



## Clinical Characteristics and Mortality of a Hospitalized 13 Years Old Patient with Covid-19: A Case Report

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### Abstract

The corona virus is a global problem that threatens human life. According to the latest data from different countries the mortality of this virus in children is less than adult.

### Keywords

- COVID-19
- Pediatric
- Chronic diseases

A 13-year-old girl was hospitalized for 6 months following a gunshot trauma and its complications. When her general condition was finally improving, she was diagnosed with the corona virus and passed away. Children who are suffering from underlying diseases and need medical care are at a higher risk of death from the corona virus.

### Introduction

COVID-19 is an emerging illness that is rapidly spreading throughout the world.<sup>1</sup> A number of severe cases of pneumonia occurred in Wuhan in

Hubei province, China, since December, 2019, for which severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has been recognized as causative factor.<sup>2</sup> COVID-19 has been announced as a worldwide pandemic. There are a considerably

lower number of recorded COVID-19 cases in the pediatric population compared to adults, although the incidence rises every day.<sup>3</sup> Although earlier data suggested that the effects of Covid-19 on children are much less severe than those on adults, there are many concerns regarding its effects on children with special health care needs and underlying disorders.<sup>1</sup>

Corona virus presents a serious risk to patients due to the high incidence of pneumonia with potential damage to vital organs.<sup>4</sup> So far, the clinical manifestations and therapeutic responses to Covid-19 differ among children and adults, which may be due to specific features of the immune system responses in children.<sup>5,6</sup> A cohort of 44 672 Chinese Covid-19 cases reported that 2.1% of patients were under 20 years of age, and 1.2% were asymptomatic.<sup>7</sup> The major cause of mortality in pediatric patients with COVID-19 is Pneumonia.<sup>8</sup> In children, different immunologic responses to viral infections may occur and cause serious damage to vital organs.<sup>9</sup> Here we present a case of mortality due to COVID 19 in a 13 years old girl with underlying risk factors.

### Case Presentation

In August 2019, a 13-year-old girl was shot in the lower left abdomen and suffered extensive colonic, colorectal, rectal, and pelvic injuries and her arteries were damaged. Two months later, in October 2019, due to the need for reconstructive surgery to correct a wide defect in the abdominal wall and back, as well as cyanosis of the left foot, she was sent to Mofid children's hospital. When she arrived she had a large defect in the abdominal wall

with fever, thrombocytopenia, and increased PTT (Partial Thromboplastin Time) and was admitted to the PICU (Pediatric Intensive Care Unit) with the possibility of sepsis. Due to severe ileus and intolerance of oral nutrition, the patient underwent TPN (Total Parenteral Nutrition), which was discontinued 5 days later and oral administration was initiated.

Three days after hospitalization at the PICU, the patient was transferred to the surgical department since she no longer had a fever and her general condition had relatively improved. laboratory tests were carried out in order to rule out septic shock. The laboratory test results on the first day of transfer to the ward are shown in **Table 1**.

It should be noted that from the beginning of hospitalization due to electrolyte disturbances, intolerance of oral nutrition and reversal of gastric contents, treatment with KCl (Potassium chloride) and NaCl (Sodium chloride) supplementation was started with control tests. Meanwhile, albumin was prescribed accompanied by serial checking of its serum levels. Heparin was started at the time of hospitalization due to impaired blood flow to the left leg. Nine days after hospitalization, the left foot was amputated in the operating room due to the lack of left foot perfusion and gangrene. Heparin was continued for 3 weeks, then it was changed to enoxaparin, and the patient continued to be bedridden. From November 2019 to January 2020, the patient had underwent debridement twice a week. During these trials, she often had positive blood cultures with staphylococcus aureus and positive CRP (C-reactive protein) and leukocytosis, and periodically had fever. Therefore in addition to

**Table 1:** Laboratory test results at different phases of patient hospitalization

	17 Oct. 2019	18 Mar. 2020	27 Mar. 2020	31 Mar. 2020	3 Apr. 2020
Hb	10.4	8	10.3	5.5	3.2
WBC	8100	7300	10000	13800	14900
Lymph (%)	28	20	9.4	24	25
Neut (%)	69	77	88.8	70	15
Plt	297000	146000	58000	6000	14000
PT	12	-	14	18	24
PTT	25	-	31	>120	58
CRP	3+	2+	+	3+	-
Alb	3.1	-	2	-	2.6
Prot	5.8	-	-	-	6.6
Cr	0.6	0.7	0.6	-	1.6
BUN	17	15	14	-	15
ALT	-	-	25	-	300
AST	-	-	26	-	2043
Na	134	131	-	136	145
k	3.7	3.5	-	4	4.5

hydration, treatment with intravenous antibiotics was carried out. Corticosteroids were started due to severe skin reactions and it was not possible to discontinue corticosteroids due to various allergic reactions.

On February 2nd, after cleaning of the abdominal viscera and the edges of the wound, tissue expander was placed under general anesthesia in the operating room for the patient. But unfortunately, the body reacted to this tissue and 2 days later it was removed. Then, she went to the operating room 3 times at 3-day intervals to wash, disinfect and change the dressing. Due to frequent debridement procedures, during the 5 months of hospitalization until March 2020, a total of 8 packages of cross matched isogroup packed red blood cells (A+)

and one unit of platelet were transfused. After the abdominal wall wound healed, using vacuum and honey dressings; the patient's general condition started to improve, but the results of blood culture and CRP were still positive. During her hospitalization, the patient developed mood disorders that required psychiatric counseling, and she was diagnosed with PTSD (Post Traumatic Stress Disorder). Then, ASENTRA and Alprazolam were started with a dose of 50 mg PO daily and 0.25 mg PO at night respectively. Due to these mental disorders and prolonged hospitalization and repeated surgical interventions, the patient became very cachectic which we tried to compensate by supplementary feeding and correction of serum protein levels. In addition to psychological and nutritional support, 90 sessions of physiotherapy

were performed to prevent muscle atrophy. During the first 5 months of hospitalization due to the lack of proper venous access, Central Vein line (either jugular or subclavian) was inserted several times, and each time a chest x-ray was taken to control the location of the CV line catheter. In all cases, normal lung tissue was reported with no complication. On March 18, 2020, the patient developed a fever, and shortly afterward developed diarrheas, which large numbers of Yeast were reported in the stool exam. Concerning the laboratory test results **Table 1**, the complications were managed by changing the antibiotics and improving the Hb level with packed cells injection.

On March 27, she underwent a CT scan of lungs due to weakness and lethargy, a drop in blood pressure, and a persistent fever. She was suspected of COVID-19 infection. In CT scanning, there was a ground glass view accompanied with 2-mm nodules in the anterior segment of the upper lobe of the right lung and mild pleural effusion on the left side. Mild sub-pleural infiltrations were seen in the posterior segment of the lower lobes of both lungs. Diagnosed as COVID-19, the patient was transferred to the Pediatric Critical Care Unit dedicated to COVID-19 patients. Furthermore, RNA PCR test was requested and the test was reported positive. Laboratory tests results on March 27 was also presented in **Table 1**.

Within 4 days of Corona's diagnosis, she received 500 cc of FFP (Fresh Frozen Plasma) iso-group due to bleeding disorders from the wound site. Experiments on the series showed an increase in thrombocytopenia and leukocytosis. In this period there was no sign and symptom of respiratory

complications. ECG monitoring and pulse oximetry were also continuously used for the patient's cardio-respiratory assessment.

On March 31, 2020, she was intubated due to a loss of consciousness and underwent mechanical ventilation. From the following day, she suffered from a decrease in blood oxygen saturation, and respiratory support was increased. Disseminated intravascular coagulation was diagnosed for the patient as indicated in **Table 1**. Over the next three days, she received 4 cross matched packed cells, 10 platelet, and 5 FFP units. The latest test, taken on April 3rd, showed an increase in liver enzymes and an increase in creatinine, anemia and severe thrombocytopenia **Table 1**. Based on this, 4 FFP units, 4 P.C units, 3 Cryo units were injected. During this period, the patient's oxygen saturation with maximum respiratory support remained between 87 and 93%. Unfortunately, the patient died on April 4th, 2020, of severe respiratory failure and DIC.

### Discussion

The coronavirus is a global problem that threatens human life. So far, based on the findings and data of different countries, it has been seen that there are fewer deaths under the age of 20 years than in the elderly. Nonetheless, according to the same information, children and adolescents who suffer from underlying diseases and need medical care are at risk of death from the virus.

In a study of COVID-19 patients in the United States between February 12 and April 2, 2020, out of 149082 patients, 2572 (1.7%) were under the age of 18, of whom 147 were admitted to the

ICU. A total of 345 children were screened for underlying diseases, 80 of whom had at least one underlying problem, the most common of which were chronic lung disease, heart disease, and immunosuppression. In one of the centers studied, six children who were admitted to the ICU all had underlying diseases. Out of which, three died.<sup>10</sup> A study by Dong and colleagues in April 2020 in China found several reasons for the lower severity of corona virus in children. The first reason was that children are more cared for and have less contact with the environment. The second theory was that ACE2 receptors are likely to play a role in the reproduction of the virus in the body, which has less maturity and function in children. It is caused by multiple respiratory infections. And last but not least, the immune system of children is evolving and responds differently in comparison to adults. Although the clinical manifestations of COVID-19 in children are less severe than in adults, children are also susceptible to the infection.<sup>11</sup>

This patient was a child who had been hospitalized for 6 months following a trauma and its complications, and at a time when her general condition was improving and his abdominal wall wound had largely healed, she was once more hospitalized with the coronavirus and eventually passed away. In a retrospective study of her medical information and patient records, several risk factors can be cited that could have weakened the patient's immune system. Throughout the hospitalization period, there was a blood infection due to the extent of the injury and the difficulty of repair despite surgical interventions and regular adjustment of

antibiotics. Blood cultures and CRP were positive. Naturally, the immune system was involved in fighting the bacterial infection for 6 months. The next risk factor in our case was long-term use of corticosteroids, which have been used due to numerous drug reactions and skin sensitivities. Other factors that can be mentioned in the context of our patient's immune system defect include severe weight loss and eating disorders due to the underlying disease, also her mood disorders have been effective in this regard. Another factor that may be involved in this process is several injections of blood products that were unavoidable due to repeated debridement and the subsequent anemia. Our patient was intubated 5 days after Corona virus infection diagnosis due to hypotension and loss of consciousness, and underwent respiratory and inotropic support. Unfortunately she died of DIC and respiratory failure.

### **Ethical Consideration**

This study was approved by Research Institute for Children's Health, Shahid Beheshti University of Medical Sciences, with code number IR.SBMU.RICH.REC.1399.013.

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### **Conflict of interests**

There is no conflict of interest

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