



# The First Presentation of Pediatric COVID-19 With Diabetic Ketoacidosis: A Unique Case Report



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## Abstract

**Introduction:** Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), or COVID-19, is a pandemic infectious disease involved all over the world. Its mortality, especially in cases with additional co-morbidities, is so high that it has attracted the attention of the world. Diabetes mellitus is known as one of its risk factors for mortality.

**Case Presentation:** A unique case of pediatric COVID-19 who presented with diabetic ketoacidosis (DKA) is reported in this manuscript as the first presentation. He presented with abdominal pain, nausea, and vomiting. RT-PCR test for COVID-19 via nasal swab was performed, and a positive diagnosis was obtained. Chest CT scan confirmed the diagnosis with multifocal bilateral patchy consolidation. Case was discharged after usual treatment of COVID-19.

**Conclusion:** In pediatrics, this disease can be subtle and have a confusion presentation, but it should be controlled to avoid spread of the disease. During epidemic status, suspicious cases specially children with nonspecific symptoms and other underlying diseases should be considered as at risk or potentially asymptomatic COVID-19 cases.

**Keywords:** Pediatrics, Coronavirus, Pneumonia, Diabetes Mellitus

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## Introduction

Recent severe acute respiratory syndrome coronavirus 2 (SARS-COV2; COVID-19) has affected the whole world with a serious and fatal pandemic especially threatening to cases with comorbidities like diabetes.<sup>1,2</sup> It is reported that the severity of the diseases, mortality, and further complications are more common in diabetic patients. Many considerations related to diabetic patients in SARS-Cov2 epidemic conditions, including the health requirements necessary for healthcare in the community and blood sugar control have been mentioned.<sup>1-3</sup> One point of discussion is the possible complications in diabetic patients, especially children, which will be mentioned in the following case. Herein is reported a unique case of COVID-19; to the best of our knowledge, this is the first case reported concerning this topic.

## Case Presentation

A 9-year-old boy, 20 kg in weight, and with a previous history of

poorly controlled diabetes mellitus type 1 (DM), was referred to the local hospital. He presented with abdominal pain, nausea, and vomiting. After a diagnosis of acute appendicitis, he underwent appendectomy. The laboratory findings at admission were within normal range except for blood sugar (BS): 180 mg/dL and with blood cell (WBC) count: 12000/ $\mu$ L, polymorphonuclear (PMN): 95%. Ultrasound assessment revealed a fixed blind bowel loop with normal diameter (4.5 mm) in the right lower quadrant.

Post operation, BS increased (after 8 hours) and symptoms of restlessness, weakness, lethargy, and cough were observed in the patient. The patient was referred to our center as a tertiary referral pediatrics hospital with a diagnosis of diabetic ketoacidosis (DKA) according to the following laboratory findings: pH: 7.2, PCO<sub>2</sub>: 26 mm Hg, HCO<sub>3</sub>: 16 mmol/dL, ketonuria: 3+, fasting blood sugar (FBS): 400 mg/dL. Post-appendectomy complications were excluded due to the administration of suitable antibiotic therapy and a normal

ultrasound.

There were some suspicions indicating an underlying diagnosis that made the patient susceptible to DKA. First, frequent nonproductive cough, mild dyspnea, and tachypnea for 3 days, continuous uncontrolled FBS (exactly before appendectomy equal to 430 mg/dL), and decreased O<sub>2</sub> saturation and its changes with or without oxygen therapy (94% vs 84%). Because of the COVID-19 epidemic, the subject underwent additional chest computed tomography (CT), which revealed bilateral multifocal patchy ground-glass opacities in the lower lung lobes (Figure 1). RT-PCR test for COVID-19 via nasal swab was performed, and a positive diagnosis was obtained. The subject underwent treatment with hydroxychloroquine and Kaletra (containing a combination of lopinavir and ritonavir) for COVID-19 and insulin and serum therapy and potassium for DKA, and his status became stable.

## Discussion

Since December 2019 when COVID-19 was recognized and rapidly became a pandemic disease, many reports have been published about the clinical/paraclinical manifestations in pediatrics that were deferent to adult COVID-19.<sup>1,2</sup> Many aspects of COVID-19 were considered in children; it is more likely to be asymptomatic, and laboratory, clinical, and radiological results show more unusual findings than in the adult population.<sup>3,4</sup> Severe forms of the disease have been reported less frequently in children.<sup>5</sup> Based on our experience, some considerations can be suggested in this case. First, COVID-19 can be asymptomatic or sub-clinically symptomatic. In pediatrics, COVID-19 may present with non-specific symptoms such as abdominal and gastrointestinal



**Figure 1.** Non-enhanced chest CT showing ground-glass opacities with sub-pleural sparing in the lower lobes bilaterally, typically reported in COVID-19.

symptoms, and these asymptomatic cases may infect other people, such as general healthcare personnel. Second, COVID-19 may trigger or worsen underlying diseases in pediatric patients such as uncontrolled DM or metabolic disorders as previously reported for the H1N1 influenza.<sup>6</sup> Third, in affected regions, any suspicious symptoms like subtle dyspnea, low grade fever, or unlocalized abdominal pain should be subject to further evaluation.<sup>7</sup> Fourth, chest CT scan should be performed in suspicious cases. Fifth, patients' physical conditions and responses to the disease can be quite different from those of others, even those of similar age and physical status. It may depend on cultural situation, incomplete and inconclusive previous treatment, host immunologic response, etc. Sixth, viral infection and its immunologic response can trigger DM onset as reported for SARS.<sup>8</sup> Due to further referral of diabetic cases to clinics and hospitals as well as the relative immune deficiency of such patients, there is an increased risk of infection.<sup>9</sup>

## Conclusion

It was suggested that during epidemic status, suspicious cases with nonspecific symptoms and other underlying diseases should be considered as at risk or potentially asymptomatic COVID-19 cases.

## Authors' Contributions

All authors have contributed equally to data collection, text writing, and final editing.

## Conflict of Interest Disclosures

The authors declare no conflicts of interest regarding this work.

## Ethical Approval

All data was duly presented, and all necessary interventional procedures were done. Moreover, written informed consent was obtained from the subject's parents.

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