"Explosion" in an Anesthesia Vaporizer

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Despite all the thought and engineering that goes into the production of an anesthesia machine, an unforeseen chain of events can occur which results in an accident. This report describes an "explosion" which blew off the front glass of an anesthesia vaporizer (Copper Kettle) causing a contusion of the sternal region of the anesthesiologist, but fortunately no harm to the patient.

Case Report

An elderly patient was undergoing abdominal surgery. Induction of anesthesia had been uneventful; endotracheal anesthesia (nitrous oxide, oxygen, narcotic and curare) was being administered when the anesthesiologist observed that the rebreathing bag was shrinking in size. A quick check revealed no obvious leak to account for this, so he reached for the shunt valve to flush oxygen into the bag to refill it. As soon as the oxygen flush was turned on, a loud report was heard in the room. The glass from the front of the anesthesia vaporizer was shattered (fig. 1), and a piece struck the anesthesiologist in the chest. The delivery hose to the absorber flew off its connection. Not knowing whether or not the machine was still usable, the Y-piece was disconnected from the patient's endotracheal tube and expired-air ventilation instituted. Another anesthesia machine was brought into the room and connected to endotracheal tube. No apparent harm had befallen the patient, whose vital signs had remained unchanged. The surgical procedure, however, was abandoned and the patient was taken to the recovery room. She made an uneventful recovery and returned for operation several days later.

Discussion

The shunt valve on the machine in question has three positions, "Off," "Vaporizer On" and "Flush." At both of the latter positions the valve's motion is stopped by a pin. Twice during the past year this pin was sheared off by overvigorous turning. When the pin is sheared off, the valve may be turned from "Off" to "Flush," then past "Flush" to "Vaporizer On." In the case under discussion, if the pin which stops the valve was bent, it might have allowed the cam shaft to turn from "Off" past "Flush" far enough so that the vent to the vaporizer might open at the same time as oxygen was still flushing. This would cause a build-up of pressure in the vaporizer resulting in a blow-out at the weakest point, namely the glass window. The reverberation might be enough to cause the hose to the absorber to fly off or the hose might have been kinked at the same time.

To prevent this happening in the future, the valve must be so constructed that such a sequence can not happen and the vaporizer must be vented to the exterior so that if pressure does build up, it has a means of escaping.

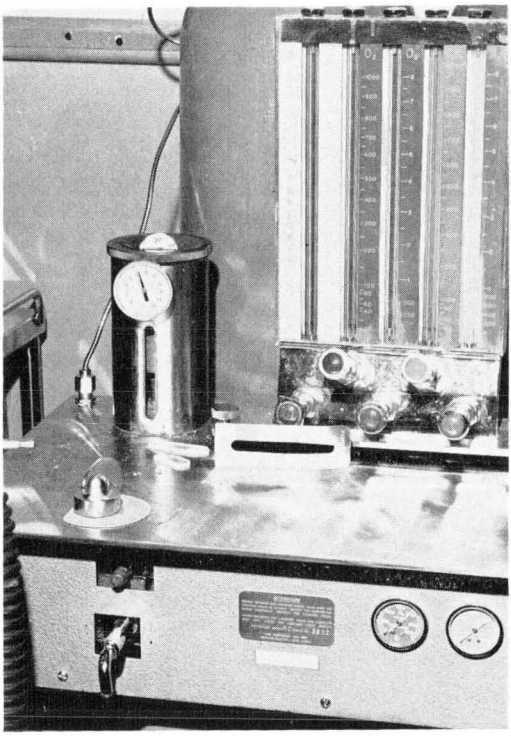

Fig. 1

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