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**Original research article**

# Study of radiologic characteristics of various mediastinal lesions using CT thorax

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**Abstract**
**Background:** Within the thorax, between the two pleural spaces, there is an additional inter pleural space known as the mediastinum. When compared to other imaging modalities, CT continues to be the most accessible and reliable instrument. Through the use of CT Thorax, the purpose of this study was to investigate the radiologic properties of a variety of mediastinal lesions.
**Keywords:** CT scan. Mediastinal pathology, contrast resolution, sensitive imaging modality, diagnosing mediastinal lesions.

## Introduction

The mediastinum is an extra pleural space located between the two pleural spaces in the thorax. It is divided into two sections: superior and inferior mediastinum. The inferior mediastinum is divided into three sections: anterior, middle, and posterior mediastinum. The complex anatomy of the mediastinum can sometimes make radiological diagnosis of these tumors difficult [1].

Mediastinal disease is typically first seen on a chest radiograph as a mediastinal soft tissue mass, widening of the mediastinum, or a pneumomediastinum. However, in the presence of mediastinal disease, a chest radiograph may appear normal [2].

CT is still the most widely available and dependable imaging method. Because of continuous technological advancements, it can now be used as a one-step solution to all pretherapeutic evaluation requirements for mediastinal lesions [3]. As a result, computed tomography has revolutionized the diagnosis of mediastinal lesions. It is one of the most advanced non-invasive imaging modalities for imaging the thorax [4].

While both CT and MR provide cross-sectional images, CT has a higher spatial resolution and a shorter imaging time, in addition to being less expensive and more widely available. On CT, coexisting lung abnormalities and calcification within the lesions are more visible [9]. The current study aimed to investigate the radiologic characteristics of various mediastinal lesions using CT Thorax.

## Material and Methods

Present study was single-center, descriptive, Retrospective and Prospective study, conducted in department of Radiodiagnosis in KMC Manipal from Jan 2018 to Dec 2019.

**Inclusion criteria:** All patients of all ages presenting in the outpatient and/or inpatient Departments of our institute suspected to have mediastinal related complaints and referred to the Department of Radiodiagnosis for CT scan.

**Exclusion criteria**

- Patient not consenting for study.
- Contraindication to contrast enhanced ct.
- Pregnancy.
- Allergy to intravenous iodinated contrast media.
- Renal failure.
- Hemodynamic instability.

Following receipt of the request form for a CT thorax (P+C), a thorough clinical history and the results of the clinical examination were documented. The patient was fully informed about the procedure before providing written, legally-binding consent in accordance with the proforma. With the aid of a Philips Brilliance 64-Slice Ct Scanner, the patient will be evaluated. Various radiologic characteristics of the mediastinal lesion, such as origin (thymic, neural, lymph nodal, or vascular), CT enhancement pattern (homogenous/heterogeneous enhancement, peripheral enhancement, or non-enhancing), density (solid,

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cystic, fatty), margin (well defined/ill-defined), calcification, necrosis, and Hydration was kept at a sufficient level. Patients were instructed to skip solid food for six hours before to the investigation. Prior to the contrast study, the patient was informed of the risks of administering the contrast and given their agreement. In order to corroborate the tomographic plane, a preliminary supine AP scout film with 30mA was acquired. Prior to the contrast scan, a precontrast scan was performed in the supine position utilizing a 4mm collimation (70 mA, 130Kv) from the thoracic inlet up to the supra renal glands. Images were produced through sporadic suspended inspiration. Initial dynamic injection of 60-80 ml of iodinated nonionic contrast iopamidol at 370 mg/ml is used to increase contrast. Children received OR at a dose of 300 mg of iodine/kg of body weight, and a section was taken from the thoracic inlet to the level of the suprarenal's. There were coronal and sagittal reconstructions. On a direct display console, the scan was examined in a variety of window configurations, including. To assess the variation in tissue density, three windows were used: (1) a soft tissue (mediastinal) window at 320/40; (2) a lung window at 1400/-600; and (3) a bone window at 2400/200.

The size, position, presence of calcification, lesion effect on adjacent structures, pre and post contrast attenuation values, as well as other related data, were examined. The tumor was located in the mediastinum using Sutton's mediastinal division technique. By measuring Sensitivity, the diagnostic accuracy of a mediastinal CT diagnosis in comparison to Histopathology will be evaluated.

**Results**

In our study most common age group to present with mediastinal lesion is between 31-45yrs (30%) followed by 16-30 yrs age group (24%). Present study included a greater number of male patients (65%) as compared to female patients (35%).

**Table 1:** Compartmental distribution of mediastinal lesions

| Compartment | No of cases |
|---|---|
| Anterior mediastinum | 58 |
| TB lymph nodes | 20 |
| Metastatic lymph nodes | 12 |
| Thymic lesions | 6 |
| Thyroid lesion | 7 |
| Lymphoma | 5 |
| Aortic | 8 |
| Middle mediastinum | 20 |
| TB lymph nodes | 9 |
| Metastatic lymph nodes | 5 |
| Esophageal duplication cyst | 3 |
| Bronchogenic cyst | 2 |
| Pericardial cyst | 1 |
| Posterior mediastinum | 22 |
| Neural tumours | 5 |
| Neuroenteric cyst | 1 |
| TB lymph nodes | 5 |
| Paravertebral abscess | 4 |
| Esophageal lesion | 3 |
| Hiatus hernia | 4 |

**Table 2:** CT features of mediastinal lesions

| CT features | No of cases |
|---|---|
| Enhancement pattern | |
| Intense enhancement | 6 |
| Rim enhancement | 18 |
| Non-enhancing | 12 |
| Heterogeneous | 51 |
| Homogeneous | 9 |
| Not applicable | 4 |
| Nature | |
| Solid | 52 |
| Solid +cystic | 34 |
| Vascular | 8 |
| Cystic | 6 |
| Calcification | |
| Present | 15 |

**Discussion**

The mediastinum is the extrapleural space between the two pleural spaces in the thorax. It runs anteriorly from the sternum to the spinal column posteriorly. The thoracic inlet forms the upper limit, and the diaphragm forms the lower limit. Radiographic assessment of the mediastinum is commonly performed

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to determine the location and extent of mediastinal lesions within the thorax [5].

Calcification, fat, fluid, or soft tissue inside the lesion, invasion of the mediastinal fat (indicating malignant rather than benign illness), and contrast enhancement on CT are all useful in reducing the differential diagnosis. Other CT characteristics of mediastinal lesions, such as shape, edge, sharpness, contour, relation to normal structures, effect on adjacent structures (especially displacement), and the presence of other abnormalities, including those visible in the lung and abdomen as well as those distant from the lesion in the mediastinum, are considered in improving specificity of the differential diagnosis [6].

In our study, 92% of patients were symptomatic, while 8% were asymptomatic. This is comparable to the findings of Dubashi B *et al*., [7], who found that 97% of patients were symptomatic and 3% were asymptomatic.

Cough was the most common clinical symptom (50%) in our sample of 100 cases, followed by dyspnea and fever (20%), chest discomfort (15%), and other (20%). According to the Davis *et al*., [8] research of 400 consecutive patients with mediastinal masses, the most prevalent symptom was chest discomfort (30%), followed by fever (20%).

Males (65%) were more typically afflicted in our study than females (35%). This is comparable to the findings of Singh G *et al*., [9], who discovered that males (61.1%) are more affectionate than females (38.9%). The majority of the mediastinum lesions in our study were in the anterior mediastinum, accounting for 58%, followed by the posterior (22%) and middle (20%) mediastinal compartments, which is similar to the study conducted by Devis *et al*., [8], in which the anterior, middle, and posterior mediastinums accounted for 54%, 20%, and 26%, respectively.

In our CT investigation, three patients (50%) were identified as thymoma, 33.6% as thymic cyst, and 16.6% as thymic hyperplasia. Cohen *et al*., [10] conducted a study on 230 patients with CT diagnostic of thymic mass, and found that thymoma composed 55.4%, thymic cyst 19.6%, and thymic hyperplasia 10.7%.

Neurogenic tumors accounted for 5% of mediastinal lesions in our investigation. Neurofibromas and Schwannomas formed 60% and 40% of the histologically confirmed tumors, respectively. According to Srivastava *et al*., [11] schwannoma accounted for 43.8% of all neurogenic tumors, whereas neurofibromas accounted for 31.3%.

Tuberculous, metastatic, and lymphoma were the pathologies of nodal enlargement in our study, accounting for 67.7%, 30%, and 8% of total cases of nodal lesions, respectively. In Kumar A *et al*., study's [12] tubercular lymph nodes made up 34.3% of total mediastinal nodes, which is similar to our data (35%).

In our investigation, 20 individuals had mediastinal lymph node enlargement, and 18 had a diagnosis that matched the CT findings. However, in two cases, the CT and histology diagnoses did not agree. One instance was revealed to have Hodgkin's lymphoma after being detected on CT as tubercular lymph nodes. Histopathology revealed that one case of lymphoma identified on CT had tubercular lymph nodes.

Calcification is common after therapy and can have a variety of morphologies, including irregular, diffuse, or even egg shell calcification. Lymphomas exhibit necrosis but no cystic regions; nevertheless, thymic cysts can form after irradiation of mediastinal lymphomas or chemotherapy.

CT can help to locate the lesion and determine its extent. It can characterize lesion features based on their location, type, and enhancement. The importance of CT in performing CT guided biopsies of lesions cannot be overstated. CT scan can assist distinguish mediastinal lesions based on their appearance, such as solid, cystic, fat density, calcification, and enhancing pattern. The involvement of neighbouring structures can be clearly seen. CT thorax can show pulmonary, bone, hepatic, and adrenal metastases.

**Conclusion**

CT is recommended when the doctor suspects mediastinal pathology or when it is diagnosed on plain chest radiographs, as well as in individuals with normal chest radiographs but clinical suspicion of mediastinal disease. Because of its great contrast resolution, CT is very effective in imaging the mediastinum; CT can distinguish normal mediastinal structures and veins. CT scanning is an extremely sensitive imaging modality for identifying mediastinal lesions.

**Conflict of Interest:** None to declare.

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