JONATHAN L. BENUMOF, M.D.
Professor of Anesthesia

SHEILA GAUGHAN, M.D.
Resident in Anesthesia

GEORGE T. OZAKI
Specialist in Anesthesia

RON RUSK, C.P.T.
Anesthesia Monitoring Laboratory

Department of Anesthesiology
University of California, San Diego
Medical Center, H-770A
225 Dickinson Street
San Diego, California 92103-1990

REFERENCES

1. Bedger RC, Chang JL. A Jet Stylet Catheter for Difficult Airway Management. ANESTHESIOLOGY 66:221–223, 1987
2. Benumof JL, Scheller MS. Importance of Transtracheal Jet Ventilation in the Management of the Difficult Airway. ANESTHESIOLOGY 71:769–778, 1989

(Accepted for publication February 12, 1991.)

Anesthesiology
74:964, 1991

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]

RICHARD M. SOMMER, M.D.
Assistant Professor of Anesthesiology

LEVON M. CAPAN, M.D.
Associate Professor of Clinical Anesthesiology

New York University School of Medicine and Department of Anesthesiology
New York University Medical Center
550 First Avenue
New York, New York 10016

REFERENCES

1. Cahen, CR: An aid in cases of difficult tracheal intubation. ANESTHESIOLOGY 74:197, 1991
2. Rosenberg MB, Levesque PR, Bourke DL: Use of the LTA® kit as a guide for tracheal intubation. Anesth Analg 56:287–288, 1977

(Accepted for publication February 13, 1991.)

Anesthesiology
74:964–965, 1991

CO_2 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 CO_2 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 O_2/air mixture yielding a net O_2 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% O_2, 3) continuance of the flame with removal of the laser, and 4) continuance of the flame with removal of the supplemental O_2.

Results are shown in table 1. Of the tapes tested in 40% O_2, 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% O_2, 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 O_2 promotes combustion,

TABLE 1. Time to Ignition and Duration of Flame

	Room Air		40% O_2		
				Fire Persisted after Removal of:	
	Time to Ignition (s)	Fire Persisted after Laser Removed	Time to Ignition (s)	Laser	Supplemental O_2
Tapes					
3M 1525 Blenderm®	*	No	1 layer: 5	No	NA
			wad: DNI	NA	NA
Johnson & Johnson Dermaclear® ⅓-inch	DNI	NA	1 layer: 2	Yes	Yes
			wad: 3	Yes	Yes
3M 1530 ½-inch Micropore® (paper tape)	1 layer: 1	Yes	1 layer: 1	Yes	Yes
	wad: DNI	NA	wad: 8	Yes	Yes
Orthaletic® 1-inch waterproof adhesive tape	1 layer: 1	Yes	1 layer: 1	Yes	Yes
	wad: 1	Yes	wad: 1	Yes	Yes
Johnson & Johnson silk	DNI	NA	1 layer: 1	Yes	Yes
			wad: 1	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 O_2. It is conceivable that there could be a slightly increased percentage of O_2 (*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 O_2 concentration (FI_{O_2}) greater than 21%. Based on our results, an increased O_2 concentration will facilitate combustion of adhesive tape when contacted by a CO_2 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 O_2-enriched setting; this is in contrast to Datta's[2] finding that Lacrilube® mixed with hair clippings did ignite under the same conditions.

Fifth, because Hirshman and Smith[3] 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 CO_2 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 CO_2 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.

JAMES M. GREEN, M.D.
Resident

NASSER SONBOLIAN, M.D.
Clinical Associate Professor

RENE M. GONZALEZ, M.D.
Clinical Associate Professor
Chief Anesthesiologist

CHRISTOPHER E. LARSON, D.M.D., M.D.
Assistant Professor

PAUL REHKOPF, C.C.E.
Department of Ophthalmology

University of Pittsburgh
Eye and Ear Institute Pavilion
Montefiore University Hospital
Department of Anesthesiology and Critical Care Medicine
230 Lothrop Street
Pittsburgh, Pennsylvania 15213

REFERENCES

1. Carpel EF, Rice SW, Lang M, Schochet HL: Fire risks with ophthalmic ointments (letter). Am J Ophthalmol 100:477–478, 1985
2. Datta TD: Flash fire hazard with eye ointment (letter). Anesth Analg 63:698–703, 1984
3. Hirshman CA, Smith J: Indirect ignition of the endotracheal tube during carbon dioxide laser surgery. Arch Otolaryngol 106: 639–641, 1980

(Accepted for publication February 13, 1991.)