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Association between ultrafiltration variability and clinical outcomes in patients undergoing hemodialysis

Kyu Hyang Cho[1], Hae Dong Choi[1], A Young Kim[1], Jong Won Park[1], Jun Young Do[1], Ji Young Choi[2], Bo Yeon Kim[2], Yu Jeong Lim[2], Seok Hui Kang[1]
[1]Department of Internal Medicine-Nephrology, Yeungnam University Medical Center, Korea, Republic of
[2]Department of Quality Assessment Administration Department, Health Insurance Review and Assessment Service, Korea, Republic of

Objectives : Ensuring a stable ultrafiltration volume (UFV) and identifying prognostic risk factors related to UFV are critical concerns for hemodialysis (HD) patients. Our study seeks to access the impact of UFV variability on clinical outcomes in patients undergoing maintenance HD using a population-based cohort.
Methods : In our retrospective analysis, we examined datasets from patients who received periodic HD quality evaluations along with their claims data (n = 50,583). The UFV variability was calculated using the residual standard deviation derived from a within-subject linear regression model with six UFV values for each patient. Participants were divided into four quartiles based on the UFV variability.
Results : The 5-year survival rates for patients in Q1, Q2, Q3, and Q4 were 68.3%, 67.9%, 66.4%, and 65.8%, respectively. Multivariable analysis revealed that the hazard ratio (HR) for all-cause mortality was the highest in the Q4 group. Additionally, a spline curve using the multivariable model indicated that an increase in UFV variability, based on a median of 0.44 L/session, was linked to all-cause mortality. Multivariable Cox regression indicated that the Q4 group had a higher HR for cardiovascular events or atrial fibrillation compared to the Q1 and Q2 groups. Additionally, the Q1 group had the lowest HR for dementia among the four groups.
Conclusions : Our study demonstrated an association between high UFV variability and various clinical outcomes, particularly all-cause mortality and dementia. These findings suggest that UFV variability could serve as a useful supplementary indicator for predicting prognosis, in addition to UFV or ultrafiltration rate.