Malfunction of a New Anesthetic Machine

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Hazards to the patient from mechanical breakdown and failure of anesthetic equipment are ever present. Most anesthesiologists, using the same machine over and over again, are alert to sudden radical changes in performance suggestive of malfunction. Frequently, however, one will accept a machine recently purchased from the manufacturer and, assuming performance according to specification, will undertake the initial case with a lack of proper caution. Presented here is an example of machine failure due to improper manufacturing control of new equipment. It is only because of the anesthesiologist’s watchfulness that disaster was averted.

Case Report

One of our anesthetic machines was returned to the manufacturer for repair. In its place the area salesman left a "demonstrator." This machine came to us from another hospital in the area where it had undergone a thirty-day trial.

The first case in which the machine was used, was a craniotomy on a 60 year old woman with a presumptive diagnosis of intracranial meningioma. The anesthetic technique was endotracheal nitrous oxide and oxygen, supplemented with intravenous meperidine and curare. After satisfactory induction and intubation using a thiobarbitalate and succinylcholine chloride, the resident anesthesiologist found the patient difficult to control. During the first ninety minutes of the operation, the patient was given 210 mg. of meperidine, and 48 mg. of curare to supplement the 5 to 2 liter ratio of nitrous oxide and oxygen. In spite of this dosage of drugs, the patient moved on the table and showed an elevation in systolic pressure from 160 to 220 mm. of mercury. Because of this difficulty, a sample of gas from the rebreathing bag was analyzed using the Pauling oxygen analyzer, and was found to contain 78 to 80 per cent oxygen. The anesthetic machine was replaced and the case proceeded uneventfully. The duration of the operation was seven hours and fifty minutes. The total amount of supplementary drugs given was 340 mg. meperidine, and 66 mg. of curare.

Careful examination of the machine with a company representative revealed that by mistake, a small bore rotameter tube had been used in place of the normally large bore nitrous oxide tube. No error had been made in the scale. As a result, the bobbins, suspended two-thirds of the way up the tube, indicated a flow of 5 liters of nitrous oxide per minute, when in fact the flow was closer to 500 ml.

Discussion

This case stresses a very important maxim in anesthesia. The patient's clinical signs must be paramount in monitoring the anesthetic, and the machine's indicators secondary. When there appears to be a discrepancy between the two, it must be assumed until otherwise disproven, that the machine is in error.

In the case illustrated, as a result of the error of insufficient nitrous oxide output, large doses of intravenous medications were administered. Had it been planned that the patient would not receive "balanced" anesthesia, but nitrous oxide, oxygen and halothane instead, the situation might have been more serious. The machine utilized the "kettle" vaporization principle. The rotameter error would have resulted in the delivery of triple the amount of halothane indicated by the machine. One can only speculate as to the possible outcome if a similar error had been made in the oxygen rotameter, or a reverse error made in the "kettle" rotameter tube.

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