

## CORRESPONDENCE

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## Severe Air Embolism Caused by a Pulmonary Artery Introducer Sheath

**To the Editor:**—Air embolism associated with pulmonary artery catheter introducer kits has been described.<sup>1-4</sup> Causes of embolism have included disassembly of the introducer sheath, valve incompetence,<sup>3</sup> fracture of the hub needle connection,<sup>4</sup> and valve prolapse.<sup>1</sup> We report two unusual cases of severe air embolism in confused patients resulting from disassembly of the locking mechanism between the introducer sheath and the side port-hemostatic valve.\*

**Case 1.** A 63-yr-old man sustained multiple injuries in a traffic accident. For fluid resuscitation an Arrow introducer sheath\* was inserted *via* the right internal jugular vein. The patient's perioperative course in the intensive care unit was uneventful, and he was transferred to the ward 10 days later. The following night, the patient was restless and agitated. Upon arrival the physician found him almost unconscious. The obturator of the introducer sheath had been pulled out, and the hemostatic valve had been unscrewed (fig. 1). Although volume resuscitation and administration of oxygen was begun immediately, the patient suffered a cardiac arrest. Initial attempts at resuscitation were successful, but despite administration of high-dose catecholamines, severe pulmonary edema and a low cardiac output state developed. He died 4 h later. Autopsy demonstrated many microinfarctions in both lungs.

**Case 2.** A pulmonary artery catheter was inserted *via* the right internal jugular vein through an Arrow introducer sheath\* in a 59-yr-old man undergoing an orthotopic liver transplantation. His peri-

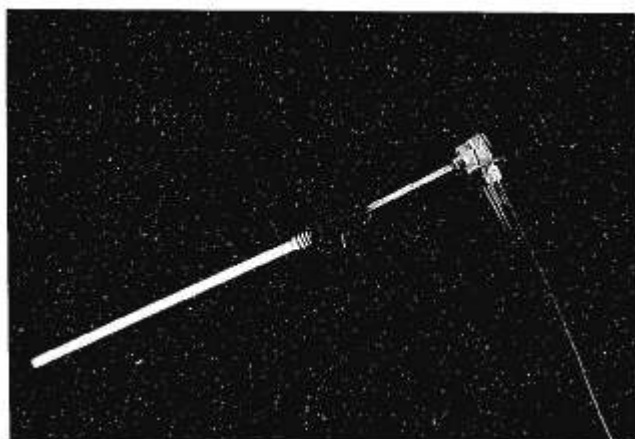
operative course in the intensive care unit was uneventful, and the pulmonary artery catheter was removed. An obturator was inserted through the hemostatic valve. The patient, somewhat disoriented 6 days after successful transplantation, unscrewed the hemostatic valve (fig. 1), and although the valve was immediately reconnected, the patient lost consciousness.

He remained hemodynamically stable, but left-sided hemiplegia and temporary aphasia developed. Repeated cerebral computed tomography scans demonstrated air bubbles in the right hemisphere and, subsequently, large infarctions in the perfusion area of the right anterior and middle cerebral arteries.

Air embolism is a rare complication of invasive monitoring of the right heart and of central venous cannulation, especially when large-bore catheters are used.<sup>2</sup> In the two cases described, embolism was facilitated by disassembly of the two-part introducer sheath and side port-hemostatic valve mechanism. The Luer lock screw-top attachment for the introducer to the side port and hemostatic valve has no safety lock to prevent unauthorized use. We believe that the development of a safety lock cap is the only way to allow the use of the two-part system in awake patients. Safe hemostatic valves and a tight or safe junction between the catheters (*e.g.*, introducer sheaths) and the valves are recommended.

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**Fig. 1.** Arrow 8.5-French introducer sheath with the unscrewed hemostatic valve and the obturator pulled out at half of its length. This situation was observed in the first case. In the second case, the hemostatic valve with the obturator was disconnected completely.

\* Percutaneous Sheath Introducer Set (8.5-French) SI-09800-E (two-part system); Arrow International, Hill and George Avenues, Reading, Pennsylvania 19610.

### References

1. Cohen MB, Mark JB, Morris RW, Frank E: Introducer sheath malfunction producing insidious air embolism. *ANESTHESIOLOGY* 67: 573-575, 1987
2. Orebaugh SL: Venous air embolism: Clinical and experimental considerations. *Crit Care Med* 20:1169-1177, 1992
3. Kondo K, O'Reilly LP, Chiota JJ: Air embolism associated with an introducer for pulmonary arterial catheters. *Anesth Analg* 63:871-872, 1984
4. Matta B, Willatts S, McGregor PJ: A possible complication with a sheath introducer (letter). *Anaesthesia* 47:534-535, 1992

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*In Reply:*—Historically, the two-piece hemostasis valve–sheath introducer system has made it possible to remove the valve, with the following benefits:

1. connection of a large-volume resuscitation line directly to the sheath introducer
2. preattachment of the valve assembly over the balloon catheter so that the balloon's integrity can be tested before insertion into the sheath introducer
3. replacement of a potentially contaminated hemostasis valve with a sterile valve assembly
4. replacement of the hemostasis valve with a smaller hemostasis valve (for temporary pacemaker introduction).

Of these reasons, certainly the first is the most important. Recognizing the need for volume resuscitation and the potential benefits of the one-piece sheath introducer design, in 1990 Arrow introduced a 9-French one-piece sheath introducer with large-bore sidearm tubing. In this 9-French product, the flow through the sideport tubing is almost equivalent to the flow directly through an 8.5-French sheath introducer. The physician thus has the option of using a one-piece

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## Tongue Cyanosis after Laryngeal Mask Airway Insertion

*To the Editor:*—With the recent introduction of the laryngeal mask airway into clinical practice in the United States, several previously unreported complications have arisen.<sup>1,2</sup> We describe a case in which appropriate placement of the laryngeal mask airway resulted in cyanosis of the distal portion of the tongue.

A 40-yr-old, 55-kg, ASA physical status 1 woman was scheduled for elective repair of a torn anterior cruciate ligament of her left knee during general anesthesia. Her medical history was unremarkable. She had undergone a previous general anesthetic without complications for wrist fracture. Physical examination revealed a class I airway with normal neck extension.

After sedation with midazolam 2 mg, anesthesia was induced with 100 µg fentanyl and 100 mg propofol. A number-4 laryngeal mask airway was placed easily on the first attempt, with bilateral equal breath sounds; placement was confirmed by the presence of carbon dioxide on capnography. A total of 20 ml air was used to inflate the cuff, and ventilation of the lungs with up to 20 cm positive pressure was easily accomplished. The tube was secured, and the patient began breathing spontaneously. After several minutes it was noted that the distal visible portion of her tongue had become quite cyanotic. Oxygen saturation at this time was greater than 98% by pulse oximetry. Mucous membranes otherwise were pink.

The air was evacuated from the cuff, and the laryngeal mask airway was removed and replaced with a number-3 laryngeal mask airway. Again, a patent airway was obtained, and the patient continued to breathe spontaneously. The tongue remained pink throughout surgery. The patient had an uneventful postoperative course and was

discharged on the 3rd hospital day. Her tongue remained pink, and she did not experience any associated sensory or motor dysfunction.

We have found no previous reports of this complication with a laryngeal mask airway. The lingual artery is a branch of the external carotid artery, which runs parallel to the greater horn of the hyoid and then ascends and enters the base of the tongue. A correctly positioned laryngeal mask airway lies with its distal tip in the hypopharynx at the upper esophageal sphincter and the upper border under the base of tongue. We believe that in our case the laryngeal mask airway was occluding the patient's lingual artery bilaterally. It is unclear whether this occlusion of the lingual artery was due to malpositioning or to the size of the laryngeal mask airway itself; perhaps it was a combination of both.

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### References

1. Ezri T, Priscu V, Szmuk P, Soroker, D: Laryngeal mask and pulmonary edema (letter). *ANESTHESIOLOGY* 78:219, 1993
2. Lee JJ: Laryngeal mask and trauma to uvula (letter). *Anaesthesia* 44:1014, 1989

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