A measure of consciousness and memory during isoflurane administration: the coherent frequency

Sir,—We read with interest the study by Munglani and colleagues [1], which investigated the correlation between auditory evoked potentials and measures of cognitive function in subjects given isoflurane. We are not qualified to comment on the psychological aspects of the study, but are concerned by some technical details of the neurophysiological methods.

The authors stated that the output of the headphones was 65 dB greater than the average hearing threshold, at a stimulus rate of 6 Hz. We are not sure if the output was reduced as the stimulus frequency was increased. If the stimulating voltage was kept constant as the stimulating frequency increased, this would increase the delivered energy and produce an increase in the apparent loudness of the clicks. Is it possible that the effect that they are seeing could be caused, in part, by the change in stimulus energy (within the same sedation level) rather than being caused purely by the change in stimulus frequency?

Our second query deals with filtering of the EEG amplifier and the rate of digital sampling. Band pass filtering is defined normally by the 3-dB points; that is where the signal output has fallen to 0.707 of its original value. The Nyquist sampling criteria require that the sampling frequency must be greater than twice the highest frequency component in the signal being analysed [2]. If the authors’ values of 1 Hz-2 kHz are the 3-dB points then they should have been sampling the signal at a much higher rate than 2 kHz, instead of at the 1-kHz sampling frequency that they used. An alternative would be to reduce the band width of the signal so that the signal above 500 Hz is negligible. This seems more logical, because mid-latency EP have a band width typically in the range 19–200 Hz. These comments assume greater importance by the 3-dB points; that is where the signal output has fallen to 0.707 of its original value. 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electrically participating tissue contributed to the inaccuracy of TEB CO.

The magnitude of TEB CO change as a result of alterations in electrode placement quoted by Castor and colleagues was not referenced. We feel that incorrect placement of electrodes is unlikely to cause major errors in the TEB method in practice. A previous study has shown that alteration of inter-electrode distance by 5 cm did not produce a significant difference in stroke volume estimation [5]. In practice, random error in electrode placement between operators is unlikely to exceed 5 cm.

Third, regarding Doppler CO measurement, we were intrigued that Castor and colleagues were able to obtain satisfactory Doppler signals with the Quantascope (Vital Science) during IPPV. In our experience, interference from the ventilator during IPPV prevents satisfactory Doppler signals from being obtained. The duration during apnoea was also too short, so that only one or two waveforms can be obtained in each respiratory cycle. We concluded that the Quantascope was technically unsuitable for CO measurement during IPPV. A previous study using the same equipment has also experienced similar technical difficulties [6]. This is in contrast with the experience of Castor and colleagues when they can average Doppler CO over a 12-s interval.

We disagree with the suggestion that the inaccuracy of the Doppler method was caused by error in estimating the aortic diameter. It is important to note that the purpose of the Quantascope emitting two concentric Doppler beams (wide and narrow) is to compensate for error caused by tissue attenuation and to eliminate the need to estimate the aortic cross-sectional area and the angle of insonation of the beams during CO measurement [7, 8]. We feel that the most likely reason for the inaccuracy of the Quantascope was the technical difficulty in obtaining optimum power return of the Doppler beams from the ascending aorta. This may be related to suboptimal setting of the sampling depth or inability of the wide beam to insonate the whole aortic lumen. We also feel that the phenomenon of aliasing suggested by Castor and colleagues is unlikely to be an important cause for the inaccuracy of the Quantascope. The Quantascope uses a transducer of relatively low frequency (2 MHz) and aliasing would not have occurred unless either the sampling depth was exceedingly deep or the blood velocity was exceedingly high.

Studies such as that by Castor and colleagues are important in validating non-invasive CO measurement methods. However, it is important that data are analysed correctly and results interpreted appropriately.

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Retrobulbar block fails to prevent an increase in serum cortisol concentration on emergence from anaesthesia after cataract surgery

Sir,—Barker and colleagues [1] title their paper with a bold statement, suggesting that a retrobulbar block is superfluous if a general anaesthetic is given for cataract surgery.

Cataract surgery per se does not involve considerable tissue trauma and is not likely itself to evoke much of a stress response if appropriate anaesthesia is given. Their description is of a stress response occurring in all patients given a general anaesthetic whether or not retrobulbar block is incorporated. It would seem inconceivable that a retrobulbar block given in association with a general anaesthetic would not provide appropriate analgesia and another conclusion must be drawn.

The general anaesthetics were given to premedicated patients who first had a central venous catheter inserted via the antecubital fossa. General anaesthesia was induced with “a sleep dose” of thiopentone and tracheal intubation followed the use of vecuronium. No mention is made of the use of nitrous oxide, volatile agent or opioid and it is my experience that if this indeed was the general anaesthetic given, then a considerable increase in arterial pressure would occur. Intubation itself is a major stress, as is tracheal extubation.

Hett and co-workers [2] showed that patients who had pethidine premedication with nitrous oxide and a volatile agent still had an increase in arterial pressure on induction and this is a considerably more complete anaesthetic than that given by Barker and colleagues.

In conclusion, the inference that a retrobulbar block fails to prevent a stress response cannot be drawn from the published data. Almost certainly the increase in serum cortisol concentration in their patients was secondary to inadequate general anaesthesia. Local anaesthetic blocks for the eye are useful and do work well. They may be useful adjuncts to general anaesthesia, but this paper does not advance our knowledge.

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