CEREBRAL HEMISPHERECTOMY FOR CONTROL OF INTRACTABLE CONVULSIVE SEIZURES*

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This is a report of our experiences with cerebral hemispherectomy for the control of intractable convulsive seizures. It is a direct outgrowth of a former project of performing hemispherectomies in an attempt to cure patients with cerebral gliomas. The first patient operated upon primarily for seizures was a 38-year-old man who in February, 1950, had a left cerebral hemispherectomy in an attempt to control persistent status epilepticus. He had been in status intermittently for a period of 6 weeks, controlled only when under sodium pentothal anesthesia. Twelve years previously, this patient had undergone removal of a left parietal glioma. It was felt that his seizures were caused by either recurrence of the tumor or extensive glial scarring secondary to the removal of the tumor. Following removal of the entire left hemisphere in 1950 he has had no seizures. He does have a persistent right hemiparesis but is able to be up and around and can do minor jobs around the house. Before hemispherectomy he had a global type aphasia but now he has fair speech comprehension and production. Subsequently 8 more patients have been treated by a similar operative procedure. All have been severe uncontrolled epileptics who have had a hemiparesis from infancy or early childhood. The purpose of this paper is to present the results of cerebral hemispherectomy on these 9 patients. The discussion will be limited primarily to its effect on the control of seizures and to the pre- and postoperative neurological and mental status.

REVIEW OF THE LITERATURE

Total, unilateral cerebral hemispherectomy was first reported by Dandy5 in 1928. In all his 5 cases the operation was done in an attempt to cure gliomas. Others1,4,6,7,14,15,17,18,21 have since reported on hemispherectomy for attempted cure of gliomas. Williams and Scott20 stated that McKenzie in 1938 had done a cerebral hemispherectomy in an attempt to control convulsive seizures. There were no further reports of the procedure being done for this purpose until November, 1950, when Krynwauv8, 9 described a series of 12 patients upon whom he had done hemispherectomies. All of these patients had infantile hemiplegias associated with uncontrolled convulsions.

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Since Krynauw's original paper, others\textsuperscript{5,10–13,16} have reported limited experience with this procedure.

**SELECTION OF CASES AND PREOPERATIVE STUDIES**

Included in this series from the University of Minnesota is the above-mentioned patient plus 8 more patients who had an infantile type of hemiplegia associated with uncontrollable seizures. All the latter were institutionalized epileptics from the State School and Hospital at Cambridge, Minnesota. The main criteria used in the selection of these patients were that they must have had a hemiparesis since infancy or early childhood and also grand mal seizures uncontrolled by what is generally considered adequate anticonvulsant medication. Hemiparesis alone was never considered sufficient indication for the operation. Krynauw,\textsuperscript{5,9} however, operated on several patients who had no seizures but who did have infantile hemiplegias associated with severe personality disturbances which prevented them from living a normal life in society. The age of the patients in our series varied from 13 to 38 years and at the time of operation they had been institutionalized for periods varying from 6 to 17 years. Neither the age of the patient nor the length of time hospitalized prior to surgery had any effect on the postoperative control of the seizures. The long institutional care of these patients did make available very important data, i.e. the number of observed seizures within each 24-hour period for many years and the kind and quantity of anticonvulsant drugs given during these periods. This type of information is not commonly available in a study of seizures because these data usually are obtained from the patient, a relative, or a friend, and represent a rough approximation of what actually exists and may be grossly misleading. All patients were examined carefully to ascertain their preoperative neurological status. Other preoperative studies done on all patients were electroencephalograms, pneumoencephalograms, carotid angiograms, and an extensive battery of psychological tests.

Preoperatively there was evidence of gross abnormality of the affected hemisphere as manifested not only by the hemiplegias and the seizures but also by the above-mentioned studies. Air encephalograms usually showed a dilated ventricle on the affected side indicative of an atrophic process or, as in several cases, large porencephalic cysts. Carotid angiograms often revealed malformation or atresia of the middle cerebral vessels.

**OPERATIVE PROCEDURE AND FINDINGS**

All patients were operated upon under pentothal-curare-nitrous oxide-oxygen anesthesia. A large craniotomy flap was turned to expose a maximum of the cerebral cortex. After the dura mater was opened the cortex was inspected with a Wood's lamp, the patient previously having received 5 cc. of 20 per cent sodium fluorescein. Cortical electrography was carried out under various experimental conditions. Arterial and venous blood samples were taken for oxygen-carbon dioxide saturations.\textsuperscript{19} Ligation of various