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:
  1. To determine the incidence of EM in patients with and without LAE.
  2. To define the specific morphologic features of infected vs. non-infected EM detected by TEE.
  3. 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-Whitney U for continuous variables. All p < 0.05 were considered statistically significant.

Results

- Table 1: LAE

<table>
<thead>
<tr>
<th>Group</th>
<th>Definite LAE (n=35)</th>
<th>No LAE (n=254)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yr)</td>
<td>70 (55-78)</td>
<td>70 (61-77)</td>
<td>NS</td>
</tr>
<tr>
<td>Male</td>
<td>27 (77.1)</td>
<td>104 (40.6)</td>
<td>NS</td>
</tr>
<tr>
<td>Echogenic material</td>
<td>None</td>
<td>15 (42.9)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>None</td>
<td>15 (42.9)</td>
<td>3 (1.2)</td>
<td>0.001</td>
</tr>
<tr>
<td>Linear</td>
<td>23 (65.7)</td>
<td>26 (10.2)</td>
<td>NS</td>
</tr>
<tr>
<td>Mass</td>
<td>27 (77.1)</td>
<td>104 (40.6)</td>
<td>NS</td>
</tr>
<tr>
<td>Long axis (mm)</td>
<td>13 (10-18)</td>
<td>9 (6-12)</td>
<td>0.001</td>
</tr>
<tr>
<td>Short axis (mm)</td>
<td>9 (6-12)</td>
<td>9 (6-12)</td>
<td>NS</td>
</tr>
<tr>
<td>Long axis &gt; 10 mm</td>
<td>18 (51.4)</td>
<td>21 (29.6)</td>
<td>0.006</td>
</tr>
<tr>
<td>Multiple (&gt;2)</td>
<td>15 (43.4)</td>
<td>10 (14.3)</td>
<td>0.001</td>
</tr>
<tr>
<td>Multi-lobulated</td>
<td>17 (48.6)</td>
<td>15 (21.1)</td>
<td>0.001</td>
</tr>
<tr>
<td>Calcified</td>
<td>17 (48.6)</td>
<td>15 (21.1)</td>
<td>0.001</td>
</tr>
<tr>
<td>Mobile</td>
<td>17 (48.6)</td>
<td>15 (21.1)</td>
<td>0.001</td>
</tr>
</tbody>
</table>

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.

Conclusion

1. Echogenic material on non-infected CIED leads is a common finding (28%).
2. 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.
3. Lead-associated EM on TEE should be interpreted within the overall clinical context.