Letters to the Editor

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Diagnosis of Right-to-Left Shunts by Transcranial Doppler in Patients With Insufficient Temporal Bone Window

To the Editor:
I read with great interest the article entitled “Diagnosis of right-to-left shunt with transcranial Doppler and vertebrobasilar recording,”1 which appeared in Stroke. The authors studied use of vertebrobasilar circulation (VBC) monitoring for detection of right-to-left shunts (RLS) by contrast transcranial Doppler, so-called as “the bubble test.” In comparison with right middle cerebral artery (MCA) recordings, contrast transcranial Doppler with VBC recording missed all of the 22 patients with nonlow-grade RLS, which was defined as presence of at least 11 microbubbles (MBs). Based on these data, they suggest a possible use for VBC monitoring in subjects with insufficient sonic bone windows, in whom transesophageal echocardiography, according to the statement by the authors in the introduction section of the article, remains the only way to diagnose patent foramen ovale in these patients. I have some comments on the problems concerning use of VBC for the bubble test and the other TCD methodologies for patent foramen ovale detection in the subjects with inadequate temporal sonic bone windows.

Indeed, inadequate temporal acoustic bone window is a prevalent barrier for the bubble test. Temporal sonic window is absent in about 10% of the population undergoing TCD examination, and was detected in 4% (8/195) of the subjects in this study.1 In addition to total absence of window, at least in a similar percentage of the subjects, bone window quality is low, and leads to frustrating time expenditures in locating of the suitable windows and fixation of transducers. In the presence of this problem, the bubbles test can be performed by insonation of extracerebral arteries directly, the carotid siphon transorbitally, and the vertebral or basilar arteries transforaminally.

We have previously shown that submandibular (high cervical) internal carotid artery (ICA) recording is at least as sensitive and specific as the MCA monitoring.2 In this prospective study, more (77% higher at average) MBs were detected in the submandibular ICA compared to the ipsilateral MCA in 40 of 49 bubble tests. The reasons for this difference are MB decay before their arrival into intracranial arteries and entry into the anterior cerebral artery. Accordingly, the detection rate of small RLS was increased with submandibular ICA recording. We have observed that some of the small RLS would have been missed if the MCAs had only been monitored, because all MBs visualized in the submandibular ICA passed into the anterior cerebral artery or were detected only in this vessel. In other words, the submandibular ICA seems to be better than transorbital monitoring of the carotid siphon. In conclusion, I recommend using submandibular ICA recording instead of vertebral/basilar ones for identification and quantification of patent foramen ovale in patients with inadequate bone windows.

Of note, bubble test cannot be performed by using standard duplex (4 to 7 MHz) transducers in imaging the common carotid artery* because the detectability of microemboli is inversely dependent on the transducer frequency. As transducer frequency increases, backscatter from blood decreases more slowly than that from microemboli.7 Accordingly, monitoring with 2 to 2.5 MHz probes resulted in 10 to 17 times more MBs in comparison with 5 to 5.33 MHz probes in the patients with artificial heart valves.8 However, this problem can be overcome by harmonic imaging.9

Disclosures

None.

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