



## Hypoparathyroidism After COVID-19 Pneumonia

Mahmoud Dianatfar<sup>1</sup>, Mojgan Sanjari<sup>2</sup> and Behnam Dalfardi<sup>1,2,\*</sup>

<sup>1</sup>Khatam-Al-Anbia Hospital, Yazd University of Medical Sciences, Abarkooh, Iran

<sup>2</sup>Endocrinology and Metabolism Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences, Kerman, Iran

\*Corresponding author: Endocrinology and Metabolism Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences, Kerman, Iran. Email: b.dalfardi@kmu.ac.ir

Received 2021 May 08; Revised 2021 May 23; Accepted 2021 May 23.

**Keywords:** COVID-19, Hypocalcemia, Hypoparathyroidism, SARS-CoV-2, Seizures

### Dear Editor,

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a highly contagious infectious agent causing an ongoing pandemic. There is currently a discussion about the impact of this virus on endocrine organs (1). The data gained from autopsy assays demonstrated adrenal gland necrosis after coronavirus disease 2019 (COVID-19). Furthermore, there are active discussions on the involvement of the hypothalamic-pituitary-adrenal axis and thyroid tissue by this virus (1). Herein, we present a case of COVID-19 pneumonia complicated with new-onset hypoparathyroidism, severe hypocalcemia, and seizure.

This patient was a 44-year-old woman with a significant medical or surgical history and presented to the Emergency Department with chief complaints of cough and dyspnea. She had a room-air oxygen saturation (SpO<sub>2</sub>) of 81% (by finger pulse oximetry) on hospital admission.

The SARS-CoV-2 reverse transcription-polymerase chain reaction (nasopharyngeal swab test) yielded a positive result, and non-contrast computed tomography (CT) of the lungs showed bilateral and peripheral ground-glass lung infiltrations, highly suggestive of COVID-19 pneumonia. Therefore, treatment with remdesivir (200 mg on the first day and then 100 mg daily for 4 days) and interferon beta-1a (44 µg for 3 doses every other day) was started. She also received famotidine, vitamin D, vitamin C, and zinc supplements. The patient was discharged from the hospital with stable hemodynamics and a normal room-air SpO<sub>2</sub> after 7 days of admission.

This patient experienced a depressed mood a few days after the improvement of her respiratory complaints. She developed one episode of tonic-clonic seizure about a week after hospital discharge. Therefore, she was again

hospitalized, and some new diagnostic evaluations were performed. The patient's brain imaging investigations showed no significant abnormality; however, laboratory evaluations revealed a low serum calcium level and an increased serum phosphorus level (Table 1). Further investigations showed that her serum parathyroid hormone (PTH) level was significantly low (about 40 days after COVID-19 presentation) (Table 1). For this reason, treatment with calcium (intravenous followed by oral form) and calcitriol was started.

This patient had a good general condition before COVID-19 pneumonia, and she had no history of seizure or depressive disorder. This patient had a normal level of serum calcium (8.8 mg/dL [range: 8.5 - 11]) about a year ago (assessed as a part of her general health checkup tests).

Mild hypocalcemia is a prevalent and distinctive biochemical feature among COVID-19 patients. It has been suggested that this electrolyte abnormality can affect disease clinical severity and patients' outcome (2, 3). The precise etiology of hypocalcemia in COVID-19 is not clear. Chronic vitamin D deficiency, poor nutritional status, and malabsorption of calcium (particularly in the elderly), calcium influx to the cells following cell membrane damage, inhibitory effect of pro-inflammatory cytokines on PTH secretion or impaired response to PTH, and interaction between calcium and unsaturated fatty acids released during the disease are among suggested etiologies for hypocalcemia in these patients (2, 3).

There are few previous reports of hypoparathyroidism following SARS-CoV-2 infection. Elkattawy et al. (4) reported an otherwise healthy 46-year-old man with a prolonged course of hospital admission and diagnosis of COVID-19 pneumonia. In this case, hypoparathyroidism

**Table 1.** Main Laboratory Features of Reported Patients with Hypoparathyroidism After Coronavirus Disease 2019 Infection<sup>a</sup>

Variable	Current Patient	Case Reported by Elkattawy et al. (4)	Case Reported by Bossoni et al. (5)
Parathyroid hormone, pg/mL	< 3* (11 - 67)	8 and 10 (12 - 88)	10 (15 - 65)
25-hydroxy vitamin D, ng/mL	33.1 (30 - 100)	7	8
Magnesium, mg/dL	2 (1.9 - 2.5)	1.9	-
Calcium, mg/dL	6.2 (8.5 - 11)	9.2	4.75
Phosphorus, mg/dL	5.7 (2.7 - 4.5)	6.9	5.2
Albumin, g/dL	3.9 (3.5 - 5.5)	2.9	4

<sup>a</sup>\*, Serum parathyroid hormone test was repeated for confirmation resulting in a similar value.

was incidentally observed during the evaluation of the etiology of his hyperphosphatemia (Table 1). There was no other explanation for the cause of hyperphosphatemia, and the serum levels of vitamin D and parathyroid hormone-related peptide were low (Table 1) (4).

Another case reported by Bossoni et al. (5) was a 72-year-old woman with a history of total thyroidectomy 19 years ago who was hospitalized with complaints of mild fever, headache, and acute-onset dysarthria, and perioral paresthesia. Her laboratory investigations revealed low serum total and ionized calcium levels, hyperphosphatemia, and a low serum PTH level. This patient's nasopharyngeal swab test for SARS-CoV-2 showed a positive result (Table 1) (5).

In the current patient, there was no clue of chronic hypoparathyroidism or hypocalcemia (e.g., perioral numbness, carpopedal spasms, and seizures), no cataracts, and no history of depressed mood. Her brain CT scan showed no basal ganglia calcification. The sequence of events for this patient was in favor of new-onset hypoparathyroidism. It is worth mentioning that there are some previous reports about the association of viral infections (e.g., HIV and Coxsackie B) and hypoparathyroidism, which might suggest a similar role for SARS-CoV-2 in parathyroid gland dysfunction (6, 7).

In summary, SARS-CoV-2 can cause multi-organ involvement, including endocrine system dysfunction. This case report highlighted the effect of this viral agent on parathyroid glands. However, some important unanswered questions remain. The prevalence of parathyroid dysfunction among COVID-19 patients, precise mechanism of this condition, duration of this dysfunction, and its reversibility are unclear. Further studies are warranted to answer these questions.

## Footnotes

**Authors' Contribution:** All the authors contributed to the study conception. Mahmoud Dianatfar and Behnam Dalfardi performed data collection. Behnam Dalfardi

wrote the first draft of the manuscript. All the authors approved the final version of the manuscript.

**Conflict of Interests:** The authors declare that there is no conflict of interest.

**Funding/Support:** The authors declare that there is no funding or support for this manuscript.

## References

- Marazuela M, Giustina A, Puig-Domingo M. Endocrine and metabolic aspects of the COVID-19 pandemic. *Rev Endocr Metab Disord.* 2020;**21**(4):495-507. doi: [10.1007/s11154-020-09569-2](https://doi.org/10.1007/s11154-020-09569-2). [PubMed: [32643004](https://pubmed.ncbi.nlm.nih.gov/32643004/)]. [PubMed Central: [PMC7343578](https://pubmed.ncbi.nlm.nih.gov/PMC7343578/)].
- Liu J, Han P, Wu J, Gong J, Tian D. Prevalence and predictive value of hypocalcemia in severe COVID-19 patients. *J Infect Public Health.* 2020;**13**(9):1224-8. doi: [10.1016/j.jiph.2020.05.029](https://doi.org/10.1016/j.jiph.2020.05.029). [PubMed: [32622796](https://pubmed.ncbi.nlm.nih.gov/32622796/)]. [PubMed Central: [PMC7306733](https://pubmed.ncbi.nlm.nih.gov/PMC7306733/)].
- Singh VP, Khatua B, El-Kurdi B, Rood C. Mechanistic basis and therapeutic relevance of hypocalcemia during severe COVID-19 infection. *Endocrine.* 2020;**70**(3):461-2. doi: [10.1007/s12020-020-02530-y](https://doi.org/10.1007/s12020-020-02530-y). [PubMed: [33099749](https://pubmed.ncbi.nlm.nih.gov/33099749/)]. [PubMed Central: [PMC7585352](https://pubmed.ncbi.nlm.nih.gov/PMC7585352/)].
- Elkattawy S, Alyacoub R, Ayad S, Pandya M, Eckman A. A Novel Case of Hypoparathyroidism Secondary to SARS-CoV-2 Infection. *Cureus.* 2020;**12**(8). e10097. doi: [10.7759/cureus.10097](https://doi.org/10.7759/cureus.10097). [PubMed: [33005518](https://pubmed.ncbi.nlm.nih.gov/33005518/)]. [PubMed Central: [PMC7522187](https://pubmed.ncbi.nlm.nih.gov/PMC7522187/)].
- Bossoni S, Chiesa L, Giustina A. Severe hypocalcemia in a thyroidectomized woman with Covid-19 infection. *Endocrine.* 2020;**68**(2):253-4. doi: [10.1007/s12020-020-02326-0](https://doi.org/10.1007/s12020-020-02326-0). [PubMed: [32346814](https://pubmed.ncbi.nlm.nih.gov/32346814/)]. [PubMed Central: [PMC7188455](https://pubmed.ncbi.nlm.nih.gov/PMC7188455/)].
- Sandhu S, Desai A, Batra M, Girdhar R, Chatterjee K, Kemp EH, et al. Severe Symptomatic Hypocalcemia from HIV Related Hypoparathyroidism. *Case Rep Endocrinol.* 2018;**2018**:8270936. doi: [10.1155/2018/8270936](https://doi.org/10.1155/2018/8270936). [PubMed: [30356346](https://pubmed.ncbi.nlm.nih.gov/30356346/)]. [PubMed Central: [PMC6176304](https://pubmed.ncbi.nlm.nih.gov/PMC6176304/)].
- Fisherhoch S. Coxsackie B Virus Infection Associated with Hypoparathyroidism in a Neonate. *Lancet.* 1982;**320**(8312):1395-6. doi: [10.1016/s0140-6736\(82\)91288-0](https://doi.org/10.1016/s0140-6736(82)91288-0).