Adrenal insufficiency as a post-COVID-19 sequela

Sir,

Novel coronavirus outbreak was declared as a ‘pandemic’ by the World Health Organization on 11 March 2020.[1] Patients with severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) may have had multiorgan involvement including involvement of adrenal glands.[2] Structural adrenal gland changes with histological features showing focal necrosis have been reported. Hypothalamic–pituitary–adrenal (HPA) axis has shown the presence of SARS-CoV-2 ribonucleic acid suggesting hypophysitis.[3]

We report a case of adrenal insufficiency (AI) in a 62-year-old man who presented with shock. This patient had persistent vomiting and imbalance while walking since the previous 2 days. He was a known hypertensive, diabetic and hypothyroid taking regular treatment. He was hospitalised 2 months back with coronavirus disease (COVID)-19 pneumonitis and had received oral steroids, remdesivir and supplementary oxygen.

Clinical examination revealed high-grade fever with a heart rate of 136/min, blood pressure of 86/60 mm Hg and mild tachypnoea with oxygen saturation of 90% on room air. He was restless, irritable and confused with cold clammy dry skin. Blood investigations revealed a high white blood cell count (16,000/ mm$^3$), raised renal parameters (Blood urea nitrogen  86 mg/dL, serum creatinine 2 mg/dL) and random blood sugar 386 mg/dL. Serum electrolytes, blood gases, electrocardiogram, two-dimensional echocardiogram and computerised tomography chest were normal. Inferior vena cava was seen collapsed on echocardiography. Our provisional diagnosis was post-COVID-19 septic shock with prerenal azotemia.

He was treated aggressively with intravenous (IV) antibiotics: meropenem, aztreonam, IV infusion of crystalloids (normal saline) and IV insulin. He needed noradrenaline IV infusion (0.2-1 µg/kg/min) to maintain haemodynamic stability. Despite being treated...
aggressively for 24 h with IV fluids and vasopressor therapy, his blood pressure was persistently low. He was restless, confused and irritable with hypotension and tachycardia (110–142/min). Considering persistent hypotension (lowest mean arterial pressure 68 mm Hg) in a patient who had received steroids for COVID-19 a few days back, AI was suspected. He was given injection hydrocortisone 100 mg IV followed by 50 mg 8 hourly. The patient showed dramatic improvement in haemodynamic and neurological status over the next 12 h. His blood pressure improved and tachycardia settled. Noradrenaline infusion was tapered and discontinued gradually in the next 24 h. He made good clinical recovery over the next one week. The dose of hydrocortisone was tapered and he was discharged on the 10th day with oral prednisolone 5 mg once a day. Our final diagnosis was AI secondary to COVID-19.

The effect of the COVID-19 disease process on adrenal glands and cortisol dynamics is not clear. Mao et al. suggested that adrenal cortex may be the target organ of SARS-CoV-2. They found low cortisol levels in critically ill patients with COVID-19.

The clinical presentation of our patient was suggestive of acute AI. It is a medical emergency and as the general condition of the patient was worsening, we did not wait for estimation of serum adrenocorticotropic hormone and serum cortisol levels.

Recently, some case reports mentioned adrenal haemorrhage and infarction in patients with COVID-19. COVID-19 can affect adrenal function causing both primary and secondary AI. The cytokine storm associated with COVID-19 might be responsible for development of AI. It was noted that 67% of the critically ill patients with COVID-19 showed serum plasma cortisol levels less than 10 µg/dL. Recently a new term ‘critical illness-related corticosteroid insufficiency’ was coined which presents with hypotension refractory to fluid resuscitation requiring vasopressor therapy.

Thus, there should be high index of suspicion for AI in patients with COVID-19 with hypotension unresponsive to vasopressor therapy. The presentation of AI may be transient and vigilance is needed in the diagnosis and treatment of relative cortisol deficiency in these patients.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

**Manisha D Katikar**

Consultant Anaesthesiologist and Intensivist, Balwant Institute of Neurosurgery and Intensive Trauma Care, Solapur, Maharashtra, India

**Address for correspondence:**
Dr. Manisha D. Katikar,
Consultant Anaesthesiologist and Intensivist, Balwant Institute of Neurosurgery and Intensive Trauma Care, Solapur, Maharashtra, India.
E-mail: mdkatikar@gmail.com

**Submitted:** 22-Jun-2021
**Revised:** 11-Oct-2021
**Accepted:** 17-Oct-2021
**Published:** 22-Dec-2021

**REFERENCES**

1. Bajwa SJ, Sarna R, Bawa C, Mehdiratta L. Peri-operative and critical care concerns in corona virus pandemic. Indian J Anaesth 2020;64:267-74.
2. Malhotra N, Bajwa SJS, Joshi M, Mehdiratta L, Hemantkumar I, Rani RA, et al. Perioperative management of post-COVID-19 surgical patients: Indian Society of Anaesthesiologists (ISA National) Advisory and Position Statement. Indian J Anaesth 2021;65:499-507.
3. Siejka A, Barabutis N. Adrenal insufficiency in the COVID-19 era. Am J Physiol Endocrinol Metab 2021;320:E784-5.
4. Mao Y, Xu B, Guan W, Xu D, Li F, Ren R, et al. The adrenal cortex, an underestimated site of SARS-CoV-2 infection. Front Endocrinol (Lausanne) 2021;11:593179.
5. Hashim M, Athar S, Gaba WH. New onset adrenal insufficiency in a patient with COVID-19. BMJ Case Rep 2021;14:e237690.
6. Heidarpour M, Vakhshoori M, Abbasi S, Shafie D, Rezaei N. Adrenal insufficiency in coronavirus disease 2019: A case report. J Med Case Rep 2020;14:134.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

| Access this article online |
|---------------------------|
| Quick response code       |
| Website: www.ijaweb.org   |
| DOI: 10.4103/ija.ija_574_21|

**How to cite this article:** Katikar MD. Adrenal insufficiency as a post-COVID-19 sequela. Indian J Anaesth 2021;65:912-3.

© 2021 Indian Journal of Anaesthesia | Published by Wolters Kluwer - Medknow