Correspondence

Intracardiac Catheters in Neurosurgical Anesthesia

To the Editor:—I agree with Dr. Jackson that the routine use of the pulmonary-artery catheter is not necessary for the detection and treatment of venous air embolism. Dr. Jackson advocates abandoning the intracardiac catheter in patients undergoing posterior fossa craniotomy. However, this recommendation is based on clinical management that included neither the use of a precordial Doppler monitor nor the measurement of end-tidal CO₂ concentrations. Therefore, it is not surprising that this retrospective report showed a relatively low incidence (<1 per cent) of "clinically important" venous air embolism. However, it is very likely that silent showers of embolized air would have gone undetected in some of his patients. In those instances in which venous air embolism was detected using the esophageal stethoscope, changes in vital signs, including decreases in systolic blood pressure of 20 to 30 mm Hg, did occur. In our experience, the incidence of venous air embolism discovered by detectors such as the Doppler monitor and by measurements of end-tidal CO₂ concentration is 27 per cent. Use of these monitors results in early detection and, therefore, early treatment. Such episodes of embolism usually do not affect changes in heart rate and systolic blood pressure. They usually are self-limiting, and aspiration of gas by an intracardiac catheter is not possible, since the gas bubbles pass through the heart and lodge in the distal pulmonary vessels. Although most embolic episodes are of this nature, I feel it would be a mistake to abandon the use of the right atrial catheter, since gas aspiration would be extremely important in those rare occasions when massive venous air embolism occurs.

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To the Editor:—Jackson recently reported that since the incidence of clinically important air embolism was very low in his experience, the routine use of central venous or pulmonary-artery catheters was not necessary. Jackson also mentioned the serious risks involved in right atrial and pulmonary arterial catheterization and the fact that catheter placement may be "time consuming and troublesome" as other reasons for not employing these catheters. Unfortunately, the medical literature is replete with neurosurgical cases in which venous air embolism has been shown to be a cause of neurosurgical mortality and morbidity, and this has been described for posterior cranial fossa explorations as well as cervical laminectomies with the patients in the sitting position. The critical factor in venous air embolism is the gradient that develops between the open vessel and the right heart. Thus, it is possible to entrain air with a very small gradient in the lateral, supine, or prone position.

Dr. Jackson is indeed fortunate to be able to report such a low incidence of clinical venous air embolism (0.7 per cent—three patients) in a five-year review of 461 patients at his institution. Retrospective studies are often difficult to evaluate because critical data may not always be present. Michenfelder and co-workers reported an incidence of 2.2 per cent of patients with clinical signs of air embolism (nine of 418 posterior cranial fossa procedures during 1961–1964) and noted that some cases were probably missed because the study was retrospective. Recently, Davis and co-workers reported an air embolism incidence of 60 per cent (94 of 156 patients) during cerebellar stimulator implants with the patients in the sitting position; in 15 per cent, hypotension and ventricular arrhythmias developed, but subsided after aspiration of air from a right atrial catheter, irrigation, covering the wound, and changing to oxygen breathing. Similarly, Wilkins and Jannetta found venous air embolism in 57 per cent of their patients operated on in the semi-sitting position, with an average of 21 ml of air aspirated via the right atrial catheter. It was not stated which of the three patients with air embolism in Dr. Jackson's retrospective study were