

CORRESPONDENCE

patients with heterogenous injury in whom cerebral perfusion pressure (CPP) decreases into the 70–90-mmHg range. They make a very persuasive argument that increased ICP in this subset of patients is due to the exponential increase in cerebral blood volume that occurs when CPP decreases into the 70–90-mmHg range. When an exponential increase in cerebral blood volume is produced in a patient whose intracranial pressure-volume relationship is on the exponentially increasing portion of that curve, it is not surprising that a small decrease in MAP, through reflex vasodilatation of brain areas with intact autoregulation, might result in an increase in ICP.

The authors appropriately indicate the possibility that seizure activity could have contributed to their observation, but they report that electroencephalographic evidence of this in humans is lacking. In a recently published study,⁴ however, Tempelhoff *et al.* gave fentanyl doses of 7.7–35.7 µg/kg to epileptic patients and observed hippocampal seizure activity with intracranial electrode recordings. This study circumvented the pitfall of missing deep seizure activity with the commonly used surface scalp electrodes or intranasal electrodes. Although the seizure activity was observed in patients with epilepsy, it occurred in the temporal lobe, which was not the epileptic focus. In addition, abstracts by Kearsse *et al.*^{5,6} have reported dose-related spike activity detected by 20-channel scalp-electrode recordings in humans undergoing induction of opioid anesthesia for cardiac or carotid surgery.

W. Andrew Kofke, M.D.
Department of Anesthesiology/CCM
University of Pittsburgh
School of Medicine
1385 Scaife Hall
Pittsburgh, Pennsylvania 15261

Anesthesiology
78:621, 1993
© 1993 American Society of Anesthesiologists, Inc.
J. B. Lippincott Company, Philadelphia

In Reply:—Kofke and Tempelhoff refer to the possibility that a modestly decreased cerebral perfusion pressure may explain the observed increase in intracranial pressure (ICP) is an important observation. It is true that autoregulatory responses to decreased cerebral perfusion pressure may be associated with an increased ICP. While this may be a contributing factor, in this instance, it is unlikely to be the only causative factor. The standard deviation for the ICP response in our patients was 10 mmHg. This heterogeneity did not correlate with the decrease in cerebral perfusion pressure. Thus, I find it unlikely that decreased cerebral perfusion pressure was anything more than contributory.

Kofke and Tempelhoff add very recent information to our discussion

Rene Tempelhoff, M.D.
Department of Anesthesia
Washington University
School of Medicine
660 South Euclid Avenue
St. Louis, Missouri 63110

References

1. Sperry RJ, Bailey PL, Reichman MV, Peterson JC, Petersen PB, Pace NL: Fentanyl and sufentanil increase intracranial pressure in head trauma patients. *ANESTHESIOLOGY* 77:416–420, 1992
2. Rosner MJ, Coley JB: Cerebral perfusion pressure, intracranial pressure, and head elevation. *J Neurosurg* 65:636–641, 1986
3. Rosner MJ, Becker DP: Origin and evolution of plateau waves: Experimental observations and a theoretical model. *J Neurosurg* 60:312–324, 1984
4. Tempelhoff R, Modica PA, Bernardo KL, Edwards I: Fentanyl-induced electrocorticographic seizures in patients with complex partial epilepsy. *J Neurosurg* 77:201–208, 1992
5. Kearsse LA, McPeck K: Prevalence of epileptiform activity of narcotic anesthesia during carotid endarterectomy (abstr). *ANESTHESIOLOGY* 75:A1029, 1991
6. Kearsse LA Jr, Husain M, Koski G, Philbin D, McPeck K: Transient epileptiform activity of narcotic anesthesia is not dose dependent (abstr). *ANESTHESIOLOGY* 77:A188, 1992

(Accepted for publication December 14, 1992.)

of potential mechanisms for our observations. Their insights on subcortical seizure activity and neuroexcitation associated with opioid administration are a significant addition to our discussion.

Richard J. Sperry, M.D.
Assistant Professor
Department of Anesthesiology
The University of Utah
50 North Medical Drive
Salt Lake City, Utah 84132

(Accepted for publication December 14, 1992.)