Correspondence

False hyperlactatemia in ethylene glycol poisoning

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A 50-year-old man was admitted to another hospital because of deep coma (GCS 3) after presumed intentional poisoning with 12 g of diclofenac and 60 mg of diazepam. On examination, brainstem reflexes were normal and the patient was hemodynamically stable with a blood pressure of 160/85 mmHg, warm skin and acra, and the pulse was regular at 65 bpm. The body temperature was 33°C. The patient had Kussmaul respirations of 20/minute. Laboratory results showed a metabolic acidosis (arterial blood gas: pH 6.81, bicarbonate 3.9 mmol/l, pCO2 23 mmHg, pO2 275 mmHg), leukocytosis (30.5×10^9/l), hyperglycemia (14.8 mmol/l), sodium 142 mmol/l, potassium 5.7 mmol/l, increased creatinine 167 µmol/l, lowered ionized calcium 0.78 mmol/l, normal liver enzyme activity, hyperlactatemia 15.3 mmol/l, and normal CRP.

The patient was transferred to the IC unit and treated with sodium bicarbonate infusion (8.4% 300 ml), activated charcoal, and laxative. After several hours his wife told the physicians her husband had drunk probably more than 500 ml ethylene glycol containing coolant about 17 h before admission. The plasma ethylene glycol concentration, measured by gas chromatography (blood taken 18 h after presumed ingestion) was 200 mg/dl. Infusion with ethanol was started, and the patient was transported to our hospital for extracorporeal clearance of ethylene glycol and its metabolites.

In our hospital hemodialysis was initiated immediately after admission. The osmolar gap and the anion gap were 32 mOsm/kg and 37 mmol/l respectively. Hemodialysis was performed for a 6-h period, while the ethanol infusion was tuned during hemodialysis based upon blood ethanol concentrations measured every hour (range 0.92–1.21 mg/dl). However, renal failure recovered gradually, requiring hemodialysis for 2 months. The neurological condition improved over several days, but it took 10 days before the patient was capable of communicating adequately [*1*].

Remarkable hyperlactatemia was present for at least 2 days, which was not explained by hypotension, seizures or lactate-inducing medication. Since glycolate, a metabolite of ethylene glycol having almost the same chemical structure as lactic acid (CH_2OH-COO and CH_3-CHOH-COO^-), has been described as being able to cause falsely elevated lactic acid measurements on some analyzers [*2*, *3*] the samples were reanalyzed for lactic acid using the initially used Rapidlab-865 blood gas analyzer (Bayer Health Care, Tarrytown, NY, USA) and on a Vitros-250 routine chemistry analyzer (Johnson and Johnson, Rochester, NY, USA) [*3*, *4*]. Surprisingly, as can be seen in Fig. 1, the highly elevated lactic acid levels determined by the Rapidlab-865 blood gas analyzer were not measured when the same samples were analyzed on the Vitros-250 chemistry analyzer. Although we have not measured the glycolate concentration, the most likely explanation is that the L-lactate oxidase used by the Vitros-250 chemistry analyzer only measures L-lactate, whereas the L-lactate oxidase used by the Rapidlab blood gas analyzer cross-reacts with glycolate [*3*]. It seems that the Beckman lactate measurement method on the Beckman LX 20 also cross-reacts with glycolic acid [*5*]. It is important that clinicians are aware of artificial elevations of lactic acid measurements in the presence of glycolate using some automatic analyzers. It can lead to a misdiagnosis and a delay in the treatment of ethylene glycol poisoning.

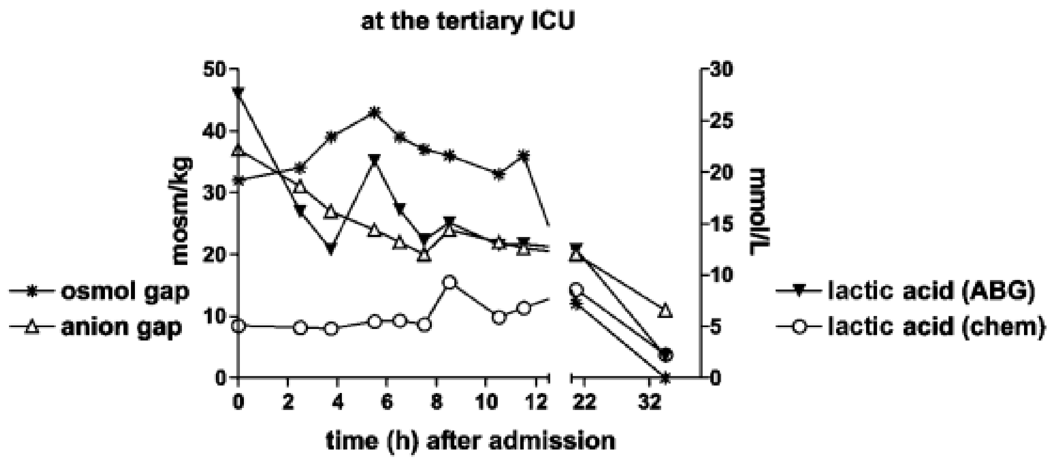

Fig. 1 Plasma levels of lactic acid using a blood gas analyzer (*ABG*) and a routine chemical chemistry analyzer (*chem*) in relation to the osmolar gap and the anion gap. Time point zero is the admission time in our hospital, 27 h after ingestion and 10 h after admission to the previous hospital. The 6-h hemodialysis shift started at 90 min. Infusion of ethanol was continued until 18 h after admission. After 1.5 days the osmolar gap was zero, the anion gap was normalized, and the lactic acid concentrations determined by the two analyzing methods were identical

References

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