Case Report

Pleural Effusion in a Child With COVID-19: A Case Report

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ABSTRACT

The coronavirus disease 2019 (COVID-19) outbreak started in December 2019. The disease can manifest in various respiratory and non-respiratory symptoms and clinical findings. The signs and symptoms of this disease in children are not entirely known yet. Ground-glass opacity and pleural effusion in the chest computed tomography scan have been reported in infected patients. The pleural effusion has been reported in a few cases. The present case report describes a pediatric patient with the chief complaints of fever, diarrhea, and vomiting who presented to an emergency department with a differential diagnosis of a gastrointestinal infection. However, he was diagnosed with COVID-19, which was complicated by respiratory distress and pleural effusion.

1. Introduction

In December 2019, an outbreak of COVID-19 began in Wuhan, China (1). COVID-19 is an acute respiratory infectious disease caused by a severe acute respiratory syndrome coronavirus (SARS-CoV-2) (2). This disease mainly presents with respiratory symptoms, but less than 10% of children with COVID-19 develop gastrointestinal symptoms such as diarrhea and vomiting (3).

The chest computed tomography (CT) scan is used to diagnose respiratory tract manifestation in infected patients. The affected area appears as white lung, subpleural consolidations, and initial and pleural irregularities. Further, massive pleural effusion has been reported in an adults with COVID-19 (4, 5). In this study, one case of COVID-19 was reported in a child with pleural effusion.

2. Case Presentation

On April 13, 2020, a 7-year-old boy without a past medical history of a specific disease and medical drug use was presented to the Emergency Department of Be'sat Hospital in Sanandaj City, Iran, with seven days

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history of fever, abdominal pain, and non-bloody vomiting and diarrhea. The vomiting had begun after the onset of fever, and it was intermittent. In addition, he had suffered from two transient generalized urticarial lesions that disappeared after a few hours.

Although the patient received outpatient treatment during these seven days, the symptoms did not improve over time. His primary vital signs included an elevated temperature of 39°C, a tachycardia of 120 beats per minute, a respiratory rate of 51 breaths per minute, and an oxygen saturation of 93%. Erythematous conjunctiva and generalized wheeze were detected in the left lung auscultation. The patient was transferred to the pediatric ward after stabilization, and antibiotic therapy with ceftriaxone was started. His preliminary laboratory results showed elevated C-reactive protein (Table 1).

The size of the liver was normal in abdominal ultrasound, and the spleen had a normal echo, but it represented a slight enlargement. Based on the results, the kidneys had normal size and echo, and numerous hypoechoic lymph nodes were observed in the right paraumbilical region. Echocardiography was performed to rule out Kawasaki, and it was normal.

One day after hospitalization, the patient developed a dry cough and became tachypneic. Therefore, the chest x-ray (CXR) was performed, and the result was normal (Figure 1). Nevertheless, the patient's respiratory symptoms worsened during the following days, and gastrointestinal symptoms improved accordingly. Therefore, the CXR was performed again on the fourth day of hospitalization, and signs of pleural effusion in both lungs (with severity in the right lung) were evident (Figure 2). Thus, a chest CT scan was requested, and several symptoms were observed, including patchy consolidation, ground-glass opacity (GGO), and bilateral pleural effusion with severity on the right side (Figure 3). Therefore, a polymerase chain reaction (PCR) test of the nasopharyngeal sample was requested to rule out the COVID-19.

Nasopharyngeal PCR was positive for COVID-19; thus, the patient was transferred to the intensive care unit of COVID-19 patients on the fourth day of hospitalization. He underwent treatment with hydroxychloroquine, azithromycin, Kaletra (lopinavir/ritonavir), and one dose of intravenous immunoglobulin. Moreover, chest tubes were placed on both sides on the fifth day of hospitalization, and meropenem and vancomycin were added to his treatment.

Table 1. Laboratory results

Tests	Values	Tests	Values
Blood urea nitrogen	8.57 mmol/L	Alkaline phosphatase	2.91 µkat/L
Creatinine	0.04 mmol/L	Blood sugar	65 mg/dL
Aspartate aminotransferase	0.6 µkat/L	White blood cell (109/L)	4.6 Neutrophils 90% Lymphocytes 10%
Alanine aminotransferase	0.6 µkat/L	Complete blood count: Hemoglobin	102 (g/L)
Sodium	137 mmol/L	Complete blood count: Platelet	125 (109/L)
Potassium	3.9 mmol/L	Mean corpuscular volume	69 fL
Blood-culture	Negative	Albumin	3.2
Erythrocyte sedimentation rate	60 mm/h	C-reactive protein	+1
Pleural fluid laboratory results: LDH	2.933 µkat/L	Blood sample (same time to pleural fluid): Glucose	88 mg/dL
Pleural fluid laboratory results: Glucose	60	Blood sample (same time to pleural fluid): LDH	7.5 µkat/L
Pleural fluid laboratory results: Protein	11 g/L	Blood sample (same time to pleural fluid): Protein	64 g/L
Pleural fluid laboratory results: Culture	Negative		

LDH: Lactic acid dehydrogenase.

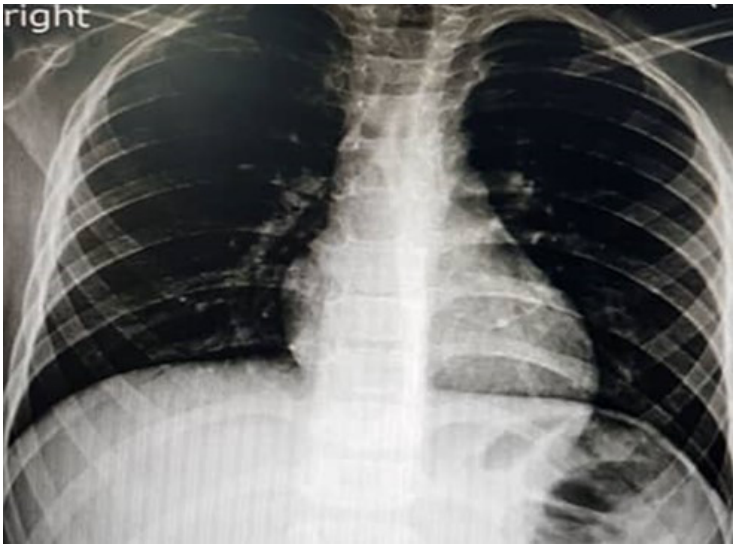

Figure 1. First chest X-ray

The laboratory results of pleural fluid examinations showed transudative pleural effusions (Table 1)—nearly 400 mL of a clear fluid discharged from both sides.

The second chest CT scan on the eighth day of hospitalization demonstrated patchy infiltration on both sides, although bilateral pleural effusion disappeared, and chest tubes were removed accordingly (Figure 4). On the 10th day of hospitalization, abdominal sonography was performed again, and the result was normal. The patient became symptom-free after 15 days of hospitalization and treatment and was discharged in a generally good condition.

3. Discussion

Severe acute respiratory syndrome COVID-19 can also involve the gastrointestinal tract. Like the respiratory mucosa, angiotensin-converting enzyme-2 receptor and trans-membrane serine protease 2 co-express in the gastrointestinal tract, which helps viral entry into the tissue (3).

Chest CT scan has a high sensitivity for the diagnosis of COVID-19 and may be considered a primary tool for diagnosing COVID-19 in epidemic areas (6). Adam et al. suggested that bilateral and peripheral ground-glass and consolidative pulmonary opacities in the chest CT scan are the hallmarks of COVID-19 (7). Likewise, Zhou S et al. reported that the identification of GGO and a single lesion on the initial CT scan suggested early-phase disease (8). Thus, patients with fever and cough symptoms and GGO lesions on chest CT scan, with a standard or decreased range of white blood cells and a history of epidemic exposure, are highly suspected of having COVID-19 (9).

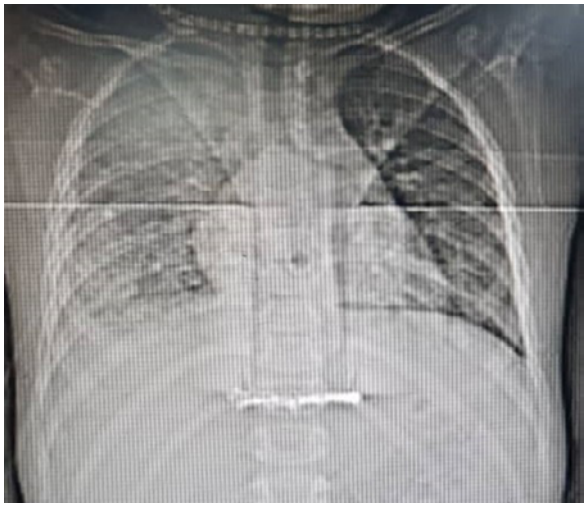

Figure 2. Topogram of the first chest CT Scan

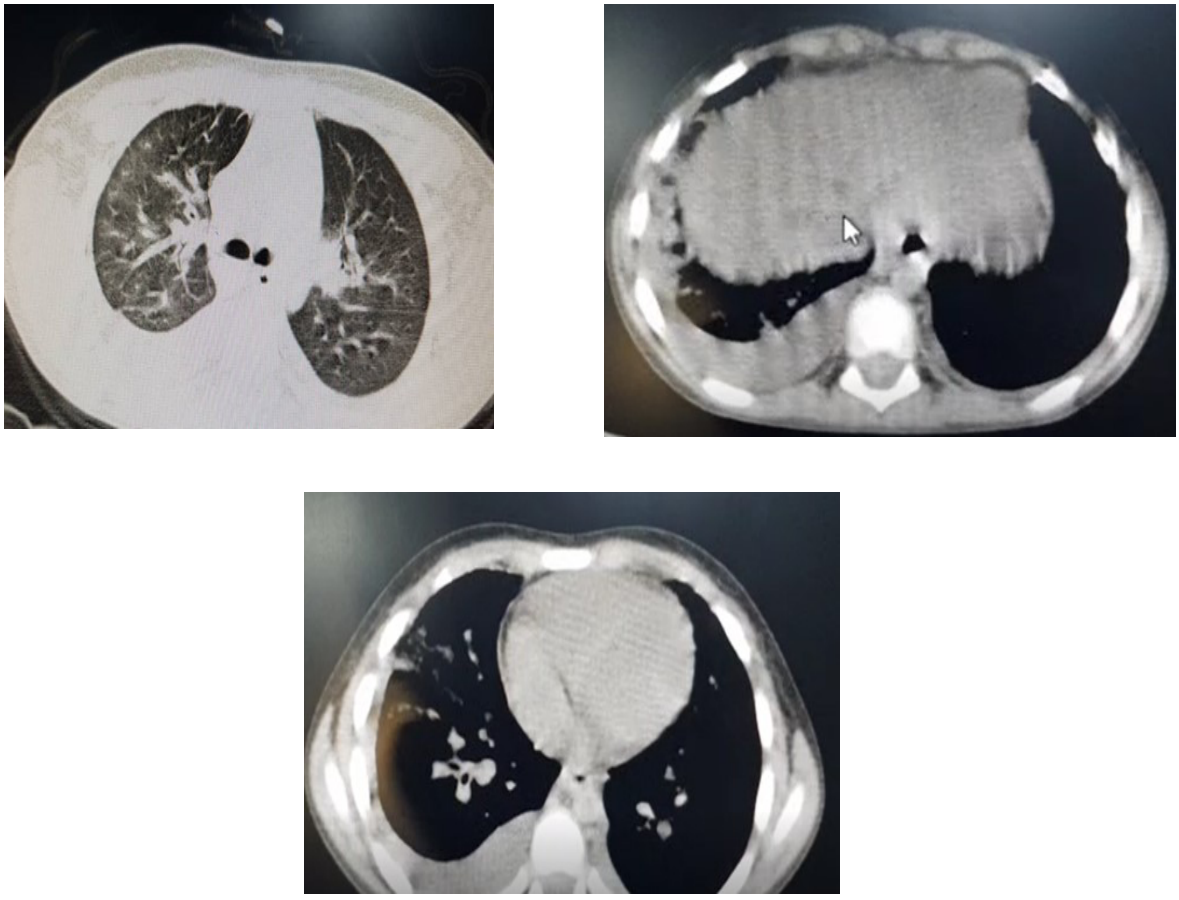

Figure 3. First chest CT scan findings

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Lung ultrasound in COVID-19 patients revealed a different pattern of lung involvement. Vertical artifacts (70%), pleural irregularities (60%), white lung areas (10%), and sub-pleural consolidations (10%) were the main findings in patients with COVID-19, although there were no cases of pleural effusions (3). However, Ahmadinejad et al. reported a 59-year-old patient who complained of fever, dry cough, and dyspnea with massive pleural effusions, which was reported positive for COVID-19 (5).

A limited body of knowledge is available about the lung manifestations of COVID-19 in children. Recent studies have suggested that COVID-19 pneumonia is mainly mild in children and has a good prognosis in those with no underlying diseases (2, 11). Chest CT scan in infected children can present characteristic changes of sub-pleural GGOs and consolidations with the surrounding halo, which is a suitable index for following up and evaluating the changes of lung lesions (2).

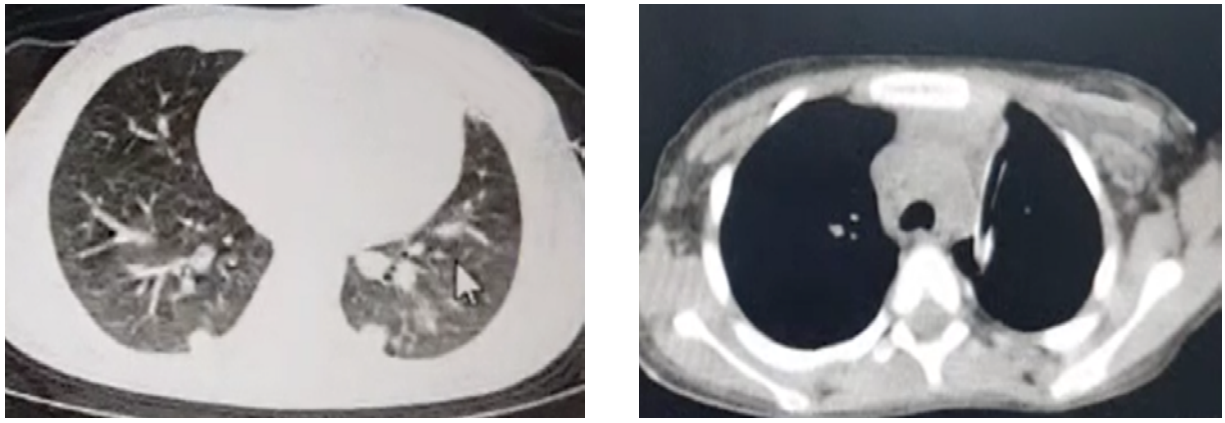

Figure 4. Second chest CT scan findings

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Pleural effusions can be caused by bacteria, viruses, tuberculosis, atypical mycobacterium, and fungus (10), but viral pathogens are rare causes of pleural effusion in children (12). Recently, Chen et al. reported a 12-year-old boy with COVID-19 and pleural effusions complicated by secondary Mycoplasma pneumonia infection (13). Additionally, a systematic review showed that pleural effusions are rare, and only three cases of COVID-19 in children were reported with pleural effusions (14).

Based on the results of this study, gastrointestinal symptoms can be the primary manifestations of COVID-19 infection and may present before respiratory symptoms in children. Pleural effusions in chest CT scans can be one of the manifestations of pulmonary involvement in infectious with COVID-19 in pediatrics.

4. Conclusion

Because of the prevalence of COVID-19, nowadays, a chest CT scan may be necessary for children with gastrointestinal symptoms if they have a complicated clinical situation. The pleural effusion should be considered a chest CT scan diagnostic manifestation of COVID-19, and the PCR test for COVID-19 should be conducted in these patients.

Ethical Considerations

Compliance with ethical guidelines

The Ethics Committee of Kurdistan University of Medical Sciences approved this research (Code: IR.MUK.REC.1399.256).

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Authors' contributions

All authors equally contributed to preparing this article.

Conflicts of interest

The authors declared no conflict of interest.

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