vidual data was analyzed across the entire Q range of 0.1 to 5.0 ml/min/g, as well as in different narrow Q ranges to obtain PS dependence on Q.
Results: Table I demonstrates that PS for TL is significantly higher than MIBI for all the STs. The correlation between mean ST flow and mean PS suggests PS dependence on Q. Additional estimates of PS in narrow Q bands shows similar influence of Q on PS under each of the three STs.
Conclusion: PS appears different under the various STs. However, these differences can be mainly attributed to differences in Q. The results suggest that PS, and hence roll-off effects, are present at substantially lower flows than predicted by constant PS theory.
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Uptake vs Flow Analysis, * p < 0.05 vs MIBI

Stressor	n	Base Flow ml/min/gm	Stress Flow ml/min/gm	Mean PS-TL ml/min/gm	Mean PS-MIBI ml/min/gm
AD	7	0.68 ± 0.24	1.25 ± 0.28	1.31 ± 0.33*	0.62 ± 0.19
DB	5	0.66 ± 0.05	2.08 ± 0.32	2.68 ± 1.02*	1.64 ± 0.82
NG	4	0.67 ± 0.13	0.56 ± 0.04	0.45 ± 0.12*	0.25 ± 0.08

ORAL CONTRIBUTIONS

855 Quantitative Left Ventricular Function by Magnetic Resonance Imaging

Tuesday, March 09, 2004, 4:00 p.m.-5:00 p.m.
Morial Convention Center, Hall D-1

4:00 p.m.

855-1 Effects of Off- Pump Versus On-Pump Coronary Surgery on Early and Late Postoperative Left Ventricular Function: A Randomized Trial Using Cardiovascular Magnetic Resonance Imaging

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Introduction: There is biochemical evidence that off pump coronary artery bypass grafting (OPCABG) reduces myocardial injury when compared to the use of cardiopulmonary bypass (ONCABG), but the functional significance of this is uncertain. We hypothesized that OPCABG surgery would result in improved early and late left ventricular function compared with ONCABG surgery.**Methods:** In a single centre randomised trial, 30 patients undergoing multi-vessel total arterial revascularization were randomly assigned to OPCABG and 30 patients to ONCABG surgery. Patients underwent pre-operative, early (day 6) and late (6 months) post-operative cine MRI for global left ventricular function and regional wall motion assessment.**Results:** The two surgical groups were well matched in terms of pre-operative (age, cardiopulmonary risk factors, pre-operative medication use) and peri-operative (number of distal anastomoses, inotropic requirements) factors. The mean pre-operative cardiac index was similar in the two surgical groups (2.9 +/- 0.7 ONCABG; 2.9 +/- 0.8 OPCABG; p = 0.9). Early post-operatively, the cardiac index was significantly higher in the OPCABG group (2.7 +/- 0.6 ONCABG; 3.2 +/- 0.8 OPCABG; p = 0.04). The mean pre-operative ejection fraction was 62 % +/- 12 % in the ONCABG group and 62 % +/- 11 % in the OPCABG group (p = 0.9). In the early post-operative period this decreased to 59 % +/- 11 % in the ONCABG group and increased to 65 % +/- 12 % in the OPCABG group (p = 0.03 for the change in EF). When assessed at 6 months, the mean cardiac index was 3.1 +/- 0.6 in the ONCABG group and 3.1 +/- 0.8 in the OPCABG group (p = 0.7). Ejection fraction at 6 months was significantly improved compared with pre-operative measurements for both groups (P<0.05 for each), but not significantly different between the two surgical groups (p = 0.5). **Conclusion:** In patients undergoing isolated coronary artery grafting, OPCABG surgery results in significantly better left ventricular function early after surgery, but at 6 months both surgical groups show a similar benefit in left ventricular function from revascularization.

4:15 p.m.

855-2 Transmural Difference of Diastolic Function in Physiological Hypertrophy Versus Pathological Hypertrophy Using Tagged Magnetic Resonance Imaging

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Back Ground: Athletes tend to develop remodeling primarily in the form of eccentric hypertrophy while concentric hypertrophy is prevalent in aortic stenosis (AS). The transmural patterns of contraction and relaxation in athletes and in AS have not been studied thoroughly. Our goal was to study the transmural patterns of contraction and relaxation in these types of remodeling using tagged magnetic resonance imaging (MRI).
Methods: Eleven elite rowers, 13 patients with AS and 13 healthy adults underwent C-SPAMM myocardial tagging MRI. Left ventricular endocardial, midwall and epicardial circumferential shortening, relaxation rates, and time to peak relaxation were analyzed in anterior, lateral, posterior and septal segments using semiautomatic tracking of the grid intersection points.
Results: Time to peak relaxation rate was substantially shorter in athletes compared to healthy adults and patients with AS. These differences were evident through out all segments and in all the layers. Average time to peak myocardial relaxation (100 is defined as end-systole) was 128.9±17.6, 152.5±16.9 and 142.8±18.6 in athletes, volunteers and patients with AS, respectively (p<0.01 in athletes vs. other groups). Peak midwall and epicardial relaxation rates were reduced in AS compared with physiological hypertrophy and normal individuals (-1.1±0. 4, -1.3±0.5 and -1.7±0.5 1/sec, respectively - p<0.01). Maximal endocardial shortening is enhanced in AS compared to normal volunteers (37.2% ± 7.3% vs. 31.1% ± 6.4%, respectively, p<0.001) in contrast to the midwall, where shortening was lower in AS (20.5% ± 5.1% vs. 23.5% ± 6.6%, respectively, p=0.023). Myocardial shortening in athletes was similar to normal volunteers.
Conclusions: This study demonstrates distinctive patterns of relaxation in normal individuals, physiologic hypertrophy and pathological hypertrophy. A shortened time to peak relaxation is evident in athletes and this may be a measurable marker of enhanced diastolic relaxation to improve mechanical efficiency in this sub-group. Reduced myocardial relaxation rate and shortening are evident in pathological hypertrophy and can be used as quantifiable markers of negative remodeling.

4:30 p.m.

855-3 Correlation Between Hyperenhancement on Delayed Contrast Enhanced Magnetic Resonance Imaging (MRI) and Diastolic Function Assessed by Steady State Cine MRI in Hypertrophic Cardiomyopathy

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Backgrounds: Diastolic dysfunction is common in patients with overt hypertrophic cardiomyopathy (HCM). Steady state cine magnetic resonance imaging (MRI) can provide accurate measurement of diastolic function of the left ventricle (LV), and delayed contrast enhanced MRI can delineate the presence and extent of fibrosis in HCM. The purpose of this study was to determine if altered diastolic function in HCM is related to the extent of myocardial fibrosis demonstrated by contrast enhanced MRI.
Methods: Seventeen patients (13 men, 4 women, mean age 57.7±9.8 years) with hypertrophic cardiomyopathy were studied. The severity index of hyperenhancement on delayed contrast enhanced MRI was determined by scoring the extent of hyperenhanced tissue in 30 myocardial segments. The peak filling rate (PFR), LV ejection fraction (EF) and LV mass were determined by steady state cine MRI.
Results: Delayed contrast-enhanced MRI demonstrated hyperenhancement in 97 of the 510 segments (19%) and 13 of the 17 patients (77%). The severity index determined by delayed enhanced MRI demonstrated a significant negative correlation with the PFR (r=-0.86,p<0.01) and with the LVEF (r=-0.59, p <0.05). No significant correlation was observed between the severity index of hyperenhancement and LV mass (r=0.23, p=0.30).**Conclusion:** The current study using delayed contrast enhanced MRI and steady state cine MRI demonstrated that the severity of myocardial fibrosis revealed by delayed contrast enhanced MRI has a strong relation with diastolic dysfunction in patients with HCM.

4:45 p.m.

855-4 Cardiac Magnetic Resonance Imaging-Derived Parameters of Right Ventricular Function Correlate Significantly With Hemodynamic Data in Patients With Pulmonary Hypertension

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Background: In patients with pulmonary hypertension (PH), the association between quantitative right ventricular (RV) morphological and functional cardiac magnetic resonance imaging (cMRI) parameters and hemodynamic parmaters obtained at right heart catheterization (RHC) has been studied on small populations and yielded contradictory results.
Aim of the Study: To evaluate the relationship between cMRI-derived RV functional parameters and hemodynamics in a large cohort of patients with PH.
Methods: We included in the analysis 116 PH patients (82 women, 34 men, mean age of 48 years) who had both RHC and cMRI examination. Most patients had moderate-to-severe PH [mean pulmonary artery pressure (mPAP) was 47 +/- 14 mmHg]. CMRI was performed with a 1.5 Tesla scanner using a phased array cardiac coil as receiver. Image acquisition was performed using electrocardiography-gated, breath-hold, cine TrueFISP sequences and post-processsing was done with ARGUS software. RV end-diastolic and end-systolic volumes and ejection fraction were determined by the Simpson's method. RHC was performed per standard protocol and cardiac output was determined by thermodilution. Quantitative RV morphologic and functional cMRI-derived parameters and hemodynamic parameters at RHC were analyzed for correlation and linear regression.
Results: RV end-diastolic and end-systolic volumes obtained at cMRI showed significant positive correlation (r=0.45-0.6, p<0.01) with right atrial pressure and mPAP, and significant negative correlation with pulmonary artery oxygen saturation (r=-0.45, p<0.01). There was a significant positive (r=0.48, p<0.01) correlation between cMRI-determined RV ejection fraction and the pulmonary artery saturation and a negative correlation between RV ejection fraction and the right atrial pressure (r=-0.44, p<0.01). Furthermore, a linear relationship was present between cMRI and RHC-derived parameters of RV function.
Conclusion: CMRI-derived RV functional parameters correlate well with hemodynamic parameters of prognostic significance and thus may be an important non-invasive tool for the initial and follow-up evaluation of PH.