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An Aid in Cases of Difficult Tracheal Intubation

We noted with interest Dr. Cahen's recent letter regarding the use of the laryngotracheal analgesia cannula as a guide for tracheal intubation.¹ The technique, though blind, has been used by us many times over the last 14 yr to "save the day" when confronted with an unanticipated, difficult intubation. It is, however, worth noting that this is not a new technique and that it was described previously by Rosenberg and colleagues.²

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CO₂ Laser Resistance of Various Ointments and Tapes

To the Editor:—With the frequent use of lasers in the management of disorders of the upper airway, laser-induced airway fires have been recognized as a cause of severe morbidity. Much research has been focused on improving the resistance to ignition of endotracheal tubes and on limiting the use of combustion-supporting gases. We have chosen to investigate in the laboratory the risk of combustibility of tapes and ointments that are commonly used in and around the airway during laser surgery. Although there exists the opinion that one should avoid petroleum-based preparations near the laser or electrocautery, there is a paucity of research in this area.

We assembled several varieties of tapes and topicalizing ointments and gels. A Coherent 450 XL CO₂ laser (Palo Alto, CA) was set at 20 W with a beam diameter of 1.0 mm (clinically relevant settings) in the continuous mode for up to 30 s. All items were studied under two conditions: 1) room air and 2) an O₂/air mixture yielding a net O₂ concentration of 40% blown onto the study material at 6 l/min. All tapes were studied both as 1) a single layer suspended in air between

two points and as 2) a wad of tape formed by carefully folding the tape on itself so as to exclude air between the layers, to a total of ten layers thick, and placed on a slightly moist towel.

The following were noted: 1) time to ignition in room air, 2) time to ignition in 40% O₂, 3) continuance of the flame with removal of the laser, and 4) continuance of the flame with removal of the supplemental O₂.

Results are shown in table I. Of the tapes tested in 40% O₂, the 3M 1525 Blenderm[®] was the slowest to ignite, followed by the Johnson & Johnson Dermaclear[®], followed by the Johnson & Johnson silk. We no longer intend to use the Ortholetic[®] or Micropore[®] "paper tape" during laser surgery.

Second, in the presence of 40% O₂, tape repeatedly wrapped (a wad) was less susceptible than a single layer of tape to ignition. In room air, a lessened susceptibility to ignition of the wad could be demonstrated only with the Micropore[®] "paper tape".

Third, it is apparent that supplemental O₂ promotes combustion,

TABLE I. Time to Ignition and Duration of Flame

	Room Air		40% O ₂		
	Time to Ignition (s)	Fire Persisted after Laser Removed	Time to Ignition (s)	Fire Persisted after Removal of:	
				Laser	Supplemental O ₂
Tapes					
3M 1525 Blenderm®	*	No	1 layer: 5 wad: DNI	No	NA
Johnson & Johnson Dermaclear® 1/2-inch	DNI	NA	1 layer: 2 wad: 3	NA Yes	NA Yes
3M 1530 1/2-inch Micropore® (paper tape)	1 layer: 1 wad: DNI	Yes NA	1 layer: 1 wad: 8	Yes Yes	Yes Yes
Ortholetic® 1-inch waterproof adhesive tape	1 layer: 1 wad: 1	Yes Yes	1 layer: 1 wad: 1	Yes Yes	Yes Yes
Johnson & Johnson silk	DNI	NA	1 layer: 1 wad: 1	Yes Yes	Yes Yes
Ointments and Gels					
Astra® flavored 5% Xylocaine ointment	1 †	No	1	Yes	Yes
Allergan® Lacrilube NP™	DNI	NA	DNI	NA	NA
Astra® Xylocaine 2% jelly	DNI	NA	DNI	NA	NA
Surgilube® lubricant	DNI	NA	DNI	NA	NA

* A very small, very transient (<0.1 s) flame appeared several seconds into the trial; it was not sustained.

† Ignited only when the laser was directed on a thin edge of the

material.

DNI = Did not ignite; NA = Not applicable.

since all five tapes supported combustion with continued laser energy and supplemental O₂. It is conceivable that there could be a slightly increased percentage of O₂ (i.e., >21%) in and around the patient's airway and face under some conditions, e.g., a small leak around the cuff when administering a fractional inspired O₂ concentration (FI_{O₂}) greater than 21%. Based on our results, an increased O₂ concentration will facilitate combustion of adhesive tape when contacted by a CO₂ laser.

Fourth, our results lend some support to Carpel *et al.*,¹ who noted that Lacrilube® does not ignite when in contact with electrocautery in an O₂-enriched setting; this is in contrast to Datta's² finding that Lacrilube® mixed with hair clippings did ignite under the same conditions.

Fifth, because Hirshman and Smith³ previously have reported indirect ignition of an endotracheal tube (via presumed primary ignition of nearby tissue) during laser surgery, our work suggests another potential source of indirect ignition. We had frequently used Astra® flavored 5% xylocaine ointment (containing polyethylene glycols and propylene glycol) to anesthetize airways topically and to lubricate the endotracheal tube for easier insertion. One can now conceive that indirect ignition of an endotracheal tube could occur should the CO₂ laser strike any Astra® xylocaine ointment remaining in the oropharynx positioned near the endotracheal tube.

Sixth, the plastic tapes tended to be less combustible than the cloth or paper tapes. Also, the plastic appeared to vaporize rather than to melt.

Finally, although the Blenderm® and Dermaclear® tapes were the most resistant to CO₂ laser ignition of all of the five tapes commonly used for securing the endotracheal tube, it is apparent that care must be taken to avoid contact of the laser with all of these tapes.

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