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LETTER TO THE EDITOR

Operating room fires – a South African ENT perspective and recommendations

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We would like to bring to the attention of the surgical community the results of a survey we conducted amongst the ear, nose and throat (ENT) community regarding the rare but potentially fatal airway fires in the operating room and highlight the need for attention to be given to the prevention and management of all operating room fires.

A fire occurs when there is ignition of combustible material.[1] Three components are required – fuel, a source of ignition and oxygen. In ENT surgery, the airway is shared between surgeon and anaesthetist. Oxygen is free flowing throughout the procedure. There is an inverse relationship between the ignition energy required to start a fire and the oxygen concentration available.[2] Reduction of the oxygen concentration intraoperatively is by far the most important preventive measure. Alcohol cleaning solution, the patient's own tissues, towel drapes and endotracheal tubes are sources of fuel. Laser and electrocautery are potential sources of ignition.

In colonic surgery the presence of methane and hydrogen in the colon is a result of fermentation of nonabsorbable or incompletely absorbed carbohydrates by colonic flora. Mannitol-based bowel preparations has been associated with increases in combustible gas production.[3] In neurosurgery, draping and use of an oxygen mask with 6 L/min of oxygen results in oxygen concentrations of 35–50%.[3]

Operating room fires occur at least 650 times annually.[3] Airway fires, on the other hand, are regarded as 'never events'.[4] The incidence in the United States is between 50 and 200 annually.[5] Although classified as airway emergencies, there is a paucity of data in the literature regarding their occurrence in the low- and middle-income countries (LMICs).

The survey had 37 respondents. Nine had experienced 12 airway fire incidents – five resulted from laser, two from monopolar diathermy and in five there was no specified cause. They occurred during surgery on the larynx (4), the trachea (2) and the oropharynx (1). Supplemental oxygen was in use in seven patients. The endotracheal tube and towel drapes were burnt in 10, the oral cavity in one patient and the neck in one patient. These findings are similar to those of Smith and Roy.[6] In their survey, the majority of fires occurred during endoscopic airway surgery. In addition, 81% of fires occurred while supplemental oxygen was in use.

Operating room fires pose an occupational hazard to staff and a financial burden to the hospital through damage of theatre equipment and a litigation risk to the surgeon.[7] It therefore behoves the surgical team to understand the mechanisms involved in fire incidents to ensure safe practice by adopting preventive and management strategies. We recommend the following measures be taken.

A representative from the supplier of the laser must always be in the operating room, until proficiency of its use is achieved. Eye protection must be available for all personnel. Extra eye protection must be available at entrances to the room for anyone who enters the operating room. Standard prescription eyeglasses are sufficient for CO_2 laser, although side-guards are recommended. "Non-flammable" endotracheal tubes may be used, and the cuff must be filled with saline dyed with methylene blue. The patient's eyes must be shut with tape and moist pads placed over the covered eyelids. An open container filled with saline must be immediately available to douse a laser fire. To minimise the possibility of a "blow-torch effect", wet swabs must be placed around the endotracheal tube. The "locking key" to the laser machine should be accessible only to persons trained in the use of laser. It should not be stored in or on the laser machine but kept in a secure location. Keep the laser turned off or in "standby" mode unless in use. Only brushed, beaded or sand-blasted instruments must be used to prevent reflection of the laser beam. The surgeon should give the anaesthetist prior warning to reduce the FiO_2 before the laser is activated and wait for clearance before proceeding. Throughout the procedure, maintain the FiO_2 as low as is clinically feasible. The surgeon must communicate at all times when commencing and ceasing laser use.

Conclusion

It is the responsibility of all staff working in operating rooms to be aware of the risks involved. Although laser was the most common cause of airway fires, its use must not be discouraged, rather safety must be emphasised as outlined above. Supplemental oxygen must be kept on the lowest feasible level. Communication amongst the team is crucial.

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Conflict of interest

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