CORRESPONDENCE continued from p. 1069

moderate hypocapnia should be maintained after discontinuing first the halothane and subsequently the nitrous oxide preferably until the pre-operative level of consciousness has been regained. This may take several hours. Under no circumstance can it be justified to "wake up" the patient using a rebreathing system for letting carbon dioxide accumulate. Controlled hyperventilation during recovery from anaesthesia is especially important in head injury cases where risks of vomiting and aspirating gastric contents are increased.

(4) The blood pressure decreases with the combined effect of chlorpromazine, barbiturates, halothane, and hypocapnia. Especially in the initial phase of anaesthesia, and if surgery is not carried out, the blood pressure may fall quite markedly. As is the general practice in most clinics a moderate level of hypotension (at a blood pressure level of approximately 80 per cent of the pre-operative or the assessed normal level) is acceptable. Development of lower pressures is counteracted by fluid administration (we use plasma or glucose 6 per cent in an amount of 1–2 litres if no bleeding occurs) and with hypertonic urea (we use 0.75 to 1.00 g/kg).

No comments will be given here regarding the use of the profound hypotension used for certain types of neurosurgery. Such lowering of the blood pressure is, when necessary, easily achieved by means of postural tilt and the occasional use of hypertensive agents; it should as a matter of principle be of as brief duration as possible and preferably combined with moderate hypothermia (30–32°C). A discussion of the various measures used for using brain bulk also lies beyond the scope of this discussion.

(5) A timely warning which was explicitly made in the Editorial concerns brief halothane anaesthesias in patients with intracranial space-occupying lesions. In such anaesthetics, often used in conjunction with neuroradiological studies, precisely the same precautions as discussed above must be taken, namely: careful induction; intubation, controlled moderate hypocapnia maintained during and after anaesthesia until adequate recovery has been reached and with proper precautions against vomiting and aspiration; as the "stimulus" of surgery is absent, hypotension is apt to be relatively more pronounced and it must be counteracted by fluid administration and/or hyperosmotic therapy. Without proper attention to these problems a most dangerous triad of intracranial hyper-tension, hypercapnia and (despite the hypercapnia) systemic hypotension can arise. This condition may well aggravate the clinical condition of critically ill patients, i.e. precisely those patients who cannot tolerate any further brain tissue damage. Often the neuroradiological procedure is blamed for what really is due to the anaesthetic technique used and its complications (including aspiration of gastric contents). In addition, it may be affirmed, as the Editorial also mentioned, that an angiographic study made during a state of cerebral vasodilatation (as during halothane combined with normal or high PaO₂ values) may be falsely interpreted as normal. This is so because the blood flow decreases in the damaged tissue (e.g., around a tumour or in an area of brain contusion) due to the above-mentioned "intracerebral steal" effects.

It is our conclusion that low doses of halothane (0.5 per cent) can be used safely in neurosurgery, but only when used in combination with other techniques. In particular the risks of brief inadequate anaesthetics can hardly be overemphasized. Safer drugs and procedures will undoubtedly be developed. At present, however, none of the alternative modes of conducting routine neuro-anaesthesia can be stated to be of assured superior value to the mode described here. And, more important, the somewhat complex pattern of considerations which the neuro-anaesthetist must be able to comprehend and make use of (cerebral blood flow, intracranial pressure, systemic blood pressure, PaO₂, etc.) is undoubtedly here to stay. To have focused attention thereon is a valuable contribution of the Editorial of April 1969.

N. A. Lassen
W. H. Dam
M. S. Christensen

REFERENCES

