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Title: Pre-LVAD CT-derived Measures of RV Size and Function May Be Strong Identifiers of Right Ventricular Failure.

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Purpose:
LVADs are a commonly used treatment for patients with end stage heart failure, though patients are at a high risk of right ventricular failure (RVF) after implantation. ECG-gated, contrast enhanced functional CT provides quantitative volumetric and functional measures that may prove more useful in predicting RVF than traditional measures.

Methods:
Since September 2017, ECG-gated contrast-enhanced CT scans of the heart were acquired on a Revolution scanner (GE Healthcare) as part of the work-up for heart failure patients with GFR > 40. For this study, we included patients who received a functional CT scan and went on to receive an LVAD. RVF classification and severity was assessed within 6 months of implantation per INTERMACs criteria. Prognostic values for previously published risk scores and common predictors were compared to CT-derived measures of RV size and function. Area under the curve (AUC) values, accuracy, sensitivity, and specificity were used to compare CT-derived RV EDVI and RVEF to clinical risk scores, CVP, Creatinine, PAPI, Michigan Score, and CRITT score.

Results:
Of the 62 patients scanned, 12 received LVADs. Post implantation, 7 patients had RVF (5 moderate, 2 severe). Patients were evaluated for their RV EDVI (131 ± 34 mL/m2), RVEF (30 ± 13%), CVP (9 ± 4 mmHg), Creatinine (1.17 ± 0.25 mg/dL), PAPI (2.74 ± 1.91), Michigan Score (2 ± 2), and CRITT score (0.5 ± 0.7). RV EDVI, RVEF, and PAPI were the strongest predictors (AUC = 0.75, 0.725, 0.714 respectively) with ideal cutoffs of 144 ml/m2 for RVEDVI, 27% for RVEF, and 1.88 for PAPI. Creatinine was less predictive (AUC = 0.7) and the Michigan Score, CRITT score, and CVP were not predictive (AUC = 0.575, 0.5, 0.5).

Conclusion:
For this small cohort, functional CT derived parameters had high AUC in predicting RVF in LVAD patients, and may prove useful in future risk assessment.

Parameter	RV EDVI (mL/m2)	RV EF (%)	PAPI	Creatinine (mg/dL)	Michigan Score	CRITT Score	CVP (mmHg)
AUC	0.75	0.73	0.71	0.7	0.58	0.5	0.5

Ideal Cutoff	144	27	1.87	1.2	6.5	2	12
Accuracy	77%	77%	85%	69%	54%	54%	54%
Sensitivity	80%	63%	50%	80%	100%	100%	50%
Specificity	75%	100%	100%	63%	13%	14%	29%