

Double-lumen Tube Fire during Tracheostomy

To the Editor:—Ignition of polyvinyl chloride tracheal tubes by diathermy (electrocautery) is an uncommon but serious complication that has been previously reported.^{1,2,*} However, fire involving a double-lumen tube has not been described. We report a case of ignition of a double-lumen tube that occurred during elective tracheostomy.

A 41-yr-old woman (ASA physical status 4) was scheduled for thoracotomy and tracheostomy. She had a 14-day history of streptococcal pneumonia with progressive respiratory failure. Her lungs were being mechanically ventilated, and an inspired oxygen concentration (FI_{O_2}) of 0.7 and positive end-expiratory pressure (PEEP) of 7.5 cmH₂O were necessary to maintain normoxia. Sedation was achieved with an infusion of midazolam and morphine.

Upon arrival in the operating room, ventilation was continued with isoflurane in oxygen. The single-lumen tracheal tube was replaced with a left-sided 37-Fr Broncho-Cath (Mallinckrodt) double-lumen tube, lubricated with lidocaine 2% gel. The patient was turned to the right lateral position, and drainage of left empyema and left lower lobectomy were performed. The patient then was returned to the supine position for tracheostomy.

Throughout the operation, the FI_{O_2} was 1.0, and the PEEP was 10 cmH₂O. As the final incision was made through the tracheal wall with a diathermy pencil on coagulation mode, the tracheal cuff of the double-lumen tube burst and ignited intensely. The wound was covered with a wet swab, and the double-lumen tube was immediately withdrawn and replaced with a cuffed tracheostomy tube.

Although there was some localized charring of tissue at the tracheostomy site, there was no other apparent damage further down her

trachea and bronchi. The patient ultimately died because of progression of her original illness.

Examination of the double-lumen tube (fig. 1) revealed a 4.5-cm-long burn that was confined to the tracheal (proximal) cuff with small areas of molten plastic apparent within both lumina of the tube.

The risk of tracheal tube fire is much reduced if the FI_{O_2} is less than 0.3.^{3,4} However, this was not possible in this patient, as indeed it would not be feasible for many critically ill patients who require tracheostomy. Simpson and Wolf⁵ have reported a case of fire involving a 4-yr-old boy. They postulated that a cuffed tracheal tube would have resulted in the presence of air rather than pure oxygen in the pharynx, which in turn would be less likely to support combustion. In our case, rupture of the tracheal cuff exposed the upper trachea to an atmosphere of 100% oxygen, well known to support combustion. With a double-lumen tube it is generally not possible to advance the tube further down the trachea to place the tracheal cuff distal to the tracheostomy incision. Furthermore, it is common practice to ventilate the lungs with 100% oxygen for the few minutes prior to the change from tracheal tube to tracheostomy tube. Despite these common practices, we can find only one* prior case report of a fire during tracheostomy.

We recommend that, if possible, the cuff of a single-lumen endotracheal tube should be advanced distally to the proposed tracheal incision, with care taken to maintain ventilation of both lungs, and that the use of diathermy during tracheal incision be kept to a minimum (if used at all). It is rare to perform a tracheostomy with a double-lumen tube *in situ*. Perhaps it would be safer to reinsert a single-lumen tube before proceeding to tracheostomy if diathermy is going to be used.

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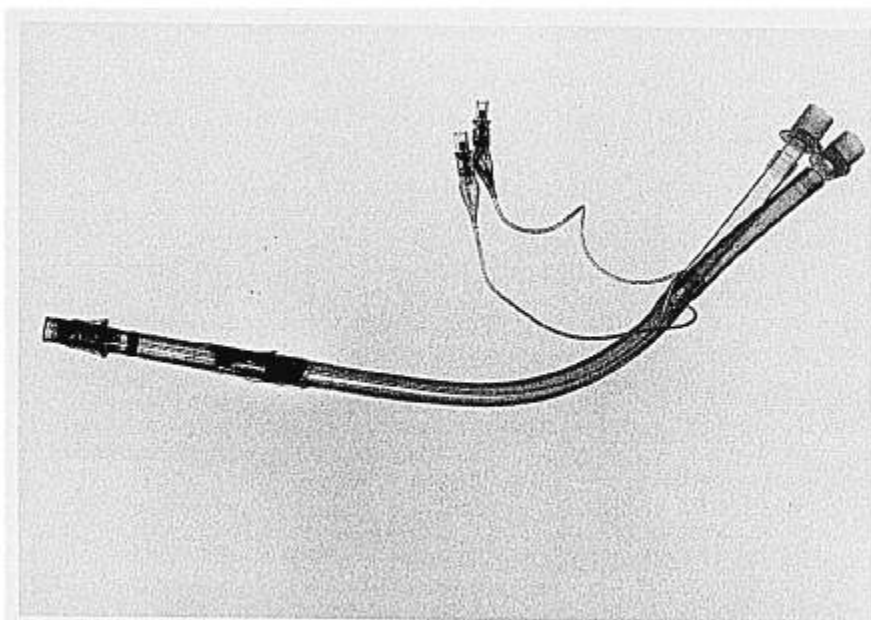


FIG. 1. The burnt left-sided Broncho-Cath double-lumen tube following removal.

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Signs for Flowmeters

To the Editor:—Hospitals in developing countries are often the recipients of anesthetic machines from developed countries. Flowmeters on such machines, however, may be differently configured from machines already in use. For example, anesthetic machines from the United States may have the oxygen flowmeter to the right of the flowmeter bank, whereas on those from the United Kingdom or some European countries it is the nitrous oxide flowmeter that is located in this position. Having both types of machines in use within the same operating room suite may cause confusion among anesthesiologists or nurse anesthetists who have to use them. This confusion may lead to errors in administration of nitrous oxide instead of oxygen, with potentially lethal results.

Although monitoring devices, *e.g.*, oxygen analyzers and pulse oximeters, would give early warning of such an error, these are not readily available in developing countries because of their cost. It is obvious that a system using a single type of anesthetic machine would be best. However, given the financial constraints of hospitals in developing countries, sufficient funding often is not available to purchase machines for all the work areas. These hospitals therefore often have to rely on gifts of anesthetic machines, in good working condition, from donor countries.

In an effort to minimize the confusion that may result from using different machines and flowmeter configurations at the University Hospital of the West Indies, we have devised a system using plastic signs to make the difference between machines more visible. The signs are placed at the top of the flowmeter bank (fig. 1) and are asymmetrical and color-coded. The one for oxygen is 6 × 7.5 cm with green letters on a white background, and that for nitrous oxide is 5 × 7.5 cm with white letters on a blue background.

Measures could have been undertaken to have the oxygen flowmeter, needle valve, and inlet nipple relocated on the machines, but we believed that this might interfere with the integrity of the machine. In addition, such a procedure in a developing country would have been carried out by a non-factory-trained technician. This exercise would also have been more expensive than the cost for the signs.

Although we are not suggesting that this simple measure will completely prevent errors in the administration of oxygen or nitrous oxide, we believe that the larger signs will more readily alert anesthesiologists

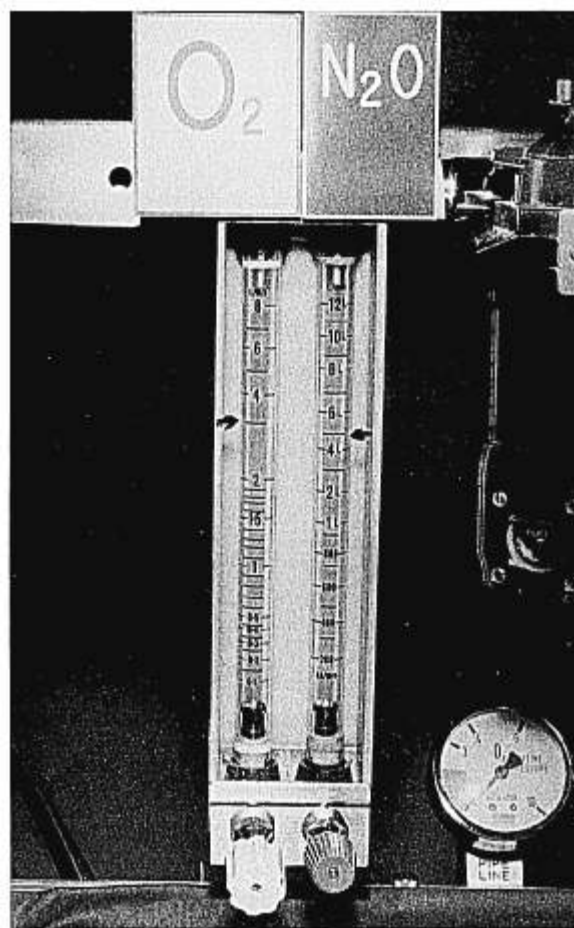


FIG. 1. Flowmeter with oxygen and nitrous oxide signs attached.