



Multi spiral Computed Tomography Analysis of Chronic Lung Disease Complications in Patients Who Have Undergone Covid-19 Pneumonia

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ABSTRACT

The article provides an analysis of changes in the pulmonary parenchyma in pneumonia caused by a new coronavirus infection in the acute and separated period of the course of the disease. Based on clinical material (60 patients with viral pneumonia, who underwent classical lung radiography and computed tomography at various times of the disease) changes in radiological signs of lung tissue damage were assessed. The dependence of the course and regression of the disease on the degree of lung tissue damage was revealed according to the results of radiography and computed tomography

Keywords:

Coronavirus infection, viral pneumonia, radiography, computer tomography, «frosted glass», fibrosis

During the pandemic of a new coronavirus infection, the question of the possible consequences of the infection, the assessment of post-inflammatory changes and quality of life is widely discussed in clinical practice. As of November 14, 2021, according to the World Health Organization website, 254 million cases of the new coronavirus infection COVID-19 were registered, of which 5.1 million were fatal, 229.1 million patients recovered. Among the complications of infection caused by SARS-CoV-2, complications associated with damage to the lungs, heart and blood vessels, kidneys and central nervous system are distinguished [1, 2]. Among domestic and foreign publications, there are isolated works devoted to the long-term results of COVID-19 treatment [3].

The purpose of the study. To evaluate the features of the course of the inflammatory process, to study the condition of the lung tissue according to the results of multisection computed tomography (MSCT) 1, 3 and 6

months after completion of treatment in patients with COVID-19-associated pneumonia.

Material and methods. The Main Military Clinical Hospital of the National Guard Troops of the Russian Federation analyzed the results of examination and treatment of 60 patients (41 (68%) men and 19 (32%) women) aged 37 to 81 years (average age – 52.5 ± 5.1 years) who were treated in the period from March 2020 to March 2021 about viral pneumonia caused by COVID-19. The data obtained using classical radiography, MSCT of patients with varying degrees of severity of lung tissue damage, at admission, after 1, 3 and 6 months were analyzed. Depending on the degree of lung tissue damage, the patients were divided into four groups of 15 people each: with minimal damage according to computed tomography (CT-1), with mild damage (CT-2), moderate (CT-3) and severe damage (CT-4). The criteria for inclusion in the study were the presence of clinical signs of COVID-19 viral pneumonia, the identification of changes in the lungs

characteristic of this disease using radiation diagnostics methods and positive results of reverse transcription polymerase chain reaction on SARS-CoV-2. The exclusion criteria were the presence of bacterial pneumonia and other acute diseases of the upper respiratory tract. The main method of assessing the state of the pulmonary parenchyma after a new coronavirus infection was multi-slice computed tomography (MSCT) performed on a 16-slice computed tomograph Toshiba Aquilion (Japan); 128-slice computed tomograph Philips (Netherlands); 64-slice computed tomograph Siemens Go Top (Germany).

The severity of pneumonia was assessed on the basis of criteria approved by the order of the Moscow Department of Health of 08.04.2020 No. 373 and the order of 16.04.2020 No. 10-18-231/20. The degree of damage to the lung tissue was assessed by the volume of involvement of its parenchyma: does not correspond to pneumonia – CT-0, minimal – CT-1 (less than 25%), mild – CT-2 (25-50%), moderate – CT-3 (50-75%) or severe – CT-4 (75-100%) [1]. Laboratory diagnostics of COVID-19 was carried out by reverse transcription polymerase chain reaction. The material from the patient's oropharynx was examined. The study was conducted in the laboratories of Rospotrebnadzor and the Main Center for State Sanitary and Epidemiological Surveillance of the National Guard Troops of the Russian Federation. Statistical processing of the obtained results was carried out using the Microsoft Office 2016 software package.

The results of the study. The analysis of the obtained results made it possible to identify criteria for residual phenomena in the form of the presence of a "frosted glass" symptom, with unilateral (1A) and bilateral (2A) localization, as well as local pneumofibrosis of lung tissue with unilateral (1B) and bilateral (2B) localization.

Discussion Taking into account the clinical course of lung tissue damage in patients who have had SARS and MERS, a group of doctors from the University of California strongly recommends monitoring patients who have had COVID-19 and checking their lungs "to assess long-term or permanent damage,

including fibrosis" [3, 4]. In our study, lung MSCT performed 1 month after discharge from the hospital showed that in 100% of cases, patients with CT2–4 retained residual changes in the lungs in the form of compaction of lung tissue by the type of "frosted glass", "cobblestone pavement", reticular pattern. In patients with CT-1, in 87% of cases, only residual compaction of the lung tissue by the type of "frosted glass" was preserved [1, 3, 5]. Studies conducted after 3 and 6 months demonstrated polymorphism and dynamism of the above-described patterns in patients with CT2-4, which were completely leveled after 6 months in patients with CT2–3. In patients with CT-4, after 6 months, both unilateral and bilateral fibrotic lung changes were detected in 14% of cases (Fig. 1). In 72% of cases, patients with changes characteristic of CT-4 had complete regression. In two cases, fibrous changes were detected, however, after a retrospective review of studies, including classical X-ray images, these areas of lung tissue compaction were characterized as zones of local fibrosis and were classified as "without fibrous changes".

Conclusions.

1. The absence of long-term changes on the part of the lung tissue in severe pneumonia caused by COVID-19 in 72% of cases may indicate an atypical course of inflammation in its classical sense, requiring further study.

2. In 28% of patients with CT-4, 1, 3 and 6 months after COVID-19, post-inflammatory changes persist in the form of local one- or two-sided pneumofibrosis, which may be both a consequence of the addition of bacterial flora and a complication of the course of interstitial viral pneumonia (pneumonitis).

3. The detection of long-term changes in the lungs after 1, 3 and 6 months makes it necessary for such patients to carry out a complex of diagnostic and therapeutic and preventive measures for at least 6 months after the regression of clinical and laboratory signs of COVID-19.

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