ETHYLENGLICOL POISONING, A MEDICAL EMERGENCY IN AN EMERGENCY HOSPITAL

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A 41-year-old man with a previous history of drug autolytic attempt following the death of his father, who came to the Emergency Room (ER) after a probable/possible voluntary consumption of more than 250 mL of antifreeze. On admission the patient presented psychomotor agitation and aggressiveness, BP 113/70 mmHg, HR 80 bpm, RR 18 rpm, temperature 36° C, capillary glucose 99 mg/dL and negative ethanol in exhaled air. Pharmacological restraint with benzodiazepines was performed, blood analysis, determination of levels of ethylenglycol and urinary sediment were sent to laboratory. Second evaluation: BP 90/60 mmHg, HR 120 bpm, RR 24 rpm, temperature 36,2 °C, pulse-oxymetry (FiO_2 0,8) 97%. Heart examination: tachycardia without murmurs or noises. Pulmonary: tachypnea with crackles in both lungs. Neurological: Glasgow 15, isochoric normoreactives pupils, not focality and no meningeal signs. Treatment was initiated with absolute ethanol, pyridoxine and thiamine. Analysis: blood count and hemostasis within normal limits. Acid-base balance: pH 7,30 [7,33-7,43], bicarbonate 13,5 mmol/L [23-27], BE -11,4 mmol/L [-3-3], glucose 98 mg/dL [70-100], creatinine 1,28 mg/dL [0,7-1,2], urea 22 mg/dL [10-50], sodium 147 mEq/L [136-145], potassium 4,4 mEq/L [3,5-5], chlorine 107,2 mEq/L [98-106], ionized calcium 5,1 mg/dL [4,5-5,3], magnesium 2,4 mg/dL [1,6-2,6], lactic acid 80,1 mg/dL [4,5-19,8] and osmolality 352 mOsm/Kg [275-300]. GAP anion 26,3 and osmolar GAP 51,07 mOsm/L were calculated. Urinary sediment: calcium oxalate monohydrate crystals. Blood ethanol < 10 mg/dL. In patients with probable/possible ingestion of ethylenglycol having a metabolic acidosis, GAP anion and osmolar GAP elevated, and calcium oxalate crystals in urine, the treatment must be initiated without confirmed levels of ethylenglycol. The patient has sharply decreased level of consciousness so we proceed to endotracheal intubation and admission to the ICU. From toxicological reference laboratory, ethylenglycol levels of 0,3 g/L are confirmed. Treatment is completed with hemodialysis. After 24 hours tracheal intubation was removed: an acute respiratory failure with bilateral pulmonary infiltrates on chest x-ray (picture) appeared, so the patient was reintubated, disappearing pulmonary images within 5 days. The patient was discharged after 14 days without sequelae. Acute ethylenglycol poisoning is rare in our country. It is a medical emergency due to their high morbidity and mortality if the diagnosis and treatment are not instituted early, so the ER must have a plan of action for early diagnosis, because the discharge without sequelae is based exclusively on early treatment. The ethylenglicol is an alcohol of structure similar to ethanol, but with the addition of a hydroxyl group on each carbon, used as antifreeze and as solvent[1]. The toxic dose for ingestion is 50-100 mL and more than 100 mL is considered life-threatening, but as the case presented, with early treatment there are no sequelae. The most common causes are, adulteration of alcoholic beverages, ingestion as a substitute for ethanol in alcoholic patients and inappropriate use in pharmaceutical formulations not controlled[1]. It is absorbed through the digestive tract and 80% is metabolized in the liver by the alcohol dehydrogenase to glycolaldehyde and subsequently glycolic acid, glyoxylic acid and oxalic acid, metabolites

responsible for toxicity, which accumulate during 12-24 h after ingestion. The typical sign of intoxication is the metabolic acidosis with increased anion and osmolar GAP (in the case shown, 26,3 and 51,07 mOsm/L respectively) by the accumulation of toxic acids. We should be very careful when interpreting the levels of lactic acid (in the case presented, 80,1 mg/dL), because glycolic and glyoxylic acid cross-react with L-lactate oxidase which is used in the blood gasometry machine, inducing an artefacted result[2]. Oxalic acid produces myocardial depression, alcohol and aldehyde glycolic and glyoxylic acids contribute to depression of the central nervous system (CNS), and the accumulation of calcium oxalate monohydrate crystals in the kidney tissue produce tubular necrosis leading to renal failure[3.] The early appearance of these crystals in the urinary sediment is a pathognomonic finding of ethylenglicol poisoning when circumstances are not clear[4]. And finally chelation of calcium by oxalic acid, produces hypocalcemia. Ethylenglicol concentration in blood > 0,2 g/L is considered toxic, > 0,5 g/L very toxic and > 1 g/L threatening. After intake, the ethylenglicol poisoning has an initial clinical presentation similar to alcohol overdose and later appears CNS depression, associated with cerebral edema, confusion, hallucinations, convulsions, coma, neck stiffness, tremor, hyporeflexia and tetany; between 12-48 h multifactorial respiratory failure caused by cardiorespiratory involvement with the appearance of acute pulmonary edema and/or ARDS occurs, so early extubation should be evaluated carefully[1]. Action plan in the ER[1,5,6]: (1) Administration of bicarbonate 1M (up to > 1000 mEq/24 h) to correct metabolic acidosis (pH > 7,20). (2) Noninvasive ventilation or invasive, if acute respiratory failure. (3) Management antidote alcohol dehydrogenase inhibitor, if intake > 50 mL ethylenglycol, if a decreased level of consciousness and/or metabolic acidosis and/or ethylenglycol > 0,2 g/L. Two antidotes to choose: absolute ethanol or fomepizole. Absolute ethanol 10%[5] at doses of 1,1 mg/ Kg in 50 mL dextrose 5% in 60 min and after that 0,1 mL/Kg/ h in continous perfusion or 0,2 mL/Kg/ h if there is previous chronic alcohol abuse, to maintain alcohol plasma levels between 1-1,2 g/L with strict monitoring of plasma values. The drawbacks in the use of absolut ethanol as antidote are the interindividual variations in metabolism and the difficulty of maintaining appropriate values, as well as the occurrence of undesirable side effects such as CNS depression, aspiration and hypoglycemia (requiring strict control of glycemia) and higher rate of post-treatment intubation. The fomepizole[5,6], despite their higher cost and short expiration interval, has an affinity for aldehyde dehydrogenase thousand times higher than ethanol (14,2 h of clearance), few adverse effects, does not produce hypoglycemia, does not alter the state of consciousness, does not induce the acetaldehydic syndrome in patients treated with disulfiram and early indication avoid severe acidosis, renal failure and hemodialysis. (4) Hemodialysis, if plasma values > 0,5 g/L or metabolic acidosis with arterial pH < 7,1 (refractory to treatment with bicarbonate) or kidney failure or hypocalcemia. The hemodialysis is maintained until the plasma level of ethylene glycol < 0, 1 g/L. (5) Administration of 100 mg/24 h of thiamine and 200 mg/24 h of pyridoxine for 48 h, to increase degradation of glyoxylic acid. (6) Monitoring levels of calcium and magnesium and administration of calcium gluconate/chloride and/or magnesium

sulfate if required for occurence of tetany or seizures (in combination with benzodiazepines).

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