ARCHIVES OF HELLENIC MEDICINE: ISSN 11-05-3992

CONTINUING MEDICAL EDUCATION
ΣΥΝΕΧΙΖΟΜΕΝΗ ΙΑΤΡΙΚΗ ΕΚΠΑΙΔΕΥΣΗ

ARCHIVES OF HELLENIC MEDICINE 2010, 27(3):563
ΑΡΧΕΙΑ ΕΛΛΗΝΙΚΗΣ ΙΑΤΡΙΚΗΣ 2010, 27(3):563

Acid-Base Balance-Electrolyte Quiz – Case 16

M. Elisaf,
T. Filippatos

Department of Internal Medicine, Medical School, University of Ioannina, Ioannina, Greece

A 72-year-old man was admitted to the hospital with symptoms of congestive heart failure: Arterial pH 7.62, PO_2 48 mmHg, PCO_2 25 mmHg, HCO_3^- 21 mEq/L, Na^+ 128 mEq/L, Cl^- 78 mEq/L.

Which are the acid-base disorders of the patient?

a. Respiratory alkalosis
b. Respiratory alkalosis and metabolic alkalosis
c. Respiratory alkalosis and metabolic acidosis
d. Metabolic alkalosis and respiratory acidosis
e. Respiratory alkalosis and metabolic acidosis, as well as metabolic alkalosis

Comment

Hypoxemia-induced respiratory alkalosis is the dominant acid-base disorder (alkalemia due to decreased PCO_2). In this case the expected HCO_3^- concentration is between 18 mEq/L and 21 mEq/L (a 2–4 mEq/L decrease of serum HCO_3^- levels for each decrease of PCO_2 by 10 mEq/L). Thus, there is no obvious superimposed metabolic disorder. However, the serum anion gap is elevated (29 mEq/L), suggesting the presence of a coexisting wide gap metabolic acidosis (possibly due to lactic acidosis). Even though other causes of an elevated anion gap should be carefully excluded, a very wide anion gap virtually establishes the presence of an increased anion gap metabolic acidosis. In an increased anion metabolic acidosis the decrease in HCO_3^- is equal to the increase in the anion gap. However, in the present case the decrease of serum HCO_3^- concentration (3 mEq/L) was substantially lower than the increase in serum anion gap (29–10=19 mEq/L), a finding that implied the presence of an additional acid-base disorder (metabolic alkalosis) due to the previous furosemide administration.

Corresponding author:

M. Elisaf, Department of Internal Medicine, Medical School, University of Ioannina, GR-451 10 Ioannina, Greece
e-mail: egepi@cc.uoi.gr

Diagnosis: *Chronic respiratory acidosis and metabolic acidosis*