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**Original research article**

# Histopathological study of mediastinal lesions

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**Abstract**

**Aim:** To study the spectrum of lesions in the mediastinum.
**Methodology:** This is a prospective study of various types of lesions in the mediastinum. The specimens included CT guided biopsies, excision biopsies and tissue biopsies obtained from the departments of Cardiothoracic and Surgical Oncology at Andhra Medical College & General Hospital, Vishakapatnam from June 2022 to May 2024.
**Results:** There were 50 cases of mediastinal lesions, both non neoplastic and neoplastic lesions during the study period of two years. Neoplastic lesions were the majority in number 35(70%) with benign being 15 (30%) and malignant are 20 (40%). Non-neoplastic lesions were 15 (30%) in number with the most common age group affected being 21-30 years and 41-50 years and the commonest lesion was chronic nonspecific lymphadenitis constituting to 6 cases (40%). Of the benign lesions, The common age group affected benign lesions was 41-70 years with female preponderance and majority being schwanomma. Among the malignant neoplasms, the common age group affected was 41-60 years and commonest lesion was metastatic deposit. As most non-neoplastic and neoplastic lesions of the mediastinal lesions have similar clinical manifestations and radiological appearances, only provisional diagnosis can be made in these cases. Many of these lesions are inaccessible to FNAC and in some FNAC is not recommended for fear of hemorrhage.
**Conclusion:** The study concluded that correct and final diagnosis can be made only by histopathological examination. Therefore, histopathological diagnosis is mandatory for proper early treatment and to assess the prognosis of these patients.
**Keywords:** FNAC, Neoplastic Lesions, mediastinal lesions, lymphadenitis

## Introduction

The mediastinum is the portion of the thoracic cavity located between the pleural cavities, extending anteroposteriorly from the sternum to the spine and sagittally from the thoracic inlet to the diaphragm. The numerous organs and structures it contains make it a veritable Pandora's box, within which congenital cysts, benign tumors, primary and secondary malignant neoplasms may develop [1].

An arbitrary division of the mediastinum into superior, anterior, middle, and posterior compartments has proved useful, since most cysts and neoplasms have a predilection for one compartment over the others [1]. About half of the patients with mediastinal lesions are asymptomatic, the lesions being discovered incidentally on chest X-Ray films or CT scans done for other reasons.

Nevertheless, selected symptoms and signs are of particular diagnostic importance because they are associated with predefined subsets of mediastinal lesions. Systemic complaints, such as weight loss, fever, and night sweats, are predominantly seen with lymphoproliferative diseases (malignant lymphomas and Castleman disease [angio-follicular lymphoid hyperplasia]. Myasthenia gravis is generally a marker of true thymic hyperplasia and thymoma, as distinguished from thymic carcinoma rarely, other mediastinal tumors may be linked to this disorder as well. Similarly, acquired hypogammaglobulinemia serves as a potential indicator of thymoma [2].

The location of lesions in the mediastinum, together with their configuration, provides important diagnostic information, but many lesions (both benign and malignant) result in similar radiographic and CT scan appearances. Exploration is therefore mandatory in most instances.

Core needle biopsies and fine needle aspiration of mediastinal masses has been used increasingly and successfully, particularly in lesions of the anterosuperior compartment [3].

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**Aims and Objectives**

1. To study the spectrum of lesions in the mediastinum.
2. To categorize the various lesions into non-neoplastic and neoplastic lesions based on histopathological findings.
3. To study the incidence of lesions with respect to age, sex and site of lesions.
4. To compare the present data with other similar studies.

This is a prospective study of various types of lesions in the mediastinum. The specimens included CT guided biopsies, excision biopsies and tissue biopsies obtained from the departments of Cardiothoracic and Surgical Oncology at Andhra Medical College & General Hospital, Vishakapatnam from June 2022 to May 2024.

All the specimens and tissue biopsies received are fixed in 10% formalin and routinely processed. 3-5 microns thick sections made from paraffin embedded blocks and stained with haematoxylin and eosin. Special stains and IHC are done whenever required. Detailed study of the histopathological sections is done and the results are tabulated.

**Inclusion criteria**

All the specimens from the mediastinum.

**Exclusion criteria**

Biopsy material other than the lesions of mediastinum.

**Ethical clearance**

Ethical clearance has been obtained from Ethical committee of Andhra Medical College, V Vishakapatnam.

**Statistical Methods Applied**

1) Number and percentage
2) Descriptive statistics

**Observations and Results**

The present study included all the mediastinal lesions that were reported in the Department of Pathology, Andhra Medical College, Vishakapatnam over a period of 2 years from June 2022 to May 2024. The study included 50 cases, of which 15 cases were non-neoplastic and 35 cases were neoplastic lesions. The neoplastic lesions were more common than non-neoplastic lesions. The ratio of neoplastic to non-neoplastic lesions is 2.2 : 1.

**Table 1:** Incidence of neoplastic and non-neoplastic lesions

| Type of Lesion | Number of Cases (%) |
|---|---|
| Neoplastic | 35 (70) |
| Non-neoplastic | 15 (30) |
| Total | 50 (100) |

**Table 2:** Sex distribution among the non-neoplastic lesions

| Sex | Number (% of cases) |
|---|---|
| Male | 9 (60%) |
| Female | 6 (40%) |
| Total no. of cases | 15 (100%) |

Histological types of non-neoplastic lesions.

Out of 15 cases of non-neoplastic lesions, the common lesion was chronic non-specific lymphadenitis of 6 cases (40%), followed by 4 cases (26.6%) of residual thymus.

**Table 3:** Histological types of non-neoplastic lesions

| Types | Number (% of cases) |
|---|---|
| Chronic non-specific lymphadenitis | 6 (40%) |
| Normal or residual thymus | 4 (26.6%) |
| Thymic cyst | 2 (13.3%) |
| Thymolipoma | 1(6.6%) |
| Tuberculous etiology | 2 (13.3%) |
| Total | 15 (100%) |

Age distribution among various non-neoplastic lesions.

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Chronic non-specific lymphadenitis were the commonest of all non-neoplastic lesions and there was no specific age predilection.

**Table 4:** Age distribution among various non-neoplastic lesions

| Type of lesion | 0-10 yrs | 11-20 yrs | 21-30 yrs | 31-40 yrs | 41-50 yrs | 51-60 yrs | 61-70 yrs | 71-80 yrs | Total |
|---|---|---|---|---|---|---|---|---|---|
| Chronic non-specific lymphadenitis | – | – | 1 | 1 | 1 | 1 | 1 | 1 | 6 |
| Normal or residual thymus | – | – | 1 | 1 | 1 | 1 | – | – | 4 |
| Thymic cyst | – | – | 1 | – | 1 | – | – | – | 2 |
| Thymolipoma | – | – | – | – | 1 | – | – | – | 1 |
| Tuberculous etiology | – | – | 1 | 1 | – | – | – | – | 2 |
| Total | – | – | 4 | 3 | 4 | 2 | 1 | 1 | 15 |

**Neoplastic Lesions**

Out of 35 neoplastic lesions 15 cases were benign neoplasms and 20 cases were malignant neoplasms.

**Table 5:** Incidence of Neoplastic Lesions

| Type | Number (% of cases) |
|---|---|
| Benign neoplasms | 15 (42.8%) |
| Malignant neoplasms | 20 (57.1%) |
| Total | 35 (100) |

Age distribution among the benign neoplasms.

The age distribution among the benign neoplasms ranged from 22 to 64 years. Majority of cases were seen in the age group of 41-70 years constituting to 12 cases (80%) of all the benign neoplasms.

**Table 6:** Age distribution among the benign neoplasms

| Age group (Years) | Number (% of cases) |
|---|---|
| 0-10 | 0 |
| 11-20 | 0 |
| 21-30 | 1 (6.6%) |
| 31-40 | 2 (13.3%) |
| 41-50 | 4 (26.6%) |
| 51-60 | 4 (26.6%) |
| 61-70 | 4 (26.6%) |
| 71-80 | 0 |
| Total | 15 (100%) |

Histological types of benign neoplasms.

Among 15 cases of benign neoplasms, the most common lesion was Schawannoma accounting for 6 cases (40%).

**Table 7:** Histological types of benign neoplasms

| Types | Number (% of cases) |
|---|---|
| Schwannoma | 6 (40%) |
| Type A Thymoma | 1(6.6%) |
| Type AB Thymoma | 1(6.6%) |
| Type B2 Thymoma | 3 (20%) |
| Type B3 Thymoma | 3 (20%) |
| Demoid cyst | 1(6.6%) |
| Total | 15 (100%) |

Age distribution among various benign neoplasms.

The most common age group involved was 41-70 years of age with 12 cases (80%) out of total 15 benign lesions.

**Table 8:** Age distribution among various benign neoplasms

| Type | 0-10 yrs | 11-20 yrs | 21-30 yrs | 31-40 yrs | 41-50 yrs | 51-60 yrs | 61-70 yrs | 71-80 yrs | Total |
|---|---|---|---|---|---|---|---|---|---|
| Schwannoma | – | – | 1 | – | 1 | 1 | 3 | – | 6 |
| Type A Thymoma | – | – | – | – | 1 | – | – | – | 1 |
| Type AB Thymoma | – | – | – | – | 1 | – | – | – | 1 |
| Type B2 Thymoma | – | – | – | 1 | – | 2 | – | – | 3 |

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| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Type B3 Thymoma | – | – | – | – | 1 | 1 | 1 | – | 3 |
| Demoid cyst | – | – | – | 1 | – | – | – | – | 1 |
| Total | – | – | 1 | 2 | 4 | 4 | 4 | – | 15 |

**Age distribution among the malignant neoplasms**

In the present study, the age distribution among the malignant neoplasms ranged from 16 to 75 years. Majority of cases were seen in the age group of 41-60 years constituting to 10 cases (50%) of all malignant neoplasms.

**Table 9:** Age distribution among the malignant neoplasms

| Age in Years | Number of Cases (%) |
|---|---|
| 0-10 | – |
| 11-20 | 1 (5%) |
| 21-30 | 1 (5%) |
| 31-40 | 3 (15%) |
| 41-50 | 5 (25%) |
| 51-60 | 5 (25%) |
| 61-70 | 4 (20%) |
| 71-80 | 1 (5%) |
| Total | 20 (100%) |

**Sex wise distribution among the malignant neoplasm**

Among 20 cases of malignant neoplasms, 12 cases were seen in males and 8 cases were seen in females. There was a male preponderance with male to female ratio of 1.5 : 1.

**Table 10:** Sex wise distribution among the malignant neoplasm

| Sex | Number (% of cases) |
|---|---|
| Male | 12 (60%) |
| Female | 8 (40%) |
| Total | 20 (100%) |

**Histopathological subtypes of malignant neoplasms**

Among 20 cases of malignant neoplasms, there were 5 cases of Non hodgkins lymphoma, 3 cases of adenocarcinoma metastatic deposit, 4 cases of carcinoma metastatic deposit, 4 cases of carcinoma of lung, 2 cases of small round blue cell tumor, 1 case from both small cell carcinoma deposit and metastatic stromal sarcoma of endometrium.

**Table 11:** Histopathological subtypes of malignant neoplasms

| Types | Number (% of cases) |
|---|---|
| Non-Hodgkins lymphoma | 5 (25%) |
| Adenocarcnimoa deposit | 3 (15%) |
| Carcinoma deposit | 4 (20%) |
| Carcinoma of lung | 4 (20%) |
| Small round blue cell tumor | 2 (10%) |
| Small cell carcinoma deposit | 1 (5%) |
| Metastatic stromal sarcoma of enodmetrium deposit | 1 (5%) |
| Total | 20 (100%) |

Age distribution among various malignant neoplasms.

Among, 20 cases, 5 cases were lymphomas, 4 cases were lung carcinomas and rest are metastatic deposits. The most common age group was 41-60 years with 10 cases (50%).

**Table 12:** Age distribution among the malignant neoplasms

| Type of Malignant Neoplasm | Age in years TOTAL | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 0-10 | 11-20 | 21-30 | 31-40 | 41-50 | 51-60 | 61-70 | 71-80 | |
| Non-Hodgkins lymphoma | – | 1 | 1 | – | 1 | 1 | 1 | – | 5 |
| Adenocarcnimoa deposit | – | – | – | – | 2 | 1 | 1 | 1 | 5 |
| Carcinoma deposit | – | – | – | 2 | – | 2 | 1 | – | 5 |
| Small round blue cell tumor | – | – | – | 1 | 1 | – | 1 | – | 3 |
| Small cell carcinoma | – | – | – | – | – | 1 | – | – | 1 |
| Metastatic stromal sarcoma of enodmetrium deposit | – | – | – | – | 1 | – | – | – | 1 |
| TOTAL | – | 1 | 1 | 3 | 5 | 5 | 4 | 1 | 20 |

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**Distribution of mediastinal lesions according to their compartment origin**

Out of 50 cases, the most common involvement of component is anteriorcompatment constituting to about 27 cases (54%), followed by middle and posterior compartment accounting to 30% and 12% respectively.

**Table 13:** Distribution of mediastinal lesions according to their compartment origin

| Diagnosis | Anterior | Middle | Posterior | Multiple | Total |
|---|---|---|---|---|---|
| Thymoma | 8 | 0 | 0 | 1 | 9 |
| Lymphoma | 2 | 3 | 0 | 0 | 5 |
| Lung Cancer | 2 | 1 | 0 | 1 | 4 |
| Metastatic deposit | 7 | 4 | 0 | 0 | 11 |
| Non neoplastic lesions | 8 | 7 | 0 | 0 | 15 |
| Schwannoma | 0 | 0 | 6 | 0 | 6 |
| Total | 27 | 15 | 6 | 2 | 50 |

**Thymolipoma**

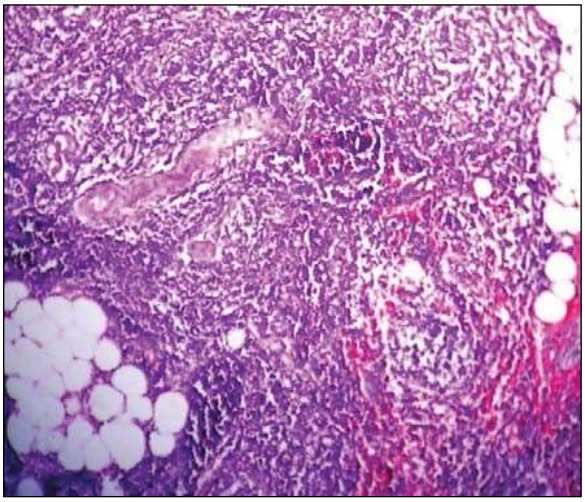

**Fig 1:** Microphotograph showingthymocytes with adipose tissue (H&E X100)

**Tuberculous Lymphadenitis**

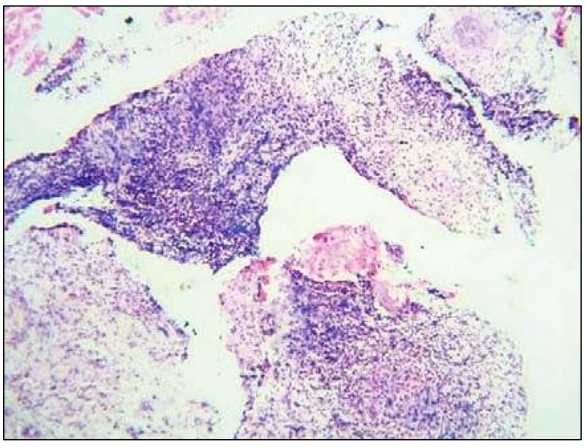

**Fig 2:** Microphotograph showing clusters of epithelioid cells with Langhans type of giant cells (H&E X40)

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**AB Thymoma**

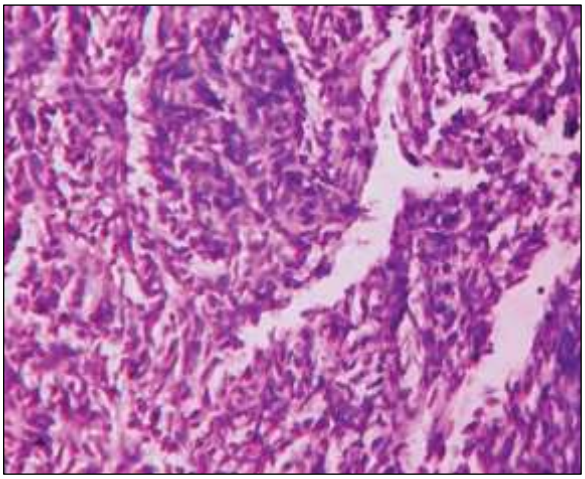

**Fig 3:** Microphotograph showing lymphocytes and epithelial cells in equal proportion (H&E X100)

**Dermoid CYST**

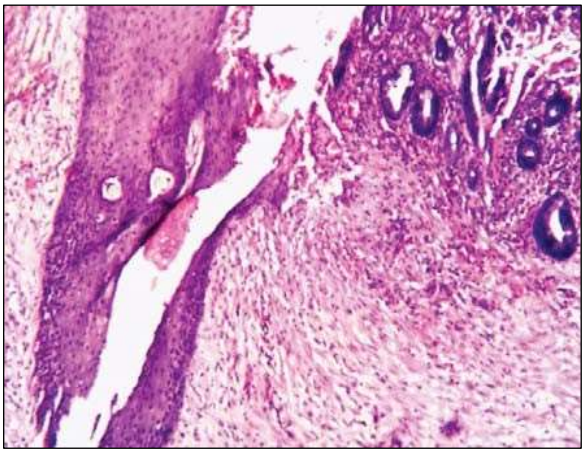

**Fig 4:** Microphotograph showing Squamous epithelium and intestinal lining epithelium in organoid pattern (H&E X100)

**B2 Thymoma**

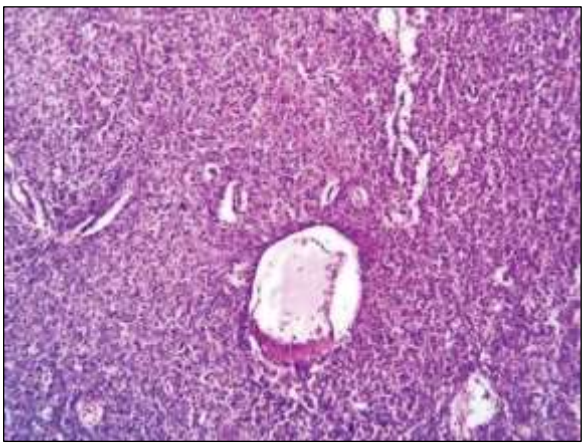

**Fig 5:** Microphotograph showing lymphoid cells predominantly with perivascular spaces (H&E X100)

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**B3 Thymoma**

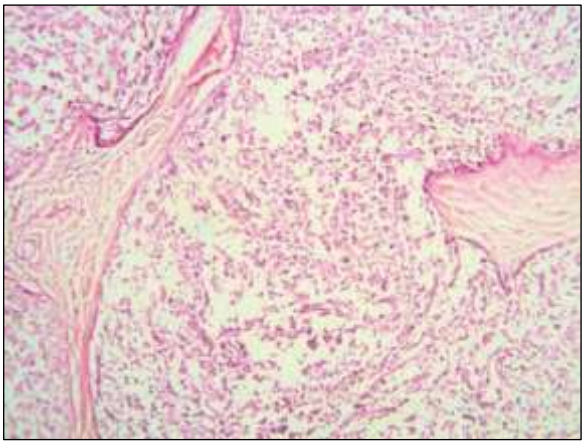

**Fig 6:** Microphotograph showing tumor cells in lobules separated by fibrous septa (H&E X100)

**High Grade Carcinoma of Lung**

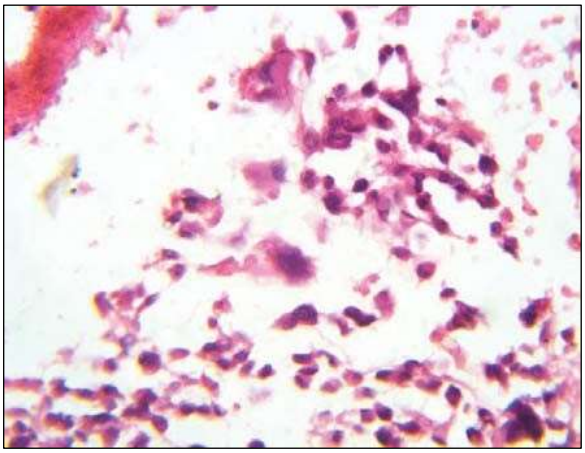

**Fig 7:** Microphotograph showing malignant epithelial cells in scattered pattern with marked pleomorphism (H&E X400)

**Lepidic Predominant Adenocarcinoma of Lung**

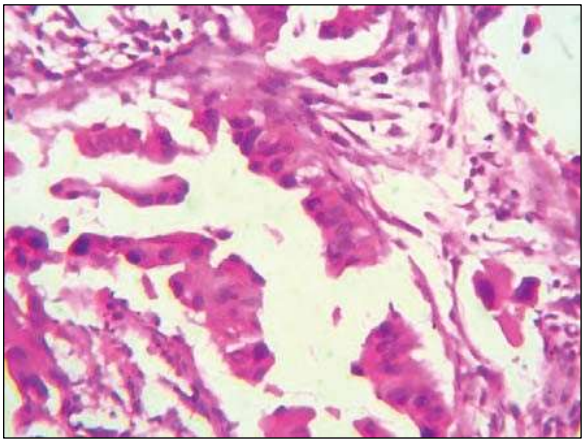

**Fig 8:** Microphotograph showing malignant epithelial cells with nuclei towards lumen side (H&E X400)

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**Poorly Differentiated Adenocarcinoma**

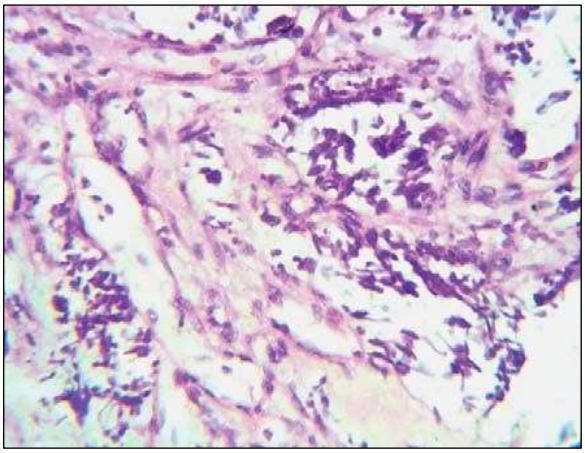

**Fig 9:** Microphotograph showing malignant epithelial cells with moderate pleomorphic cells (H&E X400)

**Small Blue Round Cell Tumor**

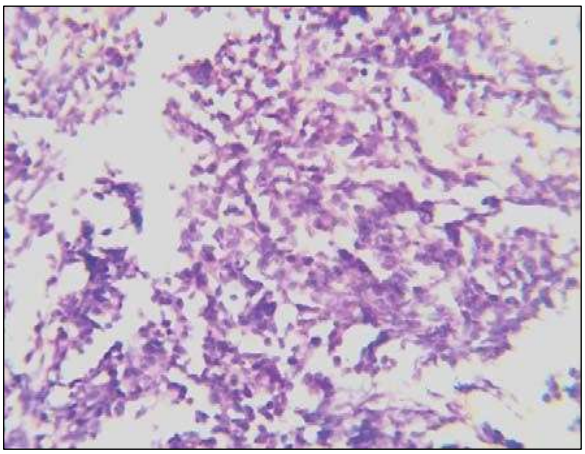

**Fig 10:** Microphotograph showing monotonous cells with scant cytoplasm and hyperchromatic nuclei (H&E X400)

**Schwannoma**

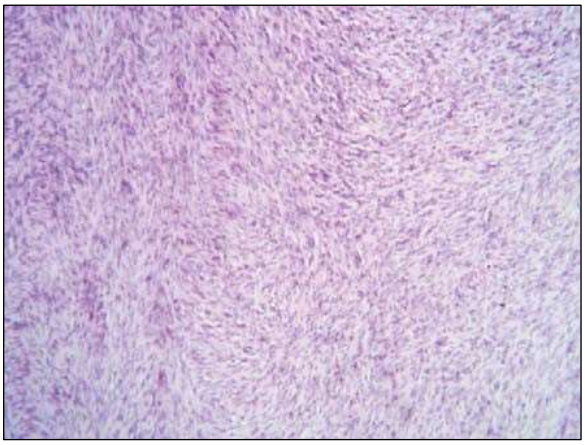

**Fig 11:** Microphotograph showing tumor cells in fascicular and storiform growth pattern (H&E X100)

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**Squamous Cell Carcinoma**

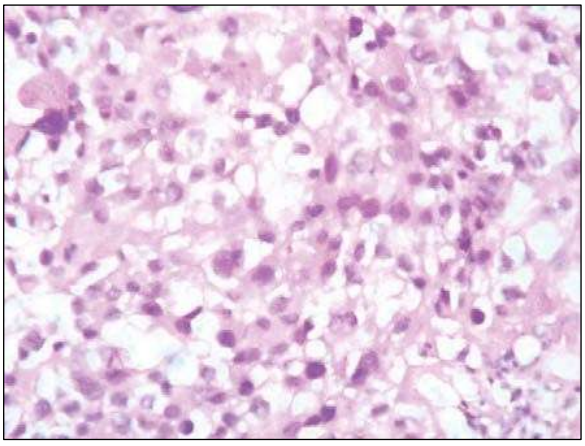

**Fig 12:** Microphotograph showing malignant tumor cells with abundant cytoplasm and hyperchromatic nucleus (H&E X400)

**Non-Hodgkin Lymphoma-B Cell Type**

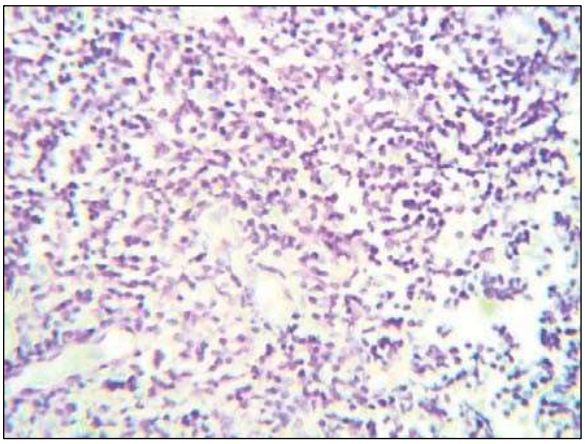

**Fig 13a:** Microphotograph showing neoplastic lymphoid cells in diffuse pattern (H&E X100)

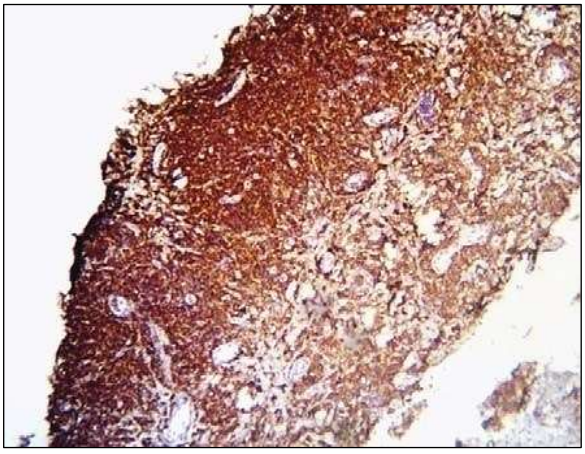

**Fig 13b:** Microphotograph showing CD20 diffuse positivity in lymphoid cells (X40)

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**Non-Hodgkin Lymphoma-T Cell Type**

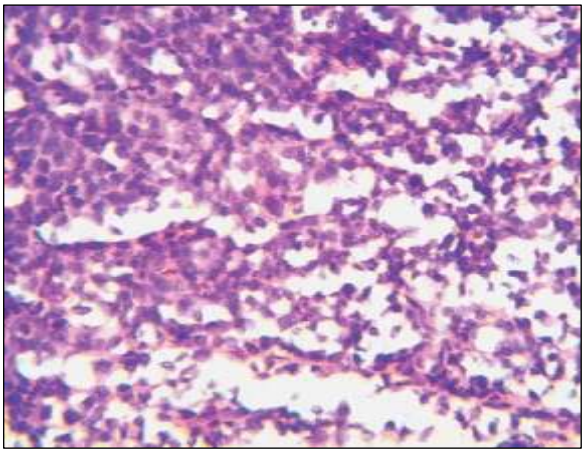

**Fig 14a:** Microphotograph showing neoplastic lymphoid cells in diffuse pattern (H&E X100)

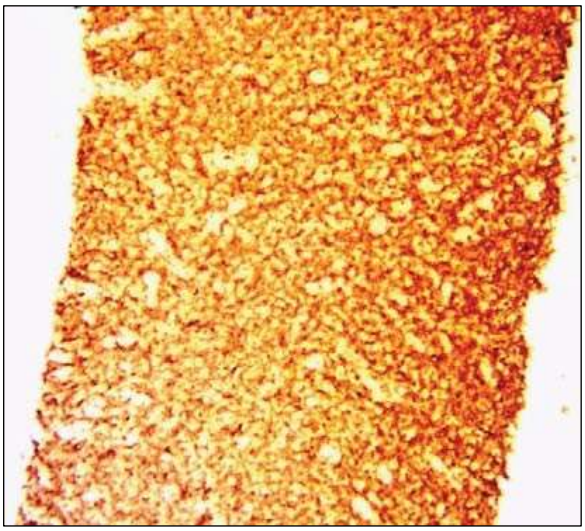

**Fig 14b:** Microphotograph showing CD3 diffuse positivity in lymphoid cells (X40)

**Discussion**

The mediastinum is the portion of the thoracic cavity located between the pleural cavities, extending antero-posteriorly from the sternum to the spine and sagittally from the thoracic inlet to the diaphragm. Division of mediastinum into compartments has been useful [1].

In the present study which consists of 50 cases of various diverse lesions of mediastinum were analyzed over a period of 2 years at Andhra Medical College & General Hospital from June 2022 to May 2024.

The analysis of the results obtained in the present study showed that out of 50 cases, 15 were of non-neoplastic cases and 35 cases were neoplastic ones. There was predominance of neoplastic lesions, with the ratio of non-neoplastic to neoplastic of 1: 2.3.

In the present study, out of 50 medeiastinal lesions, 15(30%) were non neoplastic, 35(70%) were neoplastic. Among neoplasic tumors malignant were common constituting 40% which is similar to the study done by Aroor *et al*. [4] (68.5%) and Vaziri *et al*. [5] (60%).

The common site was anterior mediastinum (54%) in this study followed by middle (30%) and posterior (12%) compartments. In the studies done by Jahanshahi *et al*. [4] Vaziri *et al*. [5] M O Thomas *et al*. [7] Emadian Saravi O *et al*. [8] and Senjuti Dasgupta *et al*. [14] Hoffman *et al*. [9] the common site was anterior mediastinum constituting 78.33%, 65%, 42.8%, 76.3%, 56.7% and 45.5% of cases respectively.

In the present study the most common non neoplastic lesion was reactive lymphadenitis accounting to 6 cases (40%) which was in contrast to the study done by Emadian Saravi O. *et al*., [8] constituting 16.6% cases. Reactive lymphadenitis is followed by residual thymus (26.6%), thymic cyst and tuberculosis etiology accounting 13.3% cases each. Tuberculous etiology cases were tuberculous lymphadenitis and pulmonary tuberculosis. Thymic cysts accounted for 13.3% in the present study which nearly correlated with the study by Emadian Saravi O. *et al*. [8].

In the present study maximum number of mediastinal tumors (24 out of 35) were seen in 5$^{th}$ and 6$^{th}$ decade, followed by 7$^{th}$ decade and least common age group was 2$^{nd}$ decade. No cases were found in 1$^{st}$ decade, whereas in study done by Nitesh mohan *et al*. [10] maximum number of the cases (12 out of 38)

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where found to be in 3rd decade followed by 5th decade and least common age group was in 7th decade. No cases were found in above 7th decade whereas two cases were noticed in the present study. In M O Thomas *et al*. [7] study the most common age group was 4th decade followed by 3rd decade. Studies done by Nitesh mohan *et al*. [10] and Martins *et al*. [7] were contrast to the present study.

In the present study tumor cases are accounting for 35 out of which 18 cases were males and 17 cases were females showing male preponderance and correlates with studies done by Nitesh mohan *et al*. [10].

In the present study benign tumors were commonly seen in 5th, 6th and 7th decades. In contrast to this study, studies done by Aroor *et al*. [4] and Senjuti Dasgupta *et al*. [14] the common age groups were 3rd and 7th decade respectively.

In the present study constituting 6 cases (40%) which correlates with study done by Nitesh mohan *et al*. [10] (30.7%). Study done by Aram Baram *et al*. [11] showed thymoma 14.1% constituting of mediastinal lesions, whereas in present study Thymoma constitute 16% of mediastinal lesions with correlates with the previous study. But in Aram Baram *et al*. (11) study, thymoma constituted equal proportion of benign (50%) and malignant (50%), whereas in present study all the thymoma were benign epithelial thymoma with no thymic carcinoma.

In the present study age range was 39-63 yrs with mean age of 50.1yrs, which is near similar to Shamsuddin F *et al*., [71] where mean age is 47.8yrs, but there is difference in male to female ratio (M: F is 2.7: 1) in Shamsuddin F *et al*., [71] but in the present study M:F is 1:1. There is difference in age range when compared with Moran suster [51] and Okumura *et al*. [50] where age range is 18-73yrs and 17-78 yrs respectively.

In the present study the most common among mediastinal tumors malignant tumors (40%) were more common when compared to the benign tumors (30%), which correlates with the studies done by Aroor *et al*. [4] (malignant 68.5%).

In the present study out of 20 cases of malignancy, there are 4 cases of lung carcinoma which is in contrast to the Nitesh Mohan *et al*. [10] where there was no lung carcinoma. In the study done by Aroor *et al*. [4] bronchogenic carcinomas were reported and these findings correlate with the present study.

In the present study Lymphomas constituted only 10% of the mediastinal lesions, whereas in the study done by Shamsuddin F *et al*. [12].

In the present study, among 5 cases of Non-Hodgkin Lymphoma's (NHL), 4 cases were NHL-B cell type and 1case of T-cell type and were found mostly in the older age group with the youngest patient being 16 years with female preponderance, whereas in the study done by Shamsuddin F *et al*. [12] all the 4 cases of NHL were B-cell type found mostly in older age group with male preponderance.

In the present study NHL was the most common lymphomas and it is similar to the study done by Adegboye *et al*. [13] But Hodgkin's lymphoma was the most common lymphoma in the studies done by Aroor *et al*. [4] and Senjuti Dasgupta *et al*. [14].

In the present study Diffuse large B cell type variant is most common in NHL which is similar to the studies done by Adegboye *et al*. [13] and Shamsuddin F *et al*. [12] whereas in the study done by Senjui Dasgupta *et al*. [14] there was only one case of diffuse large B cell type of Non-Hodgkin's lymphoma.

For all the Non-Hodgkin's Lymphoma cases immunohistochemistry was done for confirmation. IHC done were CD45, CD3 and CD20. All the 5 cases of NHL showed diffuse positivity for CD45, 4 out of 5 cases were positive for CD20 and one case was positive for CD3.

One case showed ambiguous histology and so differential diagnosis of poorly differentiated carcinoma/lymphoma was offered. When study for IHC markers for pancytokeratin, CD45, CD20 was done, the tumor cells showed positivity for pancytokeratin and subsequently the final diagnosis of Poorly differentiated carcinoma was made.

**Conclusion**

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