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## THE ROENTGENOLOGICAL MANIFESTATION OF PULMONARY TUBERCULOSIS IN HIV-POSITIVE PATIENTS

**Key words:** *tuberculosis, HIV-infection, diagnostics.*

**Abstract.** *Due to the precipitous decline in epidemiological situation of HIV-infection in Ukraine and in the world, annual increasing of the number of HIV-associated tuberculosis cases is observed. Tuberculosis in HIV-positive patients is characterized by difficulty of the diagnostic. The article presents the results of the analysis of the roentgenological manifestation of pulmonary tuberculosis in HIV-positive patients.*

### Introduction

People living with HIV-infection/AIDS are 29 times more likely to develop tuberculosis than those who are HIV/AIDS-negative. About 50% of the 1.1 million HIV-positive people are estimated to have developed tuberculosis (TB) in the same year [6].

The fact that HIV/AIDS was really fast to spread on all continents made it a real epidemic and one of the most global problems in the healthcare, and made the epidemic situation of tuberculosis even worse [4, 6]. The largest number of the registered patients, who live with HIV/AIDS falls for developing countries. That is why the problem of HIV/AIDS-infection is of urgent importance for Ukraine [4, 5]. According to the UNAIDS (The Joint United Nations Program on HIV/AIDS) data in the European region, Ukraine wins the first place in the spread of HIV/AIDS-infection and second place in HIV/AIDS-associated tuberculosis [5, 6].

Tuberculosis in HIV-positive patients is characterized by difficulties of diagnostic due to modifications of TB manifestation and decreasing of effectiveness of different diagnostic methods [1, 2, 3, 4].

### Aim of investigation

To estimate the character of the roentgenographic changes in patients with the pulmonary tuberculosis on the background of HIV/AIDS-infection.

### Materials and methods

To achieve the aim of the research there were examined 70 patients with pulmonary tuberculosis. The research was conducted for the period: second half of 2013 - 2014.

The including criteria were: the confirmed diagnosis of the primary diagnosed pulmonary tuberculosis (PDTB) and presence of HIV-testing results.

The excluding criteria were: the absence of the final HIV-test results in patients with tuberculosis.

On the basis of the HIV-status data two groups of patients were formed. The main group 1 was formed by 30 patients with co-infection HIV/tuberculosis, the control group 2 was formed by 40 HIV-negative patients with the PDTB.

The average age of the patients in group 1 was 38,9 5,2 years (minimum 27 years, maximum 49 years): young people made up 10 %, seniors - 73,3 % and middle-aged - 16,7 %, so the number of mature age patients prevailed.

The average age of the patients in group 2 was 37,4 14,35 years (minimum 18 years, maximum 74 years): the mature age patients prevailed - 40 %, a significant number of patients was made up by young people - 30 %, middle-aged patients made up - 15 % and senior patients - 15 %.

According to the gender division the male patients prevailed in both groups: in group 1 males made up - 76,7 % (23 people), females - 23,3 % (7 people), in group 2 the males made up - 80 % (32 patients), and females - 20 % (8 patients).

According to the anamnesis, the HIV-positive patients from group 1 got infected in a parenteral way in 43,3 % of cases, in other cases - in a sexual way (56,7%).

For the roentgenological examination of the patients were used the examination roentgenography both in frontal and lateral views, linear tomography, target roentgenography and computer tomography.

Analysis of data was performed using the SPSS software package, version 10.5 (SPSS). Significance was defined at the 5% level.

### Results and Discussion

The clinical forms of the tuberculosis in HIV-positive patients, depending on the kind of the

tuberculosis progression, and data about involving of extrapulmonary organs in specific TB process and unusual medium and lower lobe localization of tuberculosis in comparison with HIV-negative patients are shown in the table 1.

It was found that the prevalence of spread forms of lungs' damage in patients with the pulmonary tuberculosis and AIDS was higher than in group 2. The most frequent was the disseminative clinical-roentgenographical form of tuberculosis ( $p < 0,0001$ ), that in comparison with HIV-negative patients with the pulmonary tuberculosis was two times more frequent - 80% versus 40% ( $p = 0,02$ ). The infiltrating form of the pulmonary tuberculosis was less frequent in HIV-positive in comparison with the patients from group 2 - 10 % in group 1 versus 50% in group 2 ( $p = 0,023$ ). There were found no considerable differences of frequency occurrences of nidal tuberculosis in HIV-positive and HIV-negative patients - 10 % in group 1 versus 10% in group 2 ( $p = 0,05$ ). In patients from group 1 more often one could observe the tuberculosis of the extrapulmonary localization (in the form of tuberculosis of intrathoracic lymph nodes and tuberculosis pleuritis) than in patients from group 2 -

23,3 % in group 1 versus 2,5% in group 2 ( $p = 0,0096$ ). The tuberculosis of the lymph nodes (intrathoracic, paracaval, mesenterial) in group 1 was found in 10 % patients with disseminative pulmonary tuberculosis, and exudative pleuritis - in 13,3 % patients with disseminative tuberculosis and in 33,3% patients with infiltrating pulmonary tuberculosis. In group 2 in 2,5% patients was found the exudative pleuritis.

The data about the frequency of destructive forms of the pulmonary tuberculosis in patients with co-infection in comparison with group 2 in accordance with clinical and roentgenographical form of tuberculosis are shown in the table 2.

It was researched that the HIV-positive patients with the pulmonary tuberculosis, less cases of destruction of lung tissue than in HIV-negative patients with tuberculosis being diagnosed for the first time and who have no AIDS infection - 43,3% instances of destruction cases in group 1 versus 85% instances in group 2 ( $p = 0,0004$ ). The destructive changes of the lung tissue in group 1 were observed less often than in group 2 as by infiltrating form of tuberculosis - 33,3% versus 85% ( $p < 0,05$ ), so also by

Table 1

**Clinical forms of the tuberculosis in HIV-positive and HIV-negative patients with the pulmonary primary diagnosed tuberculosis**

Clinical form of the tuberculosis, %	Group 1 (n=30)	Group 2 (n=40)	P
Nidal	10	10	>0,05
Infiltrative	10	50	<0,05
Disseminative	80	40	<0,05
In combination with extrapulmonary tuberculosis	23,3	2,5	<0,05
Medium and lower lobe localization of tuberculosis	3,3	4,2	>0,05

Note. Group 1 – HIV-positive patients with PDTB; Group 2 – HIV-negative patients with the PDTB; p – indicator of statistical probability.

Table 2

**The destruction of the lung tissue in HIV/AIDS-associated pulmonary tuberculosis**

Clinical form of tuberculosis	Presence of destruction, %		P
	Group 1 (n=30)	Group 2 (n=40)	
Nidal (n1=3, n2=4)	0	10	0,6
Infiltrating (n1=3, n2=20)	33,3	85	0,028
Disseminative (n1=24, n2=16)	50	93,7	0,020

Notes. Group 1 – HIV/AIDS-associated pulmonary tuberculosis; group 2 – HIV-negative patients with the pulmonary tuberculosis; p – indicator of statistical probability

the disseminative form of the pulmonary tuberculosis - 50 % in group 1 versus 93,7 % in group 2 ( $p < 0,05$ ).

In the tables 3 and 4 is presented the roentgenographical characteristic of the certain clinical forms of the pulmonary tuberculosis in HIV-positive and HIV-negative patients.

The analysis of the received data showed, that in HIV-positive patients with nidal and infiltrating pulmonary tuberculosis roentgenographically were found soft foci without distinct boundaries, that was two times more frequent than in patients from group 2 (66,7% in group 1 versus 30% in group 2,  $p < 0,05$ ). The foci were mostly localized in the upper parts of

the lungs ( $p < 0,05$ ), however, in 16,7% instances was observed the lower lobe localization of the pathologic process, that was a credibly higher indicator than in patients from group 2 ( $p < 0,05$ ).

In group 1 credibly more often, than in HIV-positive patients were found the roentgenographic characteristics of the tuberculosis of intrathoracic lymph nodes and pleuritis (33,3% in group 1 versus 0% in group 2,  $p < 0,05$ ).

It was researched the roentgenographic characteristics of the disseminated pulmonary tuberculosis in HIV-positive patients: in comparison with group 2, in patients from group 1 credibly more often was

Table 3

**Roentgenographic characteristics of the nidal and infiltrating pulmonary tuberculosis in HIV-positive patients**

Roentgenographic characteristics, %	Group 1 (n=6)	Group 2 (n=20)	P
Typical localization	83,3	100	$>0,05$
Lower and medium lobe localization	16,7	0	$<0,05$
One-sided process	100	100	$>0,05$
Two-sided process	0	0	$>0,05$
Polymorphous foci (soft, fibrous, thick)	0	20	$<0,05$
Medium thickness	33,3	50	$<0,05$
Soft foci without distinct boundaries	66,7	30	$<0,05$
Extrapulmonary localization (tuberculosis of intrathoracic lymph nodes, pleuritis)	33,3	0	$<0,05$

Notes. Group 1 – HIV-positive patients with pulmonary tuberculosis;

Group 2 – HIV-negative patients with the pulmonary tuberculosis; p – indicator of statistical probability

Table 4

**Roentgenographic characteristics of the disseminative pulmonary tuberculosis in HIV-positive patients**

Roentgenographic characteristics	Group 1 (n=24)	Group 2 (n=16)	P
One-sided process	0	6,3	$>0,05$
Two-sided process	100	93,8	$>0,05$
Slightly nidal dissemination	37,5	18,75	$<0,05$
Medium and highly nidal dissemination	58,3	82,25	$>0,05$
Discharge foci	30,4	25	$>0,05$
Mild intensity	47,9	31,2	$<0,05$
Medium intensity	29,1	25	$>0,05$
Foci of various intensity, intensive	20,8	43,8	$<0,05$
Extrapulmonary localization (tuberculosis of intrathoracic lymph nodes, pleuritis)	16,7	6,25	$<0,05$

Note. Group 1 – patients with HIV/AIDS-associated pulmonary tuberculosis;

group 2 – HIV-negative patients with the pulmonary tuberculosis; p – indicator of statistical probability

observed the slightly nodal dissemination (37,5% in group 1 versus 18,75% in group 2), mainly of a low intensity (47,9% in group 1 versus 31,2% in group 2), throughout both lungs. In 16,7% of HIV-positive patients roentgenographically were found the characteristics of the extrapulmonary tuberculosis that was almost 3 times more frequent than in group 2 ( $p < 0,05$ ).

### Conclusions

The analysis of the roentgenographic changes of HIV/AIDS-associated pulmonary tuberculosis allowed to find out that the most spread clinical form in HIV-positive patients with the pulmonary tuberculosis being diagnosed for the first time is the disseminated form ( $p < 0,0001$ ). In HIV/AIDS-associated pulmonary tuberculosis being diagnosed for the first time credibly more frequently in comparison with HIV-negative patients, were found slightly intensive foci, medium and lower lobe localization of disease, in combination with the tuberculosis of intrathoracic lymph nodes and specific exudation pleuritis ( $p < 0,05$ ). The frequency of the typical for the tuberculosis destructive changes in the lungs was less observed in patients with HIV/AIDS-associated pulmonary tuberculosis being diagnosed for the first time - in 43,3% of patients in group 1 versus 85% in group 2 ( $p < 0,05$ ).

### Prospects for further research

As it was shown in the article HIV-associated tuberculosis is characterized by modification of X-ray manifestation of specific tuberculous lesion, thus, it reduces the effectiveness of radiologic diagnostic methods and indicates the necessity of further investigation of other more sensitive methods of TB diagnostic.

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### РЕНТГЕНОЛОГІЧНІ ПРОЯВИ ТУБЕРКУЛЬОЗУ ЛЕГЕНЬ У ВІЛ-ПОЗИТИВНИХ ХВОРИХ

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**Резюме.** Внаслідок стрімкого погіршення епідеміологічної ситуації по ВІЛ-інфекції в Україні та світі, спостерігається щорічне збільшення кількості випадків ВІЛ-асоційованого туберкульозу, який характеризується важкістю діагностики. У статті наведено результати аналізу рентгенологічних проявів туберкульозу легень у ВІЛ-позитивних хворих.

**Ключові слова:** туберкульоз, ВІЛ-інфекція, діагностика.

### РЕНТГЕНОЛОГИЧЕСКИЕ ПРОЯВЛЕНИЯ ТУБЕРКУЛЕЗА ЛЕГКИХ У ВИЧ-ПОЛОЖИТЕЛЬНЫХ БОЛЬНЫХ

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**Резюме.** Вследствие стремительного ухудшения эпидемиологической ситуации по ВИЧ-инфекции в Украине и мире, наблюдается ежегодное увеличение количества случаев ВИЧ-ассоциированного туберкулеза, который характеризуется тяжестью диагностики. В статье приведены результаты анализа рентгенологических проявлений туберкулеза легких у ВИЧ-положительных больных.

**Ключевые слова:** туберкулез, ВИЧ-инфекция, диагностика.

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