

Please read this bit first

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The Thistle QA CEU No is: **MT00025**.

Each attendee should claim **THREE** CEU points for completing this Quality Control Journal Club exercise, and retain a copy of the relevant Thistle QA Participation Certificate as proof of registration on a Thistle QA EQA.

January 2008

Hypernatraemia

Case presentation:

A comatosed 78-year-old man was admitted to hospital with a history of thirst and polyuria for three weeks. Three days prior to admission his mental state rapidly deteriorated and on the day of admission he was unable to be aroused after an afternoon sleep.

The admission clinical examination revealed a moderately to severely dehydrated man with a supine blood pressure of 115/65 mm Hg and a pulse rate of 110 beats per min. He did not respond to painful stimuli and had hypotonia and decreased tendon reflexes. There were no localizing signs of neurological disorder but he was given a provisional diagnosis of a brain stem haemorrhage.

The admission **plasma** electrolyte, urea and creatinine values were :

Na	156 mmol/L	(132-144)
K	4.6 mmol/L	(3.2-4.8)
Cl	116mmol/L	(98-108)
HCO ₃	25mmol/L	(23-33)
Urea	18.0mmol/L	(3.0-8.0)
Creat	0.17mmol/L	(0.06-0.12)

He was considered to be 8-10% dehydrated and was commenced on an intravenous infusion of normal saline at an initial rate of six litres over twelve hours.

Differential diagnosis:

Hypernatraemia associated with polyuria may be due to: *diabetes insipidus*; *osmotic diuresis*: glucose (hyperglycaemia), urea (renal failure).

Other possible causes of the hypernatraemia are decreased fluid intake due to the unconscious state, vomiting, and diarrhoea. These are unlikely in this patient as these conditions usually present with oliguria rather than polyuria.

Progress of patient:

Further laboratory investigations, on samples acquired prior to IV therapy, revealed a plasma osmolality of 385 mmol/kg, a urine osmolality of 448 mmol/kg, and a urine [Na] of 25 mmol/L.

The patient has moderate to severe dehydration with a plasma [Na] of <160 mmol/L. This suggests hypotonic fluid depletion. The urine osmolality is only slightly higher than the plasma osmolality with a urine:plasma ratio of 1.16, and this indicates the presence of an osmotic diuresis. (For diagnostic purposes a patient is considered to have a urine:plasma osmolality ratio of approximately 1 if his urine osmolality value is in the range of his plasma value \pm 50 mmol/kg). A further important observation in this patient is the high osmolar gap, i.e., his measured plasma osmolality (385 mmol/kg) is much greater than his plasma osmolality calculated from the following equation:

$$\text{Calculated plasma osmolality} = 2[\text{Na}] + [\text{urea}] + [\text{glucose}]$$

(mmol/L)

NB: the [Na], [urea] and [glucose] are all expressed in mmol/L. If the plasma (glucose) is not known it is the usual practice to assume a mean value of 5.0 mmol/L.

This patient has an osmolar gap of approximately 50 mmol/kg and this alerted the clinician to the possibility of hyperglycaemia. A subsequent plasma (glucose) estimation on the admission blood sample gave 45 mmol/L. (If the plasma [glucose] had been normal other causes to consider would have been intoxications (ethanol, methanol, ethylene glycol, drugs), and hyperlipidaemia.

CPD Questions:

1. Why are the admission (plasma) urea & creatinine elevated?
 2. Would you consider further confirmatory tests on this patient, i.e. a GTT?
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