



## EXCEPTIONAL CASE

# The syndrome of inappropriate antidiuresis in COVID-19 pneumonia: report of two cases

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## ABSTRACT

The emergence of the novel coronavirus or severe acute respiratory syndrome coronavirus 2 leads to a high number of cases of severe pneumonia. So far, little is known about the course of the disease and its symptoms, complications and treatment. We report the first two cases of the syndrome of inappropriate antidiuresis complicating COVID-19 pneumonia.

**Keywords:** COVID-19, hyponatraemia, pneumonia, SIADH

## BACKGROUND

The emergence of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) starting in December 2019 in China confronted physicians all over the world with a new disease [1]. Typical symptoms of the infection include cough, fever and dyspnea [2]. The most prominent symptom of COVID-19 in more severe cases is lung affection with often bilateral infiltrates and consequent hypoxaemia [3]. We describe the first two cases of the syndrome of inappropriate antidiuresis (SIADH) in patients with COVID-19 pneumonia.

## PATIENT 1

An 80-year-old woman was referred to our hospital due to dyspnea on exertion and malaise for the past 2 days. Past medical history was unremarkable and she did not take any medication.

Physical examination on admission showed a Glasgow Coma Scale of 15, blood pressure 138/68 mmHg, pulse rate 81/min, oxygen saturation 92% on ambient air and a tympanic temperature of 38.1°C (101°F). Auscultation of the lungs

revealed normal breathing sounds. The patient's skin was warm without signs of oedema or dehydration.

Laboratory results showed lymphopenia of  $0.54 \times 10^9/L$ , C-reactive protein of 12 mg/L and slightly elevated lactate dehydrogenase (LDH) of 277 U/L. Arterial blood gas analysis revealed a partial pressure of oxygen of 8.5 kPa while breathing ambient air. Serum sodium on admission was 122 mmol/L with an osmolality of 253 mOsm/kg. An overview of laboratory results is provided in Table 1.

Computed tomography (CT) of the chest showed bilateral ground-glass opacities in all lobes of the lung, highly suggestive of COVID-19 pneumonia. After 12 h, the initially taken nasopharyngeal swab proved to be positive for SARS-CoV-2 in the polymerase chain reaction (PCR) analysis. The patient was admitted to the COVID-19 isolation ward with oxygen therapy.

After infusion of 1.000 mL of crystalloid, serum sodium fell to 115 mmol/L and a re-evaluation was made: urine chemistry revealed a urine osmolality of 789 mOsm/kg and a urine sodium of 71 mmol/L. On the basis of hypo-osmolar hyponatraemia, a decreased serum urea level of 3.3 mmol/L, normal thyroid stimulating hormone (TSH) levels together with a high

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Table 1. Serum and urine chemistry results on admission

Parameter	Reference range	Patient 1	Patient 2
<b>Serum</b>			
Sodium	136–145 mmol/L	122	127
Potassium	3.6–5.1 mmol/L	4.0	3.7
Calcium	2.20–2.60 mmol/L	2.02	2.11
Phosphate	0.74–1.52 mmol/L	0.84	1.07
Osmolality	270–295 mOsm/kg	253	270
Glucose	4.6–6.1 mmol/L	5.9	5.4
Creatinine	49–90 µmol/L	53	67
Urea	3.5–7.2 mmol/L	3.3	4.0
C-reactive protein	<5.1 mg/L	12.1	43.4
Procalcitonin	<0.1 ng/mL	0.09	0.03
Aspartate transaminase	5–31 U/L	50	36
Alanine transaminase	<35 U/L	16	26
LDH	125–220 U/L	277	299
Thyroid stimulating hormone	0.35–4.94 mU/L	0.59	0.74
<b>Urine</b>			
Sodium	mmol/L	71	59
Creatinine	µmol/L	13.746	12.917
Osmolality	mOsm/kg	789	616

urine osmolality as well as a urine sodium >30 mmol/L in this euvoelaemic patient not taking diuretics, the diagnosis of SIADH due to COVID-19 pneumonia was made. Fluid restriction, low-dose loop diuretics and concomitant substitution of ongoing fluid losses were initiated. During the further course of hospitalization, serum sodium levels rose continuously.

Concerning COVID-19 pneumonia, the patient was administered hydroxychloroquine 400 mg twice daily as a loading dose followed by 200 mg twice daily for 4 days as well as azithromycin 500 mg once daily for 5 days. The demand for oxygen supply decreased during hospitalization and the patient's general state of health improved significantly.

## PATIENT 2

A 62-year-old previously healthy man was admitted due to persistent cough and fever for 8 days. Physical examination revealed a haemodynamically normal, afebrile patient in no distress. Auscultation of the lungs showed bilateral rales. The patient appeared euvoelaemic with normal skin turgor. Differential blood count on admission was unremarkable except for discrete lymphopenia of  $0.74 \times 10^9/L$ . Serum chemistry was striking for a sodium level of 127 mmol/L, osmolality of 270 mOsm/kg, C-reactive protein of 43 mg/L and LDH of 299 U/L.

CT of the chest revealed bilateral ground-glass opacities affecting all lobes of the lung. A nasopharyngeal swab proved positive for SARS-CoV-2 in the PCR analysis and the diagnosis of COVID-19 pneumonia was made.

Concerning hyponatraemia, a urine chemistry was performed that showed an osmolality of 616 mOsm/kg and a urine sodium level of 59 mmol/L. Diagnosis of COVID-19 pneumonia-related SIADH was made. The patient was hospitalized on the COVID-19 isolation ward for further therapy.

## DISCUSSION

We report two cases of SIADH in COVID-19 pneumonia during the present pandemic.

It was reported that most infections of the lung may lead to SIADH [4]. In a prospective, observational study, prevalence of hyponatraemia, defined as serum sodium  $\leq 130$  mmol/L, in patients with community-acquired pneumonia was 8%, with approximately 50% of cases having hyponatraemia due to SIAD [5].

The emergence of SARS-CoV-2 around the world and the resulting disease COVID-19 led to a high number of cases with severe pneumonia. Today, it is unclear whether hyponatraemia due to SIADH is common in this patient population. However, it can be assumed that data from other collectives with community-acquired pneumonia or from critically ill patients can be extrapolated. Still, high-quality data are urgently needed to get an impression of the potentially manifold faces of COVID-19 and its complications.

In conclusion, we report the first two cases of SIADH in COVID-19 pneumonia, showing a new complication of this emerging infectious disease.

## PATIENT CONSENT

Informed consent was obtained to publish these cases.

## AUTHORS' CONTRIBUTIONS

G.L., N.N., C.R., T.S. were involved in the diagnosis and treatment of the patients. S.R. wrote the manuscript draft. G.L., T.S., C.R., E.P. and N.N. critically revised the manuscript draft.

## CONFLICT OF INTEREST STATEMENT

None declared. The results presented in this article have not been published previously in whole or part, except in abstract format.

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