


Transient myopia due to choroidal effusion: A novel ocular complication of COVID-19 infection

*Nilutparna Deori, Mohit Garg¹,
Harsha Bhattacharjee¹, Dipankar Das², Mitesh Jain¹,
Rajendra N Gogoi³, Arup Deori³*

Access this article online	
Quick Response Code:	Website: www.ijo.in
	DOI: 10.4103/ijo.IJO_972_21

Department of Paediatric Ophthalmology, Ocular Genetics and Myopia Clinic, Sri Sankaradeva Nethralaya, Guwahati, ¹Department of Comprehensive Ophthalmology, Sri Sankaradeva Nethralaya, ²Department of Uvea, Ocular Pathology and Neurophthalmology, Sri Sankaradeva Nethralaya, ³Department of Ophthalmology, Assam Medical College, Dibrugarh, Assam, India

Correspondence to: Dr. Mohit Garg, Sri Sankaradeva Nethralaya, Beltola, Guwahati - 781 028, Assam, India. E-mail: doctormohitgarg@gmail.com

Received: 23-Apr-2021

Revision: 17-Aug-2021

Accepted: 21-Sep-2021

Published: 23-Dec-2021

COVID-19 was declared as a global pandemic by the WHO in 2020. Although it is a respiratory virus, ocular complications and manifestations of the infection have been reported in different forms. We report a case of transient myopia and narrow angles due to choroidal effusion following infection by the SARS-COV-2 virus. We propose that the ability of the virus to incite an inflammatory response in the host body may be the mechanism behind the disease entity. This is a novel, previously undocumented ocular complication in case of a COVID-19 infection.

Key words: Acute myopia, choroidal effusion, COVID-19

The world recently faced a new threat in the form of a virus that was given the status of a global pandemic by the WHO.^[1] COVID-19 is caused due to infection by a respiratory virus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).^[2] The virus, owing to its high infectivity, spreads quickly and widely, and its numbers are still increasing.^[3]

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

Cite this article as: Deori N, Garg M, Bhattacharjee H, Das D, Jain M, Gogoi RN, *et al.* Transient myopia due to choroidal effusion: A novel ocular complication of COVID-19 infection. Indian J Ophthalmol 2022;70:316-8.

Although it is primarily a respiratory virus, the close anatomical relationship between the eye and the respiratory tract enables the virus to reach and infect the ocular structures.^[4] In addition, the receptors of respiratory and ocular epithelial cells have been shown to share similar structural configurations, which might explain the affinity between the virus and the ocular tissue.^[4] Various clinical ophthalmic presentations of COVID-19 infection have been described, including episcleritis,^[5] anterior uveitis,^[6] retinal hemorrhages,^[7] optic neuritis,^[8] and cranial nerve palsy.^[9]

SARS-COV-2 has been isolated in the tear of infected patients, and there are several case reports of conjunctivitis related to the virus. However, to the best of our knowledge, there is no other documented case of COVID-19 presenting with choroidal effusion, acute angle closure, and transient myopia.

Case Report

A 28-year-old female, who is a medical student, was tested positive for COVID-19 by rapid antigen test and confirmed by RT-PCR. During her stay in the hospital, she was treated with remdesivir for 3 days and with dexamethasone (tapering dose). Her respiratory symptoms were relieved after 3 days and she was managed conservatively for COVID-19 after that. During treatment, after 10 days of initiating therapy, she started complaining of sudden-onset diminution of vision with autorefractometer values of -3.00 DS (OU), which progressed to -6.00 DS in both the eyes in the next 3 days. The patient was tested negative for COVID-19 by RT-PCR test and was referred to our eye clinic for further management. On arrival, the uncorrected visual acuity was 6/24 (OD) and 6/60 (OS). On subjective refraction, the patient presented -5.50 DS in the right eye (OD) and -7.00 DS in the left eye (OS) with a best-corrected visual acuity (BCVA) of 6/6 and 6/9, respectively. Color vision was intact. On Goldman's applanation tonometry, the intraocular pressure (IOP) was 26 mm Hg in OD and 24 mm Hg in OS. On gonioscopy, no angle structures were seen in both the eyes (OU). Slit-lamp examination revealed narrow angles in both eyes and there was no other significant anterior segment finding noted. +90 D fundus examination through undilated pupils revealed normal disc and macula. Further investigations were ordered for evaluation. Ultrasound bio-microscopy (UBM) of both eyes revealed a shallow AC due to anterior pushing of the iris, with the right eye having cystic choroidal effusion in the temporal and inferior quadrant and the left eye having cystic changes nasally [Fig. 1]. Ultrasound B-scan (USG-B) of OD revealed a shallow choroidal effusion in the superior temporal quadrant

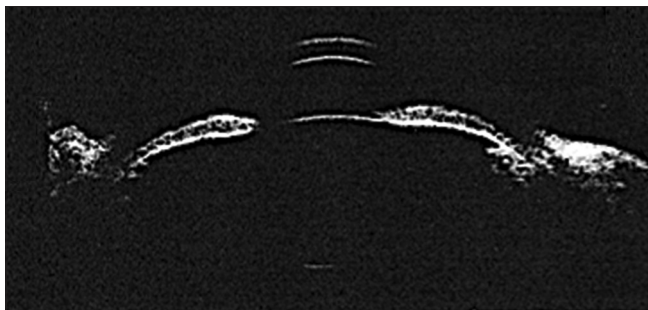


Figure 1: Ultrasound bio-microscopy (UBM) on presentation revealed a shallow AC due to anterior pushing of the iris, ciliary body thickening, and cystic changes

with a mild increase in macular thickness. USG B-scan of OS also revealed a shallow choroidal effusion in the inferior and temporal quadrant. VEP, which was done to rule out optic nerve involvement, was suggestive of a normal waveform OU along with a normal Humphrey visual field analysis. Systemic examination and investigations were within normal limits apart from mild elevation in ESR levels. The patient was started on eyedrop (e/d) timolol maleate 0.5% 1 drop twice daily in OU to control the IOP. In addition, three doses of intravenous methylprednisolone, 1 gm in 200 ml ringer lactate each, were administered targeted at the ciliary and choroidal effusion. The patient was followed up after 4 days when the uncorrected visual acuity was recorded to be 6/9 OD and 6/6 P OS. IOP recorded by NCT was 21 mm Hg OD and 19 mm Hg OS. The patient was started on a tapering dose of oral prednisolone started at a weight-matched recommended dosage. After 5 days, the patient reported no blurring of vision. The visual acuity recorded was 6/6 OU without any optical correction. The IOP was 18 mm Hg OD and 16 mm Hg OS. On gonioscopy, the angles were found to be open OU until scleral spur. USG B-scan revealed a normal study with resolution of the choroidal effusion. UBM done was suggestive of a normal anterior chamber depth and a significant decrease in the cystic changes in the ciliary bodies OU [Fig. 2]. The patient since then has maintained a 6/6 uncorrected visual acuity in both eyes without any systemic or topical medications for more than a year now.

Discussion

Acute transient myopia along with acute angle closure has been reported with several systemic conditions such as diabetes mellitus, diarrhea, icterus, influenza, angioneurotic edema, and acute nephritis. In addition, it has been reported as a side effect of many drugs, such as acetazolamide,^[10] sulphonamide,^[11] oseltamivir,^[12] and cabergoline.^[13]

The mechanism proposed for the pathology is the edema of the ciliary body which leads to a shift of the lens-iris diaphragm assembly anteriorly leading to both the shallowing of the anterior chamber and the myopic shift.^[14]

The mechanism of coronavirus, a respiratory virus, infecting the ocular tissues has not been fully understood, but theories put forward include direct infection with aerosol, infection through the nasolacrimal duct, or hematogenous through the lacrimal gland.^[15] Also, studies have demonstrated ACE2 and TMPRSS2 receptor expression in the ocular tissues, making them susceptible to coronavirus infection.^[16]

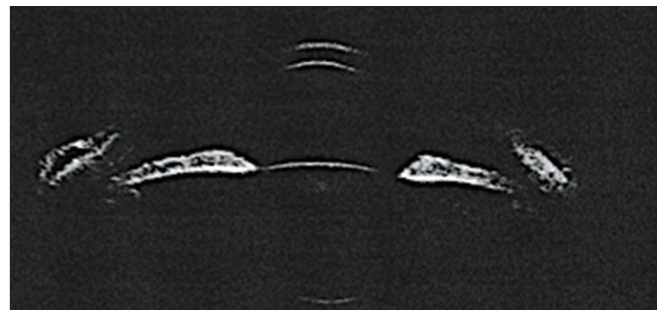


Figure 2: UBM done after treatment suggestive of a normal anterior chamber depth and a significant decrease in the cysts in the ciliary bodies

In this case, the patient presented with myopia after testing positive for the COVID-19 virus. Through a detailed inquiry into the patient's history and careful systemic examination, other inflammatory causes of choroidal effusion and transient myopia were excluded. Another possibility of remdesivir being the cause of the symptoms was negated as the symptoms of the patient did not resolve spontaneously by stopping antiviral drugs.

It has been proposed that SARS COV-2 infection can activate auto-immunity by observing raised titers of auto-antibodies in infected patients.^[17] In addition, animal experiments with intraocular inoculation of coronaviruses have been shown to have incited inflammatory responses and auto-immune reactions with the breakdown of the blood-retinal barrier and vascular exudation. Choroidal effusion has been reported with other viral infections as well.^[18,19]

The onset of symptoms after the infection proves the temporal relationship and the evidence of inflammation following COVID-19 infection makes it biologically plausible. Alternate explanations of any other systemic or local illness were disproven by detailed systemic and ocular examination and investigations. Therefore, we propose that the SARS COV-2 virus infection is the cause of the transient myopia observed in this case.

Conclusion

Incidence of clinical ocular manifestations of COVID-19 infection is uncertain. Reported here, choroidal effusion and transient myopia is a previously undocumented presentation of COVID-19 infection. The exact mechanism for the disease process needs to be studied further to answer many imperative and indispensable queries.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Coronavirus (COVID-19) events as they happen. Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen>. [Last accessed on 2021 Mar 20].
2. CDC COVID-19 Response Team. Severe outcomes among patients with Coronavirus disease 2019 (COVID-19) - United States, February 12-March 16, 2020. *MMWR Morb Mortal Wkly Rep* 2020;69:343-6.
3. Zhao W, Yu S, Zha X, Wang N, Pang Q, Li D, *et al*. Clinical characteristics and durations of hospitalized patients with COVID-19 in Beijing: A retrospective cohort study. *medRxiv* 2020. doi: <https://doi.org/10.1101/2020.03.13.20035436>.
4. Belser JA, Rota PA, Tumpey TM. Ocular tropism of respiratory viruses. *Microbiol Mol Biol Rev* 2013;77:144-56.
5. Méndez Mangana C, Barraquer Kargacin A, Barraquer RI. Episcleritis as an ocular manifestation in a patient with COVID-19. *Acta Ophthalmol (Copenh)* 2020;98:e1056-7.
6. Mazzotta C, Giancipoli E. Anterior acute uveitis report in a SARS-CoV-2 patient managed with adjunctive topical antiseptic prophylaxis preventing 2019-nCoV spread through the ocular surface route. *Int Med Case Rep J* 2020;13:513-20.
7. Marinho PM, Marcos AAA, Romano AC, Nascimento H, Belfort R. Retinal findings in patients with COVID-19. *Lancet* 2020;395:1610.
8. Sawalha K, Adeodokun S, Kamoga G-R. COVID-19-induced acute bilateral optic neuritis. *J Investig Med High Impact Case Rep* 2020;8:2324709620976018.
9. Belghmaidi S, Nassih H, Boutgayout S, El Fakiri K, El Qadiry R, Hajji I, *et al*. Third cranial nerve palsy presenting with unilateral diplopia and strabismus in a 24-year-old woman with COVID-19. *Am J Case Rep* 2020;21:e925897.
10. Transient myopia following the use of acetazolamide - PubMed. Available from: <https://pubmed.ncbi.nlm.nih.gov/13497648/>. [Last accessed on 2021 Mar 20].
11. The mechanism of transient myopia induced by sulfonamide therapy - PubMed. Available from: <https://pubmed.ncbi.nlm.nih.gov/6979937/>. [Last accessed on 2021 Mar 20].
12. Lee JW, Lee JE, Choi HY, Lee JS. Oseltamivir (Tamiflu)-induced bilateral acute angle closure glaucoma and transient myopia. *Indian J Ophthalmol* 2014;62:1165-7.
13. Razmjoo H, Rezaei L, Dehghani A, Peyman A, Akhlaghi M. Bilateral angle-closure glaucoma in a young female receiving cabergoline: A case report. *Case Rep Ophthalmol* 2011;2:30-3.
14. Jampolsky A, Flom B. Transient myopia associated with anterior displacement of the crystalline lens. *Am J Ophthalmol* 1953;36:81-5.
15. Harrison AG, Lin T, Wang P. Mechanisms of SARS-CoV-2 transmission and pathogenesis. *Trends Immunol* 2020;41:1100-15.
16. Zhou L, Xu Z, Castiglione GM, Soiberman US, Eberhart CG, Duh EJ. ACE2 and TMPRSS2 are expressed on the human ocular surface, suggesting susceptibility to SARS-CoV-2 infection. *Ocul Surf* 2020;18:537-44.
17. Gao Z, Wang X, Lin F, Dong K. The correlation between SARS-CoV-2 infection and rheumatic disease. *Autoimmun Rev* 2020;19:102557.
18. Cruz-Villegas V, Berrocal AM, Davis JL. Bilateral choroidal effusions associated with dengue fever. *Retina Phila Pa* 2003;23:576-8.
19. Uveal Effusion Associated with Presumed Viral Encephalitis: Ocular Immunology and Inflammation: Vol 0, No 0. Available from: <https://www.tandfonline.com/doi/abs/10.1080/09273948.2020.1797110>. [Last accessed on 2021 Mar 20].