998 Feasibility of transcranial contrast-enhanced color-coded sonography for detection of intracardiac right to left shunt

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Patient foramen ovale (PFO) with right to left shunt (RLSh), has been suggested as a potential source of paradoxical embolism for ischemic stroke. Contrast material—enhanced transesophageal echocardiography (c-TEE) is gold standard for diagnosis, but is semi-invasive and depends on the patient’s ability to swallow. Contrast-enhanced transcranial Doppler ultrasoundography (c-TEE), has become an optimal method for detecting a transcardiac Sh and superior over c-TEE. The absence of temporal windows can represent an indisputable limitation of c-TEE (patient’s age after 60 years and the sex).

Aim: Feasibility of c-TEE as a screening method for diagnosis of intracardiac right to left shunt in selected population.

Methods: Between February 2004 and May 2005, 85 patients admitted with stroke or transient ischemic attack, were studied in our department of Cardiology, with c-TEE, method never performed before, for detection of intracardiac right to left shunt. The mean age was 57.5 years (range, 24–82 years), 47 female and 38 male. All patients underwent a standardized stroke diagnostic work-up. C-TEE examination was carried out using a phased-array transducer (Hewlett Packard Sonos 5500; Philips Medical Systems). Contrast examination (glucose solution (9 mL) and air (1 mL), agitated between two 10-mL syringes) was made at right bron window. The injection was performed during normal inspiration and during a Val-salva maneuver. The appearance of air-embolism signals in the cerebral arteries within 7 seconds of the injection was considered positive for intracardiac shunt (hyperechoic audible signals in 1 cerebral artery).

Results: An optimal temporal acoustic window was found in 76 out of 85 patients (89.4%), in 42 out of 47 female (89.3%) in 31 out of 38 male (81.5%). Forty-seven subjects were older than sixty (55%) and one had unfavourable window (10%). The middle cerebral artery was sampled in 60 out of 85 patients (70%), anterior cerebral artery in 25 (29%), posterior cerebral artery in 26 (30%). More than one artery was sampled in 26 out of 85 patients (30%). Every examination took almost 10 minutes.

Discussion: The feasibility of c-TEE is high especially in subjects younger than sixty. Slity different were found between female (more feasible) and male. The results of this study imply that c-TEE can be used as an alternative tool to detect cardiac right to left shunt and may be used to complement c-TEE, because is feasible, fast, and valid non-invasive bedside method.

996 Detection of patient foramen ovale and atrial septal aneurysm by transesophageal echocardiography: influence of acquired experience, adequate technique and patient selection

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Background: Transesophageal echocardiography (TEE) is a very important tool in the evaluation of patients with embolic events, for the detection of cardiac source of embolism. Patient foramen ovale (PFO) is an entity that relies mainly in TEE for its diagnosis.

Objectives: To evaluate the detection of PFO and atrial septal aneurysm (ASA) in different time periods since 1994, accompanying the learning curve and changes in method for detection (by administration of agitated saline solution in the right atrium during the last years during Valsalva maneuvers).

Population: Retrospective study using our database of TEEs performed since 1994 through May 2005 in patients with an embolic event: stroke, transient ischemic attack (TIA) or other forms of peripheral embolism (PE). Since 2002, after the creation of cerebrovascular units, patients with TIA/PE have been systemically referred for TEE to exclude cardiac source of embolism.

Results: We studied 1110 patients (P) submitted to TEE (23% of the total number of TEEs performed). 53±14 years, 52% males. Results are presented in Table 1.

Table 1. Results (%)

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>1994-1998 (n=216)</th>
<th>1999-2002 (n=620)</th>
<th>2003-2005 (n=374)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 650 ms</td>
<td>54±14</td>
<td>54±14</td>
<td>54±14</td>
</tr>
<tr>
<td>Male gender*</td>
<td>49</td>
<td>50</td>
<td>57</td>
</tr>
<tr>
<td>TIA</td>
<td>78</td>
<td>74</td>
<td>74</td>
</tr>
<tr>
<td>PE</td>
<td>8</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>ASA*</td>
<td>22</td>
<td>78</td>
<td>87</td>
</tr>
<tr>
<td>PFO</td>
<td>32</td>
<td>90</td>
<td>12.3</td>
</tr>
<tr>
<td>Acroc lai pias*</td>
<td>9.13</td>
<td>13.5</td>
<td>11.5</td>
</tr>
<tr>
<td>Thrombus*</td>
<td>9.2</td>
<td>6.7</td>
<td>4.0</td>
</tr>
<tr>
<td>TIA</td>
<td>6.2</td>
<td>0.5</td>
<td>1.2</td>
</tr>
</tbody>
</table>

Conclusions: With the development of cerebrovascular units, with different P populations and greater experience with this technique, we observed an increase in the detection of PFO and atrial septal aneurysm as causes of embolism. There has been a decrease of P referred with concomitant valvular heart disease.

997 Evidence for an influence of interval-strength relationship on beat-to-beat variations in active relaxation during atrial fibrillation


Introduction: Interval-strength relationship (IS), which causes beat-to-beat changes in inotropic state, accounts in part for the varying myocardial contractility during atrial fibrillation (AF), but the effect of IS on active relaxation has not been studied yet. Therefore, we tested the hypothesis, that active relaxation of an individual irregularly arrhythmic beat is influenced by IS, that is, by the duration of the preceding cardiac cycles.

Methods: Six subjects (81±14 years, 2 men) with nonvalvular permanent AF, good right ventricular function and mild-to-moderate tricuspid regurgitation (TR) went through a complete echocardiographic examination. From study subjects, a total of 496 consecutive CW Doppler profiles of TR and RR intervals were recorded and digitally stored. The mean rate of LV pressure decay (a measure of negative (-)dP/dt) during early diastole was derived from the CW Doppler recordings as the rate of change of regurgitant flow velocity between 1 and 2 ms. Thus, the time interval (dt) between velocities of 1 and 2 ms was off-line measured and (-)dP/dt was calculated as: (-)dP/dt = 12/dt x 1,000. In each subject, (-)dP/dt was normalized by multiplying data as a percentage of the maximum observed value. Next, those (-)dP/dt values with a short pre-preceding RR interval (group SPI, RR < 650 ms) and those with a long pre-preceding RR interval (group LPI, RR > 850 ms) were selected for further analysis. Data are expressed as means±SD, paired t-test was used for comparison.

Results: The mean cycle length was 781±118 ms and the mean (-)dP/dt was 38.5±110 ms/m². The length of the preceding cycle length was not different between groups SPI and LPI (792±22 ms and 837±13 ms, ns), but in group SPI the mean normalized (-)dP/dt was significantly higher than in group LPI (0.60±0.02 vs. 0.51±0.01, p<0.001).

Conclusion: Interval-dependent potentiation of active relaxation was observed in subjects with permanent AF. Our results show, that with similar preceding RR interval length, active relaxation is faster when the pre-preceding interval is shorter.

988 Intracardiac echocardiography in atrial fibrillation percutaneous ablation procedures

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Background: Pulmonary veins (PV) radiofrequency (RF) isolation is a potentially curative therapy for atrial fibrillation (AF) that demands a transseptal puncture of the interatrial septum (AS) and placement of mapping and ablation catheters in the left atrium (in the PV orifices).

Methods: To determine the usefulness of ICE in guiding the invasive maneuvers of this procedure and detecting complications.

Conclusion: ICE was more effective showing the left PV (23 left PV vs 11 right PV, p<0.001); in all cases the left superior PV was identified and in 92% the left inferior PV was also identified.

In all the cases the left atrial appendage was observed and the absence of thrombus was documented.

ICE allowed good positioning of the mapping circular catheter (Lasso) in all the PV identified, within their oris.

In all the exams the left atrial cavitation was observed and the absence of thrombus was documented.

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