954-1 Cost-Effectiveness of Early Cardioversion Guided by Transesophageal Echocardiography for Hospitalized Patients with Atrial Fibrillation

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Transesophageal echo (TEE)-guided early cardioversion has been proposed as a strategy for hospitalized patients with new atrial fibrillation (AF). Such an approach would serve to minimize the cost of anticoagulation and eliminate the need for a second hospitalization for cardioversion at the cost of TEE. To evaluate the cost-effectiveness of the TEE approach, we examined the cost per quality-adjusted life year (QALY) for 4 strategies: I) anticoagulation for 1 mo followed by cardioversion; II) transfemoral echo (TTE) and 1 mo anticoagulation followed by cardioversion; III) TEE with TEE if TEE (−); 1 mo anticoagulation if TEE (+) or TEE (−), and IV) no TEE; II) no TEE; initial TEE with 1 mo anticoagulation if TEE (+); early cardioversion if TEE (−). All strategies are assumed to include 1 mo of anticoagulation following cardioversion. The baseline assumed risk of thromboembolism was 0.8% for all strategies. The hemorrhagic risk was assumed at 0.86% for the first mo and 0.32% for the second mo of anticoagulation. We used costs rather than hospital charges.

Results: TEE-guided early cardioversion [without initial TTE; Strategy IV] dominates all other strategies in that it is the least costly and most effective. Current conventional therapy [Strategy II] costs over $400/pt more, without change in QALY. Sensitivity analysis indicates that the hemorrhagic risk drives the analysis, but the results are stable over a broad range of risks and costs, including a 2/3 reduction in the hemorrhagic complication rate. There would also be no change in the outcome if the initial TEE were eliminated from conventional therapy.

Conclusion: TEE-guided early cardioversion (without initial TEE) is both the least expensive and the most effective strategy for hospitalized patients with new AF. Future trials studying the use of TEE for treatment of new AF should consider elimination of the initial TEE study and careful assessment of hemorrhagic complications.

954-2 Transesophageal Echocardiographic and Clinical Predictors for Outcome of Cardioversion of Atrial Fibrillation

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To determine the value of transesophageal echo (TEE) and clinical variables in predicting outcome of cardioversion (CV), we studied 62 patients with non-valvular atrial fibrillation (AF), who underwent TEE prior to elective electrical CV. We measured left atrial (LA) size, mitral valve annulus (MVA) width, LA appendage (LAA) size and LAA peak flow velocity (pfv), and evaluated presence of LA spontaneous contrast (LASC) and severity (none-mild/moderate-severe) of MV regurgitation (MVR). After CV, sinus rhythm (SR) was restored in 50 patients (81%) and maintained in 29 patients (58%) at 1 year follow-up.

Results:

<table>
<thead>
<tr>
<th>Initial Outcome</th>
<th>1 Year Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF (n = 12)</td>
<td>AF (n = 21)</td>
</tr>
<tr>
<td>SR (n = 50)</td>
<td>SR (n = 28)</td>
</tr>
<tr>
<td>LA size (cm²)</td>
<td>22.6 ± 6.7</td>
</tr>
<tr>
<td>MVA width (cm)</td>
<td>39 ± 3</td>
</tr>
<tr>
<td>LAA size (cm²)</td>
<td>7.8 ± 3</td>
</tr>
<tr>
<td>LAA-pfv (cm/s)</td>
<td>22 ± 9</td>
</tr>
<tr>
<td>LASC presence</td>
<td>13</td>
</tr>
<tr>
<td>MVR severity</td>
<td>30/12</td>
</tr>
</tbody>
</table>

*p < 0.0001, **p < 0.005

Outcome was not related to age, gender, etiology of AF, or use of anti-arrhythmic drugs. In contrast, duration of AF was of influence on 1 year outcome: AF vs. SR: 6.7 ± 3.3 vs. 20.0 ± 24.4 months (**). [1]

Conclusions: No TEE or clinical variables predict initial success of CV of AF. However, 1 year after initial success, LA size, MVA width, LASC, duration of AF, and particularly LAA-pfv, are highly related to the maintenance of SR.

954-3 Usefulness of Contrast Transesophageal Echocardiography in Identification of Increased Risk of Cardiac Embolism in Nonvalvular Atrial Fibrillation

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Anatomical and functional information about the left atrial appendage (LAA) obtained by transesophageal echocardiography (TEE) is contributory to evaluate a risk of cardiac embolism (CE) in nonvalvular atrial fibrillation (NVAF). This study was designed to further characterize a subgroup of NVAF pts with an increased risk of CE with the use of contrast TEE. In 33 NVAF pts, 15 were complicated by CE and 18 were not. Twelve age-matched healthy subjects were studied as control. Albunex 0.1 ml/kg was injected intravenously and the contrast echo enhancement in the left atrium was recorded by TEE on a video tape. Non opacified area in LAA (Ao) and LA area were measured in end-systole, and the ratio of Ao to LAA area (Ao ratio) was obtained as a mean of 5 consecutive measurements. Results: In healthy subjects, the contrast agent produced complete opacification of LAA, thus Ao ratio was 0%. While, Ao ratio was 52 ± 9% and 31 ± 6% in NVAF with CE and without CE, respectively (p < 0.001). Ao ratio over 40% was 80% sensitive and 78% specific for identifying CE group, and the positive predictive value was 75%. Conclusion: In NVAF, the echo contrast agent did not opacify LAA entirely. Non opacified area of transmural contrast agent in LAA as measured by TEE, probably reflecting the extent of blood stagnation in LA more directly, may be a new useful index for identification of a subgroup of NVAF pts with an increased risk of CE.

954-4 The "Swirling" Pattern of Atrial Spontaneous Echo Contrast can be Characterized by Integrated Backscatter Using Fourier Analysis

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Atrial spontaneous echo contrast (smoke) refers to dynamic smoke-like echos that has both increased intensity and a distinctive "swirling" pattern. We have previously shown that smoke can be measured by integrated backscatter (IBS) intensity, and now hypothesize that the swirling pattern could be characterized by frequency spectrum analysis of IBS sequences by Fast Fourier Transformation (FFT).

Methods: We acquired IBS sequences during TEE in 25 pts. who had been qualitatively assessed independently for smoke, severity. We analyzed IBS intensity of the LA smoke region, as well as reference intensity sequences from the left ventricular cavity (LV) and the interatrial septum (IAS), for 60 consecutive frames at 30 Hz under optimal imaging gains. We calculated FFT centroid frequency to characterize the shape and distribution of the frequency pattern for all acquired IBS sequences.

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**Amplitude**

- **Smoke**
  - Frequency
- **No Smoke**
  - Frequency

**Results:** Mild and severe LA smoke IBS sequences were characterized by low dominant frequency with high amplitude variability, whereas the no smoke, LV and IAS sequences were characterized by high frequency with low amplitude variability, consistent with random interframe noise. The mean FFT centroid frequency for atrial smoke sequences (6.2 ± 2.7) was significantly lower than the centroid frequency for no-smoke sequences (11.9 ± 4.1; p < 0.001). Total IBS variance (integral of all non-zero components) was significantly lower in smoke sequences than in no-smoke sequences.