

## REFERÊNCIAS

1. Sá-Couto C, Rodrigues D, Gouveia M. Debriefing or feedback: exploring the impact of two post-scenario discussion methods in the acquisition and retention of non-technical skills. *Acta Med Port.* 2022;35:34-41.
2. Society for Simulation in Healthcare. About simulation. 2019. [consultado 2023 jan 16]. Available from: <https://www.ssih.org/About-SSH/About-Simulation>.
3. Pandey VA, Wolfe JH, Black SA, Cairoli M, Liapis CD, Bergqvist D, et al. Self-assessment of technical skill in surgery: the need for expert feedback. *Ann R Coll Surg Engl.* 2008;90:286-90.
4. Porte MC, Xeroulis G, Reznick RK, Dubrowski A. Verbal feedback from an expert is more effective than self-accessed feedback about motion efficiency in learning new surgical skills. *Am J Surg.* 2007;193:105-10.
5. Hunter LA. Debriefing and feedback in the current healthcare environment. *J Perinat Neonatal Nurs.* 2016;30:174-8.

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## Acute Kidney Injury with Hyperlactatemia: Clues to a Hidden Problem

### Lesão Renal Aguda com Hiperlactacidemia: Pistas para um Problema Escondido

**Keywords:** Acute Kidney Injury; Adolescent; Ethylene Glycol/poisoning; Hyperlactatemia; Suicide, Attempted

**Palavras-chave:** Adolescente; Etilenoglicol/envenenamento; Hiperlactacidemia; Lesão Renal Aguda; Tentativa de Suicídio

Intoxications in children are usually unintentional ingestions. When faced with altered mental status and an incongruent medical history a high degree of suspicion is warranted when investigating a possible intended intoxication.

We present a case of an adolescent male, previously healthy, who presented to the pediatric emergency department with a 12-hour history of headache, abdominal pain, vomiting, lethargy, confusion and altered speech. The physical examination revealed depressed mental status with confused and unintelligible speech, tachypnea, hypertension (144/92 mmHg) and tachycardia (128 beats/minute).

Laboratory evaluation (Table 1) showed acute kidney injury (AKI), severe hyperkalemia, hyperphosphatemia, hypermagnesemia and severe high anion gap metabolic acidosis (pH 7.04, pCO<sub>2</sub> 15.4 mmHg, HCO<sub>3</sub><sup>-</sup> 7.4 mmol/L, base excess -24.7 mmol/L, anion gap 37 mmol/L) with hyperlactatemia (268 mg/dL). Common toxicological tests were negative. Emergent treatment was immediately started with improvement of potassium levels and metabolic acidosis (pH 7.31, HCO<sub>3</sub><sup>-</sup> 16.7, base excess -11.4, lactate 208 mg/dL), and stable urine output (33 mL/h) and serum creatinine levels.

The AKI investigation revealed calcium oxalate crystals on urinalysis, diffuse increased cortical echogenicity and increased cortical-medullary differentiation on renal ultrasonography and crystal nephropathy on the renal biopsy. The patient consistently denied having ingested any toxic substances but further investigation revealed social isolation and depression in the previous months, and a suspicious pink fluid found in his bedroom that was revealed to be ethylene glycol. Ultimately, he confessed to having drunk 250 mL of antifreeze fluid with suicidal intent.

On day two, due to worsening renal function (serum

Table 1 – Laboratory evaluation at hospital admission and subsequent 24-hour evolution

Laboratory evaluation	At admission	3-hours after admission	24-hours after admission
Hemoglobin (g/dL)	18.6	17.4	13.8
Leucocytes (/ $\mu$ L)	43 500	47 400	18 800
Creatinine (mg/dL)	2.00	3.62	7.27
Urea (mg/dL)	63	87	160
Potassium (mmol/L)	6.5	8.1	4.1
Sodium (mmol/L)	144	140	147
Chloride (mmol/L)	109	110	105
Phosphate (mg/dL)	5.6	5.5	6.7
Magnesium (mg/dL)	2.3	2.5	2.4
Serum osmolality (mOsm/kg)	-	296	-

creatinine 7.27 mg/dL), he was started on continuous veno-venous hemodiafiltration, which he maintained for seven days. Hypertension was controlled with amlodipine and atenolol. A psychiatric evaluation revealed a major depressive disorder and psychotherapy was started along with antidepressants. On day 19, he was transferred to a psychiatric centre, where he remained for three weeks, with complete recovery of renal function and suspension of antihypertensive therapy after one month.

Few cases of suicidal attempt in the pediatric age are reported,<sup>1</sup> especially with ethylene glycol, used as antifreeze fluid, deicing solutions and windshield wiper fluids.<sup>2,3</sup> Toxicity is mostly due to its metabolites (glycolic, glyoxylic and oxalic acids) which cause a false-positive elevation in lactic acid and promote calcium oxalate crystal deposits in different tissues.<sup>4,5</sup> An ethylene glycol blood level test is not readily available in most hospitals. Therefore, clinical and analytical clues, such as an increased anion gap acidosis and hyperlactatemia should raise the suspicion of poisoning.<sup>1,4</sup> When available, the first treatment option would be fomepizole, which blocks alcohol dehydrogenase, which is responsible for the metabolism of ethylene glycol (half-life of three to nine hours).<sup>3,4</sup> Another option would be ethanol, whose affinity is 100 times higher for alcohol dehydrogenase compared to ethylene glycol.<sup>3</sup> Whenever there is renal failure, severe metabolic acidosis, severe electrolyte imbalance, very high ethylene glycol concentrations (> 50 mg/dL) and an osmolar gap above 10 mOsm/L, acute renal replacement therapy (hemodialysis or hemofiltration) must be initiated.<sup>1,2,4</sup> In our case, continuous veno-venous hemodiafiltration was the more readily available treatment option when intoxication was confirmed, given the time of inges-

tion. Therefore, it is extremely important to promptly initiate adequate treatment to achieve a favourable outcome.

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## PREVIOUS AWARDS AND PRESENTATIONS

This case was presented at the 22<sup>nd</sup> National Congress of Pediatrics from October 26<sup>th</sup> to 28<sup>th</sup> of 2022, in Porto, Portugal.

## AUTHOR CONTRIBUTIONS

SIA, SO: Design and conception of the work.

EM, FA: Critical review of the work.

## PROTECTION OF HUMANS AND ANIMALS

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the Helsinki Declaration of the World Medical Association updated in 2013.

## PATIENT CONSENT

Obtained.

## COMPETING INTERESTS

The authors have declared that no competing interests exist.

## REFERENCES

- Schoen JC, Cain MR, Robinson JA, Schiltz BM, Mannenbach MS. Adolescent presents with altered mental status and elevated anion gap after suicide attempt by ethylene glycol ingestion. *Pediatr Emerg Care*. 2016;32:688–90.
- Singh R, Arain E, Buth A, Kado J, Soubani A, Imran N. Ethylene glycol poisoning: an unusual cause of altered mental status and the lessons learned from management of the disease in the acute setting. *Case Reports Crit Care*. 2016;2016:1–6.
- Kruse JA. Methanol and ethylene glycol Intoxication. *Crit Care Clin*. 2012;28:661–711.
- Olson KR, Anderson IB, Benowitz NL, Blanc PD, Clark RF, Kearney TE, et al, editors. *Poisoning & Drug Overdose*. 4<sup>th</sup> ed. San Francisco: McGraw Hill; 2004. p.32-198.
- Tang J. Prompt diagnosis of ethylene glycol intoxication by an unusual "lactate gap": a case report. *Clin Pract Cases Emerg Med*. 2022;6:80–2.

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