High Anion Gap Metabolic Acidosis due to 5-oxoproline with low dose acetaminophen

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Introduction

- Pyroglutamic acidosis: 5-oxoprolinemia is an under recognized cause of high anion gap metabolic acidosis (HAGMA).
- Acetaminophen disrupts the gamma glutamyl cycle causing depletion of glutathione stores leading to 5-oxoproline accumulation.
- We report a case of a malnourished woman who received low doses of acetaminophen resulting in severe anion gap metabolic acidosis and was treated successfully with oral N-acetyl cysteine (NAC).

A 57 year old woman with schizoaffective disorder, seizures, status post tracheostomy following Chronic obstructive pulmonary disease exacerbation, presented with severe anemia and acute kidney injury with BUN of 70 mg/dl and serum creatinine (Cr) of 1.26 mg/dl, HCO3 15 mmol/L and anion gap (AG) 18 mmol/L.

She received 2 units of PRBCs and volume resuscitation with IV bicarbonate solution.

Discussion

- Pyroglutamic acidosis: 5-Oxoproline can occur in acetaminophen use, poor nutrition, renal failure, female gender, infections, use of fluoxacillin, chronic alcohol use.
- Glutathione plays an important role in amino acid transport and detoxification of endogenous waste products.
- This cycle becomes futile in acquired deficiency of cellular glutathione, which results in accumulation of 5-oxoproline.
- This case is interesting that the patient received low therapeutic doses of acetaminophen and still developed pyroglutamic acidosis in the absence of acetaminophen level.
- Her persistent HAGMA was likely related to poor nutrition status resulting in acquired glutathione deficiency.
- Pyroglutamic acid: 5-oxoproline levels should be checked in an unexplained HAGMA in hospitalized patients as acquired glutathione deficiency can be corrected effectively by oral NAC and good nutrition.

Follow Up

- Acetaminophen added in her allergy list.
- 6 months later for follow up: HAGMA resolved with Anion Gap 10 mmol/L with normal serum bicarbonate.

The mnemonic GOLDMARRK for HAGMA: stands for Glycols, 5-Oxoproline, L-lactate, D-lactate, Methanol, Aspirin, Renal failure, Rhabdomyolysis and Ketoacidosis.