Submitted: 27.09.2021
Accepted: 29.10.2021
Early publication date: 18.07.2022

Endokrynologia Polska
DOI: 10.5603/EP.a2022.0046
ISSN 0423–104X, e-ISSN 2299–8306
Volume/Tom 73; Number/Numer 4/2022

Adrenal crisis prompted by SARS-CoV-2 infection in a patient with autoimmune polyglandular syndrome type 1 (APS type 1)

Karolina Zawadzka [1], ***Maja Wilczyńska*** [1], ***Grzegorz Sokołowski*** [2], ***Alicja Hubalewska-Dydejczyk*** [2], ***Małgorzata Trofimiuk-Müldner*** [2]

[1]*Students' Scientific Group of Endocrinology at the Department of Endocrinology, Jagiellonian University Medical College, Krakow, Poland*
[2]*Chair and Department of Endocrinology, Jagiellonian University Medical College, Krakow, Poland*

Key words: *COVID-19; SARS-CoV-2; autoimmune polyglandular syndrome type 1; adrenal crisis; acute adrenal insufficiency*

The coronavirus disease 2019 (COVID-19) pandemic continues to pose a challenge to global health. Patients with impaired immunity are particularly prone to developing uncontrolled inflammation, predisposing them to the adverse consequences of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection. It has been proven that patients with autoimmune polyglandular syndrome type 1 (APS type 1) have an increased risk of severe disease and high mortality due to SARS-CoV-2 infection. The suggested mechanism responsible for the severity of the disease in these patients is the presence of autoantibodies that neutralize type I interferons (IFNs), because type I IFNs play an important role in combating SARS-CoV-2 through the immune defence against viruses [1].

Herein, we report an extrapulmonary complication of COVID-19, which was the occurrence of an adrenal crisis evoked by SARS-CoV-2 infection in a female with APS type 1.

A 40-year-old woman with APS type 1 was admitted to the endocrinology department due to suddenly deteriorating condition. The patient displayed decreased psychomotor drive and limited verbal contact. She reported symptoms such as heart palpitations, dyspnoea, dry cough, weakness, lack of appetite, and emesis. In the medical interview she denied both diarrhoea and abdominal pain. The patient had a known history of APS type 1 manifesting with hypoparathyroidism, primary adrenal insufficiency, Hashimoto's disease, alopecia, ectodermal dystrophy, functional asplenia, malabsorption syndrome, and pernicious anaemia.

On admission, she was afebrile and presented with oxygen saturation of 94% on room air oxygen, tachycardia (150 bpm), and low normal blood pressure (105/70 mm Hg), as well as cutaneous and mucosal signs of APS type 1. Upon chest auscultation bilateral basal crackles were found. The rest of the examination was unremarkable. A complete blood count with peripheral blood smear showed normocytic anaemia and leucocytosis with neutrophilia. Other laboratory tests revealed hyperglycaemia, hypocalcaemia, hyponatraemia, and elevated procalcitonin and C-reactive protein levels (Tab. 1, Fig. 2).

The patient's medical history, physical examination, and laboratory findings confirmed that the woman was admitted in the acute state of adrenal crisis. The patient was immediately administered intravenous hydrocortisone (100 mg) and was parenterally rehydrated. Given the high levels of inflammatory markers, blood and urine cultures were collected, and meropenem was

Table 1. *Results of laboratory tests on admission*

Type of test	Patient's result	Normal range
Haemoglobin [g/dL]	10.6	12–16
Haematocrit (%)	29.9	37–47
White blood cell count [$10^3/\mu$L]	17.43*	4–10
Neutrophil ratio (%)	90.7	50–70
Level of C-reactive protein [mg/L]	108	< 5
Procalcitonin [ng/mL]	6.47	< 0.1
Glucose [mmol/L]	7.67	3.3–5.6
Sodium [mmol/L]	121	136–145
Potassium [mmol/L]	4.21	3.5–5.1
Ionized calcium [mmol/L]	0.44	0.98–1.13
Phosphor [mmol/L]	1.07	0.81–1.45

Małgorzata Trofimiuk-Müldner, Chair and Department of Endocrinology JUMC, ul. Jakubowskiego 2, 30–688 Kraków, Poland, tel: +48 12 400 2332; e-mail: malgorzata.trofimiuk@uj.edu.pl

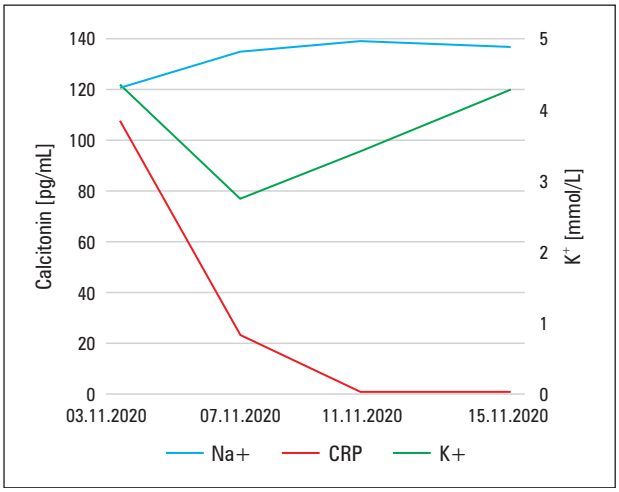

Figure 1. *Serum sodium (Na+), potassium (K+), and C-reactive protein (CRP) values measured at the patient's admission and during the course of treatment, according to days*

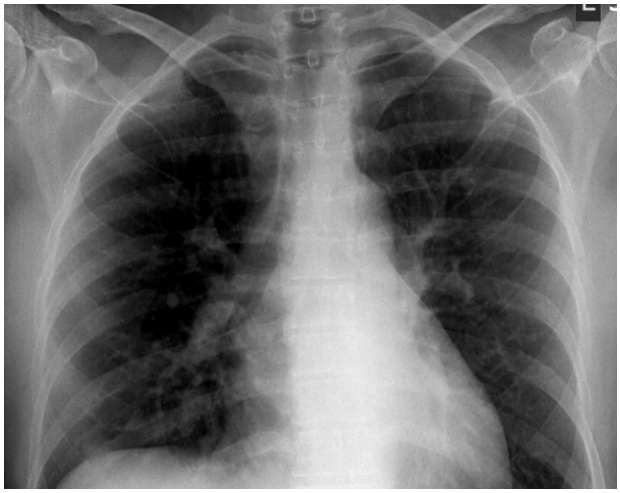

Figure 2. *Chest radiograph on admission showed no clear infiltrative changes in the lungs*

administered. The polymerase chain reaction (PCR) test for COVID-19 was performed after admission to the endocrinology department. Due to the positive result for SARS-CoV-2 infection, the patient was transferred to a COVID-19 intensive care unit. During hospitalization, she remained in a stable condition with no significant infiltrative changes in the lungs in a chest X-ray (Fig. 1). Only short-term low-flow nasal cannula therapy (1–2 L/min) was required. Pharmacological treatment included antithrombotic prophylaxis (low-molecular-weight heparin), continuation of meropenem therapy, and hormone replacement therapy. She received 50 mg of hydrocortisone intravenously every 6 hours until the normalization in blood sodium levels, after which she was switched to oral hydrocortisone. Simultaneously, the patient was treated orally with levothyroxine (50 ug/daily), calcium (1000 mg/daily), alfacalcidol (1 μg/daily), and vitamin D (2000 IU/daily). The control test for SARS-CoV-2 performed 2 weeks later was negative, and the patient was discharged from the hospital with complete resolution of the symptoms.

Although viral pneumonia is the primary presentation of COVID-19 in symptomatic patients, SARS-CoV-2 infection can also result in several extrapulmonary manifestations. Notably, some studies have reported abnormal adrenal involvement related to SARS-CoV-2 infection [2–4]. A retrospective study in patients with severe SARS-CoV-2 infection found acute adrenal infarction in 23% and biochemical hypocortisolism in 8% of patients [2]. To date, a few cases of acute adrenal insufficiency have been reported in SARS-CoV-2 infected patients with no prior history of adrenal diseases [3, 4]. In this case, we have described for the first time a COVID-19 infection that caused an adrenal crisis in a patient with pre-existing primary adrenal insufficiency.

Because COVID-19 can also affect the adrenal glands, we call attention to the paramount role of differential diagnosis in the case of symptoms such as fatigue, abdominal pain, emesis, or diarrhoea, particularly if accompanied by hyponatraemia and hyperkaliaemia. Because the abovementioned symptoms are common in SARS-CoV-2 infection, the diagnosis of impending adrenal crisis may be delayed and lead to life-threatening consequences. Conversely, because the COVID-19 pandemic continues to have a tremendous impact on healthcare worldwide, patients with a clinical suspicion of adrenal crisis should also undergo a PCR test to rule out SARS-CoV-2 infection, and suitable management should be instituted in all such patients [5].

Conflict of interest

The authors declare that they have no conflicts of interest concerning this article. All authors have read and approved the final form of this article.

References

1. Bastard P, Orlova E, Sozaeva L, et al. Preexisting autoantibodies to type I IFNs underlie critical COVID-19 pneumonia in patients with APS-1. J Exp Med. 2021; 218(7), doi: 10.1084/jem.20210554, indexed in Pubmed: 33890986.
2. Leyendecker P, Ritter S, Riou M, et al. Acute adrenal infarction as an incidental CT finding and a potential prognosis factor in severe SARS-CoV-2 infection: a retrospective cohort analysis on 219 patients. Eur Radiol. 2021; 31(2): 895–900, doi: 10.1007/s00330-020-07226-5, indexed in Pubmed: 32852586.
3. Frankel M, Feldman I, Levine M, et al. Bilateral Adrenal Hemorrhage in Coronavirus Disease 2019 Patient: A Case Report. J Clin Endocrinol Metab. 2020; 105(12), doi: 10.1210/clinem/dgaa487, indexed in Pubmed: 32738040.
4. Heidarpour M, Vakhshoori M, Abbasi S, et al. Adrenal insufficiency in coronavirus disease 2019: a case report. J Med Case Rep. 2020; 14(1): 134, doi: 10.1186/s13256-020-02461-2, indexed in Pubmed: 32838801.
5. Arlt W, Baldeweg SE, Pearce SHS, et al. ENDOCRINOLOGY IN THE TIME OF COVID-19: Management of adrenal insufficiency. Eur J Endocrinol. 2020; 183(1): G25–G32, doi: 10.1530/EJE-20-0361, indexed in Pubmed: 32379699.