

Ophthalmological manifestations of a new coronavirus infection

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Abstract. The relevance of our study lies in the fact that at the moment there is little information in the modern medical literature on the ophthalmological manifestations of the new coronavirus infection. This can be attributed to the short period of time from the appearance of SARS-CoV-2 in the human population, it's still insufficiently understood. Also, during the period in a pandemic, due to quarantine measures, high morbidity, the lack of the possibility of conducting in-depth examinations of the ophthalmological profile, difficulties were noted in providing specialized assistance to the population. Retrospective and prospective collection of information on the course of ophthalmic diseases against the background of somatic polymorbidity in persons who have undergone a new coronavirus infection remains relevant, which will allow us to draw reliable conclusions about the effect of SARS-CoV-2 on the organ of vision and its adnexa under the conditions of a specific individual (personalized approach).

Keywords: new coronavirus infection, ophthalmopathies, polymorbidity

Introduction

The pandemic of the new coronavirus infection has established a number of problems associated with the difficulty in providing ophthalmic care to the population and the poor knowledge of the effect of SARS-CoV-2 on the eye and its adnexa. According to the results of some studies, the appearance of covid-associated conjunctivitis in both humans and animals has been proven, while the contact route of the virus entering the body is characteristic [4,5,6]. A characteristic feature of SARS-CoV-2 is damage to the vascular endothelium and the development of endotheliosis, in particular of the eyeball and the accessory apparatus of the eye [1]. As a result, blepharitis, phlegmon of the orbit, conjunctivitis, keratitis, lesions of the choroid (uveitis, neuroretinovasculitis), neuritis develop [2,3]. Also, the manifestations of endotheliosis can be considered thrombosis of the own vessels of the eye. The relevance of ophthalmological observation of patients who have undergone a new coronavirus infection remains relevant, since there is still not enough information on the course of eye diseases both during the clinical manifestations of the infection and during the convalescent period [1,2,3]. Therefore, we believe that the data will be interesting and relevant for both ophthalmologists and doctors of other specialties.

Purpose of the study – to establish the features of the somatic status and ophthalmological manifestations of the new coronavirus infection.

Materials and methods. 12 patients were under our supervision, of which men - 10 (83.3%), women - 2 (16.6%) with a new coronavirus infection, who received treatment in the ophthalmology department of an adult hospital SBHCI TO "Oblast Clinical Hospital № 2" February 2020 to May 202. Median age was 51 years (range 18 to 70). The analysis of clinical,

laboratory and instrumental data of patients was carried out depending on the period of the disease (incubation, period of precursors, period of main manifestations, period of extinction and period of recovery). The structure of primary ophthalmic manifestations is presented as follows. The onset of ophthalmic diseases (it took from 7 to 14 days before the development of clinical manifestations) was noted in 25% (3/12) of patients. The onset of ophthalmic manifestations coincided with the development of the COVID-19 clinic in 33.3% of patients (4/12). Patients with eye damage after suffering a new coronavirus infection accounted for 41.6% (5/12), of which men - 33.3% (4/12), women - 8.3% (1/12), while the average number days from the diagnosis of COVID-19 to hospitalization in the specialized ophthalmological department was 47.7 days (from 22 to 83 days).

Results and discussion

The structure of ophthalmic nosologies in the analyzed group is presented in table 1.

Table 1

The structure of ophthalmic masks depending on the periods of the course of the new coronavirus infection.

Periods of infection Nosology	Incubation abs(%)	Clinical manifestations abs(%)	Reconvalescence abs(%)
Bilateral optic neuritis	1(8.33%)	-	-
Thrombosis of the CRV branch	1(8.33%)	-	-
Corneal ulcer	1(8.33%)	-	4(33.33%)
Keratouveitis	-	1(8.33%)	-
Iridocyclitis	-	1(8.33%)	-
Orbit phlegmon	-	1(8.33%)	-
Bilateral neuroretino-vasculitis	-	1(8.33%)	-
Bilateral panuveitis	-	-	1(8.33%)

A detailed analysis of the onset of ophthalmopathies in COVID-19 showed that they developed only in men, while bilateral damage to the optic nerve was noted at the age of 34, without the presence of concomitant somatic polymorbidity, 14 days before the clinical manifestations of the infection. Retinal vascular pathology was detected 7 days before infection at the age of 59 years in a man with systemic atherosclerosis, grade II arterial hypertension, risk 3. A corneal ulcer

was diagnosed at the age of 60 years in 10 days, against the background of chronic blood pathology (mild congenital anemia). The manifestations of ophthalmopathies in combination with the clinical manifestation of coronavirus infection were accompanied by the development of phlegmon of the orbit in a 40-year-old man with a history of penetrating trauma of the lower eyelid, conjunctiva 3 days before the development of infection and the absence of somatic polymorbidity. Damage to the retinal tissue and blood vessels was revealed in a young woman, aged 18 years, with the presence of ulcerative colitis, total lesion, severe debut with clinical improvement; chronic gastroduodenitis in remission, chronic mild anemia, reactive thrombocytosis. Pathology of the cornea and choroid of the eyeball was noted in a 34-year-old man without somatic polymorbidity, with a history of a second-degree corneal chemical burn within 7 days of the disease. An isolated lesion of the choroid, anterior section (iridocyclitis) was revealed in a 48-year-old man with a history of reactive arthritis of large joints five years ago. Ophthalmopathies in the convalescent period of infection are represented by one total lesion of the choroid (panuveitis) and four changes in the fibrous membrane (corneal ulcers). The onset of panuveitis of fungal etiology in the patient was noted 81 days after the onset of clinical manifestations of the new coronavirus infection, while diabetes mellitus developed against the background of massive antibiotic therapy carried out in a single hospital.

Somatic polymorbidity was systemic atherosclerosis, grade III arterial hypertension, risk 4, mild chronic anemia. Corneal ulcers were diagnosed in three men and one woman (mean age $62.25 + 4.75$ years) with a history of systemic atherosclerosis, stage II - III arterial hypertension, and type II diabetes mellitus was detected in two cases. The disease developed on average $47.25 + 35.1$ days after the beginning of the clinic for coronavirus infection. Corneal lesions are characterized by: the depth of the lesion (up to $\frac{1}{2}$ of the corneal stroma), slow regeneration of the process, a long stay in the ophthalmological hospital, on average $20.21 + 5.1$ days, and the threat of perforation.

Clinical case. Patient R., 59 years old, on January 27, 2021, was admitted to the adult ophthalmology department SBHCI TO "OCH № 2" with complaints of decreased vision in the left eye that appeared 4 days before the visit. From the anamnesis it is known that the patient suffers from arterial hypertension, constantly takes perindopril, cardiomagnēt. He denies other chronic diseases. Local status upon admission: Visus OD = 0.2 s/k +1.75 = 1.0; OS = 0.1 s/k +1.75 = 0.5. OS is calm. TP is normal. The cornea and moisture of the anterior chamber are transparent. The anterior chamber is of medium depth. The pupil is medically dilated, round. The fundus reflex is pink. On the fundus: OND is pale pink, clear boundaries. The arteries are narrowed, the veins are dilated. In the course of the superior temporal branch of the CRV,

multiple streak-like hemorrhages, exudate deposition (fig. 1). In the macular region, retinal edema. The periphery was unremarkable. OD is calm.

The patient is consulted by a therapist.

A comprehensive survey was carried out. The general analysis of blood revealed lymphocytosis 40.8%, monocytosis 13.3%. According to the results of the coagulogram, a decrease in APTT to 24 cm was found. Biochemical blood test and general urine analysis without abnormalities. Electrocardiography - sinus rhythm, 77 beats. in min, incomplete blockade of the right bundle branch block. According to the USDG data of the vessels of the extracranial basin, no hemodynamically significant violations of patency were revealed. Conclusion USDG of vessels of the intracranial basin: a decrease in the velocity indicators of blood flow in the middle cerebral artery (MCA), posterior cerebral artery (PCA) on both sides. Lack of blood flow in both vertebral arteries (VA) at the transcranial level. Computed tomography of the chest: CT scan may correspond to presumably viral pneumonia, CT-1.

As a result of a comprehensive examination, the diagnosis was made: partial thrombosis of the superior temporal branch of the central retinal vein of the left eye. Initial age-related cataract in both eyes. Arterial hypertension stage II, stage 2, risk 3 (high). NPS: Incomplete right bundle branch block. HSN-I. without specifying FC. The following treatment was prescribed: diuretics (mannitol 200 ml intravenously for 2 days, diacarb 250 mg 2 times a day orally for 4 days), parabolbar injections (dexamethasone 4 mg / ml 0.5 ml once a day for 7 days, heparin 750 IU once a day 7 days), instillations of dexamethasone 0.1% 3 times a day and tropicamide 1% 1 time a day were prescribed. The patient also received drugs to control blood pressure (enalapril 5 mg 2 times a day, hydrochlorothiazide 12.5 mg in the morning). The treatment proceeded with positive dynamics.

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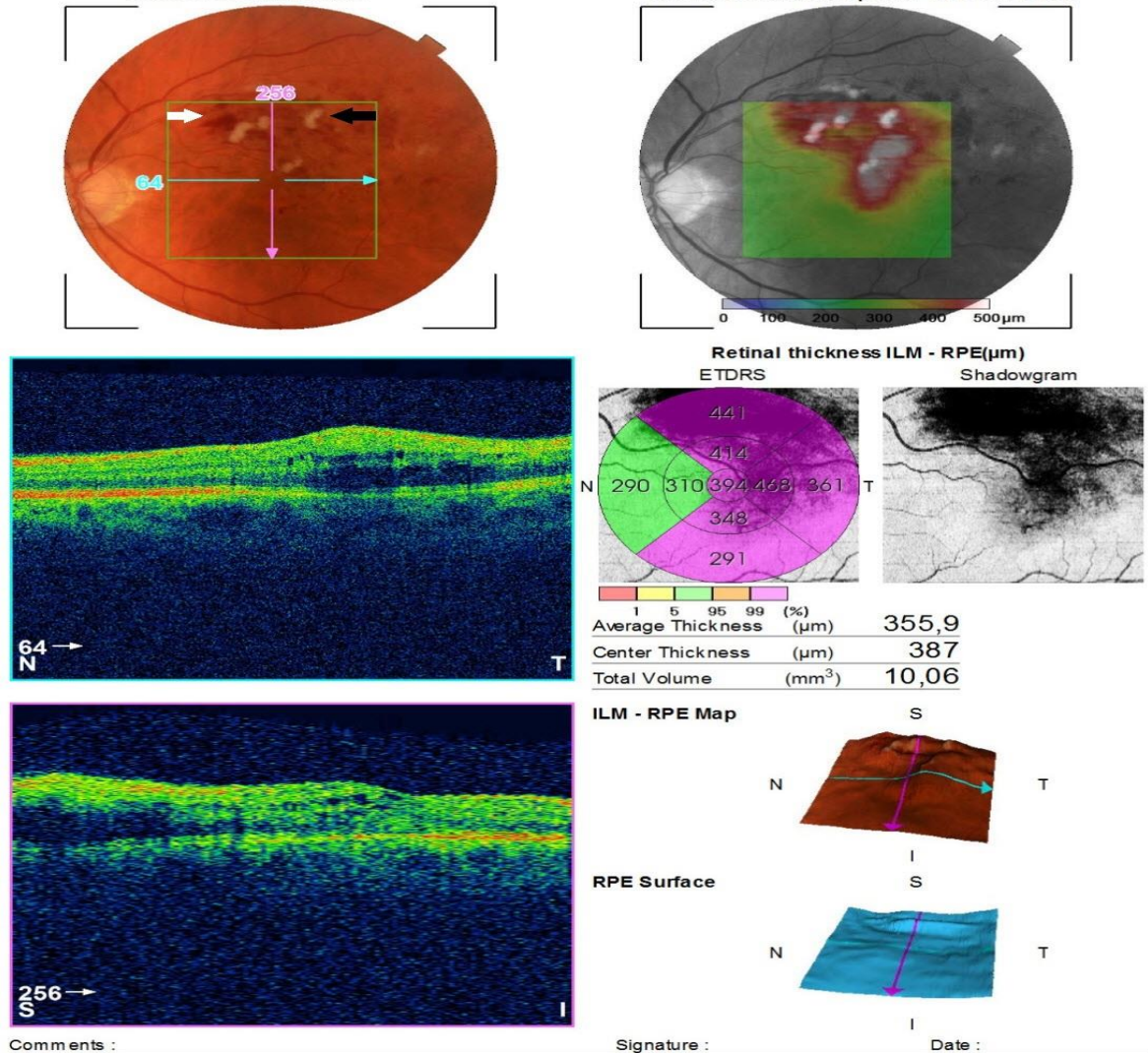


Fig. 1. Data of optical coherence tomography of the fundus of the left eye of patient R. White arrow denotes streak-like hemorrhages along the superior temporal branch of the CRV. The black arrow indicates the location of the exudate.

02.02.21 the patient began to worry about the increase in body temperature to 37.1C°, deterioration of health, the appearance of a runny nose. A nasal and pharyngeal swab was taken for a new coronavirus infection. The result was positive. For treatment, the patient was transferred to the infectious mono-hospital of the OCH № 1. Local status at checkout: Visus OD = 0.2 s/k +1.75 = 1.0 OS = s/d 0.1 s/k +1.75 = 0.5 – 0.6. OS is calm. TP is normal. The cornea and moisture of the anterior chamber are transparent. The anterior chamber is of medium depth. The pupil is medically dilated, round. In the lumen of the pupil, the lens with initial opacities.

The fundus reflex is pink. Fundus: OND is pale pink, clear borders. The arteries are narrowed, the veins are dilated. Along the course of the superior temporal branch of the CRV, multiple streak-like hemorrhages at the stage of resorption, exudate deposits decreased. In the macular area, the retinal edema is less. The periphery was unremarkable. OD is calm. Recommendations of an ophthalmologist for further therapy for thrombosis of the branch of the central retinal vein: dexamethasone 0.1% 4 times a day for 2 weeks, nepafenac 0.1% 3 times a day for 2 weeks, emoxipin 1% 4 times a day for 1 month.

Thus, the presence of arterial hypertension in this patient, insufficient blood flow in both VA at the transcranial level, and a new coronavirus infection in the incubation stage led to endotheliosis of the vessels of the eyeball, which, in turn, caused partial thrombosis of the superior temporal branch of the central retinal vein of the left eye.

Conclusions

Our study has shown that men are more likely to be affected by eye damage with a new coronavirus infection. The risk of damage to the organ of vision is higher in patients with somatic polymorbidity, or trauma to the eyeball, blood pathology, chronic diseases of the gastrointestinal tract, diabetes mellitus. The debut of ophthalmic manifestations in coronavirus infection is represented by optic neuritis, corneal ulcer, and thrombosis of the CRV branch. Damage to the nervous tissue of the eyeball (optic neuritis, retinovasculitis) is typical for young patients and has a bilateral character. It can be the primary manifestation of a new coronavirus infection during the incubation period, or together with the manifestation of clinical manifestations of the disease. Ophthalmic masks of COVID-19 convalescents are characterized by the presence of ulcerative processes of the cornea, located mainly in the optical zone, which makes it possible to judge the development of generalized endotheliosis of the eyeball vessels leading to a malnutrition of the cornea, a decrease in its regenerative capacity, long-term healing and the threat of perforation. Long-term use of antibacterial drugs as an etiotropic therapy for complications of a new coronavirus infection is fraught with the development of bilateral lesions of the choroid of the eyeball of fungal etiology.

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