

## **A Study to Characterise the Intrathoracic Lesions By Contrast Enhanced Computed Tomography and its Histopathological Correlation by CT Guided Biopsy**

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### **Abstract**

**Introduction:** Lung carcinoma is the commonest cause of cancer deaths. CT guided interventional procedures are commonly used with high diagnostic accuracy. A study was conducted to correlate the radiological findings of contrast enhanced computed tomography (CECT) with histopathological findings obtained from CT guided biopsy.

**Methods:** It was a prospective study carried in the department of Radiodiagnosis, GSL Medical College, Rajahmundry. Individuals > 18 years, both gender with intrathoracic lesions who were referred for CT guided biopsy were included; coagulation abnormalities, those with contraindication for contrast media, risky for biopsy and noncooperative members were not included. After 4 hrs fasting the patient was positioned in the CT gantry and the percutaneous access site was prepared. Immediate preprocedural topogram and CT of the chest was done from the neck base up to the diaphragm. The area was cleaned with antiseptic solutions, anaesthetised locally using 2% lignocaine; 18 gauge automated biopsy guns were used for biopsy and sent for histopathology in 10% formalin. Compression was given for 5 minutes at the site. Histopathological examination was carried as per the guidelines. P≤0.05 was considered as statistically significant

**Results:** The male female ratio was 1.2. Maximum (35.7%) were in in 51 – 60 years. Lung parenchyma is the commonest (89.2%; 50) site for the lesions. Histopathological examination showed that 92.8% (52) were malignant. Whereas CT findings revealed that 51 (91%) were malignant cases. The sensitivity, specificity, positive and negative predictive values for the CT were 98.08%, 75%, 98.0% and 75%.

**Conclusion:** The diagnostic accuracy of CECT was to be at par with histopathological findings. But long term studies on different age with different clinical conditions is recommended.

**Keywords:** Patient, CT, accuracy

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## Introduction

Lung carcinoma is the commonest cause of cancer deaths in the last century throughout the world. [1] Mediastinum is the origin of mass. Characterization of mediastinal masses by location, density discrimination of vascular and avascular lesions and separating mediastinal masses from normal structures, calcification within the lesions, and accompanying lung abnormalities can be better appreciated on CT; It distinguishes benign and vascular disorders from real malignant conditions, as well as mediastinal enlargement caused by vascular or nonvascular structures.

Till the development of CT, Chest radiograph is the first investigation in suspicious case of lung cancer. Today, CT scan of the chest is considered the cornerstone of lung cancer imaging, and it is used to determine how to proceed with treatment. MDCT is the most recent development in medical imaging. [2] Transthoracic image guided biopsy is proved to be a reliable method with 93% diagnostic accuracy. [3]

CT guided interventional procedures are commonly used now a days; here the aspirated material should be adequate in quality and quantity for an accurate diagnosis. [4, 5] For these CT guided invasive techniques, the diagnostic accuracy was 80% for benign and >90% for malignant cases. [5, 6] With these, a study was conducted to correlate the radiological findings of contrast enhanced computed tomography (CECT) with histopathological findings obtained from CT guided biopsy.

### Methods:

It was a prospective study carried in the department of Radiodiagnosis, GSL Medical College, Rajahmundry. The study was carried for 18 months, from January 2020 to June 2021. Informed consent was obtained from all study subjects. The study protocol was approved by the Institutional ethics committee.

Individuals > 18 years, both gender with intrathoracic lesions who were referred for CT guided biopsy were included in this research. Individuals with coagulation abnormalities, those with contraindication for contrast media, risky for biopsy due to difficulty in accessing the lesions and non cooperative members were not included.

The study protocol was explained to the members. The clinical history was taken and the findings were recorded in the study proforma. After 4 hrs fasting the procedure was started. For arterial phase images, acquisition of scan begins 30 seconds after the start of contrast injection. For the portal venous phase images, images were considered 60 seconds after the start of contrast. Multiplanar images were obtained in the axial, coronal views.

The patient was positioned in the CT gantry and the percutaneous access site was prepared. Immediate preprocedural topogram and CT of the chest was done from the neck base up to the domes of the diaphragm to delineate the lung masses and to locate the percutaneous site of needle puncture and marked. The area was cleaned with antiseptic solutions, anaesthetised locally using 2% lignocaine; 18 gauge automated biopsy guns were used for biopsy and sent for histopathology in 10% formalin. Compression was given for 5 minutes at the site to stop bleeding and after dressing, shifted to ward. Histopathological examination was carried as per the guidelines.

### Statistical analysis:

Data were analysed using SPSS version 20, presented as Mean  $\pm$  SD, percentage. Chi-square was used to find the association between CT and pathology findings. Sensitivity and specificity were calculated to the accuracy of diagnostic tests.  $P \leq 0.05$  was considered as statistically significant.

**Results:**

Total 56 (100%) members were recruited in this research; 52% were male. The male female ratio was 1.2. Age wise, maximum (20; 35.7%) were in in 51 – 60 years. Lung parenchyma is the commonest (89.2%; 50) site for the lesions. The mean size of the benign lesion was 48.33 mm and it was 54.53 mm for the malignant group; statistically there was no significant difference ( $P = 0.66$ ). Histopathological examination showed that 92.8% (52) were malignant. Whereas CT findings revealed that 51 (91%) were malignant cases. The sensitivity, specificity, positive and negative predictive values for the CT were 98.08%, 75%, 98.0% and 75%.

**Discussion:**

In this research, gender wise, 61% (34) were male and the male female ratio was 1.2. Male predominance was reported in the literature also. [7, 8, 9] In this research, the age of the participants was ranged between 18 to 80 years and the mean age was 51.6 years. Above 60 years was reported to be the common age group for the lung lesion. [7, 8, 10] The difference could be due to better hospital approach. Due to loss of working days as well as wages, usually there is some delay in age for the diagnosis. But in India different state as well as central government health scheme are available for the public. As most of the treatment is free, there was a litter less in the mean age of the study members compared to the western studies.

Previously lung biopsy was used to establish the microbiological diagnosis of extensive infected lobar consolidation. [11] Pathologists found it difficult to diagnose small samples or smears, despite using smaller needles. In the 1960s, fluoroscopically guided bronchial brush biopsies were utilized. [12] As per the reports, incorrect negative diagnoses ranged between 15 to 25%. [13] Later Trans-thoracic needle aspiration/biopsy (TTNB) was used with a diagnostic

accuracy between 80 to 95%. [14, 15, 16] Fine needle aspiration biopsy (FNAB) is a widely accepted technique for the diagnosing not only lung tumors but a variety lesions in thyroid, breast, lymph node, and prostate. Correlation of clinical data and imaging features with FNAB findings, diagnosis becomes more precise and accurate. [17, 18] Low cost, minimal invasion, no need of admission are the advantages with FNAB. [19]

In this study high (89.2%) proportion of lesions were located in the lung parenchyma followed by mediastinum (6; 11%). Similar findings were reported in the literature but there is some difference in proportion of the cases. [7, 8, 20] Exact reason for this is not reported in the studies. As per Navi et al. [7] out of 130 cases, 108 were in lung parenchyma followed by mediastinum (22). Whereas, it was 875, 80 in Welborn et al. report. [20]

In this study, histopathological examination showed that 92.8% (52) were malignant. Whereas CT findings revealed that 51 (91%) were malignant cases. The sensitivity, specificity, positive and negative predictive values for the CT were 98.08%, 75%, 98.0% and 75%. As per the literature, the sensitivity was ranged between 75 – 98% with specificity between 85 – 100%. [7, 20, 21]

**Conclusion:**

Radiologically one malignant case was misclassified as benign in this research. The diagnostic accuracy of CECT was to be at par with histopathological findings. But long term studies on different age with different clinical conditions is recommended.

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