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Clinical impacts of the fluid protocol and the overcorrection of preexisting hyponatremia in critically ill patients receiving continuous renal replacement therapy

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Objectives : Severe hyponatremia is associated with an increased risk of in-hospital mortality and may lead to osmotic demyelinating syndrome (ODS) with rapid correction. However, protocols for managing hyponatremia in patients with preexisting hyponatremia undergoing continuous renal replacement therapy (CRRT) are lacking. The impact of a fluid protocol designed to prevent rapid correction of hyponatremia and the consequences of overcorrection in patients undergoing CRRT was analyzed.
Methods : This retrospective cohort study included patients with preexisting severe hyponatremia (serum sodium ≤ 120 mmol/L) undergoing CRRT from 2011 to 2023. The fluid protocol included administering 1.5mL/kg/hr of dextrose water. Overcorrection of hyponatremia was defined as increase in serum sodium concentration > 18 mmol/L from day 0 to day 2 post-CRRT. Primary outcomes were changes in serum sodium levels and 30-day in-hospital mortality.
Results : A total of 173 patients were included and the median age was 62.5 years and the mean serum sodium level was 117±3.51 mmol/L. The fluid protocol was applied in 73 patients. The incidence of overcorrection of hyponatremia was comparable between the control (27.2%) and protocol (22.9%) groups. Changes in serum sodium concentrations were also comparable between the groups. While ODS was not reported in all patients, overcorrection was associated with higher 30-day in-hospital mortality (P=0.04). History of ischemic heart disease, female sex, and low serum sodium at day 0 were associated with overcorrection of hyponatremia. After adjusting for these variables, overcorrection was significantly associated with increased risk of 30-day in-hospital mortality (HR 2.58, 95% CI 1.34~4.95, P<0.01).
Conclusions : Overcorrection of preexisting severe hyponatremia was associated with an increased risk of mortality in patients with CRRT. Since the fluid protocol starting with 1.5 mL/kg/hr of dextrose water did not significantly attenuate rapid rise of serum sodium levels, more aggressive fluid therapy for mitigating overcorrection of preexisting hyponatremia may be required.