



A Study Of Computed Tomography of the Chest in Bronchogenic Carcinoma

KEYWORDS

Bronchogenic carcinoma, Computed tomography, Fine needle aspiration cytology, Bronchoscopy, Adenocarcinoma, Squamous cell carcinoma.

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ABSTRACT *Back Ground: - Bronchogenic carcinoma is the second most commonest cancer in both men and women next to prostate carcinoma and breast carcinoma respectively. Though first noted in USA and European Countries, now turned into worldwide epidemic with increasing use of tobacco.*

Objectives: - To study etiological factors, clinical profile multifacet presentations on chest radiography and correlate computed tomography findings with histopathological profile.

Materials and methods

This descriptive study included 100 consecutive patients suspicious of bronchogenic carcinoma admitted through out patient block in department of Pulmonology during the period of December 2007 to August 2009. They are subjected to computed tomography and histological sampling and the findings are correlated.

Results: - Bronchogenic carcinoma is more common in males particularly in 50-60 yrs age group. Smoking is the commonest aetiological factor. Mass lesion is commonest radiological finding. Most of lesions are right sided with irregular margins. Sqamous cell carcinoma has been the commonest histopathological type. But adenocarcinoma is predominant in our study.

Conclusion: - Computed tomography is the modality of choice for evaluating bronchogenic carcinoma. Computed tomography guided fine needle aspiration cytology is simple and safe technique with high diagnostic accuracy.

INTRODUCTION

Is applied to malignant tumours arising anywhere in trachea and tracheo tree bronchial Bronchogenic Carcinoma. Though true below the larynx uncommon disease at the turn of the 20th century has become major health problem heading into the new millennium. The higher rates of mortality and morbidity are due to late detection of lung cancer cases. In advanced stages, as most of the cases either remain asymptomatic for a long period of present with no specific symptoms.

The low cure rate of lung cancer is mainly owing to delayed diagnosis based on poor prognostic value of conventional chest radiograph in detecting small lesions. Although nodules of 0.5-0.6cm are visible, malignant nodules identified are of size 0.8 to 1cm. It is estimated that 27 doublings are needed to reach 0.5cm, the smallest detectable lesion. By the time a nodule is 1cm diameter, it represents 30 doubling times and about 1 million tumour cells. Thus delaying the diagnosis moreover. Bronchogenic carcinoma has a multifacet presentation like solitary pulmonary nodule, pleural effusion, intra bronchial growth.

The invasive techniques like bronchoscopy fine needle aspiration cytology, needle biopsy and thoracoscopy are associated with morbidity and mortality. The non invasive techniques like chest x-ray, CT scan, sputum cytology are preferable and acceptable by the patient. So in this study a critical evaluation of each technique especially computed tomography is done.

Materials and methods

This descriptive study included 100 consecutive patients of bronchogenic carcinoma admitted through out patient

block in the department of pulmonology, Siddhartha medical college, Vijayawada during the period of December 2007 to August 2009.

Methodology of the study Inclusion criteria: -

All the patients with suspicion of bronchogenic carcinoma on clinical and or radiological grounds were admitted and selected for computed tomography and later subjected to histological sampling either by TTNA or by bronchoscopy, no age, gender, environmental (or) occupational limits were applied for the selection of patients.

Exclusion criteria: -

Patients already diagnosed at some other institution and presenting to our unit with complications were not included in our study. Patients admitted with the suspicion of lung cancer. But later diagnosed as being tumours are also excluded. Patients presenting with metastases in lungs with primary lesion elsewhere in the body were also excluded.

This study was approved by institutional ethical committee. Later, written informed consent was taken from all these patients details about the patients name, age, gender, address, date of admission, present complaints, past history, occupation are noted. Physical examination and respiratory system examination findings were recorded in a specially designed proforma.

Routine urine, blood picture, ESR are done in all cases. Emphasis in particular was given to sputum for malignant cells. All the patients are subjected to computed tomography and histological sampling finally are correlated.

RESULTS

Bronchogenic carcinoma most commonly affects males accounting for 90%, 40% of the patients belong to age group of 50-60 yrs. Smoking is the common aetiological factor observed in 80% of cases. Among various symptoms, cough and breathlessness are common. Most of the patients presented with clubbing and lymphadenopathy. The commonest radiological finding is mass lesion. The most common histopathological type is adeno carcinoma .usually most of the lesions are right sided with irregular margins, CT densitometry K 195 HU. CT guided FNAC has got a good yield of 69%.

**Table No 1
AGE GROUP**

Age Group in Years	No. of Patients	Percentage
41-50	10	10
51-60	40	40
61-70	30	30
71-80	15	15
Above 80	5	5

**Table No 2
SEX**

Sex	No. Of Patients	Percentage
Males	30	30
Females	20	20

**Table No 3
AETIOLOGICAL FACTORS**

Factor	No. Of Patients	Percentage
Smokers	30	30
Non smokers	20	20

**Table No 4
SYMPTOMS**

Symptoms	No. of patients	percentage
Cough	82	82
Shortness of breath	80	80
Hemoptysis	25	25
Chest pain	50	50
Fever	30	30
Weight loss	15	75

**Table No 5
PHYSICAL FINDINGS**

Physical findings	No. of patients	percentage
Pallor	80	80
Clubbing	40	40
Lymphadenopathy	15	15
Peoac edema	5	5
Engorged neck veins	5	5

**Table No 6
RADIOLOGICAL FINDINGS**

X-Ray Findings	No. of patients	percentage
Mass lesion	55	55
Hilar Lymphadenopathy	20	20
Rib erosion	10	10
Pleural effusion	20	20
Hydro Pneumothorax	20	20

**Table No 7
COMPUTED TOMOGRAPHY FINDINGS**

Radiological findings	No. of cases	percentage
Irregular Margin	75	75
Lobulation	75	75
Smooth margin	10	10
Cavitation	10	10
Callification	30	30
Air bronchogram	10	10
Pleural effusion	20	20
Chest invasion	10	10
Direct mediastinal invasion	10	10
Superior vena cava syndrome	5	5

**Table No 8
HISTOPATHOLOGICAL PROCEDURE**

Procedure	No. of cases	No. of cases s/o malignancy
Fine needle aspiration	80	55
Needle biopsy	25	15
Pleural biopsy	20	15
Pleural fluid cytology	30	20

**Table No 9
HISTOPATHOLOGICAL VARIANT**

Type of carcinoma	No. of patients	percentage
Adeno carcinoma	50	50
Squamous cell carcinoma	30	30
Small cell carcinoma	5	5
Typing not possible	15	15

**Table No 10
SPTUM EXAMINATION**

Sputum for	No. of patients	percentage
Malignant Cells	10	10
AFB	Negative in all cases	0

Table No 11
FIBRE OPTIC BRONCHOSCOPIC FINDINGS

Findings	No. of patients	percentage
Intra Bronchial Growth	10	10
External Compression	10	10
Normal Study	80	80

Table No 12
METASTASES

Metastases	No. Of Patients	Percentage
Rib	10	10
Liver	5	5
Adrenal	5	5
Opposite lung	5	5
S.V.C Obstruction	5	5

DISCUSSION

The clinico-pathological picture and role of computed tomography of the chest is studied in 100 cases of bronchogenic carcinoma during the period between 2007 and 2009.

The peak incidence occurs in 5th and 6th decades. The incidence is 40% in 6th decade and 30% in 7th decade. The average age of the bronchogenic carcinoma patients is 63 yrs. However, 10% of the cases are reported between 41-50y, and 15% between 71-80 y. One case is noted above 80 y age group. When compared, the average age in the study done by Rajendra Prasad et al is 57 years. The maximum number of patients were in the 60-69 years age group according to the study done by Z-G Yang et al according to Jagadish Rawat et al the common age group was 40-60 years, 9.86% of the patients were less than 40 years old age.

According to this study bronchogenic carcinoma is more common in males than in females. It accounts to 90% in males and 10% females. This is against the new trend of increased incidence in females in western countries. The male female incidence ratio observed is 2:1. it may be due to increased smoking habits or passive smoking. But our study is supported by the evidence of the study done by Jagadish Rawat et al with the interpretation of male to female ratio was 8.2:1.

Smoking is the commonest agent in this study affecting 80% of the patients. While 20% of the non smokers are proved to have bronchogenic carcinoma. The risk is increased in 60 to 70 fold for the person smoking 2 packs per day for 20 years compared to the non smokers. The findings are consistent with the studies done by Jagadish Rawat et al smoking was found to be the main risk factor in 81.77% patients. (83.1%) of patients were smokers in the study done by Z-G Yang, MD S Sone et al.

10% of the patients are detected while asymptomatic, usually on a routine chest radiograph. In other cases signs and symptoms are secondary to central or endobronchial growth of the tumour in the primary tumour or regional spread of the tumour in the thorax by contiguity or metastasis to regional lymph nodes.

In our study 82% complained of cough and 80% presented

with shortness of breath. Hemoptysis was significant in 25% of cases, while fever was the major complaint in 30% of cases. Pleuritic chest pain is seen in 40%, while pain due to bone involvement accounts to 20%. weight loss is significant in 75% of bronchogenic carcinoma patients and almost all the patients had loss of appetite. The results are consistent with the study of Jagadish Rawat et al.

Results were interpreted as cough was the most common symptom found in (72.90%) patients, followed by fever (58.12%), chest pain (55.64%), and dyspnea (50.74%). study done by K.B.Gupta et al shows the symptoms with which the patients presented. Out of a total of 98 (100%) patients, majority of the patients presented with chest pain, productive cough and breathlessness. Haemoptysis was present in 31 of the patients whereas dysphagia was seen in 8 and hoarseness of voice in 11 of the patients.

History of pulmonary tuberculosis is noted in 10. this finding was noted in 16% of cases in the study of K.B.Gupta et al. Family history is significant in one case highlighting the importance lung cancer screening.

CHEST RADIOGRAPH

Bronchogenic Carcinoma is well known to have a multifacet presentation and this is supported by the facts of the study. In the present study, the commonest chest X-ray finding in cases with Bronchogenic Carcinoma was a mass lesion seen in 80% cases. Hilar lymphadenopathy is seen in 6 cases (30%). Pleural involvement is seen in 30%, 4 cases presenting with pleural effusion and 2 cases (10%) as hydropneumothorax. Rib erosion is significant in 2 cases (10%). Similar findings were reported by others.

Thoracocentesis is done in 6 cases and sent for cytology to detect malignant cells. Malignant cells are observed in 4 cases (60%). Pleural biopsy is done in 4 cases out of which 3 cases turned out to be positive.

Fine needle aspiration cytology is attempted in 16 cases, out of which 11 cases proved to be positive. The cases where FNAC failed to reveal the diagnosis, needle biopsy is tried. Totally 5 cases were targeted and 3 cases got a good yield. According to Z-G Yang et al, The most common histological type was squamous -cell carcinoma (51.5%), followed by small- cell carcinoma (17.6%) and adenocarcinoma (8.1%) the findings of Jagdish Rawat et al as follows, the most common radiological presentation was mass lesion (46.31%). The most common histopathological type was squamous -cell carcinoma (SCC) (44.83%) followed by adenocarcinoma (19.78%) and small cell lung carcinoma (SSLC) (16.75%). Similar findings are noted in other studies.

The most common radiological presentation was mass lesion (46.31%)

It is well known that tumour size is an important determinant of C.T in cases of bronchogenic carcinoma. In our study it is revealed that lung cancer less than 10mm are seen in 18%, and 60% between 11-20mm. the inconsistent results between our study and those of the previous reports could be owing to different morphological features of the tumour in terms of density and borders of the lesion.

Marked irregularity along the edge of the lesion is the characteristic finding in 75% of the mass lesions, whereas well circumscribed, spherical masses are seen in 10%. es-

centric calcifications is noted in 30% of cases. Among them 80% are adeno carcinomas, and remaining are squamous cell carcinoma. Rib invasion is seen in 10% cases, of which 5% case is adeno carcinoma and other 5% belongs to small cell carcinoma.

The radiologic presentation of adenocarcinoma and squamous cell carcinoma is showing a changing pattern. In our study, adenocarcinoma is presenting predominantly as a peripheral tumor. This relative increase in the percentage of centrally located adenocarcinoma is due to small sample size and short duration of study.

Squamous cell carcinoma often presents as a central lesion which invades the hilum and mediastinum. In the present study 50% of the cases presented with right upper lobe mass lesion, and hilar mass with extension into the mediastinum associated with SVCO was seen in 5% case. Cavitation occurs in 82% of cases with squamous cell carcinoma but in the present study it was seen in only 10% cases.

Adenocarcinoma of the lung often presents as a peripherally located lesion on chest radiographs mayo clinic study reported its peripheral location in 72% of cases while Daniel et al found the peripheral tumour in only 49% cases and reported that there is no statistically significant difference between adenocarcinoma and squamous cell carcinoma presenting as a peripheral or central mass. Hollings observed that 51% cases in his study presented with either hilar or hilar and mediastinal masses. In the present study half of the cases with adenocarcinoma appeared as hilar masses.

Small cell carcinoma commonly manifests as a hilar mass, but this classic presentation is because of hilar and mediastinal nodal metastases while the main tumour remains occult. In our study 10% case of small carcinomas presented as a peripheral mass with rib erosion. Liver metastases are noted in 5%, adrenal metastases in 5% and rib secondaries in 10% of the cases.

COMPARISON BETWEEN OUR STUDY AND STUDY BY CM SHETTY, BN LAKHKAR, VSS GANGADHAR et al

FEATURES NUMBERS%	PREVIOUS STUDY	PRESENT STUDY
IRREGULAR MARGINS	85%	75%
LOBULATION	70%	75%
SMOOTH	8%	10%
CAVITATION	8.6%	10%
CALCIFICATION	16%	30%
AIR BRONCHOGRAMS	13%	10%

FEATURES NUMBERS%	PREVIOUS STUDY	PRESENT STUDY
PLEURAL EFFUSION	34.5%	30%
CHEST INVASION	11.1%	20%
DIRECT MED. INVASION	32%	10%
SVC	8.6%	5%
CARDIA3.	7%	0
LIVER	18.5%	5%
ADRENAL	6.1%	5%
BONES	19.7%	10%
BRAIN	3.7%	0

In our study all the cases have a representative CT number of 195 HU. A higher CT density value of 400 is noted in one case and its cytology showed adeno carcinoma. In one case, the density was 40 HU and in the centre it was 15 HU showing cavitation in the mass and almost similar finding is seen in another case. Both of them revealed squamous cell carcinoma.

Conclusion:

Computed tomography is the modality choice for evaluating bronchogenic carcinoma because of its better spatial resolution. CT provides precise characterization of the size, contour, extent and tissue composition of the suspicious lesion. It also serves as a part of the staging process to assess the extent of the disease.

Computed tomography guided fine needle aspiration cytology is a simple and safe procedure with high diagnostic accuracy for the diagnosis and cell typing of bronchogenic carcinoma.

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