

## Right ventricular ejection fraction as predictor of outcome in acute heart failure using RV ellipsoid model. A retrospective analysis of a prospective cross-sectional study

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**Introduction:** Echocardiography (TTE) is an essential imaging modality for assessment of RV function in acute heart failure. Established parameters are useful and easy to perform but fail to reflect on global volumes due to reliability on one acoustic window. It is therefore attractive to calculate RV volumes and ejection fraction using an ellipsoid model (RVEF/E) which has been validated against MRI in healthy adults but not in the HF patients.

**Purpose:** Predictive value of RVEF/E were compared with two established echo parameters of RV function over two-year follow-up period in patients with acute HF. Primary outcome measure was all-cause mortality.

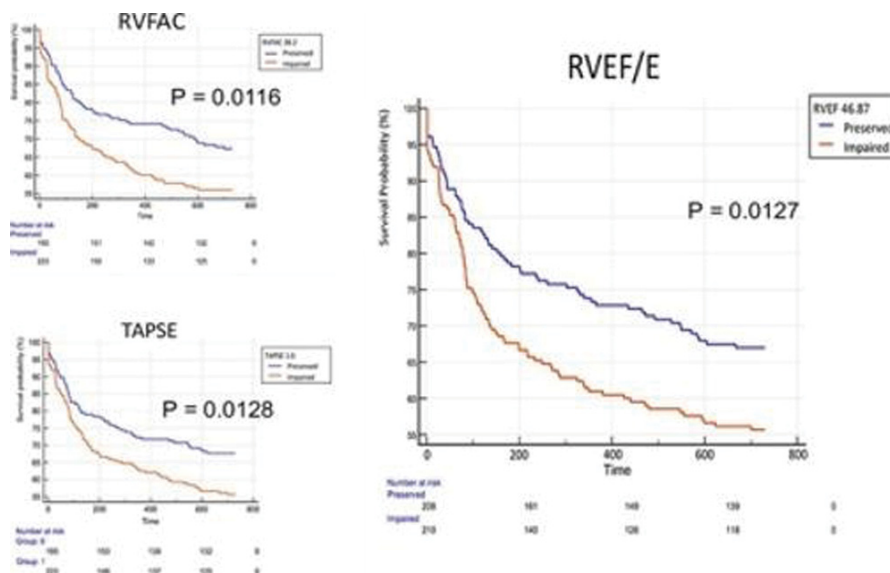
**Methods:** Prospective cross-sectional study enrolling 418 consecutive patients with symptoms of acute HF according to a predefined study protocol. All patients underwent TTE assessment of RV function using Tricuspid Annular Plane Systolic Excursion (TAPSE) and RV fractional area change (RVFAC) and RVEF/E. RV Volumes calculated using formula, RVIT is RV

inflow tract diameter, RVLAX is RV length and LVD is LV maximal diameter in 2 chamber view.

$$RVV = (3.14/6) \times RVIT \times RVLAX \times LVD$$

**Results:** ROC analyses established an RVEF/E cut-off of 46.8%, TAPSE of 1.6cm and RVFAC of 38.2%. RVEF/E was able to separate patients with higher BNP level ( $p \leq 0.0001$ ) and lower systolic BP ( $p \leq 0.002$ ). As expected TAPSE and RVFAC were significantly reduced in patients with impaired RVEF. RVEF/E was found equal to TAPSE & RVFAC in predicting outcome (HR 1.48 vs HR 1.48,  $p \leq 0.01$  vs  $p \leq 0.01$ ) and provided benefit of RV volume estimation.

**Conclusions:** This is the first study to demonstrate that RVEF/E derived from ellipsoid model is not inferior to well established measures of RV function as a prognostic indicator of medium-term outcome in the acute HF.



Kaplan Meier survival curves

Table 2. Baseline Characteristics	All patients	Preserved RVEF	Impaired RVEF	p-value*
Age, mean	78.7	79.0	78.4	0.621
Gender (male), %	53.1	49.5	56.6	0.144
Coronary artery disease, %	36.4	38.01	34.8	0.495
Hypertension, %	55.5	55.8	55.2	0.913
Diabetes, %	31.1	33.7	28.6	0.262
Chronic Kidney Disease, %	45.2	46.6	43.8	0.562
BNP, ng/L mean	1363	1078	1646	<0.0001
TAPSE, mm mean	15.5	17.0	14.1	<0.0001
RV FAC, % mean	46.5	49.0	44.8	0.009
BPs, mmHg mean	136	140	132	0.002
*P-values are estimated using N-1X <sup>2</sup> for proportions and independent samples t-test for continuous variables				

Baseline characteristics

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