Enteral nutrition and refeeding syndrome in a patient with anorexia nervosa and COVID-19

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Abstract

Introduction: the evidence on the health problem-related prevalence of COVID-19 is an emergency.

Case report: we present the case of a 28-year-old woman who had had a behavioral eating disorder (BED) since age 12. Her body mass index (BMI) was 13.6 kg/m^2. She was hospitalized for a respiratory condition (bronchospasm) due to COVID-19, with supplementary oxygen at two liters. During her stay, she refused food and was started on standard enteral nutrition via a nasogastric tube. She developed refeeding syndrome (RFS), which was managed with electrolytes, and her enteral diet was changed to a low-carbohydrate high-protein diet. She received psychological therapy through video calls, recovered, and was discharged to home.

Discussion: refeeding complications increase when a high caloric rate is begun. The standard enteral formula has 54% carbohydrates, which contributes to the risk of developing RFS. The consequences of BED and COVID-19 are unknown, and it is likely to become more evident over time. **(Acta Med Colomb 2022; 48. DOI: https://doi.org/10.36104/amc.2023.2626).**

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Introduction

The negative impact of COVID-19 on people with eating disorders is currently unknown. However, there are some notable characteristics that deserve our immediate attention. Very underweight people with anorexia nervosa (AN) may be especially vulnerable to COVID-19 due to these people's characteristic emaciation and poor physical condition (1).

In April 2020, more than half of the world's population had to undergo some type of lockdown. The serious mental health repercussions, which have only begun to be identified and documented in the last few months, have become a growing concern. The prevalence of mood and anxiety disorders has grown 7-12.5%, respectively, during this quarantine (1).

Anorexia nervosa is a serious condition which affects not only mental health but also all the body's organs. It should be suspected in patients with very low weight during the COVID-19 pandemic, due to the emotional disturbances faced in these living conditions, like social distancing, self-quarantine, changes in access to food, a more intense use of social networking platforms, the interruption of daily life, habits, and difficulty in accessing healthcare professionals (2).

The peculiarities of COVID-19 and the public's reaction are especially relevant for people living with an eating disorder and their caregivers. Disease-related malnutrition is a condition found in patients hospitalized for medical or surgical conditions and is associated with adverse clinical outcomes like increased mortality, a higher incidence of complications and prolonged hospital stay (3).

Early initiation of nutritional therapy is commonly recommended for undernourished patients to prevent adverse outcomes. A potential risk of nutritional therapy in undernourished patients is refeeding syndrome (RFS) (4).

Patients hospitalized for AN need nutritional rehabilitation to restore a positive energy balance and reverse the medical complications associated with malnutrition. Malnourished patients, like those with AN, have a higher risk of developing complications like RFS. While there is no consensus on the definition of RFS, it is generally described as the onset of electrolyte changes and fluid accumulation which occur when a person with starvation undergoes nutritional replacement, leading to organ dysfunction and possible sudden death (4, 5).

The National Institute for Health and Care Excellence (NICE, 2017) guidelines recommend beginning with a low-energy intake, 10 kcal/kg/day for patients at risk and 5 kcal/kg/day for extreme cases of malnutrition (body mass index (BMI) < 14 kg/m^2) to try to prevent RFS complications. The goal is to slowly increase the caloric intake to meet the nutritional needs between the fourth and seventh day. The American Society for Parenteral and Enteral Nutrition (ASPEN) guidelines recommend beginning feedings with

10-20 kcal/kg during the first 24 hours and increase the target energy intake by 33% every one to two days, with caloric intakes of 1,200-1,500 kcal/day (5).

However, it has been documented that adult patients with AN, even those with BMIs < 12 kg/m^2, can safely begin with caloric intakes of 1,200 to 1,500 kcal/day without causing RFS (2, 5).

Case presentation

This was a 29-year-old woman with a history of anorexia nervosa from the age of 16 who was being treated with quetiapine 50 mg/po/every 24 hours, escitalopram 10 mg/po/every 24 hours, alprazolam 2 mg/every 24 hours, pregabalin 75 mg/every 24 hours, and behavioral therapy once a week (with poor adherence), with a poor family support network. She had been hospitalized twice for BEDs and RFS. She had received two doses of the COVID-19 vaccine. Weight 36 kg, height 1.62 meters, BMI 13.6 kg/m^2, with an approximate 5 kg weight loss due to COVID-19. Her problem began a week prior to admission with arthralgias, dyspnea, a dry cough producing shortness of breath and cyanosis, 78% peripheral oxygen saturation (SpO_2), and a positive polymerase chain reaction (PCR) for COVID-19. She progressed to bronchospasm and therefore was admitted to the hospital needing supplementary oxygen at four liters per minute by nasal cannula. Medical treatment was begun with inhaled bronchodilators (salbutamol) and steroids (budesonide), as well as dexamethasone at 6 mg IV/every 24 hours, with which she improved and reached 94% SpO_2. However, she complained of hyporexia and refused food; she only drank 20 mL of water per day, with parenteral solutions at 1 mL/kg over 24 hours. She progressed as follows:

- **Day 1:** central glucose 60 mg/dL with a headache and refusing food; 5% parenteral glucose was administered at 0.5 gm/kg, with improvement.
- **Day 2:** improved respiratory function, still not eating, and having weakness and debility.
- **Day 3:** generalized weakness, refusing oral intake; a nasogastric tube was placed and enteral feeding begun. Subsequently, she started to have loose stools, with serum phosphate levels of 1.4 mg/dL. Electrolyte replacement was given, with improvement; however, she pulled out her tube on purpose because it was uncomfortable, and she self-induced vomiting (Table 1).
- **Day 4:** with psychological support (video call), she started eating, consuming 1/4 of an apple and 20 mL of water in 24 hours, and developed abdominal pain. She continued with the phosphate and electrolyte infusion.
- **Day 5:** she ate half an apple and four spoonfuls of chicken broth (with no meat or vegetables). She started physical rehabilitation with passive movements in bed due to generalized weakness and poor spirits, with improvement in her respiratory condition.
- **Day 6:** a relative supported her in eating food, and she tolerated 200 mL of chicken broth with only mild abdominal pain, which improved with analgesics.
- **Day 7:** she ate 150 mg of gelatin made with water (strawberry), half an apple, and refused any other food. She continued with IV electrolyte supplementation IV, and did not accept oral electrolytes.
- **Day 8:** physical rehabilitation, SpO_2 95% on 1 L of oxygen; she ate a whole 250 gm gelatin and half a mango, and only had mild abdominal pain, which improved with paracetamol. She continued with intravenous electrolytes.
- **Day 9:** she tolerated 20 gm of chicken breast, half a broth, and insisted on being discharged to home.
- **Day 10:** her relatives were referred to psychology to continue with nutrition and mental health management at home. She was discharged to home. She currently weighs

Table 1. *Paraclinical test and symptom characteristics by day.*

Day	K mmol/L	Na mmol/L	Cl mg/dL	Mg mg/dL	P mg/dL	Glucose mg/dL	SpO_2 %	Signs and symptoms
1	3.7	137	100	1.8	1.9	60	94	Dyspnea, hyporexia
2	3.8	138	99	1.8	1.7	80	96	Asthenia, adynamia
3	3.4	135	98	1.8	1.4	100	97	Generalized weakness, diarrhea
4	3.6	134	98	2	0.8	110	98	Muscle weakness
5	3.6	136	101	2	1.9	79	99	Abdominal pain
6	3.4	135	103	1.9	2	94	98	Minimal abdominal pain
7	3.7	136	105	2.1	3	100	97	Improvement
8	4.1	139	104	2	3.3	99	98	Improvement
9	3.9	138	103	2	3.3	110	97	Improvement
10	4.2	139	105	2	3.5	105	98	Improvement (discharge)

Abbreviations: K (potassium), Mmol/L (millimoles/liter), Na (sodium), Cl (chloride), Mg (magnesium), mg/dL (milligram/deciliter), P (phosphorus), SpO_2 (oxygen saturation).

40 kg and is being managed by nutrition and cognitive therapy at home.

Discussion

Refeeding syndrome has still not been studied in depth, and therefore a standardized definition and treatment recommendations are still lacking. The RFS mortality has varied considerably (0-71%), depending on the literature. The European Society for Clinical Nutrition and Metabolism (ESPEN) guidelines on clinical nutrition in the intensive care unit (ICU) published in 2019 emphasized the importance of recognition, prevention and early treatment of RFS (6).

Over the last two decades, a series of professional organizations, including the Society of Adolescent Health and Medicine, NICE and the American Psychiatric Association, have published guidelines for the nutritional management of AN. These guidelines recommend an initial refeeding rate between 10 and 40 kcal/kg per day or between 20 and 80% of the total daily requirements, with a slow increase in the caloric intake (6).

The ASPEN has defined RFS as a reduction by a minimum of 10% in the serum levels of at least two electrolytes (potassium, magnesium and phosphate), which our patient had, and the organ dysfunction resulting from these electrolyte reductions, secondary to thiamine deficiency, occurring within five days after beginning nutritional support (7).

While the literature suggests strategies for avoiding RFS complications, such as a continuous nutrient supply using a feeding tube, with a carbohydrate-based energy intake less than 40%, these have not been formally tested. In our case, an enteral feeding tube was placed due to a refusal to eat because of the AN, and a standard diet was begun which caused abdominal pain eased by analgesics (8).

Enteral nutrition for young people hospitalized with AN should follow a low carbohydrate and high fat formula; that is, 28% carbohydrates and 56% fats, to protect against hypophosphatemia in the first week of administration (9).

In our report, the initial management with prophylaxis was 40 milliequivalents (mEq) of intravenous potassium phosphate (KPO4) for 24 hours; this was supported by Parker et al.'s 2016 study in which they showed that patients who received prophylactic phosphate supplements prior to beginning a nutritional regimen developed less hypophosphatemia during nutritional rehabilitation (1%), and, likewise, those who were prescribed prophylactic phosphate before beginning feeding did not develop RFS (19).

The complications of refeeding increase when nutrition is begun at a high caloric rate in severely undernourished patients, in this case a BMI <14 kg/m^2, and therefore high carbohydrate doses should not be given. Carbohydrates should be reintroduced at <40%, with increased fats, calculating 5-10 kcal/weight/day. The pressing need is to find an enteral formula with the characteristics needed for these patients, as only standard formulas are available, with 54% carbohydrates, and this leads to a risk of RFS, increasing mortality.

A limitation of this report is that we still do not know the short and long-term consequences of having an eating disorder and COVID-19 simultaneously; this will probably become more evident over time.

Hypophosphatemia is considered pathognomonic for RFS; serum phosphate levels should be kept above 3.1 mg/dL (10).

We should not forget that AN management must be multidisciplinary. Due to the COVID-19 pandemic, on-site psychological therapy sessions were substituted with virtual sessions (11). This was the case for this patient, who required psychological intervention to help her accept nutrition and continue with family support. Virtual interventions offered by trained therapists who use web-based video conference platforms have proven to be effective for various mental health problems, including eating disorders, showing clinical benefits (11).

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