A64.E608
JACC March 9, 2010
Volume 55, issue 10A

IMAGING AND DIAGNOSTIC TESTING

AUTOMATED 3-D CHARACTERIZATION AND QUANTIFICATION OF PROXIMAL ISOVELOCITY SURFACE AREA AND VENA CONTRACTA OF MITRAL REGURGITATION BY REAL-TIME VOLUME COLOR DOPPLER IMAGING: INITIAL CLINICAL EXPERIENCE

ACC Oral Contributions
Georgia World Congress Center, Room B403
Monday, March 15, 2010, 11:00 a.m.-11:15 a.m.

Session Title: Echocardiography: Novel Applications of Three-Dimensional Echocardiography in Valve Disease
Abstract Category: Echocardiography: 3-D,TEE, and Intracardiac Echo
Presentation Number: 0909-05

Authors: *Shizhen Liu, Saurabh Datta, Adrien Ntinunu, Thomas Van Houten, Nathalie De Michelis, Joel Mancina, Mary Ellen Orsinelli, Helene Houle, Dawn Lombardo, Paaladinesh Thavendiranathan, David Orsinelli, Peng Li, Thomas Ryan, Mani Vannan, The Ohio State University, Columbus, OH, Siemens Medical Solutions USA Inc., Mountain View, CA*

Background: Current 3-D color flow Doppler (CFD) imaging is limited by gated acquisition and assumption of shape to quantify PISA surface area. Also, manual identification of the PISA limits the clinical work-flow. We investigated the feasibility of the real-time (RT), every heart beat volume CFD to image, and automatically identify PISA and VC to calculate effective regurgitant orifice (ERO) in mitral regurgitation (MR).

Methods: 12 patients with mild to severe MR were imaged by transthoracic RT volume CFD optimized to view the PISA and VC. 3-D PISA surface area (cm2) was measured by direct 3-D quantification (no shape assumption) and by modeling to a 3-D ellipsoid shape. 2-D PISA was conventionally modeled to a hemisphere. ERO (cm2) was computed using PISA surface area and by 3-D VC area.

Results: 3-D PISA surface area by direct method was greater than 3-D ellipsoid (3.9+1.9 Vs. 2.9+1.4) and 2-D hemisphere (3.2+2.2). ERO by direct 3-D PISA was 0.17+0.01 for mild-moderate MR and 0.33+0.12 for moderate-severe MR. Similarly, 3-D VC was 0.16+0.01 and 0.37+0.4 for mild/moderate and moderate/severe MR, respectively. Figure shows RT volume CFD of moderate MR with automatically derived 2-D reference planes, on the left. On the right, top panel shows automatically modeled PISA and the bottom panel shows 3-D VC.

Conclusions: This is the first description of a potential automatic quantification of ERO in MR using PISA and VC from real-time, every heart beat volume CFD imaging. Further validation studies are necessary.