ACC.14
TCT@ACC-i2 | innovation in intervention

A508
JACC April 1, 2014
Volume 63, Issue 12

Congenital Heart Disease

COMPARISON OF FOUR-DIMENSIONAL ECHOCARDIOGRAPHY AND TWO-DIMENSIONAL ECHOCARDIOGRAPHY IN ASSESSMENT OF FETAL CARDIAC FUNCTION: AN IN VIVO STUDY

Poster Contributions
Hall C
Saturday, March 29, 2014, 10:00 a.m.-10:45 a.m.

Session Title: Fetal and Developmental Cardiology
Abstract Category: 10. Congenital Heart Disease: Pediatric
Presentation Number: 1119-272

Authors: *David J. Sahn, Meihua Zhu, Eriko Shimada, Cole Streiff, Sumito Kimura, Muhammad Ashraf, Oregon Health & Science University, Portland, OR, USA*

Background: This in vivo study was designed to compare the accuracy of stroke volume (SV) and left ventricular mass (LVM) determinations of fetal sized hearts by using four-dimensional echocardiography (4DE) and two-dimensional echocardiography (2DE) against sonomicrometry data and displacement values.

Methods: Eight open-chest rabbits were studied under baseline conditions, a 2ml/kg saline bolus, a 4ml/kg saline bolus, an inferior vena cava ligation, and an ascending aorta ligation. Sonomicrometry crystals were sutured at apex, left ventricular outflow tract, septum and posterior wall to determine SV. 4DE data was recorded using a Philips® iU-22 system and analyzed in QLab™ GI-3DQ program. 2DE images were recorded by GE Vivid E9 system and analyzed in EchoPAC.

Results: 4DE-derived SV (r = 0.78) and LVM (r = 0.99) demonstrated superior linear correlations than 2DE derived SV (r = 0.703) and LVM (r = 0.88) when compared with sonomicrometry SV and displacement LVM under all conditions. Bland-Altman analyses showed slight bias on SV determination for 4DE (SV: +0.93 ml; LVM: -0.0076g), but higher overestimations for 2DE (SV: +1.56 ml, LVM: + 0.45 g).

Conclusions: 4D echocardiography is feasible for determining stroke volume and ventricular mass in fetal heart under different conditions, it is more accurate that 2D echocardiography.