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Management of Cuff Incompetence in an Endotracheal Tube

To the Editor:—Maintaining a patent airway is of primary importance during anesthesia, especially in surgical procedures on the head and neck (*e.g.*, craniotomy) where replacing a defective tube (with a new one) is hardly feasible. We experienced trouble when the cuff of an endotracheal tube (AIR-CUF®) started to leak in the midst of removal of a large meningioma in a 67-yr-old female patient. Since we checked our cuff before intubating and we had a functional cuff before draping, we assume that a microperforation may have occurred, caused by the patient's teeth or the Magill forceps while intubating. Initial signs of cuff incompetence may have been hidden by secretions, while the increased N_2O pressure in the cuff later during the intervention may have distended it and made the perforation apparent. Maintaining normal ventilation in such cases is extremely difficult, since higher inspiratory flows are needed, resulting in higher airway pressures and, thus, higher intracranial pressure. Keeping the cuff inflated by injection of small volumes of air is a solution, but can hardly be kept up for several hours. A more comfortable and safe technique is one that inflates the cuff at a constant rate, by means of simple devices present in the operating theatre. We assembled a rotameter (Dräger, Lübeck, Germany), which delivered an arbitrary flow of oxygen, with a green flexible oxygen tube (Argyle®, Sherwood Medical) and a three-way infusion valve (Connecta®, Viggo Helsingborg, Sweden), leaving one way open to the air (fig. 1), and connected it to the air-inlet of the cuff. A constant flow of oxygen in this system exerts a certain pressure, which is flow dependent, in the cuff, and keeps it inflated. Pressure values in a microperforated PORTEX tube *in vitro* reached 3–4 mmHg with a flow of 1 l/min, 6–7 mmHg with a flow of 3 l/min, and 10–11 mmHg with a flow of 5 l/min. In practice, flow is adjusted until an adequate tidal volume is returned to the spirometer. The system lasted until the end of the surgical procedure. A similar, but more intricate, system has been described before.[1] In our system, there are two precautions to be taken, First, the patient should be adequately relaxed to keep intrathoracic pressures as low as possible; and second, the system should be open to air; if not, dangerous intraballoon pressures will result in cuff rupture. This method does not work for large perforations of the cuff.

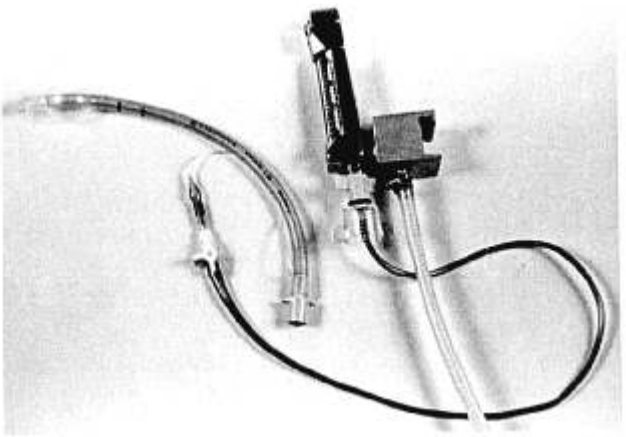

FIG. 1. Flowmeter attached to pilot tube of endotracheal tube *via* a three-way infusion valve also open to air.

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Ranitidine Prophylaxis in Outpatients

To the Editor:—The article by Manchikanti *et al.*[1] has several strengths. With the implementation of both randomization in the selection of groups and the use of a control, major biases which plague many studies, specifically selection bias, confounding bias, and chance, are eliminated. The paper does not, however, mention whether or not this was a blind study. Therefore, intra- or inter-observer error may have played a part in mea-

surement. If the measurements could, somehow, have been repeated, since a similar experiment has not been done, the aspects of consistency and reliability could be determined. Finally, patients with gastrointestinal disorders should have been studied as well. After all, it will be these patients, especially those with hypersecretory diseases, who will benefit the most from prophylactic administration of ranitidine.

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In Reply:—We would like to thank Keith P. Kittelberger for his comments. In response to his question about whether intra- or inter-observer error may have played a part in measurement of gastric contents, this was not a blind study. We believe, however, that observer bias was not a major factor in this study, as those evaluating the stomach contents, as well as laboratory technicians determining the *p*H, were not aware of premedication. To address the questions of repeating the measurements, as well as studying the patients with gastrointestinal disorders, it will require two separate studies, and we welcome other investigators to conduct such studies.

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Questions Concerning Aspiration Prophylaxis Study

To the Editor:—I am disturbed by an apparent inconsistency in the anesthetic management of patients in the study by Manchikanti *et al.*, dealing with the effectiveness of intravenous ranitidine in outpatients.[1] The purpose of their study was to establish the dose of ranitidine required to reduce gastric contents below 0.4 $ml \cdot kg^{-1}$ and to elevate gastric *p*H above 2.5. Inherent in the study design is the need to have a control group with no pharmacologic protection and groups in which pharmacologic protection may be incomplete. The authors fail to state whether an endotracheal tube was used. Yet, a gastric tube was passed which would further increase the risk of regurgitation. I find it unfortunate that pharmacologic protection is emphasized without a single comment concerning the most important aspect of aspiration prophylaxis, that of proper airway management.

There are also larger questions which could have been addressed. Should all patients be considered at risk for regurgitation and aspiration? If not, how do we identify those who satisfy the laboratory criteria of risk? Should all patients at risk receive pharmacologic protection (the authors do advocate this)? If it is not agreed that all patients at risk require pharmacologic protection, then should they all be intubated? If not, are we dealing with a laboratory definition of aspiration risk which is not accepted as a clinically significant definition of aspiration risk?

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(Accepted for publication November 17, 1986.)