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Evaluation of Echogenic Material on Transvenous Leads by Transesophageal Echocardiography in Patients with and without Lead-associated Endocarditis

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Evaluation of Echogenic Material on Transvenous Leads by TEE

In Patients with and without Lead-associated Endocarditis

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Disclosures: None

Introduction

- Transesophageal echocardiography (TEE) is often required to diagnose lead-associated endocarditis (LAE) in patients with cardiovascular implantable electronic device (CIED) and persistent bacteremia.
- TEE may detect echogenic material (EM) on CIED leads in up to 10% of patients without infection.
- The objectives of the study were:
 - To determine the incidence of EM in patients with and without LAE.
 - To define the specific morphologic features of infected vs. non-infected EM detected by TEE.
 - To characterize the echocardiographic parameters associated with EM in non-infected patients.

Methods

- Consecutive TEE studies performed in patients with CIED between 1/1/2009 and 3/31/2014 were retrospectively analyzed by an echocardiographer (PM) blinded to clinical information.
- Lead-associated EMs were classified as mass-like or linear densities and then evaluated for morphologic characteristics (multi-lobulation, calcification, and mobility), size, the total number of EMs.
- A clinical diagnosis of LAE was adjudicated using the modified Duke criteria.
- Continuous variables were summarized using medians and interquartile ranges ([IQR] = 25th percentile value - 75th percentile value). Clinical and echocardiographic variables were compared between patients with and without definite LAE using chi-square tests for categorical variables and Mann-WhitneyU for continuous variables. All $p < 0.05$ were considered statistically significant.

Results

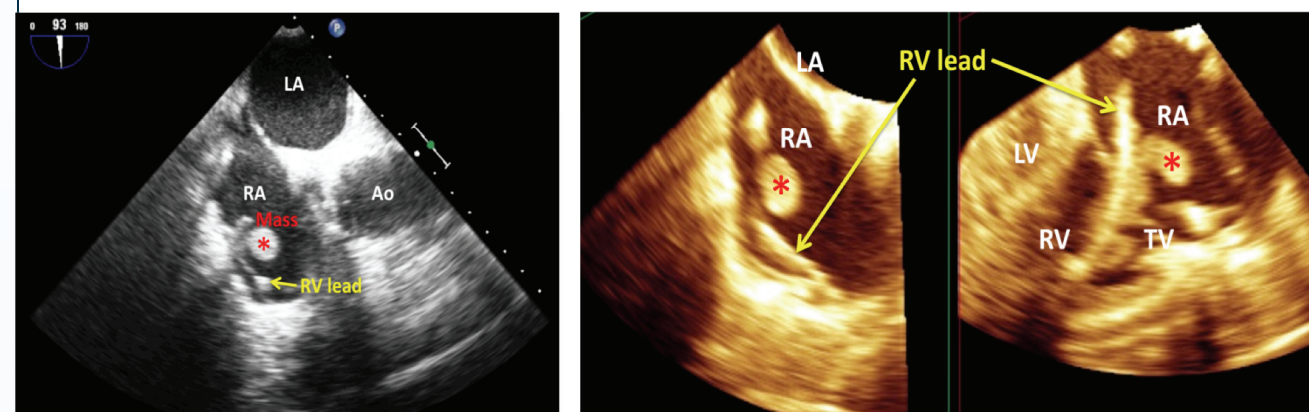
- A total of 289 TEE studies were performed in 255 patients.
 - Group I (n=35): Definite LAE
 - Group II (n=254): Without definite LAE
- EM of any type was present in
 - 31/35 (89%) in Group I
 - 71/254 (28%) in Group II ($p < 0.001$)

Results

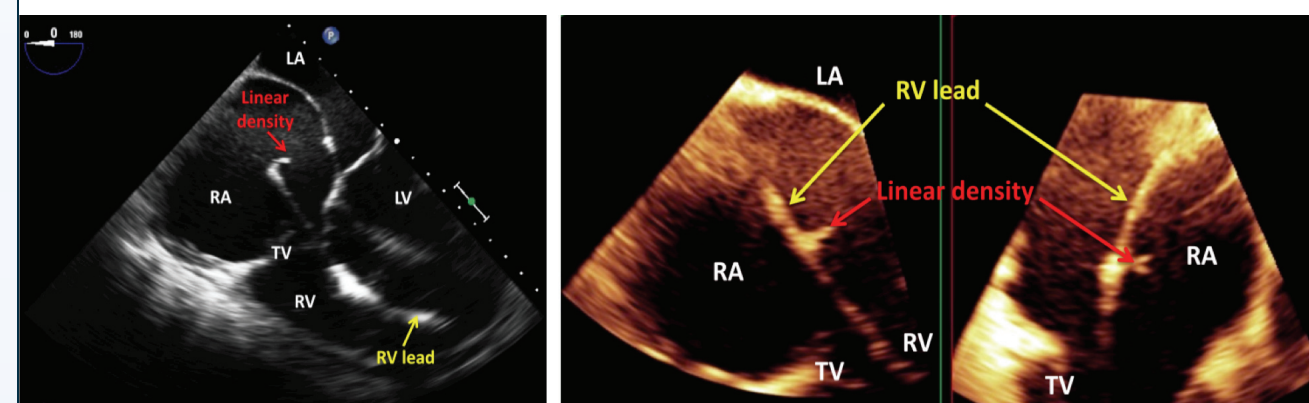
Table	Group I: LAE (n=35)	Group II: No LAE (n=254)	p-value
Age (yr)	68 [55-78]	70 [61-77]	NS
Male	27 (77.1)	164 (64.6)	NS
Echogenic material			
None	4 (11.4)	183 (72)	<0.001
Linear	8 (22.9)	45 (17.7)	
Mass	23 (65.7)	26 (10.2)	
Long axis (mm)	12 [8-18]	9 [7-12]	0.024
Short axis* (mm)	8 [6-12]	5 [4-7.25]	0.006
Long axis > 10 mm	18 (58.1)	21 (29.6)	0.006
Multiple (>2)	15 (48.4)	10 (14.3)	0.001
Multi-lobulated	17 (54.8)	15 (21.1)	0.001
Calcified	1 (3.2)	4 (5.6)	NS
Mobile	29 (93.5)	67 (94.4)	NS
Multiple (>2), large, and multi-lobulated mass	14 (40)	3 (1.2)	0.001

Values depicted as median [IQR] or n (%). *mass-like EMs only. $P < 0.05$ is significant. NS=non-significant, LAE=lead-associated endocarditis

Representative Cases



Representative Case 1 (Group I). A 57-year-old man with a dual-chamber pacemaker and lead-associated endocarditis. Several multi-lobulated mass-like echodensities were seen attached to the RV lead on TEE. Red asterisk (*) denotes the same mass seen on the 2D and 3D images (two orthogonal planes by multi-planar reconstruction). He successfully underwent complete device and lead removal. RA=right atrium, LA=left atrium, Ao=ascending aorta, RV=right ventricle, LV=left ventricle, TV=tricuspid valve.



Representative Case 2 (Group II). A 62-year-old woman with severe cardiomyopathy and a single-chamber ICD underwent TEE for the assessment of ventricular function. A small mobile linear echodensity was present on the atrial portion of the RV lead. RA=right atrium, LA=left atrium, RV=right ventricle, LV=left ventricle, TV=tricuspid valve.

Results

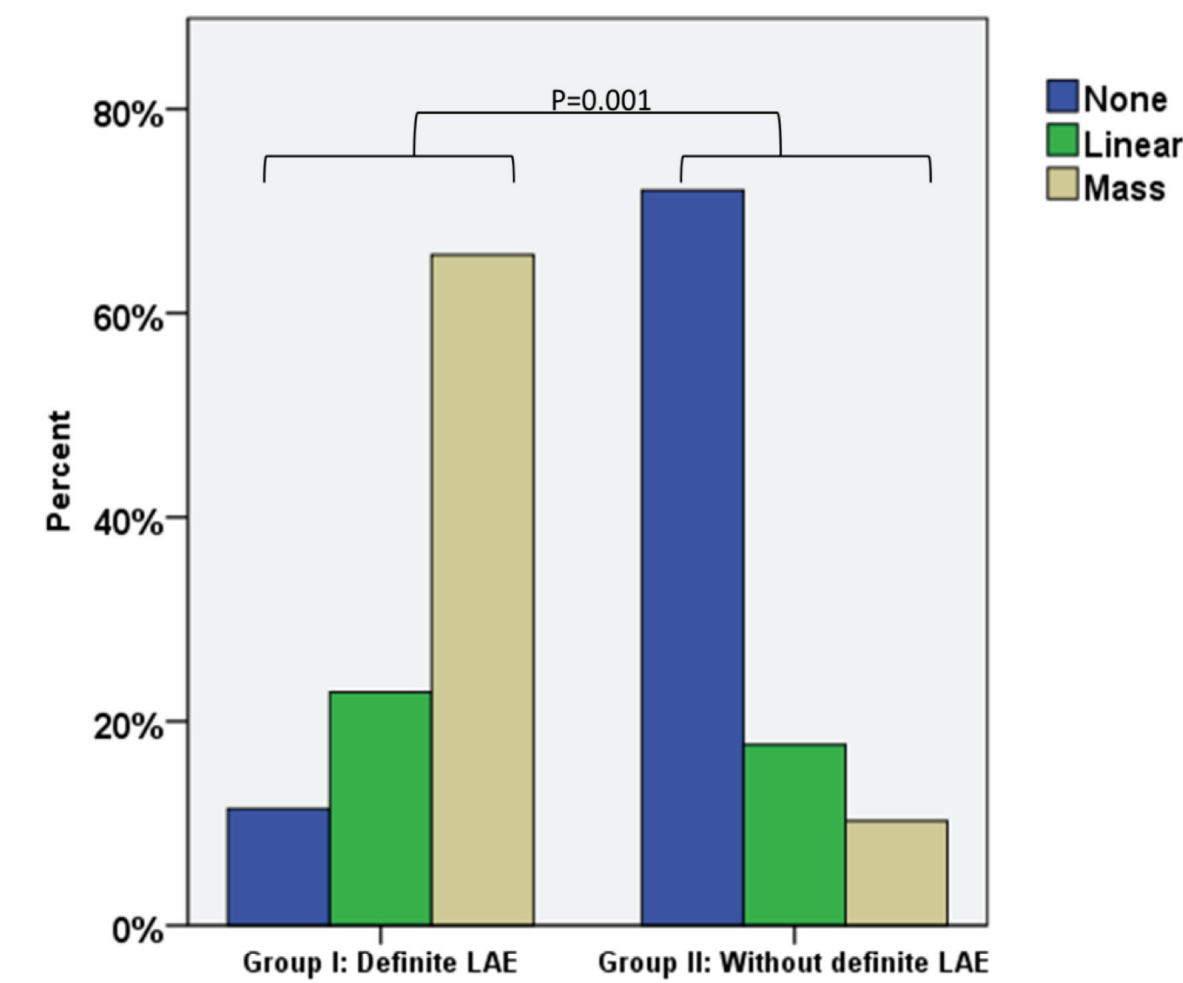


Figure 1. Morphology: Group I vs. II

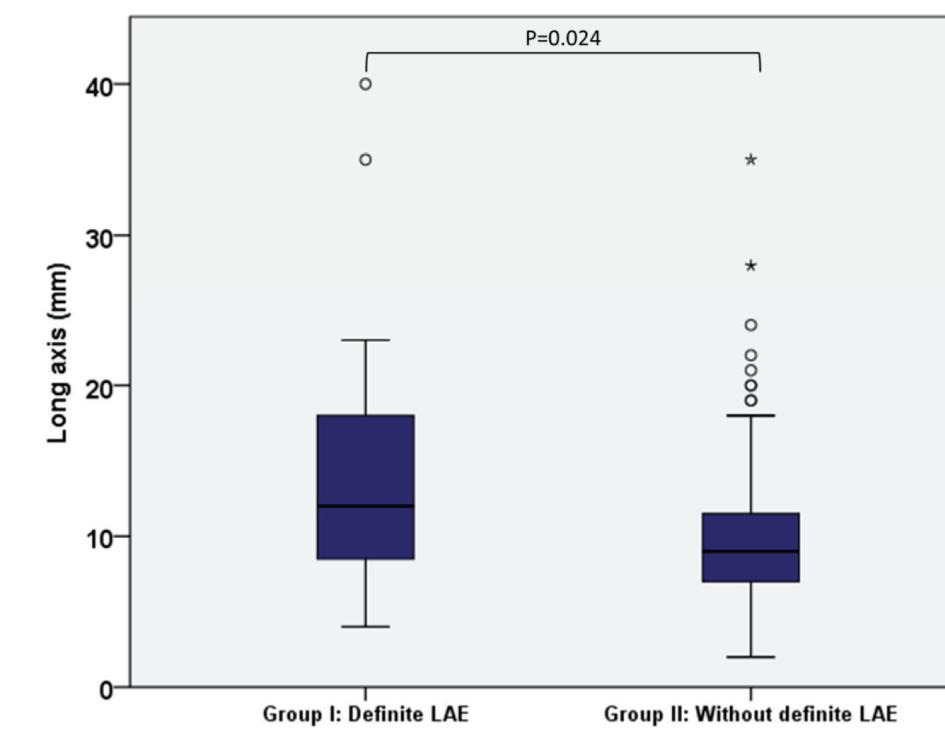


Figure 2. Long axis of echodensity: Group I vs. II

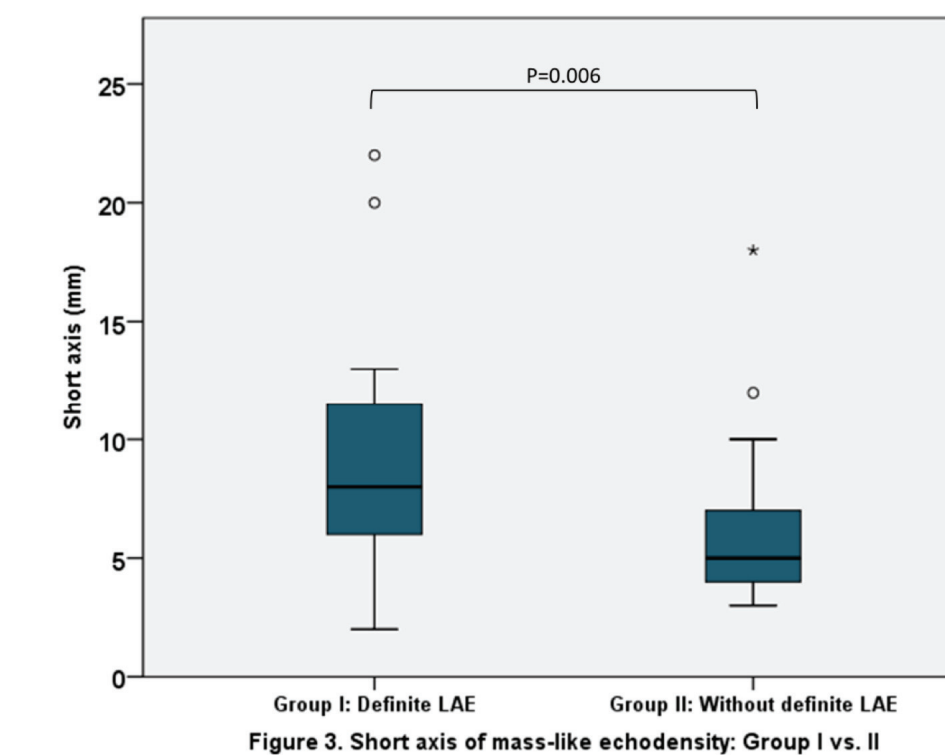


Figure 3. Short axis of mass-like echodensity: Group I vs. II

Results

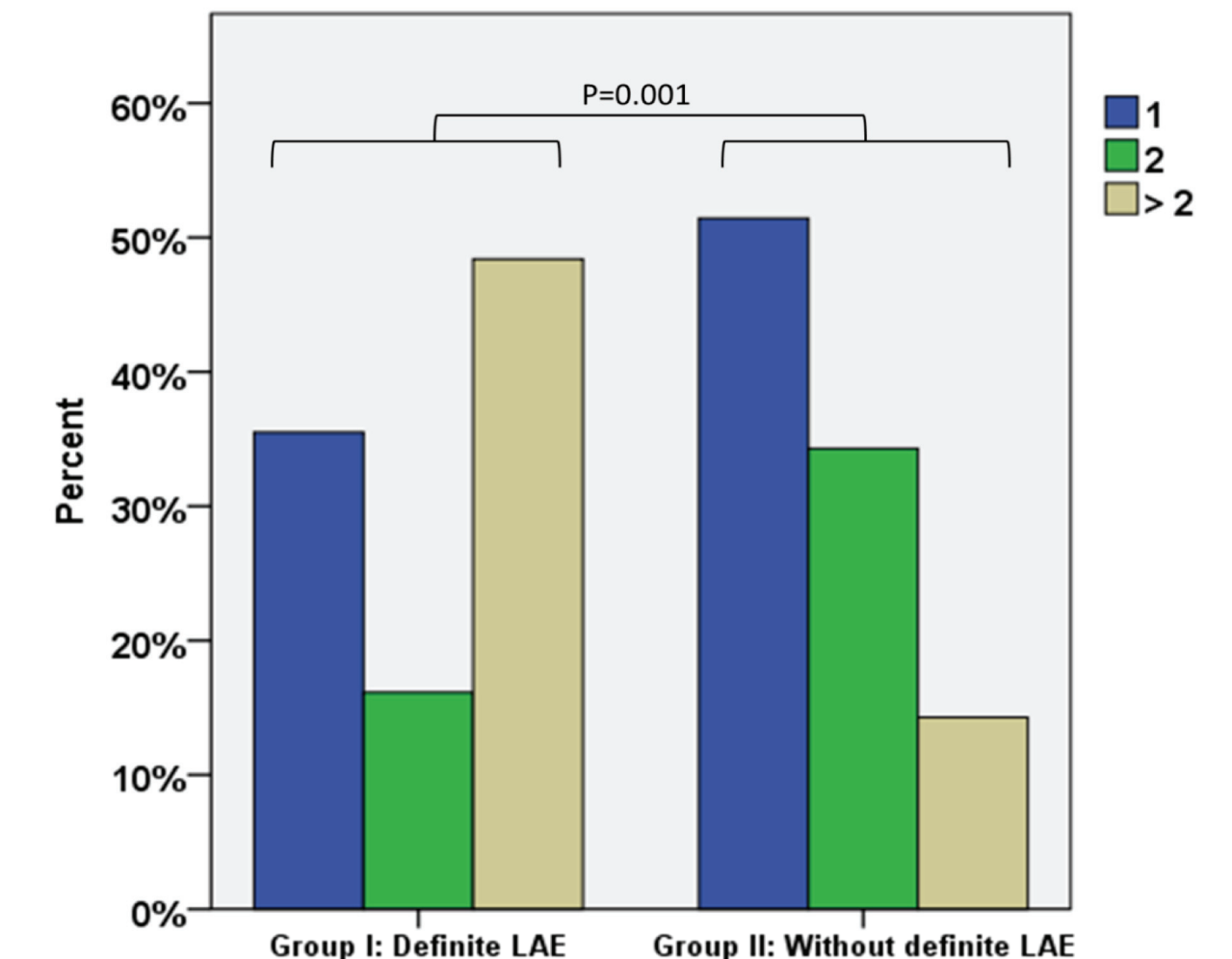


Figure 4. Number of EM: Group I vs. II

- Compared to Group II, echogenic materials (EM) in group I were more likely mass-like, larger, multiple and multi-lobulated. (**Figure 1 - 4**)
- Sensitivity and specificity of a mass-like EM for diagnosing LAE irrespective of clinical context were 66% and 90%, respectively.
- Sensitivity and specificity of multiple, large (>10 mm), and multi-lobulated mass-like EMs for diagnosing LAE were 40% and 99%, respectively.
- In patients in Group II, the presence of EM (fibrous strands and thrombi) was not associated with RA size, RV size, RV function, LV function or estimated pulmonary artery pressure.

Conclusion

- Echogenic material on non-infected CIED leads is a common finding (28%).
- Several morphologic characteristics of EM (mass-like rather than linear, large [>10 mm], multiple and multi-lobulated) are more commonly seen in LAE. However, these characteristics alone are NOT diagnostic for LAE.
- Lead-associated EM on TEE should be interpreted within the overall clinical context.