

Diagnostics of lesions of parenchymatic organs in COVID-19 with the application of digital software processing of computer tomography images

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BACKGROUND. In the third wave of the pandemic, the coronavirus disease 2019 (COVID-19) was more aggressive. The available information on the pathogenesis of respiratory failure was supplemented with new data. Up-date information about the respiratory failure pathogenesis was acquired. It has been shown that the SARS-CoV-2 virus leads to disappearance of white pulp cells in the spleen. In this tissue immune cells mature and differentiate, among others T- and B-lymphocytes, which are responsible for premuniton. The study of the structure and function of the spleen has become even more urgent. Some authors note a change in the size of the spleen during ultrasonography and chest computed tomography (CT), which correlate with indicators of the pneumonia's severity. The study of the structure and function of the spleen has become even more urgent.

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OBJECTIVE. To study is to evaluate changes in the structure of solid organs (lungs, liver and spleen) in patients with a complicated community-acquired viral pneumonia COVID-19 by means of software digital processing of CT scan data and their comparison with pathomorphological changes.

MATERIALS AND METHODS. The analysis of CT data in patients with a complicated community-acquired viral pneumonia COVID-19, who were treated at the SI “National institute of phthiisology and pulmonology named. F.G. Yanovsky of the NAMS of Ukraine”. CT WGC was performed on an Aquilion TSX-101A «Tochiba» scanner (Japan), followed by digital software processing of CT images using the Dragonfly software. Histological preparations were obtained as a result of traditional alcoholic histological tracing of tissue samples, embedded in paraffin blocks. To obtain micrographs, an Olympus BX51 microscope was used with an Olympus DP73 digital camera and a CellSens computer program for image processing.

RESULTS AND DISCUSSION. The obtained results of digital software processing of CT images clearly correlate with autopsy histological examination of tissues of the same solid organs. Changes in the structure of the spleen occur earlier than in other solid organs, which gives reason to use these changes for diagnostic purposes. Digital processing of CT images of the spleen allows determining the severity of the disease, predicting its further course and evaluating the effectiveness of treatment.

CONCLUSIONS. In patients with a complicated viral (COVID-19) community-acquired pneumonia changes (which can be determined by digital software processing of CT data) in the structure of solid organs, especially in lungs and spleen, were observed and they correlate with pathomorphological changes.

KEY WORDS: COVID-19, SARS-CoV-2, diagnostics, community-acquired pneumonia, spleen, computed tomography, digital software image processing.