Conclusion: Dobutamine stress RTMCE is a safe and feasible test for evaluating patients with known or suspected coronary artery disease.

Adverse effects	RTMCE (n = 1,487)	DSE (n = 1,012)
Premature ventricular complexes	348 (23.4%)	230 (22.7%)
Premature supraventricular complexes	71 (4.8%)	44 (4.3%)
Supraventricular tachycardia	21 (1.4%)	19 (1.9%)
Atrial fibrillation	27 (1.8%)	14 (1.4%)
Nonsustained ventricular tachycardia	20 (1.3%)	8 (0.8%)
Sustained ventricular tachycardia	5 (0.3%)	3 (0.2%)
Combined sustained arrhythmias	53 (3.6%)	36 (3.5%)
Hypotension	189 (12.7%)	127 (12.5%)
Hypertension	27 (1.8%)	15 (1.5%)

POSTER SESSION

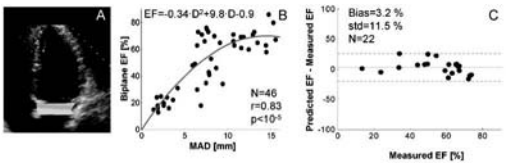
1167 Technical Advances in Tissue Velocity, Strain, and Torsion

Tuesday, March 08, 2005, 1:30 p.m.-5:00 p.m.
Orange County Convention Center, Hall E1
Presentation Hour: 2:30 p.m.-3:30 p.m.

1167-71 Automated Quantitative Measurement of Mitral Annular Longitudinal Displacement Using Tissue Texture Tracking Allows Ultrafast Assessment of LV Ejection Fraction

Jeanne M. DeCara, Eran Toledo, Ivan S. Salgo, Georgeanne Lammertin, Lynn Weinert, Victor Mor-Avi, Roberto M. Lang, University of Chicago, Chicago, IL

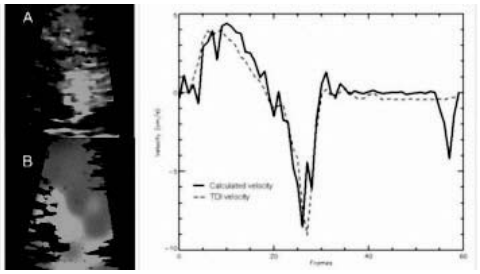
The calculation of LV ejection fraction (EF) based on manual tracing of endocardial borders is time-consuming and relies on adequate endocardial visualization. Mitral annular displacement (MAD) has been used as a surrogate marker of LV systolic function. We developed a technique for automated quantification of MAD and tested its accuracy for ultrafast assessment of LV systolic function. Methods. Apical 4-chamber views obtained in 68 patients were used for off-line automated tissue-texture tracking and frame-by-frame color-encoding of mitral annular motion throughout systole (Q-LAB, Philips). Color-encoded images (fig. A) were analyzed to quantify MAD using custom software. In 46 pts (study group), MAD values were correlated with biplane EF (method of discs) to obtain a regression formula, which was then applied prospectively to predict EF in the remaining 22 pts (test group). Results. Mitral annular tracking, color-encoding and quantification of MAD was achieved in all pts within <10 sec. MAD correlated highly with EF in the study group and was fitted with a bilinear regression formula (fig. B). When tested prospectively using this formula, MAD predicted EF with minimal inter-technique differences (fig. C; r=0.80, p<0.00001). Conclusions. Quantification of MAD from color-encoded images provides accurate information on LV systolic function. This automated, ultrafast technique can be used even in patients with poorly visualized endocardium, since the mitral annulus is usually well visualized.



1167-72 Radial and Longitudinal Myocardial Velocity Estimation From Gray-Scale Conventional Echocardiography. Validation Against Doppler Velocities.

Maria Jesus Ledesma-Carbayo, Manuel Desco, Norberto Malpica, Patricia Mahía, Esther Pérez David, Andres Santos, Miguel Angel García Fernández, Hospital General Universitario Gregorio Marañón, Madrid, Spain

Background: Measurments of myocardial velocity (V) using Tissue Doppler Imaging (TDI) has the intrinsic limitation of the angular dependency. This work presents a new method to obtain radial and longitudinal myocardial velocities from 2D gray-scale echocardiographic sequences and its validation against Tissue Doppler Imaging (TDI) velocities.
Methods: TDI and gray scale sequences of the septum (apical view) were acquired simultaneously from normal volunteers with an Acuson Sequoia at a frame rate of 110 fps, and analyzing V with both methods. The 2D velocity vector, that enclose the radial and longitudinal components, was obtained by means of an automatic motion detection method based on non-rigid registration of consecutive frames. Linear regression analysis was applied to assess the relationship between the V calculated with the proposed method (Vr) and Doppler velocities (Vd).
Results: Linear regression results showed a good correlation between Vr and Vd (slope = 0.846±0.003, R^2=0.782). Figure shows an standard TDI image (A), the equivalent image obtained with the proposed method (B), and the corresponding velocity time curves from a ROI.
Conclusions: Non-rigid registration techniques allow obtaining radial and longitudinal components of V from conventional gray-scale imaging, overcoming the limitations of Doppler techniques.



1167-73 Single Beat Determination of Regional Myocardial Strain Measurements in Patients with Atrial Fibrillation

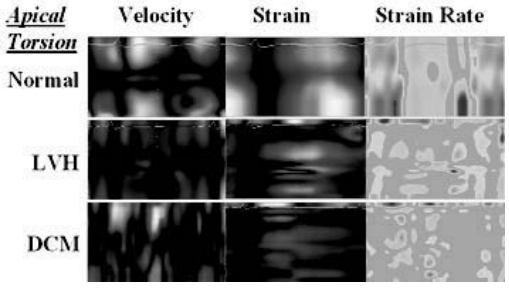
Kaoru Funabiki, Katsuya Onishi, Masaki Tanabe, Takashi Yamanaka, Masaaki Ito, Naoki Isaka, Takeshi Nakano, Mie University School of Medicine, Tsu, Japan

Background: Evaluation of regional myocardial function is an important goal in clinical cardiology. The clinical assessment of regional myocardial function in patients with atrial fibrillation is unreliable and difficult because of beat-to-beat variation. Recent reports have shown that the ratio of preceding (RR1) to prepreceding RR intervals (RR2), RR1/RR2 can assess left ventricular systolic function. Accordingly, we tested the hypothesis that regional wall motion can be estimated from single beat based on RR1/RR2 in patients with atrial fibrillation.
Methods and Results: Peak systolic strain was measured by tissue Doppler image (Vivid 7, GE Medical Systems , USA) on apical 4 chamber view in 50 patients with atrial fibrillation (mean ejection fraction 0.52±0.16, and mean heart rate 76±16 bpm). Each left ventricular wall was divided into base, middle and apex and all measurements were recorded during 30±10 cardiac cycles in each patient. Peak strain in each segments showed a positive correlation with the RR1 and RR2, and a significant positive correlation with the RR1/RR2 ratio. The correlation coefficients were significantly greater for the relationship between the peak strain and the RR1/RR2 ratio than for those between the parameter and the RR1 or RR2. Furthermoore, the peak strain at RR1/RR2=1 was calculated from the equation of linear regression line and compared with measured average value over all cardiac cycles in each patient. The calculated value of each parameter at RR1=RR2 was quite similar to the average value (r=0.997 at base, 0.998 at middle and 0.996 at apex).
Conclusions: Regional myocardial strain at RR1/RR2=1 in the linear regression line could be the representative of average value over all cardiac cycle in each patients with atrial fibrillation.

1167-74 Relationship of Left Ventricular Apical Torsion to Longitudinal Mechanics in Health and Disease

Huy Trong Nguyen, Peng Li, Hirsch Mehta, Mai T. Pham-Dunong, Cynthia D. Dell, Margaret L. Knoll, Gianni Pedrizzetti, Giovanni Tonti, Helene Houle, Chowdhury Ahsan, Jagat Narula, Mani A. Vannan, University of California Irvine, Irvine, CA

Background: LV torsion is a critical determinant of pump ejection. Longitudinal myocardial velocity (MV), strain (S) and strain rate (SR) by TDI is an index of LV function, but TDI is limited by angle-dependency to assess apical torsion. We studied the relationship between apical torsion and longitudinal mechanics in normal and abnormal LV using a novel B-Mode, high frame rate (FR), angle-independent, automated myocardial tracking algorithm (*Diogenes*).
Methods: 30 individuals (10 normals, 10 DCM and 10 hypertensive LVH) were studied. High FR (~100 Hz), B-Mode SAX view of LV apex and apical 4C views obtained using 4V2 TTE probe linked to Acuson Sequoia™ (*Siemens*).The endocardial border was traced over one arbitrary frame and was then automatically tracked over time (*Diogenes,* Amid-Italy & Siemens, USA). MV, S and SR were measured in the basal-mid septum (septum) in the A4C view and the apical SAX view.
Results: Septal MV was comparable in normals and LVH (p=0.3) but reduced in DCM (p=0.005). *Septal S and SR* was reduced (Vs. normals) by 45±0.4 % and 64±0.2 % in LVH and by 66±0.3 % and 75±0.1 % in DCM, respectively. *Apical twist* was reduced in both LVH (8.9%, p=0.02) and DCM (23.6 %, p=0.0001) compared to normals, *see figure below.*
Conclusions: Longitudinal myocardial mechanics is determined by apical torsion. Disruption of apical twist disrupts longitudinal S and SR although MV may be normal, as seen in LVH. *Diogenes* based on myocardial tracking affords a method to measure apical torsion.



Noninvasive Imaging