1002-79 TEE Assessment of Papillary Muscle Anatomy and Contraction in Patients With and Without Left Ventricular Hypertrophy

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Extremely few studies of human papillary muscle (PM) structure and function have been done using transthoracic echo, and none by TEE. In a prospective TEE study of 30 patients, 11 with LVH (LV wall thickness > 11 mm and LV mass > 140 g/m^2) and 19 with no LVH, normal LV size and wall motion, we made the following transgastric assessment: In the mid-papillary short axis view, end-diastolic (ED) and end-systolic (ES) cross-sectional area of both PMs were obtained. In the long axis view, ED and ES length of both PMs were obtained. Results are shown in table. Conclusions: 1. Improved quantitative assessment of papillary muscle morphology and function by TEE is feasible. 2. We provide the first TEE data on normal PM length and areas in systole and diastole. 3. In hypertensive hypertrophied LVs, PMs are hypertrophied, with larger cross-sectional areas; while PM length remains unchanged, PM shape changes (thicker) in such hearts. 4. PM area systolic fractional shortening is less in hypertrophied LVs than in normal LVs.

Mean Values of:	LVH (N = 11)		Normals (N = 19)	
LV wall thickness (cm)	1.31		1.09**	
LV mass (g/m^2)	178		133**	
	Anterior PM		Posterior PM	
	LVH	Normals	LVH	Normals
Cross section area, ED (cm^2)	1.79 ± 0.32	1.24 ± 0.30*	1.28 ± 0.33	0.84 ± 0.21*
Cross-section area, ES (cm^2)	2.17 ± 0.31	1.61 ± 0.24*	1.31 ± 0.22	1.09 ± 0.19*
% Increase	16.5 ± 7.2	27.3 ± 8.1*	8.4 ± 6.9	23.4 ± 8.0**
Length (L) ED (cm)	3.71 ± 0.43	3.66 ± 0.42	2.98 ± 0.29	2.81 ± 0.31
Length (L) ES (cm)	2.71 ± 0.45	2.68 ± 0.44	2.49 ± 0.28	2.41 ± 0.30
% Shortening	25.2 ± 8.1	27.1 ± 7.8	15.8 ± 5.6	14.6 ± 5.2
Shape: Area/L^2, ED	0.130 ± 0.03	0.092 ± 0.04	0.144 ± 0.02	0.106 ± 0.02*
Area/L^2, ES	0.295 ± 0.06	0.233 ± 0.05	0.244 ± 0.03	0.181 ± 0.03*

*p value < 0.05, **p value < 0.01

1002-80 Applicability of Transesophageal Imaging of the Flow Convergence Region for Evaluating Patent Ductus Arteriosus

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We imaged flow convergences to aid determination of the site of the aortic inlet of a PDA and as an aid to quantitation. In this study, we used matrix biplane transesophageal echocardiography (TEE) (Aloka 870) in 24 pts with isolated patent ductus arteriosus (PDA) with normal pulmonary artery (PA) pressures, (age: 3 mos-14 yrs; weight: 4–64 kg) during surgical PDA closure. By surgical measurement, the PDA diameters were: small (< 3 mm) in 6 pts; moderate (3–6 mm) in 10 pts; and large (> 6 mm) in 8 pts. In only 10 pts could the length of the ductus connecting to the PA be imaged clearly by TEE. However, for all cases a flow convergence region (FCR) was identified in either transverse (23) or longitudinal (20) plane TEE views while imaging in a leftward direction through the descending aorta toward the left PA and FCR was, thus, a very good marker for PDA. The maximum diameter of the FCR in either plane in the descending aorta in early diastole was less than 2 mm for small PDA's using a low aliasing velocity (AV) of 32 cm/sec; more than 4 mm for large PDA's using a high AV of 64 cm/s; and for the moderate-sized PDA's, the distance was in between (> 2 mm using an AV of 32 cm/s and < 4 mm at an AV of 64 cm/s). In 3 pts, FCR quantitation of volume flow correlated closely with measurements at cardiac catheterization and in another pt, continued flow acceleration after surgical ligation promoted further dissection, division and oversewing of an isolated PDA. Our method should be helpful in surgery, thoracopic ductus clipping and coil embolization under TEE guidance.

1002-81 Transcranial Contrast Doppler Improves Assessment of Significance of Patent Foramen Ovale in Divers With Decompression Sickness

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The presence of a patent foramen ovale (PFO) may contribute to the development of decompression sickness (DCS). The sensitivity of Transesophageal contrast echocardiography (TEE) is such that it might detect both physiologically significant and insignificant right-to-left shunts. We predicted that transcranial Doppler sonographic monitoring (TCD) would be superior to TEE in detecting PFO associated DCS since TDC would detect a lesser number of insignificant PFO's. Twenty-six divers referred for evaluation of unexplained DCS were studied by contrast transthoracic echocardiography (TTE), TEE and TCD. Hand-agitated saline was injected into the right antecubital vein of patients or age- and sex-matched controls both before and after Valsalva maneuver. Studies were judged positive if 3 to 5 micro-bubbles were detected in the left atrium (TTE and TEE) within 3 cardiac cycles or if any microbubbles were detected in the middle cerebral artery (TCD) within 4 to 6 cardiac cycles. Results were as follows:

	No DCS	DCS	+PV	–PV
TTE	17% (5/30)	31% (8/26)	62%	58%
TEE	47% (14/30)	58% (15/26)	52%	59%
TDC	23% (7/30)	50% (13/26)	65%	67%

(n/n) = number positive/total number; PV = predictive value.

The incidence of PFO by TEE was similar for normal subjects as for divers with DCS. The detection of PFO by TCD, however, was approximately 2 times greater in the group with DCS. TCD had better positive and negative predictive values for detecting PFO's in DCS than TTE or TEE.

1002-82 Impact of Transesophageal Echocardiographic Detection of Intimal Tears on Operative Mortality in Acute Type A Aortic Dissection

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Because of the abrupt and serious progression, immediate diagnosis and adequate treatments including emergent operations are required in patients of acute Stanford type A aortic dissection. Although the usefulness of transesophageal echocardiography (TEE) has been established in patients of aortic dissection, it has limitation for diagnosing the exact location of intimal tear. To investigate the relationship between the sites of intimal tear diagnosed by pre-operative TEE and operative mortality, consecutive 73 patients with acute type A aortic dissection underwent emergent surgery were retrospectively studied. Pre-operative TEE findings were compared with the surgical and/or angiographic findings during or after surgical operation. TEE showed the high sensitivity for diagnosis of type A dissection (99%), however diagnostic sensitivity of the intimal tear was lower, 39% at aortic arch, 79% at ascending and 77% at descending aorta. Undetected tears were located in distal ascending aorta to proximal aortic arch "TEE dead angle" or located in just above the aortic ring and smaller sized (< 10 mm). Mortality was higher in the undetected tear cases, 3 of 9 cases (33%) at ascending aorta and 5 of 11 cases (46%) at aortic arch, compared to the detected cases, 4 of 33 cases (12%) at ascending aorta and one of 7 cases (14%) at aortic arch. In conclusion, prompt and correct diagnosis of intimal tears by pre-operative TEE is an important factor of operative mortality in the treatment of acute type A aortic dissection.

1002-83 Evaluation of Left Atrial Appendage Flow in Patients With Atrial Fibrillation: A Transesophageal Echocardiography Study With Intravenous Albumin-Contrast Agent

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To assess hemostasis in the left atrial appendage (LAA) in patients with atrial fibrillation (Af), we performed biplane transesophageal echocardiography (TEE) with an intravenous albumin-contrast agent (Albunex) in consecutive 57 patients (36 men, 21 women; age 72 ± 11 years). Subjects consisted of 24 patients with Af and 33 patients with sinus rhythm. Based on the degree of opacification in the LAA with Albunex (0.2 ml/kg), patients were classified into three groups. Those with rapid and complete opacification in the LAA with Albunex were classified as Group 1 (*G1*). Those with delayed and incomplete opacification in the LAA compared with the left atrial (LA) cavity were classified as Group 2 (*G2*). Those with no opacification in the LAA were classified as Group 3 (*G3*). Most of the patients with sinus rhythm were in *G1* (21/33 [64%]). In contrast, patients with Af were in *G2* (8/24 [33%]) or *G3* (16/24 [67%]). No patients with Af were classified in *G1*. The incidence of LA

	G1 (n = 21)	*G2* (n = 18)	*G3* (n = 18)
LA thrombus	0 (0%)	0 (0%)	11 (61%)**##
SEC	0 (0%)	4 (22%)	10 (56%)**#
Cerebral embolism	3 (14%)	0 (0%)	10 (56%)*##

*p < 0.01, **p < 0.001 vs *G1*; #p < 0.05 ##p < 0.001 vs *G2*.