

863FO Featured Oral Session...Left Ventricular Diastolic Dysfunction: Novel Insights and Applications

Wednesday, March 10, 2004, 8:30 a.m.-10:00 a.m.
 Morial Convention Center, La Louisiane A

8:45 a.m.

863-2 Mitral Regurgitation and Low Ejection Fraction Adversely Impact Mitral Annular Velocity as an Index of Diastolic Function

Geetha Ramaswamy, Mauricio Sanchez, Majesh Makan, Julio E. Perez, Washington University, St. Louis, MO

Background: Echocardiographic assessment of left ventricular (LV) diastolic function includes Doppler mitral inflow and mitral annular velocities by tissue Doppler imaging (TDI). However, the validity of these measurements may be affected by the presence and the severity of mitral regurgitation (MR) but this remain uncertain in view of conflicting data available in the literature.

Methods: We retrospectively measured myocardial velocities at the lateral annulus (lateral Em), mitral inflow E and A velocities and their ratio, mitral deceleration time (DT) and the ratio of E/Em in 26 patients with LV moderate and severe systolic dysfunction. Ten patients had mild or no MR (Group I) while 16 patients had moderate to-severe or severe MR (Group II).

Results: Baseline characteristics were similar between the two groups with the exception of lateral Em (Group I had 7.8 ± 2.6 cm/s and Group II had 10.7 ± 2.4 cm/s, $p = 0.007$), DT (128.6 ± 36.3 ms and 177.6 ± 41.6 ms, $p = 0.005$) and LVEF calculated by Simpson's (Group I had $17.3 \pm 5.1\%$ and Group II $25.8 \pm 9.2\%$, $p = 0.014$) respectively. After stepwise multivariate linear regression model controlled for these differences, lateral Em and mitral A velocity were found to be independent predictors of the severity of MR ($r = 0.661$, $p = 0.001$).

Conclusion: Lateral Em and mitral inflow A velocity are independently associated with the degree of MR in this population with low EF. The severity of MR may limit the ability of TDI to accurately interpret diastolic function. Diastolic function in this population should be assessed using additional methods.

9:00 a.m.

863-3 Tissue Doppler Imaging for Estimation of Filling Pressures: Validation in Patients With Primary or Secondary Mitral Regurgitation

Christian Bruch, Matthias Grude, Rainer Gradaus, Joerg Stypmann, Günter Breithardt, University of Muenster, Muenster, Germany

Background: Mitral annular velocities derived from by tissue Doppler imaging (TDI) complement the evaluation of left ventricular (LV) performance. The mitral E/E'-ratio has been suggested as an estimate of LV filling pressures. E/E' has not been validated in patients with primary or secondary mitral regurgitation (MR).

Methods: Fourteen patients (pts.) with primary MR (prolapse (n=7), flail leaflet (n=4), rheumatic degeneration (n=3); mean regurgitant orifice area (ROA) 54 ± 18 cm², age 49 ± 11 y., PMR group), 26 pts. with secondary MR (19 with ischemic, 7 with dilated cardiomyopathy, mean ROA 32 ± 7 cm², age 60 ± 12 y., SMR group) and 29 asymptomatic controls (age 56 ± 11 y., CON group) underwent assessment of ejection fraction (EF) and mitral inflow velocities (E, A, E/A-ratio). Mitral annular velocities (S', E', A') derived from pulsed TDI were obtained at the septal mitral annulus. In pts., LV end-diastolic pressure (LVEDP) was derived from left heart catheterization.

Results: see table. E/E' was significantly related to LVEDP in the SMR group ($r=0.61$, $p<0.001$), but not in the PMR group ($r=0.17$, $p=ns$). Derived from receiver operating characteristic curve analysis, in the SMR group an E/E' ≥ 13.5 identified pts. with LVEDP ≤ 15 mmHg with a sensitivity 80% of and a specificity of 83% (area under the curve: 0.88 ± 0.05).

Conclusion: In subjects with secondary MR and reduced LV performance, E/E' is a reliable estimate of LVEDP. In subjects with primary MR and preserved LV performance, LVEDP is underestimated by E/E'.

* $p<0.05$ vs. CON group; # $p<0.01$ PMR vs. SMR

Group	EF (%)	Mitral E/A ratio	S' (cm/s)	E' (cm/s)	A' (cm/s)	E/E'	LVEDP (mmHg)
CON (n=29)	67±8	1.20±0.35	8.8±1.3	11.6±2.5	11.3±2.0	6.5±1.5	
PMR (n=14)	70±10	1.74±0.64 *	10.2±2.5	12.3±3.2	11.2±2.1	8.5±3.4	13±6
SMR (n=26)	30±11 *#	2.12±1.32 *	4.7±1.1 *#	5.7±1.3 *#	6.9±2.5 *#	16.2±4.5 *#	20±6 #

863-4 Changes of Preload-Independent Doppler Indices in Hemodialysis Patients

Hyuk-Jae Chang, Byoung-Joo Choi, Jung-Hyun Choi, Tae-Young Choi, So-Yeon Choi, Gyo-Seung Hwang, Myeong-Ho Yoon, Joon-Han Shin, Seung-Jea Tahk, Byung-Il W. Choi, Ajou University School of Medicine, Suwon, South Korea

Background: Assessment of mitral annular velocity by Doppler tissue imaging (DTI) and the propagation velocity of early diastolic filling by color M-mode (Vp) have been proposed as preload-independent indices of diastolic function. The aim of study was to compare these parameters with conventional Doppler transmitral and pulmonary vein (PV) flow velocity for the assessment of isolated left ventricular(LV) diastolic dysfunction in patients on periodic hemodialysis (HD).

Methods: The study group comprised 18 periodic HD patients in sinus rhythm with normal LV systolic function. Echocardiography was performed at 30 minutes prior to and after HD. Early (E) and atrial (A) peak transmitral flow velocities, peak PV systolic (s) and diastolic (d) flow velocities, peak e and a mitral annular velocities in DTI, and V(p) were measured.

Results: In all patients(60% were male; mean age was 55.0 ± 12.5 years, mean HD time: 4.8 ± 3.8 years, mean ultrafiltration volume(UV): 2501 ± 658 ml), the E/A ratio after HD (0.60 ± 0.27) was lower ($P < 0.05$) than before HD (0.85 ± 0.30). E decreased ($P < 0.05$), whereas A did not. PV s/d after HD (2.28 ± 1.51) was higher ($P < 0.05$) than before HD (1.85 ± 0.64). Tissue e/a after HD (0.49 ± 0.27) was lower ($P < 0.05$) than before HD (0.62 ± 0.25). Tissue e decreased ($P < 0.05$), whereas a did not. V(p) after HD (34 ± 13 cm/s) was lower ($P < 0.05$) than before HD (45 ± 12 cm/s). In subgroup analysis based on UV, the group having small UV(<2500 ml) showed no significant difference in tissue e/a between before HD (0.56 ± 0.31) and after HD (0.51 ± 0.26).

Conclusions: Echo Doppler parameters using DTI and color M-mode Doppler, proposed as preload-independent indices of diastolic function, exhibits a pattern of preload dependence especially in the group having large UV. It may shed a possibility that these parameters are only preload independent within certain physiologic limits.

9:30 a.m.

863-5 Usefulness of Mitral Annulus Velocity Measured by Doppler Tissue Imaging to Estimate Left Ventricular Filling Pressure in Patients With Heart Transplantation

Martin Briand, Jean G. Dumesnil, Marie-Helene Leblanc, Philippe Pibarot, Laval University, Sainte-Foy, PQ, Canada

Background: The objective of this study was to evaluate the performance of Doppler Tissue Imaging (DTI) for estimation of LV filling pressures in patients with heart transplantation, since conventional Doppler parameters are unreliable for this purpose. **Methods:** Echocardiography and pulmonary artery catheterization done within the same day were performed 44 times in 36 patients (29 males, 7 females, mean age: 49 ± 14 years). Echocardiographic measurements performed included pulsed-wave mitral flow Doppler and DTI of lateral mitral annulus. **Results:** The measurement of A wave velocity and thus of E/A ratio was feasible in only 63% of patients. The measurement of early annulus velocity Ea and E/Ea ratio was feasible in 96% of the patients. There was no correlation between E/A or E/Ea and pulmonary capillary wedge pressure (PCWP) whereas Ea correlated significantly ($r=0.55$, $p<0.001$) with PCWP (see Figure). A Ea value ≤ 12.5 cm/s predicted PCWP ≥ 15 mmHg with a sensitivity of 100%, a specificity of 66%, a positive predictive value of 33% and a negative predictive value of 100%.

Conclusion: The measurement of Ea by DTI may be useful to estimate LV filling pressures in patients with heart transplantation. A value of Ea > 12.5 cm/s can be used to rule out elevated LV filling pressures in these patients.

