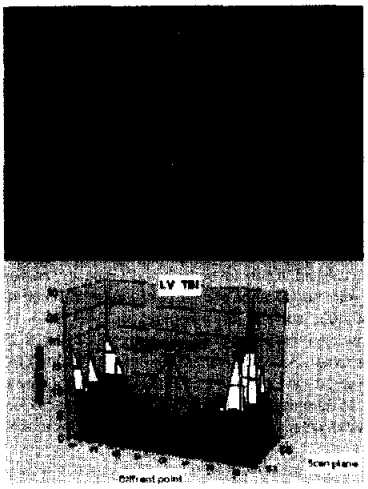
arcted segment traced slice by slice. The product of the total arc length and the slice distances determined the area of the aneurysm. **Results:** 3D calculated endocardial infarcted segment areas correlated very closely with measurements on the postmortem heart specimens ($r = 0.90$, $y = 0.83x + 1.33$, SEE = 0.92 cm^2, $P < 0.0001$). **Conclusions:** This 3D method could provide robust dynamic spatial tissue Doppler data to identify the abnormalities of regional wall motion.



1095-61 Myocardial Velocity Gradients Within Segments Having Resting Wall Motion Abnormalities Predict Contractile Reserve as Determined by Dobutamine Echocardiography

Marco R. Torres, Satoshi Yuda, Leanne Short, Brian Haluska, Thomas H. Marwick, *University of Queensland, Brisbane, Australia.*

Background. Dobutamine echocardiography (DbE) is widely used to identify myocardial viability, but this technique is based on subjective interpretation. Myocardial systolic Doppler velocity gradients (DVG obtained in the parasternal long axis view has been shown to identify nontransmural infarction in animal models. We sought whether this nonuniformity of transmural contraction could be used as a marker of contractile reserve (CR) in pts after myocardial infarction (MI). Methods. A standard DbE study was obtained in 79 consecutive pts (age 68±9, 48 men)with MI. DVG were gathered from tissue color Doppler as the ratio between the endocardial minus epicardial velocity divided by distance between these points. Differences in DVG were divided by the endocardial velocity and compared to the pattern of contraction of dyssynergic segts at rest, low and peak dose infusion. CR was defined as an improvement of at least one grade, and ischemia by a new or worsening wall motion abnormality. Results. Of the 308 segts suitable for analysis, 56 were positive (+) and 83 negative (-) for contractile reserve (CR), 44 exhibited an ischemic response, and 125 were normal. Resting MVG was 9.23±1.23 vs. 0.23±0.45 for CR + vs. 0.23±0.45 for CR - (p<0.0001). Rest hypo-, aki-, and dyskinesia waspresent respectively in 36, 20 and 2 segts and DVG differed significantly in hypokinetic and akinetic segs (Kruskal-Wallis, p<0.05). In response to low dose DbE, CR + increased by 0.30 ± 1.03 vs.0.40 ± 0.88 in CR - segts (p=0.000; Mann-Whitney test). Rest-peak dose delta for MVG was statistically significant different between CR + and CR -. Conclusions. Gradients of transmural Doppler systolic velocities at rest as well as during low and high-dose dobutamine stimulation correlates with contractile reserve, discriminating different myocardial viability conditions.

1095-62 Quantitative Doppler Tissue Imaging Using Free-Hand 3-D Echo to Assess Regional Myocardial Velocities Is Feasible

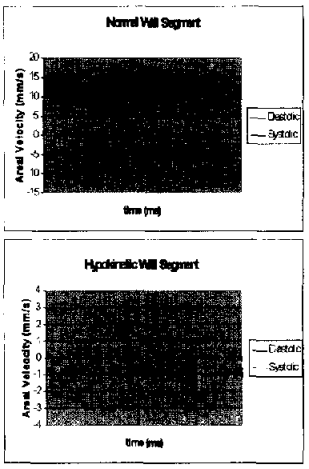
Mohan R. Nandalur, Pamela Douglas, Peter Rahko, Christian S. Breburda, *University of Wisconsin Hospitals and Clinics, Madison, Wisconsin.*

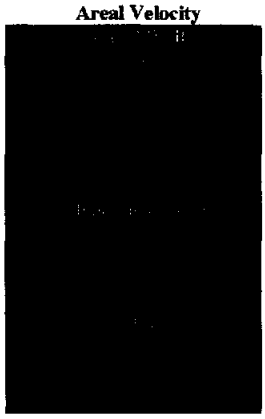
Doppler tissue imaging (DTI) is a promising technique for the quantitative assessment of regional wall function. We hypothesized, that free-hand three-dimensional (3D) DTI is feasible and provides qualitatitve and quantitative information about the function of a whole endocardial wall area.

Method: 14 patients (7 f, 7 m, age 60 ± 16, EF 57 ± 14 %) were imaged with two-dimensional Color DTI using a Sequoia echo unit interfaced with a free-hand 3-D(TomTec)system. The endocardial surfaces of the lateral and septal walls were reconstructed. 3-D DTI velocities of the endocardial areas were measured throughout the cardiac cycle.

Results: Color 3D DTI velocity patterns of endocardial wall areas in normal wall segments were more homogeneous than in hypokinetic segments. Peak (mean) systolic velocities were 1.14 ± 0.44 mm/sec(0.37 ± 0.17); peak (mean) diastolic velocities were -1.66 ± 0.98 mm/sec(- 0.51 ± 0.28) respectively. There was a strong correlation between peak systolic and diastolic 3-D wall area velocities ($y = 0.62x + 0.72$, $r = 0.71$, $p = 0.0002$) and between systolic wall acceleration of the endocardial 3D DTI area and 2-D wall motion score ($r = 0.8$, $p = 0.007$).

Conclusions: 1) Free-hand 3-D Color Doppler tissue imaging is feasible, provides endocardial wall area velocities, and suggests qualitative and quantitative differences between the motion of the endocardial area of normal and hypokinetic wall segments. 2) 3-D free hand DTI may have the potential to provide new insights into regional wall function.





1095-63 Noninvasive Assessment of the Force Frequency Relationship by a Novel Tissue Doppler-Based Index of Contractile Function: Myocardial Acceleration During Isovolumic Contraction in an Animal Experiment

Michael R. Schmidt, Steen B. Kristiansen, Michael Vogel, Paul A. White, Keld E. Sorensen, Andrew N. Redington, *Aarhus University Hospital, Skejby Sygehus, Aarhus, Denmark, Great Ormond Street Hospital, London, United Kingdom.*

Background: The force-frequency relationship (FFR) is increasingly being recognised as providing additional information on myocardial function over resting indices. As hitherto it could only be assessed invasively, its clinical applications were limited. Tissue Doppler imaging (TDI) derived indices have the potential to non-invasively assess the FFR but have not yet been formally evaluated. Methods. We examined 14 Danish landrace pigs with an approximate weight of 15 kgs using conductance high fidelity pressure catheters in the LV (n=6) or the RV (n=8). For the LV study the right atrium was paced at a rate of 110,130 and 150/min, for the RV study we paced at rates of 110,130,150,170,190, and 210 beats/min. During each step of pacing we simultaneously measured dP/dt max, and performed TDI in the free wall of the LV and RV immediately under the hinge point of the AV valves in an apical four-chamber view. From the TDI data we simultaneously measured acceleration (IVA) during isovolumic contraction (a novel index of contractile function, which we had validated previously), and myocardial velocity during systolic ejection (s-wave). Results: In the LV we found an increase in dP/dt and IVA with heart rate, while s-velocity did not change. The correlation between heart rate and dP/dt was r=0.41 (p<0.03) , while it was r=0.82 (p<0.01) for IVA. In the RV study we found similar increases in dP/dt and IVA and no significant increase in s-velocity. The increases in dP/dt and IVA were sustained up to a heart rate of 190/min. At a heart rate of 210/min both dP/dt and IVA decreased by more than 5%. Thus IVA was suitable to detect the critical heart rate. Conclusions: The TDI derived index of contractile function, IVA but not s-velocity is sensitive to detect the FFR and the critical heart rate. This novel non-invasive index warrants further clinical applications.

1095-64 Parallel Systolic and Diastolic Dysfunction in Hypertensive Hypertrophy With Normal Ejection Fraction: Insights From Doppler Tissue Imaging

Gerard P. Aurigemma, Craig S. Vinch, Jeffrey C. Hill, Theo E. Meyer, Dennis A. Tighe, *University of Massachusetts Medical School, Worcester, Massachusetts.*

Background: Hypertensive LV hypertrophy (LVH) is strongly associated with heart failure (CHF) even when ejection fraction (EF) and Doppler mitral inflow are normal. Doppler tissue imaging (DTI) has been proposed as a load-independent means of assessing diastolic function. Accordingly, we investigated whether DTI provided incremental information concerning diastolic dysfunction in patients (pts) with LVH, normal EF, and normal E/A. **Methods:** We studied 35 hypertensives (59±15 years, LV mass 197±72g) with either concentric LVH or concentric remodeling and 37 controls of similar age (C, 62±11 years, p=NS, LV mass 126±35g, p<0.05). In addition to 2D echo, E, A, E/A ratio, deceleration time (DT), and pulmonary vein flow velocities (S, D, S/D ratio), we obtained mitral annular DTI early (E'), and late (A') velocities. Midwall shortening (FSmw%) was used to assess systolic function. **Results:** LVH did not differ from C with regard to DT or mean S/D; only E' and FSmw discriminated LVH from C.E/E' ratio, which has been reported to correlate with LV filling pressure, was significantly greater in LVH than C. **Conclusions:** LVH/nl EF pts were not distinguishable from C by standard or refined mitral or pulmonary vein flow velocities. DTI, by contrast, appears to indicate a diastolic abnormality and DTI findings and parallel lower FSmw. Thus, in hypertensives with concentric LV geometry, DTI and FSmw may potentially be used to diagnose a "transition state" in the evolution to CHF with normal EF.

Group	E/A	DT (ms)	S/D	E' (cm/s)	E/E'	FSmw(%)
LVH (n=35)	1.4±0.6	223±55	1.2±0.4	11±3†	9.9±4.1†	18±1†
Control (n=37)	1.2±0.5	212±50	1.3±0.4	12±4	6.4±1.8	21±1

†=p<0.05 for LVH vs Control by unpaired t-test. Data presented are mean±SD