

# A child confirmed COVID-19 with only symptoms of conjunctivitis and eyelid dermatitis

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## Case Report

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# Abstract

The outbreak of the 2019 novel coronavirus disease (COVID-19) infection in China had quickly spread worldwide. Recent reports showed that conjunctivitis symptoms were found in a small number of adult patients diagnosed with COVID-19. But rare children diagnosed with COVID-19 were reported to have eye symptoms. Our case showed a 2 years and 10 months old child confirmed COVID-19 had no symptoms other than conjunctivitis and eyelid dermatitis, suggesting that doctors shouldn't forget to conduct COVID-19 screening when children come to hospital for ocular surface symptoms during this epidemic period.

## Background

The outbreak of the 2019 novel coronavirus disease (COVID-19) infection has become a major epidemic threat in China and the most serious in Hubei Province, inducing a global wave of anxiety.<sup>1,2</sup> WHO has increased the assessment of the risk of spread and the risk of impact of COVID-19 to very high at a global level. To date, more than 80 thousands of human infections have been confirmed in China along with more than 20 thousands of cases out of China (<http://weekly.chinacdc.cn/index.htm>). The new virus, subsequently named SARS-CoV-2 by WHO, has been rapidly sequenced and identified as a member of the coronavirus family, of which two are responsible for severe acute respiratory syndrome (SARS-CoV) and Middle Eastern respiratory syndrome (MERS-CoV). Therefore, the three kinds of virus all could lead to respiratory disease. Neither MERS-CoV nor SARS-CoV described eye symptom<sup>3-5</sup>, although the presence of the virus was confirmed by polymerase chain reaction in tears of patients with SARS-CoV infection<sup>6</sup>. Recent report showed that conjunctivitis symptoms were found in a small number of adult patients diagnosed with COVID-19, with positive results of viral nucleic acid in conjunctival sac swab samples<sup>7</sup>. Comparing to the majority of adult patients infected with COVID-19 having fever, respiratory symptoms and chest CT changes, most infected children had mild symptoms<sup>8</sup>. To date, rare children diagnosed with COVID-19 were reported to have eye symptoms. Here we report a child confirmed COVID-19 presented only symptoms of conjunctivitis and eyelid dermatitis in our hospital.

## Case Presentation

### Patient

The boy, 2 years and 10 months old, with a history of family cluster cases of COVID-19, was collected nasopharyngeal swabs and then showed positive result of SARS-Cov-2 nucleic acid through community screening on February 17, 2020. His father and grandmother were confirmed COVID-19 and hospitalized in JiangNan District of Yichang Central People's Hospital on February 4 and February 7 respectively. Given the fact that the boy had no any symptom such as cough, sputum, fever, dyspnea, crying, drowsiness, and so on, he was isolated and observed at home firstly, and then quarantined at a government designated hotel with his mother, who was healthy. During this period, the boy was treated

with traditional Chinese medicine for 2 days following the advice of the doctor in Yichang Second People's Hospital.

On February 24th, the day 7 of confirmed, the child was referred to JiangNan District of Yichang Central People's Hospital because of conjunctivitis and eyelid dermatitis for one day. He was delivered by full-term cesarean section and vaccinated according to national regulations with no previous history of other diseases or allergies. After admission, physical examination showed body temperature 36.7 ° C, pulse 112 beats / min, breathing 25 beats / min, no pharyngitis, no rhinitis and normal breathing sounds in bilateral lung. Eye examination at the bedside presented: conjunctival congestion and eyelid redness and swelling without tenderness only in the left eye, normal bilateral intraocular pressure by finger detection, normal presence of bilateral cornea, anterior chamber and pupil by flashlight inspection, and no vision loss by inquiry, which indicated that the child involved conjunctivitis and eyelid dermatitis (Figure 1). Blood tests (Table 1) showed mildly raised creatine kinase isoenzyme-MB (CKMB) and lactate dehydrogenase (LDH), revealing myocardial damage, which consistent with the summary of Shen's team<sup>8</sup>. But the slight elevated white blood cell and lymphocyte counts weren't accordant to the general regulation at present, which is that white blood cell count could be normal or decreased, with decreased lymphocyte count, in the early phase of the disease<sup>8,9</sup>. Brain natriuretic peptide (BNP) (2.61 pg / ml [0–100]) was normal, and electrocardiogram (ECG) didn't present any exception other than sinus arrhythmia. Serum antibody detection was negative for group A streptococcus, Mycoplasma pneumoniae, Chlamydia pneumoniae, adenovirus, respiratory syncytial virus, influenza virus type A and B, and parainfluenza virus type 1, 2 and 3. The chest computed tomographic scan, which is an important criterion for the diagnosis of COVID-19, didn't show any abnormality (Figure 2). While, the nasopharyngeal swabs tested by RT-PCR presenting positive result of SARS-Cov-2 nucleic acid reconfirmed the SARS-CoV-2 infection.

## Methods

At present, there is no confirmed effective therapy for the SARS-Cov-2 virus. Depending on the 6<sup>th</sup> edition of the national protocol published by the National Health Commission of China<sup>9</sup>, the child was received treatment with recombinant human interferon α2b spray (200ml: 2 million iu, tid), ribavirin (150mg, iv.gtt., q12h\*5 days) and Abidor (50mg, po., tid\*10 day). For myocardial damage, creatine phosphate (50mg, iv.gtt., qd\*5 days) was given. Subsequently, we replaced it with vitamin C (0.1g, po., bid\*4 days) and coenzyme Q10 (10mg, po., bid) to protect myocardium. Meanwhile, the child was also treated with traditional Chinese medicine like Qingwen Jiufei No. 4 (33ml, po., tid). Considering the conjunctivitis and eyelid dermatitis was mild, cefaclor (125mg, po., q8h\*4 days) was given without local eye drops for non-cooperation of the child.

## Results

Until now, the child had no symptoms other than conjunctivitis and eyelid dermatitis. On day 5 of admission, the manifestations of left eye disappeared. On March 5th, the day 11 of admission, blood

retests (Table 1) showed mildly raised creatine kinase isoenzyme–MB (CKMB) and Myoglobin (MYO) similar to the results on February 24th, but higher than those. It revealed that the myocardial damage persisted and the trend of recovery was not clear for the time being. White blood cell and lymphocyte counts were normal, but declined relative to admission tests. The SARS-Cov–2 nucleic acid wasn't detected by RT-PCR on March 4th and March 6th. In other words, the results of the viral nucleic acid were negative twice in 48 hours. Meanwhile, serum antibody detection was conducted for SARS-Cov–2, showing that IgM was negative with 9.41 AU / ml [0–10] and IgG was positive with 257.45 AU / ml [0–10]. The results of above indicated that the virus in the child had been cleared<sup>10</sup>, and whom was informed to leave hospital on March 7th, 2020.

Table 1: Partial results of blood tests after admission

	February 24th	March 5th	Reference range
White blood cell count, *10 <sup>9</sup> /L	9.57	5.02	3.5-9.5
Lymphocyte count,*10 <sup>9</sup> /L	4.48	3.20	1.1-3.2
Neutrophil count,*10 <sup>9</sup> /L	4.29	1.22	1.8-6.3
Platelet count,*10 <sup>9</sup> /L	289	298	125-350
Procalcitonin (PCT), ng/ml	<0.05	-	0-0.05
C-reactive protein (CRP), mg/L	6.5	0.5	0-10
Troponin I (CTnI), ug/L	<0.01	<0.01	0-0.01
Myoglobin (MYO), ug/L	17	60	10-46
Creatine kinase (CK), IU/L	295	-	50-310
Creatine kinase isoenzyme –MB (CKMB), ug/L	6.38	6.77	0-5.1
Lactate dehydrogenase (LDH), IU/L	329	-	120-250
Alanine aminotransferase (ALT), U/L	24	20	9-50
Aspartate aminotransferase (AST), U/L	35	30	15-40
Urea, mmol/L	5.37	-	3.1-8.0
Creatinine, umol/L	27.1	-	57-97

“-” represent no retests in this admission.

## Discussion

We report a confirmed case of COVID–19 in a 2 years and 10 months old child, who had no symptoms other than eye symptoms. The child was detected and confirmed through community screening because of his father and grandma diagnosed before. It indicated the child likely acquired SARS-CoV–2 from his household member, but it was difficult to ascertain the day of infection as being asymptomatic. On day 7 of confirmed, the child presented with conjunctivitis and eyelid dermatitis, and was admitted to our hospital subsequently. The examination after admission reconfirmed the SARS-CoV–2 infection and suggested myocardial damage, but there were no other symptoms except eye manifestations. On day 5

of admission, conjunctivitis and eyelid dermatitis of the child gradually disappeared after treatment. On days 10 to 12 of admission, negative results of viral nucleic acid twice in 48 hours, with positive IgG but negative IgM of the virus in serum, indicated that the virus had been cleared.

During the global SARS-CoV epidemic, most of children had a benign course of disease with mild respiratory symptoms, and no deaths had been reported in the pediatric population<sup>11,12</sup>. It is not clear why children under the age of 12 are less affected by infection, and one of the hypotheses is that children were slow to respond to immune disorders caused by SARS-CoV infection<sup>13</sup>. Since both SARS-COV and SARS-COV-2 belong to the  $\beta$ -coronavirus group, we could observe similar disease trajectories in these two kinds of pediatric infections. This child had no symptoms other than eye manifestations, in line with the above guess.

The child was isolated in a hotel after confirmed without further examination because of having no any symptom initially, and then referred to our hospital for eye discomfort. Occasionally, admission tests revealed his myocardial damage, though there was no clinical manifestations. According to Wang's report, 15% infant patients presented elevation of muscle enzyme in six provinces of northern China, which persisted on the 2nd to 9th day of the course<sup>14</sup>. Our child was found muscle enzyme elevation on the first day of admission, which was the 7th day after confirmed. The abnormality sustained to the discharge day, also as the 20th day of the course, meanwhile the trend of recovery was not clear for the time being. Therefore, we should closely track the blood indexes of child patients as soon as earlier to know the condition of myocardium and whole system after diagnosed even though without any clinical manifestation.

The lymphocyte count decreased in the early stage of most adult cases<sup>2,15,16</sup>, while that of this child was slightly higher than normal range in admission tests. To some extent, it was related to that the count and proportion of lymphocytes in children under 5 years old are higher than those in adults in the general population<sup>17</sup>. When leaving hospital, the lymphocyte count of the child was normal but lower than that on admission, indicating consumption of lymphocytes for viral infection. The index of lymphocyte count in this case was consistent with Wang's conclusion<sup>14</sup>. Therefore, the significance of this test for early diagnosis of COVID-19 should be combined with age and need to be confirmed by large sample data. On the whole, except for the specific detection of viral nucleic acid, the results of other laboratory tests of SARS-COV-2 infection in children had no obvious specificity and could not provide strong support for the diagnosis.

Studies had shown that ACE2 is a receptor of SARS-CoV-2 that can adsorb and lead to invasion. It is expressed not only in human type II alveolar epithelial cells, but also in cornea and conjunctiva<sup>18,19</sup>. It indicated that ocular surface tissue may also be a potential target tissue for SARS-CoV-2 infection. In fact, recent reports suggest that SARS-CoV-2 may cause conjunctivitis<sup>20</sup>. This case showed symptoms of conjunctivitis and eyelid dermatitis on day 7 of confirmed. It may be caused by virus infection, or by secondary bacterial infection with poor body resistance after systemic virus infection. After systemic

treatment such as Abidor, ribavirin and cefaclor, without local eye drops for non-cooperation of the child, the eye symptoms disappeared 5 days later.

It has been reported that SARS-CoV-2 is excreted through respiratory secretions, and respiratory droplets and contact transmission are the main routes of transmission<sup>21</sup>. It is also possible to transmit by aerosol when exposed to high concentration aerosol for a long time in a relatively closed environment<sup>9</sup>. At present, live virus has been isolated from blood, saliva and feces, but no conjunctival secretion<sup>22</sup>. In our previous report, we found positive results of viral nucleic acid from conjunctival sac swab samples by RT-PCR in two of 38 adult patients diagnosed with COVID-19<sup>23</sup>. But we didn't do experiments to confirm whether the virus was alive. In this case, we did not collect conjunctival swabs considering that it is more difficult for a 2 years and 10 months old child to cooperate.

To date, there is no direct evidence to explain the relationship between SARS-Cov-2 and eye. Our case showed a 2 years and 10 months old child confirmed COVID-19 had no symptoms other than conjunctivitis and eyelid dermatitis, which suggest that doctors shouldn't forget to conduct COVID-19 screening when children come to hospital for ocular surface symptoms during this epidemic period. And wearing eye protection (goggles) or face protection (mask) and no touching any mucosal membranes (eyes, nose or mouth) were strongly recommended to healthcare workers.

## Declarations

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**Conflict of Interest Disclosures:** None reported.

**Declarations:** This study was approved by the Medical Ethics Committee of Three Gorges University. The patient and his parents permitted to publish these information.

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## Figures

Figure 1 redacted for this preprint version

### Figure 1

(A) and (B) Day 1 of admission. The pictures showed conjunctival congestion and eyelid redness and swelling in the left eye.



**Figure 2**

(A) and (B) Day 1 of admission. The chest computed tomographic scan showed normal.