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Increased tricuspid regurgitation jet velocity as a predictor of acute decompensated heart failure in end-stage renal disease patients on maintenance hemodialysis

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Objectives: Many patients with end-stage renal disease (ESRD) on hemodialysis (HD) experience left ventricular hypertrophy and reduced vascular compliance and are likely to develop heart failure (HF). We aimed to determine the hemodynamic factors associated with acute decompensated events among ESRD patients undergoing HD.

Methods: We retrospectively investigated ESRD patients on HD through a medical record review. We divided patients into those experience who experienced any admission due to acute decompensated HF (ADHF) and those who did not. We compared medical histories, electrocardiograms, and echocardiographic and laboratory data between the groups.

Results: Of the 188 ESRD patients on HD, 87 were excluded, and 101 were enrolled (mean age: 63.7 years, 52.1% male). Thirty patients (29.7%) were admitted due to ADHF. These patients exhibited similar left ventricular ejection fraction (LVEF), left ventricular (LV) mass index, and E/E' compared to the non-ADHF group. However, the ADHF group demonstrated significantly higher tricuspid regurgitation (TR) jet velocity (2.9 ± 0.6 vs. 2.5 ± 0.4 m/s, respectively; p=0.004) than the non-ADHF group. The ADHF group also showed a higher N-terminal pro B natriuretic peptide level (2175.7 ± 14,404.8 vs. 11,895.7 ± 13,441.4 pg/dL, respectively) than the non-ADHF group. Multivariate logistic regression analysis demonstrated that TR jet velocity (odds ratio: 8.356, 95% confidence interval: 1.806–38.658; p=0.007) was an independent predictor of ADHF after adjusting for age and sex, while LVEF and E/E' were not. Per receiver operating characteristic curve analysis, TR jet velocity > 2.8 m/s was associated with ADHF with 47.7% sensitivity and 76.4% specificity (area under the curve: 0.656).

Conclusions: Our data showed that increased TR jet velocity was an independent predictor of ADHF events in ESRD patients on HD, but LVEF and E/E' were not.

Table 1. Baseline characteristics

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Variable	Pt without admission for ADHF (n=71)	Pt with admission for ADHF (n=30)	p-value
Age, mean (year)	64.1±13.7	65.5±12.5	0.629
Male, n (%)	37 (52.1)	16 (53.3)	0.911
HTN, n (%)	45 (63.4)	22 (73.3)	0.367
DM, n (%)	35 (49.3)	14 (46.7)	0.831
Dyslipidemia, n (%)	28 (39.4)	17 (56.7)	0.129
Stroke, n (%)	7 (9.9)	5 (16.7)	0.333
Thyroid disease, n (%)	2 (2.8)	2 (6.7)	0.580
Atrial fibrillation, n (%)	4 (5.6)	5 (16.7)	0.121
Body weight, pre HD, kg	57.5±16.8	49.2±28.2	0.139
Body weight, post HD, kg	54.2±17.4	46.9±26.9	0.178
IDWG, kg	-2.3±1.0	-2.8±1.2	0.080

All values are presented as mean± SD. HTN: Hypertension, DM: Diabetes Mellitus, HD: Hemodialysis, IDWG: interdialytic weight gain

Table 2. Logistic regression analysis to predict admission for ADHF

Table 5. Logistic regression analysis to predict admission for ADHF

	Univariable		Multivariable	
Risk factors	Odds ratio (95% CI)	*p*-value	Odds ratio (95% CI)	*p*-value
Age	1.008 (0.976 to 1.042)	0.625	1.019 (0.971 to 1.070)	0.450
Female gender	0.952 (0.405 to 2.239)	0.911	1.461 (0.419 to 5.095)	0.552
LV EF	0.952 (0.904 to 1.003)	0.064	0.935 (0.871 to 1.004)	0.065
E/E'	1.026 (0.954 to 1.103)	0.494	0.910 (0.801 to 1.033)	0.144
TR jet V	5.222 (1.931 to 14.125)	0.001	8.356 (1.806 to 38.658)	0.007
IDWG	0.674 (0.431 to 1.054)	0.084	0.838 (0.478 to 1.468)	0.537

CI, confidence interval; LVEF, left ventricular ejection fraction; E, peak early diastolic mitral filling velocity; E' early diastolic mitral annular velocity; TR jet V, maximal tricuspid regurgitation velocity; IDWG: interdialytic weight gain