PATHOLOGICAL-ANATOMIC DIAGNOSTICS OF CORONAVIRAL INFECTION CAUSED BY THE COVID-19 VIRUS. RESULTS OF THE APPLICATION OF MOLECULAR-GENETIC AND MORPHOLOGICAL METHODS

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The effectiveness of therapeutic and epidemiological measures aimed at combating infectious diseases directly depends on timely and accurate etiological diagnosis. In the case of a new coronavirus infection COVID-19, identification of the SARS-CoV-2 virus in the patient's biomaterial by the polymerase chain reaction (PCR) method is the main criterion for confirming a case of the disease, both in clinical and in pathological practice [1]. In an epidemic, the use of medical information systems with the formation of network access to the results of medical, in particular, laboratory research, plays a significant role in ensuring the operational exchange of data and continuity between medical institutions when routing patients. In the course of the COVID-19 pandemic, the solution of these tasks was implemented through the Unified Medical Information and Analytical System (UMIAS), which combined the results of laboratory and diagnostic tests conducted in various laboratories in Moscow in case of suspected coronavirus infection.

Purpose of the study. To assess the results of morphological and molecular genetic studies in the pathological diagnosis of COVID-19.

Materials and methods. We analyzed 270 cases of postmortem examinations of those who died in Moscow in the period from April to September 2020 with a clinical diagnosis of "coronavirus infection caused by the COVID-19 virus" or with suspicion of COVID-19 that arose during postmortem examination. Of the 270 who died, 151 were men, 119 were women, average age 63.3 years (from 20 to 99 years old, median 66, fashion 83). 62 deceased HIV positive status confirmed by immune blotting. Research methods: histological, histobacterioscopic, histochemical, molecular genetic - PCR of tissue samples of the trachea, lungs and spleen for SARS-CoV-2 coronavirus.

Results and discussion. Positive results of PCR studies of autopsy material for SARS-CoV-2 were obtained in 131 cases out of 270 (including 32 HIV-infected). Most often, the coronavirus was identified simultaneously in all three samples - in 85 cases (65%), in 28 (21%) - in 2 samples in various combinations, mainly in the trachea and lungs. Isolated detection of the virus was noted in the trachea in 7 cases (5%), in the lungs - in 8 (6%), in the spleen - in 2 (2%). In all cases of positive PCR autopsy lungs for SARS-CoV-2, histological examination showed the presence of pathomorphological changes, which were mostly nonspecific. The picture of diffuse alveolar damage (DAP) prevailed in different phases of its development: alveolar edema with the formation of hyaline membranes, alveologohemorrhagic syndrome, proliferation, cytopathic changes and desquamation of alveolar and bronchiolar epithelium, interstitial inflammation and fibrosis. Also, manifestations of fibrinous-purulent pneumonia with histobacterioscopic determination of bacterial and fungal microflora, including the use of additional histochemical stains, were noted. In the case of a combination of HIV infection with verified COVID-19 (32 cases in total), along with nonspecific microflora in the histological picture of DAP, signs of opportunistic infections were revealed, in particular, intraalveolar Schiff-positive inclusions of Pneumocystis jirovecii and giant cell transformation of alveolar epithelium, characteristic infections. Negative PCR results corresponded to cases of previous coronavirus infection with signs of organization and development of pulmonary fibrosis, as well as pneumonia of other etiology, in

ISBN: 978-81-947843-0-2; DOI: 10.21467/abstracts.102

particular, secondary HIV-associated infections. Differential diagnosis with the definition of the underlying disease and the place of COVID-19 in the structure of the final pathological anatomical diagnosis in each case was carried out taking into account the morphological and PCR data. For example, in the case of the presence of morphological signs of HIV-associated pneumonia without DAP and a positive PCR result for SARS-CoV-2 only in trachea samples with a negative result in lung samples, it was possible to establish HIV infection with the development of secondary pneumonia as the main cause of death, and COVID-19 attributed to co-morbidity. In the presence of a comorbid pathology of COVID-19 and HIV infection, death occurred mainly in the working age, in men 1.7 times more often than in women. At the same time, COVID-19 infection was the main cause of death in 17 cases (53%), in 11 cases (34%) the main disease was HIV infection with the development of severe opportunistic diseases, in 4 (12%) - death came from non-infectious pathology.

Thus, a postmortem examination for suspected COVID-19 should be based on a comprehensive analysis of clinical, morphological, molecular genetic, bacteriological data. The collection of material for PCR research from various localizations not only increases the efficiency of identification of the pathogen, but also contributes, in conjunction with histological examination, to the determination of the form and phase of the course of coronavirus infection and its role in thanatogenesis.

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