CARDIAC TWIST BY TWO-DIMENSIONAL AND THREE-DIMENSIONAL ECHOCARDIOGRAPHY: AN IN VITRO COMPARISON STUDY

ACC Poster Contributions
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Abstract Category: Echocardiography: 3-D,TEE, and Intracardiac Echo
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Background: Cardiac twist is an important index of heart function. We compared both 2D and 3D echo methods for computing rotation and twist.

Methods: We studied 10 freshly harvested pig hearts because of their anatomical similarity with human heart. Each heart was mounted on the rotary actuator of a custom designed model and connected to a pulsatile pump through a latex balloon secured into the left ventricular (LV) cavity. Each heart was passively driven by the pump with a calibrated stoke volume (50ml) at a constant rate (60/min) and the base rotated simultaneously at 15, 20 and 25 degrees with the apex held fixed. 2D short axis views were acquired on a GE Vivid 7 Dimensions system at 7MHz. 3D apical full volume loops were acquired on a Toshiba Artida ultrasound system. The 2D images were analyzed offline for rotation in EchoPac and 3D images were analyzed online with Toshiba Wall Motion Tracking software over the full LV volume at apical and basal levels.

Results: At each state, 3D echo slightly underestimated (<10%) the degree of rotation when compared to 2D echo. However, both methods detected the changes in rotation and showed a strongly positive linear correlation (r=0.87).

Conclusions: Results between the 2D and 3D echo were comparable for the measurement of rotation, twist and torsion.