

## CASE REPORT

# Severe Hyponatremia and hypokalemia: a potentially fatal clinical and nutrological condition in the emergency room: a case report

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## ABSTRACT

Electrolyte imbalances are common in clinical practice. However, if untreated they can lead to severe complications including neurologic disturbances, cardiac rhythm alterations and even death. They can be diagnosed by a detailed clinical history, a careful physical examination and serum determinations. Their etiology is broad, including renal and extra-renal losses, use of medication without medical supervision and low intake from foods. The present case describes a patient attended at the emergency room complaining of epigastric pain, nausea, vomiting and weakness that resolved after electrolyte reposition.

**Keywords:** electrolytes, sodium, potassium, chloride, muscle weakness.

## CASE REPORT

LAA, 61 years old, was admitted to the emergency room with dyspnea, muscular weakness, epigastric pain, nausea and vomiting. She had smoked until a few days ago, had high blood pressure, using enalapril 10 mg twice a day, clortalidone, initially 12.5 mg/day which was increased to 25 mg/day a few months ago. She also had a previous diagnosis of severe pemphigus foliaceus for what she was taking deflazacort 60 mg twice a day and dapsone. She had not been attending the consultations with her dermatologist for a long time. Therefore she had no control over the corticosteroid dosage. Glaucoma had been recently diagnosed, for what she was using diamox four times a day.

At hospital admission she had mental confusion, agitation and dyspnea. She presented with moon face, central fat distribution and hump, suggesting Cushing syndrome. She had cutaneous and mucosal pallor. The neurologic examination revealed loss of muscle strength and inability to remain in a seated position without manual

support under the armpits. She was unable even to raise her arms. The arterial blood pressure was 120/70 mmHg, cardiac rate 76 beats per minute. The lungs were clear. The abdomen was flaccid, liver and spleen were not palpable. Muffled and rhythmic heart sounds, no murmurs.

Laboratory evaluation showed Potassium = 1,2 mEq/liter, Sodium = 104 mEq/liter, Chloride = 69 mEq/liter. Urea was 15 mg/liter, creatinine was 0,4 mg/liter, red blood cells 2,980,000, hemoglobin 8,6, hematocrit 23.8%, platelets 203,000. The estimated serum osmolality was 215 mOsm/kg (reference value 285-295 mOsm/kg)<sup>2</sup>. Routine urine analysis was normal. Thorax X-ray was normal. She was referred to the intensive care unit (ICU) where she received saline and potassium chloride solution intravenously and orally, ceftriaxone, general care, motor and respiratory physiotherapy. Dapsone use was interrupted and the dose of deflazacort was reduced upon supervision of the dermatologist. She was discharged from the ICU at the fifth day of hospitalization and from the hospital at the eighth day of hospitalization. Two days before hospital discharge she received 2 units of red blood

cell concentrate. One day before hospital discharge she had Potassium = 4,0 mEq/liter, Sodium = 134 mEq/liter, hemoglobin 8,6, hematocrit 23.8%, platelets 203,000. At discharge she was walking, no more complaints, and referring good appetite.

## DISCUSSION

The present case describes a patient with extremely low serum sodium, potassium and chloride concentrations, which, if untreated, might have lead the patient to death. The symptoms were nonspecific, and could have been attributed to the epigastric pain. The hypotonia on neurologic examination associated to the history of corticosteroid use made mandatory a more detailed clinical evaluation, including the laboratory blood tests.

This clinical condition might be related to the prolonged corticosteroid<sup>1</sup> use without medical supervision, since the patient had not been attending the dermatologic consultation for a long time. The food intake in the past few days is another point of concern. Due to the nausea and vomiting, the sodium, potassium and chloride intake was probably very low. The expected sodium, potassium and chloride intake and the amount of these nutrients in a typical Brazilian meal are described on Table 1.

Deflazacort is a glucocorticoid with potent antiinflammatory and immunosuppressive action. The recommended initial dose is 6 to 90 mg/day and must be gradually reduced to the lowest dose at which the symptoms decrease<sup>2</sup>. In the present case the patient was taking 120 mg/day that probably contributed to the clinical signs suggestive of Cushing syndrome. The electrolytes disorders that accompany this syndrome are hypokalemia and hypernatremia<sup>1</sup>. Hypokalemia can also result from insufficient dietary potassium intake, intracellular shifting of potassium from the extracellular space, extra-renal or renal potassium losses. The present patient had nauseas and vomiting leading to extrarenal potassium loss. However, enalapril, which the patient had been making regular use, is associated with potassium retention. Therefore, if the patient were not taking enalapril the serum potassium concentration could be even lower. It is worth noting that although the severe potassium deficiency, the cardiac rhythm was unaltered and the electrocardiogram had very discrete alterations.

On the other hand, the low serum Sodium concentration here described is not characteristic of Cushing syndrome. The hyponatremia associated to the low serum osmolality leads to the hypothesis of hypotonic hyponatremia. Since the patient had no clinically detectable edema or previous history of cardiac, liver or renal disease, a hypotonic hypervolemic hyponatremia might be ruled out. The hyponatremia could be attributed to extra-renal Sodium loss due to nauseas and vomiting. However, the differential diagnosis is broad<sup>1</sup>.

In regards to the hypochloremia, gastric and intestinal losses of chloride following vomiting, gastric suction and diarrhea are common causes. Low serum chloride is also related to corticosteroid use<sup>3</sup>.

Another hypothesis that could explain the electrolyte imbalance is the use of thiazide, that might also lead to decrease in sodium, potassium and chloride levels.

The present case illustrates the importance of taking the patient's history and doing a physical examination even in the emergency room. The careful neurological examination spared the patient from being submitted to invasive and expensive laboratorial investigation.

## CONFLICTS OF INTEREST STATEMENT

The authors declare that there are no conflicts of interest regarding this case report.

## REFERENCES

- 1 - Longo D, Fauci A, Kasper D, Hauser S, J. Jameson J, Loscalzo J. Harrison Principles of Internal Medicine. Mc Graw Hill, 2012.
- 2 - Stephen McPhee S, Papadakis M, Michael W. Rabow MW. Current Medical Diagnosis and Treatment, Mc Graw Hill, 2011.
- 3 - Bernard P. Schimmer, John W. Funder. ACTH, Adrenal Steroids, and Pharmacology of the Adrenal Cortex. Goodman & Gilman's. The Pharmacological Basis of Therapeutics, Mc Graw Hill, 2011.
- 4 - USDA [http://fnic.nal.usda.gov/nal\\_display/index.php?info\\_center=4&tax\\_level=4&tax\\_subject=256&topic\\_id=1342&level3\\_id=5141&level4\\_id=10592](http://fnic.nal.usda.gov/nal_display/index.php?info_center=4&tax_level=4&tax_subject=256&topic_id=1342&level3_id=5141&level4_id=10592)

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**Table 1** – Sodium and potassium content in foods that compose a typical Brazilian diet

Food	Sodium*	Potassium*
Rice (mg per 100 grams)	382	3,5
Beans (mg per 100 grams)	237	387
Beef (mg per 100 grams)	70	256
Lettuce (mg per 100 grams)	28	194
Tomato (mg per 100 grams)	5	237
Bread (mg per 100 grams)	478	127
Cow milk (mg per 100 grams)	47	140
Coffee (mg per 100 grams)	2	49
Margarine (mg per 100 grams)	646	28

\*Data from United States Department of Agriculture, 2004