

It was not noticed by the anesthesiologist during the routine preanesthetic check of the machine. Routine service by the manufacturer was accomplished 1 month prior to the equipment failure.

We have discussed the problem with the manufacturer's Manager of Product Safety. We recommended the possibility of incorporating color contrast in the materials used and suggested that the float stop be replaced periodically during routine servicing to prevent a mishap in the future. In addition, we recommend to our colleagues that if this malfunction is detected, the machine should be taken out of service and repaired.

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*In reply:*—We thank Drs. Dobler and Hinkle for bringing their experience to us as soon as it had happened. We speculate that breakage may be the result of individuals, during servicing, bending the float stop to straighten it; thus, causing a fracture at the stem's base. The service kits include a replacement float stop, the intent being that the float stop should be replaced with each servicing. The servicing instruction sheets have been modified to emphasize that this float stop should be

changed every time, not only when it appears to be required. The part number for ordering the float stop is 216-1874-100.

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### The Paradox of Paradoxical Air Embolism—PEEP, Valsalva, and Patent Foramen Ovale. Should the Sitting Position be Abandoned?

*To the Editor:*—The recent letter by Fischler *et al.*,<sup>1</sup> demonstrating the identification of a patent foramen ovale (PFO) using an echo contrast technique during normal respiration or with the Valsalva maneuver or coughing, deserves further comments. These authors recommend performing contrast echocardiography to screen patients for a PFO who then would not be placed in the sitting position for surgery. This important information by Fischler and co-workers coincides with other findings that have been generated but recently. Hagen *et al.*<sup>2</sup> just have published a postmortem study of the incidence and size of PFO during the first 10 decades of life in 965 normal hearts. They found an overall PFO incidence of 27.3%, with a mean diameter of 4.9 mm.

Reversal of the normal transatrial pressure gradient enhancing the movement of air from right to left heart

across a PFO has been described in the sitting position,<sup>3</sup> with positive end-expiratory pressure (PEEP)<sup>4</sup> and during the Valsalva maneuver.<sup>5,6</sup>

Cucchiara,<sup>7</sup> recently reported the use of transesophageal echocardiography (TEE) for detecting and tracking air in the right heart chamber and when it passes from the right atrium to left atrium via a PFO. Conventional Doppler verification was equivocal in two cases and, of course, unable to identify the air crossing into the left side of heart.

In January 1984 we had the opportunity to anesthetize a patient in the sitting position for a deep-seated posterior fossa tumor. This procedure was uneventful, with no changes in vital signs, Doppler, blood gases, or positive yield for air on intermittent aspiration of a five-hole catheter whose tip was located near the SVC-RA junction.

As the neurosurgeon was completing hemostasis of the tumor bed, he noted the presence of small microbubbles coursing through the arterioles in brain and I visualized the movement of these bubbles for more than 15 ss through the operating microscope. The surgical procedure rapidly was terminated, the patient taken down to the supine position, and the anesthesia terminated. The patient awakened within 15 min without a neurologic deficit, and a subsequent computerized axial tomography (CAT) scan showed no evidence of cerebral edema or pneumocephalus. In the event that the patient had not awakened within a reasonable period of time after termination of the anesthetic (fentanyl-thiopental continuous infusion with pancuronium and 100% O<sub>2</sub>), our plan was to obtain a CAT scan and if diffuse cerebral edema was present, to move this patient to a nearby hyperbaric chamber. The use of frequent Valsalva maneuvers is a common practice during neurosurgery in order to identify and control bleeding, and this was practiced on numerous occasions in this case. It is paradoxical that the very use of this maneuver, which is thought capable of raising the relatively negative central venous pressure to a positive level and thus arrest the inflow of air, is in reality one of the mechanisms that enhances the development of a right to left shunt through a PFO.

With a high percentage of the normal population having a PFO, and the transatrial pressure gradient possibly reversed in the sitting position, or with PEEP and the Valsalva maneuver, the chance of paradoxical air embolism with its potentially serious sequelae becomes evident. Under these conditions, one must question the benefits ob-

tained in using the sitting position for neurosurgical procedures, for even if a PFO is not present, the consequences of venous air embolism itself still exist.

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### Intubation, Aspiration Prophylaxis in Midtrimester Abortions?

*To the Editor:*—In their report "Comparison of Continuous Infusion Fentanyl or Ketamine versus Thiopental—Determining the Mean Effective Concentrations for Outpatient Surgery,"<sup>1</sup> White *et al.* provide useful information for performing outpatient anesthesia. Their protocol for elective, midtrimester abortions (15 ± 1 week) utilized "a tight-fitting face mask." The question arises, "Are these patients at increased risk for aspiration?"

Nausea was present preoperatively in 12-32% of the patients in the three groups. This may indicate that prostaglandin suppositories were utilized. Nausea and vomiting are common side effects from the increased smooth muscle tone from prostaglandin abortifacents.

Pregnancy affects the gastrointestinal system. Gastrin

is produced by the placenta as early as the twelfth week of pregnancy. This hormone increases the acid, chloride, and enzyme content of the stomach to levels above normal.\* Older literature indicates that gastric emptying time may be delayed in early pregnancy, but this is not well substantiated.<sup>2</sup> Early in pregnancy, progesterone relaxes the phrenicoesophageal ligament with the possible production of a functional or actual hiatus hernia. Roberts states that, "This problem is a strong argument for con-

\* Attia RR, Eberd AM, Fischer JE: Gastrin: Placental, maternal, and plasma cord levels, its possible role in maternal residual gastric acidity. Abstracts of Scientific Papers, Annual Meeting, American Society of Anesthesiologists, San Francisco, 1976, p 547.