Neurosurgical Experiences with Herpes Simplex Encephalitis*

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Neurosurgeons must differentiate herpes simplex encephalitis from other rapidly-expanding middle fossa lesions by early diagnostic procedures including brain biopsy. Successful therapy may depend upon prompt surgical decompression of the massive cerebral edema that is often found. The purpose of this paper is to record our experiences with various methods of reducing increased intracranial pressure in three consecutive cases of proven herpes simplex encephalitis during a 2-year period.

In 1941, Smith, et al., demonstrated both herpes simplex virus and Cowdry type-A intranuclear inclusion bodies in the brain of a child with encephalitis. Since then, herpes simplex has been suggested as the etiologic agent in cases variously labeled as acute inclusion body encephalitis, acute necrotizing encephalitis, acute necrotizing hemorrhagic encephalitis, and even acute hemorrhagic leukoencephalitis.

The patient with acute encephalitis due to herpes simplex virus often presents a characteristic appearance which begins with the abrupt onset of fever, headache, drowsiness, occasional stiff neck, and convulsions. More specific symptoms such as dysphasia, psychomotor phenomena, and olfactory hallucinations point toward the maximally affected temporal and orbital regions. Early involvement may be predominantly unilateral. Electroencephalograms, radioisotope scans, and x-ray contrast studies may all localize to one temporal lobe. Abscess or other rapidly expanding lesions of the temporal area must then be ruled out.

Cerebrospinal fluid pressure may be elevated, and pleocytosis is usual. Viral cultures of cerebrospinal fluid, however, are rarely if ever positive. Diagnosis is usually established in retrospect by the demonstration of a greater than fourfold rise in serum antibody titer to herpes simplex virus.

Early diagnosis is made from brain biopsy material by demonstrating the characteristic inflammatory changes of acute encephalitis in association with Cowdry type-A intranuclear inclusion bodies, or by direct isolation of herpes simplex virus from brain tissue.

Herpes simplex encephalitis may vary in severity, but spontaneous recovery is extremely rare in any patient who has become comatose. It commonly is associated with severe neurological residua or death, which may be secondary to cerebral edema, intracranial hypertension, and transtentorial herniations rather than to irreversible neuronal damage by the virus itself. It would seem reasonable that when increased intracranial pressure is present, its relief prior to the stage of permanent brain-stem damage might increase the chances for useful survival.

Case Reports

Case 1. The patient, a 25-year-old white man, developed malaise, nausea, photophobia, and temperature elevations to $106^\circ F$. The next day he became lethargic, confused, and disoriented.

Examination. The patient was admitted to the hospital 4 days after the onset of symptoms with a temperature of $102^\circ F$ and a pulse rate of 80 per minute. Somnolence and dysphasia were present, yet he could perform simple calculations. Mild right facial weakness and right-sided hyperreflexia were found. The peripheral blood white-cell count was 18,500 with 85% polymorphonuclear cells. Cerebrospinal fluid cell count was 160 with 95% lymphocytes, 40 mg% protein, 64 mg% glucose, and an opening pres-
ure of 300 mm of water. There was focal electroencephalographic slowing in the left frontotemporal area. On the day of admission bilateral carotid arteriograms showed a slow circulation time but no further abnormality.

Operation. A left temporal burr hole was made and a needle biopsy taken, which showed extensive necrosis with perivascular cuffing, focal polymorphonuclear and plasma cell infiltration, vascular congestion, and hemorrhage. Intraneural inclusion bodies were not found.

On the sixth postoperative day, bilateral sixth nerve palsies and myoclonic movements were noted. The patient received penicillin, chloromycetin, streptomycin, isoniaid, amphotericin B, and dexamethasone. However, he became increasingly lethargic, and cerebrospinal fluid pressures rose to 550 mm of water over the next 10 days. Constant ventricular drainage was established. A ventriculogram showed dilatation of both lateral ventricles without shift or filling defect. Cardiac arrest occurred on two occasions during anesthesia induction for the placement of a ventriculo-peritoneal shunt. The shunt was finally established after 35 days of external ventricular drainage. Seven days later, the shunt required revision, and biopsy again revealed necrotizing encephalitis, this time with extensive gliosis. In spite of a functioning shunt, the patient remained comatose until his death 16 days later.

Postmortem examination. There was extensive cystic necrosis of both temporal lobes and mild dilatation of the ventricular system (Fig. 1). Virus was not recovered from cerebral tissue in this case, but a rise in serum antibody titer to herpes simplex virus from less than 1:4 to greater than 1:256 was demonstrated.

Case 2. A 30-year-old white woman was vacationing in Austria when she suffered two generalized convulsions which were followed by several days of headache and lethargy. She returned to this country and was admitted to a local hospital with mild temperature elevation and a tendency to "talk in a stream." Lumbar puncture revealed an opening pressure of 160 mm of water, 50 mg% protein, 30 lymphocytes, and negative bacterial cultures.

Examination. The patient was transferred to the Peter Bent Brigham Hospital with a temperature of 104°F, a pulse of 112 per minute, a stiff neck, and bilateral Kernig's signs. She was disoriented, had difficulty naming common objects or parts of her body, and exhibited a right facial weakness and right homonymous visual inattention. The peripheral blood white-cell count was 8,000 with 57% lymphocytes. Electroencephalography showed slowing over the left hemisphere, echoencephalography showed deviation of the midline toward the right, and Hg203 scanning showed increased radioactivity over the left temporal area (Fig. 2). Antibiotics were started. On the second hospital day a left carotid arteriogram showed marked elevation of the middle cerebral artery with minimal left-to-right shift of midline vessels (Fig. 3). On the third

Fig. 1. Cystic necrosis of temporal lobes 2½ months after the onset of illness. Case 1.

Fig. 2. Anterior coronal Hg203 scan. Note the increased left temporal uptake. Case 2.