

CONTINUING MEDICAL EDUCATION ΣΥΝΕΧΙΖΟΜΕΝΗ ΙΑΤΡΙΚΗ ΕΚΠΑΙΔΕΥΣΗ

Acid-Base Balance-Electrolyte Quiz – Case 27

A 77-year-old man with a chronic diarrheal syndrome was seen in the emergency department. Laboratory investigation showed: Urea 65 mg/dL, creatinine 1.2 mg/dL, potassium 3.4 mEq/L, sodium 138 mEq/L, chloride 112 mEq/L, arterial pH 7.30, bicarbonate 12 mEq/L.

Which fluid should be used?

- a. Dextrose solution with alkalinizing solution (NaHCO₃ solution)
- b. Dextrose in saline solution (0.225%)
- c. Isotonic saline (0.9%)
- d. Quarter isotonic saline with KCl and NaHCO₃ solution

Comment

The patient presented with hypovolemia (increased urate to creatinine ratio), hyperchloremic metabolic acidosis and hypokalemia. There is no role for the use of dextrose solution in the treatment of this patient (only 40% of the fluid will remain in the extracellular space). Isotonic saline can be used for the treatment of volume

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depletion. However, in view of the coexistent metabolic acidosis and potassium depletion both KCl (3 ampoules=3×13.5=40.5 mEq K⁺/L) and NaHCO₃ (44 mEq of HCO₃⁻/L) should be administered in quarter isotonic saline (sodium concentration equal to 38.5 mEq/L). This solution is slight hypotonic to plasma, having a sodium + potassium concentration of 122 mEq/L (38.5+44+40.5=122 mEq/L).

This solution can provide free water that can replace continuing insensible water losses. However, normal saline (with KCl and NaHCO₃ solutions) should be used in patients with coexistent hyponatremia. It should be mentioned that all the solutes in an intravenous solution should be included when calculating its effective osmolality, since potassium (the primary intracellular solute) is as osmotically active as sodium.

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Diagnosis: Quarter isotonic saline with KCl and NaHCO₃ solution
