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CASE REPORT – OPEN ACCESS

Successfully Managed COVID-19 Pneumonia with Prone Positioning and Convalescent Plasma Therapy

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ABSTRACT

Background: We report patient with a severe COVID-19 pneumonia, which was successfully managed with prone positioning and convalescent plasma therapy.

Case Report: A 56-year-old-woman presented to the emergency department with symptoms of cough, weakness and fever. The patient did not have any comorbid conditions apart from a well-controlled diabetes mellitus. She was hospitalized with a diagnosis of suspected COVID-19 pneumonia based on her chest CT scan. Due to deterioration in her follow-up, she was transferred to the ICU and was intubated, positioned to prone and convalescent plasma therapy was administered. Seven days after intubation, the patient was extubated, and on the 27th day of the ICU admission, she was discharged back to the ward from ICU.

Conclusion: COVID-19 still has no specific treatment. Urgent development of successful treatment modalities is necessary. However, until an effective treatment is found, the application of the existing alternative treatment methods and sharing the results may guide and help studies.

Keywords: COVID-19, pneumonia, prone position, convalescent plasma therapy

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INTRODUCTION

A new type of coronavirus (SARS-CoV-2), which was identified by Chinese facilities as the causative organism using deep sequencing analysis of patients' respiratory tract samples and named "coronavirus disease 2019"(COVID-19) (1), was introduced to the world in late December 2019 (2–4). Clinical presentations of confirmed patients with COVID-19 are fever, dry cough and dyspnea, which are similar to any lower respiratory tract illness (1, 3).

SARS-CoV-2 strongly adheres to the human respiratory epithelial cell through the interaction between viral S protein (1) and angiotensin-converting-enzyme-2-receptor (1, 4, 5). Thus, SARS-CoV-2 leads to pneumonia and aggravates the disease with no reliable and specific treatment (2, 3, 5–7). The prevalence of acute respiratory distress syndrome (ARDS) among COVID-19 patients has been reported to be up to 17% (3). There are no pathognomonic changes in radiologic images in COVID-19 pneumonia (1, 6).

Treatment options, as known so far, for seriously ill patients are low-dose systematic corticosteroids, antiviral and/or antimalarial drugs, some herbal treatments (2, 4, 6, 7), convalescent plasma therapy (4, 7, 8), extracorporeal membrane oxygenation (ECMO) (4, 9) and prone positioning (3, 4).

Here, we report patient with a severe COVID-19 pneumonia who was successfully managed with prone positioning and convalescent plasma therapy.

CASE REPORT

The written informed consent from the patient was obtained. On 27th March 2020, a 56-year-old-woman presented to the emergency department with a cough, weakness and fever. She had no comorbidity except well-controlled diabetes. The chest CT of the patient on 27 March showed "ground-glass opacities," especially in the posterior sites of both lungs (Fig. 1), consistent with a viral infection and RT-PCR amplification by a nasopharyngeal swab for SARS-Cov-2 was positive. Then, the patient was transferred to the specialized pandemic ward of the hospital. The initial physical examination was normal except bilateral pulmonary ral and roncus by chest auscultation with a high body temperature of 38.8°C measured by forehead thermometer. Her hemodynamic parameters were stable at the admission. The laboratory results of the patient were also in the normal range (Table 1).

Hydroxychloroquine (first day: 2*400 mg/day and on consecutive days: 2*200 mg/day), oseltamivir (2*75

Table 1. Course of the patient after diagnosed with COVID-19

	27/3/2020 Day of ad-mission to the ward	**3/4/2020 Day of admission to ICU**	**7/4/2020**		**10-11-12/4/2020**		**15/4/2020**	**16–30/4/2020**	**1/5/2020 Day of discharge from ICU**
Ventilation	In ward spontan 5L/min O_2	ICU spontan/NIV	ICU intubation on MV		ICU intubation on MV and prone position with treatment convalescent plasma		ICU extubation	ICU spontan/NIV	Spontan 5L/min O_2
Antibiotic therapy	+	+	+	+	+	+	+		
Hydroxy chloroquine (14 days)	+	+	+	+	+	–	–	–	–
Oseltamivir	+	+	–	–	–	–	–	–	–
Favipiravir (7 days)	–	+	+	+	–	–	–	–	–
PO_2 (mmHg)		36.9							
(Mix)	73	71	135	80	69.9	69.4	70		
SpO_2 (%)	93	93	95	94	95	96	95	95	95
Hb (g/L)	12.4	10.7	10.9	11.3	9.8	10.5	10.7	11.9	8.8
Plt (x10^3/µL)	251	276	349	324	325	304	214	245	328
CRP (mg/mL)	9	178	9.9	14	11	11.9	14.7		8.5
Procalcitonin (ng/mL)	0.12	0.17	53	0.18	0.13	0.12	0.27	0.37	0.12
Fibrinojen (mg/dL)		727							
Ferritin (ng/mL)		998			53.4				
D-Dimer (ng/mL)					2789		2270		

ICU: Intensive care unit; NIV: Non-invasive ventilation; MV: Mechanic ventilation; PO_2: Partial oxygen pressure; SpO_2: Peripheral capillary oxygen saturation; Hb: Hemoglobin; Plt: Platelet; CRP: C-reactive protein

mg/day), piperacillin/tazobactam IV (3*4,5 g/day) and moxifloxacin (1*400 mg/day) were applied to the patient as an initial treatment according to the guidelines of Turkish Ministry of Health (10).

Her vital signs remained stable for the first seven days apart from mild dyspnea and oxygen saturation (SPO_2) levels of 88% and 95%, on room air and under O_2 therapy with a face mask 5 L/min, respectively. On April 3rd, due to the deterioration of the patient's oxygenation, a control chest CT scan was performed, and it revealed progression with widespread patched infiltration areas in both lungs, especially in upper lobes. The involvement rate of the lung was reported as between 25% and 50% (Fig. 2). Then the patient was transferred to the Intensive Care Unit (ICU) for further treatment. After admission to ICU, the patient was treated using non-invasive mechanic ventilation (NIMV), hydroxychloroquine (2*200 mg/day), favipiravir (First day: 2*1600 mg/day and on consecutive days: 2*600 mg/day) and the specific antibiotherapy according to culture-antibiogram results. Her all vital signs remained stable for the first four days in ICU, except worsening dyspnea and tachypnea (30 breath/min). On the 5th day in ICU, she was intubated and positioned to a standard "prone position" to provide better oxygenation. It was continued alternately with the prone position for 16 hours and the supine position for eight hours a day for three days. She was treated with three sessions of convalescent plasma therapy in sequential days due to the national guide of the Turkish Ministry of Health (8). Seven days after intubation, the patient was extubated, and then on the 27th day of the ICU admission; she was discharged back to the ward from ICU.

DISCUSSION

The most symptoms in patients with COVID19 pneumonia are fever, cough and dyspnea (1, 3, 6). Dizziness, diarrhea, vomiting, headache, generalized weakness (1, 6), myalgia and sore throat are othernonspecific symptoms of it (6). Shi et al. (1) reported that predisposing conditions for COVID19 pneumonia are older age and chronic comorbidities, such as chronic pulmonary diseases, diabetes mellitus and hypertension. The imaging characteristics are nonspecific in COVID19 pneumonia. Most images of these patients showed bilateral lung involvement where lesions mainly located peripherally and subpleurally with the diffuse distribution. The

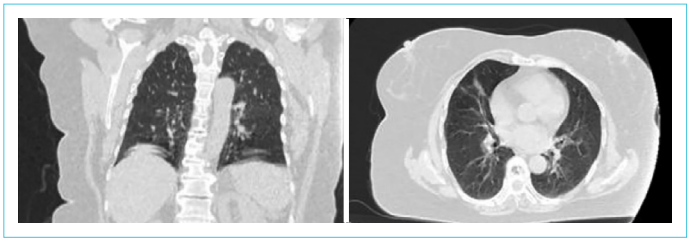

Figure 1. Chest CT findings on admission

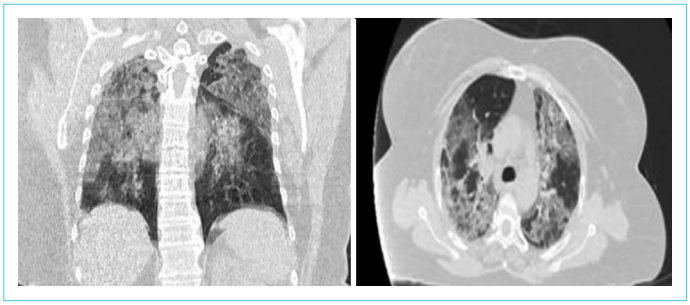

Figure 2. Control chest CT findings on 6th day of admission

predominant pattern of lung involvement was groundglass opacity, with illdefined margins, air bronchograms, smooth or irregular interlobular or septal thickening, thickening of the adjacent pleura (1, 6). There has been no effective, reliable and specific treatment of COVID-19 so far (2, 3, 5–7).

Convalescent plasma, which was one of the forgotten immunology based strategies, was successfully used to treat severe acute respiratory syndromes of viral etiology (2, 5, 7, 11). It supplies passive immunization by administering the passive polyclonal antibody to provide immediate immunity (2, 5, 11). Furthermore, SARS-CoV polyclonal antibody inhibits SARS-CoV-2 spike glycoprotein(S)-mediated entry into cells and lower fatality rate after convalescent plasma treatment (5). Shen et al. (7, 11) reported that the administration of convalescent plasma containing neutralizing antibody was followed by improvement in the patients' clinical status in their preliminary uncontrolled case series of five critically ill patients with COVID-19 and ARDS. Cunninghamet et al. (2) suggest that convalescent plasma for treatment of COVID-19 appears to be helpful in the short term until definitive and effective treatments are found.

The main mechanisms of better oxygenation with prone positioning in patients with ARDS are: applying recruitment to dorsal lung regions, increasing end-expiratory lung volume, increasing chest wall elastane, decreasing alveolar shunt, and improving tidal volume. There is an inverse relationship between the duration of prone stay and mortality rates (3). If conventional ventilation is not meeting goals, the prone position should be applied as soon as possible. The current evidence suggests that time spent in the supine position should be most of the day (>16 h) if tolerated by the patient (12).

The limitation of our case report is that prone position and convalescent plasma were applied simultaneously. Thus, which treatment improved parameters more is unclear.

CONCLUSION

COVID-19 still has no specific treatment. Urgent development of successful treatment modalities is necessary. However, until an effective treatment is found, the application of the existing alternative treatment methods and sharing the results may guide and help studies.

Informed Consent: Written informed consent was obtained from patient who participated this case report.

Peer-review: Externally peer-reviewed.

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Conflict of Interest: The authors have no conflict of interest to declare.

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