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Acid-Base Balance-Electrolyte Quiz – Case 47

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What will be the change in the serum sodium concentration following the administration of 2 L of NaCl 0.45% (N/2) plus 6 ampoules (amp) of KCl solution (10%), if Uosm is constant at 300 mosmol/kg.

a. No change in serum sodium

b. A decrease in serum sodium

c. An increase in serum sodium

d. The change in serum sodium is dependent on the patient's blood pressure

Comment

At first glance, the administration of a solution with a lower serum sodium concentration (77 mEq/L) compared to the plasma (154 mEq/L) can lower serum sodium concentration. However, this solution is isotonic to plasma, since it contains 77 mEq/L Na^++ 81 mEq/L K^+ (6 amp×13.5 mEq/L K^+). It should be mentioned that potassium is an effective osmole as sodium. In fact, the exogenous potassium will enter the cells, while intracellular sodium will leave the cells for the maintenance of electroneutrality, thereby increasing serum sodium levels. Thus, the osmotic contribution of potassium in the intravenous solutions should not be ignored. In this patient, the administration of an isotonic solution (without H_2O) to a patient who can excrete urine isoosmotic to plasma can rise serum sodium concentration, since no free water is given to replace insensible losses.

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Answer: increase in serum sodium