Effect of Atrial Fibrillation on Mitral Incompetence Severity Established by Echocardiography

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Background: Presently there is no data on the effect of atrial fibrillation (AF) on the severity of mitral insufficiency.
We have observed that some patients with AF experience improvement of their mitral regurgitation (MR) upon return to sinus rhythm.
Objective: 1) to measure the influence of heart rhythm (sinus or atrial fibrillation) on severity of MR
2) to define clinical and echocardiographic parameters that influence the changes in MR severity in these patients
Methods: Between 1992-2006 we found 335 patients (51% males, mean age 62.27±16.07 years) with significant mitral insufficiency while in atrial fibrillation who underwent follow up echocardiography within 6 months, while in sinus rhythm. These patients were divided into 2 groups according to degree of MR improvement after returning to sinus rhythm: patients who improved by two grades or more (group 1) or by less than 2 grades (group 2).
Results: There were 98 patients (29.25%) in group 1 (55% males, mean age 66.1yrs). There was no difference between the groups in relation to hypertension, diabetes, stable or unstable coronary artery disease.
Left ventricular dimensions improved significantly (left ventricular end diastolic (LVEDD) from 5.13 cm to 4.98cm, p=0.0363, left ventricular end systolic (LVESD) from 3.62cm to 3.40cm, p=0.0314) compared to group 2 (LVEDD 5.18 cm to 5.25cm, p=0.3410, LVESD 3.69cm to 3.71cm, p=0.2995).
Patients in group 1 had a morphologically normal mitral valve in 32.6% vs only 23.6% in group 2 (p=0.087).
In addition, left atrial (LA) dimensions improved significantly (4.73cm to 4.31cm, p=0.0425) in group 1 compared to group 2 (4.71cm to 4.72 cm, p=0.4270) and pulmonary artery pressures improved marginally (from 44.41 mmHg to 37.48 mmHg, p=0.0587) in group 1, compared to group 2 (44.71mmHg to 41.57mmHg, p=0.1624).
Conclusions: In 30% of patients with paroxysmal AF, MR improves significantly after cardioversion to sinus rhythm. Clinical decisions should be based on echocardiographic data when the patient is in sinus rhythm.

The Natural History of Moderate Aortic Regurgitation

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Background: Whether to replace the aortic valve for moderate aortic regurgitation (AR) in patients refer for cardiac surgery primarily for CABG or MVR is still debatable. Therefore, we sought to study the rate of progression of moderate AR and the need for future surgical intervention.

Methods and Results: Two hundred and sixty-two consecutive patients (162 men,100 women; mean age 65 ± 15 year ,range 21 to 93) with moderate AR and no more than mild aortic stenosis, were followed for 42 ± 31 months. AR resulted from disease of the aortic leaflets in 145 patients (55%): 85-degenerative disease, 54-rheumatic and 6 infective endocarditis. In 70 patients (27%) the AR was secondary to dilatation of the aortic root and/or ascending aorta (average aortic diameter 48 ±6 mm).In the remaining 47 patients (18%) the cause of the AR could not be determined. Progression to severe AR occurred in 18 of the 262 patients (6.8%) , an average rate of progression of 5.1% per year. Progressors were evenly distributed between valvar disease and aortic root dilatation. Three of the patients with aortic dilatation underwent aortic valve replacement : one of them due to type A aortic dissection.

Conclusions: A small proportion of patients with moderate AR progress to severe disease in the mid-term. Etiology of the disease doesn´t seem to influence the rate of progression. A minority of patients needed aortic valve replacement during follow-up. Therefore, the indication of prophylactic valve replacement in patients with moderate AR who undergo coronary artery bypass or mitral valve surgery is questionable.

Comparison of Fast Instantaneous 3 D Echocardiography Analysis with Cardiac MR Imaging for the Evaluation of Left Ventricular and Left Atrial Volumes - A Pilot Analysis

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Introduction: Left ventricular (LV) ejection fraction (EF) and Left Atrial (LA) volume are an important predictors of morbidity and mortality in a wide range of patients and clinical scenarios. LV and LA volumes and EF measurements from two-dimensional echocardiographic (2DE) images are subjective, time-consuming, and relatively inaccurate. Real-time 3DE technique is a novel technique capable of instantaneous acquisition of volumetric images. The aim of this pilot analysis was to validate a new method for rapid, online measurement of LV and LA volumes from 3DE data using cardiac magnetic resonance (CMR) as the reference

Methods: CMR and 3DE data from 8 unselected patients (aged 15-61) that underwent cardiac evaluation for various reasons were obtained. The 3DE parameters: end systolic (ES) and end diastolic (ED) of LV and LA were analyzed using iE-33 machine designed to automatically detect the endocardial surface calculate ESV and EDV from voxel counts. 3DE-derived LV and LA volumes were compared with CMR volume measurements that were performed by the CMR physician corrected analysis (linear regression, Bland–Altman analysis).

Results: The analysis results, comparison and the correlations are presented in the table:

Parameter	CMR ml	3DE ml	r^2 (3DE vs. CMR)	Limits of agreement
LV EDV	108.6±26.9	105.9±27.1	0.81	SD: 11 ml, 9.3%
LV ESV	43.4±9.	41.2±8.1		
LA EDV	39.4±46.9	37.9±41.8	0.76	SD: 14 ml, 11.5%
LA ESV	64.4±44.0	59.8±39.1		

Conclusions: The 3DE have good correlation and close limits of agreement with CMR for calculating LV and LA volumes. The 3DE analysis offers a rapid, and accurate method for LV, LA volume and therefore LVEF calculation. This novel tool can mitigate the errors inherent to 2DE.

Is the Common Cut-Off Point for Prophylactic Surgery to Prevent Aortic Dissection Too High?

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Background: Aortic diameter ≥5.0 to 5.5cm is the cut-off point, under which it is recommended to perform elective surgery to prevent aortic dissection (AD), in non-Marfan patients with tri-leaflet valves.
We summarized the data of patients with AD, undergoing echocardiography in our hospital, with special focus on maximal ascending aortic diameter.
Methods: Computer records of all transesophageal echocardiograms (TEE) of acute type A AD by Stanford classification, performed in our hospital in the last 10 years were reviewed. Patients' characteristics and cardiograms were reviewed. TEE's were performed on presentation or intraoperatively.
Results: The study group included 47 patients, mean age 58±13 (range 27-79), 68% male. 70% had DeBakey type I dissection, and 30% had DeBakey type II dissection. The average aortic diameter was 5.2±1cm: It was >5.5 cm in 15 patients (32%), 5.0-5.5 cm in 12 patients (25%) and smaller than 5.0cm in 20 patients (43%). Thirty-day mortality was 23%, all with aortic diameter <5.5cm. Aortic diameter was <5.5 cm in 3/4 patients with Marfan syndrome, 2/2 patients with bicuspid aortic valve and 9/11 patients with atherosclerosis.
Hypertension was common (68%) and was evenly distributed among those with diameter <5.5cm and >5.5cm.
Conclusions: The majority (68%) of patients with AD had aortic diameter <5.5cm, i.e. below the threshold for prophylactic surgery, including non-Marfan patients with tri-leaflet valves. This calls for reconsideration of the cut-off values for prophylactic surgery.

Reproducibility of Visual Assessment of Segmental Wall Motion on Echocardiograms: A Multicenter Study by the Israeli Echocardiography Research Group

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Background: Quantification of wall motion abnormalities (WMA) is of paramount importance in interpretation of echocardiograms. Visual assessment of WMA is widely used but data are lacking on its accuracy. We determined this method's accuracy in expert hands using contemporary echo-technology.

Methods: Echo studies of 105 patients (28 healthy, 62 IHD, 15 DCM) were performed using Vivid 7 (GE) echo machines and analyzed blindedly by 10 experienced readers. Readers scored (1=normal to 4=dyskinetic) 18 segments from 3 apical views per-patient. A segmental "gold-standard" score (GSS) was constructed by the majority score.

Results: Of 1890 segments, 66% were normal by GSS, 30% abnormal and 4% unreadable. The overall readers' **inter-observer** variability when dichotomizing segments into normal (score 1) vs. abnormal (scores 2-4) had a Kappa of 0.65 ($p<0.0001$). For scoring WMA from 1 to 4, Kappa was 0.65, 0.28, 0.5 and 0.26 respectively, mean 0.5 ($p<0.0001$ for all) and Kendall's coefficient of concordance 0.73. **Intra-observer** variability was assessed in 10 patients: for dichotomizing segments (normal/abnormal) mean Kappa was 0.71 (individual reader's Kappas 0.5- 0.91). For scoring WMA from 1 to 4, Kappa was 0.71, 0.36, 0.55, 0.39, respectively, average 0.57 and Kendall's statistic 0.88. Compared to GSS scores: for dichotomizing segments (normal/abnormal) mean Kappa was 0.77 (individual Kappas 0.67-0.84). For scoring segments from1 to 4, Kappa was 0.77, 0.46, 0.65 and 0.37, respectively, mean was 0.64 and Kendall's statistic was 0.90.

Conclusion: Experienced readers had considerable inter- and intra-observer variability in quantifying WMA. Introduction of standardization methods or development of objective/ automated methods are necessary to assist visual WMA assessment.

Posterior Descending Coronary Artery Blood Velocities: Value and Feasibility of Non-invasive Sampling

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Recent developments in echocardiography made transthoracic echocardiography (TTE)-Doppler sampling of coronary artery velocities possible. Left anterior descending coronary artery (LAD) velocities by TTE- Doppler is feasible almost in all subjects even without echo-contrast. Aim: Evaluation of feasibility of TTE-Doppler sampling of posterior descending coronary artery (PDA) velocities. Methods: Forty seven subjects, were studied, 27males, age 51.8±24.9 years, range 6-94 years, weight 74.6±16.7 kg. range 46-111 kg. Sampling of TTE-Doppler of the PDA were attempted from modified apical two-chamber views using 3.5 MHZ transducers. Results: Peak velocities in diastole 51.1±15.9 cm/sec were higher than in systole 23.2±6 cm/sec, $p<0.001$. Time velocity integral in diastole 15.9±5.4cm were higher than in systole 5.1±2.1 cm, $p<0.001$. Diastolic pressure half time averaged 178.3±65 msec and deceleration time 597±212.6 msec. Flow in the PDA in diastole 43.7±20.6 ml/min was higher than in systole 13.8±6.7 ml/min, $p<0.001$. Diastolic to systolic velocity ratio averaged 2.28±0.67, and was less than 1.5 in 3 subjects with severe PDA stenosis. Conclusions: Sampling of Doppler velocities of the PDA using TTE is feasible. Diastolic velocities, time velocity integrals and flows were higher than the systolic parameters. Sampling of PDA velocities may be used in the evaluation of subjects with coronary artery disease and can detect severe PDA stenosis.