


Sir.—We wish to comment on the letter from McDonald [1] in which the management of a difficult airway is described using alfentanil and propofol. We are unclear why inhalation induction preceded fibreoptic intubation. It has been shown that awake fibreoptic intubation maintains the natural airflow and there is easier identification of upper airway structures than when the patient is asleep [2]. Although propofol–alfentanil is useful for intubation without neuromuscular block in uncomplicated patients, in our experience the dose of alfentanil used produces a prolonged period of apnoea. As it was difficult to ventilate the lungs of this patient, the use of a technique likely to cause apnoea appears contraindicated. The argument that alfentanil can be antagonized safely with naloxone is unfounded as there are numerous reports of complications after opioid antagonism by naloxone [3].

We feel that in this case the technique of choice is awake fibreoptic intubation as, in the words of Benumof, “no bridges are burned” [4]. If this was unsuccessful we would then proceed to a retrograde intubation technique with the patient awake at all times.

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**Prediction of arterial from end-tidal \( P_{\text{CO}_2} \)**

Sir.—The correspondence [1] between Dr Farmery and Dr Fletcher on prediction of arterial \( P_{\text{CO}_2} \) from end-tidal \( P_{\text{CO}_2} \) is interesting, both theoretically and practically. The observations of Dr Farmery in a young healthy subject of the difference between end-tidal and mean alveolar \( P_{\text{CO}_2} \) in relation to tidal volume, are of interest, but I wish to sound a note of warning concerning the apparatus used.

The Hewlett-Packard capnometer (HP47210A) analyses carbon dioxide in the mainstream gas, by means of a window in an airway adapter inserted in the respired gas pathway. In contrast with sidestream sampling devices, when gas has to pass from the sample port by way of a catheter to the analyser, one might assume that with the Hewlett-Packard instrument there is no delay in the analysis of this gas, and hence the signal output represents the gas composition in the adapter. Unfortunately, the Hewlett-Packard device does not provide a real-time measure of carbon dioxide in the respired gas pathway. There is a degree of delay, presumably because the signal is manipulated digitally within the measuring device. I have attempted to measure the delay time and the response time of the capnometer and found that there do not seem to be unique values for these variables. In particular, there appears to be a considerable degree of smoothing of the analogue output signal and the 1:8 ratio is altered.

The plot shown by Dr Farmery depends upon end-tidal carbon dioxide measurements and these may well be correct. However, he goes on to make measurements of \( \frac{dP}{dV} \), which is the rate of change of \( P_{\text{CO}_2} \) with exhaled volume, within a single breath. To do this accurately requires the exhaled volume at a particular instant to be related to the \( P_{\text{CO}_2} \) in the airway at the same instant. Unless he has estimated the degree of delay introduced in the signal by this particular capnometer, such measurements may not be correct. This is because the rate of exhalation is not constant and the constant delay within the measurement device results in a varying volume discrepancy because of the varying expiratory flow. This may explain his observations that the pattern of expiration within the individual accounted for changes in \( \frac{dP}{dV} \).

I do not wish to cast excessive doubt upon Dr Farmery’s conclusions, which appear at least in a young healthy subject to be consistent and dependent mainly on end-tidal estimates which will be unaffected by instrument delay. His hypothesis that the influence of tidal volume may be through variations induced in alveolar gas composition can be simply tested experimentally, for example with end-inspiratory pauses of different duration. The main purpose of my letter is to emphasise that the Hewlett-Packard capnometer, although apparently a “real-time” device, is far from being so in practice and within-breath measurements have to take instrument delay time into consideration.

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1. Farmery AD. Prediction of arterial \( P_{\text{CO}_2} \) from end-tidal \( P_{\text{CO}_2} \). *British Journal of Anaesthesia* 1993; 71: 917.