REPLY

We would like to thank both Dr. Herkkamp and Dr. Luger et al. for their interest in our article. We apologize for our incomplete literature search. The study by Luger et al.[1] did not appear in our search due to the language difference. However, our failure to locate the study by Herkkamp[2] was an oversight on our part.

The discrepancy found in our study between arterial and capillary samples that was not found by Luger et al., may have been due to the method of capillary sampling, as mentioned by Dr. Luger. We used earlobe capillary samples as that was all that was available to us due to positioning of the cardiac patients in our study.[3] Perhaps a different site such as the finger tip would have given us more reliable results. We agree with practice of drawing two samples, thereby giving a more reliable haemoglobin estimate.

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Combined epidural/general anaesthesia

The incidence of perioperative myocardial ischaemia in patients undergoing regional anaesthesia and postoperative analgesia has been the subject of some contradictory studies. Garnett *et al.* failed to reduce the incidence of ischaemia using epidural local anaesthesia during and after surgery.[1]

The hypothesis is simple: are the harmful effects of surgery reduced if the patient can be shielded from nociceptive afferent input? This requires complete deafferentation of the injured area and the upper and lower segmental limits of sensory blockade should be documented following establishment of the block, at the end of surgery and postoperatively. Neither Garnett's study, nor the studies cited in the paper contain complete documentation of the extent of epidural blockade.

Examination of 16 manuscripts published over the last three years investigating the influence of epidural local anaesthetics on outcome revealed that only eight studies had a detailed record of the segmental extent of the sensory blockade throughout the experimental period.[2] The remainder assumed that placement of an epidural catheter and administration of a fixed dose of analgesic would achieve effective blockade. However, epidural catheters go astray[3] and fixed-dose schedules do not achieve predictable spread. Without frequent monitoring of the limits of analgesia we cannot determine whether epidural dosage is adequate.

We conclude that although the study by Garnett *et al.* highlighted the importance of postoperative management, the definitive paper comparing the influence of regional and general anaesthesia on postoperative myocardial ischaemia in patients undergoing abdominal aortic aneurysm repair is still required.

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1 *Garnett RL, MacIntyre A, Lindsay P, et al.* Perioperative ischaemia in aortic surgery: combined epidural/general anaesthesia and epidural analgesia vs general anaesthesia and *iv* analgesia. Can J Anaesth 1996; 43: 769–77.
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REPLY

Drs. Carli, Klubien and Baker's major objection to our efforts to use epidural anaesthesia and analgesia to reduce perioperative myocardial ischemia was that we did not document the extent of the epidural block pre, per and post operatively. The implication is that unless the extent of the block is verified, the study is invalid.

Nothing is further from the truth. We attempted to investigate the effect of epidurals on ischaemia in a clinically useful fashion. Like any clinician, we ensured that the block was working at the beginning of the case. I don't know of any way to verify the block intra operatively without the withdrawal of general anaesthesia,

extubating the trachea and inquiring as to his/her opinion as to our success. Even if the block were verified at T5 to L2 at the beginning of the case, does that mean that it remains so for the next five hours? I think not. You give an estimated dose of epidural solution based on the patient's physical status and usually this is correct. If not, you give a bolus and hope that it works.

Epidurals cannot be guaranteed; blocks may be patchy and may not spread to cover the expected dermatomes. That doesn't reduce their value, but they are not a panacea. We still use them routinely in aortic surgery.

We would not dream of writing the definitive paper, only a useful one.

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Prevention of occlusion of sampling tubes in side-steam capnographs

Condensation of water vapor, coalescence of aerosols from water humidifiers and therapeutic aerosols, along with patient secretions, result in an accumulation of water and secretions in the breathing hoses. These contaminants can be aspirated into the CO_2 sampling tubes resulting in occlusion. Methods currently available to minimize these occlusions include, positioning the sampling tube upwards away from the patient to decrease the frequency with which liquids are drawn into the tubes, increasing the sampling flow or reversing the flow (purge) to clear the secretions from the tube, and interposition of liquid traps or moisture-absorbent filters between the sampling tube and the analyzer to prevent water and secretions entering the unit. Despite these methods, water/secretions are aspirated into the sampling tubes and accumulate at dependent portions tubes or clog the filters.

Interposing an additional 25 mm diameter, 0.5 micron filter (King systems corporation, IN) between the breathing circuit and the sampling tube (proximal filter) in such a way that the filter is horizontal with the sampling tube upwards helps to overcome this problem. The additional filter helps to prevent the aspiration of condensed water/secretions into the sampling tube. Furthermore, positioning the filter horizontally allows the condensed water to gravitate downwards into the breathing circuit rather than to occlude the filter. Interposing an additional filter does not effect CO_2 measurements/waveforms in clinical settings. Furthermore, replacing the proximal filter is less expensive than replacing the entire tubing and the distal filter.

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