ROLE OF MULTIDETECTOR COMPUTED TOMOGRAPHY (MDCT) IN-EVALUATION OF BRONCHOGENIC CARCINOMA WITH HISTOPATHOLOGICAL CORRELATION

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Abstract

Background: With the rapid development of medical imaging technology and equipment, especially the application of 64 or more rows multi-detector computed tomography (MDCT), the CT images with high isotropic resolution can be achieved, more precisely presenting the internal structure of lesion such as cancer. The aim is to assess the diagnostic accuracy of multi detector computed tomography (CT) in evaluation of lung carcinoma, characteristic imaging findings with histopathological correlation in South Indian population. **Materials and Methods:** Prospective study conducted in department of radiology with 50 patients discovered with abnormality on the chest radiograph with no symptoms and Pneumonia was included in study. **Result:** Out of 50 patients we studied, 38 were male and 12 were female, with male: female ratio of 3:1. Age range of patients included 40-80 (mean age of 55 years). Highest incidence of lung carcinoma was found in the age group of 60-70 years (almost 50%). CT guided transthoracic biopsy was done in 40 patients and USG guided biopsy in 7 patients and transbronchial biopsy in 3 patients. 21 cases were diagnosed as adenocarcinoma (42%). The ratio of involvement of right to left lung was 1.9.Most common lobe affected was right upper lobe (52%) with adenocarcinoma being 26% which is highest.26 patients (50%) had presented with variable metastasis at the time of diagnosis. Among these 26 patients, 5 patients had metastasis to contra lateral lung in form of satellite nodules which were later confirmed on PET CT, 5 patients had malignant pleural effusion which was diagnosed on pleural fluid analysis. Most of the patients in our study at the time of diagnosis were in stage III with18 patients (36%), stage IV 16 patients (32%) and stage I and II patients with 8 patients (16%) each. 44 patients were diagnosed as bronchogenic carcinoma by CT and was confirmed by cytological examination, coming true positive. Sensitivity of CT to diagnose bronchogenic carcinoma was 96%, Specificity was 86% with PPV of 92% and accuracy of 96%. **Conclusion:** The preferred method for detecting bronchogenic carcinoma, staging bronchogenic carcinoma, and assessing metastases is a CT scan. Both the execution of transthoracic biopsies and the achievement of histological diagnosis benefit greatly from it, Greater survival is possible with early diagnosis.

INTRODUCTION

Most common cause of cancer-related death in men and second most common in women, worldwide. Strongest prognostic factor for survival in lung cancer cases is respectability of the tumor.[1] Thus, accurate staging of the bronchogenic carcinoma is essential as the choice of treatment options and patient prognosis are directly related to the stage at presentation. CT is the standard imaging modality used for the evaluation of bronchogenic carcinoma.[2,3] It has key role in the detection, staging and post-treatment follow up of patients.

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MATERIALS AND METHODS

Type of Study:
Prospective study conducted in territory care centre, Bangalore.

Inclusion Criteria
- Discovery of an abnormality on the chest radiograph of a patient with no symptoms. (Health check-up programme)
- Pneumonia

  a. Pneumonia not completely resolving with antibiotics
  b. Associated with volume loss and absence of air bronchograms.

- In cases of opaque hemithorax to rule out an underlying carcinoma
- Bronchus 'cut off' with distal collapse consolidation seen on chest X-ray
- For further characterization of solitary pulmonary nodule on chest X-ray.

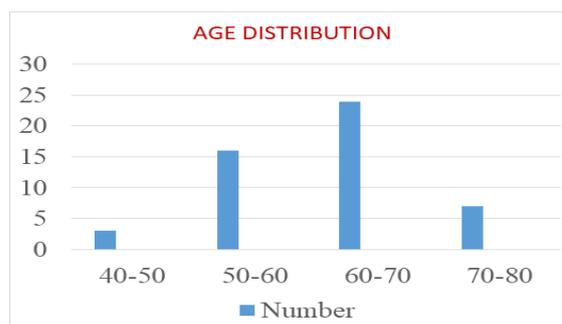**Exclusion Criteria:** Altered renal profile.
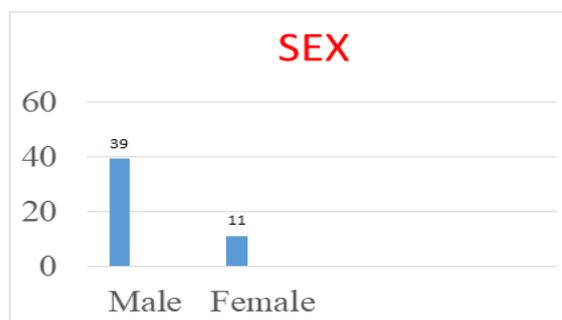
RESULTS

Chart 1: Age Distribution

Chart 2: Sex Distribution

Table 1: Histological Types

Histological diagnosis	Number of cases	Percentage of cases
Squamous cell carcinoma	8	16%
Adenocarcinoma	21	42%
Small cell carcinoma	11	22%
Bronchioloalveolar carcinoma	10	20%

Table 2: Sites of Origin of Lung Carcinoma

Histopathological diagnosis	Upper lobe No. of cases percentage		Middle lobe No. Of cases percentage		Lower lobe No. Of cases percentage	
Squamous cell	3	6%	1	2%	4	8%
Adenocarcinoma	13	26%	3	4%	6	12%
Small cell	6	12%	4	8%	1	2%
Bronchioloalveolar	4	8%	2	4%	4	8%
	26	52%	10	18%	15	30%

Table 3: Distribution in right or left lung

	Number
Right	32
Left	18

Table 4: Radiological Pattern of Lung Carcinoma with Histological Type

Radiological findings	Small cell CA	Adeno CA	BAC	Squamous cell Ca
Hilar, perihilar mass/prominence	8	0	0	1
Focal pulmonary lesion less than 4 cm	3	13	2	2
Apical mass	0	2	0	5
Pneumonitis, collapse/consolidation	0	6	8	0
Mediastinal involvement	4	3	2	0
Chest wall invasion	0	0	0	1
Pleural effusion	1	2	0	1

Table 5: Extent of Disease at Presentation

Stage	Number of cases	Percentage of cases
I	8	16%
II	8	16%
III	18	36%
IV	16	32%

Table 6: Distribution of Metastasis:

Site	Number of cases	Percentage of cases
Lungs	4	16%
Pleura	4	19%
Liver	5	19%
Adrenal	5	19%
Brain	5	16%
Bone	3	11%

Table 7: Histopathological Cell Type In Relation To Ln Involvement:

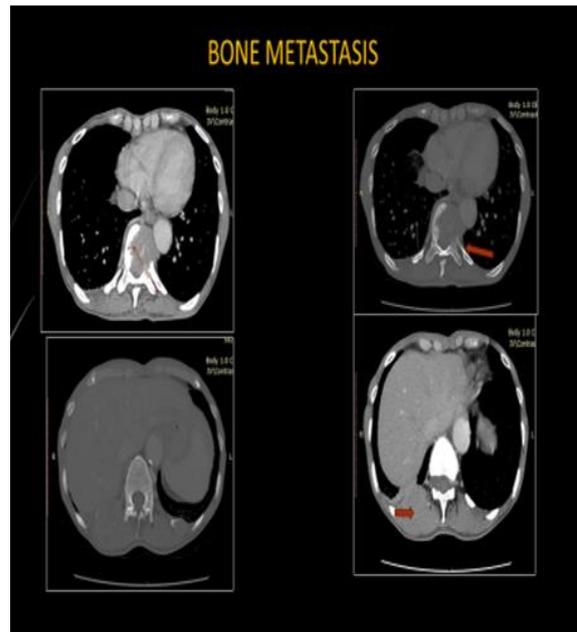| Type	Peribronchial/ hilar	Subcarinal/ mediastinal	Contralateral/Supraclavicular
Small cell CA	6	1	3
Adenocarcinoma	4	2	1
Squamous cell ca	1	2	2

RIGHT UPPER LOBE PARENCHYMAL LESION

BOTH LOWER LOBE PARENCHYMAL LESIONS

LEFT UPPER LOBE PARENCHYMAL LESION

CARCINOMA PRESENTING CONSOLIDATION

LOWER LOBE PARENCHYMAL LESION WITH MEDIASTINAL INVOLVEMENT

CAVITATION

BRAIN METASTASIS

BIOPSY
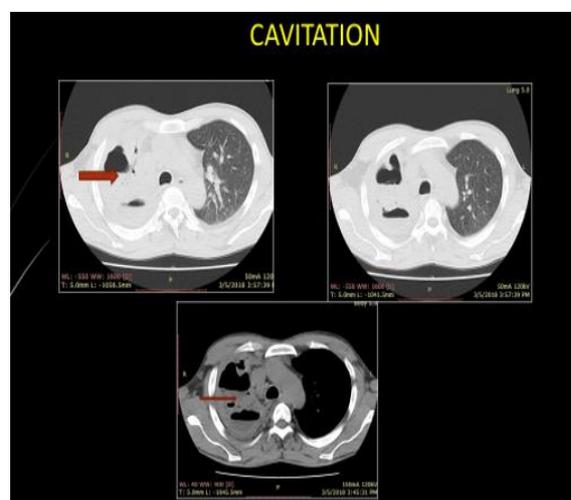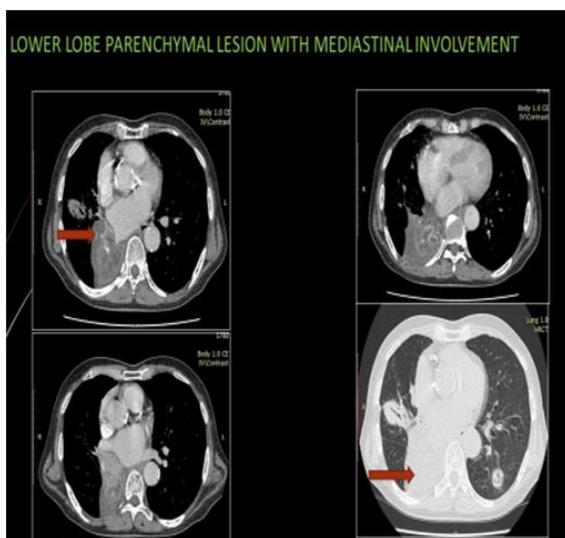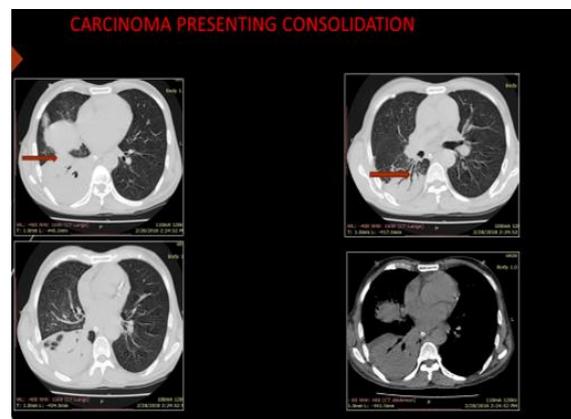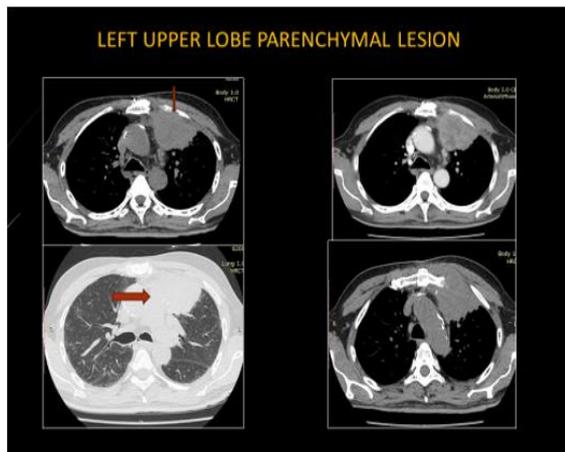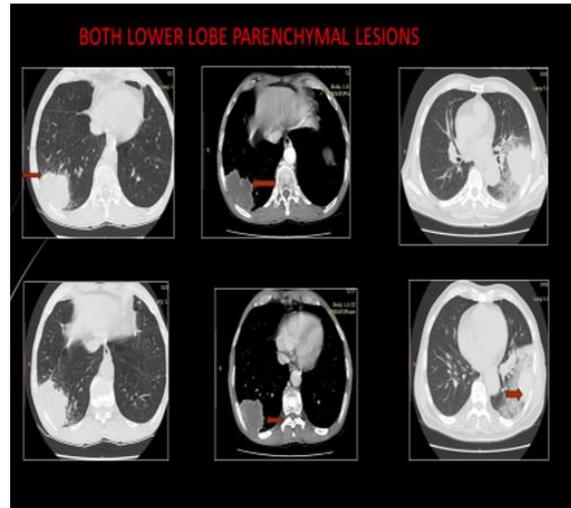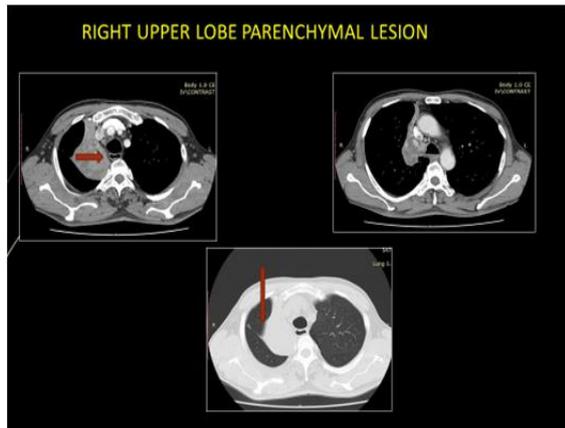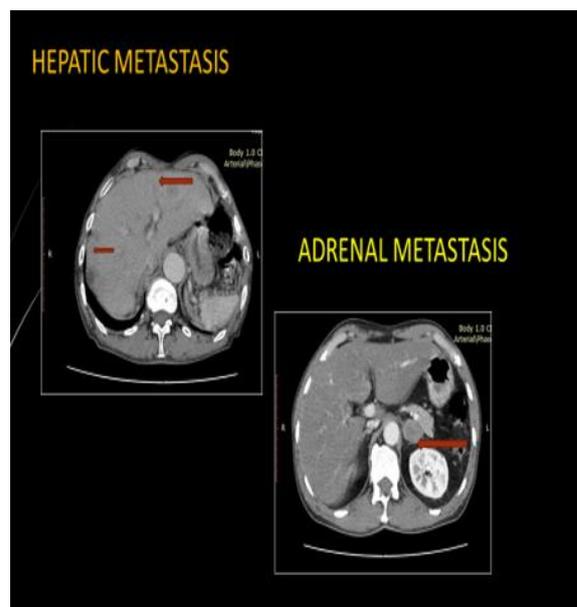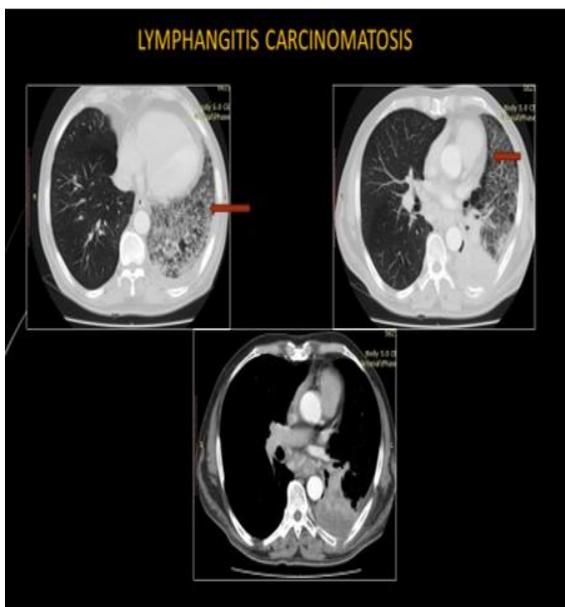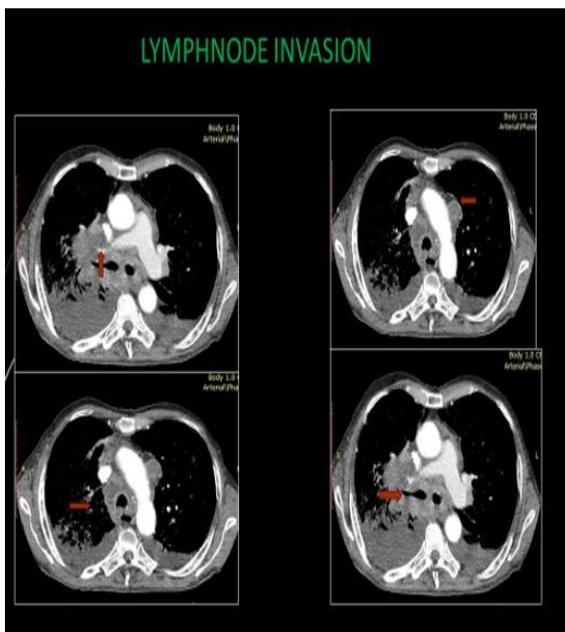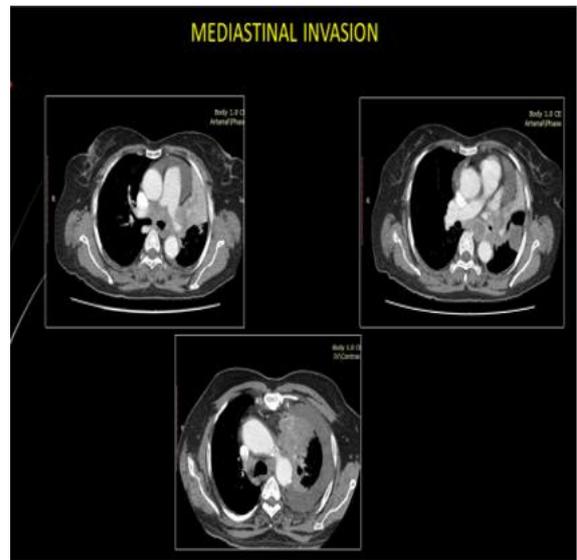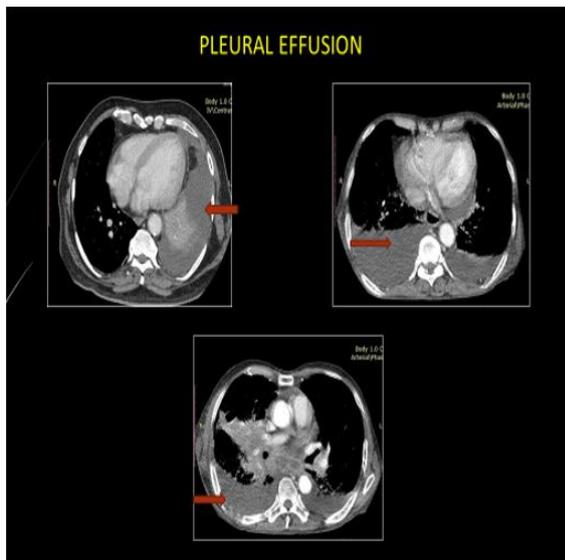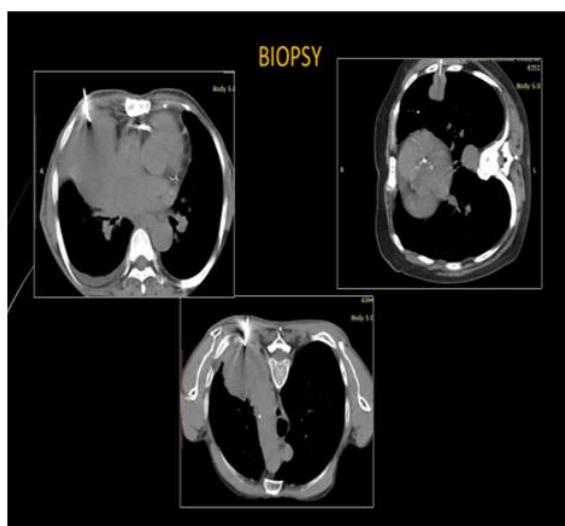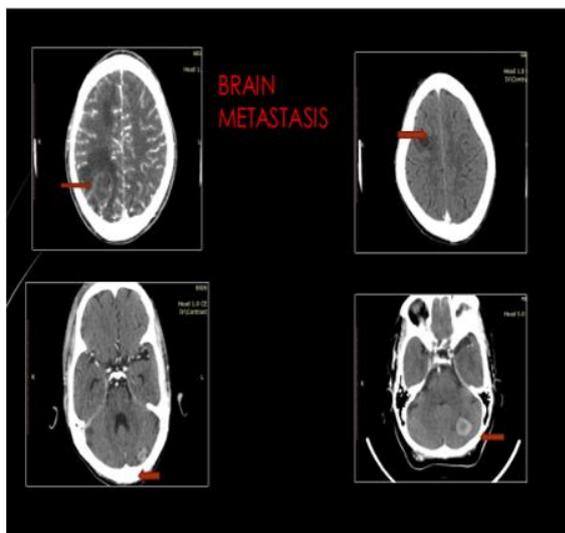
DISCUSSION

The prospective study was conducted in our institute to establish the usefulness of computed tomography in staging of bronchogenic carcinoma.

Out of 50 patients we studied, 38 were male and 12 were female, with male:female ratio of 3:1 correlating with other studies like O. Dosil-Diaz et al and study in Indian population conducted by Dhara et al.[4,5]

Age range of patients included 40-80 (mean age of 55 years). Highest incidence of lung carcinoma was found in the age group of 60-70 years (almost 50%). This included both males and females. These findings are similar to study conducted by Dela Cruz CS et al,[6]

Out of 50 patients, CT guided transthoracic biopsy was done in 40 patients and USG guided biopsy in 7 patients and transbronchial biopsy in 3 patients. Among these 50 patients, 21 cases were diagnosed as adenocarcinoma (42%). 11 patients (22%) with small cell type. 10 patients (20%) with BAC. 8 patients (16%) being diagnosed squmaous cell type. Our study depicts large number of patients with adenocarcinoma type which is nowadays most common type. This correlates well with the recent study done by Dhara et al,[5] who had 47% of patients with adenocarcinoma type out of 51 patients and 41% patients with squamous cell carcinoma, 9% BAC and 3% other carcinomas. However, studies done at middle-east and rest of the world by Uddin and Akhtar,[7] Quiyyum et al,[8] Hassan et al,[9] showed large number of patients with squamous cell type. One of the indian studies conducted by Gupta et al and Shetty et al,[10] found 42% and 44% patients with squamous cell carcinoma, 36& and 19% with adenocarcinoma, 25% and 17.2% with small cell carcinoma. The ratio of involvement of right to left lung was 1.9.Most common lobe affected was right upper lobe (52%) with adenocarcinoma being 26% (highest), squamous cell carcinoma being 6% (lowest). This is similar to the study conducted by Dhara et al,[5] 20% patients presented with middle lobe lesion, small cell carcinoma consisted of 8% of these cases (highest) and lowest is squamous cell carcinoma (2%).30% of patients had lower lobe mass with large number of patients being diagnosed as adenocarcinoma (12%) and squamous cell carcinoma, BAC involving similarly upto 8% and small cell carcinoma being the least (2%). So, adenocarcinoma is the most prevalent cell type in upper lobe and lower lobe carcinomas while squamous type was most common in middle lobe and hilar masses. In regard to the radiological pattern of lung carcinoma, most of the adenocarcinoma presented with pulmonary lesion less than 4 cm and 6 patients presented with pneumonitis and 2 with apical mass. Out of these, three patients had mediastinal involvement and 2 patients had malignant pleural effusion. Most of the BAC in our study presented with consolidation, i.e 8 patients and only two patients presented with pulmonary lesion. The most common presentation of the small cell carcinoma was hilar, perihilar mass, i.e 8 patients and 3 patients with pulmonary lesion and half of these patients had mediastinal involvement. Most of the patients of squamous cell carcinoma presented with apical mass, i.e 5 patients. Two patients with pulmonary lesion and one hilar mass. One each of the patient had chest wall involvement and pleural effusion. Out of 50 patients, 26 patients (50%) had presented with variable metastasis at the time of diagnosis. Among these 26 patients, 5 patients had metastasis to contralateral lung in form of satellite nodules which were later confirmed on PET CT, 5 patients had malignant pleural effusion which was diagnosed on pleural fluid analysis. In case of distant metastasis at the time of diagnosis, 5 patients had metastasis to liver and 5 patients to adrenals (3 patients of adenocarcinoma and two patients with small cell carcinoma). 4 patients had involvement of brain.

Bone involvement in the form of lytic destruction was seen in three patients. This in contrary to the study conducted by Riihimaki M et al,[11] showed bone metastases and respiratory metastases is more

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common. In our study, it showed equal involvement of liver, adrenals and respiratory system.

Ipsilateral mediastinal lymph nodes were most commonly involved in all types of the lung carcinoma. In our study, perihilar, hilar lymph nodes were involved most commonly (6 patients) in small cell carcinoma and least in squamous cell carcinoma (1 patient) and 4 patients in adenocarcinoma. Involvement of contralateral and supraclavicular lymph nodes was most common in small cell carcinoma (3 patients) followed by squamous cell carcinoma and least in adenocarcinoma.

Most of the patients in our study at the time of diagnosis were in stage III with18 patients (36%), stage IV 16 patients (32%) and stage I and II patients with 8 patients (16%) each. This correlates very well with study done by Dhara et al.[5]

Out of all these 50 patients, 44 patients were diagnosed as bronchogenic carcinoma by CT and was confirmed by cytological examination, coming true positive. Two patients were diagnosed as bronchogenic carcinoma by CT, but not confirmed on cytological evaluation (false positive).

Sensitivity of CT to diagnose bronchogenic carcinoma was 96%.

Specificity was 86% with PPV of 92% and accuracy of 96%.

This in comparison with study conducted by Colice et al,[12] and Michael K. Gould et al,[13]which had sensitivity upto 85% and specificity upto 77%, which is in correlation with our study.

CONCLUSION

CT scan is the modality of choice for the detection of bronchogenic carcinoma, staging of bronchogenic carcinoma and in the evaluation of metastases.

It is very helpful in performing transthoracic biopsies and to the arrival of histopathological diagnosis. Early diagnosis can help better survival.

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