



IMAGING AND DIAGNOSTIC TESTING

SIMULTANEOUSLY DERIVED CIRCUMFERENTIAL AND LONGITUDINAL RIGHT VENTRICULAR STRAINS FROM 4D ULTRASOUND USING A NEW METHOD FOR 4D CARDIAC MECHANICS: VALIDATION BY SONOMICROMETRY

ACC Poster Contributions

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Authors: David J. Sahn, Sheetal Krishnakumar, Anugraha Rajendran, Sarah K. Yang, Shahryar Ashraf, Nicole Chang, Galyna Kovch, Weihui Shentu, Zhiwen Zhou, Bill Kenny, Berkley Cameron, Muhammad Ashraf, Oregon Health & Science University, Portland, OR, Toshiba America Medical Systems, Tustin, CA

Background: Right ventricular (RV) function is of major importance in many forms of congenital heart disease in adults. The right ventricle is thin walled and has presented problems for both tissue Doppler and speckle tracking methods of determining mechanics.

Methods: We studied 6 fresh pig hearts in a model that allowed known volumes to be pumped into the RV and LV simultaneously while RV images were obtained by gated full volume acquisition using a 3.5 MHz transducer on a Toshiba Applio Artida scanner. Calibrated stroke volumes of 20 to 50 cc were delivered. Two triangular arrays of sonomicrometry crystals were placed around the RV free wall 1/3 and 2/3 of the distance from the tricuspid annulus to the RV apex. 4D strain data were computed on the system using 4D wall motion tracking (WMT) to yield the full field of RV and longitudinal and circumferential strains. Results were compared to sonomicrometry in the free wall zones where the crystals were, as analyzed by SonoView.

Results: In the mid wall zones, both the ultrasound and the sono longitudinal ($r = 0.87$, $p < 0.05$) and circumferential strains ($r = 0.76$, $p < 0.05$) were highly correlated and interobserver variability for strains was less than 5%.

Conclusions: This new 4D WMT method is easy to use and robust. It provides data on RV mechanics accurately and reproducibly.

