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CT evaluation of bronchogenic carcinoma

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Abstract
HRCT delineation of lung parenchyma down to the level of the secondary pulmonary lobule is possible. Spiral CT introduced in the early 1990's lead to an increase in utilization CT, a revolution that continued with advent of multi detector row CT (MDTC) scanners more recently. Helical technology permits multiple phases of scanning to be obtained often one contrast injection. In this study CT evaluation of 50 patients with either proven or strongly suspected bronchogenic carcicnoma based on chest radiographs, bronchoscopy, cytology of bronchial washings or pleural fluid, FNAC or clinical examination was done.Before commencing CT examination, all the preceding historical, clinical & laboratory data are recorded. Most of the bronchogenic carcinoma are heterogeneously enhancing (54.3%),with ill defined/ speculated margins (73.9%) and associated with necrosis in 43.47%of cases .calcification rarely found (13%).

Keywords: bronchogenic carcinoma, HRCT, FNAC

Introduction
Computed tomography has become a part of the standard care of evaluating pulmonary masses detected by the chest radiography. Abnormalities found or suspected on standard radiography may be characterized to better advantage by the ability of CT scan to display the overlapping structure in a crossing sectional format. The detection of relatively small lesions is enhanced by the manner in which CT separates structures that could be superimposed on standard radiographic projections. The strength of CT recides in the contrast resolution which is the ability of the discriminate small difference in tissue attenuation gas, fat, water, soft tissues, osseous and metallic densities are more easily and clearly discriminated [1].
Small adjacent structures of different density are readily distinguishable. With the advent of HRCT delineation of lung parenchyma down to the level of the secondary pulmonary lobule is possible. Spiral CT introduced in the early 1990's lead to an increase in utilization CT, a revolution that continued with advent of multi detector row CT (MDTC) scanners more recently. Helical technology permits multiple phases of scanning to be obtained often one contrast injection [2].
Based on the chest radiography alone there may be difficulty in distinguishing Mediastinal lung and chest wall lesions. Such tissue characterization may be crucial in differentiating between a benign process and malignant diseases. Due to better spatial resolution CT is superior to magnetic imaging MRI in demonstrating both normal and endobronchial masses. CT serves as a dual role in patient suspected to have the bronchogenic carcinoma based on the plain chest radiography. Initially it may be substantially facilities the Diagnostic evaluation by providing more precise characterization of the size, contour, extent and tissue composition of the suspicious lesion [3]. The findings on the CT examination can be valuable in directing further diagnosis when the lesions in question probably represents bronchogenic carcinoma. Bronchogenic carcinoma is an extremely aggressive and common malignancy received to afflict the human body. It is the most common malignancy of the men in the world and sixth leading cancer in women worldwide (Sutton seventh edition 2003, 107-108). The etiology of lung cancer is multifactorial. The most important single etiological factor is cigarette smoking. Most lung cancers are caused by carcinogens and tumor promoters ingested via cigarette smoking. The relative risk of developing bronchogenic carcinoma is increased 13 fold by active smoking and about 1.5 fold by long turn passive exposure to cigarette smoking The lung cancer death rate is related to total amount (often expressed in cigarette pack years) of cigarettes smoked, such that was increased 60 to 70 fold for a man

smoking 2 packs a day for 20 years as compared with the non smoker (Harrison's principles of internal medicine 15; 562-571). Other established causes are asbestosis exposure, occupational hazards for example Nickel, Uranium, beryllium etc [4].

Methodology

In this study CT evaluation of 50 patients with either proven or strongly suspected bronchogenic carcicnoma based on chest radiographs, bronchoscopy, cytology of bronchial washings or pleural fluid, FNAC or clinical examination was done. Before commencing CT examination, all the preceding historical, clinical & laboratory data are recorded.

Computed Tomography Examination

Equipment Somatom ART 3rd generation rotate-rotate type whole body CT scanner from Siemens.

C.T. Examination

CT scanning will be performed in two phase In the first phase, scans will be without contrast. In the second phase, scans will be obtained with non – ionic intravenous contrast. A bolus dose of 50ml of 60% iodinated non-ionic contrast will be administered and scanning started immediately.

Technique

The technique will be to obtain a front view Topogram of thorax with the patient in supine position. Contiguous 10mm slices with 10 mm interslice gap covering the entire thorax, brain and upperabdomen, routinely includeng adrenals are taken. Scanning technique with 130 KVp and 70 mA will be used. For scanning the site of lesion, slice thickness of 5mm with interslice gap of 5mm will be used.

Results

Table 1: Distribution of cases of according to the lobes of lung involved.

S. No.	Lobe of Lung Involved	No. of Patients	Percentage
1.	Rt.Lung	32	64%
	(a) Upper Lobe	20	40%
	(b) Middle lobe	0	0
	(c) Lower lobe	6	12%
	(d) More than one lobe	6	12%
2.	Lt lung	18	36%
	(a)upper lobe	11	22%
	(b)Lower lobe	3	6%
	(c) More than one side	4	8%
	Total	50	100

Bronchogenic carcinoma was found to involve right lung more frequently than left lun (64%vs 36%).on both sides upper lobes was found to be involved more frequently.

Table 2: Distribution of cases According to size of tumor

S. No	Age (in Yrs)	No of patients	Percentage
1.	>3cm	2	4%
2.	3-6 cm	21	42%
3.	7-9	19	38%
4.	10-12cms	1	2%
5.	<12 cms,	3	6%
6.	Endo luminal mass Lesion	4	8&
	Total	50	100%

Most of the masses diagnosed were between 3 to 9cms (80%). Endoluminal mass lesion was detected in 8%of cases.

Table 3: CT Characteristics of Bronchogenic carcinoma

S. No	CT Characteristics	No of Patients (46)	Percentage (Out Of 46)
1.	Nature of mass homogenously enhancing	21	45.7
	Heterogenously Enhancing	25	54.3
2.	Mass of lesion – Well defined	12	26.0
	111- Defined /speculated	34	73.9
3.	Calcification	6	13.04
4.	Necrosis	20	3.47
5.	Cavitstion	8	17.39

Most of the bronchogenic carcinoma are heterogeneously enhancing (54.3%),with ill defined/ speculated margins (73.9%)and associated with necrosis in 43.47%of cases .calcification rarely found (13%)

Table 4: Distribution of cases According to Location of bronchogenic Carcinoma

S. No	Location	No of patients	Percentage
1.	Central	33	66
2.	Peripheral	17	34
	Total	50	100

Bronchogenic carcinoma was found to be predominantly central in location as compared to peripheral location (44%)

Table 5: Spread

S. No	Feature	No of Patients	Percentage
1.	Pleural effusion	6	12
2.	Rib erosion	4	8
3.	Verteble Erosion	2	4
4.	Lung metastases	6	12
5.	Pericardial Effusion	3	6
6.	Regional lymphadenopathy	13	26
7.	Adjacent collapse /Consolidation	11	22
8.	Lymphangitic Carcinomatosa	5	10
9.	Medisatinal Invasion	18	36

Discussion

Bronchogenic carcinoma is a pathology frequently

suspected in many patients presenting in medical outdoor with relevenat clinical presentations. Their proper management will depend upon correct and early diagnosis of the pathology and other factors such as size, histological type, extent of tumor and metastases. Proper assessment of the tumor includes whether resectability is necessary before planning the treatment.

Chest radiography is the initial screening method in patients suspected of having bronchogenic carcinoma. However, it has low sensitivity and specificity in detection of bronchogenic carcinoma. Extent of mass is not satisfactorily evaluated by chest radiography.

Chest radiography has an important role in investigations in the patients with suspected or diagnosed bronchogenic carcinoma for assessment of local tumor, invasion into adjacent structures and distant metastases [5].

CT scan also provides accurate localization of mass for biopsy and radiotherapy. The ability of the CT scanning to provide specific information about tissue density enables differentiation between air, solid, fluid, fatty lesions and calcification. Use of contrast enhanced scans may further help to better define the extent of a malignant mass and to differentiate normal from abnormal tissues and lymph nodes from vessel.

In this study of 50 patients with proven or strongly suspected bronchogenic carcinoma based on the bronchoscopy, cytology of bronchial washings, direct FNAC, Plain radiography or clinical examination were subjected to CT examination. All patients were finally proven to be bronchogenic carcinoma based on radio-pathologic findings and specific cell types were attributed to them.

Bronchogenic carcinoma was found to afflict males more commonly than females (98% vs 2%). Increased incidence of the disease in males have been reported by many studies including "the world health Report 1997" issued by WHO. The increased incidence of the disease in males has often been described, at least partially, to their early and greater exposure to tobacco smoke. In many industrialized countries, however, the incidence of lung cancer is at present increasing more in females than males. (Bulletin WHO, 1982, 60 (6) 809-819). If present trend continues lung cancer is likely to be the most common fatal cancer in western women in 10 years or so, outstripping even breast cancer [6].

Gupta RC. Purohit SD *et al.* (1998) conducted study in mid west Rajasthan a. reported that out of total of 279 diagnosed cases of Bronchogenic carcionoma, 86% were males and 14% were females.

All the patients in our study were between 38 and 89 Years of age. The majority of patients were more than 50 years of age. Only 2 cases (4%) were seen in <40 yrs age group. Lung cancer has been known to be a disease of old age, though about a third of all lung cancer deaths occur below the age of 65 years (Park and park 1997). The risk of bronchogenic carcinoma is directly related to the duration of exposure to the carcinogen (tobacco, asbestos etc.).

Most of the patients had cough (50%) as the chief presenting complaint, with hemoptysis in 18 patients (36%). Other chief complaint were chest pain (20%). Dyspneoa (20%), stridor (12%), fever (12%) shoulder pain (6%). Most workers in the past have reported similar symptomatology.

In present study upper lobe was seen to be involved more frequently (62%), more on right side (40%).

Whittlesey D (1988) in a study done on 185 patients found occurrence of the tumor in upper lobes in 67.4% cases with more cases found on right side. This is in accordance with this study,

C M shetty, Lakhar BN *et al.* (2005) also reported that right lung is more commonly involved than left Lung (44% v/s 36%) and upper lobe is more commonly involved.

At the time of presentation, most of the masses 3 to 9 cms (80%). Six of these had malignant pleural effusion while five were diagnosed as lympangitic carcinomatosa.

Computed tomography was found helpful in evaluating the characteristics of the primary tumor mass [7].

Kuriuama *et al.* (1987) studied peripheral lung carcionoma in 18 patients and found a high incidence of spiculations (78%). Byrd RB *et al.* (1968) reported spiculations in 85% of squamous cell carcinoma. In present study also ill defined spiculated margins was found to be a common features of the malignant mass, being present in 34 out of 46 patients (73.91%).

Calcification in mass was found in only 6 patients in present study (13.04%). 0' Keefe ME *et al.* 1957 studies 72 patients with malignant pulmonary nodule; Of them 10 had calcification visible on radiograph. In the same study 50% of benign lesions contained calcification. They also concluded that calcifications in both masses were better visualized in CT than on conventional radiography [8].

All the malignant masses in the present study showed moderate to intense enhancement in post contrast scans, the enhancement being homogenous in 45.7% and heterogenous in 54.3%. The post contrast scans provides details regarding the nature of mass, presence of necrosis, vascular and lymph node status. Necrosis was found in 43.47%, while cavitation was found in 13.04%.

Byrd RB *et al.* (1968), reported that bronchogenic carcinoma are central in location in 60% patients. Similar findings were reported by other studies (Heitzman ER 1977). In present study also broochogenic carcinoma was found central in location then Peripheral (66% v/s 44%). In our study both squamous and adenocarcinoma presented more commonly central tumors than peripheral. This is partially in accordance with Shetty CM et at (2005) who reported that adenocarcinoma presented more as central tumor and squamous cell carcinoma as peripheral mass [9, 10].

Conclusion

CT was found to be an extremely valuable imaging modality in evaluation of bronchiogenic carcinoma.

All patients suspected with bronchogenic carcinoma should have a prior chest x-ray and abdominal ultrasonogrphy. CT can accurately delineate the malignant nature and extent of pulmonary mass. It can demonstrate local mediastinal, hilar or chest wall invasion.

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