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Translaryngeal Cannula Ventilation: Continuing Misconceptions

To The Editor:—We read with some dismay the recent communication by Reich and Schwartz dealing with translaryngeal cannula oxygenation.[1] Although we do agree that placement of a translaryngeal cannula can be lifesaving in certain emergency airway management settings, we feel that this report perpetuates misleading and potentially dangerous conceptions about the proper use of this technique.

In their letter, the authors suggest that, after translaryngeal cannulation and by using readily available operating room equipment (O_2 tubing, a 10- or 20-cc syringe, and a standard endotracheal tube), the proximal port of an intravenous cannula could be attached to an O_2 source and a temporary airway provided in emergency situations. The authors' inference that a cannula as small as 18 gauge could be employed in adults should the need arise is contrary to previously published studies in this area. In the average adult, cannulae of 14 gauge or larger should be used.[2–7]* We would further suggest that only cannulae with sideholes be used for translaryngeal ventilation. These clearly lessen the risk of tracheal wall or mucosal damage.[8] Commercially available kits that provide cannulae designed specifically for translaryngeal ventilation are easily obtained.

Although an 18-gauge cannula connected to an O_2 source of 5 cm H_2O may provide approximately 500 ml/min of flow to the proximal airway,[9] this amount is clearly not sufficient for adequate ventilation. The authors' correctly recognized this fact, yet, by omitting a discussion of this significant problem, the letter hints that oxygenation alone is acceptable in these emergency situations. We strongly disagree, and feel that use of the proper materials and technique can supply an adequate airway and ensure adequate ventilation.

A more serious flaw in the letter is represented by the implication that O_2 sources with a driving pressure of as little as 5–50 cm H_2O are sufficient to sustain life when translaryngeal cannula methods are employed. There is ample evidence that, to adequately oxygenate and ventilate adult apneic patients through a cannula of 12–14 gauge, the driving pressure of the O_2 source must be 50 pounds per square inch (psi), approximately 3500 cm H_2O, or greater.[2–6] The use of lower driving pressures may result in serious hypercarbia and acidosis, and may also jeopardize any attempt at maintaining near-normal

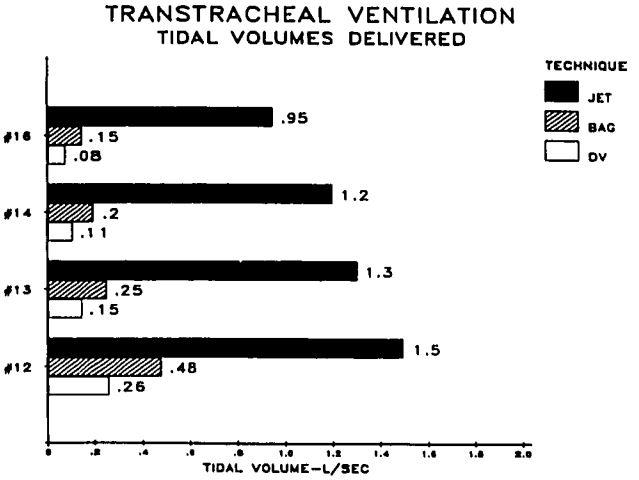

FIG. 1. Flow rates through a variety of cannulae (listed in gauge sizes on the left side of the graph) when supplied with either a bag-valve (BAG), demand valve (DV) of 50 cm H_2O, or high-pressure 50 psi (JET) source.

oxygenation. It must be emphasized that the 50 cm H_2O suggested by the report is equivalent to approximately 0.8 psi—a grossly inadequate driving pressure! Studies done at the University of Pittsburgh have confirmed the need for adequate driving pressures (50 psi or greater) to supply the needed volumes of gas that would maintain sufficient oxygenation and ventilation (fig. 1).† To employ O_2 sources with lower driving pressures (such as bag-valve methods), a cannula of at least 3.0 mm internal diameter has been shown to be necessary if proper airway management is desired.[6] Virtually every hospital room, including the operating room, has a source of O_2 of 50 psi or greater. Prior to passage through any regulator mechanisms, O_2 directly from the wall port is delivered at this pressure, and most anesthesia machines are equipped with a flush valve that allows for unregulated O_2 to be provided from the machine.[10] Either of these sources would be acceptable and easily accessible in emergency settings with a minimum of preparation. Interposition of a one-way valve (or a three-way stopcock) in tubing sturdy enough to tolerate the high pressure would allow for controlled intermittent ventilation. As shown in figure 1, use of a 13-gauge cannula and a 50-psi source can provide for greater than 1 l/sec delivered inspiratory volumes.

* American College of Surgeons Committee on Trauma: Advanced Trauma Life Support Student Manual. Chicago, 1984, p 26.

† Yealy DM, Stewart RD, Kaplan RM: Translaryngeal jet ventilation: Myths and misimpressions (abstract). Read before the Annual Scientific Assembly, Pensylvania Chapter of the American College of Emergency Physicians, Harrisburg, PA, April 22, 1987.

The proper application of the principles of translaryngeal cannula ventilation can provide adequate oxygenation and ventilation, and represents a valuable alternative in emergency settings. The use of cannulae of 14 gauge or larger, connected to O_2 sources of 50 psi or greater, will maintain adequate oxygenation and ventilation. The equipment needed is not expensive nor difficult to obtain. It has been previously shown that each operating room can be easily outfitted with the proper materials,[7,11] and nothing short of this should be acceptable. We should be prepared for all emergency situations and be satisfied only when the best possible methods are used in all patients. If we depend on ingenuity in the time of crisis instead of planned alternatives, we may fail our patient.

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On Gildar's Transtracheal Ventilation System

To the Editor:—The device described by Reich and Schwartz[1] using readily available equipment for emergency transtracheal ventilation has been previously described by Gildar.[2] The simplicity of this technique, consisting of the barrel of a 10–15-cc syringe attached to the transtracheal catheter with a cuffed endotracheal tube inserted into the barrel, has much to recommend it, and the credit should go to Dr. Gildar.

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In Reply:—We appreciate the obvious interest and experimental work of Drs. Yealy and Stewart in the area of transtracheal ventilation. However, there are several points that must be clarified. Firstly, the endotracheal tube-syringe barrel device that Gildar described[1] is strictly for transtracheal oxygenation, *not* for transtracheal ventilation. Frumin, Epstein, and Cohen demonstrated in 1959 that apneic oxygenation can be maintained for periods of 18–55 min.[2] Although hypercarbia and acidosis resulted, the lowest arterial oxygen saturation obtained was 98%.

Drs. Yealy and Stewart suggest that cannulae with