New Anatomical Insights From Three-Dimensional Echocardiography for Congenital Heart Disease: Blinded Interpretation by Experts Reveals Additional Anatomical Features Not Delineated by 2-D Echocardiography

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Background: The new 2-4 MHz Live 3D implementations are not designed specifically for use in small children, but using highest frequency and low power output improves results.

Methods: We performed focused 3D studies on 50 children with significant CHD attending the cardiology clinic at OHSU using the Philips 7500 Live 3D system. Optimized biplane and Live 3D views were acquired and analyzed by blinded observers.

Results: Real-time 3D studies were done in 53 patients (2 wks-16 yrs) (TOF 4; tricuspid anomalies 7, mitral 3, aortic 9; VSD 7; AV canal defects 4; PDA 3; cardiomyopathy 1; and complex CHD 15). All carried a working diagnosis from their preceding 2D echo studies. Time for 3D acquisition was 8-10 min, post-acquisition analysis varied with the degree of anatomical detail being sought. Blinded 3D analysis by 2 experts showed 100% accuracy in making the basic diagnosis from 3D data only while providing new diagnostic detail in many cases. Unusual views and multiplanar navigational ability within the 3D data set gave additional information: AV valve anatomy and chordal attachments, coronary artery patterns, outflow obstructions at multiple levels, valve and conduit stenosis, residual coarctations could be identified and quantified. Five new diagnoses were made in the 50 patients, at least 2 of them were pertinent to management decisions.

Conclusions: Versatile post-acquisition analysis of Live 3D volume data gives unique insight into anatomic details of CHD with a potential for enhanced information yield.