Parenteral Hydrocortisone treatment in a COVID-19 patient with Respiration Distress –a case report

ABSTRACT

This prospective case report study showed the intravenously administered Hydrocortisone response on a patient admitted to the Elekahia COVID-19 treatment centre, located in Port Harcourt, Rivers State, Nigeria. The patient was a 47-year-old man of Asian descent; he presented with pneumonia-like symptoms and developed severe breathlessness. Treatment started on 6th June 2020 and ended on 16th June 2020.

There was a marked improvement in peripheral capillary oxygen saturation (SpO_2) after hydrocortisone intervention; respiratory rate reduced from 40 cycles per minute to 18 cycles per minute, and the patient could complete sentences without developing breathlessness, three hours after receiving the first dose of intravenous hydrocortisone.

The use of Hydrocortisone therapy could be of tremendous benefit in the treatment of COVID-19 patients who present with severe respiratory distress. Controlled randomized clinical trials are required to assess steroid use in COVID-19 treatment properly. And to assess its use as a prophylactic in the early management of severe COVID-19 cases.

Keywords: COVID-19, Hydrocortisone treatment, oxygen saturation, steroid therapy, acute respiratory distress syndrome, Case report

Abbreviations: PaO_2: Partial Pressure of Oxygen; FiO_2: Fraction of Inspired Oxygen

INTRODUCTION

The clinical spectrum of COVID-19 ranges from asymptomatic to variable degrees of respiratory symptoms, multiorgan damage and death [1]. These respiratory symptoms may manifest as mild –catarrh, cough, rhinorrhoea; medium –dyspnoea, respiratory rate ≥ 30 cycles per minute, blood oxygen saturation ≤ 93%; or critical –respiratory failure, septic shock, multiple organ dysfunction or failure [2]. Acute respiratory distress syndrome (ARDS) is a type of respiratory failure characterized by rapid inflammation of the lungs; the symptoms comprise dyspnoea, tachypnoea, and cyanosis [3]. The pathogenesis of COVID-19 is associated with the expression of the cytokine storm and can result in acute respiratory distress syndrome and eventual death [4].

Evidence shows that COVID-19-related ARDS differs from ARDS caused by other factors: COVID-19-related ARDS follows a predictable time course over days, with a median onset time of 8–12 days [5]. Coagulation dysfunction appears common in COVID-19-related ARDS compared to pulmonary thrombosis in sepsis-induced ARDS [6]; it also appears to have worse outcomes than ARDS from other causes [7].

Although ARDS is underdiagnosed in intensive care settings, respiratory rate and SpO_2 are two important parameters for judging patients' clinical condition and allowing early recognition of ARDS. A patient who fits either the following requirements: respiratory rate ≥ 30 cycles/min; SpO_2 ≤ 92%; and PaO_2/FiO_2 ≤ 300 mmHg; may have severe disease and require further evaluation. Although there are no specific drugs or therapies available to directly treat or prevent ARDS [3], High-Flow Nasal Oxygen (HFNO) has been suggested for the clinical management of ARDS [8]; nevertheless, the World Health Organization recommends its use in only by patients with hypoxemic respiratory failure. It is also evident that using the prone position during mechanical ventilation improves survival among patients with ARDS [9].

This report highlights the critical role hydrocortisone treatment could play in managing COVID-19 patients with severe respiratory symptoms.

CASE PRESENTATION

History

The patient was a 47-year-old man of Asian descent. He presented at the facility on the 6th of June 2020 with a cough, fever, generalized body weakness, headache, and vomiting; these symptoms persisted for one week after he arrived from China. His travel history and the presenting symptoms prompted a Reverse Transcription Polymerase Chain Reaction (RT-PCR) COVID-19 test, which came out positive for COVID-19. The patient reported neither an underlying illness nor a family history of chronic diseases. There was no known history of tobacco use, alcohol, or recreational drug habit.

Case report

At presentation, the patient's vital signs were blood pressure of 122/84mmhg, temperature 36.7^{o}C, pulse rate of 78 beats per minute, respiratory rate of 22 cycles per minute, and SpO_2 of 98%. There was an absence of cyanosis, pallor, and pedal oedema. Blood samples were collected for full blood count, retroviral screening, Random Blood Glucose, Liver Function Test, Electrolyte, Urea, and creatinine.

Test results

The retroviral screening was negative, while Random Blood Glucose, Liver Function Test, Electrolyte, urea, and creatinine were within normal limits. Table 1 shows the results of the full blood count test.

Table 1. Full Blood Count Test Results

Test	Result
Erythrocytes	4.1 x 10^{12}/L
Haematocrit	0.322 L/L*
Haemoglobin	117 g/L*
Mean Corpuscular Haemoglobin	29 pg
Mean Corpuscular Haemoglobin Concentration	334 g/L
Mean Corpuscular Volume	85.1 fL
White Blood Cell	15.9 x 10^{9}/L**
Platelet	230 x 10^{9}/L
Lymphocyte	0.42**
Neutrophils	0.57
Basophils	0.00
Eosinophils	0.00
Monocytes	0.01*

*Below normal range **Above normal range

Two hours post-admission, the patient's vital signs showed sudden marked deterioration fever and fall in SpO2; resulting in fever and breathlessness, which also worsened progressively. The pulse rate increased to 98 beats per minute; blood pressure reduced to 118/65 mmHg; the respiratory rate rose to 40 cycles per minute, and SpO_2 fell to 93%; he developed a fever, with a body temperature reading of 38.7^{o}C.

Intervention

On admission, the patient was treated orally with two tablets of Lopinavir/ritonavir 200/50mg twice a day, 500mg of azithromycin capsules daily, 20mg of Zinc tablets twice daily, and 1000mg of vitamin C daily for seven days.

At the point of deterioration, he was placed in a cardiac position; oxygen was administered intranasally with a catheter at six litres per minute, and intramuscular paracetamol 600mg was given PRN. The patient was also administered intravenous hydrocortisone 100mg, and vital signs were closely monitored. Another dose of intravenous hydrocortisone was administered one hour later for maintenance. A summary of intravenous hydrocortisone intervention and corresponding vitals is depicted in Table 2.

Table 2. Timeline of hydrocortisone intervention and corresponding vital statistics

Events	Intravenous Hydrocortisone (mg)	SPO_2 (%)	Respiratory rate (cycles/min)	Pulse Rate (beats/min)	Blood Pressure (mmHg)	Temperature (^oC)
Admission	-	98	22	78	122/84	36.7
2 hours	100	93	40	98	118/65	38.7
3 hours	100	98	18	72	126/82	36.9
6hours	-	99	20	80	120/80	36.4

Outcome

There was a marked improvement in vital signs five hours after admission. The following statistics were observed: blood pressure –126/82 mmHg, temperature –36.4^{o}C, pulse rate –72 beats per minute, respiratory rate –18 cycles per minute, and SpO_2 –98%. The patient was completely stable at the six-hour mark.

The patient had no further episodes of breathlessness or any other respiratory symptom during the rest of his stay in the facility; as such, there was no need for ventilator care. He was discharged home on the 16th of June 2020 following full recovery and a negative RT-PCR test.

Patient Perspective

The patient relates that he felt remarkably relieved six hours after admission. He could sit up and perform some walking exercises while in the facility without dyspnoea, and no additional complaints or adverse events were reported while on admission. At the time of discharge patient was stable and had no complaints.

DISCUSSION

This case report describes a patient with no history of chronic illness or substance use who presented with symptoms comparable to the common host response to SARS-CoV-2 [10], and a travel history from a country with confirmed cases. A laboratory test result confirmed infection with SARS-CoV-2. The patient exhibited respiratory distress two hours after admission, possibly attributable to the cytokine storm syndrome [11]. The cytokine storm may have also been responsible for the patient's rapid deterioration of vital signs, which manifested as increased body temperature and blood pressure and abnormal SPO_2 [12]. However, a D-Dimer test, chest radiography, or echocardiography was impossible at the time in the facility.

Subsequently, intervention with intravenous hydrocortisone showed a remarkable improvement in the vital signs and the patient was stabilised without needing a ventilator. The patient had no relapse until his discharge, following a negative RT-PCR test. Although [13] suggested that low-dose methylprednisolone resulted in a greater improvement of ventilator-free days among COVID-19 patients compared with no steroid, they also stated that the outcome effect might depend on the type of steroid used. Hydrocortisone for respiratory therapy among COVID-19 patients is still novel. It aligns with prevailing evidence stating the insufficiency of data to prove the benefit over the risk of steroids in the treatment of severe COVID-19 [14]. The use of corticosteroids in patients with ARDS remains controversial, and its effect on patients is still uncertain.

However, treatment with corticosteroids is currently the only pharmacological intervention that may accelerate the improvement of ARDS and reduce mortality; therefore, it needs further evaluation [15].

CONCLUSION

The use of hydrocortisone was beneficial for our patient. However, a randomized controlled clinical trial is recommended to generate adequate evidence on the use of steroids for the treatment of COVID-19, keeping in mind the immunosuppressive effects of steroids.

CONSENT FOR PUBLICATION

Written consent for the publication of this article was obtained from the patient.

ETHICAL APPROVAL

The article describes a case report. Therefore, no additional permission from our Ethics Committee was required.

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