CASE REPORTS

Malfunction of Vaporizers

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Case reports appearing in recent issues of ANESTHESIOLOGY have stressed the dangers associated with overfilling or tipping vaporizers.[1, 2] We have recently encountered two other potentially dangerous situations with vaporizers of current manufacture.

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Case 1. A 68 year old man undergoing inguinal herniorrhaphy was maintained in light anesthesia with methoxyflurane-nitrous oxide in a semiclosed circle absorption system, the methoxyflurane vaporization being accomplished by means of an Ohio no. 8 Ether Vaporizer (catalogue no. 309-0201-801). Because of a progressive fall in arterial blood pressure from 170 to 100 systolic, the vaporizer was turned to *shut* 30 minutes after induction and the gas flow of 2 liters of oxygen and 2 liters of nitrous oxide was continued. The blood pressure remained at 100 systolic, and anesthesia appeared at a steady level for the remaining 15 minutes of the operation. Within a few minutes of removal of the mask, the patient began to awaken and the blood pressure to return to preoperative levels. The patient made an uneventful recovery.

Case 2. The case following the first case was in the same operating room and the same anesthesia machine was used. An 18 year old female patient was scheduled for a breast biopsy. Before induction of anesthesia, the methoxyflurane was removed from the ether vaporizer and the wick left open to the air for several minutes before replacement of the glass vaporizer jar. After an induction dose of 225 mg. of 2.5 per cent thiopental, closed cyclopropane-oxygen (total flow 1 liter/minute, controlled respiration) was induced and maintained. The arterial blood pressure fell rapidly from 100/60 to 70/40, and the odor of methoxyflurane was detected at the pop-off valve despite the fact that the vaporizer jar appeared to be empty and the vaporizer in the fully *shut* position. A high gas flow was then employed, opening the closed system, with rapid return of blood pressure to the preinduction level.

On testing the particular Ohio no. 8 vaporizer in use, it was impossible to close even in the fully *shut* position. Of the 8 Ohio no. 8 vaporizers at this institution, 3 have since been found to be similarly defective. The apparent cause of the vaporizer leak is corrosion of the metal washers, possibly brought about by water condensation during normal use. These washers should obviously be renewed at the first sign that a slight vapor leak has developed. Such a leak may be detected prior to use by closing the circuit and testing by exerting pressure on the breathing bag with the vaporizer funnel sealed with the screw plug and after the plug has been removed with the pointer in the fully *shut* position. If the vaporizer is malfunctioning a leak of gas or vapor will occur through the open funnel.

Case 3. During an uneventful pulmonary resection in which electrocautery was being used, the odor of diethyl ether was detected at the pop-off valve of the adult semiclosed circle system despite the fact that the double-barreled piggy-back Vernitrol vaporizer (Ohio model 3333) was set to deliver halothane vapor. At first it was thought that ether might have been inadvertently placed in the halothane division of the vaporizer. However, when both barrels of the vaporizer were emptied and the filling vents left open to the atmosphere, it was found possible to ventilate both vaporizers simultaneously by bag pressure with the Vernitrol switch in either the ether or halothane position and oxygen flowing through the vernitrol flowmeter. The only

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other vernitrol double-barreled vaporizer at our institution was found to exhibit a similar cross leak when tested. The cause of the trouble was apparently in the selector valve, and this required replacement of that unit by the manufacturer in each instance.

With the increasing variety and complexity of anesthetic vaporizers, it obviously becomes a routine responsibility to test the machine *and vaporizer* before each use, even if the vaporizer appears to be empty!

References

1. Safar, P., and Galla, S. J.: Overdose with Ohio halothane vaporizer, Anesthesiology 23: 715, 1962.
2. Munson, W. M.: Cardiac arrest: hazard of tipping a vaporizer, Anesthesiology 26: 235, 1965.

Sensitivity to Curare by a Patient with Undiagnosed Myasthenia Gravis Syndrome

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The following case report deals with a myasthenia gravis-like syndrome accompanying oat cell carcinoma of the lung.

A 53 year old white man entered the hospital with a history of weakness, weight loss, and productive cough of one year's duration. Four years prior to admission, the patient had a cervical laminectomy for "slipped disc" performed under halothane, nitrous oxide and oxygen anesthesia, with succinylcholine, 40 mg., given three times during the procedure. He received no curare at that time. Recovery was unremarkable.

On admission, physical examination revealed a thin white man, blood pressure 120/78, weight 118, temperature 101° F., normal sinus rhythm of 90. The positive findings were limited to wheezes in his chest and weakness on exertion. Admission chest roentgenogram showed a 4 cm. density in the lower lung field. Initial laboratory studies were within normal limits. Bronchoscopy and scalene node biopsy were negative; both were performed under local anesthesia.

Pulmonary function studies showed vital capacity 31 per cent of predicted normal; maximum breathing capacity was 23 per cent of predicted normal; one-second and three-second timed vital capacities were 24 per cent of predicted normals. The patient had great difficulty performing the tests and the degree of functional impairment did not correlate with the roentgen-ray findings. Arterial P_{CO_2} was 43 mm. of mercury, standard bicarbonate 27.5 mEq., oxygen saturation 92.8 per cent, P_{O_2} 68 mm. of mercury, *p*H 7.437. The patient was given intermittent positive pressure breathing therapy, and the pulmonary function tests repeated after two weeks showed vital capacity to be 55 per cent of predicted normal and a maximum breathing capacity of 32 per cent.

Forty-six days after admission, the patient was prepared for right lower lobectomy. He was given premedication of meperidine 25 mg., hydroxyzine 100 mg., and atropine 0.4 mg., 1 hour prior to induction. Anesthesia was induced with 250 mg. of 2.5 per cent thiopental, intravenously. The patient was given succinylcholine, 40 mg., intravenously and the trachea intubated. After the return of spontaneous respirations he was given meperidine, 20 mg., intravenously, and curare 3 mg., and maintained on nitrous oxide, 3.5 liters, oxygen 1.5 liters and halothane 0.5 per cent, intermittently. Two units of whole blood were administered during the 4½ hour thoracotomy. No additional relaxants nor any other medication were given. Respirations were controlled for the entire surgical procedure. Blood pressure and pulse were stable throughout the operation. After the chest

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