As these techniques receive wider currency, damage to the important spinal accessory nerve may place constraints on the use of the posterior approach to the internal jugular vein.

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Potentially Fatal Machine Fault

To the Editor:—The Ohio DM5000 Kinet-O-Meter® anesthesia machine with heated vaporizer system is in wide clinical use. Recently, a design-related malfunction occurred with the machine which might easily have resulted in a fatality.

A 2-day-old infant with cyanotic congenital heart disease was brought to the operating room for emergency cardiac surgery. Anesthesia was induced with ketamine (1 mg/kg) and muscle relaxation provided with pancuronium (0.1 mg/kg). Oxygen flow was set at 5 l/min with mask ventilation and a Jackson-Rees modification of the Ayre's T-piece. Repeated use of the oxygen flush-valve was necessary to maintain a full reservoir bag. A poor-fitting face mask was thought responsible. Follow-

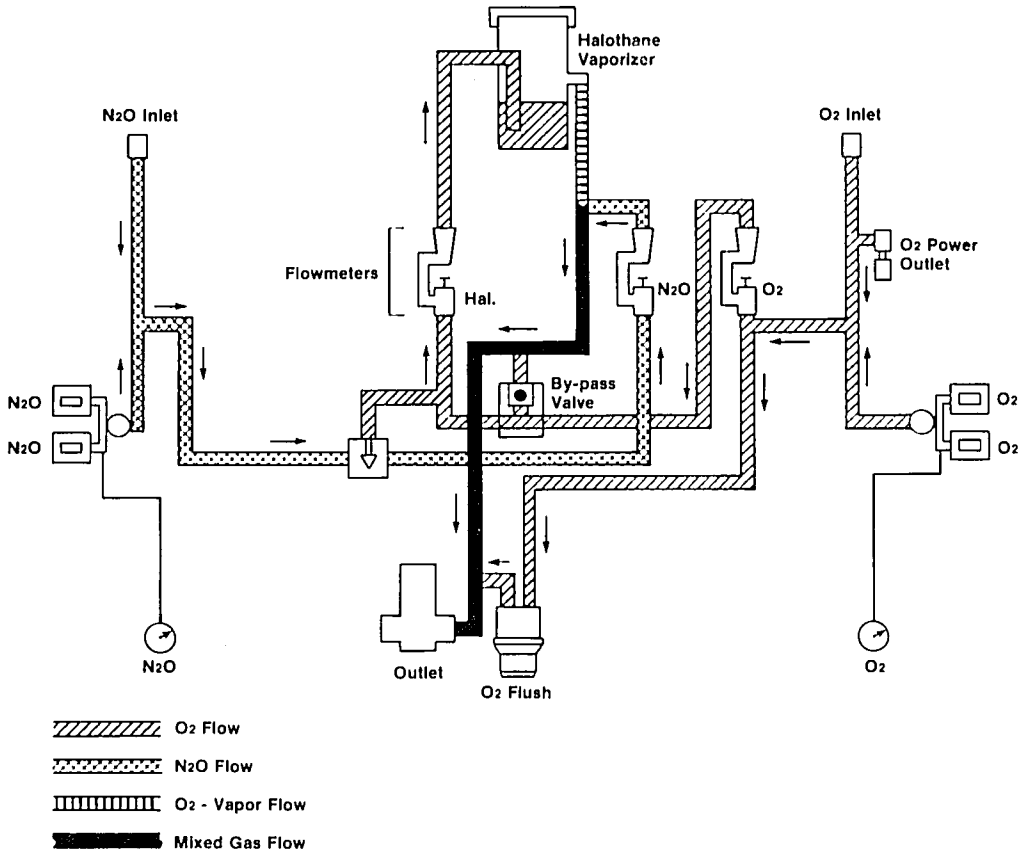

FIG. 1. The Ohio DM5000 machine.

ing endotracheal intubation (3.5-mm tube), no fresh gas flow was noted at the machine outlet, although gas flowed when the oxygen flush button was depressed. Opening the E-cylinders of oxygen on the machine did not improve gas flow. The infant was manually ventilated using the oxygen flush-valve to maintain oxygen flow. A portable oxygen supply was obtained until a replacement gas machine was obtained. The remainder of the case proceeded uneventfully.

Examination of the machine indicated that while oxygen flowed through the flowmeters, none appeared at the outlet. All gauges worked properly as did the oxygen flush valve and the ventilator power outlet. When nitrous oxide was added to the oxygen flow, only nitrous oxide appeared at the outlet. This serendipitously was avoided in this patient since the infant's cyanotic heart disease necessitated 100% oxygen.

The cause of the malfunction was later identified as a faulty bypass valve through which the flowmeter oxygen (but not the nitrous oxide or the oxygen flush) was exhausted to room air. In the Ohio DM5000 machine, oxygen supply flows both to the the oxygen flowmeter and the oxygen flush valve (fig. 1). Flowmeter oxygen passes through a bypass valve both to the outlet and to the vaporizers. Nitrous oxide supply flows through the nitrous oxide flowmeter, joins the vaporizer output, and passes to the gas outlet. Oxygen not delivered to the vaporizer flows through the bypass valve and joins the nitrous oxide-vaporizer outlet mixture. "Oxygen Pressure Sensing Valves" (at one time called "FAILSAFE") within the machine normally prevent the flow of other gases in the event of loss of oxygen pressure. These valves only respond to the loss of supply pressure (wall outlet or tank supply) and not to the discharge of oxygen to atmosphere through a leak beyond the oxygen flowmeter. Examination of the bypass valve reveals a side port intended for technician testing of supply pressure. The port was covered with a small plastic cap which blew off when the bypass valve stuck in the closed position. Thus, the oxygen was exhausted through the open port to the inside of the anesthesia cabinet. Following repair of the bypass valve, the test port was sealed closed.

Consultation with the manufacturer revealed that Ohio DM5000 anesthesia machines manufactured prior to 1971 contain a bypass valve with a test port covered by a non-threaded plastic cap. These machines are therefore subject to the above described malfunction. Machines manufactured after 1971 contained a modification to prevent such disaster from occurring. Despite service at regular intervals, this machine had not been modified. In light of the above incident, we suggest that Ohio DM5000 machines be examined to ensure that such malfunction cannot occur.

In summary, a machine malfunction occurred in which the flow of oxygen through the oxygen flowmeter was diverted to the inside of the cabinet of the anesthesia machine. The flow through the oxygen flush valve was unaffected. Since oxygen pressures in the machine were not affected, the oxygen pressure sensing valves did not detect the malfunction and were ineffective in shutting off the supplies of other gases.

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Manufacturer's Comment

We confirm Dr. Julien's statement that Model DM 5000s made after December 1971, were modified eliminating the plastic cap referenced in his article. Ohio Medical Products did have a field modification to replace the plastic caps that existed in the machines in the field. If your DM5000 has a serial number lower than number 1052 and there is a question if your machine has not been modified, please call your local Ohio Service Representative for an inspection.

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