Case report

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Identification of SARS-CoV-2 RNA in the conjunctival swab of an Italian pediatric patient affected with COVID-19: A case report

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Abstract

Introduction: To report a case of identification of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) RNA in ocular specimen in a pediatric patient affected with Coronavirus disease 2019 (COVID-19) with no signs of ocular involvement.

Case description: A 11-year old male patient with confirmed COVID-19 infection was hospitalized at the Pediatric Clinic Clinic of the IRCCS Foundation and Hospital San Matteo, Pavia, Italy. Three days after hospital admission, because of the patient complaining very mild ocular symptoms, an ophthalmological evaluation was performed. No signs related to conjunctivitis or keratitis were found but a conjunctival swab was collected as well, based on patient's medical history. The specific SARS-CoV-2 reverse transcription PCR (RT-PCR) was performed, unearthing the presence of viral RNA from the swab. On day 25 from hospitalization, the conjunctival swab was repeated, giving negative result.

Conclusions: This is the first report of the identification of SARS-CoV-2 RNA in ocular specimen in a pediatric patient without signs of ocular involvement. However, despite the transmission through tears is theoretically possible, it is still unclear whether this could be considered as an important route for the spread of SARS-CoV-2.

Keywords
COVID-19, conjunctival swab, pediatric patient

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Introduction

Coronavirus disease 2019 (COVID-19) is a respiratory syndrome caused by a novel type of Coronavirus, identified for the first time in late December 2019 and later referred as Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2).[1] In March 2020, the World Health Organization (WHO) recognized COVID-19 as a pandemic, due to the steep case number increase worldwide, and the overall mortality caused by the disease (https://www.who.int/).

Currently, SARS-CoV-2 presence on the ocular surface is debated.[2] Noteworthy, keratoconjunctivitis and other ocular abnormalities (conjunctival hyperemia, chemosis, epiphora, increased secretion) have been described as an early clinical sign of the disease, evidenced in up to 31.6% of patients.[3] Reports of SARS-CoV-2 RNA identification in the conjunctival swabs of adult patients affected by COVID-19 and with concomitant ocular signs and symptoms have been described.[3,4]

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Table 1. Results for nasal and conjunctival swabs tests.

Days from hospitalization	SARS-CoV-2 RNA cycle threshold (Ct gene S/ORF1ab)	
	Nasal swab	Conjunctival swab
0	Positive (15.58/16.10)	–
3	–	Positive (25.40/26.10)
10	Positive (20.20/21.20)	–
16	Positive (29.70/30.60)	–
19	Positive (32.00/37.70)	–
23	Negative	–
25	Negative	Negative

Case description

A 11-year old male Caucasian patient was referred to our Pediatric Clinic for medical investigation, due to prolonged and strict contacts with a family member affected with COVID-19. At the first visit, on 4 April 2020, the patient was asymptomatic (no cough, tiredness, sore throat, or diarrhea) and no sign of upper respiratory tract infection was present. Body temperature was 37.3°C. Patient's blood work showed a slight increase of transaminase values and of the serum lactate dehydrogenase (aspartate transaminase, 48 mU/ml, alanine transaminase, 43 mU/ml, Gamma-glutamyltransferase, 27 mU/ml, lactate dehydrogenase, 622 mU/ml). Chest x-ray was negative for pneumonia, but lung ultrasound examination demonstrated slight pleural irregularity, associated with mild degree interstitiopathy. On the same day, nasal swab has been collected and SARS-CoV-2 RNA was identified by testing with real-time reverse transcription polymerase chain reaction (RT-PCR) (Simplexa™ COVID-19 direct assay, DiaSorin S.p.A., Gerenzano, Italy).

Being affected by SARS-CoV-2 infection, the patient was hospitalized and a treatment regimen with azithromycin (10 mg/kg/die twice daily) and hydroxychloroquine (5 mg/kg/die twice daily) was initiated. Three days after hospital admission, because of the patient complaining of mild ocular symptoms (stinging and tearing), an ophthalmological evaluation was performed. No signs of conjunctivitis or keratitis were found (i.e. pink eye, secretion, corneal epitheliopathy, follicular/papillary reaction), but a conjunctival swab was collected as well, based on patient's medical history. The lower eyelid was opened, and a disposable sampling swab was wiped through the conjunctiva of the lower fornix, without anesthesia. Any effort was made to avoid cross-contamination. The specific SARS-CoV-2 RT-PCR was performed on the conjunctival swab revealing the presence of viral RNA. Subsequently, nasal swabs were collected respectively 10, 16, 19, 23, and 25 days after hospital admission. SARS-CoV-2 RNA was detected in nasal swabs up to day 19, with a trend of decreasing levels of viral RNA (increased cycle threshold values), as shown in Table 1. Considering the positivity of the first nasal swabs, the serology tests were not performed during hospitalization.

Due to the absence of ocular signs and symptoms, conjunctival swab was not repeated at the same time-points of nasal swabs. To confirm complete negativity for all body fluids, conjunctival swabs were performed on day 25, giving a negative result (Table 1).

For this patient the disease had a benign course. He received treatment courses with hydroxychloroquine and azithromycin of 10 and 5 days, respectively. Blood work showed a slow and progressive reduction of transaminase values, and lung ultrasound examination, performed on 10 April 2020 (6 days after hospital admission), showed a complete resolution of the interstitiopathy. An ophthalmological evaluation, performed on the same day, confirmed the absence of clinical signs of conjunctivitis/keratitis and assessed the remission of ophthalmological symptoms. The patient was discharged from hospital on 16 April 2020, that is, 12 days after hospitalization, and quarantined until negative results of nasal and ocular swabs were achieved. These serology tests were programmed at a subsequent time but they were not fulfilled because the patient returned to his home country. A formal statement of consent was obtained from the parents of the child to publish this case.

Conclusion

The identification of SARS-CoV-2 RNA in ocular specimen of a COVID-19 pediatric patient give evidence that SARS-CoV-2 could be detected in conjunctival samples not only in adults[5] but also in children. In the time-frame 26 March–1 May 2020 eight confirmed COVID-19 cases were treated in our Pediatric Clinic, and for those the SARS-CoV-2 RNA was identified in all the nasal swabs (100.0% 8/8), whereas only one conjunctival sample was positive (12.5% 1/8).

The ocular manifestations in our COVID-19 pediatric patient seem to be milder than in adults, as observed in a group of 27 pediatric patients with COVID-19 infection and ocular manifestations at admission.[6] In this latter study, 11% of the patients were found to have SARS-CoV-2 in their ocular secretions at their first conjunctival swab. Another case of a pediatric patient with confirmed COVID-19 infection and ocular symptoms was reported in China, but no conjunctival swab was collected.[7]

To the best of our knowledge this is the first report of the identification of SARS-CoV-2 RNA in ocular specimen in a pediatric patient with no signs of ocular involvement. However, despite the transmission through tears is theoretically possible, it is still unclear whether this could be considered as an important route for the spread of SARS-CoV-2.

Data already reported support the hypothesis that SARS-CoV-2 infection is clinically milder and less frequent

in the pediatric population than in adults.[8] Age-related Angiotensin-Converting Enzyme 2 (ACE2) receptor expression, lymphocyte count, and trained immunity are thought to be the key factors behind the resilience of the pediatric population.[9] Expression of ACE2 receptor has been recently detected in the human adult conjunctival, limbal, and corneal epithelium, providing an additional portal of entry for SARS-CoV-2.[10] More studies are needed to evaluate the age-related ACE2 expression on ocular surface.

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