

CONTINUING MEDICAL EDUCATION ΣΥΝΕΧΙΖΟΜΕΝΗ ΙΑΤΡΙΚΗ ΕΚΠΑΙΔΕΥΣΗ

Acid-Base Balance-Electrolyte Quiz – Case 24

A 52-year-old woman developed hypokalemia (serum potassium 2.8 mEq/L) during her hospitalization. Four days before a diagnosis of urinary tract infection was established due to *Pseudomonas aeruginosa*. She was treated with piperacillin/tazobactam (4 g+0.5 g×3/day). The patient also received amlodipine (5 mg/day), low-molecular weight heparin and metformin (1 g×2/day). Laboratory investigation showed: Urea 65 mg/dL, creatinine 1 mg/dL, Na⁺ 135 mEq/L, glucose 180 mg/dL, Mg²⁺ 1.4 mEq/L.

Which is the main cause of hypokalemia?

- a. The uncontrolled diabetes mellitus
- b. The administration of low molecular weight heparin
- c. The administration of piperacillin/tazobactam
- d. The pyelonephritis-induced tubular damage

Comment

Even though osmotic diuresis-induced kaliuria can contribute

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ΑΡΧΕΙΑ ΕΛΛΗΝΙΚΗΣ ΙΑΤΡΙΚΗΣ 2012, 29(2):268

**M. Elisaf,
G. Miltiados**

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

to the development of hypokalemia, the most probable cause of the decreased potassium levels is the administration of piperacillin/tazobactam. It is well known that piperacillin sodium behaves as a non-reabsorbable anion. Thus, in cases of volume depletion – as it was the case in our patient shown by the increased serum urea/creatinine ratio– the sodium reabsorption without anion results in increased lumen-negative electrical gradient and enhanced potassium secretion.

Furthermore, the large amount of sodium administration with piperacillin is associated with solute diuresis and high flow rate to the collecting tubules leading to increased potassium secretion.

On the contrary, low molecular weight heparin is associated with hyperkalemia, while acute pyelonephritis is not associated with tubular damage and increased potassium secretion.

Corresponding author:

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

Diagnosis: Hypokalemia after piperacillin/tazobactam administration
