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**Title:** Three-dimensional reconstruction of the right ventricle from two-dimensional echocardiographic images: Validation of volume measurements against MRI

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**Body:** Assessment of right ventricular (RV) function is an essential component of the diagnosis and management of patients with Pulmonary Arterial Hypertension (PAH). Today, this assessment is performed using two-dimensional echocardiography (2DE), which is challenging due to the complex geometry of the right ventricle. We hypothesized that 3D reconstruction of RV endocardium from 2DE images would provide accurate RV volume measurements. The aim of this study was to validate these measurements in against cardiac magnetic resonance (CMR) reference. Methods. Eleven PAH patients were recruited for same day 2DE and CMR imaging. 2DE images of the right ventricle were acquired in standard imaging planes using a 3D spatial localization device. 3D reconstruction was performed using dedicated software to obtain end-systolic and end-diastolic volumes (ESV, EDV). (VentriPoint). CMR images were analyzed to provide RV volume reference values using Simpson's method of disks. Results. Image acquisition was feasible in all 11 patients allowing reconstruction of the ventricular cast and volume measurements at end-systole and end-diastole.

Both ESV and EDV correlated highly between modalities. Bland Altman analysis showed minimal biases and narrow limits of agreement. Conclusion. This study indicates that this novel technique may provide accurate measurement of RV volumes in PAH patients.