STUDY OF COVID-19 CASE WITH MULTIPLE COMORBIDITIES: SEVERE TO SURVIVAL

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ABSTRACT

Elderly COVID-19 patients with comorbidities suffer from severe complications and mostly didn't survive. We report management of a 80-year-old patient with several comorbidities. Due to the fast deterioration of the condition, physicians treated her with Tocilizumab along with medications for other underlying diseases. She recovered completely after therapy with Actemra.

KEYWORDS: COVID-19, Co-morbidities, High-resolution computed tomography, Anticoagulant, Actemra

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Introduction

Coronavirus disease 2019 (COVID-19) is a severe respiratory disease that is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Since its outbreak in late December 2019, it has been rapidly spreading, and the number of deaths due to COVID-19 is increasing globally. From March 2020, the number of COVID-19 patients in Bangladesh is also increasing [1]. Symptoms of this disease can range from symptoms of the common cold to fever, cough, shortness of breath, lack of smell and taste, acute respiratory problems, diarrhea, etc. [2]. Asymptomatic or mild sickness of COVID-19 patients might progress hypoxemic,
respiratory failure or multisystem organ failure, requiring intubation and intensive care management [3]. Co-morbidities like age, heart failure, chronic kidney disease (CKD), diabetes, chronic liver disease, and hypertension increases the chance of casualty from the disease and may lead to poor outcome [4]. However, we report a rare case of Bangladeshi COVID-19 patient with old age and high co-morbidities who had recovered completely after a prolonged hospitalization. This study aims to highlight the targeted management of COVID-19 patients with co-morbidities.

Case presentation

In the middle of July 2021, an older woman in her eighty was diagnosed with severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). She had a previous history of bronchial asthma and myocardial infarction (MI) and was suffering from mild fever with worsening throat pain, generalized body aches, burning on the surface of the skin, and chills with a severe respiratory disorder for the last 6 days. A day before the onset of these symptoms, she had a low-grade fever and lost her sense of smell but no change of taste. The source of transmission was not known at first, but later her grandson was tested for asymptomatic SARS-CoV-2 by reverse transcription polymerase chain reaction (RT-PCR).
The patient was referred to the COVID-19 dedicated ward of the local hospital. A physician examined her and prescribed initial medication. The patient has co-morbidities, such as arthritis, ischemic heart disease (IHD), diabetes mellitus, hypertension, CKD, and disability with a knee; all of these have increased the risk of severe disease and mortality. On primary examination, her pulse was 120 bpm, her temperature was 99.1 °F to 101.2 °F, and her oxygen saturation dropped to 92%. She was started on oxygen, intravenous fluids, and blood thromboembolism prophylaxis.

The physician referred high-resolution computed tomography (HRCT) including detailed lab tests for biomarkers of immune dysfunction seen with COVID-19, such as complete blood count (CBC), serum glutamic pyruvic transaminase (SGPT), fibrinogen, D-dimer, lactate dehydrogenase, creatine kinase, C-reactive protein (CRP), IL-6, Troponin I, Ferritin, hemoglobin and ESR. She had a high level of D-dimer, CRP, Troponin I, TC-WBC, erythrocyte sedimentation rate (ESR) with low hemoglobin, and O^+ blood group. Table 2 shows the detail values of biochemical parameter of 4 consecutive weeks report. HRCT scan showed multifocal and diffuse ground-glass opacity in all the lobes of both lungs. Meanwhile, the patient's hemoglobin level reached 5.2 mg/dL and blood sugar decreased to 2.6 mg/dL on second week, and she was

transferred to ICU immediately. She was given glucose for immediate recovery of hypoglycemia and blood transfusion every two alternate days for two weeks. The patient was continued for treatment with O_2 inhalation SOS, injection Aritone I/V 12 hourly, injection Aeropen 500 mg I/V 12 hourly, and injection Iventi 400 mg I/V OD. Besides, she was nebulized with Windel 6 hourly and with Budicort 12 hourly following the hospital's protocol at the time. In the case of COVID-19 infection, the immune system can become hyperactive, which may result in the worsening of the disease. Thus, when her condition deteriorated, she was given Actemra (480 mg and 528 mg); and her condition improved gradually. However, she was unable to speak with a sore throat. Table 1shows the medication she was prescribed and Table 2 shows her Biochemical test results of four weeks.

Table 1. List of medicine prescribed during hospitalization

Name of medicine*	Injection	Oral	Inhalation	Dose	Time
Aritone (Multivitamin)	I/V			One bottle	12 hourlies
Aeropen (Meropenem)	I/V			500 mg	12 hourlies
Inventi (Moxifloxacin)	I/V	Oral		400 mg	
UFH (unfractionated Heparin)	S/C			5000 IU	6 hourlies
Mixtard (human insulin)	S/C			40 IU	20+0+14
Remdesivir	I/V			200 mg	
Nebulizer with Windel (Salbutamol)			Inhalation	6 hourlies	4 times
Nebulizer with Budicort (Budesonide)			Inhalation	12 hourlies	2 times
Monas (Montelukast)		Oral		10 mg	0+0+1
Clopid (antiplatelet)		Oral		75 mg	0+1+0
Actemra (Tocilizumab)	I/V			480 mg 528 mg	First Second (after 3 days)
Napa extend ((Paracetamol)		Oral			0+0+1
Neuro B (Vitamin B complex)		Oral			1+0+1
Epoetin (Erythropoietin)	S/C			5000 IU	Every 15 days

*All the medications were revised before releasing from the hospital

Table 2. List of Biochemical report of case samples

Vitals and Investigations Report	1nd week	2nd week	3rd week	4rt week
Hb%	105	5.2	7.6	8.5
ESR	28	31	10	06
TC	6830	7050	9820	9380
S. Creatinine	2.35	2.09	2.23	2.02
LDH	516	527	645	387
SGPT			59	54
CRP	55.23	32.67	10.34	4.17 to 1.91
D-Dimer	1.01	2.01	2.84	2.75 to 1040
Electrolytes				
Na	122	124	120	138
K	3.49	3.77	4.39	3.53
HCO3	88	88	88	95
Cl	29	26	26	24
S. Ferritine	>1950	>1650	1875	1650
IL-6	---	----	508.2	86.24
Troponin I	0.099	0.084	0.072	0.044

In addition to her COVID-19 medication, she was treated with UHF (5000 IU) injections as well as Clopid to prevent blood clot and Mixtard 50 to control her diabetes. Her respiratory symptoms improved gradually 16 days and oxygen saturation reached 98%. At follow-up 19 days later, her condition improved slightly and continued to be relieved with medication. After complete recovery, she was released from the hospital on day 21 as her swab sample tested COVID-19 negative. After released from the hospital she was tested Biochemical parameters and presented in the Table 2.

Discussion and Conclusion

Coronavirus disease 2019 (COVID-19) is associated with immune dysregulation and hyper-inflammation, including

elevated interleukin-6 levels. Our case study reports the presentation and management of an elderly patient with several co-morbidities which has increased the risk of severe disease and mortality. She developed hypoglycemia and reduced hemoglobin level throughout her stay at the hospital. Her glucose and hemoglobin levels increased and returned to normal due to glucose injections as well as several blood transfusions. This patient suffered from severe vocal cord damage with a sore throat for 9 weeks, due to straggling with respiratory suffocation. COVID-19 virus affects the tissues in our respiratory system of which the voice box (larynx) is a part. This explains why some people get a hoarse voice during their infection [5]. The patient was treated with a monoclonal antibody named Actemra (Tocilizumab 480 mg and 528 mg) after three days of her COVID-19 diagnosis. Actemra (Tocilizumab) is a monoclonal antibody that reduces inflammation by blocking the interleukin-6 receptor. Elevated cytokine levels result in endothelial dysfunction, vascular damage, and paracrine/metabolic dysregulation, thereby damaging multiple organ systems. Levels of acute-response cytokines (TNF and IL-1β) and chemotactic cytokines rise early in hyperketonemia, facilitating a sustained increase in IL-6 [6]. IL-6 binds to either membrane bound IL-6 receptor or soluble IL-6 receptor (sIL-6R), forming a complex that acts on gp130, regulates levels of IL-6, MCP-1 and GM-CSF by activation of transcription (JAK-STAT) pathway, and thereby perpetuates the inflammatory processes [7]. IL-6, along with other pleiotropic cytokines, drives an acute phase response that elevates serum ferritin, complement, CRP, and pro-coagulant factors. In the case of COVID-19 infection, the immune system can become hyperactive, which may result in the worsening of the disease. It is the second drug ever recommended by the WHO for COVID-19 treatment after recommending dexamethasone in September 2020. After 6 days of using Actemra, a CT scan showed that her lung lesion opacity decreased along with an elevated level of CRP and IL-6. Besides, serum ferritin, serum electrolytes, serum creatinine, and TROP-I of the patient decreased significantly except for the D-dimer level. These indicated that Actemra improved the clinical outcome immediately in severe and critical COVID-19 patients [8]. Thus, for these critically ill patients with elevated IL-6 (508.2 pg/mL) a repeated dose of the Actemra is recommended [9] and after 24th day IL-6 decreased to 86.24pg/mL.

In conclusion, our case illustrates that complete recovery from COVID-19 was possible due to targeted management. This patient was not expected to survive before treatment with Actemra. Thus, it is suggested that multiple doses of Actemra are essential for elderly patients with multiple co-morbidities. A group study on patients who were treated with Actemra can give us a better understanding of the drug for future combat with COVID-19.

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