



## Extreme hyponatremia in a critically ill patient with feeding-jejunostomy: a case report.

ISSN 2545-2533

Received: 02.10.2022

Accepted: 19.12.2022

First online: 21.12.2022

Published: 31.03.2023

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Methodology - F  
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Resources - H  
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## ABSTRACT

Hyponatremia is a frequent and potentially life-threatening condition in hospitalized patients. It is a disorder of water metabolism and is usually defined as a plasma sodium concentration above 145 mEq/L. The treatment of severe cases of hyponatremia might be challenging in patient with feeding jejunostomy. The average person's GI tract secretes and reabsorbs around 7 L of gastrointestinal fluid (including 3-5 L originating above the pylorus alone). These 7 L of gastrointestinal fluid will significantly dilute whatever we consume or infuse. However, this dilution of enteral feed may be bypassed in by feeding jejunostomy. There are very few cases reported on extreme hyponatremia. We present a case of severe hyponatremia in patient with feeding-jejunostomy, managed successfully with the recommended correction.

**KEY WORDS:** Hyponatremia, jejunostomy, critically ill.

## INTRODUCTION

Hyponatremia is a disorder of water metabolism and is usually defined as a plasma sodium concentration above 145 mEq/L [1]. Studies found that hyponatremia occurred in 9% of adult patients admitted to intensive care unit (ICU) [2]. Water depletion due to either reduced intake or excessive loss is a major reason for the development of hyponatremia [2]. Regardless of the underlying cause of hyponatremia, serum sodium levels above 160 mEq/L are associated with very high mortality rates—even 100%—if the levels are not corrected within 10 days of onset [3]. The target rate of sodium reduction in hyponatremia treatment that is widely used in clinical practice is 0.5 mmol/L per hour, with a maximum rate of 10 mmol/L per day [4]. We present a case of severe hyponatremia of unknown origin in patient with feeding-jejunostomy who was managed successfully in the Critical Care Unit.

## CASE REPORT

**PATIENT INFORMATION:** A 25-year-old male patient (BMI 20 kg/m<sup>2</sup>) having previous surgical history of explorative laparotomy with a stoma in-situ came to the emergency room with complaints of pain abdomen for one month and leakage around the stoma for 15 days.

**CLINICAL FINDINGS:** Initial workup showed mild pleural effusion with underlying lung collapse / consolidation in CE-CT chest, intra-peritoneal drain in-situ with minimal necrotic collection scattered throughout peritoneal cavity and a pancreatic fistula. Other laboratory tests at the time of admission did not demonstrate any noteworthy alterations. On the third day of admission patient had sustained hypotension, which was not fluid responsive and was kept on noradrenaline support on and off. As patient had persistent stoma leak and was not tolerating feeds through nasogastric tube, patient was planned for feeding jejunostomy. On day 20 of admission, open feeding jejunostomy was done to facilitate adequate enteral nutrition. Enteral feed was started and about 2 weeks after feeding jejunostomy he passed several episodes of loose stools. Patient was received to ICU in a confused state [Glasgow Coma Scale was 8 (E2 V1 M5)], blood pressure 92/52 mmHg on noradrenaline support, heart rate of 95/ min and temperature of 98 F, RBS of 54mg/dl.

**DIAGNOSTIC ASSESSMENT:** Arterial blood gas (ABG) at the time of ICU admission was within normal limits except for sodium 181 meq/l, potassium 2.49 meq/l, glucose 54 mg/dl. Laboratory investigations revealed serum sodium 195 meq/L

**THERAPEUTIC INTERVENTION:** The corrected sodium was calculated using Hillier's equation, Corrected sodium = measured sodium + 2.4 × (54 – 100)/100 giving a value of 193.89 meq/L. Hypokalemia was corrected by giving infusion potassium chloride. A normal sodium three days prior followed by altered consciousness suggested that the serum sodium rise was likely to be relatively acute. Patient was intubated in view of poor GCS. ABGs were taken for specifically tracking sodium, chloride, and glucose.

Sodium correction was done by giving 5% Dextrose and 0.45% NS intravenously and plain water through jejunostomy tube. Patient was resuscitated with 4 litres of fluid on the day of admission with an output of 1900ml.

**FOLLOW UP AND OUTCOMES:** After 72 hours, the corrected sodium reached 168. Once the serum sodium level was under 160 mmol/L, the frequency of investigations dropped and strict fluid management was relaxed. The corrected serum sodium reached below 145 after about 7 days. His GCS improved by 4th day of admission in the ICU and was on T-piece by 6th day of ICU stay and was extubated on 7th day. Table 1 show progress of laboratory parameters during the ICU stay.

**Table 1.** Evaluation of Laboratory parameters during the ICU stay.

Blood	On admission	Evening of D1	Day 2	Evening of D2	Day 3	Day 3 evening	Day 4	Day 7
Sodium (meq/l)	195	190	180	176	166	160	154	145
Potassium (meq/l)	3.77	3.40	2.68	3.02	3.10	3.51	4.27	3.75
Chloride (meq/l)	163	151	139	134	128	124	114	107
Urea (mg/dl)	64	72	129	112	122	128	137	92
Creatinine (mg/dl)	0.72	0.84	1.15	1.07	1.04	0.94	0.93	0.71
Glucose (mg/dl)	54	134	128	107	142	118	125	132
Urine output 24 hrs (ml)	1900		1500		2200		1200	1300
Urine osmolality (mOsm/kg)	411		394		366		346	320

## DISCUSSION

This report illustrates a case of hypernatremia in a post-operative patient on feeding jejunostomy. Disorders of sodium and water metabolism are seen frequently in hospitalized patients and is associated with prolonged hospital stay and increased mortality. [5] Hypernatremia generally results from a net loss of body water relative to sodium and can occur with or without a loss or even gain in body sodium content. Our patient was severely dehydrated due to inadequate fluid intake with respect to the amount of fluid loss with regard to loose stools. Physiologically, whatever we eat or drink is automatically “diluted.” Indeed, food or enteral nutrition (EN) constitutes only a small fraction of the total contents of the gastrointestinal (GI) tract. However, this dilution of enteral feed may be bypassed in by feeding jejunostomy.

The treatment of severe cases of hypernatremia might be challenging in patient with feeding jejunostomy. When correcting hypernatremia, one must be aware of these acute and chronic changes, as major differences in serum osmolality can cause dramatic shifts in water movement, eventually leading to cerebral edema manifesting as seizures, permanent neurologic damage, or even death [2]. The goal in managing hypernatremia is to correct the water deficit in a reasonable time frame while avoiding untoward side effects [2]. Hypernatremia management include correction of hypovolemia with balanced salt solution and the free water deficit at an appropriate rate to restore normal plasma osmolality and hemodynamic stability. The speed of hypernatremia correction depends on the rapidity of hypernatremia development and presence of hemodynamic compromise or neurologic symptoms. Urgent correction of hypernatremia may be necessary when hypernatremia develops rapidly (hyperacute <12 hours and acute <48 hours) and is severe enough to cause neurologic symptoms from significant intra- and extracellular volume depletion.

In this case, initial sodium correction may be done rapidly at up to 1 mEq/L per hour for 10 to 12 hours with more gradual correction over 24 to 48 hours for remaining deficit [5]. More aggressive initial fluid replacement for hyperacute hypernatremia (<12 hours) at 1 to 2 mEq/L per hour is also recommended by some experts but the evidence suggesting the superiority of this approach is scarce and may be risky if not carefully monitored. In contrast, slowly developing or chronic hypernatremia (>48 hours duration) may be well tolerated due to the initiation of adaptive solute retention by brain cells in an attempt to normalize intracellular volume, and slow reduction of plasma sodium concentration is desirable in this case with rate not exceeding 0.5 mEq/L per hour, to a total of 10 to 12 mEq/L per day [5]. Although the importance of early recognition and treatment is well accepted, the rate of correction is still debated. We could not find any instances of neurologic complications from hypernatremia correction regardless of chronicity of the onset [4].

## CONCLUSIONS

There is inadequate secretion of saliva and gastrointestinal fluid in patient having feeding jejunostomy and proper dilution of enteral feed may be bypassed. This could be a possible cause of severe hypernatremia in jejunostomy feeding patient.

## SUPPLEMENTARY INFORMATION

**Funding:** No fund was received related to this study.

**Institutional Review Statement:** The study was conducted according to the guidelines of the Declaration of Helsinki.

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

**Data Availability Statement:** The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

**Conflicts of Interest:** The authors declare no conflicts of interest.

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