)	14 (9.2)	7 (9.5)	42 (10.5)	22 (9.6)	14 (15.4)	10 (11.8)	8 (9.0)
Primary carcinoma	10 (9.9)	0	3 (1.9)	0	34 (8.5)	4 (1.7)	8 (8.8)	0	0
Mesenchymal tumour	1 (1.0)	4 (6.6)	10 (6.5)	2 (2.7)	24 (6.0)	13 (5.7)	2 (2.2)	2 (2.4)	0
Endocrine tumour	2 (2.0)	4 (6.6)	13 (19.9)	6 (8.1)	12 (3)	7 (3.0)	0	0	5 (5.6)
Cyst	17 (16.8)	13 (19.7)	21 (13.7)	9 (12.2)	99 (24.8)	45 (19.6)	0	2 (2.4)	10 (11.2)
Other	14 (13.9)	0	0	1 (1.4)	3 (0.8)	8 (3.5)	5 (5.5)	13 (15.3)	8 (9)

Figures in parentheses indicate percentages

## Discussion

Primary lesions of the mediastinum are uncommon and represent approximately 3% of the tumours within the thoracic cavity.<sup>1,3-5</sup> Ours is a tertiary referral centre for North India and caters a broad cross-section of the population so our study may represent the true distribution of primary mediastinal tumours and cysts in the North Indian population. The mean age of the patients in the present study was 37 years which is in concordance with other studies.<sup>6-10</sup>

In the present study, precise location of the mass in the mediastinum by chest radiograph could be possible only in 32 (35.9%) patients. Although chest radiographs can show abnormalities in many patients with mediastinal masses; however, it has limited ability to delineate the extent of abnormality and relationship of masses to specific mediastinal structures. CECT thorax is much more superior than conventional radiograph in establishing the diagnosis, characterising and in delineating relationship of mediastinal masses to other structures.

Computed tomography-guided percutaneous biopsy is a standard procedure for the initial evaluation of the mediastinal masses.<sup>11</sup> In our study, 70% of the patients were diagnosed by percutaneous FNAC/ biopsy and only 26.9% of the cases required more invasive surgical procedures,

present series is similar to that from other large series across the globe.<sup>6-10</sup> The anatomical locations of various mediastinal lesions in the present study included 50.6% in the anterior; 16.9% in the middle; 10.1% in the posterior and in 22.5% in the multi-compartments. The reported anatomical locations of mediastinal lesions range for anterior mediastinal lesions was 49% to 59%; for middle mediastinal lesions, 18% to 25%; and for posterior mediastinal lesions, 23% to 27%.<sup>6-10</sup>

The most common histopathological lesion in the anterior mediastinum was lymphoma; in the middle, bronchogenic cyst; in the posterior, neurogenic tumours and in the multiple compartments involving the mediastinum was lymphoma. Many of the Western studies<sup>3,5,9,10</sup> have reported neurogenic tumours to be the largest group of mediastinal tumours; however, we observed lymphomas to be the most frequent mediastinal tumour (34.8%). This is probably due to an increase in rates of lymphoma in India like in other parts of the world.<sup>12-14</sup> Thymic lesions were the second most common lesions representing 27%, which is comparable with other reported series.<sup>6-10</sup>

The adult-to-pediatric ratio of patients with primary mediastinal tumours in the present study was 3.68:1 which is similar to other studies.<sup>15,16</sup> Amongst the pediatric

population, neurogenic tumours have been reported to be the commonest, comprising 34% to 58% in various studies<sup>16</sup> while these constituted only 12.8% cases in the present study. Lymphomas were the most common lesion among the pediatric population followed by congenital cysts in the present study which is in contrast with the observations made by Simpson *et al*<sup>17</sup> in their study from Royal Children's Hospital, Melbourne. The incidence of malignant lesions in pediatric population was higher than the adults in the present series, a result unlike other reports.<sup>16</sup> This is mainly because of the higher occurrence of lymphomas, malignant germ cell tumours and neuroblastomas in the children than in the adults.

### Conclusions

Primary mediastinal lesions are a challenge to the treating physician and the treatment and outcome depend on the histological subtypes. In our study, younger population predominated, and most of the patients could be diagnosed by image guided FNAC/core biopsy without any major invasive surgical intervention. There appears to be an increase in the rate of mediastinal lymphomas, especially in subjects with anterior and multi-compartment occurrence. Good outcome is possible with surgical resection in benign lesions and an aggressive multi-modality approach to the malignant lesions.

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