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CASE REPORT / OLGU SUNUMU

Severe COVID-19 Pneumonia and Critical Congenital Heart Disease in a Newborn

Kesintili Arkus Aortalı Yenidoğanda Ağır COVID-19 Pnömonisi

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Abstract

The new coronavirus infection, which has resulted in a pandemic, may lead to pneumonia, severe respiratory insufficiency, multi-organ failure, and death in adults and elderly as well as people with chronic diseases. As the number of people affected by this globall pandemic, patients in all age groups are being identified with more reported neonatal and pediatric patients. It has been reported that neonates and infants with a congenital cardiac disease constitute the most commonly affected group. Favipiravir may be administered in case of coronavirus disease-2019 (COVID-19) pneumonia that starts in the neonatal period. Here, we report a newborn with an interrupted aortic arch and severe COVID-19 pneumonia. The patient, who had severe COVID pneumonia, was successfully operated after being treated.

Keywords: COVID-19, pneumonia, newborn, interrupted aortic arch, favipiravir

Öz

Pandemi ile sonuçlanan yeni koronavirüs enfeksiyonu, kronik hastalığı olanların yanı sıra erişkinlerde ve yaşlılarda pnömoni, ağır solunum yetmezliği, çoklu organ yetmezliği ve ölüme yol açabilmektedir. Bu küresel salgından etkilenen insan sayısı arttıkça, tüm yaş gruplarındaki hastalar ile artan sayıda bildirilen yenidoğan ve pediatrik hasta da tanımlanmaktadır. Doğuştan kalp hastalığı olan yenidoğan ve bebeklerin, en sık etkilenen grubu oluşturduğu bildirilmiştir. Favipiravir, yenidoğan döneminde başlayan bir koronavirüs hastalığı-2019 (COVID-19) pnömonisi durumunda kullanılabilir. Bu makalede, kesintili arkus aorta ve şiddetli COVID-19 pnömonisi olan yenidoğan bir hasta sunuyoruz. Ağır COVID pnömonisi geçiren hasta, tedavinin ardından başarılı bir şekilde ameliyat edildi.

Anahtar Kelimeler: COVID-19, pnömoni, yenidoğan, kesintili arkus aorta, favipiravir

Introduction

Coronavirus disease-2019 (COVID-19) infections may result in pneumonia, severe respiratory insufficiency, multi-organ failure, and death in adults. As the number of people affected by this pandemic grows, patients from all age groups are being identified and a higher number of neonatal and

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pediatric patients are being reported. Neonates are under the risk of being infected by a positive, asymptomatic mother or other caregivers[1]. It has been reported that neonates and infants with a congenital cardiac disease constitute the most commonly affected group[2,3]. Here we report a newborn who was scheduled for surgery due to an interrupted aortic arch, but had to be treated by favipiravir due to severe COVID-19 pneumonia.

Case Report

The 16-day-old male patient, who was born as the second living infant from the second pregnancy of a 25-year-old mother was admitted to the neonatal intensive care unit as intubated with the diagnosis of Type A interrupted aortic arch and a medium-sized peri-membranous ventricular septal defect (VSD). When the result of the COVID-polymerase chain reaction (PCR) routinely performed before surgical treatment was positive, the patient was admitted into a negative pressure room for droplet and contact isolation. On day three of the patient's presentation to the hospital, widespread rales were identified in both lungs upon auscultation and right-sided infiltration on the chest X-ray (Figure 1). Complete blood cell counts, serum electrolytes, and liver, and kidney function tests were within normal limits. The D-dimer level was 6.4 µg/L (normal <0.5 µg/L) and ferritin level was 814 ng/mL (normal range: 25-200 ng/mL) (Table 1). The patient was started on treatment with an ampicillin, lopinavir-ritonavir combination and enoxaparin. On day eight of the patient's hospitalization, the patient had increased respiratory distress despite the mechanical ventilator support, and bilateral, diffuse infiltrations emerged in his chest X-ray. The patient's second COVID-PCR test also gave a positive result. Therefore, IV dexamethasone was added to the patient's treatment. The family's consent was obtained and an application was made to the Ministry of Health (for an off-label drug) to provide favipiravir treatment. On day nine of hospitalization, the lopinavir-ritonavir combination was discontinued and favipiravir treatment was initiated. The patient was followed-up in the intermittent prone position. On day 15 of hospitalization, clinical and respiratory worsening and infiltrations on the chest X-ray started to resolve. On days 19 and 20 of the patient's presentation, the COVID-PCR test results were found negative. The favipiravir treatment that was provided for 10 days was thus concluded. On day 23 of the patient's presentation, computerized tomography (CT) angiography was performed; type A interrupted aortic arch was observed, and the appearance of the lungs was inconsistent with COVID pneumonia. The COVID-PCR test results received on days 22 and 26 were also found to be negative. On day 28 of the patient's hospitalization, aortic arch reconstruction, VSD closure, and ductus ligation were performed. The patient, extubated on post-operative day 14, was discharged on day 62 of his hospitalization without any respiratory support.

Discussion

The COVID-19 because of the novel-type coronavirus is seen gradually more frequently in the pediatric and neonatal periods[4]. There are no randomized controlled studies or wide case series related to this infection in neonatal patients available yet. Contamination in neonates occurs especially by way of contact with the mother or the caregivers of the infant at home[2]. It is known that COVID-19 has milder progress in neonatal and pediatric patients and it generally progresses with non-specific clinical signs. In one of the few studies related to the group of patients in this age, it was reported that 94% of 2135 pediatric patients were asymptomatic or had a disease of mild-moderate severity[5]. It is estimated that patients with underlying diseases such as chronic pulmonary disease, congenital heart disease, severe malnutrition, or immune deficiency may have severe clinical progress and the disease may result in death[4]. Although not enough information is available about the effects of this viral disease in neonates with congenital heart disease, it has been reported that patients are subjected to high risks. Single ventricular diseases such as hypoplastic left heart syndrome, tricuspid

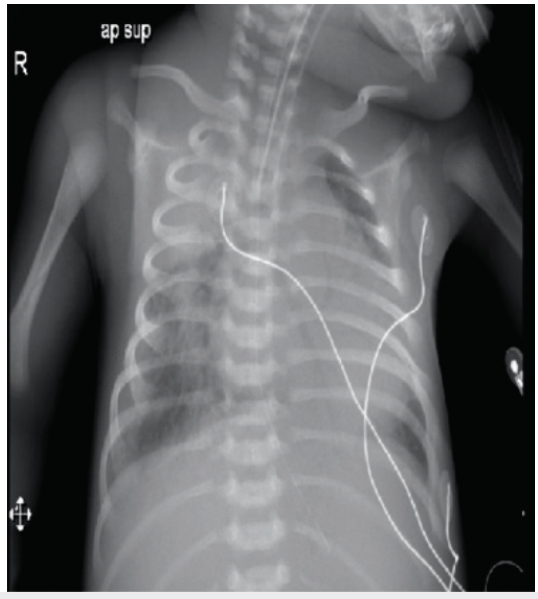

Figure 1. Chest X-ray shows diffuse infiltrations on the right side

Table 1. Follow-up of the patient's laboratory results

	Leukocyte count (/mm³)	Lymphocyte percentage (%)	CRP (<1.5 mg/dL)	Procalcitonin (<0.1 ng/mL)	Ferritin (25-200 ng/mL)	D-dimer (<0.5 mg/L)
Day 1	5090	28	1.7	0.4	-	-
Day 3	6100	42	1.2	0.4	814	6.4
Day 6	8700	31	0.5	0.3	463	6.6
Day 9	7900	14	0.3	0.2	316	2.3
Day 15	10680	25	6.9	0.7	978	4.2
Day 20	6800	30	0.6	0.03	407	3.4
Day 25	7900	31	0.7	0.03	138	1.4

CRP: C-reactive protein

atresia and double-inlet ventricle, complex heart diseases without a complete correction surgery, heart implantation, diseases accompanied by cardiac insufficiency, cyanosis, and pulmonary hypertension, have been assessed as high risk for COVID-19 infection. In cases such as critical aortic stenosis, significant aortic coarctation, and interrupted aortic arch, if the patient's hemodynamic stabilization is ensured via medical treatment, primarily with prostaglandin, it is appropriate to perform the required interventional or surgical treatment upon recovery from the COVID-19 infection[6,7]. In our case, sufficient systemic circulation was achieved by medical treatment, and the patient did not require emergent cardiac surgical intervention during the follow-up for COVID-related pneumonia. The most frequent signs observed in neonates include prematurity, respiratory stress, cough, apnea, cyanosis, tachycardia, hypo-hyperthermia, food intolerance, vomiting and diarrhea, abdominal distention, gastrointestinal hemorrhage, and lethargy[1-3]. If the disease has severe progress, pneumonia and acute respiratory distress syndrome, renal and hepatic insufficiency, myocardial damage and shock as well as coagulation disorders, and encephalopathy may develop as a result. While irregular opacities and interstitial involvement are seen on the chest X-ray, severe cases present with ground glass opacities, bilateral lobular, or segmental consolidation. Since the CT result does not influence the prognosis, routine use of CT is not recommended in neonates apart from selected cases. When the patient's clinical condition and respiratory system signs can not be explained by chest X-ray, a CT scan can also be performed[2,6]. A severe picture of pneumonia developed in our case, and typical signs were observed in his lung X-ray. So that he was followed up via X-ray in the early period. Pulmonary edema due to congenital heart disease can mimic pneumonia. In that regard, it is recommended to be cautious, to administer diuretic drugs, keep a negative fluid balance, and initiate renal replacement treatment if required[6]. There is limited information related to antiviral drugs, and there are no specific antiviral agents approved for this disease[1]. For patients aged more than 14 days, a lopinavir-ritonavir combination may be administered for 10-14 days. In connection with this drug, complications such as cardiomyopathy, complete AV block, lactic acidosis, suppression of the central nervous system, and acute renal insufficiency may develop[2]. In case of severe and persistent pneumonia related to the COVID-19, it is considered that favipiravir, a RNA polymerase inhibitor, is useful and does not lead to significant side effects. Since there is no standard dose available for this disease, the dose that is used for persistent Influenza and Ebola virus infections is used. Drug-related side effects such as hyperuricemia and QT elongation may develop[8]. Our patient received two loads at a dose of 50 mg/kg with an interval of 6 h at 25 days of age. Then, treatment was initiated at a dose of 40 mg/kg/day with two doses per day. No drug-related side effects were observed for ten days. A literature review was done and to the best of our knowledge, no reports of patients that received favipiravir treatment at such an early age in the neonatal period due to COVID-related pneumonia were found.

Conclusion

It should be known that neonates constitute a risk factor for the COVID-19. The risk is increased in neonates with critical congenital heart disease. Favipiravir administration may be considered in COVID - positive newborns with critical congenital heart disease.

Ethics

Informed Consent: The family's consent was obtained and an application was made to the Ministry of Health (for an off-label drug) to provide favipiravir treatment.

Peer-review: Externally peer-reviewed.

Author Contributions

Surgical and Medical Practices: O.G., S.Ba., S.B., Concept: S.Ba., S.B., Desing: O.G., S.Ba., Data Collection or Processing: O.G., S.Ba., Analysis or Interpretation: M.Ö., E.Ö., Literature Search: O.G., S.Ba., Writing: O.G., S.Ba.

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