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Continuous Venovenous Hemofiltration (CVVH) Versus Conventional Treatment for Acute Severe Hyponatremia in Critically Ill Patients: A Retrospective Study

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Objective: Patients with severe hyponatremia who receive conventional treatment are often undertreated. Data on the management of acute hyponatremia using continuous venovenous hemofiltration (CVVH) are limited to anecdotes. This study aimed to evaluate the efficacy and safety of CVVH for acute severe hyponatremia in critically ill patients in a retrospective cohort.

Methods: A total of 95 patients who admitted to our ICU between January 2009 and January 2014 were analyzed as the original cohort. These patients were divided into CVVH and conventional treatment groups. The patients in the conventional and CVVH groups were then matched by age, reason for ICU admission, vasopressor dependency, basic serum sodium concentration, and Glasgow scores. A Cox regression model was used to adjust the confounding variables.

Results: The accumulated 7- and 28-day survival rates of all patients were 56.8% and 32.6% (Figure 1A), respectively. In the original cohort, the 28-day survival rates were 41.9% and 25.0% for the CVVH and conventional treatment groups (Figure 1B), respectively. Conventional treatment (HR = 2.1, 95% CI 1.1–3.8, P = 0.019; Table 1) was an independent predictor of patient mortality in the multivariate Cox regression model. The accumulated 28-day survival rate was significantly higher among the patients who experienced the 24-hour hyponatremia correction (58.8% vs. 26.9%, P = 0.020; Figure 1C). In the matched cohort, the two groups were not significantly different in terms of baseline characteristics. The CVVH group had a significantly greater reduction in the serum sodium concentration (0.78 mmol/L/h vs. 0.13 mmol/L/h, P < 0.001) and an improved 28-day survival rate (34.8% vs. 8.7%, P = 0.002; Figure 1D) compared with the conventional treatment group. The two groups did not differ significantly in treatment-related complications.

Conclusion: CVVH treatment is possibly more effective than conventional treatment for the management of acute severe hyponatremia in critically ill patients.

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Table 1. Independent risk factors of mortality in total patients.

Variables	Univariate analysis		Multivariate analysis	
	HR (95% CI)	P value	HR (95% CI)	P value
Treatment methods (No-CVVH/CVVH)	1.7 (1.0–2.8)	0.038	1.8 (1.1–3.0)	0.027
Mechanical ventilation (Yes/No)	2.4 (1.4–4.3)	0.002		
Vasopressor dependency (Yes/No)	3.5 (2.1–6.0)	<0.001	2.5 (1.4–4.5)	0.003
Baseline serum sodium	1.03 (1.00–1.06)	0.027		
Glasgow score	0.92 (0.87–0.97)	0.001		

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