D J Med Sci 2021;7(1):34-36
doi: 10.5606/fng.btd.2021.25044

Case Report

Propofol-related infusion syndrome in a patient with COVID-19 infection

Tülin Akagün, Ahmet Cumhur Dülger, Raziye Turan

Department of Internal Diseases, Division of Nephrology, Giresun University Faculty of Medicine, Giresun, Turkey

ABSTRACT

Propofol-infusion syndrome (PRIS) is a life-threating complication of propofol, characterized by cardiac dysrhythmia, congestive heart failure, hyperpotassemia, hyperlipemia, metabolic acidosis, rhabdomyolysis, and myoglobinuria-related renal failure. Risk factors include hypoxia, sepsis, serious cerebral injury, and the administration of high doses of propofol (usually doses >80 μg/kg/min or >5 mg/kg/h for >48 h), but it has been also reported after low-dose, short-term infusions during surgical procedures. Propofol infusion syndrome can occur during anesthesia, even in the absence of higher propofol doses. Despite limited data on PRIS, it has been well described that PRIS is characterized by high anion gap metabolic acidosis. In this article, we present a 42-year-old female patient with novel coronavirus 2019 (COVID-19) pneumonia who underwent mechanical ventilation with propofol infusion and subsequently developed PRIS.

Keywords: COVID-19, metabolic acidosis, propofol infusion syndrome.

Propofol is an intravenous sedative which binds to multiple receptors in the central nervous system to interrupt neural transmission. It has sedative, hypnotic, anxiolytic, amnestic, anti-emetic, and anticonvulsant properties, but no analgesic effects. Propofol is highly lipid-soluble and quickly crosses the blood-brain barrier, resulting in the rapid onset of sedation.[1]

Propofol infusion syndrome (PRIS) is a rare, but potentially lethal side effect of propofol. There is no widely accepted definition, but in most cases, various combinations of the following are described: unexplained metabolic acidosis, rhabdomyolysis, hyperkalemia, hepatomegaly, renal failure, hyperlipidemia, arrhythmia, Brugada-type electrocardiogram, and rapidly progressive cardiac failure.[2] In this article, we present a case of novel coronavirus 2019 (COVID-19) pneumonia who underwent mechanical ventilation with propofol infusion and subsequently developed PRIS to emphasize a rare, but potentially lethal adverse effect of a commonly used drug.

CASE REPORT

A 42-year-old woman was admitted to emergency unit due to fever, dyspnea, and myalgia. Her past medical history was specific for familial Mediterranean fever for 20 years without colchicine treatment. A written informed consent was obtained from the patient for all diagnostic and therapeutic procedures. The COVID-19 infection caused by severe acute respiratory syndrome-coronavirus 2 (SARS-CoV-2) was confirmed by thoracic computed tomography and positive reverse transcriptase-polymerase chain reaction (RT-PCR) assay. In the absence of another etiology, the patient was diagnosed with pneumonia possibly associated with COVID-19 infection, and started on hydroxychloroquine (HCQ) 400 mg per day and ceftriaxone 1 g

Received: December 06, 2020 ***Accepted:*** January 19, 2021 **Published online:** May 05, 2021

Correspondence: Tülin Akagün, MD. Giresun Üniversitesi Tıp Fakültesi İç Hastalıkları Anabilim Dalı, Nefroloji Bilim Dalı, 28018 Giresun, Türkiye.
Tel: +90 505-451 48 70 e-mail: tulinozbay@yahoo.com

Cite this article as:
Akagün T, Dülger A, Turan R. Propofol-related infusion syndrome in a patient with COVID-19 infection. D J Med Sci 2021;7(1):34-36.

twice daily. Due to the high D-dimer values, low-molecular-weight heparin 4,000 U/day subcutaneously was also added to the treatment regimen. Two days later, dyspnea and repetitive cough with fever worsened. In this setting, the C-reactive protein value was 147.66 mg/L and laboratory tests later showed profound hypoxemia consistent with pulmonary failure. Based on these findings, the patient was intubated for airway protection and propofol was used for sedation. She was sedated with an intravenous infusion of propofol at a 4 mg/kg/h rate. Before initiating propofol, the arterial blood gas analysis results were as follows: partial pressure of oxygen (pO_2) 58.2 mmHg, partial pressure of carbon dioxide (pCO_2) 36.4 mmHg, pH 7.37, bicarbonate (HCO_3) 20.8 mmol/L, serum lactate 1.82 mmol/L, anion gap (AG) 14.4 mmol/L, and calculated serum osmolality 283 mOsm/kg. Propofol drip was infused for 30 h. Physical exam revealed adequate urine output with fever equal to 38.2°C. At the end of 30 h of propofol infusion, laboratory tests were as follows: calculated serum osmolality 308 mOsm/kg and measured serum osmolality 341.5 mOsm/kg, osmolal gap 33.5 mosm/kg, ph 7.23, HCO_3 12.5 mmol/L, serum lactate 3.46 mmol/L, pO_2 75.8 mmHg, pCO_2 30.2 mmHg, and AG 20 mmol/L. Creatinine kinase level was measured as 4,287 U/L and lactate dehydrogenase as 2,105 U/L. Laboratory findings were consistent with high AG metabolic acidosis with a higher osmolal gap. Based on clinical course and due to the presence of laboratory abnormalities, propofol was discontinued and laboratory values showed a marked improvement (pH: 7.37, pCO_2: 37.8 mmHg, pO_2: 92.4 mmHg, HCO_3: 19.7 mmol/L, and AG: 7.8 mmol/L). Anion gap and metabolic acidosis were recovered after stopping propofol. Despite treatment, pneumonia and pulmonary failure progressed and the patient died from multiple organ failure on Day 16 of intensive care unit (ICU) stay.

DISCUSSION

Propofol infusion syndrome is a rare and potentially fatal condition which was first reported in children in 1990 and more recently in adults receiving long-term, high-dose propofol infusions.[3] Hemphill *et al.*[3] suggested an updated definition of PRIS as occurring in critically ill patients receiving propofol infusions, typically either higher dose (>5 mg/kg/h) or of long duration (>48 h), and is characterized by one or more of otherwise unexplained metabolic acidosis, rhabdomyolysis, or electrocardiographic changes with or without acute kidney injury, hyperkalemia, lipidaemia, cardiac failure, fever, elevated liver enzymes, or elevated lactate levels.

The mechanism behind the development of PRIS is yet unclear. Previous theories have suggested accumulation of inactive propofol metabolites, lipid microembolization, and impaired hepatic lactate metabolism.[4-6] It has been also proposed that PRIS resembles some mitochondrial diseases, such as medium-chain acyl coenzyme A dehydrogenase deficiency, when the defective mitochondria are placed under significant physiological stress such as trauma, surgery, or sepsis.[3]

In patients with unexplained high AG metabolic acidosis, the serum osmolal gap should be calculated. In patients with elevated AG and high osmolal gap, intoxication of methanol, ethylene glycol or ingestion of propylene-glycol-containing drugs must be considered. Other considerations in regard to normochloremic metabolic acidosis with elevated AG are drugs such as linezolid, PRIS, metformin-associated lactic acidosis and, rarely, penicillin treatment.[7] The main causes of metabolic acidosis with both increased AG and osmolal gap are methanol/ethylene glycol intoxication, lactic acidosis, alcoholic/diabetic ketoacidosis, and uremia.[8,9]

In the literature, there are case reports describing PRIS with high AG metabolic acidosis, but without high osmolal gap. The high osmolal gap in our case may be due to lactic acidosis.

In conclusion, in patients with unexplained high AG metabolic acidosis in the ICU setting while being under propofol infusion; prompt recognition of this side effect is necessary to avoid complications of PRIS, since it is a rare and potentially fatal condition and the most optimal management is prevention. Clinicians should consider alternative sedation agents in patients who are receiving prolonged or high-dose propofol infusion.

Declaration of conflicting interests

The authors declared no conflicts of interest with respect to the authorship and/or publication of this article.

Funding

The authors received no financial support for the research and/or authorship of this article.

REFERENCES

1. Barr J, Fraser GL, Puntillo K, Ely EW, Gélinas C, Dasta JF, et al. Clinical practice guidelines for the management of pain, agitation, and delirium in adult patients in the intensive care unit. Crit Care Med 2013;41:263-306.
2. Krajčová A, Waldauf P, Anděl M, Duška F. Propofol infusion syndrome: a structured review of experimental studies and 153 published case reports. Crit Care 2015;19:398.
3. Hemphill S, McMenamin L, Bellamy MC, Hopkins PM. Propofol infusion syndrome: a structured literature review and analysis of published case reports. Br J Anaesth 2019;122:448-59.
4. Bray RJ. Propofol-infusion syndrome in children. Lancet 1999;353:2074-5.
5. Marinella MA. Lactic acidosis associated with propofol. Chest 1996;109:292.
6. Parke TJ, Stevens JE, Rice AS, Greenaway CL, Bray RJ, Smith PJ, et al. Metabolic acidosis and fatal myocardial failure after propofol infusion in children: five case reports. BMJ 1992;305:613-6.
7. Kitterer D, Schwab M, Alscher MD, Braun N, Latus J. Drug-induced acid-base disorders. Pediatr Nephrol 2015;30:1407-23.
8. Liamis G, Filippatos TD, Liontos A, Elisaf MS. Serum osmolal gap in clinical practice: usefulness and limitations. Postgrad Med 2017;129:456-9.
9. Kraut JA, Xing SX. Approach to the evaluation of a patient with an increased serum osmolal gap and high-anion-gap metabolic acidosis. Am J Kidney Dis 2011;58:480-4.