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Association of intradialytic pulse-rate average real variability with adverse outcomes in maintenance hemodialysis patients with diabetes

Objective

To evaluate the association between intradialytic pulse-rate average real variability (PR-ARV) and adverse outcomes in maintenance hemodialysis patients with diabetes.

Background

Hemodialysis induces rapid hemodynamic stress, whereas diabetes-related autonomic dysfunction may impair compensatory responses. Pulse rate (PR), routinely recorded during oscillometric blood pressure monitoring, may provide a feasible dynamic marker; however, its prognostic relevance during hemodialysis remains unclear. Method: This prospective single-center cohort enrolled 118 adults receiving maintenance hemodialysis. PR was measured at six predefined time points during five long-interval sessions over one month. PR-ARV was calculated as the mean absolute difference between consecutive PR measurements. The primary outcome was a composite of cardio-cerebrovascular events or all-cause mortality. Associations were assessed using multivariable Cox and Firth logistic regression models.

Results

During a median follow-up of 17.2 months, 39 participants developed the composite outcome and 12 died. Higher PR-ARV was independently associated with the composite outcome (adjusted hazard ratio per 1-bpm increase, 1.20; 95% confidence interval, 1.04–1.38). Compared with the lowest PR-ARV quartile, the highest quartile was associated with higher odds of the composite outcome (odds ratio, 3.33; 95% confidence interval, 1.03–11.65) and all-cause mortality (odds ratio, 5.74; 95% confidence interval, 1.08–58.29).

Conclusion

Greater intradialytic PR-ARV was associated with adverse outcomes, particularly all-cause mortality, in maintenance hemodialysis patients with diabetes. Serial PR measurements obtained during routine dialysis may provide a low-burden marker for risk stratification and warrant validation in larger multicenter cohorts.



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Keywords: pulse-rate average real variability, Diabetes mellitus, hemodialysis,

Biography:

(1) Qiu Yiping is a Master's candidate in Clinical Medicine at Zhejiang Chinese Medical University, China. Her research aims to optimize cardiovascular risk stratification for patients with diabetic kidney disease on hemodialysis. She is involved in a prospective study that utilizes multidimensional clinical data, including dynamic intradialytic physiological signals, to build predictive models. Ms. Qiu looks forward to presenting and discussing this work at the conference.

(2) Zhu Yunyun, M.D., is an Associate Chief Physician and Master's Supervisor at Zhejiang Provincial Tongde Hospital. She is dedicated to clinical and translational research in kidney and metabolic disorders, with a focus on diabetic kidney disease. Her work emphasizes discovering novel risk indicators and optimizing management strategies. Dr. Zhu has authored 8 peer-reviewed papers as the first author and has led or participated in 11 research projects. She looks forward to interdisciplinary discussions at this summit.