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CLINICAL AND LABORATORY FEATURES OF THE COURSE OF PNEUMONIA ASSOCIATED WITH COVID-19 IN YOUNG CHILDREN

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Annotation

Coronavirus infection (COVID-19) is an infectious disease caused by the SARS-CoV-2 virus. Most people infected with the virus experience mild to moderate symptoms of respiratory illness and recover without the need for special treatment. At the same time, in some people it occurs in a severe form that requires medical intervention. The severe form of the disease develops more often in the elderly and people with background pathologies, in particular cardiovascular, chronic respiratory, oncological diseases and diabetes. The risk of infection with COVID-19, severe course of the disease or death from it threatens any person, regardless of age. On May 4, 2023, the Director General of WHO agreed with the recommendations of the IHR Emergency Committee regarding the COVID-19 pandemic. COVID-19 is currently a recognized and ongoing public health issue that no longer constitutes a public health emergency of international concern (PHEIC). However, COVID-19 is still a global health threat. We must not let down our vigilance, it is important to continue vaccinating vulnerable groups and strengthen surveillance. It is also time to focus on better preparation for future emergencies and better recovery for a healthier and more sustainable future.

Keywords

coronavirus, pneumonia, mycoplasma, lung tissue lesions, lungs, oxygen, temperature.

Introduction

Pneumonia associated with coronavirus infection (COVID-19 pneumonia) is a special type of lung lesion that more accurately reflects the term "pneumonitis".

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This implies the involvement of interstitial lung tissue, alveolar walls and vessels in the pathological process. That is, inflammation develops in all structures of the lungs involved in gas exchange, which prevents normal oxygen saturation of the blood.

According to E.I. Krasnova et al., in 218 children with a laboratory-verified diagnosis of COVID-19, the development of pneumonia was observed in 11.5% of cases, and the incidence of lung damage was significantly higher among infants and adolescents. The authors noted that in children of the first year of life, an atypical course of the disease was mainly registered, while for puberty patients, the manifest course of COVID-19 was more pronounced. In a study by W.R. Otto et al. It is reported that out of 424 children who tested positive for SARS-CoV-2, 77 (18.2%) patients were hospitalized, of which 24 (31.2%) needed respiratory support. In M. Jahangir et al. it was indicated that in patients of pediatric departments with confirmed SARS-CoV-2 infection (n=224), in 147 (65.6%) cases, radiological changes were detected indicating the development of pneumonia, usually of mild severity. Some authors pay attention to the presence of concomitant pathology as the main risk factor for the development of SARS-CoV-2-associated pneumonia in children. However, in a systematic review and meta-analysis by C.R. Jutzeler et al. it is reported that out of 1054 children with COVID-19, only 2 people had comorbid diseases. According to CT data, 65% of patients had changes in lung tissue. Thus, it is relevant to study the features of the course of COVID-19 in children.

The purpose of the study: to study clinical and laboratory features of the course of pneumonia associated with COVID-19.

Material and methods: A study was conducted with the participation of 55 children (30 boys, 25 girls) hospitalized in COVID Cent from May 2020 to June 2021 with a diagnosis of COVID-19, moderate/severe course, pneumonia of viral/viral-bacterial etiology. The diagnosis was verified according to modern clinical and laboratory criteria for etiological diagnosis, including by detecting COVID-19 RNA in the smear material from the mouth and nasopharynx by polymerase chain reaction (PCR), as well as taking into account modern clinical and radiological criteria for viral lung damage using specialized methods of radiation diagnostics.

The criteria for inclusion in the study were: Age from 2 years to 15 years. Verified (by detecting COVID-19 RNA in the smear material from the mouth and nasopharynx by PCR) diagnosis of "new coronavirus infection COVID-19". The presence of signs of lung tissue damage typical for pneumonia of viral etiology according to CT scans of the chest organs. Age younger than 2 years and older than 14 years. A negative result of a PCR test for the detection of COVID-19 RNA in the

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smear material from the oropharynx and nasopharynx. Absence of changes in lung tissue according to X-ray computed tomography of the chest organs.

Statistical processing was carried out using Microsoft Office Excel-2012. Taking into account the limited number of observations, the absence of a normal distribution, nonparametric statistics methods were used. For correlation analysis, Spearman's rank correlation coefficient (r) was calculated with an assessment of the significance level (p). The differences were considered statistically significant at $p \leq 0.05$.

Research results: The analysis of the gender-age structure of the study group of patients revealed no significant differences in the incidence of COVID-19-associated pneumonia depending on gender. The age of the youngest patient was 2 years, the oldest — 15 years. Among the examined patients, the predominance of children over the age of 14 years was noted.

All patients were hospitalized in COVID Cent for emergency indications, of which 22 (40%) were delivered by transport of the emergency medicine center from district hospitals of the region, 17 (30.9%) were admitted by the direction of the district pediatrician, 14 (25.5%) children were delivered from home by ambulance teams, 2 more (3.6%) were hospitalized by self-referral.

In the first 3 days from the onset of the disease, 20 (36.4%) children were taken to the hospital, on the 4th-6th day — 19 (34.6%) children, on the 7th-10th day — 12 (21.8%) children, 2 (3.6%) children were admitted on the 11th-14th day, 2 (3.6%) the child was taken to the hospital after 14 days from the moment of the appearance of the first clinical symptoms.

32 (58.2%) patients had intrafamily contact with relatives with laboratory-confirmed COVID-19, for 23 (41.8%) the source of infection could not be established. 17 (30.9%) patients had various comorbidities: obesity — in 9 (16.4%), hypertension — in 4 (7.3%), diseases of the central nervous system (CNS) — in 3 (5.5%), congenital heart defects - also in 3 (5.5%), bronchial asthma — in 2 (3.6%), bronchopulmonary dysplasia — in 1 (1.8%). Note that 5 (9.1%) children had a combination of obesity with pathology of the cardiovascular system. At the time of admission, the condition of the majority of patients (53 children, 96.4%) was assessed as moderate, 2 (3.6%) children were in serious condition. The severity was due to the presence of respiratory disorders and the severity of intoxication syndrome.

Among the clinical manifestations of infectious toxicosis, fever of varying severity was most often recorded: subfebrile — in 22 (40%) patients, febrile — in 20 (36.4%), fever of more than 39.1 C (high febrile fever) at the time of admission was

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noted in 6 (10.9%). Body temperature was normal in 7 (12.7%) patients. The median body temperature was 37.8 °C.

In 9 (16.3%) patients, the phenomena of respiratory insufficiency of the 1st-2nd degree occurred. Indicators of blood oxygen saturation, as a rule, corresponded to normal values, only in 5 (9%) cases there was a decrease in saturation <95%.

An increase in respiratory rate (tachypnea) was detected in 19 (34.5%) people. Tachycardia was observed in 37 (67.3%) patients. Violations of taste and/or smell were registered in 17 (30.9%) children, mainly in the older age group. Gastrointestinal symptoms and skin rash were much less frequently detected.

The presence of a lesion of the lung tissue, typical for pneumonia of viral etiology, was established on the basis of CT data of the chest organs. In 35 (63.6%) patients, lung damage corresponded to mild severity, in 14 (25.5%) changes characteristic of moderate severity were detected, in 5 (9%) severe lung tissue damage was observed, in 1 (1.8%) — extremely severe damage. In 35 (63.6%) sick children, the presence of concomitant respiratory infection was revealed. Thus, IgM antibodies to Mycoplasma pneumoniae were detected by the ELISA method in 15 (27.3%) patients, and pathogens of different species, among which pneumococci were the dominant pathogens, were sown by the bacteriological method when analyzing a smear from the throat in 29 (52.7%) children. At the same time, mixed mycoplasma cocci infection was registered in 6 (10.9%) cases.

These results indicate that concomitant respiratory infection of mycoplasma, pneumococcal and mixed etiology was most often diagnosed in children with COVID-19-associated pneumonia. Treatment of patients with community-acquired pneumonia associated with COVID-19 was carried out in accordance with current guidelines and included antiviral drugs, nonsteroidal anti-inflammatory drugs, mucolytics, anticoagulants and glucocorticosteroids. Oxygen therapy was performed in 5 cases. In the presence of concomitant infection, antibacterial drugs were prescribed, taking into account the sensitivity of the isolated pathogen to them. Against the background of ongoing therapy, positive dynamics was observed in the condition of all patients. There were no fatal outcomes in the sample of patients studied by us. The average length of stay in the hospital was 17±5 bed days. Normalization of temperature was observed on the 6th-9th day of inpatient treatment. Among other clinical manifestations, anosmia, cough and ageusia persisted the longest. By the time of discharge, the cough phenomena were stopped in all patients, but only 5 out of 21 children recovered their sense of smell and taste. Complete regression of laboratory changes was achieved in 19 (34.5%) cases. 53 (96.4%) children were discharged in satisfactory condition under the further

supervision of a district pediatrician at the place of residence. The condition of 2 patients at the time of discharge was assessed as moderate severity, which was due to the presence of severe concomitant pathology.

Conclusion. Thus, among hospitalized patients with community-acquired pneumonia associated with COVID-19, there was a predominance of children over the age of 12 years. At the same time, 30.9% of patients had concomitant diseases, among which the most common were obesity, pathology of the cardiovascular system and the central nervous system. In addition, 63.6% of patients were diagnosed with concomitant respiratory infection, most often mycoplasma, pneumococcal and mixed mycoplasma-pneumococcal etiology. In most patients, lung damage corresponded to mild and moderate severity, severe and extremely severe lung tissue lesions were detected much less frequently — in 9.1% and 1.8% of cases, respectively. At the same time, a statistically significant positive correlation was revealed between the degree of lung tissue damage and the presence of concomitant diseases, as well as a deviation from the norm of a number of laboratory parameters.

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