Evaluation of Transesophageal Echocardiography Findings in Acute Non Hemorrhagic Cerebrovascular Stroke

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Abstract

Background: Preexisting cardiovascular disorder are established risk factors for ischemic cerebrovascular stroke and increases mortality in those patients. Aim to evaluate incidence of CVS in patients with with cardiovascular etiology using transesophageal echocardiography.

Patients and Methods: All patients with cerebrovascular stroke at Ain Shams University Specialized Hospital with acute ischemic stroke were included in the period between February 2010 and February 2011. After exclusion of recurrent stroke and cerebral haemorrhage.

Methods: After general and local examination, history taking and 12 lead ECG was done for every patient. Then transthoracic and transesophageal echocardiography was done using VIVID 7 echo machine Using 3.5 and 6.5 MHZ probe.

Results: 112 patients with the inclusion criteria mentioned above were studied with mean age 65±13. 60 male and 52 female. 80 patients were hypertensive, 22 were diabetic, 40 were smokers and 17 patients were hypecholestremic. Positive findings in 72% of patients including left atrial appendage thrombi, aortic atheroma, patent foramen ovale and. This findings were not detected by transthoracic echocardiography.

Conclusion: Transesophageal Echo is of value in elucidating a more wide range of findings in non hemorrhagic CVS with superiority over transthoracic echocardiography.

Key Words: Transoesophageal echo – Cerebrovascular stroke.

Introduction

PATIENTS who have experienced an ischemic stroke have an increased risk for mortality. Five year survival after any ischemic stroke has been reported to be as low as 40%. Patients with history of stroke have 10 fold increase in all cause mortality. Preexisting cardiovascular conditions as AF, LV dysfunction are established risk factors for ischemic stroke and are associated with increased mortality [1,2].

Routine TEE in cerebrovascular stroke is debatable among different authors whether it will affect the therapeutic decision or not. Because transesophageal echo is semi invasive tool for diagnosing masses less than 2mm which cannot be diagnosed by Transthoracic echo and complications of the procedure itself are less than 1% with best hands.

Transesophageal echocardiography (TEE) is useful in detecting potential intrathoracic sources of embolism [1,2] and is often performed in patients who have suffered from stroke or other systemic embolic events. However, it is still controversial whether all such patients should undergo TEE, and there have been no established guidelines for patient selection.

Transthoracic echocardiography (TTE), though a powerful noninvasive tool for the assessment of cardiac chamber size, function, and valvular disease, is insensitive in detecting intrathoracic sources of embolism [3]. Left atrial spontaneous echo contrast, left atrial thrombus, and mobile pedunculated aortic atheroma, which are high risk factors for subsequent thromboembolism, [4] are usually not visualized by TTE [5,6]. However, the role of TTE in selecting patients after stroke or other embolic events for TEE has not been examined. The purpose of this study was to examine whether these patients can be selected for TEE on the basis of clinical and TTE findings.

Aim of the study:

Aim of the study was to assess TEE findings in patients with acute NON Hemorrhagic cerebrovascular stroke.

Abbreviations:

TEE: Trans-oesophageal echocardiography.
CVS: Cerebrovascular stroke.
ASD: Atrial septal defect.
VSD: Ventricular septal defect.
Patients and Methods

112 patients with cerebrovascular stroke admitted to Ain-Shams University Hospitals from February 2010 till February 2011 were included in this study. Patients proved to have hemorrhage; local ischemic causes and significant carotid stenosis were excluded from the study. Exclusion was done by CT scan, MRI brain and carotid duplex before inclusion in the study.

- History and physical examination (stress was laid upon IHD, RHD, recurrent strokes).
- 12 lead ECG to diagnose ischemic changes and dysrhythmias.
- TTE and TEE. Echocardiographic examinations were performed with commercially available systems (Vingmed Vivid 7) equipped with 2.5- and 3.5-MHz phased-array transthoracic transducers and 5-MHz transesophageal transducers. Transthoracic studies were performed from all standard echocardiographic windows.

TEE was performed according to standard protocols [15]. All TEE examinations were performed within 48 to 72 hours of the corresponding transthoracic studies. Approximately 13% were mono-plane, 43% bi-plane, and 44% multi-plane studies. The presence of the following potential sources of embolism was specifically examined: (1) left atrial spontaneous echo contrast and thrombus; (2) atheroma in the thoracic aorta; (3) patent foramen ovale, atrial septal defect, and atrial septal aneurysm; and (4) others, including valvular vegetations and intracardiac masses. Left atrial spontaneous echo contrast was diagnosed by the presence of characteristic dynamic smoke-like swirling echo in the left atrium or the left atrial appendage, distinct from background white noise due to excessive gain [16].

Left atrial thrombus was diagnosed by the presence of an echodense mass in the left atrium or the left atrial appendage, distinct from the endocardium and the pectinate muscles of the left atrial appendage [17]. The presence of atheroma in the thoracic aorta was examined. Atheroma that were mobile, pedunculated, or protruding 5mm into the lumen were classified as complex atheroma [18,19]. All other sessile atheroma <5mm in thickness were classified as simple atheroma. The interatrial septum was examined for patent foramen ovale, atrial septal defect, and atrial septal aneurysm. Bubble contrast study with agitated saline was performed in all patients to look for interatrial shunting. Bubbles appearing in the left atrium within three cardiac cycles or observed traversing the interatrial septum constituted a positive study for shunting.

Atrial septal aneurysm was defined as a thin-walled area in the region of the fossa ovalis with a base of at least 1.5cm and an excursion with the cardiac cycle of at least 1.5cm [20]. Care was taken to distinguish a true atrial septal aneurysm from a hypermobile interatrial septum.

Statistical analysis:

Data were collected, verified, revised and then edited on the P.C. The data were then analyzed statistically by using SPSS statistical package version (12).

Results

The study included 112 patients with cerebrovascular stroke admitted to Ain-Shams University Hospitals from September 2008 till September 2010 were included in this study. Their age range was 65±13 years.

Table (1) shows that hypertension was the most prevalent known risk factor for cerebrovascular stroke. Hypercholesterolemia was the second prevalent risk factor followed by smoking habit and lastly diabetes mellitus.

Table (1): Baseline data and risk factors.

<table>
<thead>
<tr>
<th>Baseline data and risk factors</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>60</td>
<td>59</td>
</tr>
<tr>
<td>Female</td>
<td>52</td>
<td>41</td>
</tr>
<tr>
<td>Diabetes</td>
<td>22</td>
<td>19</td>
</tr>
<tr>
<td>Hypertension</td>
<td>80</td>
<td>70</td>
</tr>
<tr>
<td>Smoking</td>
<td>40</td>
<td>28</td>
</tr>
<tr>
<td>Hypercholesterolemia</td>
<td>42</td>
<td>30</td>
</tr>
</tbody>
</table>

Trans-thoracic echocardiography findings revealed the following:

- 12 patients (9.5%) had impaired LV ejection fraction (<40%).
- 5 patients (4%) had RHD.
- 10 patients (8%) had mitral valve prolapse.
- 15 patient (12%) had ischemic heart disease IHD (segmental wall motion abnormality).
- 2 patients (1.6%) revealed left atrial thrombus.
- 13 patient (10.3%) had atrial septal aneurysm.

Table (2) revealed that aortic masses was diagnosed in 30% of the studied patients indicating that it is the most frequent findings detected by TEE. Followed by heavy sec (spontaneous echo contrast) in LA and LAA. Patent foramen ovale was detected in only 4% of the population studied.
Atrial septal aneurysm represented 10.3% of the patients. The large atrial thrombi detected by transthoracic echocardiography were the same that were detected by transesophageal echocardiography 1.6%. The TEE was free in 32% of the referred patients.

The results revealed that TTE was of equal diagnostic sensitivity to TEE in detecting IHD, RHD, left atrial aneurysm, mitral valve prolapse and left atrial thrombi (excluding left atrial appendage), but was inferior in demonstrating it atrial appendage thrombi, aortic wall thrombi, patent foramen ovale and atheroma in main aortic arch descending aorta and aortic root.

Table (2): Positive findings in transoesophageal echocardiography.

<table>
<thead>
<tr>
<th>Findings</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy LA+LAA Spontaneous echo contrast</td>
<td>15</td>
<td>11.9</td>
</tr>
<tr>
<td>Left atrial thrombus</td>
<td>2</td>
<td>1.6</td>
</tr>
<tr>
<td>Aortic wall thrombus</td>
<td>6</td>
<td>4.7</td>
</tr>
<tr>
<td>Atrial Septal aneurysm</td>
<td>13</td>
<td>10.3</td>
</tr>
<tr>
<td>Patent foramen ovale</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Aortic masses (atheroma)</td>
<td>28</td>
<td>30</td>
</tr>
<tr>
<td>in main aortic arch, descending aorta, and aortic root</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal TEE</td>
<td>33</td>
<td>32.4</td>
</tr>
</tbody>
</table>

Discussion

The decision to perform TEE in patients after stroke or other embolic events should be based on the likelihood of the findings contributing to patient management. The presence of left atrial thrombus increases the risk of subsequent thromboembolism. In the absence of contraindications, warfarin therapy may be considered on thrombus detection. Left atrial spontaneous echo contrast may represent a hypercoagulable state [24] and has been shown to be predictive of future thromboembolic events [9]. Preliminary data suggest that warfarin therapy may be associated with a reduced risk of subsequent thromboembolism [9]. Complex or protruding aortic atheromas seen on TEE have been shown to predispose to future vascular events [10] and are associated with a higher rate of perioperative stroke in patients undergoing can be avoided and aortic cannulation during cardiopulmonary bypass modified. Cardiopulmonary bypass [18]. Although warfarin or antiplatelet therapy for complex aortic atheroma is empirical with no proven efficacy, the detection of such atheroma by TEE may still be worthwhile because invasive intravascular procedures. Our study showed that systemic hypertension was the most prevalent risk factor detected and this was in accordance to Chatuparisute et al 2012, so they raised the benefit of TEE over TTE by doing TEE only for those with normal TTE. In our study we preferred to do TEE for all patients to get much benefit and to diagnose more than one risk factor for CVS in the same patient. [26].

Our study showed that 70% of patients with ischemic stroke had positive findings in transoesophageal echo, which may explain cardiac sources of cerebrovascular stroke. The most frequent incidence of positive findings was in aortic masses, followed by heavy left atrium and left atrial appendage spontaneous echo contrast and lastly patent foramen ovale. The prevalence of PFO was less than expected due to the different inclusion criteria. Our results were in accordance to Harloff and colleagues 2006 who conducted his study to improve importance of transoesophageal echo in delineating therapeutic modalities before using anticoagulation in acute ischemic cerebrovascular stroke [25].

The results of this study (Harloff and colleagues) [25] were:

- Heavy LAA and LA spontaneous echo contrast: 11.5%.
- Complex aortic atheroma: 19.7%.
- Patent foramen ovale: 9%.
- Thrombus: 7.2%.

And In our study the results were:

- LAA and LA spontaneous echo contrast: 11.9%.
- Aortic wall thrombus: 4.7%.
- Atrial Septal aneurysm: 10.3%.
- Aortic atheroma: 30%.

Harloff and colleagues [25] concluded that TEE is mandatory for all patients with cerebrovascular stroke before anticoagulation. Also we recommend TEE for every patient with cerebrovascular stroke especially with acute ischemic cerebral event specially, no complications occurred during the study period, the cost effectiveness and accessibility.

Another study included 503 patients represented the largest reported series of consecutive patients referred for TEE after stroke or other suspected systemic embolic events. It confirms the utility of TEE in detecting potential intrathoracic sources of embolism in these patients. Left atrial thrombus was detected in 7% of patients, left atrial spontaneous echo contrast in 26%, and complex thoracic
aortic atheroma in 13%. The vast majority of the patients (95%) with these abnormalities had an abnormal TTE. Interatrial septal anomalies, detected in 15% of our patients, were more common in younger patients.

This study systematically examined the value of clinical and TTE findings in selecting patients for TEE after stroke or systemic embolic events. TTE plays a complementary role in the noninvasive detection of left ventricular dysfunction, hypertrophy, valvular disease, and left atrial enlargement and is often performed before TEE in these patients. Various investigators have suggested that the yield of TEE for potential intracardiac sources of embolism tended to be higher in patients with clinically suspected heart disease [1,3,6,21]. In the present study, 95% of all patients with left atrial spontaneous echo contrast, left atrial thrombus, or complex aortic atheroma had an abnormal TTE and/or atrial fibrillation. Ninety percent of all patients with impaired left ventricular function and in atrial fibrillation were found to have at least one of the above abnormalities by TEE. In contrast, TEE had a very low yield for these abnormalities in patients with normal TTEs. These findings are perhaps not surprising given the strong association between left atrial spontaneous echo contrast, left atrial thrombus, left atrial enlargement, mitral valve disease, and atrial fibrillation [9,11,16]. Left atrial spontaneous echo contrast has also been shown to be significantly associated with complex aortic atheroma [9]. Furthermore, the value of a normal TTE in identifying a subgroup of patients with a very low prevalence of the above TEE findings is independent of patient age. It seems very clear now the importance of transesophageal echo in cerebrovascular stroke and this shared with all studies but the difference in our results with this large study is in, mainly aortic atheroma, may be in part to pattern of modern developed country and developing country and also due to difference in number of patients included.

Study limitations:

Need for larger scale multicenter studies.

References


