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Monitoring volume status using bioelectrical impedance analysis in chronic hemodialysis patients

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Objectives : Fluid overload can be an independent risk factor of cardiovascular events and all-cause death in end-stage renal disease (ESRD) patients on chronic hemodialysis. We performed a retrospective study to investigate whether chronic overhydration assessed by bioelectrical impedance analysis (BIA) increases the rate of these complications.

Methods : In ESRD patients on chronic hemodialysis, we identified the ratio of extracellular water to total body water (ECW/TBW) every 6 months using BIA. Patients were divided according to ECW/TBW. The uncontrolled group included patients with all ECW/TBW measurements ≥0.40; in contrast, the controlled group included those with any measured ECW/TBW <0.40.

Results : A total of 142 patients (85 [59.9%] in the controlled group and 57 [40.1%] in the uncontrolled group) were followed for 29 (12, 42) months. The risk of cardiovascular events was higher in the uncontrolled group (HR 2.4, 95% CI 1.2-5.1; P = 0.020) than it was in the controlled group; however, this difference disappeared after adjusting for age, sex, and Charlson comorbidity index (P = 0.104). On the other hand, the patients in the uncontrolled group had a higher risk of all-cause death than did those in the controlled group; this finding was independent of age, sex, and Charlson comorbidity index (HR 4.7, 95% CI 1.4 - 16.1; P = 0.013).

Conclusions : Monitoring hydration status using BIA may help to predict all-cause death in chronic hemodialysis patients. Further controlled studies are needed to confirm that strict volume control could reduce the rates of cardiovascular events and mortality in this population.

Keywords : fluid overload; bioelectrical impedance analysis; chronic hemodialysis; cardiovascular event; mortality