Investigation vignette

A 64 Year old Woman with a Six Hour History of Confusion and Weakness Following Bowel Preparation for Surgery

CASE REPORT

A 64 year old woman was admitted to the critical care unit with a 6 hr history of confusion and weakness following a Picolax® (sodium picosulphate) bowel preparation for colon surgery. The patient ingested 1 sachet of Picolax® at 8 am the day before her admission to hospital and again at 4 pm on the same day. As she had numerous diarrhoea bowel actions she drank large amounts of water, as she had been instructed, to replace the fluid lost. When she was admitted to hospital she was disoriented but cooperative and could not remember the events of the previous day.

Her vital signs revealed a pulse of 82 beats per minute, blood pressure of 135/45 mmHg, respiratory rate of 10 breaths per minute and temperature of 36.8°C.

On examination she was drowsy but cooperative with generalised hypotonia. Her weight was 65 kg. As her plasma biochemical results on admission were severely abnormal (Figure 1, 2.4.02) she was admitted to the critical care unit for further fluid and electrolyte management.

A central venous cannula was inserted into the right subclavian vein which revealed a pressure of 9 mmHg. During the next 18 hr she was treated with 700 mL of intravenous fluid (700 mL of water, 75 mmol of sodium chloride and 200 mmol of potassium chloride). Her urine output during this period was 1740 mL and her oral intake was recorded as 350 mL.

The plasma biochemical estimation at the end of the infusion is also shown in (Figure 1, 3.4.02).

Name	Age	Sex
Mrs. S. K.	64	F

	2.4.02	**3.4.02**		
Sodium	121	130	mmol/L	(135 - 145)
Potassium	2.2	3.1	mmol/L	(3.2 - 4.3)
Chloride	84	97	mmol/L	(99 - 109)
Bicarbonate	28	30	mmol/L	(21 - 32)
Glucose	7.2	5.8	mmol/L	(3.0 - 6.0)
Urea	2.8	2.9	mmol/L	(3.0 - 8.0)
Creatinine	0.047	0.048	mmol/L	(0.05 - 0.10)
Phosphate	1.43	0.64	mmol/L	(0.75 - 1.40)
Total Calcium	2.05	2.07	mmol/L	(2.00 - 2.55)
Albumin	30	32	g/L	(31 - 44)
Globulins	28	31	g/L	(21 - 49)
CK	608	657	U/L	(< 150)
LDH	251	244	U/L	(115 - 200)
ALT	21	22	U/L	(10 - 50)
ALP	82	77	U/L	(30 - 110)
Total bilirubin	15	15	μmol/L	(4 - 20)

Figure 1. Blood biochemical profiles taken from the patient on admission and after 18 hr of treatment.

Diagnosis: Hyponatraemia caused by water excess and potassium depletion, corrected largely by intravenous potassium chloride administration.

Picolax® is a purgative that usually produces a bowel action within 3 hours of ingestion. The main ingredient is sodium picosulphate, which is hydrolysed by colonic bacteria to form *bis*(para-hydroxyphenyl)-2-pyridylmethane. This acts as a colonic stimulant to increase colon motility and is often used to prepare the bowel for colonoscopy, sigmoidoscopy, barium enema and colon surgery.[1] However, as this bowel preparation has a significant dehydrating effect,[2,3] the patient is often requested to drink liberal amounts of water prior to, during and after Picolax® administration.

Hyponatraemia is a common disorder in hospital patients and may be associated with an alteration in total body water (usually increased), total exchangeable sodium (normal, decreased or rarely increased) and total exchangeable potassium (normal or decreased).[4] Accordingly, the extracellular fluid and intracellular fluid volumes may be increased, decreased or remain unchanged.[5-7] Usually, however the intracellular fluid volume is increased, which can be associated with cerebral oedema, seizures and brain death unless there is a concomitant loss of intracellular osmotic particles (e.g. potassium and organic anions).[8]

If the total body water and total exchangeable sodium does not change, an acute reduction in exchangeable potassium and its accompanying anion will generate an hypoosmolar intracellular environment causing water to move from the intracellular to the extracellular space, reducing the extracellular sodium concentration. In the absence of any change in total body water or total exchangeable sodium, a loss of approximately 40 mmol of potassium (i.e. numerically the same as the patient's total body water) is required to lower the plasma sodium by 1 mmol/L.

While the total water, sodium and potassium balances over the 18 hr period were not measured in the patient described, if one assumes that the water balance over this period was 0.69 L negative and that the sodium and potassium balances were 75 mmol and 200 mmol positive, respectively, then in a 64 year old 65 kg lady (with total body water content of approximately 33 L), the elevation in serum sodium of 2 mmol/L and 6 mmol/L could be explained by sodium and potassium administration, respectively, and 1 mmol/L elevation in the serum sodium could be explained by 0.69 L water loss.[4]

While potassium replacement in this patient may appear to be an unusual way to manage hyponatraemia, potassium replacement is important, with one review reporting that hypokalaemia was a risk factor for the development of the osmotic demylination syndrome during hyponatraemia correction.[9] They proposed that, in patients with hyponatraemia without severe neurological symptoms, correction of hypokalaemia should precede the correction of hyponatraemia.[9]

M. N. SANAP
Department of Critical Care Medicine, Flinders Medical Centre, Bedford Park, SOUTH AUSTRALIA

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