

The Chest Radiographs Of Suspected and Confirmed HIV/AIDS Patients - Pattern Of Radiological Features In Ilorin.

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Abstract

An important diagnostic tool in assessing the complications as well as the manifestations of Human immunodeficiency virus (HIV) infection or acquired immunodeficiency syndrome (AIDS) is the chest radiograph. Recent findings have shown, using microbial assessment together with chest radiographic features that bacterial pneumonia and acute bronchitis are currently the most common causes of respiratory disease in HIV-infected individuals in developed countries and are frequently the first clinical manifestation of HIV-infection.

The aim of the study therefore is to identify the radiological pattern or specific changes that are characteristic of HIV infection/AIDS as seen on chest radiographs at the University of Ilorin Teaching Hospital, between June 2000 and July 2006, with a view to using it as a guide in future evaluation of chest radiographs of suspected HIV/AIDS patients.

Chest X-ray records of ninety-two (92) patients who were suspected to have HIV infection and those who have been confirmed positive with known CD4 count levels, were retrieved. The following variables, age, sex, occupation, HIV status, CD4 count levels (if known), and the observed radiological features on the chest radiographs were documented and the findings analyzed. There were 45 females (48.9%) and 47 males (51.1%). The age range was 24 days to 78 years (mean = 27.95 years). Seventeen (18.5%) of them were traders while twenty (22%) of the total sample were children under 1-3 years of age. The following changes ranked high as common radiological features between known HIV infected patients and the suspected undiagnosed cases, namely: Bilateral pleural effusions (33.33%), unilateral pleural effusions (30.77%), focal

consolidation (segmental or lobar) (27.78%), patchy opacities (24.14%), cases of Tuberculosis (TB) with classical features such as cavitations (23.53%).

The study has shown that the observed changes in the chest radiographs of confirmed cases of HIV infection/AIDS were similar to those of suspected cases, and these changes may therefore be useful as radiological screening points for patients who are suspected to have HIV infection.

KEY Words: Chest, AIDS and Radiological Features

Introduction

Human immunodeficiency virus (HIV) infection or acquired immunodeficiency syndrome (AIDS) is a pandemic and since the discovery of the virus in 1981, it has ravaged the lives of men, both young and old alike. The scientific world has marshaled out its own weapons to curb the scourge and possibly eliminate it as it did to small-pox. Parts of these efforts are in the areas of diagnosis and monitoring of the progress of the disease and its various manifestations or complications. An important diagnostic tool in assessing the complications as well as the manifestations of HIV infection is the chest x-ray¹. For instance, recent findings indicate that bacterial pneumonia and acute bronchitis are currently the most common causes of respiratory disease in HIV-infected individuals in developed countries and are frequently the first clinical manifestation of HIV-infection².

The radiological features of the disease on chest radiograph are usually described as being bizarre or atypical. The chest findings are usually strange or different from the common patterns^{1,2,6,8}. However these changes have been found not to be pathognomic or specific to HIV infections alone^{1-6,8,11,13,14}.

It is on this basis that studies such as the present one, which can specify or itemize the changes in the lungs associated with HIV infection, will facilitate prompt diagnosis and treatment of the disease and also monitor response to its treatment.

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furthermore, identification of carriers of the disease, who may not want to reveal their HIV status because of social stigmatization, may be made possible through the findings on the chest radiograph, when on routine medical checkup.

The aim of this study therefore, is to identify the radiological pattern or changes that are characteristic of HIV infection as seen on chest radiographs of patients at the University of Ilorin Teaching Hospital (UITH) between June 2000 and July 2006, and possibly use it as a guide in future evaluation of chest radiographs of suspected HIV/AIDS patients.

Materials And Methods

Chest radiograph request/reports of patients who were suspected to have HIV infection as well as those already diagnosed to have the infection with known CD4 count levels, were retrieved. The various radiological features identified by the assessing radiologists, who were usually of the Senior Registrar or Consultant cadres were then tabulated, in addition to age, sex, occupation of the patients as well as the clinical features at presentation. There were thirty (30) patients with confirmed HIV infection from the retrieved laboratory records of the patients, and findings in their chest radiographs were used as control for this study. The most frequent (highest percentage of occurrence), chest radiographic feature, common to both groups of patients (suspected and clinically confirmed cases), was assigned the highest mark of 10 points. In other words, the Chest x-ray findings in the larger sample of 92 cases were rated in terms of frequency of occurrence on the chest radiographs of the subgroup of the confirmed 30 cases of HIV infection (table 2). This is meant to provide a protocol for future radiological interpretation.

Results

A total of 92 records of patients were examined inclusive of 30 cases confirmed as HIV/AIDS patients. There were 45 females (48.9%) and 47 males (51.1%). Their ages ranged between 24 days to 78 years old (mean = 27.95 years). Seventeen (18.5%) of the group suspected to have HIV infection were traders while twenty (22%) were children under 1-3 years of age. The demographic characteristics are as shown in table 3.

The highest numbers of confirmed cases of HIV with chest problem were found among the children: four (13.33%), and the traders: four (13.33%) respectively. Seven (7%) patients out of the total population were students and three (42%) of them were confirmed HIV patients, same as for the Artisans, constituting 10% of the population of the confirmed HIV patients, (table 3).

Furthermore the following changes ranked high as common radiological features between the known HIV infected patients and the unconfirmed cases, and these were: Bilateral pleural effusions (33.33%), unilateral pleural effusions (30.77%), focal consolidation (segmental or lobar), (27.78%), patchy opacities (24.14%), cases of Tuberculosis (TB) with classical features like cavitations (23.53%), and all of this can be used as radiological screening points; Figures 1-5. Patchy opacities were common radiological features at CD4 count of less than or equal to 200 cells/micro-liter and between 200-350 cell/micro-liter, table 5.

Discussion

Our experience in the radiological reporting room, is that many chest X-ray requests of unusual clinical manifestations of a disease, these days frequently carry or bear the hallmark, ?HIV. Thus, every unexplained weight loss, persistent

TABLE 1: AGE DISTRIBUTION OF PATIENTS

Age Range	Suspected HIV Pts	Percentage	Confirmed HIV Pts	Percentage
0-10	20	21.74	4	13.33
10-19	3	3.26	1	3.33
20-29	15	16.30	7	23.33
30-39	26	28.26	6	20.00
40-49	15	16.30	8	26.66
50-59	5	5.43	2	6.66
60-69	4	4.34	1	3.33
>70	2	2.17	0	-
OTHERS	2	2.17	1	3.33
Total	92	100	30	100

TABLE 2: Radiological features in the chest of suspected HIV (n=92) and AIDS patients (n=30)

changes on the chest film	Total no of patients	%ages of cases	No diagnosed HIV patients(n=30)	Percentages of cases with the changes	Ranking (Position in order of occurrence)
(Focal consolidation) Segmental/Lobar consolidation	18	19.56	5	27.78%	3
Bilateral opacities, hazy, ground glass or frank areas of consolidation (pcp -type)	3	3.26	Nil	0%	
Bilateral pleural effusions	3	3.26	1	33.33%	1
Unilateral pleural effusions	13	14.13	4	30.77%	2
Mediastinal lymphadenopathy	5	5.43	Nil	0%	
Solitary or multiple nodules	12	13.04	2	16.67%	8
Emphysemas	0	0	Nil	0%	
Fever < 1 wk and >1wk-3yrs respectively	11	11.95	Not documented		
Dyspnoea	-	-	Not documented		
Productive cough	11	11.95	Not documented		
Bronchial wall thickening(tram tracks)	2	2.17	Nil	0%	
PTB(specific)	17	16.30	4	23.53%	5
Aspergilloma	Nil	Nil	Nil		
Cavities	17	18.47	3	17.65%	7
Soft tissue wasting	24	26.08	4	16.67%	8
Infiltrates	20	21.74	4	20%	6
Patchy opacities	29	31.52	7	24.14%	4
Streaky opacities	17	18.48	2	11.76%	10

Table 3: DISTRIBUTION AMONG OCCUPATIONAL GROUPS

Occupations	Frequency	HIV positive	%age among the HIV cases
Armed Forces	4(4.35%)	-	-
Artisans	10(10.86%)	3	10
Banking	2(2.17%)	-	-
Children (< 4yrs old)	20(21.73%)	4	13.33
Clergy	1(1.08%)	1	3.33
Engineers	1(1.08%)	1	3.33
C/S & Retirees	4(4.35%)	1	3.33
Farming	1(1.08%)	-	-
H/W	2(2.17%)	-	-
Drivers	2(2.17%)	1	3.33
Students	7(7.60%)	3	10
Teaching	2(2.17%)	2	6.67
Trading	17(18.47%)	4	13.33
Unidentified (all adults)	19(20.65%)	10	33.33
Total	92(100%)	30	

Table 4: Radiological diagnoses based on Radiographic findings

Assessment	Frequency Among suspected HIV Patients	Confirmed HIV Cases	Percentages
Normal or nil	38	18	60.00
Lung inflammation(?infective)	6	1	33.33
Atypical or ?viral pneumonia or bronchopneumonia	18	3	10.00
?PTB, PTB or Miliary TB	20	4	13.33
?HIV(Agreement with Clinical impression)	3	3	10.00
Others	7	1	3.33

cough or non-response to a particular line of medication is branded a possible HIV case.

A review of the literatures reveals that efforts have been made in the recent past to itemize the chest manifestations in the AIDS patients, but no uniform accepted protocol is yet available for the radiological evaluation of the chest radiograph. Usually, when the CD4 lymphocyte count drops below 200 cells per microlitre, then the stage of clinical AIDS has been reached, and the organ involvement of infections with HIV represents the typical appearance of opportunistic infections in the immunocompromised host with an overwhelming infection, which makes treatment more difficult. The strategies employed in AIDS patients to meet this challenge consist of preserving immune function as long as possible with antiretroviral therapies, using prophylactic pharmacologic therapies to prevent infections (such as *Pneumocystis carinii* pneumonia), and diagnosing and treating acute infections as soon as possible.²

Pneumocystis carinii is the most frequent opportunistic infection seen with AIDS patients in the developed world while TB is the commonest chest finding among Africans. The most common clinical findings in patients with *Pneumocystis carinii* pneumonia (PCP) are acute onset of fever, non-productive (dry) cough, and dyspnea. Chest radiograph may show perihilar infiltrates or classically presents with diffuse

Table 5: CD4 Count and Observable Lung Changes.

Cell/ul	No. of patients	Lung changes Present or absent?	Frequency or nature of changes
≥500	6	Absent	NIL
350-500	5	Present	4 (superimposed PTB)
200-350	5	Present	Patchy opacities
≤ 200	15	Present	Patchy opacities & 3 PTB ²

bilateral, symmetrical reticular or granular opacities. All radiographic patterns of lung involvement have been described with PCP, except pleural effusions and intrathoracic adenopathy. Diagnosis is made histologically by finding the organisms in cytologic (bronchoalveolar lavage) or biopsy (transbronchial biopsy) material from lung^{1,2,3}.

On the other hand, some authors have reported bacterial lung infections in AIDS patients with early chest x-ray manifestations or findings which are quite similar to that of the immune-competent individuals, presenting either as unilateral lobar consolidation with or without air fluid level, or as patchy lobar infiltrates, and in severe infection it may be bilateral lobar consolidation or diffuse infiltrates involving both lungs. These are features of convectional bacterial pneumonia in AIDS patients.

The lower the CD4 lymphocytes count the more the tendency for the chest radiograph findings to be different or atypical⁴. The atypical presentations have also been emphasized by other authors concerning bacterial pneumonia in AIDS. Chest x-ray changes are often unusual, resembling PCP in 50% of cases, but bacterial pneumonia is rarely the cause of radiographic findings in the absence of clinical symptoms^{2,5}. Gram stains and cultures of sputum obtained by sputum induction or bronchoalveolar lavage (BAL) may help to establish the diagnosis⁵.

Some other workers believed that no significant difference exist in chest radiographic appearances by HIV status. Pleural effusions were said to be less frequent, usually unilateral and occupying less than one-third of the hemi-thorax, similar to what was observed in our study². Other reported findings were Mediastinal lymphadenopathy in a few cases and with no association with HIV status, also similar to the finding in this study where out of the five cases with mediastinal lymphadenopathy, none was an AIDS patient (see table 2).

Furthermore, bacterial infections may also present as solitary or multiple lung nodules, especially detected with high-resolution CT scans. Bacterial respiratory infections, including bacterial airways disease and pneumonia, are said to be currently the most frequent pulmonary infections in HIV-infected individuals in developed countries, focal consolidation being the most common pattern of bacterial pneumonia on chest radiographs. As shown in table 2 in this study, focal consolidation ranked high as well, among the frequently occurring radiological

features identified in the chest radiographs on HIV cases in this environment.

Comparatively, pyogenic airway diseases are not easy to diagnose on convectional radiographs, but high-resolution chest CT features are characteristic, namely bronchial dilation, wall thickening; small nodular and branching centrilobular opacities.¹⁻⁵ Only 2 cases were cited among the suspected HIV patients and none among the confirmed HIV/AIDS patients in this study, probably due to non-availability of Computerized Tomography (CT) Scan machine in this centre at the time of the study.

More importantly, due to an alleged strong association of co-infection with tuberculosis, characteristic radiological feature of pulmonary tuberculosis in AIDS patients were also enumerated in this study. About 23.53% of the confirmed AIDS patients in this series were also suffering from PTB^{2,3,5}.

Worldwide, the reported prevalence of TB in AIDS patients has ranged from 4% to 44% in different populations^{7,10}. It should be noted that the HIV status of all the patients in this series (at the onset), were not known. The intention was mainly to draw out radiological features which were common or unusual to both groups of patients, the suspected HIV and the confirmed HIV patients respectively. For instance, pleural effusions (unilateral or bilateral) ranked highest among the list of features on the chest radiographs from this study and this can be used as a radiological indication or sign for further evaluation of a patient for HIV infection, after excluding heart or renal causes. (Figure 2)

Previous reports showed that when compared to non-HIV-infected patients, HIV/TB-infected patients have higher rates of primary disease (37%)/6months vs. 5%/2 years), reactivation disease (7-10%/year vs. 5-8%/ life), skin test allergy and extra pulmonary TB (50%). TB is said to influence the natural history of HIV by activating macrophages leading to increased HIV expression and rapid progression to AIDS if latent TB is untreated.^{2,5,10,11}

Generally, patients with higher CD4 count often present in "classic" fashion whereas those with low CD4 count are more likely to present atypically. HIV-infected patients with pulmonary TB may present with atypical chest x-ray. Lobar infiltrates plus hilar adenopathy or diffuse interstitial infiltrate resembling PCP, may be seen. Chest radiographs have been reported to be normal in approximately 10-20% of AIDS-associated pulmonary TB, whereas cavity-producing form is



Fig1. Patchy opacities of bronchopneumonia



Fig 2. Unilateral pleural effusion



Fig 3. Bilateral hilar fullness with right upper lobe infiltrates

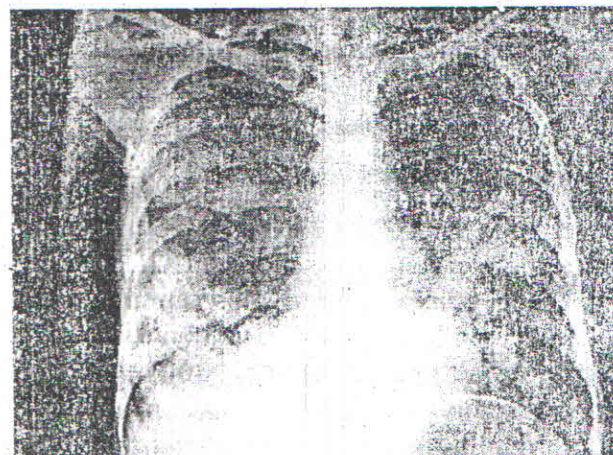


Fig 4. Bilateral soft nodular opacities worse in both lower lobes



Fig 5. Minimal right sided pleural effusion with nodular opacities

much less common, possibly reflecting the overall immune dysfunction of patients with advanced HIV infection.^{6, 11} In our study, at CD4 counts between 350-500 cell/ μ l, upper lobe lesion resembling post-primary TB were common. (See figures 1 and 2). Also common were pleural

reaction with effusion as well as miliary presentation when CD4 350 cell/ μ l. Other features are hilar nodal enlargement and mediastinal adenopathy resembling primary TB with interstitial non-cavitating lesions^{6, 11}.

At advanced stage of AIDS, the features are like primary TB, including miliary shadowing. The chest radiograph may even be normal because of weak immunity that could not mount a granulomatous reaction to the invading organism or it may resemble that of bacteria pneumonia, PCP or atypical mycobacterial infection especially *M. avium* intracellular⁶.

Lymphoid interstitial pneumonitis (LIP) is another infection that can be seen in AIDS in children which was not documented in this study. On chest radiograph, bilateral reticulonodular interstitial pulmonary infiltrates are seen. Hyperplasia of bronchial associated lymphoid tissue with aggregates of lymphocytes and plasma cells in a bronchovascular distribution is the earliest pathologic finding, but diffuse lung round cell infiltrates, and lymphoid aggregates may later be present.²

HIV/AIDS pandemic constitutes a global emergency and poses one of the most formidable challenges to development, progress, and stability.^{8,11}

There are many frustrations in managing AIDS patients including a dearth of helpful information on AIDS-related complications.⁹ Statistically, the scourge is alarming, more than 65 million people are infected with more than 25 million dead; 15 million children are orphaned, with millions vulnerable, while 40 million people currently are living with it, more than 95 percent of them in developing countries. Women now represent half of all people living with HIV with nearly 60 percent in Africa.^{8,11} Our study shows almost a 1:1 male to female ratio of occurrence. Half of all new infections globally are said to be among children and young people under the age of 25 years, majority of who lack information, skills and knowledge regarding HIV/AIDS, and this correlates with the finding in this study, (Table 1).

Protecting the health of about 2.3 million children now living with HIV/AIDS is a problem because of lack of pediatric drugs in many countries. In Nigeria for instance a multi-sectoral approach is being adopted to confront the disease involving the government, the private sector and the civil society organizations.⁸

The mass media organizations should be made to participate fully in creating awareness about the disease, eating good food and taking the antiretroviral drugs regularly, which will keep the CD4 count level over 200 cell/ul, and above this level, rate of progression to AIDS was reported to be slowed down.⁹

In conclusion, highlights of radiological features commonly identified in the chest radiographs of known HIV/AIDS patients have been compared with those of suspected HIV/AIDS patients, and the findings which were ranked can be used as a guide in evaluating chest radiographs of patients who are being investigated for, or suspected to have HIV infection. There are HIV carriers, apparently healthy and who ordinarily would not go for HIV screening.^{8,11} And like hypertension, which is a silent killer, often undetected until too late, this study may serve as an indirect screening test for suspected HIV patients. It is guarded, cautious enough and apparently non-invasive and can be used to identify potential carriers before being recommended for confirmatory screening tests. It is a diagnostic tool that can be used to limit the spread or stem the scourge of this deadly disease.

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