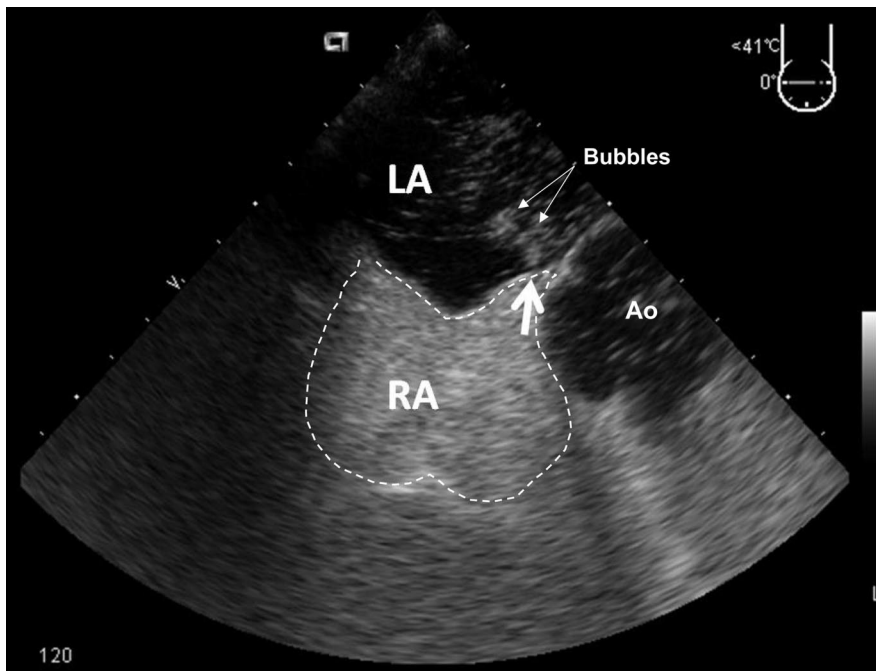


Patent Foramen Ovale, Bubble Test, and Major Spine Surgery

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POSTOPERATIVE paradoxical embolism resulting from patent foramen ovale (PFO) is a serious complication associated with major surgery. The prevalence of PFO in the general population ranges from 10 to 15% (contrast echocardiography¹) to 27.3% (autopsy series). Preoperative diagnosis of PFO is rarely performed except in special settings such as surgery in the sitting position. In this case, a 68-yr-old patient, having undergone thoracolumbar laminectomy and arthrodesis (T12–L1 levels), presented with a bilateral segmentary pulmonary embolism and a left parietooccipital stroke on postoperative day 1. Because of both venous and arterial embolism, PFO was suspected and confirmed with transesophageal echocardiography sensitized with the bubble test.² Contrast material was

prepared by mixing 9 ml normal saline with 1 ml air through a three-way stopcock. This is known to produce 152 ± 79 microbubbles/ mm^3 with a diameter of 30–100 μm . A PFO is considered to be present when at least one bubble is seen in the left atrium (LA) within three cardiac cycles after total opacification of the right atrium³ (RA, *dotted line*) (see Supplemental Digital Content 1, which is a video showing bubbles in the left atrium immediately after total opacification of the right atrium, <http://links.lww.com/ALN/A595>). The *arrow* shows right-to-left shunting across the septum secundum not far from the aorta (Ao). Echocardiography with the bubble test is a safe, sensitive, and specific method to detect PFO. We suggest that systematic, prospective evaluation with bubble testing might be used for high-risk patients undergoing major spine surgery.

References

1. Lechat P, Mas JL, Lascault G, Loron P, Theard M, Klimczak M, Drobinski G, Thomas D, Grosgeat Y: Prevalence of patent foramen ovale in patients with stroke. *N Engl J Med* 1988; 318:1148–52
2. Mas JL, Arquizan C, Lamy C, Zuber M, Cabanes L, Derumeaux G, Coste J: Recurrent cerebrovascular events associated with patent foramen ovale, atrial septal aneurysm, or both. *N Engl J Med* 2001; 345:1740–6
3. Homma S, Di Tullio MR, Sacco RL, Mihalatos D, Li Mandri G, Mohr JP: Characteristics of patent foramen ovale associated with cryptogenic stroke. A biplane transesophageal echocardiographic study. *Stroke* 1994; 25:582–6

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