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Dialysis-Induced Alterations in Right Ventricular Free Wall Strain as a Marker of Intradialytic Hypotension Risk

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Objectives : Intradialytic hypotension (IDH) is a frequent and clinically important complication of maintenance hemodialysis, associated with adverse cardiovascular outcomes. The contribution of right ventricular (RV) contractile reserve to hemodynamic stability during ultrafiltration remains incompletely understood. We investigated whether acute dialysis-induced changes in RV free wall strain (RVFWS) are associated with IDH.
Methods : In this prospective, single-center study, 33 patients with end-stage renal disease undergoing maintenance hemodialysis underwent transthoracic echocardiography with speckle-tracking strain analysis immediately before and after dialysis. IDH was defined as a decrease in systolic blood pressure (SBP) ≥20 mmHg after dialysis. RVFWS was analyzed offline by a blinded observer. Changes in RVFWS were compared between patients with and without IDH, and correlations between SBP decline and RVFWS change were assessed.
Results : Fifteen patients (45%) developed IDH. Baseline characteristics, ultrafiltration volume (mean 2.9 kg), pre-dialysis SBP, left ventricular ejection fraction, and baseline RVFWS were similar between groups. However, the IDH group exhibited a significantly greater post-dialysis reduction in RVFWS compared with the non-IDH group (−7.0 ± 7.2% vs. −1.7 ± 4.6%, $p = 0.017$). The degree of SBP reduction correlated moderately with the magnitude of RVFWS decline ($r = 0.50$, $p = 0.003$).
Conclusions : IDH was associated with a greater dialysis-induced decrease in RVFWS despite comparable baseline RV function, suggesting that acute volume removal may unmask impaired RV contractile reserve. Dynamic assessment of RV strain may help identify patients at risk for intradialytic hemodynamic instability.