Original Article

Diagnosis And Treatment Effectiveness of Disseminated Pulmonary Tuberculosis

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Abstract

Today the pulmonary tuberculosis is a key cause of many deaths in the Russian Federation. The article determines the increase in the level of the disseminated tuberculosis in the western regions of Russia and its decrease in the eastern districts. Analysis of specialized sources provided an opportunity to study the causes of misdiagnosis of the disseminated pulmonary tuberculosis, to compare this disease with lung sarcadoitis, drug-induced alveolitis, and idiopathic pulmonary fibrosis. As part of the work, a clinical example is given to be able to visually trace the detection of a disease with disseminated tuberculosis, the wrong appointment of a doctor due to insufficient diagnosis and at the end analyze the diagnosis itself, the results, draw a conclusion, thereby seeing the picture of the disease and its cure in the work.

The purpose of this study is to identify and analyze errors in the differential diagnosis of disseminated pulmonary tuberculosis in the 21st century.

The objective is to study the effectiveness of the treatment of the disseminated pulmonary tuberculosis on a specific clinical example.

Methods are clinical, functional, microbiological and morphological.

At the end of the work, the results are summed up thanks to a detailed analysis of foreign and domestic sources, it was possible to study the real picture of the tuberculosis`s incidence in the Russian Federation.

The effectiveness of the disseminated tuberculosis`s treatment consists in an extended histological examination, a diagnostic examination with an extended biopsy, and surgical video-assisted thoracoscopy. In conclusion promising solutions are given to improve the effectiveness of anti-tuberculosis therapy and high-quality diagnosis (annual visits to diagnostic centers for consultations with highly qualified doctors, the use of computed tomography of the chest cavity in pulmonary dissemination syndrome; morphological verification of the diagnosis, compliance with the diagnostic algorithm, differential diagnosis of disseminated lung diseases and other).

Keywords: disseminated tuberculosis, sarcodiasis, pathogenesis, ground glass effect, drug-induced alveolitis, bronchoscopy

Introduction

Tuberculosis is the fundamental cause of death from infectious diseases in Russia today. The percentage ranges from 60% to 70% of all deaths associated with infectious diseases and parasitic diseases in the Russian Federation.

In the Russian Federation, the detected cases of tuberculosis disease`s clinical forms exceeded those in the pulmonary localization, which is confirmed on the basis of microbiological methods performed. According to the statistical indicators with bacterioexcretion.

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30–35 people have tuberculosis per 100,000 Russian citizens, and 20–25 people per 100,000 populations have tuberculosis using the microscopy method [38].

By the beginning of the 21st century the incidence of pulmonary tuberculosis in the population of the Russian Federation began to grow significantly; researchers attribute it to the economic and social situation in the country, despite frequent events and anti-tuberculosis institutions.

The mortality rate from pulmonary tuberculosis increased 2.5 times in 2005 (about 22.6 per 100 thousand citizens) compared to the end of the 20th century in Russia [30].

Today in our country tuberculosis is an acute public health problem: about 80% of deaths occur in working age, which affects the health of the Russian nation and the country's economy.

An analysis of scientific sources indicates a fluctuating difference in the incidence of tuberculosis: the mortality rate increases from the western regions of Russia to the eastern ones, the revealed fact can be explained by the unfavorable demographic situation in the area and federal districts (about 15–18 people per 1000 population) [41].

After 2010 there has been a decline in the incidence of tuberculosis, medical institutions are trying to take preventive measures, educate the younger generation as part of lecture support, help identify symptoms and early stages of the disease, and prevent contact with the infected [34].

Over the past 10 years there has been an improvement in the equipment of fluorographic equipment, thanks to new research a high definition of bacterioexcretors is growing in many regions of Russia, which has significantly reduced the proportion of tuberculosis` chronic forms. Studies of specialized literature over the past 20 years point to the stabilization of the epidemiological situation by increasing the effectiveness of anti-tuberculosis work in the institutions of the Federal Penitentiary Service.

It should not be forgotten that in many regions of the Russian Federation there is still a high incidence of pulmonary tuberculosis, it is especially necessary to single out the Siberian and Far Eastern federal districts.

In the world of globalization processes and nanotechnologies, diagnostics, laboratory methods, and the effectiveness of treatment for pulmonary tuberculosis have errors, a high percentage of incorrect diagnoses ─ all this worsens the situation and reduces the chances of a quick cure for an infectious disease.

In the course of medical research, domestic and foreign doctors, clinicians, pulmonologists, and phthisiatricians are faced with multidrug resistance, as well as with chronic and severe forms of tuberculosis (with HIV infection). The global crisis of 2008 affected the social and demographic situation in Russia, increased the incidence of pulmonary tuberculosis which is noted in the statistics, referring to a study over 20 years [35; 52; 43; 53-56].

An analysis of the study of the incidence of pulmonary tuberculosis draws attention to the high prevalence of cases with the disseminated tuberculosis among Russian citizens.

Disseminated pulmonary tuberculosis is a clinical form; a distinctive feature is bilateral localization, the formation of multiple tuberculosis foci that occur due to hematogenous or lymphogenous dissemination of Mycobacterium tuberculosis. Clinicians studying disseminated tuberculosis mention more than 200 diseases of various etiologies associated with the X-ray syndrome of bilateral dissemination [16].

The problem of identifying the syndrome of bilateral dissemination and the effectiveness of determining the differential diagnosis of disseminated lung diseases lies in the accuracy of the diagnosis. Oncologists, surgeons, therapists, radiologists pay attention to emerging difficulties in diagnosis, the percentage ranges from 50% to 79% of errors in making a clear diagnosis due to the existing more than 150 nosological units with similar similar clinical and laboratory features of various etiologies, pathogenesis, morphology [39, p. 58-59; 40, p. 940─944; 10].

The above percentage was formed due to frequent cases of incorrect diagnosis and identification of disseminated pulmonary tuberculosis in a patient with a severe form of the disease due to an incorrect diagnosis. The study of specialized sources confirms the provision of emergency care to the patient only after a year or even two years, adversely affecting the patient's body, aggravating the state of health, and minimizing the chances of a full recovery [7, p. 23-30].

In most cases the disseminated pulmonary tuberculosis is about 20% in patients in the early stages but more than 40% in HIV-infected citizens who were incorrectly diagnosed with their incidence, which affected the development of the disease [3; 38].

An analysis of studies over the past 20 years confirms real changes in the clinical signs of respiratory diseases as well as an increase in medical errors in diagnosing a disease with pulmonary dissemination (up to 80-85%), making the diagnosis itself, the result is incorrect patient treatment, the appearance of nosological forms and syndromes [5; 8; 10; 24].

According to the above information it is worth noting the relevance of this study in connection with the constantly changing epidemiological, sociological and demographic situation in Russia and around the world.

The purpose is to identify and analyze errors in the differential diagnosis of the disseminated pulmonary tuberculosis in the 21st century.

The objective is to study the effectiveness of the treatment of disseminated pulmonary tuberculosis on a specific clinical example.

Diagnostics

The view of making a diagnosis within the framework of the pulmonary dissemination`s disease, it is almost impossible to reveal the real picture of the patient's disease on an x-ray in this case the doctor should rely on his experience in differential diagnosis [18; 19; 25].

Referring to the analysis of scientific works by V. M. Granitov, O. V. Demikhova, N. V. Kuzmina, V. Yu. Mishin, an opportunity is provided to study:

1) dissemination of infectious genesis in the lungs, which include tuberculosis, HIV-associated dissemination, fungal infections;

2) malignant lesions of the lungs - carcinomatosis, cancerous lymphangitis;

3) cardiogenic dissemination and interstitial lung disease [6; 25];

4) Goodpasture's syndrome and drug damage [6];

5) sarcoidosis of the lungs [12];

6) diseases associated with allergic interstitial lung diseases [19].

Studies of disseminated pulmonary tuberculosis indicate in most cases an asymptomatic course of the disease; in the diagnosis, the doctor may diagnose sarcodiasis or chronic (long-term) lung disease.

The study of specialized sources confirms that in the absence of a clinic in a patient, it is possible to detect the disseminated tuberculosis only with the use of high-resolution computed tomography, which will help minimize disease variants (for example, allergic alveolitis) [4; 44; 45].

Fig. 1 sarcoidosis of the lungs

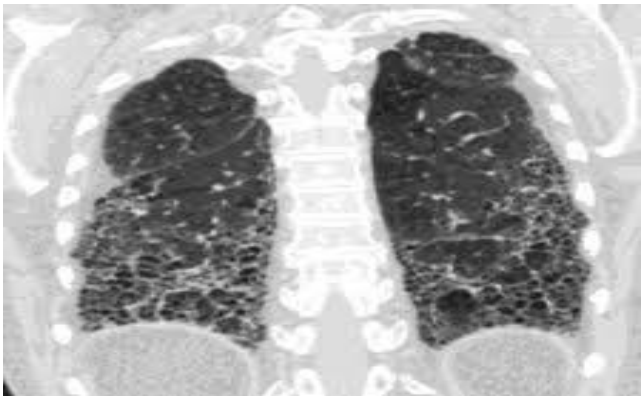

Fig 2. idiopathic pulmonary fibrosis

According to fig. 1 and fig. 2 cardinal differences can be detected using high-quality modern technology or histological verification.

Pulmonologists, phthisiatricians, oncologists tend to more rigorous diagnostics ─ histological verification, where bronchial and surgical biopsy can reveal or verify the absence of malignant lung lesions [6, 26, 27]. Within the framework of medical institutions, cases of “light cancer” similar to disseminated pulmonary tuberculosis have been identified, an accurate diagnosis is possible when conducting a histological examination of biopsy specimens.

Clinical example

Referring to the scientific work of G. M. Kuklin, N. N. Makaryants, E. I. Shmeleva, give a clinical example [23].

In 2017 a woman living in Moscow a representative of a pharmaceutical company at the age of 53 applied to a medical institution for a clinical examination.

After the examination, the doctor revealed signs of the disseminated pulmonary tuberculosis (Fig. 3A, B).

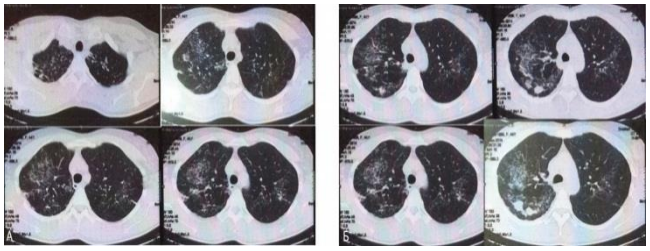

Fig. 3 Computed tomography of the chest at the initial visit in 2017.

According to the result, the doctor noted that for 5-6 years the patient did not seek medical help due to a satisfactory state of health.

Based on the detected disseminated tuberculosis, tuberculin tests were performed: Mantoux test with 2 TE - 5 mm, diaskintest - 10 mm, as well as a bronchological examination (11 Septemper, 2017) with taking bronchoalveolar lavage, a complex of biopsies and subsequent cytomorphological and microbiological examination of the obtained material.

It should be noted that after the surveys were revealed:

1) the endoscopic picture was unchanged;

2) in the cytogram of bronchoalveolar lavage, 88% of alveolar macrophages, 7% of lymphocytes, 0% of neutrophils, 5% of eosinophils were observed.

These results indicated the need for a bronchial lung biopsy, during which the doctor found groups of cylindrical epithelial cells, single macrophages, lymphocytes, mast cells, small areas of fibrosis and the absence of acid-fast mycobacteria.

It is necessary to indicate the results of a histological examination: as part of a thorough examination, the doctor revealed lymphoid-macrophage infiltration in the lungs, clear signs of incomplete phagocytosis and pronounced peribronchial and perivascular fibrosis, as well as a marophageal-histiocytic granuloma with a sclerosis band.

Based on the above results, the patient received the following conclusion: chronic granulomatous inflammation. The results of microbiological examination: no AFB, DNA of Mycobacterium tuberculosis (MBT) by PCR was not found, BAL culture for AFB was negative.

Referring to the absence of complaints, undiagnosed health problems for 5-6 years, the absence of contact with those infected with tuberculosis, the patient was recommended to apply to a medical institution for hospitalization and verification of the identified research data.

After 16 days, the woman was hospitalized (also with no complaints of deterioration in health) was hospitalized on 27 October, 2017. Condition at admission is satisfactory, no complaints.

A number of studies were carried out in a medical institution, but no wheezing or breathing problems were found, clinical and biochemical blood parameters were normal.

On a CT scan of the chest, the doctor noticed:

1) ground glass infiltration areas;

2) on the lungs - a slight deformation, which was expressed as a compaction of the connective tissue of the interstitium at the level of lobular and intralobular structures;

3) in the area of the tops of the lungs - paraseptal emphysema;

4) in the projection of the upper lobes, under the lung pleura ─ bullous emphysema.

The rest of the revealed results showed no changes, in connection with the above violations, the doctor concluded: disseminated pulmonary tuberculosis of lymphogenous genesis (see Fig. 3A, B).

Two weeks later, the patient underwent clinical examinations (video-assisted thoracoscopy with resection of the C4 segment on the right with partial pleurectomy), which indicated granulomatosis, which may indicate the development of tuberculous inflammation or sarcoidosis.

Clinical examination and the doctor's experience made it possible to identify disseminated tuberculosis (Fig. 4).

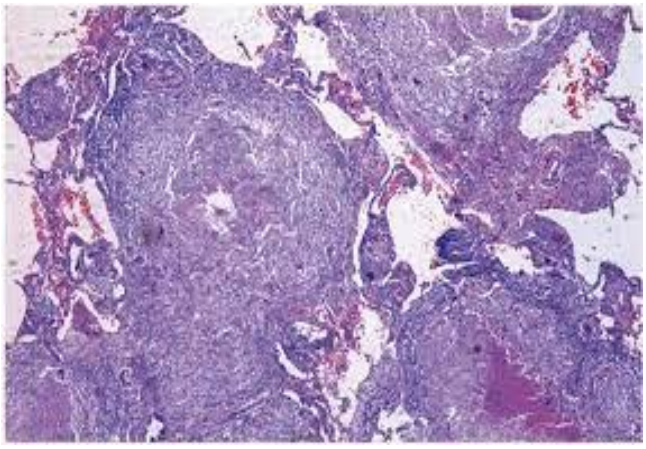

Fig. 4 Histological examination of the surgical material 06 November, 2017. Hematoxylin eosin staining

As a result the doctor prescribed the patient treatment (anti-tuberculosis therapy) referring to the established clinical diagnosis.

In January 2018 2 months later the patient again turned to this medical institution for help in connection with complaints of shortness of breath and signs of increasing bronchial obstruction. The woman was urgently examined: the doctors revealed an increase in disseminated changes and the appearance of ground-glass pulmonary infiltration (Fig. 5).

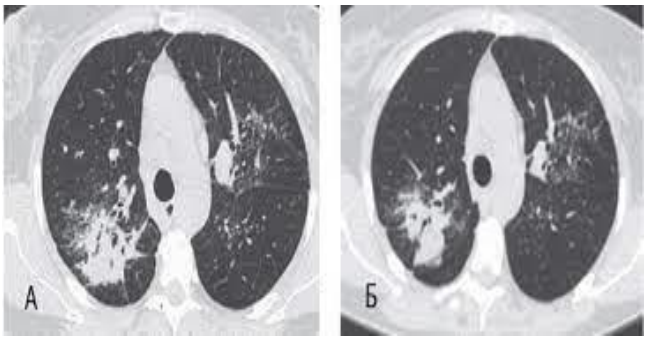

Fig. 5 ground glass pulmonary infiltration

The established past diagnosis (disseminated tuberculosis) did not correspond to the clinical findings. After lengthy discussions a new extended examination was scheduled in which the doctors determined the presence of tuberculous

granules in a dense fibrous capsule with areas of caseation in the center.

The conclusion of the doctors was changed in favor of the productive stage of the disseminated pneumonia`s inflammation. The medications taken by the patient provoked the drug-induced alveolitis` development as part of the negative dynamics of chest CT scan.

In connection with the above circumstances, anti-tuberculosis therapy was adjusted; the conclusion was changed: the disseminated pulmonary tuberculosis, drug alveolitis.

After a month of prescribed therapy, the patient came for examination: CT returned to normal (positive dynamics), seals in the connective tissue changed (resorption was detected), other indicators, deviated from the norm a month ago, stabilized.

The control CT scan of the chest revealed positive dynamics in the form of partial resorption and induration of interstitial changes in the lung tissue (Fig. 6).

Fig. 6 compaction of interstitial changes in the lung tissue

In conclusion it is necessary to highlight the difficulties in diagnosing disseminated processes in the lungs. It is important to single out the duration of the patient's treatment, which was influenced by the lack of a medical examination (the woman had no complaints), as well as the wrong appointment of a doctor.

With the aggravation of the health`s state (shortness of breath, signs of bronchial obstruction), the patient again turned to the same medical institution, underwent an additional diagnostic examination with an extended biopsy, surgical video-assisted thoracoscopy.

Result: adjusted antituberculous therapy. In connection with the revealed dense fibrous capsules around tuberculous granulomas and the resulting drug alveolitis, the doctors made a different conclusion than 2 months.

Methods are clinical, functional, microbiological and morphological.

As part of the description of a clinical example with a patient, clinical, functional, microbiological and morphological research methods were analyzed in the framework of the detection of disseminated pulmonary tuberculosis and drug alveolitis.

Results And Discussions

In connection with the analysis and study of the disease of disseminated pulmonary tuberculosis in Russia, it is worth highlighting the jump in this incidence in the western regions and a slight decline in the eastern federal districts.

Statistical data from specialized sources for 20 years confirm an acute problem in the development of disseminated pulmonary tuberculosis, which affects the economic side of the state, reduces the level of health care and increases the “aging of the nation”` s level [46-50].

Preventive measures are being actively implemented in educational institutions with the call for an annual survey even in the absence of complaints. Disseminated tuberculosis, as analysis has shown, can be asymptomatic in the early stages, and then abruptly “appear”, which will aggravate a person’s health and complicate anti-tuberculosis therapy.

Conclusion

As a result it is worth highlighting the solutions to improve the effectiveness of anti-tuberculosis therapy and high-quality diagnosis:

1) refer patients to diagnostic centers for consultation with a phthisiatrician, pulmonologist, oncologist, as well as identify an accurate diagnosis based on modern medical equipment;

2) do not neglect the use of computed tomography of the chest cavity in case of pulmonary dissemination syndrome;

3) to carry out morphological verification of the diagnosis for a reliable result: fibrobronchoscopy with a complex of biopsies, VATS biopsy [59];

4) follow the diagnostic algorithm;

5) train doctors, conduct practical exercises to improve skills in the use of new medical devices;

6) pay attention to the differential diagnosis of disseminated lung diseases, due to the widespread prevalence of this disease in Russia.

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