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Increased Right Ventricular Pressure 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) have reduced vascular compliance and are likely to develop heart failure (HF). This study aimed to determine the factors associated with acute decompensation events among ESRD patients undergoing HD

Methods: We retrospectively investigated ESRD patients on HD using a medical record review. We divided the patients into those admitted to hospital due to acute decompensated heart failure (ADHF) and those who were not. We compared the medical histories, electrocardiograms, and echocardiographic and laboratory data between the two 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' values compared to the non-ADHF group. However, the ADHF group exhibited significantly higher tricuspid regurgitation (TR) jet velocity (2.9±0.6 vs. 2.5±0.4 m/s; p=0.004) and right ventricular systolic pressure (RVSP) (43.5±17.2 vs. 34.2±9.9 mmHg; p=0.009) than the non-ADHF group, respectively. A multivariate logistic regression analysis demonstrated that the 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 the LVEF and E/E' were not.

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

Table 1

Table 1. Baseline characteristics

Variable	Pt without admission for ADHF (n=71)	Pt with admission for ADHF (n=30)	p value
Age (years)	64.1±13.7	65.5±12.5	0.629
Male	37 (52.1)	16 (53.3)	0.911
HTN	45 (63.4)	22 (73.3)	0.367
DM	35 (49.3)	14 (46.7)	0.831
Dyslipidemia	28 (39.4)	17 (56.7)	0.129
Stroke	7 (9.9)	5 (16.7)	0.333
Thyroid disease	2 (2.8)	2 (6.7)	0.580
Atrial fibrillation	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±standard deviation.
ADHF = acute decompensated heart failure; HTN = hypertension; DM = diabetes mellitus; HD = hemodialysis; IDWG = interdialytic weight gain.

Table 3

Table 3. Echocardiography parameters

Parameters	Pt without admission for ADHF (n=71)	Pt with admission for ADHF (n=30)	p value
LVEF (%)	63.3±7.3	59.9±9.4	0.057
LVEDD (mm)	48.4±6.0	48.4±7.8	0.993
LVESD (mm)	34.5±23.5	33.3±7.7	0.778
IVSTd (mm)	12.1±2.4	13.9±2.8	0.002
PWTd (mm)	10.8±1.9	11.9±3.0	0.030
LVMI (g/m^2)	129.0±38.8	135.7±45.0	0.564
LA diameter (mm)	38.5±8.0	41.6±9.3	0.091
Aorta diameter (mm)	33.3±4.4	33.7±4.5	0.708
E velocity (cm/sec)	0.8±0.3	0.9±0.3	0.359
A velocity (cm/sec)	0.9±0.3	0.9±0.2	0.670
E/E′	14.9±5.8	15.8±6.3	0.498
TR jet V (m/s)	2.5±0.4	2.9±0.6	0.004
RVSP (mmHg)	34.2±9.9	43.5±17.2	0.009