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## Preventing Endotracheal Tube Fire During Pharyngeal Surgery

*To the Editor:*—A recent publication by Simpson and Wolf reported the fire hazard of using "spray" electrocoagulation during adenoidectomy and tonsillectomy in a 4-yr-old boy.<sup>1</sup> The ingredients required for a fire, ignition source, oxidizing agent, and combustible material were provided by the electrocautery, N<sub>2</sub>O/O<sub>2</sub>, and the endotracheal tube, respectively, the authors suggested that less flammable cuffed endotracheal tubes, and reduced FI<sub>O<sub>2</sub></sub> in N<sub>2</sub>, be considered when using "spray" electrocautery.

Several other techniques are available for reducing the risk of pharyngeal fire. To reduce the concentration of oxidizing agent in the oral cavity when using an uncuffed endotracheal tube, a moist, occlusive pharyngeal pack could be placed to reduce the leak of N<sub>2</sub>O/O<sub>2</sub> into the oral cavity. If any anesthetic/oxidizing agent leaked into the oral cavity, it could be effectively diluted by insufflating the oral cavity with a gas which does not support combustion, such as N<sub>2</sub>, He, or CO<sub>2</sub>.

Finally, the risk of igniting the endotracheal tube *via* stray electrical current could be reduced by using bipolar cautery rather than unipolar cautery. The current flow with the bipolar unit is between the electrode tips with little leakage current to the surrounding tissues. The unipolar cautery has its greatest current density at the active electrode tip, and it dissipates as distance from the tip

increases.<sup>2</sup> The current density in the tissues surrounding the active electrode is substantially less in the case of the bipolar electrocautery when compared with unipolar electrocautery. Therefore, the risk of igniting a fire from heating nearby combustible material is significantly reduced with bipolar electrocautery.

In summary, moist, occlusive, pharyngeal packing, oral insufflation of a gas which does not support combustion, and bipolar electrocautery may substantially reduce the risk of a fire when an uncuffed endotracheal tube is used during pharyngeal surgery in which electrocoagulation is employed.

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## Mass Spectrometer and/or Capnograph Use During Low-flow, Closed Circuit Anesthesia Administration

*To the Editor:*—During the past year, Ohmeda has received several reports of unusual occurrences during low-flow, closed circuit anesthesia administration (fresh gas flow rate less than 1000 ml/min). These occurrences were the result of the use of accessory monitors that remove a portion of gas from the patient circuit.

Monitors of this type, which primarily include mass spectrometers and capnographs, used with anesthesia gas machine systems, sample and analyze mixed gas from the patient circuit. With some devices, this sampling rate may approach or even exceed 250 ml/min. During very low flow anesthesia administration in closed circuit applications, the flow rate of fresh gas from the anesthesia machine could be less than the sampling rate of the mass spectrometer and/or capnograph.

If the sampling draw upon the circuit (withdrawal of

gas) continues for an extended period, the patient may ultimately be deprived of the necessary fresh gas. Room air also may enter the breathing system through any leaks that may exist. Fresh gas could then mix with entrained room air, resulting in unintended gas mixtures, in addition to unexpected variation in mass spectrometer and/or capnograph readings.

To avoid such occurrences, several things should be done. Foremost, with low-flow, closed circuit techniques, the flow rate of fresh gas must be significantly greater than the sampling rate of the monitoring system. In addition, the anesthesia gas machine system must be checked, following the manufacturer's recommended procedures, prior to use, to ensure that it is as leak-free as possible. Furthermore, it is important to use an oxygen monitor, to verify the oxygen concentration delivered by

the anesthesia system, and a volume monitor, to measure the volume exhaled by the patient.

In conclusion, it is important to recognize that these potential occurrences depend on the design and use of certain mass spectrometers and/or capnographs, in low-flow, closed circuit application. Both monitors provide valuable information when used and interpreted properly. However, for these monitors to be effective, they must be used in harmony with each specific anesthesia gas machine system.

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### Corneal Abrasion During Induction

*To the Editor:*—The incidence of corneal abrasion during general anesthesia was reported in one study as high as 44%.<sup>1</sup>

Recently, during an induction of general anesthesia, we identified two common, but unusual, hazards during direct laryngoscopy for endotracheal intubation.

In one instance, the anesthesiologist was wearing a waterproof watch on his left wrist, and the end of the plastic (belt style) watchband came perilously close to the patient's partially open left eye during laryngoscopy (fig. 1).

In the second, the anesthesiologist's hospital I.D. card, clipped to the vest pocket of his scrub suit, came very close to both eyes as he bent over slightly to perform direct laryngoscopy (fig. 2).

An informal survey in our department revealed that about 1/3 of anesthesiologists have similar watchbands and about 1/3 wear their I.D. cards clipped to the vest pocket.

It is common practice to attend to the protection of the patient's eyes just after induction of anesthesia and endotracheal intubation.<sup>2</sup> The two illustrations shown



FIG. 2. Plastic I.D. card perilously close to patient's left eye.

would suggest that patient's eyes should be protected before direct laryngoscopy.

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FIG. 1. End of plastic watchband noted very close to patient's left eye.