



STUDY TO EVALUATE THE PATTERN OF INVOLVEMENT BY COMPUTED TOMOGRAPHY IN SPUTAM POSITIVE PULMONARY TUBERCULOSIS

Radiodiagnosis

Dr Mrinalkanti Ghosh

Associate Professor, Department of Radio diagnosis, Burdwan Medical College, Burdwan

Dr Susmita Giri*

Associate Professor, Department of Radio diagnosis, Burdwan Medical College, Burdwan
*Corresponding Author

Dr Aniruddha Ghosh

Resident, Department of Radio diagnosis, Burdwan Medical College, Burdwan

Dr Srikanta Biswas

Resident, Department of Radio diagnosis, Burdwan Medical College, Burdwan

Prof Utpal Dan

Professor, Department of Anatomy, Burdwan Medical College, Burdwan

ABSTRACT

AIM: Tuberculosis, usually caused by *Mycobacterium tuberculosis*[1] typically attacks the lungs. Different CT[2] findings such as nodule, cavitation, ground glass opacity, consolidation are significantly associated with smear positive pulmonary tuberculosis (PTB). The study is aimed to assess the spectrum of the lesions which is found in computed tomography of sputum positive tuberculosis patients of Burdwan Medical College.

METHODS: Fifty random known sputum positive patients attending in tuberculosis unit in Burdwan Medical College were studied over the period of one and half years (January 2015 to September 2016) after getting clearance from institutional ethical committee. The patients were subjected to thorough CT scan evaluation including contrast enhanced CT scan of lung. Analysis of spectrum of lesion in CT thorax was performed with appropriate statistical tool

RESULTS: In our study both new and old cases of sputum positive pulmonary tuberculosis patients were taken under considerations. Overlapping of CT features was predominated the CT analysis. The fibrosis and pleural thickening were emerged as predominant features available in 27 and 25 cases (54%, n=50 and 50%, n=50) respectively resulting bronchiectasis, distortion of bronchovascular structure and emphysematous changes. Mediastinal lymphadenopathy was least among the features, available only 7 cases (14%, n=50). The active form of lesions were also available in study.

CONCLUSION: The CT scan of thorax particularly High Resolution CT (HRCT) and CECT is excellent investigation to evaluate the different spectrum of pulmonary lesion in smear positive cases both in new and old cases

KEYWORDS

CT , Tuberculosis, Pulmonary, Sputum positive.

INTRODUCTION

Tuberculosis (TB) is a preventable and curable disease, but still million of people suffer every year and a number of them die from this disease, resulting in a heavy impact on social and economic development.^[3]

Tuberculosis primarily affect the lung but can affect other parts of the body. Transmission occurs by airborne spread of infection droplets and droplet nuclei containing the tubercle bacilli (mainly *Mycobacterium tuberculosis*).^[3] The source of infection is a person with sputum smear positive pulmonary tuberculosis.^[4] Each sputum positive case can infect 10-15 individual in a year, if not treated.^[5] Tuberculosis is second only to HIV/AIDS as the greatest killer worldwide due to a single infectious agent.

Early detection followed by effective therapy is extremely important in controlling TB. Delay in diagnosis results in increased infectivity in the community.^[6] Smear positive cases are more likely to infect other individuals. Thus, screening of pulmonary tuberculosis (PTB) suspect using history of cough > weeks provides a quick, cheap and convenient way to identify individual at a high risk of tuberculosis. Doctors should be trained to "think TB", where in they maintain a high index of suspicion for TB and follow the standardized diagnostic procedures, thereby reducing the delay in diagnosis of TB.^[7] The chest radiograph has been a major tool in the diagnosis of tuberculosis but early disease can be missed. Computed tomography is found to be sensitive in detection of subtle or occult parenchymal disease, differential diagnosis of parenchymal lesions evaluation^[8] of mediastinal lymph nodes (LNs), assessing disease activity, and evaluating complications. CT findings may permit empirical initiation of ATT until the time culture results are obtained^[9]

Contrast-enhanced CT (CECT) is the investigation of choice for evaluation of mediastinal LNs and also aids in depicting pleural enhancement in empyema. In recent year because of high resolution power and minimal partial volume effect, HRCT has been found to be superior to conventional chest radiography and standard CT in evaluation of pulmonary parenchymal disease.^[10] High-resolution CT

(HRCT) reconstructions are especially useful to detect miliary and centrilobular nodules, ground-glass opacities, and air-trapping outlines the various situations where CT chest is recommended.

Using this advantage, we have studied patients with sputum positive tuberculosis to assess the contribution of CT thorax in evaluation of TB.

METHODOLOGY

A descriptive cross sectional study was conducted in the department of Radio-diagnosis & Imaging, and Department of Pulmonary Medicine at Burdwan Medical College & Hospital from 1st January 2015 to 30th September 2016

50 patients who were sputum positive were taken from the tuberculosis-clinic register by simple random method and were subjected to complete clinical examination and radiological examination including CT thorax after taking consent. The study was approved by the institute ethical committee.

On the basis of these clinical and CT scan of thorax (including contrast and HRCT) findings, the different types of Smear positive cases were classified.

The imaging findings which were used to suggest active TB are consolidation, thick wall cavity with air fluid level, centrilobular nodule, clustered nodule, rim enhancing lymph node and pleural effusion.^[11-12]

Imaging findings which were used to identify TB sequelae are bronchovascular distortion, fibro-parenchymal lesions, bronchiectasis, emphysema, and fibro-atelectatic bands indicative of prior infection with scarring.^[9]

Their characteristic CT scan of thorax features as obtained in the study were discussed. The data regarding the frequencies of each type of lung lesion were prepared.

Result and analysis

We studied 50 cases of sputum positive pulmonary tuberculosis patients who attending Tuberculosis clinic.

Out of 50 patients 36 patients (72%) were male and 14 patient (28 %) are female . the age ranged from 9 years to 75 years; the mean age being 43.45 ± 17.13 years. The maximum age group was involved between 20 to 60 yrs. Cough was predominant symptoms of and present in all patient (100%), others symptoms were variable.

Table -1 : showing frequency distribution according to symptoms of patient

Symptoms	Frequency	Percent
Respiratory Distress	11	22.0
Fever	30	60.0
Cough	50	100.0
Weight Loss	21	42.0
Haemoptysis	9	18.0
Anorexia	7	14.0

In our study both new and old cases of sputum positive pulmonary tuberculosis patients weretaken under considerations

Table -2 : Showing frequency distribution according to different types of lesion in tuberculosis patients .

Different patterns of Lesion	Frequency	Percent
CENTRILOBULAR NODULE	19	38.0
CAVITATION	13	26.0
CONSOLIDATION	17	34.0
GROUNG GLASS	12	24.0
MILIARY PATTERN	6	12.0
TREE-IN BUD	12	24.0
PLEURAL EFFUSION	8	16.0
FIBROSIS	27	54.0
BRONCHIECTESIS	16	32.0
PLEURAL THICKENING	25	50.0
DISTORTION OF BRONCHOVASCULAR STRUCTURE	13	26.0
EMPHYSEMA	10	20.0
MEDIASTINAL LYMPH NODES	7	14.0
PULMONARY CALCIFICATION	9	18.0

According to different types of lesions most of the patient came to our clinic with old sputum positive tuberculosis in follow up treatment . we had got the sequelae of sputum positive pulmonary tuberculosis. The fibrosis and pleural thickening were present in more frequency resulting bronchiectasis ,distortion of bronchovascular structure and emphysematous changes

The active form of tuberculosis lesion was also common in our study. From different lesion the centrilobular pattern was found in 19 patient out of 50 ,frequency was 38 % of cases , cavitation 34 % cases, ground glass in 24 % cases , military pattern 12 % cases, tree-in -bud in 24 % cases. Others lesion like mediastinal lymph nodes in 14 % and pulmonary calcification in 18 % of cases.

Most of the patient had presented with combination of multiple lesions.

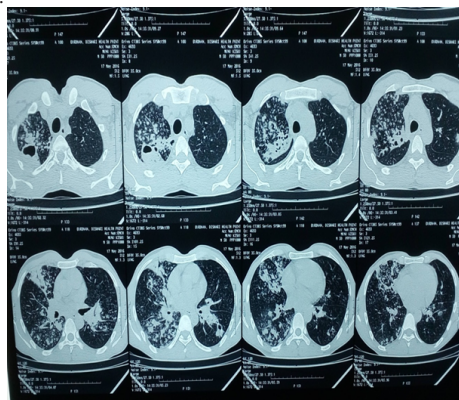


Fig 1 : consolidation with cavitation with centrilobular nodules and tree-in-bud pattern

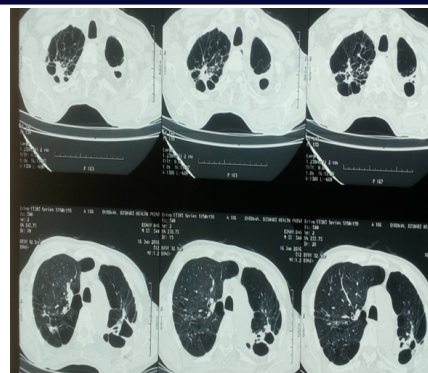


Fig 2:Multiple fibrotic bands and strands with air trapping and bullous emphysema at both upper lobes

Discussion

Post-primary or reactivation tuberculosis is the most common form of pulmonary tuberculosis in adults. Various investigations have concluded that post-primary tuberculosis results from reactivation of previously dormant primary infection in 90% of cases.. The early parenchymal infiltrate of post-primary tuberculosis results from an intense inflammatory reaction in the hypersensitive host.

Several authors have reported the pattern of lung involvement in HRCT in patients suffering from pulmonary tuberculosis Im et al^[13] reported that the earliest HRCT finding of bronchogenic dissemination of tuberculosis was a centrilobular nodule or branching linear structure 2-4 mm in diameter. These centrilobular lesions consisted of solid caseous material within or around the terminal or respiratory bronchioles. Multiple branching linear structures of similar calibre originating from a single "stalk" (the "tree-in-bud" appearance) were commonly seen in patients with extensive bronchogenic spread.. In addition they showed that bronchial wall thickening occurred during bronchogenic dissemination, that interlobularseptal thickening resulted from increased lymphatic clearance, and that the ground glassappearance could be present around active lesions. Healing of tuberculosis lesions results in the development of a fibrotic scar and calcification with loss of lung parenchyma volume. Rarely, if lesions heal without development of necrosis,no residual fibrotic changes occur. Im et al¹ showed that healing of cavitatory lesions caused more cicatricial change than in other areas without cavitation and that distortion of bronchovascular structures, emphysema, fibrotic bands, or bronchiectasis tended to increase inprevalence on follow up CT scans.

Another study^[14] by Aribandi M¹, Gulati M, Behera D, Das KM, Chandra NE, Suri S :Twenty-five patients with active pulmonary tuberculosis were prospectively studied with CT. Three major parenchymal patterns were noted. The nodular opacities pattern was seen in all cases. Confluent consolidation was seen in 37% of patients and consolidation with associated loss of volume (CWALV) was seen in 69% of patients.

In our study we got wide spectrum of different types of pulmonary lesion in sputum positive pulmonary tuberculosis patient, we had considered the sample of both new cases and old h/o sputum positive pulmonary cases in follow up treatment phases. we had got the sequelae of sputum positive pulmonary tuberculosis. The fibrosis and pleural thickening were present in more frequency resulting bronchiectasis, distortion of bronchovascular structure and emphysematous changes.

The active form of tuberculosis lesion was also common in our study.. Most of the patient had presented with combination of multiple lesions.

In our study the frequency of bronchovascular distortion(26%),fibrotic changes (54%), emphysema (20%), and bronchiectasis in patients with inactive pulmonary tuberculosis was high. This high frequency might be due to the presence of residual fibrosis.

In our study we looked for different types of lesion in sputum positive pulmonary tuberculosis patient both in old and new cases.

Conclusion

In our study of computed tomography scan evaluation of pulmonary tuberculosis patients we come to following conclusions. The middle age group people are more frequently involved. The active form of tuberculous lesions like centrilobular nodules, cavitations, consolidations, ground glass, tree-in-bud are lesions are more frequently seen in newly diagnosed cases. The fibrotic band strands, pleural thickening, bronchiectasis, emphysematous changes are also common in old follow up case of sputum positive pulmonary tuberculosis patient.

The CT scan of thorax particularly HRCT is excellent investigation to evaluate the different spectrum of pulmonary lesions in smear positive cases both in new and old cases. It can differentiate the active and sequelae of pulmonary lesions in smear positive cases.

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