ORIGINAL RESEARCH PAPER

Radiodiagnosis

MULTI DETECTOR MULTI SLICE COMPUTED TOMOGRAPHY (MDCT) IN THE EVALUATION OF PULMONARY TUBERCULOSIS.

KEY WORDS:

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ABSTRACT

AIM: To determine the pattern of HRCT findings in Pulmonary Tuberculosis.

MATERIALS AND METHODS: A hospital based retrospective study was undertaken with 50 patients to evaluate the significance of multi detector multi slice computed tomography (MDCT) in the evaluation of pulmonary tuberculosis.

RESULTS: Study comprised of 50 patients diagnosed with pulmonary tuberculosis. The maximum patients belonged to the age group of 31-40 years. 31 patients were male and 19 patients were female. MDCT findings observed were traction bronchiectasis, peribronchial thickening, ill defined nodules, consolidation, tree-in-bud appearance, atelectasis, cavitations, calcified granulomas and ground glass opacification.

CONCLUSION: MDCT is sensitive for early detection of pulmonary tuberculosis and can be used as a guidance for follow-up and management of the disease.

INTRODUCTION

TUBERCULOSIS is a malady caused by Mycobacterium tuberculosis (MTB).

Mycobacterium tuberculosis(MTB) is a gram positive, aerobic, acid and alcohol fast bacillus. Tuberculosis (TB) is one amongst the main public health issues in the Republic of India. India is the second most inhabited country in the world behind China however India has the maximum number of tuberculosis cases worldwide accounting for about one fourth of the worldwide TB cases.

In 2013, out of the calculable world annual incidence of nine million TB cases, 2.1 million were estimated to have occurred in the Republic of India[1]. Throughout recent years there has been emergence of resistance to multiple drugs in TB bacilli that has become a great public health threat. When TB bacilli become resistant to both isoniazid and rifampicin or solely mono- resistant to rifampicin it is known as the Multidrug Resistant TB (MDR TB)[2]. Chest radiography is the imaging method of choice in the initial evaluation and follow-up of pulmonary tuberculosis[3]. Sputum smear results may take just several days whereas culture results need several weeks[4]. This limits the diagnostic potency of these conventional approaches and regularly causes a delay in isolating infectious patients[5]. Due to these limitations, imaging plays a very important role in the evaluation of chest TB (CTB) patients and CT is more sensitive than CXR in this regard [6,7].

OBJECTIVE

To determine the pattern of HRCT findings in active and inactive Pulmonary tuberculosis.

MATERIALS AND METHODS
STUDY POPULATION

A hospital based retrospective study was undertaken with 50 patients over a 6 month period to evaluate the significance of multi detector multi slice computed tomography (MDCT) in the evaluation of pulmonary tuberculosis.

INCLUSION CRITERIA
- Patients with proven cases of pulmonary tuberculosis by laboratory tests.
- Patients between 18-75 years of age.
- Both genders were included in this study.

EXCLUSION CRITERIA
- Patients with known malignancy.
- Patients less than 18 years of age.
- Patients above 75 years of age.
- Patients with history of trauma.

EQUIPMENT USED

16 Slice Activion Toshiba CT Scanner with thin 0.5mm sections with 1mm reconstruction with a sharp algorithm.

RESULTS

This study was done in the Department Of Radio-Diagnosis in MGM Hospital Kamothe, Navi Mumbai during a 6 month period from January 2019 to June 2019. The following results were observed:

Distribution of patients according to Age

Majority of the patients (44%) were from the age group of 31-40 years followed by 26% from the age group of 41-50 years, 12% from the age group of 51-60 years, 8% from the age group of 61-70 years, 6% from the age group of 21-30 years and 2% from the age groups of 18-20 years and 71-75 years. The mean age of the patients was 42.74 ± 11.89 years.

Age (years)	N	%
18-20	1	2%
21-30	3	6%
31-40	22	44%
41-50	13	26%
51-60	6	12%
61-70	4	8%
71-75	1	2%
Total	50	100%
Mean ± SD	42.74 ± 11.89	

Distribution of patients according to Gender

There was male preponderance (62%) while female patients constituted 38% of the study group.

Table 2: Distribution of patients according to Gender

Gender	N	%
Male	31	62%
Female	19	38%
Total	50	100%

Lobar distribution of the lesions in right lung of patients

It was observed that 98% of the lesions involved the upper lobe while 90% and 84% involved middle lobe and lower lobe respectively. In the upper lobe and middle lobe, 25-50% of the

lung parenchyma was involved more commonly while in lower lobe <25% of the lung parenchyma was involved more commonly.

Table 3: Lobar distribution of the lesions in right lung of patients

Right Lung	Lung Parenchyma							
	0%		<25%		25-50%		>50%	
	N	%	N	%	N	%	N	%
Upper Lobe	1	2%	8	16%	30	60%	11	22%
Middle Lobe	5	10%	16	32%	22	44%	7	14%
Lower Lobe	8	16%	20	40%	10	20%	12	24%

Lobar distribution of the lesions in left lung of patients

It was observed that 96% of the lesions involved the upper lobe while 76% involved lower lobe. In the upper lobe and lower lobe, 25-50% of the lung parenchyma was involved more commonly.

Table 4: Lobar distribution of the lesions in left lung of patients

Left Lung	Lung Parenchyma							
	0%		<25%		25-50%		>50%	
	N	%	N	%	N	%	N	%
Upper Lobe	2	4%	8	16%	32	64%	8	16%
Lower Lobe	12	24%	10	20%	20	40%	8	16%

Distribution of patients according to Computed Tomography (CT) Findings

The most common Computed Tomography (CT) findings was traction bronchiectasis (86%), peribronchial thickening (78%), ill-defined nodules (74%), consolidation (74%), tree in bud appearance (70%), atelectasis (66%), cavitations (42%), calcified granulomas (22%) and ground glass opacity (18%).

Table 5: Distribution of patients according to Computed Tomography (CT) Findings

CT Findings	N	%
Traction bronchiectasis	43	86%
Peribronchial thickening	39	78%
Ill-defined nodules	37	74%
Consolidation	37	74%
Tree-in-bud	35	70%
Atelectasis	33	66%
Cavitations	21	42%
Calcified granuloma	11	22%
Ground glass opacity	9	18%

CASE 1

Miliary tuberculosis. Axial chest CT image shows numerous micronodules in a random distribution. Note subpleural (arrowhead) and centrilobular (arrow) nodules

CASE 2
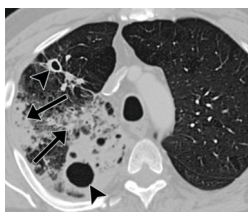
Postprimary tuberculosis. Axial chest CT image shows right upper lobe consolidation (arrows) with associated cavitation (arrowheads).

DISCUSSION

A hospital based retrospective study was undertaken with 50 patients to evaluate the importance of multi detector multi slice computed tomography (MDCT) in the evaluation of pulmonary tuberculosis.

Tuberculosis is a malady with caseating granulomas. TB infection is taken into account in two stages: primary infection and reactivation or post primary disease. It has an inclination to involve the upper lobes without lymphadenopathy and additionally cavitation.

Main findings on imaging include consolidation, opacities or both (100%), principally in the apical and posterior segments of the upper lobes (91%), cavitation (40% to 87%), ill-defined nodules (19% to 58%), fibrosis (29%) and pleural effusion (18%) [8]. The CT and HRCT findings seen in postprimary TB are different. Findings are (1) consolidation; (2) cavitation; (3) centrilobular nodules and branching linear opacities "tree-in-bud appearance"[2]. All these features in a combination are helpful in diagnosis of TB. HRCT findings in patients with post primary TB are deranged bronchovascular structures, bronchiectasis, emphysema, and fibrotic bands suggestive of past infection [9]. Determination of diagnosis and activity in patients with pulmonary tuberculosis typically depends on the detection of acid-fast bacilli in sputum smear or culture[10]. Value of sputum culture in diagnosis is same or perhaps better than the HRCT. HRCT provides assurance to treating doctors and radiologists in differentiating other diseases that have similar appearances without using invasive methods. In view of delay in reports of sputum culture HRCT has vital importance in primary diagnosis of tuberculosis and empirical therapy can be started[11].

CONCLUSION

Tuberculosis is an important public health issue in both developing and developed countries. Radiologists need to be well acquainted with the imaging findings of pulmonary tuberculosis. Awareness of certain risk factors, such as vulnerability to exposure, altered immunity, pediatric age group, and comorbidities, that can influence the likelihood and the appearance of disease is very essential.

It is also important to be aware of the role and limitations of laboratory testing, alongside imaging and clinical evaluation, in establishing a diagnosis.

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