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Radiographic Manifestations in TB/ HIV Patients

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ABSTRACT

***Background**: HIV is the most common risk factor for reactivation of latent TB and is associated with increased rate of progression of infection to disease.*

Radiological presentation of TB is variable in both HIV (-) and HIV (+) patients but is more in the latter. In this study we describe and analyze radiological presentation of TB/HIV patients in Massih Daneshvari hospital in IRAN.

***Materials and Methods**: We registered the demographic, clinical and laboratory information of TB/HIV patients in Massih-Daneshvari hospital between 2002-2003. Inclusion criteria were standard serologic test for HIV (Two positive Elisa test and one positive westernblot test) and proof of TB with clinical and mycobacteriologic or pathologic criteria. Chest x-ray was reported by pulmonary imaging specialist and was divided to two category: Typical (fibrocavitary infiltration in posteroapical segment of upper lobes) and atypical (opacity in middle and lower lobe, hilar and mediastinal adenopathy, pleural effusion, diffuse nodular opacity and normal X-ray). Findings were analyzed using SPSS version 10.5.*

***Results**: 15 patients, 13 men (86.7%) and 2 women were included. Mean (±SD) of CD_4 count was 229.15 ± 199.45.*

53.3% of patients had adenopathy, 26.7% had pleural effusion. Only one patient had cavitary disease.

Radiographic pattern was typical in one (6.7%) and atypical in 93.3% of patients.

In regard to severity of radiological presentation, mild; moderate and severe pattern was seen in 40%, 26.7% and 33.3% respectively.

There was no correlation between severity of radiological presentation and death (p=0.8) and severity of radiological presentation and CD_4 count (p=0.53).

Conclusion**: In this study, it was shown that in spite of some other studies, radiological presentation had not direct correlation with CD_4 count; thus, in HIV+ patient, we must consider TB in all atypical radiological presentation regardless of CD_4 count.* ***(Tanaffos 2004; 3(9): 33-39)

***Key words**: Tuberculosis, HIV, Radiography, Chest- x ray*

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INTRODUCTION

HIV (Human Immunodeficiency Virus) has a major effect on tuberculosis (1,2). It is the most common risk factor to activate latent tuberculosis, usually associated with rapid progress of infection towards disease (3,4)

Radiographic findings of pulmonary tuberculosis are diverse in both HIV+ and HIV– patients which is specially true in HIV+ patients (5,6). In HIV+ patients with CD_4 counts> 200 radiographic findings are seen as infiltration and cavitation in upper lobes which are similar to tuberculosis in HIV– persons (7).

In HIV+ patients with CD_4 counts <200 mediastinal adenopathy and pleural effusion are common, which is the same as the condition seen in HIV– patients with primary infection (7,8).

With molecular epidemiologic methods, it is proved that presence of adenopathy does not necessarily represent primary infection, but it might probably be due to immunodeficiency. About 5% of HIV+ patients have normal radiography in spite of positive sputum culture (7).

Findings like lymphadenopathy and pleural effusion are more common in HIV+ patients than others, but apical involvements and cavitations are less common (9). Further investigations demonstrated that atypical manifestations with progressive loss of CD_4 are more common (10,11).

In spite of this, extensive researches studying the relationship between radiographic manifestations and CD_4 count have not been performed. Besides, factors which determine the radiographic manifestations in HIV+ patients have not been properly recognized. Contrary to the previous theory it seems that cavitation and fibrotic lesions are not directly related to CD_4 count (12).

In this study we have investigated the radiographic manifestations of TB/HIV patients of Massih Daneshvari Hospital.

MATERIALS AND METHODS

First, a specific questionnaire consisting of basic, clinical, and paraclinical information was prepared.

All patients admitted in Massih Daneshvari hospital with TB/ HIV diagnosis from the year 2002 to September 2003 entered the study.

Inclusion criteria: confirmed HIV infection by standard serology tests, (two positive ELISA and one Western-Blot test) tuberculosis disease confirmed by standard clinical criteria and mycobacteriologic or pathologic confirmation.

Sputum smear for BK by Ziehl-Neelsen method was performed in the laboratory of this center which is the reference laboratory of the country.

Sputum culture in Lowenstein-Jensen medium and sensitivity test by proportion method were performed in reference laboratory of this center.

Flowcytometry was performed with 2cc of peripheral blood and conjugated dual color antibody panel with Fluorescin Isothiocyanate (FITC) and phycoerythrin staining (PE) that were made in Becton-Dickenson company.

Antibodies used were CD_3/CD_4, CD_3/CD_8, and CD_3/CD_{16+56}. Cellular count analysis was performed by Flowcytometry technique, using SimulSET software program and FACS Caliber. For all patients, lateral and postero-anterior radiographies were obtained and were interpreted by a radiologist specialized in pulmonary imaging.

Radiographies were evaluated in order to determine the presence of opacity in the parenchyma of the lung, mediastinal and hilar adenopathy, pleural effusion, cavity, interstitial nodules, bronchiectasis, and pleural thickening.

According to radiographic manifestations the patients were divided into 2 categories.

1) Typical manifestations: reactivation or post-primary lesions including opacities in upper lobes of the lung in the form of infiltration

or fibrocavitary changes (posterior or apical segments).

2) Atypical manifestations: included opacities in middle and inferior lobes, opacity in anterior segment of superior lobe, mediastinal or hilar adenopathy, pleural effusion, diffused opacity, interstitial nodules, and normal radiography of the lung. All radiographies were examined at the beginning of admission and before starting the treatment.

At the time of interpretation of the radiographies, the radiologist was not aware of the CD_4 counts.

To determine the severity of radiographic manifestations, each lung was divided into superior, middle, and inferior zones and depending on the severity divided into mild, moderate and severe involvement.

Mild: slight to moderate involvement of one or both lungs (but not more than 1 zone)

Moderate: involvement of several zones in such a way that intact areas are seen between the involved areas.

Severe: involvement of several zones in such a way that no intact areas are seen between the involved areas.

The findings were analyzed with SPSS version 10.5; statistical program and central (basic) parameters for the quantitative variables were calculated.

If necessary, nominal variables were tested by chi-square and Fisher's exact test.

Mann-Whitney test was used for variables with abnormal distribution.

P-value less than 0.05 will be regarded as statistically significant.

RESULTS

A total of 15 patients were enrolled in the study during this period. There were 13 male (86.7%) and 2 female patients. All the cases had pulmonary tuberculosis.

Meanwhile 13 patients (86.7%) had a positive sputum smear, and sputum culture was positive in 9 patients (60%).

In the remaining 6 patients, the culture was negative in 2 and undetermined in other 4 cases.

In the antibiogram performed in 9 patients, there were no MDR-TB cases (defined as having resistance to at least Isoniazid and Rifampin). However, there were 2 cases of isolated resistance to Rifampin and Isoniazid.

The average CD_4 count was 229.15±199.45. 50% of patients had CD_4 counts below 200, and 78.6% of patients had CD_4 counts under 350. Also, 5 (33.3%) died during the treatment. The causes of death were cryptococcal meningitis, disseminated CMV infection, and myocardial infarction. In the other 2 cases the cause of death was not determined.

In regard to radiographic findings, 53.3% had adenopathy, 26.7% had pleurisy, and only in one (6.7%) cavity was detected. In 13.3% bronchiectasis and in 20% of patients pleural thickening was found. One patient (6.7%) had normal radiography. In 40% of the cases, pulmonary involvement was bilateral. In regard to radiographic pattern, one case (6.7%) had typical manifestations while in 14 (93.3%) atypical manifestations were detected. In the one case with typical manifestations CD_4 count was 240. In regard to the severity of involvement, 6 cases (40%) had mild, 4 cases moderate (26.7%) and 5 cases (33.3%) had severe involvement.

CD_4 distribution in various radiographic manifestations is demonstrated in table 1.

Statistically, there was no significant correlation between the severity of pulmonary involvement and mortality (p=0.8). On the other hand, there was no significant statistical difference between the CD_4 count and severity of radiographic findings (p=0.53). Besides, statistically there was no significant

correlation between the presence of adenopathy and CD_4 (p=0.142).

Table 1. CD_4 distribution among the various radiographic manifestations

Extent / CD_4	<200	>200	Total
Mild	3	3	6
Moderate	1	3	4
Sever	3	2	5
Total	7	8	15

DISCUSSION

An epidemiologic relation between the TB and HIV has been proved (1,13,14). Because TB is curable and contagious, prompt diagnosis and treatment is necessary (15).

On the other hand, tuberculosis in healthy persons is limited by the cellular immunity. However, during the HIV infection, cellular immunity is suppressed.

Thus, during the HIV infection, we will have both increased incidence of pulmonary tuberculosis as well as atypical manifestations of tuberculosis. Therefore delay in diagnosis because of unusual clinical and radiographic manifestations will be a great threat to public health (16,17,18).

Radiologic manifestations are different in TB patients with normal immunity (19, 20, 21).

In tuberculosis, there are mainly 2 groups of radiologic manifestations: one is the typical form (reactivation or post primary) including opacity in upper lobe (superior-posterior segment) with or without cavity and fibrosis (21,22).

The second form is the unusual adult tuberculosis which is similar to primary tuberculosis seen in children. This type consists of mediastinal or hilar adenopathy, pleural effusion, miliary form, opacities in the anterior segment of superior lobe, middle and inferior lobes as well as normal radiographic image (21, 22, 23, 24).

In different articles, it has been noted that clinical and radiologic manifestations in HIV patients are different depending on the level of immunity suppression (25, 26, 27, 28). In such a way that in different reports it has been pointed that in CD_4 counts of less than 200, atypical manifestations are present (15, 18, 27, 28). The interesting point in this study was that 93.3% of patients had atypical manifestations which were not related to CD_4 count. Although in other studies a significant statistical difference between the CD_4 count and radiographic manifestations has been reported (11, 27, 28). In these studies it has been pointed that CD_4 count alone does not determine the host response to tuberculosis in HIV+ patients, and some other causes may be involved (11, 29).

On the other hand, in some researches, it is clearly pointed that contrary to previous theories cavity creation and fibrotic changes do not have direct relation with CD_4; and factors determining the radiologic manifestations in HIV+ patients have not been perfectly understood (12, 30).

Presence of adenopathy, pleural effusion and absence of cavity are in favor of primary infection. Therefore, the question is whether all TB cases with atypical manifestations are due to primary infection, or some of the cases are as a result of reactivation.

In molecular studies performed in the USA, it has been shown that about 50% of tuberculosis infections in HIV+ and HIV– patients are caused by primary infection (30, 31). On the other hand, Jones et al. studies pointed out that prevalence of adenopathy and pleural effusion is higher in HIV+ patients. This difference is seen in both primary and reactivation forms, which indicates the weakness of immunity system in limiting the mycobacteria (9).

The prevalence of adenopathy and pleural effusion in our research was 53.3% and 26.7% respectively, which was similar to the investigations performed in other places. Also, cavity was seen in one case; being similar to other studies (6, 32).

Besides, there was no significant statistical difference between the severity of radiographic manifestations and mortality in this study. On the other hand, there was no significant statistical difference between the severity of radiographic manifestations and CD_4 count. This might be as a result of the fact that radiologic manifestations and severity are not directly related to immunosuppression.

CONCLUSION

HIV is the most common cause of TB reactivation and progression of the infection towards disease.

According to the fact that TB is curable and preventable, its diagnosis and prompt treatment is necessary.

This study indicates that the majority of TB manifestations in HIV patients are atypical.

The important point in this research which was contrary to previous studies was the fact that, radiologic manifestations were not related to CD_4 count.

Regardless of CD_4 count in HIV+ patient, TB should be considered when atypical pulmonary manifestations are observed in this group of patients.

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