

SUPPLEMENTARY MATERIAL

Supplementary Appendix:

Derivation of Sanz Equation:

E_{max} is maximal systolic ventricular elastance.

$$\text{Equation 1: } E_{max} = ESP / (ESV - V_0)$$

V_0 is not well characterized in human, particularly in the right ventricle, therefore E_{max} can be simplified as:

$$\text{Equation 2: } E_{max} = ESP/ESV$$

ESP (end-systolic pressure) can be approximated by using mean arterial pressure. For the right ventricle, equation 2 becomes:

$$\text{Equation 3: } E_{max} = mPAP/ESV$$

mPAP is mean pulmonary artery pressure.

E_a (arterial afterload) can be represented as the slope of arterial ESP versus stroke volume (SV) relationship in the volume-pressure loop and can be calculated as:

$$\text{Equation 4: } E_a = ESP/SV$$

Equation 4 becomes equation 5 when pulmonary capillary wedge pressure (PCWP) is not negligible and thus can become:

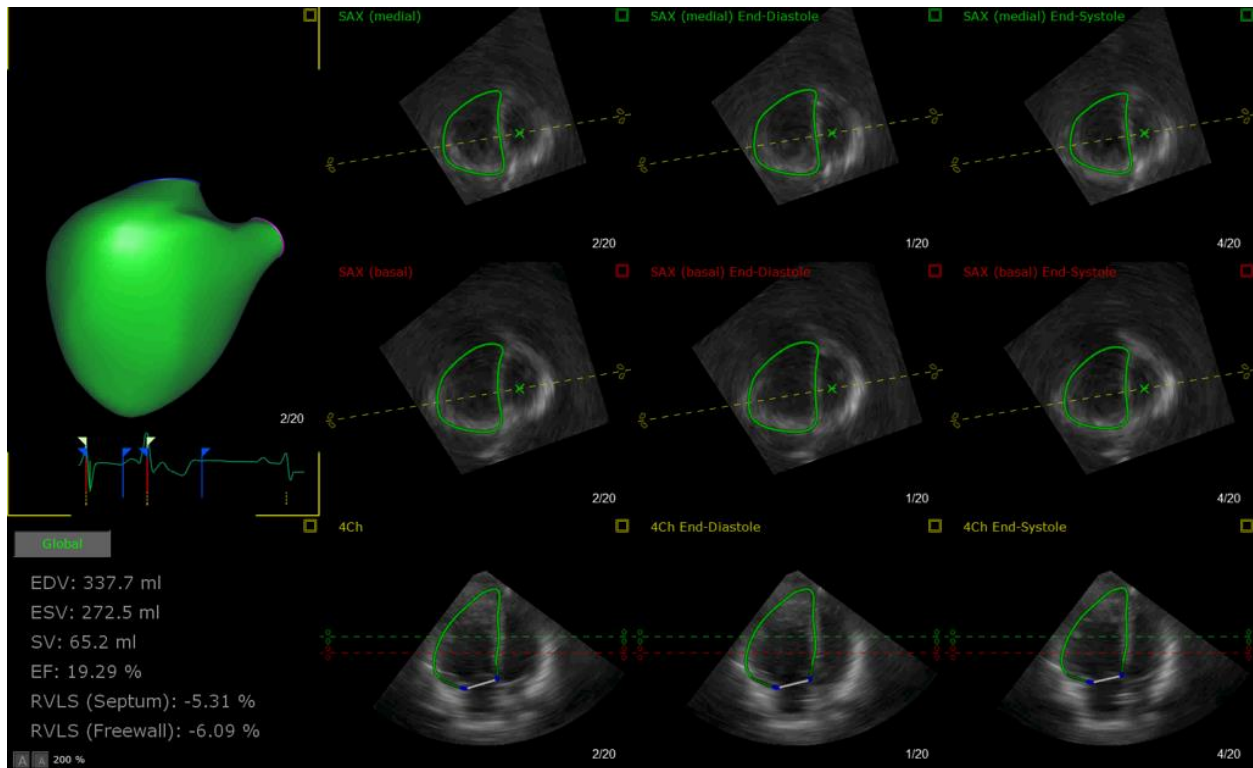
$$\text{Equation 5: } (mPAP - PCWP)/SV$$

Sanz defined ventriculo-arterial coupling as the E_a/E_{max} ratio derived from equations 3 and 5. They simplified the equation by disregarding the effect of PCWP in arterial load calculations and further simplified the equation to:

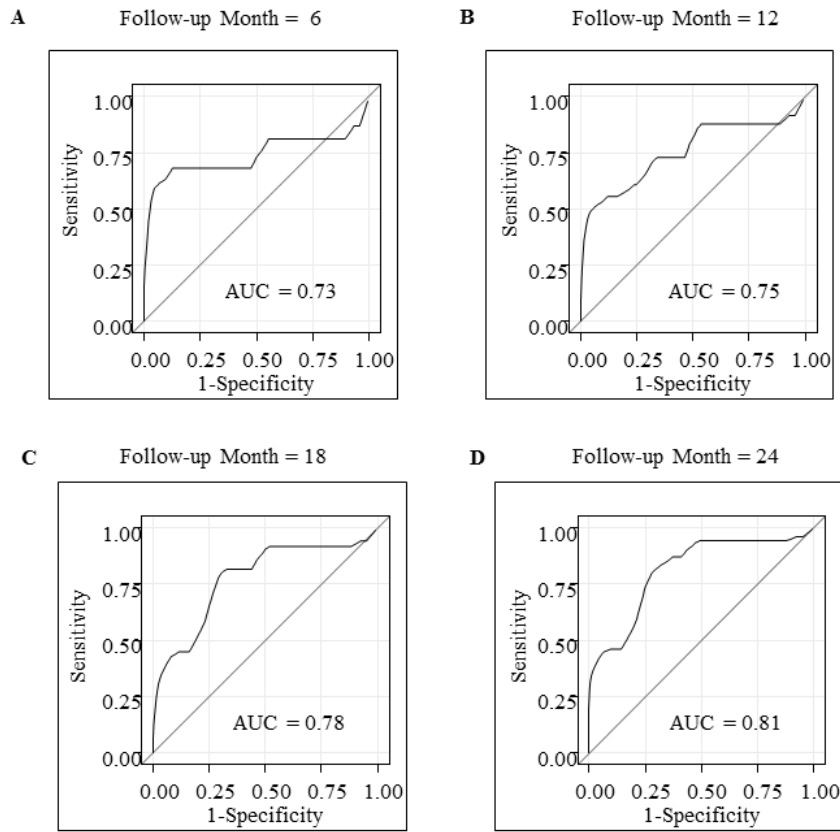
Equation 6:

$$E_a/E_{max} = ESV/SV$$

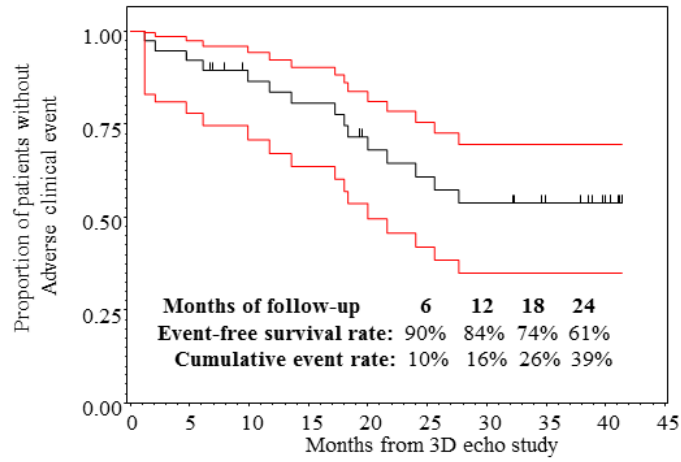
SUPPLEMENTAL FIGURE LEGENDS



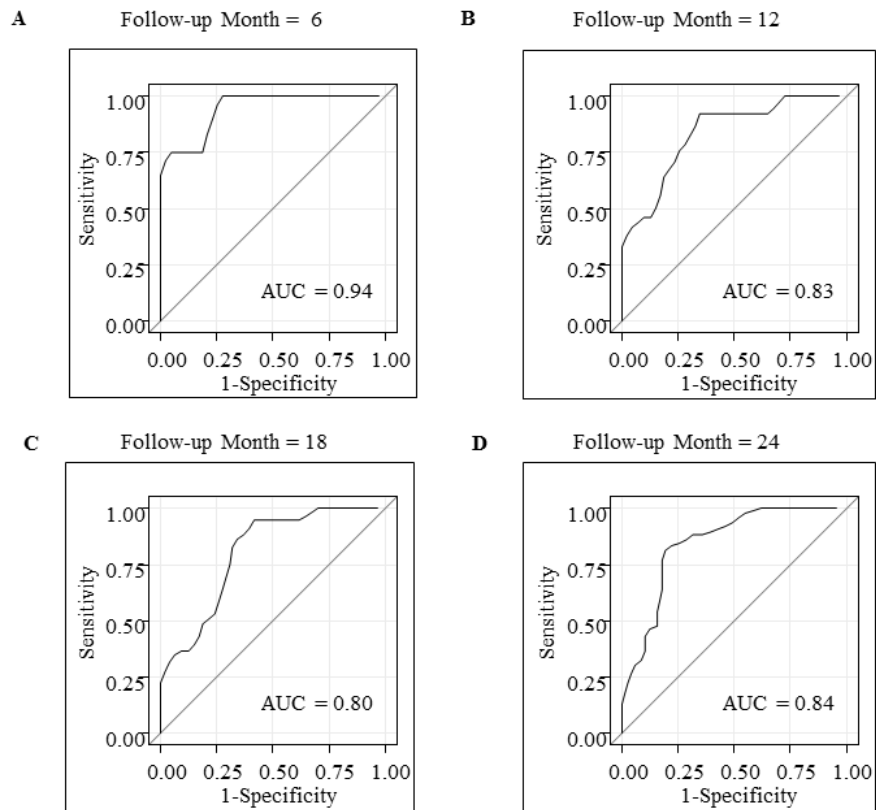
Supplemental Figure 1: Right ventricular analysis of three-dimensional echocardiographic images using the TomTec software.



Supplemental Figure 2: Discriminating ability of the Cox model. Figure A, B, C, and D show that the Areas under the ROC curves (AUC) for SV/ESV were 0.73, 0.75, 0.77, and 0.81 respectively for predicting adverse clinical event at 6, 12, 18, and 24 months.



Supplemental Figure 3: Kaplan Meier curve in sub-analysis of idiopathic pulmonary arterial hypertension (IPAH) patients demonstrates that SV/ESV is a good ratio of adverse clinical events.



Supplemental Figure 4: Discriminating ability of the Cox model in sub-analysis of idiopathic pulmonary arterial hypertension (IPAH) patients. Figure A, B, C, and D show that the Areas under the ROC curves (AUC) for SV/ESV were 0.94, 0.83, 0.80, and 0.84 respectively for predicting adverse clinical event at 6, 12, 18, and 24 months.

VIDEO LEGENDS:

Video 1: Three-dimensional echocardiography of the right ventricle in pediatric pulmonary hypertension patient.