ARCHIVES OF HELLENIC MEDICINE: ISSN 11-05-3992

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ARCHIVES OF HELLENIC MEDICINE 2013, 30(3):371
ΑΡΧΕΙΑ ΕΛΛΗΝΙΚΗΣ ΙΑΤΡΙΚΗΣ 2013, 30(3):371

# Acid-Base Balance-Electrolyte Quiz – Case 31

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A 52-year-old patient with vomiting-induced metabolic alkalosis (arterial pH 7.56, with $HCO_3^-$ concentration 34 mEq/L) is presented. Laboratory investigation showed: Urea 50 mg/dL, creatinine 1 mg/dL, and $K^+$ 2.5 mEq/L. Urine pH was 6.8.

The alkaline urine pH is due to the:

a. Alkalemia per se

b. Disequilibrium phase of gastrointestinal loss of $H^+$

c. Hypokalemia

d. Hypochloremia

**Comment**

*It should be mentioned that in patients with metabolic alkalosis urine pH is lower than 5.5 to 6 because of the increased proximal bicarbonate reabsorption and enhanced $H^+$ secretion, necessary conditions to sustain the alkalemia. Furthermore, hypokalemia is associated with increased net acid excretion and bicarbonate reabsorption. In patients with metabolic alkalosis alkaline pH (>6.5–7) is commonly seen in the disequilibrium phase of gastrointestinal loss of $H^+$ when there is an excess delivery of $NaHCO_3$ in the distal tubules (due to an inadequate proximal tubular reabsorption of $HCO_3^-$), and subsequently increased excretion of the non-reabsorbable $HCO_3^-$, which is associated with increased sodium and potassium excretion. It has recently been stated that alkaline urine pH along with an increased (>50 mEq/L) urine anion gap ($Na^+ + K^+ - Cl^-$) points to the diagnosis of active vomiting or even ongoing bicarbonate ingestion.*

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**Answer:** *Disequilibrium phase of gastrointestinal loss of $H^+$*