Correspondence

Increased Cerebrospinal Fluid Pressure after Ketamine

To the Editor:—Dissociative anesthesia with ketamine has been recommended repeatedly for minor neurosurgical procedures in children because of ease of induction and maintenance of anesthesia.1-3

A recent study of healthy adult volunteers demonstrated that cerebrospinal fluid pressures (CSFP) increased to values as high as 600 mm H2O after 2.0 mg/kg ketamine given intravenously.2 An increase of CSFP to above 400 mm H2O has been reported to cause a significant decrease in cerebral blood flow in man.4

This theoretical concern was sharpened by clinical events in the case of a 4-month-old hydrocephalic infant given 2 mg/kg ketamine in preparation for a ventriculoperitoneal shunt. Owing to previous CSF drainage at the close of ventriculography, the fontanelle was flat initially. As preparation of the skin and draping were completed, respirations ceased. The fontanelle was now tense and bulging. Ventricular puncture was immediately accomplished and spontaneous respirations resumed after drainage of 30–40 ml CSF. With this suggestive evidence that patients with increased CSFP may be particularly sensitive to ketamine, we investigated its effect on CSFP in seven hydrocephalic patients undergoing insertion of revision of ventriculo-peritoneal or ventriculovenous shunts.

Patients were premedicated with atropine, 0.1 mg/10 kg body weight and placed supine on the operating table. We monitored heart rate, ECG, arterial P O2 and P CO2 and end-expired CO2. CSFP was measured in the lateral ventricle by a Statham P 23 transducer through a 22-gauge needle inserted through the plastic cap of the shunt, a burr hole, or the fontanelle. Free CSF flow and respiratory and blood pressure excursions in the CSFP recording indicated intraventricular placement. All patients were breathing room air spontaneously. Body temperature was maintained within normal limits.

After baseline values had been obtained, ketamine, 2.5 mg/kg, was injected intravenously within 20 seconds.

CSFP did not increase in one patient (Patient 1) only. This 5-month-old infant did not show signs of adequate anesthesia, and became quiet for only 2 minutes after ketamine. In one patient CSFP rose above 800 mm H2O and CSF was removed to decompress the brain.

In every patient respiratory rate decreased and tidal volume increased slightly. PaCO2 and end-expired CO2 paralleled each other and remained below 40 mm Hg. No patient was hypoxic. Two patients had increases in systolic blood pressure from 95 to 130 torr and from 155 to 195 torr at 2 and 3 minutes, respectively. Heart rates tended to increase, but not consistently. Despite marked CSFP elevations no patient developed apnea or convulsive movements.

In view of these findings, we recommend the use of ketamine for patients suspected to

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<th>Table 1. Effects of Ketamine in Seven Hydrocephalic Patients</th>
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<td>Patient 1 5 mo</td>
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<td>Patient 2 51 mo</td>
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<td>Patient 4 3 years</td>
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<td>Patient 5 5 years</td>
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<td>Patient 6 16 years</td>
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<td>Patient 7 64 years</td>
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have increased CSFP only when CSFP can be monitored continuously and if rapid decompression by removal of CSF can be provided.

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REFERENCES


Substitute Exhalation Valve for the Emerson Ventilator

To the Editor—Mr. Eross (Anesthesiology 35:317-318, 1971) has described a substitute exhalation valve for the Emerson 3-PV ventilator which is interesting. Unfortunately, its value is limited to readers whose hospitals have design departments capable of fabricating custom parts. The same results can be achieved by use of the commercially-available Air-Shields Respirator exhalation valve. The Air-Shields valve not only eliminates the Emerson valve and the long, heavy exhalation tubing, but it also offers capability for graded retardation of exhalation.

The Air-Shields valve substitution has been used daily for about four years on five Emerson ventilators at St. Vincent's Hospital in Manhattan, with no major problems. It costs more than the price given by Mr. Eross for his custom-made valve, but it is readily available to anyone. I suspect that other commercial exhalation valves, such as the Bennett models, would also work on the Emerson ventilator.

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