

# Diagnostic and therapeutic challenges in SARS-CoV-2 and Rotavirus coinfection

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## ABSTRACT

The SARS-CoV-2 infection in children associates multiple challenges related especially to the diagnosis due to the lack of symptoms or due to the polymorph clinical picture that might occur in these children, and which can often mimic a wider spectrum of pathologies. The Rotavirus infection is one of the most common etiologies of acute gastroenteritis in children which might result in increased mortality rates in small ages or in patients at risk.

We report the case of a 2-month-old male infant, without significant personal history admitted to the Pediatrics Clinic 1, COVID Compartment, Targu-Mures, for vomiting, loss of appetite, and diarrhea. The family history revealed that the paternal grandfather was confirmed with SARS-CoV-2 infection. Based on the patient's symptoms and anamnesis, he was tested and confirmed with SARS-CoV-2 by RT-PCR. The stool viral antigens confirmed also Rotavirus infection. The clinical exam at the time of admission pointed out influenced general status, diminished cutaneous turgor, abdominal tenderness at palpation and accelerated bowel movements. The laboratory tests revealed severe dehydration associated with positive inflammatory biomarkers. Taking into account the small age, the presence of coinfection and the severe dehydration, we initiated supportive treatment with rehydration solutions by vein, antibiotics, anticoagulant and symptomatic treatment. The patient's evolution was favorable with the previously mentioned treatment.

The early diagnosis of a possible coinfection in pediatric ages represents the cornerstone in preventing potential complications.

**Keywords:** SARS-CoV-2 infection, Rotavirus infection, coinfection, child

## INTRODUCTION

The cases confirmed with the new Coronavirus among pediatric patients present a smaller percentage as compared to adults, most of the times in the setting of direct contact with a positive case in the family. In children, multiple challenges related to this infection have emerged since most of the patients in this age group are asymptomatic or the clinical picture is non-specific including fever, cough, dysphagia, rhinorrhea, nasal obstruction or contrariwise, digestive symptoms such as diarrhea, vomiting or abdominal pain [1] Nevertheless, the

studies performed during the current pandemics showed that the lack of specific symptoms does not rule out the presence of infection [2]. As we already mentioned, the gastrointestinal symptoms might be present at the onset of SARS-CoV-2 infection or they might occur during the evolution. The explanation for the occurrence of this type of symptoms seems to be related to the angiotensin converting enzyme which is more expressed along the digestive tract in comparison to the respiratory one owning a role of target for the virus [3,4]. In these cases the viral nucleic acid is often detected in the stools, while the respiratory samples might be negative [5,6].

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The child's digestive pathology raises important problems of differential diagnosis taking into consideration the wide spectrum of infectious etiologies in these cases including viruses, bacteria or parasites [7,8]. In addition, child's digestive pathology represents one of the most frequent causes of referral to pediatrician or even for admission in certain cases. Moreover, one of the most commonly involved etiological agents in child's acute gastroenteritis is viral – Rotavirus, representing a major public health problem worldwide [9]. The diagnosis should be oriented by the occurrence of more than 3 diarrheic stools per day associated with abdominal pain, nausea, vomiting, loss of appetite, and fever, all of them sustaining the suspicion of acute gastroenteritis/gastro-enterocolitis.

Thus, the digestive onset can be significant in both SARS-CoV-2 and Rotavirus infections. The coinfection between these two infectious agents represents a real challenge in the management of these patients since diarrhea, vomiting and dehydration can be common causes of morbidity and mortality among children.

*The aim* of this case report is to point out the importance of early diagnosis regarding both SARS-CoV-2 and Rotavirus infection in pediatric patients, but at the same time to underline the challenges that might occur in the setting of their association.

## CASE REPORT

We report the case of a 2-month-old male infant without significant personal history, admitted to the Pediatrics Clinic I, COVID Pediatric Compartment, Targu-Mures, for vomiting, loss of appetite and diarrhea. The family history revealed that the paternal grandfather was confirmed with SARS-CoV-2 infection.

The onset of the actual disease was approximately 1 day before the admission with vomiting and loss of appetite for which the mother requested the Ambulance and the patient was brought to the Regional Emergency Department where the clinical exam revealed cyanosis, diminished cutaneous turgor, nausea associated with vomiting attempts and 2 diarrheic stools. Based on the clinical exam, a rapid antigen testing was performed which established the diagnosis of SARS-CoV-2 infection. Nevertheless, taking into account the digestive symptoms, a rapid stool antigen test was performed for other viruses and a coinfection Rotavirus was detected. Considering all the above mentioned facts and the severe dehydration sustained by both the patient's clinical exam and the laboratory tests, the patient was transferred in the our clinic for follow-up, further investigations and specialty treatment.

The clinical exam at the time of admission pointed out the following pathological findings: influ-

enced general status, pallor, diminished cutaneous turgor, mild pharynx hyperemia, abdominal tenderness at palpation, accelerated bowel movements, diarrhea, and depressed anterior fontanelle. The weight was 4100 g.

The ASTRUP exam performed at the time of admission showed severe metabolic acidosis, hyponatremia and hypopotassemia (pH: 7.14; Na: 133.7 mEq/L; K: 2.89 mEq/L; PaCO<sub>2</sub>: 23.2 mmHg; HCO<sub>3</sub>: 8 mEq/L). Thus, we initiated rehydration solutions by vein, as well as symptomatic treatment with intestinal adsorbents, anti-nausea drugs and probiotic. In order to adjust the rehydration regimen, we performed ASTRUP exam in dynamics which revealed a mild improvement of the parameters. Taking into account the small age of the patient and SARS-CoV-2 infection, we performed thoracic radiography revealing interstitial pneumonia. During the admission the patient presented during the first 72 hours influenced general status, low fever, multiple diarrheic stools, vomiting and loss of appetite. Due to the small age, the coinfection and the increases acute phase reactants (PCR 33 mg/l), we decided to associate a wide spectrum antibiotic, but also liver and gastric protection. We also assessed the cardiac markers (NT-proBNP, D-dimer), which were positive, and we initiated subcutaneous anticoagulant treatment. The echocardiography was normal.

The patient's evolution was favorable, the patient being discharged after 7 days in good general status.

## DISCUSSIONS

Viruses represent the main etiologic agent of acute gastroenteritis in pediatric patients worldwide [10]. Nevertheless, the prevalence of viral infections, including *Coronavirus* infection varies depending on both season and geographic area. Coinfections in children were reported also by older studies which proved that 36.8% of the children admitted with the diagnosis of acute gastroenteritis presented coinfections belonging to *Coronaviridae* family and other viruses such as adenovirus, norovirus, or rotavirus [11]. The most important symptoms in COVID-19 are fever, dry cough, fatigue, but according to the epidemiologic data, diarrhea can occur in approximately 2-3% of the cases accompanied in 1-5% by nausea and vomiting [11]. Although up to this moment most of the digestive symptoms were the result of certain infections with frequently encountered viruses, such as Rotavirus, COVID-19 pandemics places SARS-CoV-2 virus among the potential etiologies of these disorders [12]. Nevertheless, in our patient most-likely the symptoms were caused by both viruses explaining the slow favorable evolution during the admission. The differential

diagnosis between SARS-CoV-2 and Rotavirus is extremely difficult since both can manifest by fever and diarrhea complicated by dehydration or they can even coexist like in our case. The epidemiologic context is the first that can orient the diagnosis such as direct contact with a confirmed case like in the infant we reported above, whose grandfather was diagnosed with SARS-CoV-2 infection. The laboratory tests are mandatory for confirming the diagnosis [13].

In children, several studies proved that SARS-CoV-2 is associated with moderate to mild symptoms, therefore being extremely important to perform a thorough anamnesis and to test the child by RT-PCR whenever this infection is suspected. In a study performed by Dong et al, which included 2143 children suspected with SARS-CoV-2 infection bases on anamnesis and clinical symptoms, only 34.1% were confirmed by RT-PCR [14]. The case presented above combines both the importance of anamnesis and the establishment of diagnosis based on specific laboratory tests, although the digestive manifestations might have been explained after identifying Rotavirus in the stools. Another study performed in the Pediatrics hospital from Wuhan [15], assessed 171 children confirmed with SARS-CoV-2 infection. Most of the children included in the study (48.5%) presented cough, followed by pharynx hyperemia and fever, but digestive symptoms such as diarrhea (8.8%), nausea and vomiting (6.4%) were also present. The prevalence of severe symptoms, respective of complications appeared predominantly in children below the age of 1 year (10.6%), thus the prevalence being indirectly related to the patient's age [15]. We must mention that in our case, a 2-year-old infant, the establishment of correct diagnosis with subsequent administration of proper treatment was essential for the patient's prognosis. Although as noticed in all the studies performed during the pandemics, the percentage of children infected with SARS-CoV-2 infection is considerably lower as compared with adults, the diagnosis is crucial for monitoring the cases with increased risk. Moreover, a study realized at the onset of pandem-

ics proved that in 86% of the children remained undiagnosed and consequently unreported suggesting that they might present the real source of transmission (76%) among general population [16].

Rotavirus, the most commonly involved etiological agent in acute gastroenteritis can be at the same time the weak point of multiple complications in pediatric patients. Thus, it is predictable for each small child to present episodes of gastroenteritis especially during the first 3 years of life [17]. During the last years, multiple researches concluded that approximately 3.6 millions of cases of acute gastroenteritis due to Rotavirus are diagnosed every year among the 23.6 millions of children below the age of 5 years from the European Union. According to these reports approximately 230 deaths caused by Rotavirus and 87,000 admissions were recorded every year, and these numbers tend to increase [18]. Another study performed in the Czech Republic assessed 832 cases of acute gastroenteritis and identified viruses (74.5%) to be the most common etiology in the studies sample, with the predominance of Rotavirus in 410 children followed by Calicivirus, Coronavirus, Adenovirus and Astrovirus [19]. The authors identified the presence of coinfection in 107 cases [19].

In a retrospective study performed in the East of London, it was found that in patients admitted with gastroenteritis caused by Rotavirus, the complications such as dehydration and hydric and electrolytes imbalances were more commonly encountered than in those caused by other agents [20]. Similarly, in our case the patient presented severe dehydration.

## CONCLUSIONS

Considering the new challenges associated to the pandemics, the early recognition of symptoms, correct diagnosis and administration of subsequent therapy in order to avoid all complications represent a major importance in the management of pediatric cases with acute gastroenteritis independently of the cause.

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## REFERENCES

- Marginean CO, Melit LE, Sasaran MO. The Discrepancies of COVID-19 Clinical Spectrum Between Infancy and Adolescence - Two Case Reports and a Review of the Literature. *Front Pediatr.* 2020;8:577174.
- Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet.* 2020 Feb 15;395(10223):507–13.
- ACE2 angiotensin converting enzyme 2 [Homo sapiens (human)] - Gene - NCBI [Internet]. [cited 2022 Jun 25]. Available from: <https://www.ncbi.nlm.nih.gov/gene?Db=gene&Cmd=DetailsSearch&Term=59272>
- Gu J, Han B, Wang J. COVID-19: Gastrointestinal Manifestations and Potential Fecal-Oral Transmission. *Gastroenterology.* 2020 May;158(6):1518–9.
- Pan L, Mu M, Yang P, Sun Y, Wang R, Yan J, et al. Clinical Characteristics of COVID-19 Patients With Digestive Symptoms in Hubei, China: A Descriptive, Cross-Sectional, Multicenter Study. *Am J Gastroenterol.* 2020 May;115(5):766–73.

6. Zhou P, Yang XL, Wang XG, Hu B, Zhang L, Zhang W, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. *Nature*. 2020 Mar;579(7798):270–3.
7. Linhares AC, Bresee JS. Rotavirus vaccines and vaccination in Latin America. *Rev Panam Salud Publica*. 2000 Nov;8(5):305–31.
8. Wylie KM, Stanley KM, TeKippe EM, Mihindukulasuriya K, Storch GA. Resurgence of Rotavirus Genotype G12 in St. Louis During the 2014-2015 Rotavirus Season. *J Pediatric Infect Dis Soc*. 2017 Nov 24;6(4):346–51.
9. Kirkwood CD, Bogdanovic-Sakran N, Cannan D, Bishop RF, Barnes GL. National Rotavirus Surveillance Program annual report, 2004-05. *Commun Dis Intell Q Rep*. 2006;30(1):133–6.
10. Welsh G, Gough H, Hall W, Bradley P, Livești R, Iliescu D. Technical manual for the Barron-Welsh Art Scale. Cluj-Napoca: Odiseea; 2009.
11. Xiong LJ, Zhou MY, He XQ, Wu Y, Xie XL. The Role of Human Coronavirus Infection in Pediatric Acute Gastroenteritis. *Pediatr Infect Dis J*. 2020 Jul;39(7):645–9.
12. Stockman LJ, Massoudi MS, Helfand R, Erdman D, Siwek AM, Anderson LJ, et al. Severe acute respiratory syndrome in children. *Pediatr Infect Dis J*. 2007 Jan;26(1):68–74.
13. Davitoiu A, Chindris S, Iancu M, Țincu I, Spatariu L, Plesca D. Managementul paraclinic al infecției cu SARS-CoV-2 la pacientul pediatric. *Revista Română de Pediatrie*. 2020;LXIX(3):215–9.
14. Dong Y, Mo X, Hu Y, Qi X, Jiang F, Jiang Z, et al. Epidemiological Characteristics of 2143 Pediatric Patients With 2019 Coronavirus Disease in China. *Pediatrics* [Internet]. 2020 Mar 1 [cited 2020 Jun 8]; Available from: <https://pediatrics.aappublications.org/content/early/2020/03/16/peds.2020-0702>
15. Lu X, Zhang L, Du H, Zhang J, Li YY, Qu J, et al. SARS-CoV-2 Infection in Children. *N Engl J Med*. 2020 23;382(17):1663–5.
16. Li R, Pei S, Chen B, Song Y, Zhang T, Yang W, et al. Substantial undocumented infection facilitates the rapid dissemination of novel coronavirus (SARS-CoV-2). *Science*. 2020 May 1;368(6490):489–93.
17. Clark B, McKendrick M. A review of viral gastroenteritis. *Curr Opin Infect Dis*. 2004 Oct;17(5):461–9.
18. Soriano-Gabarró M, Mrukowicz J, Vesikari T, Verstraeten T. Burden of rotavirus disease in European Union countries. *Pediatr Infect Dis J*. 2006 Jan;25(1 Suppl):S7–11.
19. Arientova S, Schramlova J, Ambrozova H, Maresova V, Holub M. Electron microscopy in the diagnosis of viral gastroenteritis in hospitalised children in the Czech Republic. *Folia Microbiol (Praha)*. 2012 May;57(3):177–82.
20. Karampatsas K, Osborne L, Seah ML, Tong CYW, Prendergast AJ. Clinical characteristics and complications of rotavirus gastroenteritis in children in east London: A retrospective case-control study. *PLoS One*. 2018;13(3):e0194009.