Therapy Implications of Transthoracic Echocardiography in Acute Ischemic Stroke Patients

Tiago Tribolet de Abreu, MD; Sónia Mateus; José Correia, MD

Background and Purpose—Stroke is the third leading cause of death in most Western countries. Cardioembolism might be responsible for 15% to 20% of ischemic strokes. Although atrial fibrillation can be diagnosed by electrocardiography, the remaining causes of cardioembolic stroke are diagnosed by echocardiography. Recent recommendations on the management of acute ischemic stroke fail to consider echocardiography as an essential test in all patients.

Methods—We conducted a prospective observational study, performing transthoracic echocardiography on all patients admitted in our hospital with ischemic stroke, in sinus rhythm, from January 7, 2002, to October 16, 2003. Findings compatible with heart diseases that would indicate anticoagulation as beneficial were identified.

Results—Of the 853 patients admitted with ischemic stroke, transthoracic echocardiography was performed on 846 (99.2%). Of the 435 patients with ischemic stroke, in sinus rhythm, 37.2% had findings indicating anticoagulation as beneficial: dilated cardiopathy (19.1%), previous anterior wall myocardial infarction (6.2%), left ventricular systolic dysfunction with an ejection fraction <35% (3.7%), mitral valve stenosis with enlarged left atria (1.6%), intracardiac masses (0.5%), valvular prosthesis (0.2%), and 1 abnormality (5.5%).

Conclusions—In our study, transthoracic echocardiography had therapy implications in 37.2% of ischemic stroke patients in sinus rhythm. Transthoracic echocardiography should be considered an essential test in all ischemic stroke patients in sinus rhythm. (Stroke. 2005;36:1565-1566.)

Key Words: anticoagulants ▪ echocardiography ▪ stroke, ischemic

**Materials and Methods**

We conducted a prospective observational study from January 7, 2002, to October 16, 2003. The study was approved by our hospital ethics committee. Informed consent was obtained from all patients.

**Patients**

All patients sent to our unit for transthoracic echocardiography with an acute ischemic stroke in sinus rhythm were included in the study. Acute ischemic stroke was defined as an acute neurological deficit persisting for >24 hours, with primary cerebral hemorrhage or nonvascular causes excluded by computed tomographic brain scan within 24 hours of presentation. Sinus rhythm was defined at the time of the performance of the echocardiogram (as evaluated by the cardiac monitoring of the patient) or previously (as evaluated by previously performed electrocardiograms).

Heart diseases that indicate anticoagulation as beneficial were defined as: mitral valve stenosis with an enlarged (>55 mm) left atria, valve prosthesis, left ventricular systolic dysfunction (with an estimated ejection fraction <35%), dilated cardiopathy, previous myocardial infarction (with left ventricular wall dyskinesis), left atria, or left ventricle masses.

**Echocardiography**

The authors performed all echocardiograms using a 2.5-MHz transducer for M-mode, 2D, and Doppler transthoracic echocardiography. All exams were performed and interpreted by the recommendations of the American Echocardiography Society.

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TABLE 1. Demographic Characteristics of the Study Patients (n=435)

<table>
<thead>
<tr>
<th>Findings</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean, SD, minimum-maximum)</td>
<td>73.6, ±8.7, 52–96 years</td>
</tr>
<tr>
<td>Male sex (%)</td>
<td>229 (52.6)</td>
</tr>
<tr>
<td>Hypertensive (%)</td>
<td>283 (65.1)</td>
</tr>
<tr>
<td>Diabetic (%)</td>
<td>98 (22.5)</td>
</tr>
<tr>
<td>Dystlipidemic (%)</td>
<td>70 (16.1)</td>
</tr>
<tr>
<td>Smoker (%)</td>
<td>18 (4.1)</td>
</tr>
<tr>
<td>Former smoker (%)</td>
<td>36 (8.3)</td>
</tr>
</tbody>
</table>

Results

During the study, 846 patients with acute ischemic stroke were sent to our unit for transthoracic echocardiography. A total of 435 of those patients were in sinus rhythm.

The demographic characteristics of the study patients are depicted in Table 1. All patients were white.

The echocardiography findings suggested a heart disease indicating a benefit of anticoagulation in 162 (37.2%) patients. The echocardiography findings are summarized in Table 2.

Discussion

In our study population, 37.2% of patients with acute ischemic stroke, in sinus rhythm, had findings on transthoracic echocardiography that had a therapy implication: a benefit of anticoagulation.

During the study period, 853 patients were admitted to our hospital with acute ischemic stroke, of whom 846 patients (99.2%) were sent to our unit for transthoracic echocardiography. These facts reduce the possibility of bias of the study population.

Some of the echocardiography findings indicating anticoagulation as beneficial might have been diagnosed without echocardiography: valve prosthesis and previous anterior wall myocardial infarction. Although this is true for valve prosthesis, we believe that the inclusion of the only patient without atrial fibrillation had therapy implications in 37.2%. Although these results must be confirmed in other ischemic stroke populations, we believe these results support the transthoracic echocardiogram as a compulsory examination on all acute ischemic stroke patients.

TABLE 2. Echocardiography Findings (n=435)

<table>
<thead>
<tr>
<th>Findings</th>
<th>No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No findings suggesting need of anticoagulation</td>
<td>273 (62.8)</td>
</tr>
<tr>
<td>Dilated cardiopathy</td>
<td>83 (19.1)</td>
</tr>
<tr>
<td>Anterior wall dyskinesis</td>
<td>27 (6.2)</td>
</tr>
<tr>
<td>Left ventricle ejection fraction &lt;35%</td>
<td>16 (3.7)</td>
</tr>
<tr>
<td>Mitral valve stenosis with left atria &gt;55 mm</td>
<td>9 (2.1)</td>
</tr>
<tr>
<td>Intracardiac masses</td>
<td>2 (0.5)</td>
</tr>
<tr>
<td>Valve prosthesis</td>
<td>1 (0.2)</td>
</tr>
<tr>
<td>Mitral valve stenosis with left atria &gt;55 mm +dilated cardiopathy</td>
<td>7 (1.6)</td>
</tr>
<tr>
<td>Dilated cardiopathy + anterior wall dyskinesis</td>
<td>9 (2.1)</td>
</tr>
<tr>
<td>Dilated cardiopathy + left ventricle ejection fraction &lt;35%</td>
<td>8 (1.8)</td>
</tr>
<tr>
<td>Total</td>
<td>435 (100.1)</td>
</tr>
</tbody>
</table>

Therefore, only transthoracic echocardiography can determine the degree of anterior wall motion abnormalities. The remaining findings, although possible to suspect on clinical grounds, needed transthoracic echocardiography for confirmation.

In conclusion, in our study population, the performance of transthoracic echocardiography on acute ischemic stroke patients without atrial fibrillation had therapy implications in 37.2%. Although these results must be confirmed in other ischemic stroke populations, we believe these results support the transthoracic echocardiogram as a compulsory examination on all acute ischemic stroke patients.

Acknowledgments

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References

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