



## ORIGINAL ARTICLE

# Low sensitivity of the echocardiograph compared with contrast transcranial Doppler in right-to-left shunt<sup>☆,☆☆</sup>

P. Martínez-Sánchez<sup>\*</sup>, J. Medina-Báez, M. Lara-Lara, J. Oliva-Navarro,  
R. Cazorla-García, G. Ruiz-Ares, M. Martínez-Martínez, B. Fuentes, E. Díez-Tejedor

Laboratorio de Exploración Neurovascular Ultrasonográfica, Servicio de Neurología y Centro de Ictus, Hospital Universitario La Paz, Universidad Autónoma de Madrid, Instituto de Investigación IdiPAZ, Madrid, Spain

Received 28 March 2011; accepted 30 May 2011  
Available online 6 May 2012

### KEYWORDS

Transcranial Doppler;  
Echocardiography;  
Right-to-left shunt;  
Patent foramen  
ovale;  
Cerebral ischaemia;  
Accuracy

### Abstract

**Background:** Contrast transcranial Doppler (c-TCD) has a high sensitivity for detecting right-to-left shunt (RLS), and is probably higher than transthoracic echocardiography (TTE) and comparable with transesophageal echocardiography (TEE).

**Objective:** To evaluate the accuracy of echocardiography (TTE and TEE) to detect RLS compared to c-TCD.

**Materials and methods:** Observational study of patients <55 years old with cerebral ischaemia of undetermined origin (2007–2009). All underwent c-TCD monitoring to detect RLS, at rest and after Valsalva manoeuvre (VM). The TTE and TEE were performed when indicated by our cerebrovascular protocol. The accuracy of TTE and TEE for detecting RLS was calculated by comparing them with c-TCD.

**Results:** A total of 115 patients with c-TCD, mean age 43.3 (SD 10.3) years, 51.3% male. The TTE was performed in 102, and TEE in 81, patients. RLS detection was higher with c-TCD than with TTE (67.6% vs. 22.5%,  $P = .001$ ) or TEE (77.8% vs. 53.1%,  $P = .001$ ). The TTE, compared with c-TCD after MV showed: sensitivity 31.8%, specificity 96.9%, positive predictive value (PPV) 95.6%, negative predictive value (NPV) 40.5% and accuracy 52.9% to detect RLS. TEE, compared with c-TCD after MV showed: sensitivity 63.4%, specificity 83.3%, PPV 93%, NPV 39.4% and accuracy 67.9%. The accuracy of TTE and TEE improved when they were compared with c-TCD at rest.

**Conclusions:** TTE and TEE show a considerable number of false negatives for RLS detection. Clinical studies should consider the c-TCD as the best technique to diagnose RLS when a paradoxical embolism is suspected.

© 2011 Sociedad Española de Neurología. Published by Elsevier España, S.L. All rights reserved.

<sup>☆</sup> This work was presented as an oral communication at the 62nd Annual Meeting of the Spanish Society of Neurology in 2010.

<sup>☆☆</sup> Please cite this article as: Martínez-Sánchez P, et al. Bajo rendimiento del ecocardiograma, comparado con el Doppler transcraneal, en la detección de la comunicación derecha-izquierda. Neurología. 2011;27:61–7.

<sup>\*</sup> Corresponding author.

E-mail address: [patrindalo@hotmail.com](mailto:patrindalo@hotmail.com) (P. Martínez-Sánchez).

**PALABRAS CLAVE**

Doppler transcraneal;  
 Ecocardiograma;  
 Comunicación  
 derecha-izquierda;  
 Foramen oval  
 permeable;  
 Isquemia cerebral;  
 Precisión

## Bajo rendimiento del ecocardiograma, comparado con el Doppler transcraneal, en la detección de la comunicación derecha-izquierda

**Resumen**

**Introducción:** El Doppler transcraneal con contraste (DTC-c) tiene una alta sensibilidad para la detección de comunicación derecha-izquierda (CDI), probablemente mayor que la del ecocardiograma transtorácico (ETT) y comparable con la del transesofágico (ETE). Objetivo: Evaluar la precisión del ecocardiograma (ETT y ETE) para detectar CDI, comparándolo con DTC-c.

**Material y métodos:** Estudio observacional de pacientes <55 años con isquemia cerebral de origen indeterminado (2007–2009) a los que se les realizó una monitorización con DTC-c para detectar CDI, en reposo y tras maniobra de Valsalva (MV). El ETT y ETE se realizaron cuando estaba indicado según el protocolo de estudio cerebrovascular de nuestro centro. La precisión del ETT y ETE para detectar CDI fue calculada comparándolos con DTC-c.

**Resultados:** Se incluyeron 115 pacientes a los que se les realizó monitorización con DTC-c. Edad media 43,3 (DE 10,3) años, 51,3% hombres. El ETT se realizó en 102 y el ETE en 81 pacientes. La detección de CDI fue mayor con DTC-c que con ETT (67,6 vs. 22,5%,  $p=0,001$ ) o con ETE (77,8 vs. 53,1%,  $p=0,001$ ). El ETT, comparado con DTC-c tras MV, mostró: sensibilidad 31,8%, especificidad 96,9%, valor predictivo positivo (VPP) 95,6%, valor predictivo negativo (VPN) 40,5% y precisión 52,9% para detectar CDI. El ETE, comparado con DTC-c tras MV, mostró: sensibilidad 63,4%, especificidad 83,3%, VPP 93%, VPN 39,4% y precisión 67,9%. La precisión del ETT y ETE se incrementó cuando se compararon con el DTC-c en reposo.

**Conclusiones:** El ETT y ETE presentan un número elevado de falsos negativos para detección de CDI, cuando se comparan con el DTC-c. Los estudios clínicos deberían considerar al DTC-c como mejor técnica para diagnosticar CDI cuando se sospecha embolia paradójica.

© 2011 Sociedad Española de Neurología. Publicado por Elsevier España, S.L. Todos los derechos reservados.

**Introduction**

Right-to-left shunt (RLS) occurs when there is a patent foramen ovale (PFO) or extracardiac arteriovenous fistula, and it is a risk factor for cerebral paradoxical embolism.<sup>1,2</sup> It can be detected by various techniques, such as contrast-enhanced transcranial Doppler (c-TCD),<sup>3,4</sup> transthoracic echocardiography (TTE)<sup>7,8</sup> and transesophageal echocardiography (TEE).<sup>5,6</sup> TEE is considered the “gold standard” for the diagnosis of RLS, especially because it enables direct visualisation of a PFO with more sensitivity and specificity than TTE.<sup>7,8</sup> However, c-TCD detects the presence of RLS in a high percentage of patients with ischaemic stroke of undetermined origin,<sup>9,10</sup> and this figure is comparable with that of TEE.<sup>3,11–13</sup> Moreover, c-TCD detects up to 30% of RLS cases that are not detected by TEE, whilst RLS cases detected by TEE but not detected by c-TCD are only anecdotal.<sup>3,9,10,14</sup> This divergence between c-TCD and echocardiography may be due to the presence of an extracardiac RLS. However, the exact intra- or extracardiac location of this short circuit should not be an obstacle that would justify RLS being detected less frequently with TTE or TEE than with c-TCD. On the other hand, the technical limitations of echocardiography, such as the difficulty to perform an adequate Valsalva manoeuvre (VM) or reduced visibility with this manoeuvre, could limit the sensitivity of this technique.

Although c-TCD is considered by most neurologists as the most sensitive technique for the detection of RLS,<sup>3</sup> no studies have been conducted that evaluate the accuracy of TTE and TEE in its detection considering c-TCD as the “gold standard”.

Our objective was to evaluate the sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy of echocardiography (TTE and TEE) in detecting RLS, compared with c-TCD.

**Materials and methods**

This was an observational study including patients younger than 55 years with ischaemic stroke treated at our stroke centre during a period of 3 years (2007–2009). Patients were recorded prospectively in a specific database for stroke, which included the results of c-TCD monitoring and echocardiographic studies. We retrospectively selected and studied those patients who had undergone monitoring with c-TCD, following the cerebrovascular study protocol, to investigate the presence of RLS. The performance of TTE and/or TEE followed the same cerebrovascular study protocol used at our centre, which is detailed below.

We analysed the following parameters: (a) demographic data; (b) prior vascular risk factors such as arterial hypertension (AHT), diabetes mellitus (DM), hyperlipidemia (hypercholesterolemia and hypertriglyceridemia), smoking, migraine (with or without aura), alcohol abuse, use of other drugs, peripheral arterial disease, prothrombotic coagulopathy, atrial fibrillation (AF), ischaemic heart disease (angina pectoris and myocardial infarction), valvular heart disease and prosthetic heart valve, haematocrit higher than 50%, treatment with oral contraceptives and pregnancy; c) aetiological subtype of stroke according to the classification by the Study Group for Cerebrovascular

Download English Version:

<https://daneshyari.com/en/article/3077603>

Download Persian Version:

<https://daneshyari.com/article/3077603>

[Daneshyari.com](https://daneshyari.com)