

## CASE REPORT

# Infant Case of Co-infection with SARS-CoV-2 and *Citrobacter koseri* Urinary Infection

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### ABSTRACT

Since 2019 coronavirus disease (COVID-19) is highly contagious with a high mortality rate. France has taken strict infection control measures. According to the report by the Center for Disease Control and Prevention, children are less affected with COVID-19 and seem to have less severe disease than adults. We reported the first confirmed infant case of co-infection with SARS-CoV-2 and *Citrobacter koseri* urinary infection in 6-week-old child admitted on 25 March 2020 with mild symptoms in the Pediatric COVID Unit of Amiens University Hospital, France.

### BACKGROUND

Since 2019 coronavirus disease (COVID-19) is highly contagious with a high mortality rate [1]. France has taken strict infection control measures, with a stop of almost all activities for a month, favored work at home or was possible, isolated the exposed and suspected cases according to international standards, constantly updated the diagnosis and treatment process, and carried out public education [2].

According to the report by the Center for Disease Control and Prevention, children are less affected with COVID-19 and seem to have less severe disease than adults [2, 3]. Similarly, also during the SARS-CoV and MERS-CoV epidemics, children were affected less commonly and less severely as compared with adults [3].

We report a case of 6-week-old child in France, with SARS-CoV-2 positive by real-time reverse transcription polymerase chain reaction (rRT-PCR) assay 24 h after the child started having first symptoms.

### CASE REPORT

A 6-week-old male child was admitted on 23 March 2020 to the Pediatric Emergency Services (PES) of University Hospital of Amiens-France due to fever (38.9°C) since 12 h.

He was born at 39 weeks' of gestation, Apgar scores at 1 and 5 min were 10 and 10, respectively. The infant had no moaning or spitting after birth. Birth weight was 3160 g. The mother was 25 years old with no relevant clinical history, and presented, a week before the baby's admission, ageusia and anosmia, without fever or other associated symptoms.

The father was 28 years old and presented only anosmia the day before admission.

On initial evaluation at PES, the infant presented good general condition but mildly whiny and hypotonic, was well fed with formula, weighed was 5000 g, with temperature of 38.2°C, heart rate of 160 beats per minute, respiratory rate of 30 breaths per minute, oxygen saturation (SpO<sub>2</sub>) of 100% in room air and blood pressure was 89/59 mmHg. His abdomen was soft; the liver was palpable 0.5 cm below the right costal margin, and presented no coughing and no dyspnea. The findings of the rest of the examination were unremarkable.

Laboratory tests at admission revealed a leukocyte count of 8.500/mm<sup>3</sup> (normal range, n.r., 5.000–18.000/mm<sup>3</sup>); lymphocytes 4.700/mm<sup>3</sup> (n.r. 1.100–3.200/mm<sup>3</sup>); neutrophils 2.000/mm<sup>3</sup> (n.r. 1.800–6.300/mm<sup>3</sup>); a hemoglobin (Hb) level of 10.9 g/dl (n.r. 9.4–14.1 g/dl); and platelet count of 321.000/mm<sup>3</sup> (n.r. 150.000–450.000/mm<sup>3</sup>). His lactate dehydrogenase level was 255 UI/l (n.r. 120–246 UI/l) and renal and liver function values were normal. C-reactive protein; Procalcitonin, urine strip and cytology exam of urine were negative. Rapid screening test for influenza A and B was negative.

Due to the symptoms of parents, the age and symptoms of baby (mildly whiny, fever and hypotonic), the child was admitted to the COVID-19 pediatric unit and was performed: aerobic and anaerobic blood cultures, cyto-bacteriological urine test and lumbar puncture. The SARS-CoV-2 test was performed on nasopharyngeal swab, urine, cerebrospinal fluid (CSF) and stool.

Few hours after his hospitalization, the baby presented excessive crying, for that; we performed an abdominal ultrasound that was normal.

Pending the results of microbiological tests, intravenous Cefotaxime (200 mg/kg/day divided in four doses) associated to Gentamycin (5 mg/kg/dose/day) and probiotics treatment was started.

The patient's clinical condition improved 24 h after hospitalization with a gradual disappearance of the fever and initial hypotonia.

Nasopharyngeal swab and stool tested positive for SARS-CoV-2 by rRT-PCR assay. Aerobic and

Anaerobic blood cultures tested negative, CSF cultures were sterile (both bacterial and virus: SARS-CoV-2, enterovirus ribonucleic acid, human herpes virus 6, herpes simplex virus, adenovirus). Despite the fact that urine test strip was negative, a few days later, the laboratory confirmed the positivity for *Citrobacter koseri* at the cyto-bacteriological urine test with good sensitivity to ongoing antibiotic treatment.

Five days after admission, given the good health conditions and the normal results of blood and microbiological tests, the patient was discharged with home monitoring indications for the next 3 weeks. Furthermore, given the age of baby, parents will be contacted by phone every 2 days during the next 2 weeks to ensure his physical conditions. For the positivity of *C.koseri* in the urine and the results of antibiogram, he was prescribed Clavulanic Amoxicillin at home for another 6 days.

Finally, for the presence of SARS-CoV-2 in the stool and stools relatively abundant, probiotics were prescribed for the next 2 weeks.

Two weeks after discharge, the baby was well and afebrile with no diarrhea or vomiting. The parents were advised to continue home monitoring, with a visit to their doctor if necessary.

## CONCLUSION

Our case suggests that, even in co-infection case, the clinical and therapeutic management of the baby with mild symptoms is crucial and need at the beginning of infection a hospital surveillance.

Furthermore, in infants with fecal excretion of SARS-CoV-2, it seems necessary probiotics treatment, and also before re-admission in community obtain a complete viral clearance in the stool to allow the reduction of risk of disease transmission in the population.

Seeing the low prevalence of severe form, consistent with a case series reported in Italy and China [1–4], a prompt and correct diagnosis is required to minimize unnecessary investigation and the inappropriate instigation of potentially harmful treatments, providing reassurance to parents, as well as to initiate/activate/trigger protective/correct preventive/safe behavior in doctors involved with the patient and caregivers to contain hospital outbreaks of COVID-19.

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