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Clinical Impact of Hydrocortisone Uses on Patient with COVID-19: A Case Report

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Authors' contributions

This work was carried out in collaboration among all authors. Author GCO did the review and summary of the patient's medical history. Authors GCO and CNEE did the first draft of manuscript. Authors TIN and VOO provided medical care. Author CNEE did the editing and critical review of manuscript. All authors read and approved the final manuscript.

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Case Report

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ABSTRACT

COVID-19 can cause anything from no symptoms at all to severe breathing problems, organ failure, and even death. Currently, there is no cure for COVID-19, thus treatment focuses on providing the patient with as much comfort as possible. Hydrocortisone are utilized for patients with acute respiratory disease syndrome and septic shock because they shorten the need for mechanical ventilation, ICU stay, and perhaps mortality. 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

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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

1. 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.

2. CASE PRESENTATION

2.1 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 overseas. 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 respiratory illness. There was no known history of tobacco use, alcohol, or recreational drug habit.

2.2 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.

2.3 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.

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.

2.4 Intervention

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

At the point of deterioration, he was placed in a cardiac position, Semi Fowler's position; oxygen was administered intranasally with a catheter at six litres per minute, and intramuscular paracetamol 600 mg was given PRN. The patient was also administered intravenous hydrocortisone 100 mg, 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.

2.5 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.

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*

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 (^{o}C)
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
6 hours	-	99	20	80	120/80	36.4

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.

2.6 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.

3. 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]. Studies have shown that corticosteroid treatment dramatically reduces in-hospital mortality for COVID-19 patients, and our results confirm this [15-17]. Corticosteroids have been demonstrated to help critically ill patients with COVID-19 [18-20].

However, 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 [21].

4. CONCLUSION

The use of hydrocortisone was beneficial for our patient as the case study showed a correlation between the administration of corticosteroids to COVID-19 patients and recovery and reduced risk of death. 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

As per international standard or university standard, patient(s) written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

DISCLAIMER

This paper is an extended version of a preprint document of the same author.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Evers JM, Pehlke SJ, Jones LL, Urquhart MG. Oxygenation strategies in critically Ill patients with COVID-19. Dimensions of Critical Care Nursing, 2021;40(2):75-82.

2. He F, Deng Y, Li W. Coronavirus disease 2019: What we know? Journal of Medical Virology, 2020;92(7):719-725.
3. Fan E, Brodie D, Slutsky AS. Acute respiratory distress syndrome: Advances in diagnosis and treatment. JAMA. 2018;319 (7):698-710.
4. Jiang Y, Rubin L, Peng T, Liu L, Xing X, Lazarovici P, Zheng W. Cytokine storm in COVID-19: from viral infection to immune responses, diagnosis and therapy. International Journal of Biological Sciences. 2022;18(2):459-472.
5. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, Zhang L, Fan G, Xu J, Gu X, Cheng Z, Yu T, Xia J, Wei Y, Wu W, Xie X, Yin W, Li H, Liu M, Xiao Y, Gao H, Guo L, Xie J, Wang G, Jiang R, Gao Z, Jin Q, Wang J, Cao B. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. The Lancet. 2020;395(10223):497-506.
6. Wang J, Hajizadeh N, Moore EE, McIntyre RC, Moore PK, Veress LA, Yaffe MB, Moore HB, Barrett CD. Tissue plasminogen activator (tPA) treatment for COVID-19 associated acute
1. respiratory distress syndrome (ARDS): A case series. J Thromb Haemost. 2020; 18(7):1752-1755.
7. Bellani G, Laffey JG, Pham T, Fan E, Brochard L, Esteban A, Gattinoni L, van Haren F, Larsson A, McAuley DF, Ranieri M, Rubenfeld G, Thompson BT, Wrigge H, Slutsky AS, Pesenti A. Epidemiology, Patterns of Care, and Mortality for Patients With Acute Respiratory Distress Syndrome in Intensive Care Units in 50 Countries. Jama, 2016;315(8):788-800.
8. Ou X, Hua Y, Liu J, Gong C, Zhao W. Effect of high-flow nasal cannula oxygen therapy in adults with acute hypoxemic respiratory failure: A meta-analysis of randomized controlled trials. CMAJ :Canadian Medical Association Journal = Journal de l'Association Medicale Canadienne. 2017;189(7):E260-E267.
9. Sud S, Friedrich JO, Adhikari NKJ, Taccone P, Mancebo J, Polli F, Latini R, Pesenti A, Curley MAQ, Fernandez R, Chan M-C, Beuret P, Voggenreiter G, Sud M, Tognoni G, Gattinoni L, Guérin C. Effect of prone positioning during mechanical ventilation on mortality among patients with acute respiratory distress syndrome: A systematic review and meta-analysis. CMAJ : Canadian Medical Association journal = journal de l'Association medicale canadienne. 2014;186(10):E381-E390.
10. Boechat JL, Chora I, Morais A, Delgado L. The immune response to SARS-CoV-2 and COVID-19 immunopathology - Current perspectives. Pulmonology. 2021;27(5): 423-437.
11. Luo XH, Zhu Y, Mao J, Du RC. T cell immunobiology and cytokine storm of COVID-19. Scandinavian Journal of Immunology. 2021;93(3):e12989.
12. Hafezi B, Chan L, Knapp JP, Karimi N, Alizadeh K, Mehrani Y, Bridle BW, Karimi K. Cytokine Storm Syndrome in SARS-CoV-2 Infections: A Functional Role of Mast Cells. Cells. 2021;10(7):1761.
13. Yoshihiro S, Hongo T, Ohki S, Kaneko T, Ishikawa J, Ihara S, Taito S, Sakaguchi M, Yatabe T. Steroid treatment in patients with acute respiratory distress syndrome: a systematic review and network meta-analysis. J Anesth. 2022;36(1):107-121.
14. Raju R, V P, Biatris PS, J SJUC. Therapeutic role of corticosteroids in COVID-19: a systematic review of registered clinical trials. Futur J Pharm Sci. 2021;7(1):67-67.
15. RECOVERY Collaborative Group. Dexamethasone in hospitalized patients with Covid-19. New England Journal of Medicine. 2021;384(8):693-704
16. Fadel R, Morrison AR, Vahia A, Smith ZR, Chaudhry Z, Bhargava P, Miller J, Kenney RM, Alangaden G, Ramesh MS. Early short-course corticosteroids in hospitalized patients with COVID-19. Clinical Infectious Diseases. 2020;71(16):2114-20.
17. Sterne JA, Murthy S, Diaz JV, Slutsky AS, Villar J, Angus DC, Annane D, Azevedo LC, Berwanger O, Cavalcanti AB, Dequin PF. Association between administration of systemic corticosteroids and mortality among critically ill patients with COVID-19: A meta-analysis. Jama. 2020;324(13): 1330-41.
18. Chen H, Xie J, Su N, Wang J, Sun Q, Li S, Jin J, Zhou J, Mo M, Wei Y, Chao Y. Corticosteroid therapy is associated with improved outcome in critically ill patients with COVID-19 with hyperinflammatory phenotype. Chest. 2021;159(5):1793-802.
19. Ritter LA, Britton N, Heil EL, Teeter WA, Murthi SB, Chow JH, Ricotta E, Chertow DS, Grazioli A, Levine AR. The impact of corticosteroids on secondary infection and mortality in critically ill COVID-19 patients.

Journal of Intensive Care Medicine. 2021; 36(10):1201-8.

20. Monedero P, Gea A, Castro P, Candela-Toha AM, Hernández-Sanz ML, Arruti E, Villar J, Ferrando C. Early corticosteroids are associated with lower mortality in critically ill patients with COVID-19: A cohort study. Critical Care. 2021;25(1):1-3.

21. Meduri GU, Bridges L, Shih MC, Marik PE, Siemieniuk RAC, Kocak M. Prolonged glucocorticoid treatment is associated with improved ARDS outcomes: Analysis of individual patients' data from four randomized trials and trial-level meta-analysis of the updated literature. Intensive Care Med. 2016;42(5):829-840.

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