

**Diagnosis and quantification of patent foramen ovale shunt: the role of transcranial Doppler sonography**

*Laranjo S. (1), Paramés F. (1), Mateus T. (1), Ferreira-Martins J.D. (1), Pinto F.F. (1)  
Serviço de Cardiologia Pediátrica, Hospital de Santa Marta, Lisbon, Portugal (1)*

Introduction: Patent foramen ovale (PFO) occurs in about 30% of general population. Its role in cryptogenic stroke is still debated, but from recent follow-up studies it seems that the amount of right-to-left shunt (RLS) is a major determinant of stroke recurrence. A contrast transesophageal echocardiography (TEE) is currently regarded as gold standard for RLS detection, but its invasive nature has fostered the search for new diagnostic techniques. In recent years, transcranial Doppler (TCD) has proved to be a valid alternative to TEE for its high sensitivity and specificity, relative ease of execution and little discomfort to the patients, but its use in the pediatric population is scarce.

Objective: To report our experience with TCD for the detection of RLS in pediatric patients.

Methods: Twenty patients (16.3±4.2 years, 57% female) were included in this study. All had ASD/PFO, but not RLS, documented by transthoracic echocardiography and were referred for percutaneous closure. TCD was performed according to a standard protocol: while blood flow in middle cerebral artery (MCA) was monitored through TCD, an agitated contrast agent (9 ml isotonic saline solution and 1 ml air) was injected into an antecubital vein, in two conditions: during normal breathing and after Valsalva manoeuvre (VM). The number and pattern of microbubbles of air in the MCA was recorded. A four-level categorization, according to microbubbles count, was applied: (1) 0 microbubbles (negative result); (2) 1-10 microbubbles; (3) >10 microbubbles and no curtain, and (4) curtain. All patients with 5 or more microbubbles documented by TCD were considered to have tested positive for the presence of RLS. On the day of the percutaneous intervention, under sedation, TEE was performed to detect or rule out an intracardiac RLS.

Results: RLS was documented by TEE and TCD in 9 patients. Two patients had RLS documented by TCD, but not by TEE. No shunt was documented in 7 patients. In no case was a cardiac cause for RLS documented by TEE and not by TCD.

Conclusions: TCD is a valid alternative for RLS detection. Our experience, albeit short-numbered, has demonstrated its feasibility, safety and efficacy, obviating the need for sedation/anesthesia in pediatric patients.