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Hazard Associated with Using CO_2 as the Cooling Gas during Endobronchial Nd:YAG Laser Therapy

To The Editor:—During Nd:YAG laser therapy, a coaxial flow of gas around the fiberoptic guide light is necessary to cool the tip of the fiber and to blow away debris.[1] The source of gas is usually a cylinder connected to the co-axial sheath of the laser at a fixed pressure. CO_2 is often used as the cooling gas in the gastrointestinal tract[2] due to its rapid absorption; however, only air or helium in oxygen are recommended in the upper respiratory tract.[3]

We recently anesthetized a 66-yr-old female for Nd:YAG laser resection (Medilas 2 YAG, MBB-AT, Munich, West Germany) of a left mainstem bronchus lesion. The laser fiber was introduced through a 8.5-mm rigid bronchoscope. Ventilation was maintained *via* the side-arm of the bronchoscope using high fresh gas flows (10 l/min) of helium and O_2. The $P_{ET}CO_2$ was monitored using an infrared sensor and cuvette (Hewlett-Packard® 47210A, Waltham, MA) placed between the 'Y' piece of the circle system and the bronchoscope connection. This allowed us to obtain satisfactory capnograms despite leakage of gas around the bronchoscope. Prior to activation of the laser, we were able to keep the $P_{ET}CO_2$ less than 50 mmHg. However, each time the laser was activated, we noted a step increase in $P_{ET}CO_2$ to over 80 mmHg (fig. 1). These increases were of short duration, and were always temporally related to laser activation. Identical increases were observed by concurrent mass spectroscopy (Perkin Elmer Advantage, Pomona, CA). Arterial blood gas analysis during a period of $P_{ET}CO_2 > 80$ mmHg revealed a P_aCO_2 of 54 mmHg. We then realized that CO_2 was being used as the cooling gas instead of air. At this stage, the resection was nearly complete, and the procedure concluded uneventfully.

Postoperatively, we measured the flow of CO_2 from the laser tip during laser activation (with the laser unarmed) using a spirometer (9 liter respirometer, WEC Inc., Braintree, MA). The driving pressure into the laser was adjusted to 2 bar as per the manufacturer's recommendations. We found that the baseline CO_2 flow rate was 335 ml/min. However, when the laser was activated, the flow increased to 1.5 l/min. Other Nd:YAG laser systems use cooling gas flows as high as 4.8 l/min.[3] Adequate ventilation during bronchoscopy in patients with narrowed airways is often difficult, and a temporary increase in Pa_{CO_2} is sometimes unavoidable. In these situations, it may be dangerous to add CO_2 to the inspired gas. CO_2 is often used as the cooling

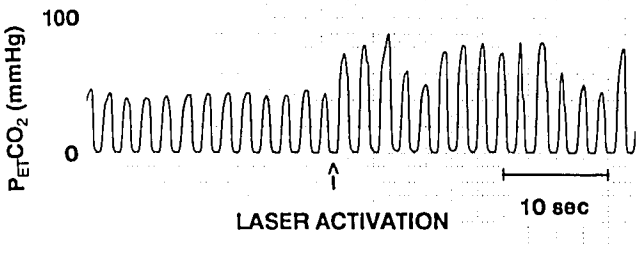

FIG. 1. Increase in $P_{ET}CO_2$ during activation of Nd:YAG laser.

gas during laser therapy in the gastrointestinal tract, and there is always a risk that a CO_2 cylinder may be inadvertently left connected during a subsequent therapy in the trachea or bronchus. We recommend careful checking procedures to avoid this potential hazard. Only air, or helium in oxygen, should be used as the cooling gas during endobronchial Nd:YAG laser therapy.

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Quality Assurance: Irrelevant Data is Never Inexpensive Enough

To the Editor:—In their recent study, Cooper *et al.* listed and defined Recovery Room Impact Events (RRIEs) as the basis for a quality assurance program.[1] However, despite attention to RRIEs in over 12,000 patients, the authors could not show a significant change in clinical outcome attributable to them. This negative finding should have at least caused a discussion of the underlying validity of the RRIEs. It surely did not support their final conclusion, that RRIEs measure an important component of outcome, and are an appropriate addition to the anesthesia record. Moreover, stating that opinion as a conclusion obscured the fact that RRIEs were assumed, rather than demonstrated, to be a significant measure of anesthesia care.

The heart of this study is the author's definition of the RRIE. This definition provides the sole justification for calling the RRIE a measure of anesthesia care. If it fails in that capacity, then the RRIE concept is undermined from the outset. Essentially, the definition of a RRIE is that it is: 1) undesirable, 2) pertinent to recovery room care, and 3) capable of causing morbidity or mortality. The problem is that each of these characteristics is too broad to be of use in measuring anesthesia care. Almost any action taken by an anesthesiologist, even injecting succinylcholine or performing laryngoscopy, has the potential of causing morbidity or mortality. Since the mere possibility of harm does not meaningfully distinguish risk from acceptable practice, how can that same possibility meaningfully measure the quality of anesthesia care? Similarly, pertinence to recovery room care includes much that has little to do with the measurement of anesthesia care. An example would be adding epinephrine to a spinal anesthetic. That action would be pertinent to recovery room care, but how does the pertinence measure anesthesia care?

This study may well have been testing the RRIEs themselves. The test was whether or not the information collected had significance to the clinical practice of anesthesia. If it did not, as the results seem to indicate, then stating this negative conclusion is important. It is especially important in a state like Massachusetts, where government regulators mandate extensive quality assurance and risk management activities.* The primary goal of these regulations is to ensure that patients receive optimal care.† Where the authors' recommendations cannot be shown to enhance clinical safety, they do not serve that goal. They may, in fact, subvert it by causing us to waste limited time and resources in irrelevant pursuits. Information that is not shown to be clinically relevant, no matter how cheaply bought, ultimately serves no one's best interest.

* 243 Code of Massachusetts Regulations 3.07 (1987).
† 243 Code of Massachusetts Regulations 3.01 (1987).