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Poster #23

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Acute Renal Failure and an Acid-Base Dilemma

Introduction: Acute renal failure (ARF) is well-recognized to result in metabolic acidosis. The acidosis of ARF is associated with decreased ammoniogenesis and anion excretion. Alkalosis in the presence of ARF presents diagnostic uncertainty and therapeutic challenges. This vignette describes a case of ARF resulting in several electrolyte imbalances and metabolic alkalosis.

Case Description: A 54-year-old female with past medical history of small bowel resection with colostomy presented for nausea and vomiting for two weeks. On presentation, she was noted to be tachycardic and lethargic. Her workup revealed a serum creatinine of 6.8 mg/dL, blood urea nitrogen of 147 mg/dL, bicarbonate (HCO_3^-) of 35 mEq/dL, chloride of 57 mEq/dL, potassium of 2.1 mEq/dL, and sodium of 122 mEq/dL. Her venous blood gas revealed a pH of 7.34. She was given aggressive fluid resuscitation and started on continuous renal replacement therapy for uremic encephalopathy with improvement of her mental status and electrolyte derangements.

Discussion: Alkalosis is an unusual and rare finding in patients with ARF. Normally, as GFR falls, the kidney is less able to excrete the daily acid load, and HCO_3^- declines as chloride increases producing a hyperchloremic metabolic acidosis. As GFR falls further, anion excretion becomes affected resulting in an anion gap metabolic acidosis. ARF with metabolic alkalosis can occur either in volume depletion with endogenous HCO_3^- retention, or a gain of exogenous HCO_3^- . In this case, vomiting lead to volume depletion and a loss of gastric secretions containing potassium, and hydrogen chloride. The net effect is intestinal retention of endogenous HCO_3^- , tubular hydrogen excretion, and intracellular shifts of hydrogen. Occult retention of anions also occurs in renal failure and explains the lack of dramatic pH changes. Recognizing the interplay between history taking and the various electrolytes can give clues to the keen clinician in discerning cause and effect.