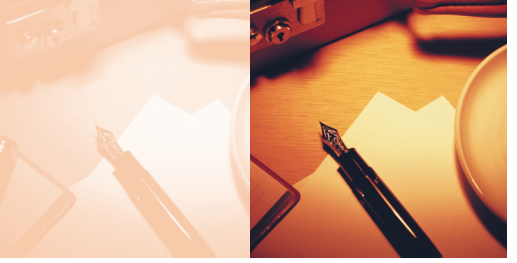

LETTERS

A COMPARISON OF ENDOTRACHEAL TUBE CUFF PRESSURES USING ESTIMATION TECHNIQUES AND DIRECT INTRACUFF MEASUREMENT

Letter to the Editor:

I read with great interest the article in the December 2003 *AANA Journal* titled "A comparison of endotracheal tube cuff pressures using estimation techniques and direct intracuff measurement."[1] I commend the authors for performing this study and elevating the consciousness of the national anesthesia community with respect to the issue of appropriate management of endotracheal tube cuff pressure. I also read with interest the Letter to the Editor written by John Karnes.[2] Both authors support findings that I published in 1995[3] in which I point out the dichotomy that exists between intraoperative care and care in critical care units with respect to cuff pressure.

In my study, I looked at 2 key issues: the initial cuff pressure achieved by methods of cuff inflation commonly used in clinical practice and also how rapidly the intracuff pressure rises from aspiration prevention level (19 mm Hg) to the pressure associated with beginning tracheal ischemia (25 mm Hg) during 50% to 70% nitrous oxide use. I observed the use of 3 primary techniques to inflate cuffs in the operating room setting. These were:

1. Minimal occlusive volume technique: the cuff is inflated to just seal, air is removed 0.2 cc at a time until seal is lost, and then air is added in 0.2-cc increments to again achieve seal.

2. Palpation: the provider palpates the cuff for appropriate tension.

3. Predetermined volume: the provider injects a specific amount of cubic centimeters of room air into the cuff based on what is determined to be correct.

My findings were consistent with those of the current authors. I found that approximately 40% of patients started with an intracuff pressure below 19 mm Hg, 40% started with a pressure above 25 mm Hg, and 20% of patients started with intracuff pressure in the "ideal" range. I then adjusted all cuffs to a pressure of 19 mm Hg and measured time for intracuff pressure to increase to 25 mm Hg using 50% to 70% nitrous oxide. In my study, the median time for intracuff pressure to rise from 19 to 25 mm Hg was only 8 minutes during 50% to 70% nitrous oxide administration. Predetermined volume was the most commonly used technique and also generated the highest pressures with initial manometer readings often "off the scale" (Rusch Endotest, Rusch, Inc, Duluth, Ga). My conclusion in 1995 was that a manometer should be available on every gas machine, that predetermined volume technique should not be used, and that intracuff pressure should be measured whenever practical.

I also have recently observed a fourth technique now in common practice that I will call the "syringe technique," which is the use of a syringe continuously connected to the pilot balloon as a sort of pressure relief valve. The problem with this system is that not all syringes have the same "stick" characteristics and depending on the size and manufacturer, once the syringe comes back after the first pressure release, it then "sticks." A buildup of as much as 90 mm Hg pressure within the cuff is then necessary to get the syringe to restart illustrating the principle of static vs dynamic friction (personal communication, Charles Buffington, MD, Pittsburgh, Pa).

Primum non nocere

Finally, I would add my advocacy to that of Stewart et al[1] and Karnes[2] with but minor disagreement. There *is* a clear standard of care for intracuff measurement. It has been established for the postanesthesia care unit and critical care areas for more than 25 years and includes intermittent, *direct* measurement of endotracheal tube intracuff pressure. There is longstanding evidence that high intracuff pressure, even for brief periods, will result in tracheal injury. Whether the injury is immediately apparent or causes significant long-term effect is, in my opinion, irrelevant. As a profession, we must adhere to the ethical doctrine of *primum non nocere* (first do no harm)—our patients deserve no less.

REFERENCES

1. Stewart SL, Secrest JA, Norwood BR, Zachary R. A comparison of endotracheal

tube cuff pressures using estimation techniques and direct intracuff measurement. *AANA J.* 2003;71:443-447.

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3. O'Donnell JM. Orotracheal tube intracuff pressure initially and during anesthesia including nitrous oxide. *CRNA.* 1995;6:79-85.

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Response:

We appreciate the response to our study.[1] We referenced the findings from the O'Donnell study,[2] finding it to be pivotal to our study. We agree with his findings and support his conviction that all anesthesia providers have access to a manometer for direct pressure monitoring. His "minor disagreement" with our study is actually something we agree upon. There is a standard in the critical care, postanesthesia care, and respiratory care arenas. What we report is the lack of a standard in the field of anesthesia specifically. Although some aspects of care in anesthesia overlap other areas of patient care, certain standards do not. We support an effort to make direct cuff pressure measurement and monitoring a standard in the field of anesthesia practice.

REFERENCES

1. Stewart SL, Secrest JA, Norwood BR, Zachary R. A comparison of endotracheal tube cuff pressures using estimation techniques and direct intracuff measurement. *AANA J.* 2003;71:443-447.
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