

## МЕДИЧНІ НАУКИ

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## CLINICAL AND RADIOGRAPHIC PECULIARITIES OF CHANGES IN LUNGS AT PNEUMOCYSTOSIS IN PATIENTS WITH AIDS

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*The group of causative agents of some infections that associate with comprehensive stage of HIV-infection is strictly distinguished. It is called HIV-associated diseases that must be considered as opportunistic. Pneumocystic pneumonia dominates in clinical presentation of about half of patients, the others have candidal injuries, cytomegaloviral pneumonia, chlamidia trachomatic pneumonia and so on.*

*The aim of this research is to detect clinic and radiographic peculiarities of changes in lungs at pneumocystosis in patients with AIDS.*

*Materials and methods.* Radiographs dates in frontal and additional projections of thorax in 42 patients 18–56 years old were studied.

*Results.* An analysis of dates allowed group the detected changes into radiographic symptom complexes.

*Conclusion.* 1) Radiography of thorax stays is the main objective method of diagnostics of changes in lungs in patients with AIDS;

2) peculiarities of radiographic manifestations of the modern course of pneumocystic pneumonia from an initial changes of lung pattern to an apparent picture are ascertained, the complications and dynamics of treatment are given

*Keywords:* radiography of thoracic organs, pneumocystic pneumonia, HIV-infected, patients with AIDS

*Пневмоцистоз найвідоміше опортуністичне захворювання у хворих СНІДом, рентгенологічний метод основний з найоб'єктивніших при встановленні правильного діагнозу.*

*Вивчення рентгенологічних проявів у легенях дозволило нам констатувати у 21,4 % відсутність виявлених патологічних відхилень. Проведений аналіз даних дозволив нам згрупувати виявлені зміни у 3 рентгенологічні симптомокомплекси та розробити класифікацію рентгенологічних змін органів грудної клітки при пневмоцистній пневмонії*

*Ключові слова:* рентгенографія органів грудної клітки, пневмоцистна пневмонія, ВІЛ-інфіковані, хворі СНІД

### 1. Introduction

During thirty years an epidemic of AIDS (acquired immunodeficiency syndrom) spreads all over the world, turning into a huge in its scales pandemia that destabilizes social and political situation in many countries, brings big economic losses, put obstacles in the way of development of health protection and other spheres. This problem became universal it includes economic and politic aspects and increases on-budget expenditures [1].

The group of causative agents of some infections that associate with comprehensive stage of HIV-infection is strictly distinguished. It is called HIV-associated diseases that must be considered as opportunistic. Pneumocystic pneumonia dominates in clinical presentation of about half of patients, the others have candidal injuries, cytomegaloviral pneumonia, chlamidia trachomatic pneumonia and so on.

### 2. Foundation of research

The number of patients with subnormal immunity permanently increases in last decades it is connected with usage of cytostatic, transplantation of bone marrow, an epidemic of AIDS/HIV-infection, growth of the number of people with asocial behavior and so on. An injury of the lung tissue of infectious or noninfectious nature is an almost most widespread described pathology in persons with disturbance of immunity, so the lung infection is a leader among all invasive infections. In the foreign literature exists an opposite point of view – the morbidity of these infections decreased in more than 10 times with an appearance of antiretroviral therapy [3, 4].

An innate and postnatal immunodeficiency states, dysfunctions of cellular and humoral immunity are the main causes of the difficult clinical course and unfavorable outcome of the primary and the secondary pneumo-

nias especially in children in the first month and years of life [5].

The disease of lungs is the main cause of the morbidity and mortality from the secondary pathology on the background of HIV-infection, and pneumocystis is the main etiological factor of it (more than 50 %) [6].

Pneumocystis carinii attributed to the easiest ones was accepted as a causative agent of pneumocystic pneumonia (PP) for many years. But in the last years it was established that Pneumocystis carinii causes disease in rodents, but Pneumocystis jiroveci is the causative agent in humans, in addition it relates to yeast-like funguses. Pneumocystises are widespread in people; 1–10 % of healthy people are carriers of pneumocystises.

An infection transmits by respiratory way, contamination comes in an early childhood; 2/3 of healthy children 2–4 years old have antibodies to P. jiroveci. An infection is primary in infants who don't have immunity yet and the disease flows heavily; in adults pneumocystosis is usually a result of reactivation of the latent infection. In 80 % of children with normal immunity who reached 3 years have antibodies to pneumocystosis [7], consequently, seroconversion comes at an early age when the child is infected with microbe. Pneumocystis antibodies are detected in 71 % of children 11–15 years old [8].

Pneumocystis don't always causes pneumonia that is followed with clinical symptomatology; there is an information about detection of asymptomatic carriage of pneumocystis in healthy people [9, 10]. Moreover pneumocystises can play some role in the development of the chronic obstructive diseases of lungs [11].

According to an international classification of diseases (Medicode Hospital ICD.9.CM, 1999) the disease states caused by pneumocystises are classified as pneumocystosis that can flow as an acute respiratory disease, an exacerbation of the chronic bronchopulmonary diseases and also (its heaviest form) as the pneumocystic pneumonias [12].

Pneumocystic pneumonia is one of the best-known and significant opportunistic diseases in patient with AIDS and radiography is the most objective and important method for diagnosis. But don't forget that immunodeficiency don't rule out the development of an ordinary bacterial pneumonia. The researchers accentuate that several processes can behavior in the lung tissue, especially an infectious one with one or a few pathogens. (Pneumocystis jiroveci, CMV and so on) [13].

It is well-known that the general features of bronchopneumonia under conditions of an acquired immunodeficiency syndrome in children of an early age is an acute progressive alterative and proliferative inflammation with the signs of pneumonitis and alveolitis, with an interstitial and desquamative components, with an apparent pathology of the cell membrane, that is inherent for the many virus and other opportunistic diseases, its individual and group peculiarities depends on the term of development of the complex of pathologic changes and predominant infection agent: DNA, RNA-viruses, pneumocystis bacterial flora, funguses [5].

Competed tomography (CT) is carried out to these patients at worsening of clinical and radiographic indices, at

complicated interpretations of roentgenograms in the clinically difficult cases. It wanted to be underlined that the scialogical phenomena of the “frosted glass” as an interstitial infiltration that are apparent on CT aren't the pathognomic sign of pneumonia. These changes represent only the phenomena of thickening of inter-alveolar septum and can take place at numerous pathological processes of infectious or un-infectious nature. But Hidalgo A. et al. (2003) maintains that CT allows the strict differentiation of the pneumocystic pneumonia from the other lung infections [12].

### 3. Aim of research

An aim of research was the more precise definition of the radiographic semiotics of the pneumocystic pneumonia in patients with AIDS.

### 4. Materials and methods

The data of the radiographic research (roentgenograms in the frontal and additional projections at the vertical state of patient) of the thoracic organs of 42 patients with AIDS 18–56 years old are studied. Technical specifications of taking pictures: tension – 48–57 kW, current – 100 mA, exposure – 0,04–0,08 sec. The researches were carried out in x-ray rooms of Kharkov regional isolation hospital. The specific dose at radiographic research was from 2,2 to 8,5 mкw/MA. The diagnosis was verified by the full clinical and laboratory examination including the way of immune-enzyme analysis.

### 5. The results of research

The detailed study of changes in lungs allows us ascertain the diversity of detected pathological deflections, from its absence to an apparent two-sided injuries with complications. Radiographic manifestations of pneumocystic pneumonia depend on the level of immunosuppression, an acuteness of the clinical course and the period of disease. But radiographic changes were absent in 21,4 % of patients.

An analysis of the received data allowed us group the detected changes in 3 radiographic symptom complexes.

The first symptom complex appears at the beginning of the pneumocystic pneumonia development it is not specific for this disease and develops on roentgenograms as a lung picture. At the same time during the first 5–8 days an intensification of the lung picture was observed most often, it began with root segments (76,2 %), and in the sequel spread on the both lungs but it was more apparent in the central segments.

Another symptom complex was characterized by the worsening of the state as an emergence of the signs of an inflammatory process in lungs during 5–10 days and during the next 3–4 weeks the typical signs appeared on roentgenogram in the form of diffuse bilateral root interstitial infiltrates more often in the low basal segment of lungs that spread from the roots of lungs to periphery (the symptom of the “frosted glass”, “snowflakes”) corresponding to an atelectatic stage and followed with an apparent respiratory failure. In our material pneumonias in patients with AIDS were distinguished for diffusivity, by an often involvement of pleura to the process of internal pectoral lymph nodes.

On an early stages of disease some patients has on they roentgenograms the two-sided so-called “fluffy” parts of infiltration that were mainly located in subpleural zones, it were often unsymmetrical. Infiltrates had illegible outlines, uniform structure, sometimes it were united with an existence of the small focuses in the surrounding lung tissue that represented the fulfillment of alveoli with a liquid. An intensity of a shadow of the tightened nucleuses was differ at the primary stage it is law (interstitial type of infiltration).

The two-sided finely focal pneumonia of mainly confluent character was detected in 23,8 % of this group. In 3 patients it was united with an intensified interstitial lung picture and interstitial emphysema.

The third symptom complex represented changes of pleura. On roentgenograms of 14 patients (33,3 %) the carnification of pleura was visualized along the horizontal fissure at the right. In 4 patients (9,5 %) the clinical course of the two-sided pneumonia was complicated with pleurisy. An amount of liquid was usually small and located in sinuses.

During the treatment interstitial changes in lungs disappeared and the focal shadows became more apparent, normalization of radiographic picture took place during 10–15 days. An increase of internal pectoral lymph nodes was detected in 16,7 %. Practically in all patients the changes on roentgenograms were two-sided. In the sequel pneumofibrosis and deformed lung picture developed in patients with pneumonia that respond to treatment.

At integration of pneumocystic pneumonia with the other infections the signs of pneumocystosis prevail on roentgenograms.

## 6. Discussion about the results of research

Radiographic researches allow us to elaborate

### Classification of radiographic changes of thoracic organs at pneumocystic pneumonia

#### I. Changes of the lung picture:

- a) normal;
- b) intensified as a result of intoxication, perivascular edema, perivascular fibrosis, interstitial changes.

#### II. Changes of the lung transparency (limited and extended):

Reduction at the expense of fibrosis changes – an appearance of the finely focal shadows, an appearance of infiltrates of the low or middle intensity – “wool cotton lung”, an appearance of pneumofibrosis focuses, development of atelectasises.

##### 1. Lymphadenopathy.

2. An increase of transparency at the expense of interstitial emphysema, at the expense of forming cavities as a result of necrosis, an emergence of pneumothorax, pneumomediastinum.

III. Changes of pleura – infiltration of pleural folia as a result of edema, an appearance of liquid in pleural cavity.

## 7. Conclusions

1. Radiography of thoracic organs remains the main objective method of diagnostics of inflammation changes in lungs in patients with AIDS.

2. Peculiarities of radiographic manifestations of the modern clinical course of pneumocystic pneumonia at AIDS in the form of initial changes of the lung picture are detected and peculiarities of its clinical course, complications and dynamics of radiographic image under treatment are given.

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