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Original Research Paper

Radiodiagnosis

ROLE OF HIGH RESOLUTION COMPUTED TOMGRAPHY IN EVALUATION OF SPECTRUM OF LUNG PARENCHYMAL AND INTERSTITIAL LESIONS IN HUMAN IMMUNO DEFICIENCY VIRUS INFECTED PATIENTS

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ABSTRACT

Pulmonary infections remain a leading cause of morbidity and mortality and one of the most frequent causes of hospital admission in HIV infected people worldwide. High-resolution computed tomography (HRCT) of the lung provides detailed visualization of the lung parenchyma and is being used to evaluate interstitial lung disease. HRCT reveals pulmonary parenchymal and interstitial changes before they are evident on chest radiographs. The technique of HRCT involves use of 0.5-1.5-mm-thick collimation scans with a high spatial frequency algorithm. From this study, we found that, HRCT has highly significant sensitivity specificity and overall accuracy in the identification and characterization of lung parenchymal and interstitial lesions in HIV positive patients.

KEYWORDS :

INTRODUCTION

HIV infection is characterized by a state of profound immunodeficiency resulting primarily from deficiency of helper CD4 T cells. The clinical profile of HIV infection encompasses a spectrum of diseases ranging from a syndrome seen with primary infection to a prolonged asymptomatic stage to advanced disease or full blown AIDS.

About 36.9 million people worldwide are suffering from HIV infection and associated complications1. An estimated 2.17 million people in India are living with HIV infection in 2015 as compared to 2.26 million in 2007 it has shown a decrease.

Respiratory complications are extremely common and important cause of morbidity and mortality in HIV positive patients. Majority of the pulmonary complications of HIV positive patients are infectious in origin.

Chest radiography is the initial imaging modality for evaluation of patients with suspected pulmonary infections. However Chest radiographs have less sensitivity and specificity than HRCT, and has not distinct findings specific for diseases. HRCT reveals pulmonary parenchymal and interstitial changes before they are evident on chest radiographs. High resolution computed tomography (HRCT) technique has excellent spatial resolution and provides anatomical details similar to that obtained from the gross pathological specimens. It combines the use of thinly collimated CT slices that are 0.5 to 1.5 mm in thickness, with a high spatial frequency or sharp algorithm that enhances edge detection. Due to these features, HRCT has become an important diagnostic tool in pulmonary medicine.

Purpose of our study was to determine the spectrum of HRCT lung imaging findings in HIV infected patients and to assess the specificity and sensitivity of HRCT.

MATERIAL AND METHOD

This study was conducted in the Department of Radio diagnosis in collaboration with the Department of Medicine M.G.M. Medical College & M.Y. Hospital Indore. A total of 50 HIV positive adult (>18 years) patients of both sexes, who have presented with a lung disease on the basis of clinical profile and/or plain radiography, were evaluated on HRCT. The immunocompromised patients who were suspected lung disease but were found HIV negative, pregnant HIV positive patients and patient not giving consent were excluded from the study. HRCT examination was performed on GE 128 multi slice CT scanner. Scan was done in lung window and mediastinal window and then reformations were done in coronal, sagittal and oblique section.

RESULTS

In our study of 50 patients, 88% (44) cases of infection, 4% (2) cases of neoplastic and 8% (4) cases of COPD were seen. On the basis of imaging findings following spectrum of important lesions were noted in our study:

Spectrum of Diseases	No of cases	% of cases
Pulmonary tuberculosis	31	62
Bacterial pneumonia	10	20
Pneumocystis carinii	3	6
Lung carcinoma (adenocarcinoma)	1	2
Non-Hodgkin's lymphoma (high grade)	1	2
Chronic obstructive pulmonary disease	4	8
Total	50	100%

Pulmonary tuberculosis appeared as cavitations, nodular opacities with pleural effusion and mediastinal lymphadenopathy. Bacterial infection appeared predominantly as consolidatory pattern. Pneumocystis Carinii pneumonia showed diffuse ground glass opacification with mosaic pattern attenuation (crazy paving) and nodular opacities. COPD was predominantly emphysematous type which appeared as increased volume of bilateral lungs with multiple centrilobular and panacinar emphysema and subpleural blebs and bulla formation. Non-Hodgkin's lymphoma was appeared as multiple nodular opacities with surrounding ground glass haziness (flame shaped opacities) with multiple conglomerated mediastinal lymph nodes encasing mediastinal structures. Primary lung neoplasm viz adenocarcinoma of lung showed nodular opacity with lobulated and spiculated margins.

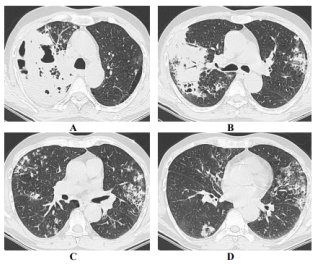

Fig :1 (A,B,C&D) Large area of consolidation noted in right upper

lobe, multiple areas of cavity formation seen within this consolidation. Multiple scattered focal areas of nodular lesions, ground glass opacities and consolidation in both lungs. Tree in bud appearance seen. Pretracheal and prevascular lymphadenopathy (Mediastinal Lymphadenopathy) seen. PULMONARY TUBERCULOSIS

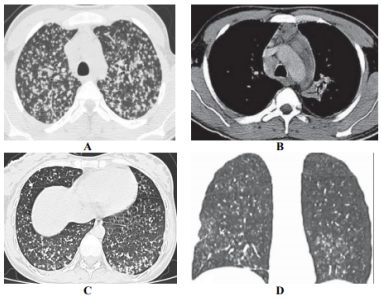

Fig: 2 (A,B,C&D) Multiple small nodular infiltrates in both lungs in random distribution both lungs. Multiple prevascular and pretracheal lymph nodes are seen. MILIARY TUBERCULOSIS

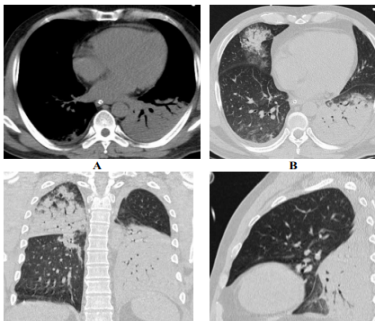

Fig: 3 (A,B,C&D) Pulmonary consolidation in the right upper and left lower lobe with airbronchograms. BACTERIAL PNEUMONIA

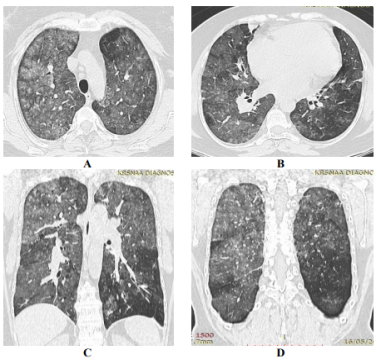

Fig: 4. (A,B,C&D) Diffuse ground glass haziness with intervening interstitial septal thickening (crazy paving appearance) seen in both lungs. PNEUMOCYSTIS CARINII PNEUMONIA

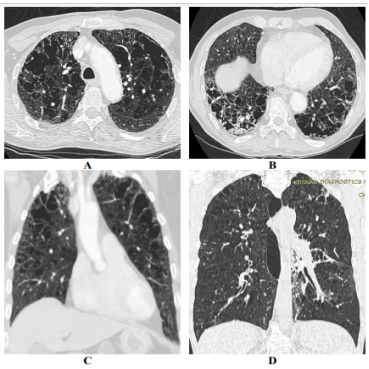

Fig: 5 (A,B,C&D) Centrilobular and Paraseptal emphysema with subpleural blebs and emphysematous bulla formation with hyperinflation of lungs. COPD

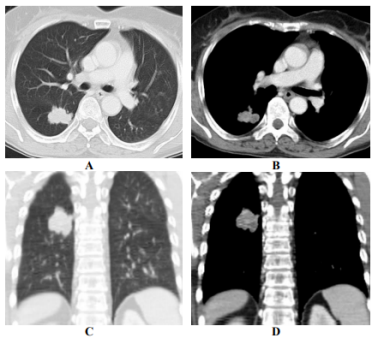

Fig: 6 (A,B,C&D) Hyperdense lesion with speculated and lobulated margins seen in right upper lobe posteriorly. ADENOCARCINOMA

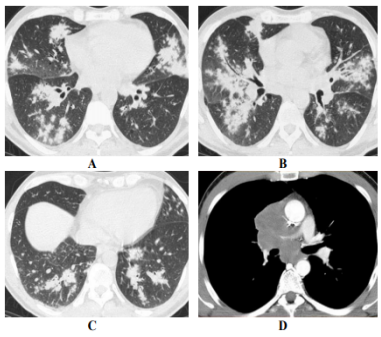

Fig: 7 (A,B,C&D) Ill-defined nodular opacities (flame-shaped), some of which are surrounded by a halo of ground glass opacity are seen in both lungs. Mediastinal lymphadenopathy seen encasing ascending aorta and right pulmonary artery. NON HODGKINS LYMPHOMA.

DISCUSSION

Out of 50 patients included in the study maximum cases were seen in the age range of 21-40 years (84%). 72% (36) were males and 28 % (14) were females with male to female ratio of 2.6:1.Weight loss was the most common 76% (36) presenting symptom along-with productive cough 64% (32).

In our series of 50 patients, 31 patients were diagnosed as having pulmonary tuberculosis accounting for 62% cases, 10 patients were diagnosed as having bacterial infection accounting for 20% of cases, 3 patients were diagnosed as having Pneumocystis carinii pneumonia (6%), in 2 patients the study revealed malignant neoplastic lesions (1 case lung adenocarcinoma and 1 case pulmonary non-Hodgkin's lymphoma) while in 4 patients study revealed COPD.

Pulmonary tuberculosis was most common infection seen in 72% (31) cases. Acid fast bacilli (AFB) positive sputum was seen in (58%) cases of pulmonary T.B.

The most common HRCT finding in pulmonary tuberculosis was nodular opacities 74% (23), followed by pleural effusion 35.4% (11), lymphadenopathy 38.7% (12), and cavitation 22.4 % (7). Bacterial infections most commonly presented with lobar consolidation (70%) followed by nodules (20%) and bronchiectasis (10%).The most common HRCT finding in Pneumocystis carinii pneumonia was diffuse ground glass opacities in mosaic pattern of distribution, noted in all patients.In HRCT, adenocarcinoma appeared as nodule with spiculated margin while non-hodgkin's lymphoma showed flame shaped opacities with mediastinal lymphadenopathy. In HRCT, COPD cases showed hyperinflated lungs with air trapping, bullae, and cysts. In this study we found that lymphadenopathy and nodular opacities were more in patients with (cd4 counts>200) 80% and 47% respectively than in patients with (cd4 counts< 200) 69% and 31% respectively.

Sensitivity, Specificity, Positive predictive value and Negative predictive value of HRCT in predicting infectious lesions turned out to be 95%, 83%, 98% and 71% respectively. While in predicting neoplastic lesions turned out to be 100%, 97%, 66% and 100% respectively and in predicting COPD turned out to be 75%, 97%, 75% and 97% respectively.

From this study, we found that, HRCT has highly significant sensitivity specificity and overall accuracy in the identification and characterization of lung parenchymal and interstitial lesions in HIV positive patients. HRCT lung plays a crucial role in the diagnostic evaluation of patients suffering from pulmonary manifestations of HIV infection. It can categorize the various patterns of disease and highlight the main differential diagnoses for each pattern thus helping in early diagnosis and management and reducing the morbidity and mortality.

CONCLUSION

In HRCT, every HIV associated diseases show specific pattern and distribution, which can be correctly identified. Therefore HRCT plays an important role in identification, characterization and differentiation of these lesions thereby helps in making early and accurate diagnosis and thus reducing morbidity and mortality. However, it is imperative that HRCT Pattern recognition should be combined with knowledge of clinical factors in order to generate a limited and meaningful differential diagnosis.

On the basis of imaging findings, pulmonary tuberculosis appeared as cavitations, nodular opacities predominantly showing tree in bud appearance with pleural effusion and mediastinal lymphadenopathy. Bacterial infection appeared predominantly as consolidatory pattern. Pneumocystis Carinii pneumonia showed diffuse ground glass opacification with mosaic pattern attenuation (crazy paving) and nodular opacities. COPD was predominantly emphysematous type which appeared as increased volume of bilateral lungs with multiple centrilobular and panacinar emphysema and subpleural blebs and bulla formation. Non Hodgkins lymphoma was appeared as multiple nodular opacities with surrounding ground glass haziness (flame shaped opacities) with multiple conglomerated mediastinal lymph nodes encasing mediastinal structures. Primary lung neoplasm viz adenocarcinoma of lung showed nodular opacity with lobulated and spiculated margins.

The spectrum of pulmonary illnesses in HIV-infected patients has considerable variation and overlap in their presentations which poses a considerable challenge for the radiologist and the attending physician. The initial imaging tool for evaluation of these illnesses, remains the chest radiography, however the chest radiograph is non-specific and has its limitations. In HRCT, every HIV associated diseases show specific pattern and distribution at particular CD4 count which can be correctly identified. Therefore HRCT plays an important role in identification, characterization and differentiation of these lesions therebyhelp in making early and accurate diagnosis and thus reducing morbidity and mortality. However, it is imperative that HRCT Pattern recognition should be combined with knowledge of clinical factors in order to generate a limited and meaningful differential diagnosis.

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