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Hyperkalemia in the emergency department: Consider the use of nebulized salbutamol



Sir:

We have read with great interest an article “Hypoglycemia as a complication of intravenous insulin to treat hyperkalemia in the emergency department” in which the authors described the frequency of hypoglycemia following the use of insulin to shift potassium intracellularly [1]. They reported that hypoglycemia is a frequent complication of treatment with IV insulin in the ED. They also recommend interventions, such as standardized protocols, to assist with the ED management of hyperkalemia. Hyperkalemia is a potentially life-threatening electrolyte disturbance that can be fatal [2]. Because of the potential cardiac effects of hyperkalemia, its management is an emergency intervention and patients require a rapid drop of serum potassium level [3]. In the emergency department, we can use intravenous insulin or beta₂-agonists. Here, we want to highlight the interest of a nebulized beta₂-agonist, an easy-to-use tool with reduced monitoring for the management of hyperkalemia in the emergency department.

Allon et al. reported, in 10 patients on hemodialysis, a significantly greater reduction in serum potassium with 10 mg and 20 mg nebulized salbutamol compared with placebo, with a peak effect of 10 mg nebulized salbutamol at 120 min and at 60 min for 20 mg nebulized salbutamol [4]. In 17 chronic renal failure patients, Mandelberg et al. reported a significant decrease in serum potassium with 1200 µg of salbutamol in a metered-dose inhaler with a spacer device compared to placebo in a cross-over trial, with a peak effect at 60 min [5]. Importantly, Balanzario et al. reported no significant difference in serum potassium between 0.5 mg IV salbutamol and 10 mg nebulized salbutamol [6]. In a randomized cross-over trial including 12 hemodialysis outpatients, Allon et al. reported that IV insulin-dextrose (regular insulin 10 units with glucose 50 mL) significantly reduced serum potassium compared to nebulized salbutamol (nebulized treatment of albuterol 20 mg) at 15 min but not at 30, 45 or 60 min. The maximal decrease was 0.65 ± 0.09 and 0.66 ± 0.12 mmol/L after insulin with glucose and albuterol, respectively. In this study, insulin-dextrose therapy caused significant hypoglycemia (mean plasma glucose concentration 2.8 ± 0.3 mmol/L) at 60 min, whereas albuterol was associated by a non-significant increased heart rate [7]. Ngugi et al. included 20 patients with acute and chronic renal failure and reported no significant differences in serum potassium reduction between intravenous salbutamol and intravenous insulin-dextrose at 60 and 120 min. In detail, at 2 h the decrease in serum potassium caused by insulin with glucose was 0.90 ± 0.45 mmol/L which was comparable to that caused by salbutamol 0.90 ± 0.56 mmol/L [8].

Therefore, we propose that beta₂-agonists should be used preferentially by the emergency physicians for the management of hyperkalemia in the emergency department. Insulin is associated with increased monitoring with repeated measurement of blood glucose, and hypoglycemia is associated with longer stay in the emergency room. The authors propose that “emergency departments developing standard practices for checking glucose at frequent and regular intervals following the administration of intravenous insulin”. This may be

complicated in an overcrowded emergency department, and beta₂-agonists will not require such intensive monitoring.

We also note that robust evidence for the emergency treatment of hyperkalemia is missing. Thus, a rigorous evaluation of the first-line treatments of hyperkalemia in emergency departments is needed and a large scale randomized clinical trial is warranted.

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