

Bilateral acute anterior uveitis and optic nerve edema as a manifestation of coronavirus disease-2019 (COVID-19): a case report

Aria Mohamadzadeh¹ and Dena Mohamadzadeh²

¹Razi University of Kermanshah

²Kermanshah University of Medical Sciences

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Introduction:

Coronavirus disease-2019 (COVID-19) is a novel infection, that first appeared in Wuhan, China. It has been well established that different organs including the heart, kidney, pulmonary and gastrointestinal systems might be involved during or post COVID-19 infection. A possible reason is that the virus enters host cells through the angiotensin-converting enzyme 2 (ACE 2) receptor and this receptor is expressed by different human organs [1]. ACE 2 receptor is also expressed in different parts of the eyes including the conjunctiva, cornea, limbus, aqueous humor, and retina [2].

In addition, COVID-19-associated multisystem inflammatory syndrome in children (MIS-C) can affect different organ systems including skin, renal, cardiac, hematological, and gastrointestinal systems. But ocular involvement is not still a part of the world health organization (WHO) criteria or the Center for Disease Control and Prevention criteria for MIS-C [3].

Whether uveitis or optic disk edema would be manifestations of acute COVID-19 infection or they can occur as a part of COVID-19-associated MIS-C is still unknown.

Case presentation:

A nine-year-old girl presented to the emergency department of Dr. Mohammad Kermanshahi Pediatric Hospital in Kermanshah City, Iran on September 25, 2021. She complained of fever, myalgia, loss of appetite, headache, cough, diarrhea, abdominal pain, and skin rashes. Her symptoms initiated five or six days prior to this hospitalization and her fever was not controlled by Acetaminophen syrup. She also complained of blurred vision, photophobia, pain, and redness of the eyes on the day of hospitalization. Her parents claimed that she had had mild gastrointestinal symptoms such as diarrhea about four weeks ago which lasted for two days and resolved completely without specific treatment. Her past medical history and familial history were unremarkable.

On general examination, her vital signs were as follows: pulse rate of 98 beats/minute, respiratory rate of 20, blood pressure of 100/65 and she was not febrile on the day of admission. Jaundice, paleness, and cyanosis of the skin were absent. Lymphadenopathy was not detected. Diffuse erythematous patches and plaques were observed on her face, trunk, and limbs. A ciliary injection was detected in her eyes. Eye movements were normal in all directions and were not painful. Pupil's size and their reaction to light were normal. Examination of the respiratory and cardiovascular systems was within normal limits. Abdominal examination was unremarkable.

Laboratory investigation showed hemoglobin of 13.4 mg/dl, white blood cell count (WBC) 8.9

$\times 10^3/\text{mm}^3$ (differential count: neutrophils 88%, lymphocytes 7%), platelet counts $191 \times 10^3/\text{mm}^3$, creatinine 0.9 mg/dl, aspartate transaminase (AST) 16 IU/L (normal:0-31 IU/L), alanine transaminase (ALT) 20 IU/L (normal:0-34 IU/L), alkaline phosphatase (ALP) 196 U/L (normal:64-306 U/L), erythrocyte sedimentation rate (ESR) 26 mm/hr and C-reactive protein (CRP) was positive. Urine analysis and stool examination were normal. Blood and urine cultures were sterile. PCR (polymerase chain reaction) testing for COVID-19 was positive.

Ultrasonography of the abdomen was done and revealed no pathological finding. Chest CT (computerized tomography) scan showed mild bilateral pleural effusion, mediastinal lymphadenopathy, and sub-segmental atelectasis (Figure 1). Echocardiography was remarkable for the pericardial effusion of 6-millimeter thickness, mild MR (mitral regurgitation), and mild TR (tricuspid regurgitation). MIS-C (a multisystem inflammatory syndrome in children) was suspected and she was started on Methylprednisolone 30 mg/ daily with gradual tapering to oral prednisolone 5 mg/ daily and IVIG 2 gr/kg in four divided doses.

An ophthalmologist visited the patient. Slit lamp examination and indirect ophthalmoscopy were performed. Bilateral acute anterior uveitis was documented. Findings of the slit lamp examination included mild ciliary injection, anterior chamber reaction with 2+ cells, and flares. The posterior chamber was clear. Examination of the fundus showed bilateral optic disc edema. Orbital sonography showed increased thickness of both optic nerves. Corticosteroids and cycloplegic eye drops were added to the ongoing treatment. The ocular symptoms improved gradually. In the follow-up echocardiography, pericardial effusion decreased to 3mm. She was discharged in stable condition. Repeated ophthalmologic examinations after discharge showed gradual improvement.

Discussion:

Acute anterior uveitis is the most common type of uveitis and is defined as inflammation of the iris (middle layer of the eyes). While idiopathic uveitis is the major type, various etiologies have been described for uveitis including autoimmune inflammatory systemic disorders (AIDS), infections, side effects of medications, eye injury, etc. [4] AIDS-causing anterior uveitis including HLA B-27 associated spondyloarthritis, Juvenile idiopathic arthritis-associated uveitis, sarcoidosis, systemic lupus erythematosus, Behcet's syndrome and Crohn's disease [5]. Viruses have been found to be the commonest infectious agents causing anterior uveitis. Common etiologies of viral anterior uveitis are herpes simplex virus, varicella-zoster virus, cytomegalovirus, and rubella. Human immunodeficiency virus and human T-cell lymphotropic virus type 1 are less common etiologies [6].

Here, we reported a case of bilateral anterior uveitis and optic disk edema with a positive PCR test for COVID-19 infection. She met the MIS-C diagnostic criteria of both WHO and, the Center for Disease Control and Prevention (united states) for the presence of fever, skin rashes, diarrhea, cardiac involvement, respiratory involvement, elevated ESR and CRP, and positive PCR of COVID-19. As we know MIS-C leads to multi-organ involvement, but ocular involvement is not a part of the diagnostic criteria yet [3]. Bettach et al [7] described a 54-year-old female diagnosed with bilateral anterior uveitis. She was hospitalized for multi-system inflammatory syndrome secondary to COVID-19 infection two weeks prior to the diagnosis of uveitis. At that time, she was treated with corticosteroids, vasopressors, and antibiotics. In contrast, our patient had a negative PCR test for COVID-19 from a nasopharyngeal swab but SARS-CoV-2 immunoglobulin G was positive showing a previous COVID-19 infection. She has successfully treated with topical dexamethasone 0.1% and cycloplegia. This previous case report confirms the concept that uveitis could be a part of multisystem inflammatory syndrome secondary to COVID-19 infection.

Based on the current knowledge of COVID-19 infection, various organs could be affected during the acute phase of COVID-19 infection. The reason is the expression of the ACE 2 receptor by different human tissues, which builds the main route for the virus to enter tissue cells. Different parts of the ocular system might be invaded through this mechanism. Conjunctivitis is the most well-recognized ocular involvement in COVID-19 infection [8]. Alcalde et al [9] investigated 17 children with COVID-19, in which conjunctivitis was the most frequently detected ocular finding (three patients). Two patients had episcleritis, one had retinitis,

and one had optic neuritis. Mazzotta et al [10] reported acute anterior uveitis and acute bilateral follicular conjunctivitis in a 30-year-old female patient with a positive PCR test for COVID-19. Iriqat et al [11] reported three cases of uveitis in 19, 29, and 62-year-old males. The first one had bilateral anterior uveitis, the second one had bilateral intermediate and posterior uveitis, and the last one had right eye iridocyclitis. Rheumatologic tests returned negative for all of them. They were successfully treated with topical and systemic steroids.

We conclude that acute anterior uveitis and optic disk edema could be a manifestation of the acute phase of COVID-19 infection or occurs as a part of MIS secondary to COVID-19. Since uveitis could be an eye-threatening condition, physicians must pay attention to this less-recognized manifestation of COVID-19 infection to avoid irreversible complications.

Ethics approval and consent to participate

Approval was not needed by the local Clinical Research Ethics Committee for case reports.

Consent for publication

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of the written consent is available for review of the Editor-in-Chief of this journal.

Conflict of interests

The authors declare that they have no competing interests.

Data availability statement

Data is available if requested

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Authors' contributions

DM conceived the idea to report the case. AM was responsible for data collection. DM and AM drafted the manuscript. All authors read and approved the final manuscript.

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References:

1. Zou X, Chen K, Zou J, Han P, Hao J, Han Z. Single-cell RNA-seq data analysis on the receptor ACE2 expression reveals the potential risk of different human organs vulnerable to 2019-nCoV infection. *Front Med.* 2020;14(2):185-92.
2. Collin J, Queen R, Zerti D, Dorgau B, Georgiou M, Djidrovski I, et al. Co-expression of SARS-CoV-2 entry genes in the superficial adult human conjunctival, limbal and corneal epithelium suggests an additional route of entry via the ocular surface. *Ocul Surf.* 2021;19:190-200.
3. Kabeerdoss J, Pilania RK, Karkhele R, Kumar TS, Danda D, Singh S. Severe COVID-19, multisystem inflammatory syndrome in children, and Kawasaki disease: immunological mechanisms, clinical manifestations and management. *Rheumatol Int.* 2021;41(1):19-32
4. Tsirouki T, Dastiridou A, Symeonidis C, Tounakaki O, Brazitikou I, Kalogeropoulos C, et al. A Focus on the Epidemiology of Uveitis. *Ocul Immunol Inflamm.* 2018;26(1):2-16.
5. Forrester JV, Kuffova L, Dick AD. Autoimmunity, Autoinflammation, and Infection in Uveitis. *Am J Ophthalmol.* 2018;189:77-85.
6. Babu K, Konana VK, Ganesh SK, Patnaik G, Chan NSW, Chee SP, et al. Viral anterior uveitis. *Indian J Ophthalmol.* 2020;68(9):1764-73.

- Bettach E, Zadok D, Weill Y, Brosh K, Hanhart J. Bilateral anterior uveitis as a part of a multisystem inflammatory syndrome secondary to COVID-19 infection. *J Med Virol.* 2021;93(1):139-40.
- Roshanshad A, Ashraf MA, Roshanshad R, Kharmandar A, Zomorodian SA, Ashraf H. Ocular Manifestations of Patients with Coronavirus Disease 2019: A Comprehensive Review. *J Ophthalmic Vis Res.* 2021;16(2):234-47.
- Fernández Alcalde C, Granados Fernández M, Nieves Moreno M, Calvo Rey C, Falces Romero I, Noval Martín S. COVID-19 ocular findings in children: a case series. *World J Pediatr.* 2021;17(3):329-34.
- 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.
- Iriqat S, Yousef Q, Ereqat S. Clinical Profile of COVID-19 Patients Presenting with Uveitis - A Short Case Series. *Int Med Case Rep J.* 2021;14:421-7.

Figure 1a & b: Chest CT (computerized tomography) scan showing A. bilateral pleural effusion (8 mm on right and 4 mm on the left), B. mediastinal lymphadenopathy (the biggest= 7 mm), and C. sub-segmental atelectasis in the right middle lobe (RML) and right lower lobe (RLL).

