

## **Original Research Article**

### **To establish the role of HRCT in the early diagnosis of pulmonary disease in symptomatic HIV sero-positive patients with normal chest radiograph**

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**Abstract:** The present study aimed to establish the role of HRCT in early diagnose of pulmonary disease in symptomatic HIV seropositive patients with normal chest radiograph. A Total of 352 cases with HIV infection and pulmonary complaints have been screened between January 2013 to January 2014 attending the pulmonary medicine OP/WARD , govt general hospital , Vijayawada . 34 patients have pulmonary complaints with normal chest radiograph, out of which 31 patients were investigated. 3 patients did not turn up for follow up and investigation. Only 31 are included in present study. In our study 1 case showed ground glass appearance in HRCT. The main complaint is this patient being dyspnoea. In 3 cases (9.67 %), bacterial pneumonia was diagnosed based on the clinical features, HRCT and sputum cultures. In 19 found patients normal chest x – ray and HRCT, the respiratory complaints might be due to upper respiratory infections or obstructive air way disease. They are treated symptomatically and they respond to treatment. This highlights the importance of early diagnosis and treatment in symptomatic HIV seropositive patients with normal chest x-ray findings in India, where TB contributes the major share for the morbidity and mortality of HIV infection.

**Keywords:** HRCT, pulmonary TB, human immune deficiency virus.

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#### **INTRODUCTION**

The three most important and common pulmonary complications of HIV are TB, PCP and bacterial pneumonia, these comprise greater than 90% [1]. In developing countries, bacterial infections are of much greater importance, perhaps because these virulent infections occur at an earlier stage in the disease before the profound immune – suppression required for PCP [2].

The clinical and radiographic presentation of lung disease associated with HIV infection is non specific. Chest radiographic has limited sensitivity for the detection of early infection in immune compromised patients [3]. The absence of radiographic findings, however, does not rule out pulmonary disease. In the patient respiratory complaint, PCP and TB must be considered even when the radiographic is normal. In up to 10% Cases of TB and PCP chest radiograph are normal. CT scanning of chest, especially HRCT may be useful by revealing lesions not apparent on chest radiograph [3].

Literature supports that further diagnostics tools require to evaluate the pulmonary complication in

HIV patients except radiography [3]. In their study, it concluded that empirical therapy or immediate bronchoscopy can be avoided in many patients of PCP on the basis of the HRCT findings.

HIV poses special problems in the diagnosis of TB. With the spread of HIV every corner of Indian subcontinent, TB being the main opportunistic pulmonary infection contributing to mortality among HIV infections it is important to diagnose and treat early. More often it is presents in atypical forms with rapid progression. Though pulmonary TB is common form, extra pulmonary forms are increasingly seen in HIV and difficult to diagnose. In addition to these, sputum smear negative for AFB is more common in HIV, TB patients. Sputum smear examination is main stay of diagnosis in many underdeveloped countries, including India, and this smear negativity contributes to under diagnosis and delay diagnosis of TB [4].

The chances of MDRTB in HIV seropositive individuals are higher because of the increased bacillary load. They serve as reservoirs for MDRTB [4] in community leading to primary drug resistance even in non HIV patients. Epidemiologic and virologic and

immunologic data support the premise that TB accelerates the course of HIV infection. So, early detection of the disease and treatment decrease the chances the MDRTB, slows the progression of HIV infection, decrease the morbidity and mortality and life span of the patients.

PCP is not an uncommon infection in Indians with advanced HIV. Lack of reorganization has probably been responsible for absence of any large series from this country. Certain findings chest CT scans allow confident diagnosis of specific complications in patients with AIDS [5]. CT based diagnosed may preclude more invasive diagnostic procedures in selective cases.

In some studies HRCT was shown more sensitive and more specific than gallium scintigraphy in diagnosing pulmonary disease early[6,7].

In the early diagnosis of pulmonary disease in symptomatic HIV sero reactive patients with normal chest radiograph. The purpose of HRCT is to improve spatial resolution. Several factors that affect this resolution are CT scanner specific and cannot be changed such as focal spots size the geometry and array detectors. there are a number of controllable factors , however , that affect the spatial resolution and quality of HRCT collimation , reconstruction algorithm , field of view , kVp ,maS , Window level and width.

#### **Aims and Objectives:**

To establish the role of HRCT in early diagnose of pulmonary disease in symptomatic HIV seropositive patients with normal chest radiograph.

#### **METHODS AND MATERIALS:**

A Total of 352 cases with HIV infection and pulmonary complaints have been screened between January 2013 to January 2014 attending the pulmonary medicine OP/WARD , govt general hospital , Vijayawada . 34 patients have pulmonary complaints with normal chest radiograph, out of which 31 patients were investigated. 3 patients did not turn up for follow up and investigation. Only 31 are included in present study.

#### **Inclusion criteria:**

1. HIV seropositive patients.
2. Symptomatic patients for lung disease – fever, cough, SOB, chest pain, right sweat, loss of appetite and weight etc...
3. Normal chest radiograph.

#### **Exclusion criteria:**

1. HIV Seronegative Patients
2. Asymptomatic HIV seropositive patients
3. Patient with abnormal chest radiograph

4. Patient less than 12 years of age
5. Patients with other systemic disease like heart and CNS problems, dm etc..
6. Pregnant woman
7. Unco- operative patients

HIV seropositivity was confirmed at the government general hospital, VCTC (voluntary& confidential counseling and testing center) where 3 different types of ELISA tests were performed to detect antibodies against HIV.

All the cases were examined in detail as per proforma with special reference to respiratory system ,other systems were also examined in detail whenever it was found necessary. In each case ,history of present and past illness was carefully enquired into so as to obtain a complete historical background of case .none of the patients were on antiretroviral therapy.

After clinical examination all the patients were subjected to the following investigations:

- Chest x ray pa view
- Blood Hb%
- Total leukocyte count
- Differential count
- ESR
- Urine –albumin, sugar and deposits
- Blood sugars
- Serum creatinine
- Serum bilirubin
- Sgpt
- Serum electrolytes
- Absolute lymphocyte count
- Mantoux skin test
- Sputum examination-gram stain, culture
- Afb smear examination (3 samples)
- Exercise oxygen saturation measurement

A HRCT scan of the chest was performed consisting of 1.5mm collimation section at 10mm interval reconstructed with a high spatial frequency algorithm. all scans was performed without intravenous contrast media at suspended end inspiration with the patient in supine position .scans were reviewed at a setting appropriate for lung parenchyma and mediastinum .the chest radiotherapy and HRCT scans were evaluated radiologists who had no prior knowledge of the etiology and clinical features. The HRCT scans were reported without the concurrent availability of the chest radiography.

#### **RESULTS AND DISCUSSION**

HRCT findings were correlated with clinical features and other investigations.

The secondary pulmonary lobule as defined by miller refers to the smallest unit of lung enclosed by connective tissue septae. It is polygonal in shape , measuring approximately up to 10-25 mm in dm. in the centre of secondary pulmonary lobule are the pulmonary artery and bronchioles that supply the lobule . The pulmonary veins are the periphery of the lobule and lymphatics presents centrally and peripherally . Each lobule has 4-8 acini , each of which is supplied by terminal bronchioles . the acinus is the largest unit of lung composed of entirely structures that are involved in gas exchange.

According to cortico medullary lung this lung can be divided in to peripheral cortex and central medulla. This helps to differentiate between physiological difference between peripheral and central lung ultimately predicting the HRT distribution of some lung disease[8] .

Peripheral and cortical lung cortical lung can be conceived as consisting two or three rows of well organized and well defined secondary pulmonary lobules , which together form a layer 3-4mm in thickness at lung periphery and along surfaces adjacent to fissures the lobules are relatively large in size , better defined , uniform and margined by thick inter lobar septa . Bronchi and pulmonary vessels in lung cortex are relatively small. Lobules are uniform, cuboid appear like stones in roman arch.

Pulmonary lobule in central lung is smaller and more regular in shape than in cortical lung and margined by irregular septae that are thinner and less vessel defined. When visible they are hexagonal in shape but well defined lobules are uncommonly seen in normal objects. In contrast with peripheral lung peri

hilar vessels and bronchi in the lung medulla are large and easily seen on HRCT [9].

Generally HRCT findings can be classified in to 4 large categories based on the appearance

1. Linear And reticular opacities
2. Nodules and nodular opacities
3. Increased lung opacity
4. Abnormalities associated with decreased lung opacity, including cystic lucencies, emphysema, airway disease

In our study 1 case showed ground glass appearance in HRCT. The main complaint is this patient being dyspnoea. Patient was tachypnic, oxygen saturation is low. The patient was started on cotrimoxazole based on HRCT findings. The patient responds to treatment in 1 week. Gruden JF *et al.*[3]; confirmed that HRCT was 100% Sensitive and 89% Specific with 90% Accuracy in diagnosing PCP. Udwardia ZF *et al.* concluded that PCP is not uncommon infection in Indians with advanced HIV[10]. Richards PJ *et al.*; showed that the use of HRCT may help avoid unnecessary delay in diagnosing PCP and allow early medical interventions[11].

In 3 cases (9.67%) Bacterial pneumonia was diagnosed based on the clinical features, HRCT and sputum cultures and treated with appropriate antibiotics. They respond to the treatment with in 1 week

In 19 patients normal chest x – ray and HRCT the respiratory complaints might be due to upper respiratory infections or obstructive air way disease. They are treated symptomatically and they respond to treatment.

**Table 1: Age distribution**

AGE {in years}	no. of cases	percentages (n=31)
12	1	3.22
21	18	58.06
31	10	32.25
41	2	6.45

**Table -2: sex distribution**

Sex	no. of cases	percentage (n=31)
Male	20	64.51
Female	11	35.49

**Table 3: Clinical presentation**

Symptoms	no. of cases	percentage (n=31)
Cough	31	100
Dyspnoea	8	25.80
Fever	24	77.4
Chest pain	4	12.90
Other	10	32.25

**Table 4: patients with normal and abnormal HRCTS**

HRCT finding	no. of cases	percentage (n=31)
Abnormal	12	38.7
Normal	19	1.3

**Table 5: Mantoux skin test results**

HRCT finding	male	female	percentage (n=31)
Positive [ $>5\text{mm}$ ]	5	4	29
Negative	15	7	71

**Table 6: HRCT findings**

HRCT findings	no. of patients	percentage [n=31]	Male(%)	Female(%)
Blebs	1	3.22	0 (0%)	1(3.22%)
Bullae	1	3.22	1(3.22%)	0(0%)
Consolidation	4	12.9	2(6.45%)	2(6.45%)
Infiltrations	2	6.45	1 (3.22%)	1(3.22%)
Ground glass opacity	1	3.22	1(3.22%)	0(0%)
Fibrosis	3	9.67	3(9.67%)	0(0%)
Brochioectasis	3	9.67	3(9.67%)	0(0%)
Hair adenopathy	1	3.22	0(0%)	1(3.22%)

**Conclusion:**

1. In this study, 9.66% Of the HIV seropositive patients with pulmonary symptoms had normal chest radiograph.
2. 38.7% Of patients with normal chest radiograph and abnormal HRCT.
3. HRCT Is useful in detecting early lesions in HIV seropositive patients with pulmonary symptoms, with normal chest x- ray, so HRCT should be done in all HIV seropositive patients having pulmonary symptoms, with normal chest x ray as it may reveal additional information.
4. As most of the patients in the present study belong to young age group [mean age of 30.3 years ] it is advisable to indicate HRCT in these patients for early diagnose and helping further investigations and management
5. HRCT can localize lesions in the lungs and helps further diagnostic accuracy in invasive investigations like bronchoscopy, BAL, FNAC etc.
6. HRCT can help in suspecting a probable diagnose and start empirical treatment early before reaching a definitive diagnosis so, it may be included in diagnostic algorithm in these patients before contemplating for invasive investigations.
7. TB is most common pulmonary infection in HIV seropositive patients with normal chest radiograph. early diagnosis can be suspected by HRCT

8. PCP can be diagnosed early on the basis of the HRCT findings even when the chest radiograph is normal.
9. Centres for disease control and prevention 1993 revised classification system and expanded surveillance case definition for AIDS among adolescents and adults.JAMA269.729.730.

**Conflict:**

Compliance with ethical requirements and conflict of requirements. Informed written consent was obtained from patient for publication this study was approved by ethical committee of our institute and the authors declare that they have no conflict of interest.

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