Moorthy.[2] Campbell and Schwartz attribute the functional failure of the catheter to kinking as the catheter exits the introducer sheath. They further comment that withdrawing the sheath restored catheter function in their experience, and that the report of Bromley and Moorthy should not be taken as an indication to avoid the EJV when placing PACs. I would like to report my experience in using the infraclavicular subclavian (ISC) approach for PACs.

In our facility, it is the rule for our cardiologists to place PACs preoperatively via the ISC approach. The left side is used preferentially, because of the anatomic ease of placement, with the right side being used only occasionally. The sheath assembly almost always is withdrawn completely. Under such circumstances, in more than 400 cases, I have never seen a catheter malfunction due to kinking. In the five cases where the sheath was left in place, three have kinked and become totally obstructed when the sternum was retracted. Two of these were on the left and one on the right. In every case, the catheter resumed normal functioning as soon as sternal retraction was relaxed.

In reviewing the previous reports, and my experience, it appears clear that catheter kinking is likely when the introducer sheath is left in place and the sternum is retracted, whether the EJV or ISC approach is used. I am unaware of reports involving the internal jugular vein. It would seem appropriate to recommend that, rather than avoiding one's preferred approach to the central venous circulation, one should withdraw the introducer sheath before a sternal splitting procedure.

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REFERENCES

1. Campbell FW, Schwartz AJ: Pulmonary artery catheter malfunction? (Letter to the Editor) ANESTHESIOLOGY 60:513–514, 1984
2. Bromley JJ, Moorthy SS: Acute angulation of a pulmonary artery catheter. (Letter to the Editor) ANESTHESIOLOGY 59:367–368, 1983

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Oxygen Pressure Sensor Shutoff Valve Failure in the Ohio® "Wedge" Anesthesia Machine

To the Editor:—We recently experienced an unusual failure of the Ohio modulus "Wedge" anesthesia machine, which has caused us to revise the preventive maintenance schedule proposed by the manufacturer.

REPORT OF A CASE

A 36-year-old white man was scheduled for left inguinal herniorrhaphy and requested general anesthesia. A 6-month-old Ohio® "Wedge" anestheia machine was checked preoperatively for low-pressure and high-pressure leaks with the semiclosed circle system and in-line vaporizors both on and off. The attached Ohio® volume ventilator had been used during the preceeding case and was not reevaluated.

After induction of anesthesia with sodium thiopental and succinylcholine, the patient's respirations first were assisted and then controlled using a semiclosed circle system and 2.5% halothane in 70% nitrous oxide and oxygen. Shortly after the incision, the patient was placed on an Ohio® volume ventilator (V5) with a measured exhaled tidal volume of 15 ml/kg and rate of 6 breaths/min. Five minutes later, the anesthesia machine made an explosive noise, and a loud continuous rush of gas was audible from the back of the machine. Nitrous oxide and halothane were discontinued and manual ventilation performed using the reservoir bag of the circle without change in the noise. Ventilation pressures and volumes were unchanged. The flow meter bobbin fluctuated when the circle was pressurized, both at low and high flows, and the oxygen analyzer indicated that 100% oxygen was being provided. A brief check of the machine demonstrated that wall gas pipelines were not loose or damaged. The noise persisted despite conversion from external pipeline oxygen to tank oxygen and disconnection of all external gas lines. Finally, turning the machine off stopped the presumed internal leak. The patient was ventilated with portable oxygen and a Mapleson D system as the surgery was concluded speedily under intravenous anesthesia.

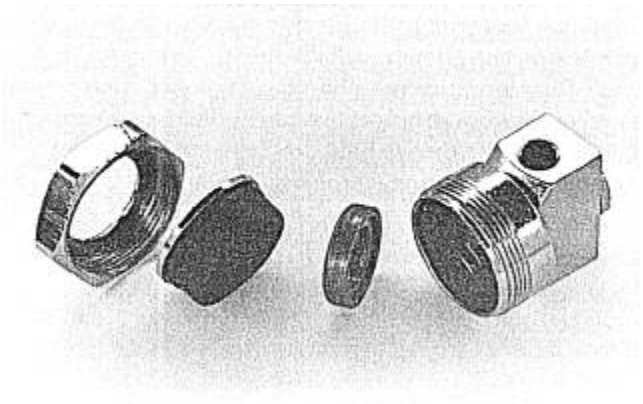

FIG. 1. Valve assembly.

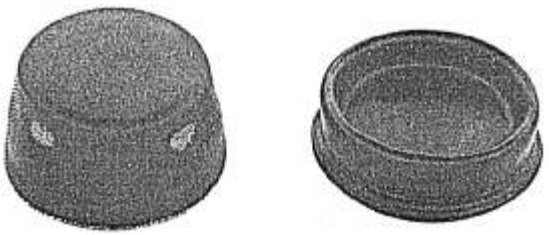

FIG. 2. Valve diaphragm: note fatigue areas only evident when valve diaphragm is reversed.

Later, a leak was discovered in the oxygen pressure sensor shutoff valve (fig. 1), which, upon further inspection, appeared to be in one of several fatigue sites in the rubberized valve diaphragm (fig. 2). This evidently permitted system pressure oxygen to ventilate through the pressure-sensing system, although it did not interrupt flow through the oxygen flow meter.

Two other Ohio® "Wedge" machines recently acquired by the North Carolina Memorial Hospital also were inspected. Evidence of valve diaphragm fatigue in the pressure sensor shutoff valve, which resembled that demonstrated in figure 2, was noted. The Ohio® corporation was contacted and informed of a potential design flaw and the probable need to increase the frequency of preventive maintenance on this valve system. Previously, the valve was not examined routinely as part of the preventive maintenance schedule offered by Ohio. We have decreased preventive maintenance intervals from yearly to every 6 months on this valve. We recommend this interval until further information becomes available. We suggest that it is good practice to perform preventive maintenance more frequently than recommended with every new anesthesia life support system introduced until inhouse experience proves this unnecessary. Laboratory and clinical testing by the manufacturer cannot always be relied upon to accurately predict the experience in another clinical setting.

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In reply:—The Oxygen Pressure Sensor System is designed to shut off the flow of other gases automatically when the supply oxygen pressure is significantly reduced or lost. The described valve is a three-chamber valve. The first chamber receives the oxygen supply pressure; the second is a neutral vented chamber; and the third is a sealed control chamber for the gas being controlled. When oxygen supply pressure is applied to the first chamber, the pressure pushes against a rubber-coated fabric diaphragm. The diaphragm pushed a control rod (not shown), which opens an orifice in the third chamber, allowing the secondary gas to flow through.

The center chamber is sealed from the oxygen and the secondary gas by a set of seals. In the event of a leak from either of the chambers, the leaking gas will enter the center chamber and exit to atmosphere through a vent hole in the valve. This design is to avoid the possibility of inadvertent internal gas mixing due to a leaking seal. If the leak is large enough, as reported above, the oxygen passing through the vent hole will make an audible sound. A large leak may reduce the pressure differential enough to allow the valve to partly or completely close, preventing the controlled gases from flowing.

The integrity of the diaphragm is verified on Ohio® Models 2000, 3000, 4000, DM5000, and Unitrol during the preoperational check of the high-pressure oxygen system. On the Modulus® and Modulus II®, leaks can be identified during maintenance by a simple bubble test. With the gas supplies turned on, soap solution should be applied over the vent hole in the valve. If bubbles are noted, there is a leak. The leak should be repaired.

We do not recommend disassembly of this component