

Case Report



Hyponatremia in COVID-19 patient using angiotensin type 1 receptor (AT1R) blocker and diuretic: a case report

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Introduction

On 31 December 2019, a cluster of pneumonia cases with unknown etiology was reported in Wuhan city, Hubei province of China. A novel coronavirus (SARS-CoV-2) was later detected as the causative agent and the clinical condition was called coronavirus disease 19 (COVID-19). The SARS-CoV-2 infection has a wide clinical course that can progress from mild symptoms such as fever, sore throat, cough to pneumonia and acute severe respiratory failure. The S protein of SARS-CoV-2 is thought to bind to the host cell angiotensin-converting enzyme 2 (ACE2) receptor and cause the disease.

Case Presentation

An 82-year-old male patient presented to the emergency room with fever and cough. He had a history of diabetes mellitus, hypertension, Parkinson's disease and coronary bypass, been on a regular prescription of metformin, rasagiline, telmisartan and hydrochlorothiazide. A prescription was issued to treat bacterial pneumonia and he was discharged with a plan of outpatient follow-up by the department of pulmonology. Three days later, he came back to the emergency department as his complaints continued. As the patient had bilateral infiltrations on the thorax CT-scan, consultation from specialists in infectious diseases and pulmonology departments was requested. Viral pneumonia was considered by the consultants as the possible diagnosis; oseltamivir was added to his treatment and an outpatient follow-up for five days was recommended. Because of his increasing complaints and additional shortness of breath despite the treatment, he was referred to us at the emergency department following a review appointment at the pulmonology outpatient clinic.

In physical examination, the patient appeared alert, oriented and cooperative with the following vital signs: temperature 36.7°C, pulse rate of 88 beats/minute,

respiratory rate of 18 per minute, blood pressure of 182/106 mm Hg, and oxygen saturation of 90%. His breathing was spontaneous and unaided. Bilateral rales and rhonchi were detected in lung auscultation. Other system findings were normal.

In laboratory tests; lymphocyte count was 0.8×10^3 cells/ μ L, serum sodium: 115 mmol/L, C-reactive protein (CRP): 30 mg/L, lactate: 2.1 mmol/L. There were bilateral peripheral infiltrations in HRCT (Figure 1). The SARS-CoV-2 serology test was positive, he was therefore hospitalized in an isolated bed in intensive care unit. Serum sodium values and lymphocyte counts of the recent hospital admission are displayed in Figure 2.

Discussion

SARS-CoV-2 interacts strongly with ACE2 in human cells due to S-protein.^{1,2} Therefore, cells expressing ACE2 are at high risk for SARS-CoV-2 infection.³ SARS-CoV-2 binds to type 2 alveolar cells in the lung through the ACE2 receptor, causing the disease. Therefore, in a study comparing ACE2 expression rates in other organs, lung ACE2 expression rate was accepted as the reference value.³ Other high-risk organ cells for SARS-CoV-2 infection include ileum epithelial cells, myocardial cells and kidney proximal tubule cells.³ Xu et al reported that ACE2 receptors were also interestingly expressed in lymphocytes in oral mucosa; SARS-CoV-2 attacked lymphocytes resulting in increased morbidity of the patients.⁴ It was noted that the reported symptoms of COVID-19 (dyspnea, diarrhea, acute heart damage, kidney failure) could be associated with fusion of the virus into the cells in high risk organs, especially in the presence of viremia.³ ACE inhibitors, angiotensin type 1 receptor blockers and angiotensin type 2 receptor agonist drugs increase ACE2 expression in renal proximal tubule cells and it is well known that hyponatremia may occur due to these drugs.⁵ In a large-scale study with 1099 patients, 15% had

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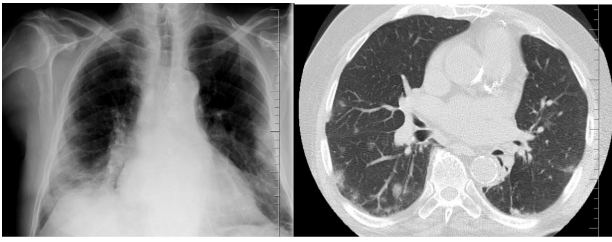


Figure 1. Bilateral consolidation on X-ray, bilateral patchy infiltration in tomography

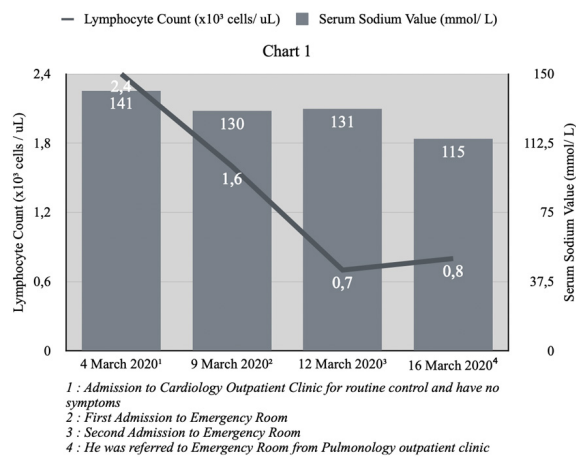


Figure 2. Lymphocyte Count with Serum Sodium Value by time.

hypertension and mean serum sodium value of 138 mmol/L. In addition, lymphopenia was reported in 82.3% of patients at the time of admission.⁶ As noted above, our patient had been on a regular prescription of a combination of telmisartan and hydrochlorothiazide for some period prior to his presentation to our department. It is important to note that from the onset of his symptoms, this patient continued to display increasing clinical symptoms and worsening hyponatremia with lymphopenia (Figure 2).

Limitations

1. We could not find any information in the published COVID-19 related data about the type of anti-hypertensive medications that the COVID-19 patients were on/had used.
2. In COVID-19 related clinical studies, mean serum Na values were given but we could not find any data about the lowest and highest serum Na values.

Conclusion

This case indicates that COVID-19 may well have triggered or accelerated drug-dependent hyponatremia.

Conflict of Interest

None declared.

Ethical Approval

Informed consent was obtained from the patient for publication of the report.

Authors' contribution

Conception: MYS; Data collection and processing: MYS and NU; Literature review: AB and MYS, Drafting the manuscript: AB, MYS, HK, and SC; Critical Review of the manuscript: AB, MYS, and NU; All authors read and approved the final version of the manuscript.

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