

# TREATMENT OF MILD-MODERATE HYPONATRAEMIC ENCEPHALOPATHY WITH INTRAVENOUS BOLUS THERAPY OF 3% HYPERTONIC SALINE SOLUTION

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## BACKGROUND

Hyponatraemia is the most common disorder of electrolytes in clinical practice. Hyponatraemic encephalopathy is the most serious complication, and constitutes a medical emergency. According to the recent Expert Panel Recommendations, 3% hypertonic saline solution (HSS) is recommended for treatment of both acute and chronic hyponatraemic encephalopathy, but evidence is limited. We designed a protocol, based on the latest consensus statements and adapted to our Hospital, for the use of 3% hypertonic saline solution (HSS) in patients with hyponatraemia.

## MATERIALS & METHODS

Unicentric observational study of a case series. We collected data from 14 adult patients with severe hyponatraemia (serum sodium [SNa] <125 mmol/l) and mild-moderate hyponatraemic encephalopathy (no signs of brain herniation) treated with an intravenous bolus of 250 ml of HSS over 30 minutes and reevaluated 6 hours later. Our goal was to raise 4-6 mmol/l as soon as possible, and 6-8 mmol/l in 24 hours with a limit of 12 mmol/l. The bolus was repeated if SNa raised <3 mmol/l.

A comparative analysis was performed using the Wilcoxon signed-rank test. The analysis was conducted with R version 3.2.2. Continuous variables are expressed as median (interquartile range).

## RESULTS

Median age (IQR) was 69.9 (64.5-78.1) years, and 62% were female. Most patients (85%) had chronic hyponatraemia (>48 hours or undetermined). 62% of patients were euvolaemic, 31% were hypervolaemic and 7% were hypovolaemic. Chronic diuretic therapy (mostly hydrochlorothiazide) was documented in 93% of patients.

Baseline median SNa was 120 (114.3-122.8) mmol/l. Median SNa 6 hours after the bolus was 124.4 (120.7-128.3) mmol/l, a median raise of 5 (4.4-6.2) mmol/l (p<0.001). One patient required an additional bolus. Median SNa raise 24 hours after the bolus was 6 (3.9-8.2) mmol/l (p<0.01) in 9 patients; there was no significant change between 6 and 24 hours. Median rise per 100 ml of HSS was 2 (1.7-2.5) mmol/l after 6 hours and 2.4 (1.6-3.3) mmol/l after 24 hours.

No patients required treatment for overcorrection nor had adverse outcomes. No significant changes were observed in serum potassium and creatinine.

Table 1. Demographic and clinical characteristics of the 14 patients

Patients characteristics	
Median age (years)	69.9 (64.5 – 78.1)
Sex	Male 38% Female 62%
Volaemia	Hypovolaemia 7% Hypervolaemia 31% Euvolaemia 62%
Neurological symptoms	Mild 38% Moderate 62%
Onset	Chronic or undetermined 85% Acute 15%

Table 2. Main results of the study

	Baseline (n=14)	6 hours	24 hours (n=9)
Median Serum Na (mmol/l) Median rise (mmol/l)	120 (114.3 – 122.8)	124.4 (120.7 – 128.3) 5 (4.4 – 6.2) p<.001	122.8 (119.8 – 126.6) 6 (3.9 – 8.2) p<.01
Median Serum K (mmol/l)	4.5 (4 – 4.6)	4.4 (4 – 4.6) p=NS	4.5 (4.4 – 4.7) p=NS
Median Serum Cr (mg/dl)	0.83 (0.53 – 1.08)	0.77 (0.53 – 1.32) p=NS	0.63 (0.4 – 1) p=NS

Our data suggests that this protocol is safe and effective to reach the goals in the treatment of severe hyponatraemia with mild-moderate encephalopathy in the first 6 hours, without noticeable side effects or overcorrection. Patients at low risk of osmotic demyelination may receive another bolus to reach a higher SNa in 24 hours. Larger studies are required to confirm these results.

