

Vetamac Vapors

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Vol I, Issue 2

Welcome to the second quarterly edition of "Vetamac Vapors". The purpose of this newsletter is to educate your staff with a goal of the best possible patient care. We also would like to inform you of services and products that Vetamac has to offer and to provide support for all of your anesthesia needs. Future editions will cover topics on machines as well as different techniques. Please send comments to the e-mail link at www.vetamac.com.

Basic Function of the Anesthetic Machine, Part II

The anesthetic machine must deliver vaporized anesthetic agent to the breathing circuit in concentrations that are optimal for the desired effect. Since the liquid agent is in a closed system, a carrier gas must be present to deliver the vaporized agent to the breathing circuit. The gas used to accomplish this is the fresh gas flow of oxygen.

In almost all anesthesia machines used today, the liquid agent is contained in an agent specific vaporizer that is outside the patient breathing circuit. The fresh gas flows from the flowmeter to the vaporizer. A very precise portion of the flow is diverted into a vaporization chamber where it is saturated with vaporized anesthetic. It is then mixed with that portion of the flow that bypassed the vaporization chamber and is delivered to the breathing circuit.

The anesthetic vaporizer also has a thermal compensation device. This is necessary because the liquid anesthetic cools as vaporization occurs and makes vaporization more difficult. This device then diverts more of the flow into the vaporization chamber to compensate for the cooling. Most vaporizers are constructed of brass which conducts heat from the ambient air to the liquid to minimize the magnitude of the temperature change. This assures that the vaporizer output is constant despite changes in temperature.

Vaporizers have a dial with numbers from 0-5 for isoflurane and 0-8 for sevoflurane. These numbers represent volume percent, and indicate the concentration in percent delivered to the output of the vaporizer. If the fresh gas flow is 1 liter per minute and the dial is set at 2%, this means that 0.98 liters per minute of oxygen and 0.02 liters per minute of agent is leaving the vaporizer and is delivered to the breathing circuit. Doing the math, it is evident that if the fresh gas flow is 2 liters per minute, the amount of agent consumed will be doubled and vice versa. The same relationship is true related to the dial setting on the vaporizer.

It is important to remember that the numbers on the dial do not necessarily indicate depth of anesthesia. That is determined by assessing the patient, not the vaporizer setting.

Some vaporizers are filled with liquid agent by using a pin fill device. There is an agent specific spout that replaces the cap on the agent bottle. There is a keyed pin that fits into the fill manifold on the vaporizer. It is locked into place and the vaporizer is filled to the desired level on the window. Most vaporizers used in the U.S. have a funnel fill device and the liquid agent is simply poured into the vaporizer. Care must be exercised to avoid spillage. Anti-Spil™ adapters are available that replace the cap on the agent bottle and minimize the potential for spillage. The window that indicates the level of liquid in the vaporizer will help prevent over-filling of the vaporizer and will also indicate when the liquid level is low. Operating the vaporizer with the level too low may result in lower than indicated concentrations.

The fill cap on funnel fill vaporizers has an O-ring that seals against the funnel surface. Each time the cap is removed the O-ring and funnel surface should be wiped with a 4x4 gauze pad moistened with alcohol. This prevents the buildup of dirt particles that could cause a leak in the vaporizer.

All vaporizers have a drain plug to allow the vaporizer to be drained. This plug is usually in the center of the funnel fill device. Continuous removing of the cap to fill the vaporizer may cause the drain plug to become loose. This may result in agent leaking from the drain. The drain plug should periodically be checked to ensure that it is tight.

No vaporizer should be subjected to "blunt force trauma" as a result of moving the anesthetic machine or from other portable equipment being moved in the vicinity of the anesthetic machine. Not only can this result in external damage, but internal damage to the thermal compensating device may also occur.

The external surface of the vaporizer should be cleaned periodically using a 4x4 gauze pad moistened with alcohol. *No liquid should be poured or sprayed on the vaporizer for the purpose of cleaning.*

The calibration of the vaporizer should be checked periodically, and if necessary, the vaporizer should be serviced. Most vaporizers will provide many years of reliable service with proper care and maintenance.

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