QUANTITATIVE ASSESSMENT OF MITRAL REGURGITATION IN PATIENTS WITH MULTIPLE REGURGITANT JETS USING PROXIMAL ISOVELOCITY SURFACE AREA: HEAD TO HEAD COMPARISON BETWEEN TWO-VERSUS THREE-DIMENSIONAL TRANSESOPHAGEAL ECHOCARDIOGRAPHY

ACC Poster Contributions
Ernest N. Morial Convention Center, Hall F
Monday, April 04, 2011, 9:30 a.m.-10:45 a.m.

Session Title: 2D and 3D Transthoracic and Transesophageal Echocardiography
Abstract Category: 32. Echocardiography: 3-D, TEE, and Intracardiac Echo
Session-Poster Board Number: 1092-221

Authors: Eiichi Hyodo, Shinichi Iwata, Aylin Tugcu, Marco R. Di Tullio, Takashi Muro, Minoru Yoshiyama, Shunichi Homma, Linda D. Gillam, Rebecca T. Hahn, Columbia University Medical Center, New York, NY, Osaka City University Medical Shool, Osaka, Japan

Background: The geometry of proximal isovelocity surface area (PISA) is conventionally assumed to be a hemisphere for the assessment of mitral regurgitation (MR). Recently, an effective regurgitant orifice area (EROA) calculated by a hemielliptic assumption of PISA with three-dimensional (3D) echocardiography was shown to be more accurate compared to the hemispheric assumption of PISA by two-dimensional (2D) echocardiography in a single MR jet. However, the accuracy of this method in multiple MR jets is not known. This study was design to determine whether direct measurement of multiple PISA by real-time 3D transesophageal echocardiography (TEE) is a feasible and accurate method of measuring MR severity in multiple MR jets, when compared to 2D TEE.

Methods: 2D and 3DTEE was performed in 56 patients with multiple functional MR jets. PISA contours were characterized as hemispheric or hemielliptic by 3D TEE. MR severity was assessed using the pulsed Doppler quantitative flow method of deriving EROA (EROAdopp). EROA by 3D TEE was calculated using a hemielliptic formula for each MR PISA from the mid-esophageal view and the sum of the areas (3D EROAs) was compared with EROAdopp. Likewise, 2D EROA was computed for each MR jet using standard hemispheric assumption from mid-esophageal 2D view optimizing imaging of multiple jets. EROAs of the jets were summed (2D EROAs) and compared to EROAdopp.

Results: There were 127 PISA contours in 56 patients, in which only 8 (6%) had hemispheric contours. 3D EROAs correlated well with EROAdopp (r=0.85, P<0.01); the relation was stronger than for 2D EROAs (r=0.71, P<0.01). 3D EROAs correlated better with EROAdopp compared to 2D EROAs with MR degrees greater than mild (r=0.88, P<0.01 vs r=0.55, P=0.09) and in case of three or more regurgitant jets (r=0.83, P<0.01, vs r=0.50, P=0.06).

Conclusions: The direct measurement of multiple PISA areas using 3DTEE is feasible and provides a simple parameter that accurately reflects MR severity in multiple jets, particularly in MR degrees greater than mild and in case of multiple regurgitant jets. Based on this 3D shape, a hemielliptic approach can improve MR quantification in multiple MR jets, where geometric assumptions may be challenging.