Asymptomatic hyponatremia precipitated by COVID-19 pneumonia

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ABSTRACT

COVID-19, also known as SARS-CoV-2, which originated in China in late 2019, has spread rapidly resulting in a global pandemic. COVID-19 has been linked to many different clinical manifestations, including hyponatremia. The cause of hyponatremia in acute COVID-19 infection is speculated to be multifactorial, including syndrome of inappropriate antidiuretic hormone secretion (SIADH), thought to be a result of inflammatory cytokines (Interleukin-6) and/or related to the gastrointestinal symptoms of this infection. SIADH in the setting of COVID-19 pneumonia is an established complication of this disease. This is the case of an 81-year-old woman with a history of hypertension, on thiazide diuretic, initially presented after a fall in the setting of COVID-19 pneumonia. She was treated with remdesivir and dexamethasone and then discharged to a rehab facility with normal labwork, including a sodium of 137 mmol/L. Two weeks later, routine labwork identified hyponatremia of 111 mmol/L. Her vital signs were normal, she was euvoemic on exam and alert/oriented with no complaints. Investigations into the etiology of her hyponatremia included a urine sodium of 72 mmol/L, serum osmolality of 231 mOsm/kg, urine osmolality of 454 mOsm/kg. We diagnosed hyperosmolar hyponatremia due to SIADH. Management included fluid restriction and then tolvaptan, which ultimately corrected the serum sodium to 134 mmol/L. As COVID-19 is a new infection, little is known regarding its impact on electrolyte imbalances. Our patient recovered from pneumonia, then later developed severe hyponatremia possibly secondary to the last effects of inflammation in her lungs.

1. Background

Coronavirus disease 2019 (COVID-19), caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), originated in late 2019 and has spread rapidly resulting in a global pandemic. Clinically, COVID-19 has several manifestations, including hyponatremia. The cause of hyponatremia in acute COVID-19 infection is speculated to be multifactorial, including syndrome of inappropriate antidiuretic hormone secretion (SIADH), thought to be a result of inflammatory cytokines (Interleukin-6) and/or related to the gastrointestinal symptoms of this infection. SIADH in the setting of COVID-19 pneumonia is an established complication of this disease.

2. Case report

An 81-year-old female who was previously admitted to the hospital following a fall at which time she was also diagnosed with COVID-19 pneumonia, which was treated with Remdesivir and dexamethasone following which she was sent to a rehabilitation centre for recovery, presented to the emergency department after a basic metabolic panel was checked at the facility and she was found to have severe hyponatremia (111 mEq/dL; reference range: 137–145 mEq/dL). Her prior baseline serum sodium was 137 mEq/dL. She did not display any symptoms of hyponatremia. On presentation, she was normotensive (124/73 mm Hg), with a regular heart rate (64 beats per minute), regular respiratory rate (20 breaths per minute), afebrile (36.5°C) and calm. She was alert and oriented to person, place, and time. Lung exam was significant for bibasilar crackles, which were unchanged from prior examinations from when she was admitted for COVID-19 pneumonia. Cardiac auscultation revealed a 2/6 systolic ejection murmur in the aortic region with no additional murmurs, rubs or gallops or changes in the present murmur. The abdominal exam was benign. She had good peripheral pulses in all four extremities, along with two plus pitting edema to the level of the mid shin.

Laboratory diagnostics revealed hyponatremia (111 mEq/dL; reference range: 137–145mEq/dL), potassium of (4.1 mEq/dL; reference range: 3.5–5.1 mEq/dL), hypochloremia (76 mEq/dL; reference range: 98–107 mEq/dL), BUN of (14 mg/dL;
reference range: 7–17 mg/dL) and creatinine of (0.91 mg/dL; reference range: 0.52–1.04 mg/dL). Serum osmolality was 231 mOsm/kg (reference range: 275–300 mOsm/kg). Complete blood count revealed anemia (11.6 g/dL; reference range: 11–14.5 g/dL), leukocyte count 4.6 K/µL (4.0–10.8 K/µL), platelet count 284 K/µL (reference range: 145–400 K/µL). COVID-19 RNA PCR was positive. Urinalysis was unremarkable. Urine chemistry showed urine chloride 98 mmol/L (27–283 mmol/L), urine osmolality 454 mOsm/kg (reference range 300–900 mOsm/kg), urine potassium 56.8 mmol/L (reference range 35–336 mmol/L), urine sodium 72 mmol/L (reference range 32–112 mmol/L), urine protein 16 mg/dL (0–16 mg/dL). Further diagnostics revealed morning cortisol level of 14.2 mcg/dL (5.0–23 mcg/dL), TSH 0.12 uIU/ml (0.4–4.0 uIU/ml), T4 1.03 ng/dL (reference range 0.9–2.3 ng/dL). EKG revealed: Normal sinus rhythm and possible left atrial enlargement. Plain-film chest radiograph revealed an enlarged cardiac silhouette and diffuse interstitial prominence.

The patient was admitted to the hospital for further management of severe, but asymptomatic, Hypotonic hyponatremia. She was started on a continuous infusion of normal saline at 100 cc/h and was given a 1-g tablet of sodium chloride. Her home medication of chlorothalidone 25 mg was held. She was also kept on fluid restriction limited to 1200 cc/day. Fluid restriction was then intensified to 800 cc/day, however her sodium increased only to 112 mEq/dL. Nephrology was consulted. Her sodium gradually improved to 113 mEq/dL with the same management for 24 hours, and the frequency of salt tabs was increased to 1 g twice a day. She was then given 15 mg of tolvaptan, which increased the serum sodium to 121 mEq/dL over the next 24 hours. After this correction of sodium, she was managed with only fluid restriction and her sodium gradually corrected to 134 mEq/dL.

3. Discharge and follow up

The patient was discharged back to the rehabilitation facility with instructions to maintain fluid restriction to 1200 cc/day. The nursing home was contacted, and they stated that she was following up with her primary care physician, was compliant with the fluid restriction, and was tolerating it well. She had a follow-up basic metabolic panel a week after discharge, which showed a serum sodium of 133 mEq/dL.

4. Discussion

Over the past year, COVID-19 has spread rapidly resulting in a global pandemic. Given that this is a new disease, the clinical outcomes of patients presenting with electrolyte disturbances and COVID-19 are not known or well-studied. Older patients have had worse outcomes with coronavirus infections even in the pre-pandemic era as there was a higher incidence of cardiovascular disease in this patient age group [1]. The exact mechanism of development of hyponatremia in COVID-19 is speculated to be related to SIADH given that our patient most likely suffered a lung injury during her COVID-19 illness and then developed hyponatremia. The cause of hyponatremia could be multifactorial, in the setting of ADH secretion or in the setting of increased inflammatory cytokines being produced in the body. Given that the mechanism is not well understood, it can also be considered that COVID-19 plays a direct role in causation of hyponatremia [2]. Another issue requiring further consideration in our patient relates to her being on chlorothalidone for blood pressure and diuresis; however, this was a chronic medication with no prior episodes of hyponatremia. Clinicians should consider withholding medications that can cause hyponatremia in patients who have experienced COVID-19 pneumonia, given that COVID-19 infection in itself could cause hyponatremia. COVID-19 can lead to rapid inflammation throughout the lung fields and ARDS, therefore maintaining the patients on fluid restriction as they tolerate could prove beneficial from a respiratory standpoint as well [3]. Thus, aggressive volume resuscitation in COVID-19 patients can cause increased venous wall stretch, which stimulates the activation of the endothelium and release of inflammatory mediators, potentially leading to interstitial damage and functional abnormalities, such as diminished tubular reabsorption, which could cause retention of sodium and water [4].

5. Conclusion

- COVID-19 may present in ways other than the typical pulmonary manifestations.
- Medications causing hyponatremia should be carefully considered in patients with COVID-19, as the virus itself can cause hyponatremia by various mechanisms, which are not yet fully understood.
- Dysnatremia may be associated with worse outcomes in COVID-19 [5].

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