
# Heart Damage and Arrhythmias in Children After Coronavirus Infection: Early and Remote Observations

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**ABSTRACT**

The article presents data on complications of coronavirus infection in children, such as carditis, cardiopathy and pericarditis, as well as rhythm and conduction disorders.
Signs of carditis were detected in 7 (13.5%) children, signs of infectious-toxic cardiopathy in 15 (28.8%) children, exudative pericarditis – in 9 (17.3%) patients, and in 4 of them simultaneously with the detection of fluid and in the pleural cavity.Sinus tachycardia was observed in 76.9% of 52 patients, sinus bradycardia – in 3.8%, atrioventricular block 1 degree – in 3.8%, atrioventricular block 2 degree – in 3.8%, atrioventricular block 3 degree – in 1.9% of the child. Ventricular extrasystole was detected in 5.8%, and in 1 of them – by the type of bigemenia, in 1.9% – supraventricular tachycardia, in 3.8% – atrial rhythm, in 3.8% – pacemaker migration, in 23.1% of patients a significant (P <0.01) prolongation of the QT interval was detected.

**Keywords:** coronavirus infection, children, carditis, cardiopathy, pericarditis, rhythm and conduction disorders.

Currently, covid infection and its complications in the early and late periods are of great interest. The incidence of COVID-19 among children according to the American Heart Association (AHA) is about 17.6% of all cases, and mortality is 0.1%[1].Now,when the pandemiccoronavirusinfection has declined, attention is drawn to more distant complications of this disease, including cardiovascular[1,2,3]. Etiopathogenetic, epidemiological, age-related, clinical and other aspects of this problem are being studied [4]. In children, viral diseases are often complicated by various rhythm and conduction disturbances[5,6,7].

Cardiovascular complications, in particular various arrhythmias, after a covid infection are among the most frequent and insidious, difficult to treat and aggravate the condition of patients [1,2,8,9,10]. And the children's contingent is no exception [1].

Numerous reports on this issue have revealed a number of patterns. In particular, it has been shown that more cardiovascular complications were detected in patients infected with the SARS-CoV-2 virus compared to SARS-CoV [12]. The latter are characterized by severe respiratory syndrome [11]. Chinese experts studied arrhythmias against the background of current covid infection, they report that the overall frequency of cardiac arrhythmias in patients hospitalized for COVID-19 is 16.7%. A higher incidence of arrhythmias (44%) was observed in patients with COVID-19

admitted to the intensive care unit [11]. Goyal P. et al. when monitoring 130 patients on artificial lung ventilation, cardiac arrhythmias were recorded in 18.5% of patients [8]. However, arrhythmias developing in Covid-recovered patients are of our interest.

Hypoxemia in the presence of acute respiratory syndrome, myocardial damage caused by a cytokine crisis, an increase in the level of catecholamines, electrolyte disturbances, metabolic changes in conditions of increased cardiac stress, which leads to destabilization of cardiac processes, including number of rhythm and conduction. These disorders begin against the background of the infection itself and, most likely, cannot immediately disappear after recovery [1,4].

In addition, cardiac arrhythmias can develop against the background of carditis, cardiopathy, and pericarditis; at the same time, they can become an independent complication of coronavirus infection [12]. In the AAS statementon coronavirus infection and related complications of the cardiovascular system in children, it is emphasized that lesions of the cardiovascular system are not typical for the course of coronavirus infection in children, although cases of cardiogenic shock, myocarditis, pericarditis and arrhythmias, including ventricular tachycardia and atrioventricular blockade of the 1st degree[1].

**Goal of the work:**to characterize the lesions of the cardiovascular system after covid infection in children.

**Material and research methods.** We examined 52 children aged 2 to 14 years 2 weeks to 6 months after covid infection (only confirmed cases). In addition to the general clinical examination, he underwent ECG and echocardiography. According to the results of the survey, prior to the covid infection, our patients had no complaints from the heart, they had not previously been examined and had not received treatment from a cardiologist.

**Results.** All lesions of the cardiovascular system after a coronavirus infection can be divided into 2 groups: lesions of the heart muscle and other membranes and heart rhythm and conduction disturbances. These changes occurred both in children who had a severe covid infection and in children with a mild course of the disease. The earliest time to contact us is 2 weeks after recovery from coronavirus, the latest is 6 months.

Parents paid attention to increased fatigue (96.2%), lethargy and drowsiness, irritability, decreased appetite, weakness (76.9%), shortness of breath after exercise (48.1%) and at rest (5.8%), palpitations (57.7%), pain in the heart (38.5%), sweating (40.4%), decreased diuresis (19.2%).

An objective examination was characterized by pallor, sweating of the palms and feet, as a manifestation of vascular dystonia, and sometimes subfebrile temperature. On examination, an increase in the area of the apex beat and its strengthening, or weakening. Changes in the boundaries of the heart, predominantly to the left, were detected infrequently. When listening - muffled heart tones, arrhythmias (listed below), systolic murmur at the apex of the heart and at Erb's point.

After examination and ECG, we observed the following. Thus, sinus tachycardia was observed in 40 (76.9%) of 52 patients, sinus bradycardia - in 2 (3.8%), 1st degree blockade - in 2 (3.8%), 2nd degree - in 2 (3, 8%), 3 degrees - in 1 (1.9%) child. In 3 (5.8%) - ventricular extrasystole was detected, and in 1 of them - by the type of bigemia, in 1 (1.9%) - supraventricular tachycardia, in 2 (3.8%) - lower atrial rhythm, in 2 ( 3.8%) - migration of the pacemaker, in 12 (23.1%) patients a significant ($P<0.01$) prolongation of the QT interval was detected. Rhythm disturbances, with the exception of sinus tachycardia, were detected mainly in children older than 3 years.

According to echocardiography, signs of carditis (increased LV EDR and decreased ejection fraction) were detected in 7 (13.5%) children, signs of ITCH (LV overload, hypokinesia of the left ventricle, IVS) in 15 (28.8%) children, exudative pericarditis (liquid in the pericardial cavity) - in 9 (17.3%) patients, and in 4 of them simultaneously with the detection of fluid in the pleural cavity.

Arrhythmias were accompanied by metabolic (71.2%), hypoxic-ischemic (13.5%) and electrolyte disorders (15.4%) according to ECG data.

Only in 3 (5.8%) cases we carried out antiarrhythmic therapy: in a child with supraventricular tachycardia with verapamil and in 2 children with severe persistent sinus tachycardia with metaprolol. The remaining patients received complex therapy with cardiotropic drugs, intravenous immunoglobulins and diuretics, against which most of the rhythm and conduction disturbances gradually recovered.

**Discussion:** Our studies do not contradict the literature data, according to which one of the most common arrhythmias in COVID-19 is sinus tachycardia and bradycardia [1,2,13,14,15].Yu CM et al.[16]report that the most common finding in a cohort of 121 patients with COVID-19 infection was sinus tachycardia with an overall incidence of 72%, which is also consistent with our observations. Sinus tachycardia remained stable for 30 days after hospital discharge in 40% of patients. Sinus bradycardia was observed in 14.9% of patients[16].Unlike tachycardia, which was persistent, bradycardia disappeared in a shorter time [11]. However, in our study, bradycardia also persisted for at least about 2 months [15].

According to [14], sinus bradycardia was recorded in some patients, followed by episodes of accelerated idioventricular rhythm, in another study, the authors report the persistence of sinus bradycardia for 2 weeks after the onset of sinus node dysfunction. In the report of Kir D. et al. we found data on atrioventricular blockade of 2-3 degrees were observed in a patient with COVID-19 infection, while echocardiography and cardiac biomarkers were within the normal range [17]. With regard to prolongation of the QT interval, this condition is also associated with the use of azithromycin in the standard of care for infection [18].

**Conclusions:** Coronavirus infection, regardless of severity, in some cases causes damage to the cardiovascular system in children.

Among the lesions of the membranes of the heart, myocardial dystrophy, myocarditis, pericarditis are detected. At an early age, changes in the type of myocarditis are characteristic; dystrophy, pericarditis were detected in different age groups.

Another group of disorders are various arrhythmias. Among arrhythmias - the most common are sinus tachycardia and bradycardia, atrioventricular blockade, sinus rhythm substitution, and QT interval prolongation should.

The majority of rhythm and conduction disorders do not require antiarrhythmic therapy and gradually disappear under the influence of cardiotropic therapy.

**Literature**


1. Pei-Ni Jone, Chair; Anitha John, Matthew E. Oster, et all Sars-Cov-2 infection and associated cardiovascular manifestations and complications in children and young adults: a scientific statement from the american heart association//J.Circulation, 2022,May:1036-1052
2. Long B., Brady WJ, Koyfman A. et al. Cardiovascular complications in COVID-19 // Am. J. Emerg. Med., 2020; Vol. 38(7):1504–1507.
3. Khazova E.V., Valiakhmetov R.V., Bulashova O.V., Malkova M.I. Cardiac arrhythmias in new coronavirus infection (Covid-19) // J. Practical medicine. 2021. №6:10-13
4. Aghagoli G., Gallo MB, Soliman LB et al. Cardiac involvement in COVID-19 patients: Risk factors, predictors, and complications: A review // J. Card. Surg., 2020; Vol. 35:1302–1305.
5. Хаятова З. Б. и др. Особенности ферротерапии у женщин с железодефицитной анемией и воспалительными заболеваниями органов малого таза //РМЖ. Мать и дитя. – 2019. – Т. 2. – №. 2. – С. 108-112.

6. Abdukadirova N. B., Telmanovna X. S. Options clinical manifestations of giardiasis in children //Eurasian Research Bulletin. – 2023. – Т. 17. – С. 167-170.
7. Раббимова Д. Т. и др. Особенности распределения HLA-антигенов у младенцев с сепсисом //Вопросы науки и образования. – 2019. – №. 27 (76). – С. 32-39.
8. Goyal P., Choi JJ, Pinheiro LC et al. Clinical characteristics of Covid-19 in New York City//N Engl J Med., 2020; Vol. 382(24):2372–2374.
9. AbdukadirovaN. B., RabbimovaD. T., KhayatovaZ. B. The role of connective tissue dysplasias in pathology of various body systems // Journal of Siberian Medical Sciences, 2020;3:126-135.
10. Achilova F. A., Ibatova Sh. M., Abdukadirova N. B. The prevalence of minor heart anomalies in children according to echocardiography data // International Journal of Scientific Pediatrics, 2022; 5: 11-15.
11. Peigh G., Leya MV, Baman JR et al. Novel coronavirus 19(COVID-19) associated sinus node dysfunction: a case series //Eur Heart J., Case Rep.,2020;Vol.10:1–6.
12. Kodirova MM Shadieva Kh.N. Bolalarda norevmatik miokarditning EKGdagi asosiy simptomlari //J. gastroenterol. research, 2022; 1(3):33-36.
13. Шадиева Х.Н., Хайдарова С.Х., Мамутова Э.С. ВПС: масштаб проблемы, выявление факторов риска развития ВПС//Ж. гастроэнтерол. исследований, 2021; 3,2(2):67-69
14. Шадиева Х.Н., Хайдарова С.Х., Мамутова Э.С. Клинический случай ДКМП, осложненной желудочковой экстрасистолией и тромбом ЛЖ. //Ж. гастроэнтерол. исследований, 2021; 3,2(2):51-55
15. Шадиева Х. Н., Мамутова Э. С. Нарушения ритма сердца у детей после перенесенной коронавирусной инфекции (Covid-19) //Журнал гепато-гастроэнтерологических исследований, 2022; 3(3): 52-54.
16. Yu CM, Wong RS, Wu EB et al. Cardiovascular complications of severe acute respiratory syndrome // Postgrad. Med. J., 2006;Vol. 82(964):140–144.
17. Kir D., Mohan C., Sancassani R. Heart break: an unusual cardiac manifestation of coronavirus disease 2019 (COVID-19) // JACC Case Rep., 2020; Vol. 2:1252–1255.
18. Mercuro NJ, Yen CF, Shim DJ Risk of QT interval prolongationassociated with use of hydroxychloroquine with or without concomitant azithromycin among hospitalized patients testing positive for coronavirus disease 2019 (COVID-19)//JAMA Cardiol., 2020; Vol. 5:1036-1042