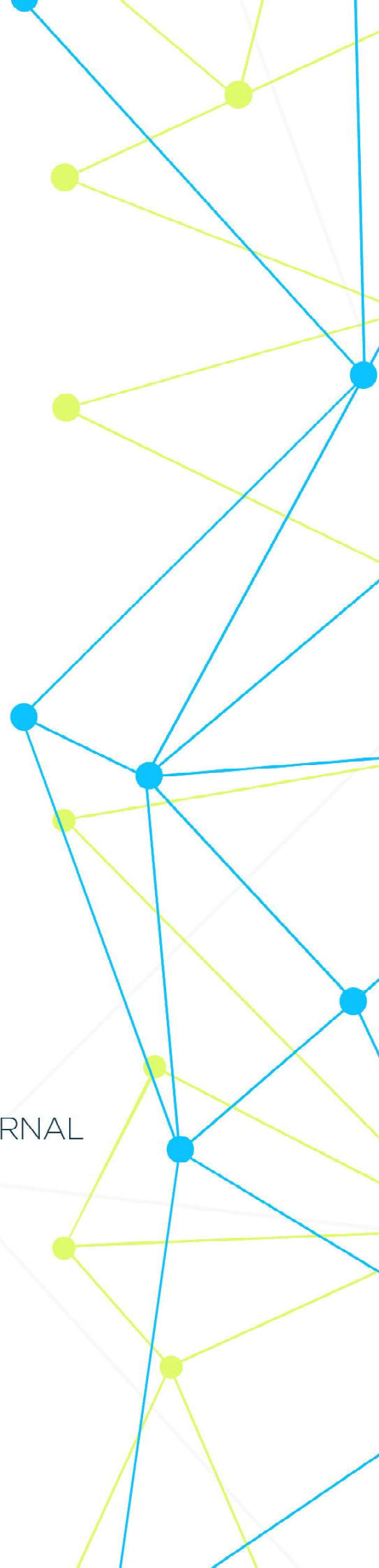


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11931 Barlow Pl Philadelphia, PA 19116, USA +1 (929) 266-0862

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**OPHTHALMOLOGIC COMPLICATIONS IN THE STRUCTURE OF THE
CLINICAL FEATURES OF NOVEL CORONAVIRUS INFECTION (COVID-19)**

**Kasimova Munirakhon Sadikjanovna,
Iminova Mufazzal Muzaffarovna
Ashurov Olimjon Mirzazhanovich**

Center for Development of Professional Qualifications of Medical Workers
Republican Clinical Ophthalmology Hospital
Tashkent Emergency Hospital

Abstract.

The data from 26 patients suffering from COVID-19 during the manifestation of the disease served as the material for the research. The features of pathological processes in various parts of the organ of vision have been demonstrated with the help of ophthalmologic and standard examination methods. The data received, together with information from the reference materials, allow us to draw conclusions about the damage to the structures of the organ of vision under COVID-19, depending on the concomitant somatic pathology and the state of homeostasis in the body. Emphasis is placed on multifactorial lesion of both the front segment and the vitreoretinal interface. Today, the variability of ophthalmic complications is demonstrated in the form of catarrhal conjunctivitis, vascular and inflammatory lesions, in the flesh to the phlegmon of the orbit and thrombosis of the carotid-cavernous sinus, which is a frightful and life-threatening condition. In the light of the foregoing, it can be concluded that today the organ of vision is a target organ under COVID-19. Thus, ophthalmologists are required to develop a unified classification for ophthalmic complications under COVID-19, which facilitates the effective management and pathogenetic targeted correct therapy.

Key words: organ of vision, papillophlebitis, hemophthalmos, carotid-cavernous sinus, retrobulbar neuritis

Relevance of the topic. After severe respiratory syndrome and Middle East respiratory syndrome in 2004, the 2019 global pandemic caused by a novel β -coronavirus virus, called SARS-CoV-2, was the third coronavirus pandemic in 2019. The source of SARS-CoV-2 has not yet been identified, but there are suggestions about the zoonotic type of infection. Human-to-human transmission occurs through close contact with an infected person, due to airborne-droplets, air-dust transmission path. Also, recorded and described the contact-household and fecal-oral transmission routes. The average infected age is 51. The most severe course develops in patients 60 years and older, with concomitant diseases such as diabetes mellitus (20%), arterial hypertension (15%), and other cardiovascular diseases (15%) [1]. The clinical picture can vary from acute respiratory viral infection (mild course) 80%, to pneumonia with symptoms of respiratory failure, ARDS, respiratory distress syndrome, sepsis and septic (infectious toxic) shock (severe course). It gives negative impacts, with lesions of target organs such as heart, brain, kidneys and eyes to multiple organ failure. Hypoxemia develops in more than 30% of those infected (SpO_2 less than 88%) [2]. The disease can be attributed to generalized vasculitis, and the developing lung pathology is a variant of angiogenic pulmonary edema. The pathogenesis of COVID-19 fits not only into the picture of catarrhal phenomena in the upper and lower respiratory tract. One of the main damaging factors is a violation of blood coagulability with the start of intravascular disseminated coagulation.

At an early stage of the epidemic, ophthalmic symptoms manifested themselves in the form of follicular conjunctivitis. With the passage of time, and the clinical symptoms were studied in more depth, the sources report increasingly of damage to the posterior segment of the eyeball and the adnexa of the organ of vision. Patients with confirmed SARS-CoV-2 manifested central retinal vein thrombosis in combination with thrombosis of the lower extremities [3]. A case of papillophlebitis was registered - it is a variety of occlusion of the central retinal vein. In both cases the authors indicate that the cause was hypercoagulation [4]. In addition, there is data on the registration of vitriitis and other diseases of the choroid of an inflammatory nature. The authors suggest this can be caused by the autoimmune genesis of the disease [5].

As of today, the sources do not portray the variations of ophthalmic complications and specific management tactics for patients with severe forms of damage to the organ of vision under COVID-19.

Aim of the study. Develop generalization and summary of the variability of ophthalmic complications under (when infected with) COVID-19.

Materials and methods used. The findings from clinical and functional studies were based upon the analysis of data from 26 (52 eyes) patients with a confirmed diagnosis of COVID-19 during the period of manifestation of the disease, with ophthalmological complications. They were hospitalized in the emergency ophthalmology department of the Tashkent Clinical Emergency Hospital in the period from 09.10.20 - 20.11.2020. Among them, there were 13 males, 11 females, aged 18 to 81. The SARS-CoV-2 virus was detected through PCR testing in 18 (69%) patients. All patients were diagnosed with polysegmental viral pneumonia with the 1-3rd degree of severity of lung lesions, according to computed tomography (CT) and through ARF (Acute Respiratory Failure) testing - 1-2nd degree severities. In the medical history of somatic diseases, hypertension was recorded in 5 (19%) patients, type II diabetes mellitus was recorded in 9 (34.6%) patients, 5 (19%) patients had mild and moderate iron deficiency anemia, 5 (19%) patients had rhinosinusitis, sinusitis was recorded in 2 (7.6%). 2 patients suffered from ophthalmic complications in the form of moderate myopia, open-angle glaucoma was found in 1 patient, cataracts was found in 3 patients, diabetic retinopathy in the paired eye was found in 4 patients, and 2 patients had hypertensive angiopathy.

The research involves: collection of anamnestic data and complaints about the presence of changes in taste and smell; clarification of the degree of severity CT according to medical records.

In compliance with the Temporary Methodological Recommendations developed by the Ministry of Health of Uzbekistan, with purpose of prevention, diagnosis and treatment of new coronavirus infection, patients with COVID-19 received symptomatic, immune-modulatory, antiviral, anticoagulant, prophylactic antibacterial therapy.

All patients received traditional ophthalmological examinations, such as: visometry with determination of the maximum corrected visual acuity, according to the table (HCP 700, Huvitz, Korea), auto-refractometry, tonometry (Maklakov), non-contact ophthalmotometry (TRK-1P, Topcon, Japan), B-scanning, statistical perimetry (HFA 745 i, Carl Zeiss, Germany), direct and reverse ophthalmoscopy (with a 90.0D non-contact lens, in addition to the standards, optical coherence tomography (OCT) was performed on the RTVue 100 apparatus (Optovue, USA). The patients also received MRI of the brain as well as consultation based on indications from ENT specialists, neurosurgeons, hematologists and endocrinologists.

Analysis of the statistical data. Details are presented for continuous values as average and standard deviation; for an overview of the presence of signs, the absolute number of patients and the percentage of the total group size are presented. Fisher's exact test

was used to compare the data. $P < 0.05$ was considered a statistically significant difference. Statistical data processing was carried out on a personal computer using Microsoft Excel 2016 software.

Results

Bacterial conjunctivitis encountered in 2 (7.5%) cases, and acute catarrhal conjunctivitis in 2x (7.5%) cases.

All patients with ID (iron deficiency) anemia of varying degrees suffered from acute herpetic keratitis - 4 (15%); acute iridocyclitis was observed in one patient with type II diabetes mellitus and in 2 patients with rhinosinus (11.5%); posterior uveitis in 4 (15%) patients with type II diabetes mellitus; in 3 patients with hypertension of various degrees and type II diabetes mellitus and in one patient isolated with hypertension, hemophthalmus was recorded in total - 4 (15%); acute circulatory disorders in the central retinal artery in 2 (7.6%) patients with hypertension; neurovasculitis was observed in the 1 (3.8%) patient with ID anemia; the patient with retrobulbar neuritis had no concomitant pathology -1 (3.8%); phlegmon of the orbit, followed by thrombosis of the cavernous sinus - was observed in 3 patients (11.5%) with rhinosinusitis and sinusitis.

Findings

The cited arguments justify the cause of multifocal damage to the organ of vision when infected with COVID-19. The degree and nature of disorders in the tissues of the organ of vision depends on the individual characteristics of the organism.

Provided we consider ID anemia as a factor influencing immunodeficiency, then the level of ID anemia under COVID-19 can contribute to the development of other viral infections (in our cases Herpes simplex). Metabolic syndrome have brought vascular complications such as ischemic (in nature), and complications of an inflammatory nature. The latter was complicated ENT pathologies up to cavernous sinus thrombosis. Based on the afore-mentioned, it can be concluded that today the organ of vision is a target organ under COVID-19, and ophthalmologists need to develop a unified classification concerning ophthalmic complications under COVID-19. This facilitates the management and pathogenetic targeted correct therapy.

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