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### Patent Foramen Ovale and Sitting Position

*To the Editor:*—In the December 1982 issue of ANESTHESIOLOGY, Perkins-Pearson *et al.*<sup>1</sup> have demonstrated that the sitting position in anesthetized patients can induce a positive gradient between right atrial pressure and pulmonary wedge pressure. This gradient may allow the passage of air bubbles through a patent foramen ovale into the systemic circulation. It is, therefore, important to recognize, before surgery, the patients who present with this pathology.

Contrast echocardiography is, at the present time, the only noninvasive method to demonstrate the presence of a patent foramen ovale. The injection into a peripheral vein of 10 ml saline or dextrose solution induces the appearance of a cloud of echoes, which opacifies the right heart cavities.<sup>2</sup> In case of a right-to-left shunt at the atrial level, the passage of microcavitations is visualized easily in the left atrium. The Valsalva maneuver<sup>3</sup> has been shown to reverse the normal transatrial pressure gradient with resultant transient right-to-left shunting across a foramen ovale.

Kronik *et al.*<sup>4</sup> have studied 11 patients with a patent foramen ovale documented by catheterization: M mode contrast echocardiography was positive in seven cases (64%) either during normal respiration or during the Valsalva maneuver. Gross *et al.*<sup>5</sup> studied 36 patients with systemic embolism, using two-dimensional contrast echocardiography: an intracardiac right-to-left shunt was detected during normal respiration in three patients (8.3%) and in six additional patients (16.7%) during the Valsalva maneuver, yielding a total of nine positive cases. Dubourg *et al.*<sup>6</sup> have studied three patients presenting with paradoxical embolism and a catheterized patent foramen ovale: prompt appearance of the echo contrast agent in the left heart cavities occurred in one patient during the Valsalva maneuver and in all three when coughing was used to reverse the transatrial gradient. Since this preliminary report,<sup>6</sup> these authors have studied five additional patients in whom a patent foramen ovale was documented. In the whole group, a patent foramen ovale was identified by the echo-contrast technique in four patients during normal respiration or the Valsalva maneuver and all eight patients during coughing.

The incidence of paradoxical air embolism in neurosurgical patients with a patent foramen ovale has not yet been assessed. Performing a contrast echocardiography

before deciding upon operating in the sitting position may have surgical and anesthetic implications: if positive, contraindication of this position or knowledge of the possibility of systemic air embolism. If the test is negative, the usual precautions remain valid.

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