

## *Elevation of PETCO<sub>2</sub> after submucosal epinephrine*

To the Editor:

A 14-yr-old boy with chronic sinusitis presented for a Caldwell-Luc procedure, ethmoidectomy, and antrostomy. Induction of anaesthesia was accomplished with thiopentone and pancuronium followed by uneventful tracheal intubation and was maintained with isoflurane 0.75%, nitrous oxide 60%, and fentanyl. The surgeon injected 6 ml lidocaine (1%) with 1:100,000 epinephrine submucosally. Approximately 20 sec later PETCO<sub>2</sub> increased from 32 to 40 mmHg and remained elevated for three minutes. The continuous CO<sub>2</sub> wave form analysis was measured by infrared spectrometry and verified with mass spectrometry every two minutes. Minute ventilation had remained constant. Increases in heart rate, blood pressure (130/60 to 170/90 mmHg), and oesophageal temperature (36.1° to 36.4°) accompanied the CO<sub>2</sub> elevation. After three minutes the PETCO<sub>2</sub> returned to 32 mmHg without any changes in ventilation. Similar changes followed two subsequent injections of 1% lidocaine with epinephrine.

Barber<sup>1</sup> studied the haemodynamic and plasma catecholamine response to perianal injection of lidocaine 0.5% with 1:200,000 epinephrine and noted a rise in serum epinephrine levels without appreciable changes in heart rate or blood pressure. Chernow<sup>2</sup> observed similar results in dental patients given 1.8 ml lidocaine 2% with 1:100,000 epinephrine. Increases in serum epinephrine levels occurred without changes in blood pressure or heart rate. In our case, the increase of blood pressure and heart rate following submucosal injection of lidocaine and epinephrine may have been due to injection into inflamed, vascular sinuses where rapid vascular absorption occurred in close proximity to the heart.

Epinephrine may increase exhaled CO<sub>2</sub> through several mechanisms. Bronchodilation could increase alveolar dead space thereby reducing effective ventilation; increased cardiac output may increase CO<sub>2</sub> returned to the lungs without changing metabolic rate; peripheral vasoconstriction might increase central blood volume and pulmonary blood flow; lung zone characteristics may be altered to convert Zone 1 to Zone 2 or 3 with a decrease in dead space and an increase in exhaled CO<sub>2</sub>; and epinephrine may increase metabolic rate.

We observed an increase in PETCO<sub>2</sub> after submucosal injection of epinephrine. We feel this was related to the rapid systemic absorption of epinephrine from the site of injection. The patient suffered no ill effects. Nevertheless, close attention should be given to the concentration, volume, and location when using epinephrine-

containing solutions. Since submitting this report, we have observed this phenomenon in one additional patient.

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### REFERENCES

- 1 Barber WB, Smith LE, Zaloga GP, et al. Haemodynamic and plasma catecholamine responses to epinephrine-containing perianal lidocaine anesthesia. *Anesth Analg* 1985; 64: 924-8.
- 2 Chernow B, Balestrieri F, Ferguson CD, Terezhalmay GT, Fletcher JR, Lake CR. Local dental anesthesia with epinephrine. Minimal effects on the sympathetic nervous system or on hemodynamic variables. *Arch Intern Med* 1983; 143: 2141-3.

## *Laryngoscope design*

To the Editor:

I would like to make some comments on "An analysis of laryngoscope blade shape etc," by Drs. Marks, Hancock and Charters - in the March 1993 issue of the CJA. The primary purpose of this very stimulating study was to describe a novel laboratory method of evaluating existing and future laryngoscope blades. The results also have important, immediate clinical implications. The superiority of the larger Macintosh (Penlon) blades over straight blades is clearly demonstrated. This is no surprise; these blades are preferred by the majority of anaesthetists since their inception 50 yr ago. Another more important finding is not given the prominence it deserves. According to the measurements the Macintosh #4 blade is superior to #3 blade - even at 12 cm and much more so at 15 cm. Unfortunately, no clinical deductions were made by the authors. In fact the two blades are often grouped together as "larger Macintosh blades".

Clinical teachers will be able to refer residents to this study when arguing in favour of the larger blade. Some other clinical observations in the operating room may also convince the resident of the superiority of the #4 blade.

- 1 Looking at the lateral (outside or left) surface of both blades with their tips aligned, the tallest portion of the vertical flange of the #3 blade will lie very likely between the teeth of an adult whereas the tallest portion of the #4 blade will be well outside the mouth.