

A case report of critically ill COVID-19 ICU patient recovery from acute respiratory distress syndrome, acute heart failure, kidney disorder, and Churg-Strauss syndrome

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Abstract

During the COVID-19 pandemic, a 32-year-old front line health-worker tested positive for COVID-19 in RT-PCR and was admitted to the Japan East West Medical College Hospital in Bangladesh. In the ICU, the patient was in coma for 5 days. The Patient's condition was improved after taking fresh frozen plasma.

Introduction:

A new strain of coronavirus named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was first identified in Wuhan, Hubei province, China, in December 2019. Since then, the virus spread all over the world rapidly and became the reason for millions of deaths in the world. The disease caused by SARS-CoV-2 was termed as Coronavirus Disease 2019 (COVID-19) and was declared a global pandemic by the World Health Organization on March 11, 2020 [1]. Severe COVID-19 patients suffer from severe critical illness with pneumonia, acute respiratory distress syndrome (ARDS), and multiorgan failure [2]. This novel coronavirus disease had a dangerous impact on patients, families, healthcare systems, and communities due to the lack of accurate medicine and vaccines, especially in the year 2020 and 2021. To decrease the transmission of the virus, a heavy lockdown was implemented in almost all the nations of the world and global economic activities were in turmoil.

The SARS-CoV-2 virus spreads from person to person through small respiratory droplets and mutates over time. There are several variants of SARS-CoV-2 developed from several mutations. Alpha, Beta, Gamma, Delta, and Omicron variants are remarkable variants of SARS-CoV-2. The Delta (B.1.617.2) variant first emerged in India at a time of low vaccine coverage and was the most dangerous among all the variants of the globe due to high transmissibility, the severity of illness, and death rate [3]. In May 2021, the delta variant of SARS-CoV-2 was the most dominant variant in maximum countries of the world [6]. The poor recovery of COVID-19 patients suffering from heart failure, diabetes, hypertension, malignancy, and chronic kidney disease has been reported [5]. In this case report, we will discuss how the patient recovered from severe COVID-19 symptoms after about six months' rest and treatment.

Case presentation (Disease diagnosis and treatment):

Md. Rabiul Awal is a patriotic Biotechnologist who started his unpaid work without fear of death in the

COVID-19 detection laboratory in the Shahjalal University of Science and Technology, Sylhet, Bangladesh on the behalf of DGHS (Directorate General of Health Services) of Bangladesh Government from the very beginning of the COVID-19 pandemic. During a high surge of the Delta variant of Coronavirus, when he was working as a scientific officer in Japan Medical Center located in Dhaka city for COVID-19 detection, he got infected with COVID-19 with the symptoms of fever (99°F) and headache on 22th April, 2021 and medication was started with rivaroxaban, Paracetamol, Zinc Sulfate Monohydrate, Colecalciferol (Vitamin D3), Vitamin C, Montelukast Sodium, Fexofenadine Hydrochloride, Ivermectin and Doxycycline Hydrochloride. Doses of the medicines were maintained as prescribed by the consultant physician. At the same time, the patient started to suffer from body ache, weakness, cough and remittent fever (101°F-105°F). On 26 April 2021, fever decreased to 99°F but dyspnea started. The SpO₂ of the patient fell down and that was nearly 85% in the pulse Oximeter after 1:00 am of 27 April 2021.

At 11.15 am of 27 April 2021, the patient was admitted in the Japan East West Medical College Hospital in COVID-19 Cabin Block. On examination, his SpO₂ was 90% with 15 L/min O₂ by NRBM, BP was 140/70 mmHg, Pulse 121 b/min, RR 30 br/min, Temperature 99.5 °F. After admission the patient's condition gradually deteriorated therefore at 12.30 pm on 27 April 2021 patient was shifted to ICU and patient was put into HFNC immediately. Despite giving 80 L/min O₂ through HFNC, the patient could not maintain SpO₂. Then NIV was given with 100% FiO₂, but the patient's SpO₂ was not maintained, and gradually the patient became drowsy and disoriented. ABG could not be performed due to failure of locating arterial lines. So mechanical ventilation starts at 11.30 pm. Here all relevant investigation was done and patient was diagnosed as a case of Covid-19 pneumonia (critical) with ARDS (corrected) with Type 1 respiratory failure (corrected), with acute heart failure with Myocarditis, pericarditis and pleural effusion, with AKI (corrected) with Hyponatremia, and with Churg-Strauss syndrome (CSS). Conservative treatment was given with mechanical ventilation. Patient's SpO₂ and FiO₂ improved gradually after taking two-unit of Fresh frozen plasma and bevacizumab injection. After 5 days of mechanical ventilation, extubation was done on May 2, 2021 and the patient was put into HFNC. Thereafter, the patient's condition improved rapidly and a HRCT was done which showed 68% involvement. His 2nd RT-PCR was done on May 5, 2021 and which was COVID-19 negative. As his condition was stable and improving, he was shifted to Medicine IPD on May 8, 2021. The patient was discharged from the hospital with advice on May 13, 2021, when his health was better and fit for discharge. After the COVID-19 infection, the patient suffered about 6 months from the post COVID-19 symptoms with diabetes, psychotic disorder, panic, anxiety, weakness, extrapyramidal side effects and erectile dysfunction.

Tables of laboratory findings is given below:

A few test that was done on 27 April 2021 (Hospital Day 0/ Sickness Day 6):

Test	Result	Normal Range
1. Troponin-i	4.09 ng/ml	<0.11 ng/ml (Normal)
2. Serum Ferritin	3296.7 ng/ml	20-40 ng/ml
3. LDH	594 U/L	313-618 U/L
4. INR	1.09	-
5. Blood Group	B (+ve)	-
6. Chikungunya Ab, Dengue Ab, Dengue Ag NS1, HBsAg, HCV-Ab, Syphilis, MP	Negative	-

RT-PCR, HRCT, CT Brain, ECG and X-Ray:

Test	Result	Date and Hospital or Sickness Day
1. RT-PCR	Covid-19 Positive	22 April 2021 (S 1)
	Covid-19 Negative	5 May 2021 (H 8/ S 14)
2. HRCT	68% Involvement	4 May 2021 (H 7/ S 13)
3. CT Brain	Mastoiditis	4 May 2021 (H 7/ S 13)

4. ECG	Sinus tachycardia	27 April 2021 (H 0/ S 6)
	Sinus bradycardia	3 May 2021 (H 6/ S 12)
	No regional wall motion abnormality	11 May 2021 (H 14/ S 20)
5. X-Ray A/P view	Bilateral pneumonia	28 April 2021 (H 1/ S 7)
6. X-Ray P/A view	Inflammatory changes in both lungs	2 May 2021 (H 5/ S 11)
	Inflammatory changes in both lungs	5 May 2021 (H 8/ S 14)
	Showing mild inflammation	11 May 2021 (H 14/ S 20)
	No abnormal findings	15 June 2021 (S 55)

*** H means Hospital Day and S means Sickness day.

(C) A table of several tests those were done in several time:

Dates	27 April 2021	28 April 2021	02 May 2021	03 May 2021
Day	H 0/S 6	H 1/ S 7	H 5/ S 11	H 6/ S 12
Hemoglobin	14.4 g/dl	13.6	11.1	11.9
WBC	18860	16630	31500	25630
Neutrophil	90%	87%	77	80
Lymphocyte	7%	9%	15	15
Platelet	186000	250000	530000	450000
ESR	90 mm	98 mm	78 mm	30 mm
D-dimer	5.19 µg/ml	2.22 µg/ml	3.87 µg/ml	2.1 µg/ml
CRP	77.4 mg/L	78.5 mg/L	16.9 mg/L	22.1 mg/L
Pro-BNP	4037 pg/ml	-	16561 pg/ml	-
Serum Electrolyte	Na-132, K-3.9, Cl-99, ECO ₂ -21	Na-142, K-4.2, Cl-103, ECO ₂ -25	-	Na-132, K-3.8, Cl-99
Serum Creatinine	1.42 mg/dL	-	-	0.71 mg/dL
Interleukin-6	114.9 pg/mL			
RBS	8.5 mmol/L	10 mmol/L	6.9 mmol/L	6.8 mmol/L

*** H means Hospital Day and S means Sickness day.

In case of Covid-19 pneumonia with acute respiratory distress syndrome with type 1 respiratory failure, Monas, Mucomist DT, Paracetamol, Linezolid, Dexamethasone sodium phosphate, Piperacillin +Tazobactam, Albumin human 20% and Nintedanib were prescribed by consultant physician. The details laboratory tests including RT-PCR, Biochemistry examinations and others tests were described in Table 1A, 1B and 1C. Oxygen inhalation and Nebulization with windel plus was also used and the patient was kept in awake prone position for 6-8 hours as breathing exercise during staying in ICU. For Acute heart failure with myocarditis and pericarditis, Bisoprolol, Propranolol Hydrochloride, Digoxin, Enoxaparin, Ramipril, and Furosemide antibiotics and steroid were used. In case of acute kidney infection with Hyponatremia, Intravenous (NaCl) was applied. For Churg-strauss syndrome treatment, Prednisolone was prescribed. In case of Diabetes treatment, Actrapid® HM, Sitagliptin, and Glimepiride were used. Quetiapine and Haloperidol were given for the treatment of psychotic disorder like hallucinations and disorganized thinking. For panic, depression, anxiety and extrapyramidal side effect, Mirtazapine, Carbidopa and levodopa, Trihexyphenidyl hydrochloride, Sertraline hydrochloride, Procyclidine Hydrochloride, and Clonazepam were given. Besides, when the patient's condition developed more critical ARDS, Inj. Bevacizumab and 2 units Fresh frozen plasma were also given. As antibiotic, Inj. Meropenem, Tab. Moxifloxacin and Cap. Cefixime were prescribed. During staying in ICU, the patient also faced with Conjunctivitis, Fungal Infection and mouth ulcer. In case of Conjunctivitis, Cyst tear eye drop and Optimox eye drop were used. For fungal Infection and mouth ulcer, Voriconazole and Micoral® oral gel were used respectably. As food supplements, Vitamin-C, Vitamin B complex + zinc, Multivitamin & Multimineral [A-Z gold preparation] were used. Doses of the all medicines were maintained as prescribed by the expert physician.

Discussion:

Fever, cough, weakness, vomiting, runny nose, sneezing, headache, body ache, feeling very unwell and shortness of breath or dyspnea are the common symptoms of Covid-19 [7, 8]. In case of severe Covid-19, dyspnea of the patient develop into acute respiratory distress syndrome with Type 1 respiratory failure and the patient needs to be treated carefully with intensive care unit (ICU) support. Acute respiratory failure is one of the most common cause of death in case of Covid-19 patient [9]. In Bangladesh, 15.53 % of them were severely ill in a random sample of 103 RT-PCR confirmed case of Covid-19 [10].

In this case study, the patient's suffering condition can be divided into three stages. 1st stage (Mild to moderate condition): where the patient suffered from fever and cough for 5 days and shortness of breath for 1 day. 2nd Stage (Covid-19 pneumonia Severe Condition): In this stage, the patient was in coma for 5 days and suffered from ARDS with Type 1 respiratory failure, acute heart failure with myocarditis and pericarditis, Churg-Strauss syndrome (CSS), Kidney disorder with Hyponatremia, Oral ulcer, Conjunctivitis and diabetes. 3rd stage (Post Covid-19 symptoms): In this stage, he suffered from diabetes for about two months and psychotic-disorder, erectile dysfunction, panic, fear, anxiety, and extrapyramidal side effects for about six months. About all the symptoms of three stages were observed in the review article of Hassan S *et al.* and Cascella M *et al.* [8, 11] without extrapyramidal side effects and erectile dysfunction. The patient suffered from Covid-19 (mild to moderate condition) from 22 April 2021 to 26 April 2021; Severe condition from 27 April 2021 to 2 May 2021 and later he suffered from Post Covid-19 symptoms for about 6 months.

During admission in Japan East West Medical College Hospital (now SHIP International Hospital), the patient's blood sample was tested for Chikungunya Ab, Dengue Ab, Dengue Ag NS1, HBsAg, HCV-Ab, Syphilis and MP and those showed negative results. Therefore, it was confirmed that the patient was suffering from Covid-19 (that was tested on 22 April 2021). Increased level of white blood cell, neutrophil, lymphocyte, ESR, D-dimer, CRP (C-reactive protein), Pro-BNP, Serum creatinine, Interleukin-6, Random blood sugar, Serum Ferritin, LDH (lactate dehydrogenase), Troponin-I, INR was observed in the severe condition of the patient and the similar increased level of results were discussed in Al Noman *et al.* and Hassan S *et al.* [10, 11].

Covid-19 pneumonia with acute respiratory distress syndrome with type 1 respiratory failure was confirmed with X-Ray, HRCT (High-resolution computed tomography) and severe shortness of breath. Acute heart failure with myocarditis, pericarditis and pleural effusion was detected by irregular heartbeat, X-ray, HRCT, ECG, and other laboratory tests (such as- Pro-BNP, D-dimer and Troponin-I). Kidney disorder was investigated by serum creatinine and serum electrolytes. Diabetes was detected by Blurred vision, urinating more often and being thirstier and measured by RBS (random blood sugar) and HbA1c test. Churg-strauss syndrome was confirmed by clinical symptoms such as- rash, gastrointestinal bleeding, body pain and loss of strength.

Conclusion:

Due to COVID infection, the patient became very much weak and lost weight about 13 Kg in 12 days after infected with COVID-19. With proper medication, diet (fish, chicken, pigeon and egg soup; green vegetables, seasonal fruits and cow's milk) and home rest, he gained back weight after 7 month of infection. At last, it can be concluded that, after strong struggle with diseases, the patient recovered from COVID-19 disease with the blessing of the Almighty.

Abbreviations:

ICU = Intensive Care Unit, IPD = Indoor Patient Department, SpO₂ = Peripheral capillary oxygen saturation, HFNC = High flow nasal cannula, FiO₂ = fraction of inspired oxygen, HRCT = High-resolution computed tomography, ARDS = acute respiratory distress syndrome, DGHS = Directorate General of Health Services, NRBM = non-rebreather mask, BP = Blood Pressure, mmHg = millimetres of mercury, RR = Respiratory rate, NIV = Non-invasive ventilation, ABG = Arterial blood gas, CSS = Churg-Strauss syndrome, LDH = Lactate dehydrogenase, INR = International normalized ratio, ECG = Electrocardiogram,

CRP = C-reactive protein, RBS = Random blood sugar, ESR = Erythrocyte sedimentation rate, BNP = brain natriuretic peptide.

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Author's contribution:

The first author, Md. Rabiul Awal (S.O.) wrote the manuscript with the help of Dr. Ayesha Chowdhury and Md. Shariful Islam (S.O) from the record of medical reports. Dr. Md. Imran Hasib Khandakar revised and edited the manuscript.

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Supplements:

A table of vital signs recorded in ICU:

Day (Date)	Vital signs	Body temperature (°F)	Blood pressure (mmHg)	Heart rate (beats/min.)	Respiratory rate (breath/min.)	Oxygen Saturation (%)
27 April 2021 (H 0/S 6)	12:00 PM	98.4	90/52	152	23	94
28 April 2021 (H 1/ S 7)	12:00 AM	98	100/65	140	22	76
	12:00 PM	97	94/65	124	22	89
29 April 2021 (H 2/ S 8)	12:00 AM	97.2	95/62	105	22	90
	12:00 PM	97.6	106/62	97	22	95
30 April 2021 (H 3/ S 9)	12:00 AM	98.4	98/56	91	22	97
	12:00 PM	98.3	106/72	71	22	98
01 May 2021 (H 4/ S 12)	12:00 AM	98	112/60	81	23	96
	12:00 PM	97.6	123/74	72	22	98
02 May 2021 (H 5/ S 11)	12:00 AM	97.6	122/72	88	28	92
	12:00 PM	98	128/72	72	23	96
03 May 2021 (H 6/ S 12)	12:00 AM	97.1	134/86	67	28	94
	12:00 PM	98.4	125/78	88	24	99
04 May 2021 (H 7/ S 13)	12:00 AM	97.6	134/86	65	28	96
	12:00 PM	98	133/80	70	23	99
05 May 2021 (H 8/ S 14)	12:00 AM	97.4	127/81	61	26	96
	12:00 PM	97.8	129/76	76	22	95
06 May 2021 (H 9/ S 15)	12:00 AM	97.1	120/80	86	22	95
	12:00 PM	97.8	122/78	78	22	95

*** H means Hospital Day and S means Sickness day.