

Valve	TEE1			TEE2		
	N %	Length	Width	N	Length	Width
Mitral	16 (73)	8 ± 3	1.0 ± 0.3	10	9 ± 1.5*	0.8 ± 0.2
Aortic	12 (55)	7 ± 2	1.0 ± 0.2	8	9 ± 4	0.9 ± 0.2

*P < 0.02 as compared to length on TEE1. LE length and width are expressed in mm.

LE were hypermobile and all but 2 were located at the leaflet coaptation point. All mitral LE prolapsed into the atrium during systole and the aortic LE prolapsed into the outflow tract during diastole. No LE were noted on the tricuspid and pulmonic valves. No subject had a cardioembolic event during longterm follow up. **Conclusions:** 1) LE are common (14%) in subjects with normal hearts; 2) LE are seen with equal frequency on the mitral and aortic valves; 3) LE persist unchanged over time; and more important 4) LE may not be a substrate for cardioembolism.

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Spontaneous Echocardiographic Contrast (SpE): An *in-vitro* Study of the Impact of Cardiac Output, Left Ventricular dP/dt and Temperature

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Purpose: Recent clinical studies have indicated echocardiographic observations of *gaseous emboli* in the left ventricle (LV) and atrium (LA) during studies in patients with mechanical heart valves (MHV) in the mitral position. These reports have shown that the intensities of these gas bubbles in elderly patients are less than those in younger patients. These facts may indicate a correlation between formation of the gas bubbles and the LV functions. The goal was to utilize our pulse duplication system to create the corresponding physiologic conditions and to understand the impact of these parameters on SpE formation.

Methods: Our system with a flexible LV model simulated physiological conditions. (LAP)_{peak} = 8, (LVP)_{peak} = 130, (dP/dt)_{LV} = 1800-3000, (SP)_{mean} = 100, HR = 60, CO = 3-5l/min, SR = 35%. A 27 mm Edwards-Duromedics (ED) valve was used in the mitral position. The aortic valve was a 23 mm porcine Carpentier-Edwards. For the experiments, the liquid was de-ionized, de-bubbled. The liquid temperature was carefully monitored and gradually increased from the room temperature to 37°C. M-Mode Doppler and 2D-echo of long and short axis planes were performed using a Vingmed CFM750 machine. An Argon-Ion laser beam was used for planar illumination and high-speed video flow imaging.

Results: High-speed videography of the mitral valve depicted little bright bubbles formed in the immediate vicinity of mechanical prosthesis upon closure at CO = 3l/min. As the CO was increased, we observed an increase in their intensities and a significant difference in their nature. The effect of dP/dt was even more substantial. At dP/dt = 3000, we observed a major increase in the size of these bubbles and in their life-span. Increasing temperature from 22°C to 37°C caused an immediate increase in the bubbles intensities and size.

Conclusions: CO, dP/dt, and Temperature have major impact on SpE formation in MHV.

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Is the Patent Foramen Ovale Functionally Closed in Patients with Elevated Left Atrial Pressure?

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It is assumed that a patent foramen ovale (PFO) due to its valvelike structure allows only right-to-left (R-to-L) shunting but is functionally closed with elevated left atrial pressure, whereas an atrial septal defect (ASD) allows bidirectional shunting. To assess the prevalence of a PFO, we studied 245 consecutive patients (P), 59 with and 186 without significant left heart disease (LHD), by transesophageal contrast (C-TE) and color Doppler echo-cardiography (D-TE). A PFO was diagnosed if ≥ 1 microbubble appeared in the left atrium within 3 heart cycles after opacification of the right atrium or if a color jet across the atrial septum was identified and no obvious ASD was seen. A PFO with R-to-L shunt by C-TE including provocative maneuvers was present in 4/59 P (7%) with LHD vs 49/186 P (26%) without LHD (p < 0.005). A PFO with L-to-R shunting by D-TE was identified in 15 P with LHD. The shunt was intermittent in 4 P with and continuous in 11 P without a R-to-L shunt by C-TE. In 7/11 P with continuous L-to-R shunt on D-TE, a typical PFO with valvelike morphology was subsequently confirmed at surgery (n = 5) or autopsy (n = 2). Combining C-TE and D-TE results, a PFO was present in 15/59 P (25%) with LHD vs 49/186 P (26%) without LHD (p = ns). In 2 P with LHD and a follow-up study, preoperative diagnosis of a PFO could be achieved only by D-TE showing a continuous L-to-R shunt. After valve surgery with normalization of intracardiac pressures, however, a R-to-L shunt across the PFO was demonstrated by C-TE. **Conclusion:** Despite its valvelike structure, a PFO may allow bidirectional shunting. In P with LHD, D-TE is superior to C-TE for diagnosis of a PFO.

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A Normal Transthoracic Echocardiogram Obviates the Need for Transesophageal Echocardiography in Suspected Endocarditis

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It has been demonstrated that transesophageal echocardiography (TEE) is superior to transthoracic echocardiography (TTE) for detection of valvular vegetations. The lower sensitivity of TTE is largely due to shadowing from prosthetic valves or a poor acoustic window resulting in inadequate visualization. Whether TEE improves the diagnostic yield in patients with suspected native valve endocarditis after a technically adequate TTE is uncertain. Accordingly, we reviewed the records of 181 patients, without prosthetic valves, referred for evaluation of suspected endocarditis. Of these, 25% had a technically difficult TTE and were excluded from analysis. Of the 135 remaining patients, 87 were men and 48 were women (mean age 45 ± 14 yrs). All patients underwent TTE followed by TEE within 72 hours. Patients were classified into 3 groups based on the results of the TTE: definite endocarditis, if a vegetation was seen; suspicious, if there was valvular thickening or regurgitation, and normal. TEE studies were reviewed separately and the presence or absence of a vegetation was noted. All patients with a positive TTE (42/42) had endocarditis by TEE whereas 96% (44/46) with a normal TTE had no evidence of endocarditis by TEE.

TEE	Endocarditis Normal	TTE		
		definite	suspicious	normal
		42	17	2
		0	30	44

We conclude that in patients without prosthetic valves who have a normal TTE, TEE is unlikely to be of incremental benefit in diagnosing endocarditis.

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Geometry and Volume of Right Ventricles — A Quantitative Echo CT Study

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The function of the right ventricle (RV) may be limiting in patients with pulmonary or heart disease. Echocardiographic evaluation of ventricular volumes and geometry is often difficult and usually semi-quantitative. Thus our objective was to characterize different pathologic abnormalities of RV by quantifying volume and geometry.

The study was done with 3-D reconstructed RV from multiplane transesophageal echocardiograms (TEE) in 4 groups of patients (controls (C) n = 4, coronary heart disease (CHD) n = 7, mitral stenosis (MS) n = 6, RV volume load (VOL) n = 4). Volume (V) was calculated by summing up manually traced slices in diastole and systole from echotomographic picture files. Geometry (G) was assessed by circumference (C) to area (A) ratios in 2 orthogonal views (A1; A2). G is an easily calculated parameter, which is maximally 2 in a circular section (S) and depends on shape and size in other sections.

Inter-individual reproducibility of V (r = 0.94, mean diff. (D) 1.7 ml), A (r = 0.99, D 1 cm²) and C (r = 0.95, D 0.5 cm) is good and agreement with angiographic volumes (r = 0.84, D 12 ml) is fair. V and G (mean values and SD) are listed below:

	V diastole (ml)	V systole (ml)	G diastole	G systole
C	110 ± 35	48 ± 15	0.8A1/0.8A2	0.75 A1/0.7A2
CHD	106 ± 16	47 ± 9	0.73A1/1.2A2	0.55A1/0.92A2
MS	99 ± 24	42 ± 14	0.9A1/1.2A2	0.7A1/0.9A2
VOL	300 ± 42	136 ± 38	1.3A1/1.2A2	1.2A1/1.1A2

Discriminant analysis allowed a 100 percent correct classification of disease groups by V and G. By variance analysis significant intergroup differences in V and G were found. **Conclusion:** Quantitative analysis of RV volume and geometry from Echo CT is reproducible and fairly accurate. Different pathologic conditions affecting the right ventricle are reflected by quantitative analysis and geometry of the right ventricle.

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Index of Myocardial Performance: A Simple and Reproducible Measurement of 'Global' Right Ventricular Myocardial Function

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Assessment of right ventricular (RV) function remains cumbersome and challenging. Thus, there is a clinical need for a simple measure of RV function. We have recently developed new Doppler index (TEI index) of combined systolic and diastolic myocardial performance for assessment of primarily left myocardial dysfunction. In this study, we determined whether the index is useful to assess RV function. We studied 49 normal subjects (Mean Age: 55 ± 18 years)