Blood Gas #12

A 44-year-old woman is brought to hospital having been found disorientated and confused in her neighbour’s driveway.

Describe and interpret her venous blood gas:

Additional laboratory values:

Urea (plasma) = 4.5 mmol/L

Measured serum osmolality = 227 mmol/kg

Measured urine osmolality = 183 mmol/kg

Urine sodium (spot) = 11 mmol/L

Click below to expand solutions:

What's the pH?
7.590 = severe alkalaemia

What's the primary process?
HCO3 48.6 → primary metabolic alkalosis

Is there any compensation?
Expected pCO2 = 0.7 x HCO3 + 20 (± 5)

= 0.7 x 48.6 + 20 ± 5

≈ 49 – 59

Measured pCO2 is 50.4, therefore there is maximal respiratory compensation.

Are there any other clues?

Anion gap = Na – (Cl + HCO3)

= 104 – (48 + 48.6)

= 7.4 = low

Calculated serum osmolalty = (2 x Na) + urea + glucose (+ ethanol)

= (2 x 104) + 4.5 + 6.6

= 219.1

Osmolar gap = measured osmolality – calculated osmolality

= 227 – 219.1

= 7.9 mmol/kg (normal < 10)

Electrolyte clues:

Sodium, potassium, chloride, and calcium all severely low. Glucose is normal. Lactate is mildly elevated. Creatinine 19. Hb 101

What's the differential diagnosis?

Description: This venous blood gas reveals a severe metabolic alkalosis with maximal respiratory compensation. There is profound hyponatraemia, hypokalaemia, hypochloraemia, and

hypocalcaemia. The serum lactate is mildly elevated. The patient is normoglycaemic and mild-moderately anaemic.

Interpretation: In the absence of any additional information, this clinical picture would be most consistent with either severe volume contraction +/- gastric alkalosis (vomiting or nasogastric drainage), or diuretic abuse (typically loop and thiazide diuretics).

Additional information: The patient suffered from chronic alcoholism and had been vomiting for proceeding week of so. The patient was admitted to the High-Dependency Unit for volume correction and judicious electrolyte replacement. During her admission the patient developed haematemesis and melaena necessitating emergency oesophagogastroduodenoscopy which revealed evidence of ulcerative oesophagitis. A oral proton pump inhibitor was commenced and the patient was discharged several days later having made a complete recovery.