Gliomas in the Region of the Brain Stem*

J. LAWRENCE POOL, M.D.
Service of Neurological Surgery, Neurological Institute of New York, Presbyterian Hospital, and Columbia University, New York, New York

Our experience with three patients who have had long periods of useful survival following surgical and x-ray treatment for verified brain stem gliomas indicates that some of these tumors respond well to appropriate therapy. The three cases also illustrate the value of surgical exploration when a brain stem tumor is suspected.

Case Reports

Case 1. A 15-year-old girl was first admitted to the Neurological Institute of New York on October 17, 1945, with a history of a “heavy head” for 1 month, intermittent “crossed eyes” for 3 weeks, and occasional vomiting for 2 weeks.

Examination. Neurological examination revealed no abnormalities except bilateral papilledema of 3 diopters and slight nystagmus on left lateral gaze. X-rays of the skull showed exaggerated convolutional markings and thinning of the dorsum sellae. The pineal gland was not calcified. Ventriculography indicated moderately increased intracranial pressure (not measured) and marked dilatation of the lateral and third ventricles. The aqueduct and fourth ventricle were not visualized. The protein content of the ventricular fluid was 15 mg%. The presumptive diagnosis was glioma of the mid brain.

Operation. On October 22, 1945, suboccipital craniotomy exposed slightly herniated cerebellar tonsils, but the cerebellum otherwise appeared normal. On splitting the vermis a grayish-blue tumor nodule about 6 mm in diameter was found blocking the lower end of the aqueduct of Sylvius. After this nodule had been partially removed, a catheter could be passed easily through the aqueduct into the third ventricle. Since the cerebrospinal fluid flowed freely into the fourth ventricle on withdrawal of the catheter, no by-passing procedure was done. The pathological diagnosis was fibrillary astrocytoma.

X-ray Therapy. Three courses of x-ray therapy were given, each consisting of 2000 r, delivered through two ports. The first course was begun in January, 1946, the second in April, 1946, and the third in January, 1947, making a total of 6000 r.

Postoperative Course. The patient tolerated surgery and irradiation well. There was rapid resolution of papilledema and nystagmus and a prompt return to full, normal activity. Repeated annual follow-up visits have shown that the patient continues to be symptom-free, has married and raised a family, and continues full work with a telephone company. At the most recent neurological examination there was no papilledema, optic pallor, or nystagmus, and the extraocular movements including upward gaze and convergence were normal. There was no evidence of a visual field defect on tangent screen tests. No ataxia, nor reflex or sensory impairment were observed. X-rays of the skull continue to show no indication of increased intracranial pressure, and the sella turcica has resumed and maintained a normal degree of calcification.

Case 2. This 8 1/2-year-old girl was first admitted on May 7, 1947, with a history of occasional vomiting, tilting of the head to the right, and morning headaches for 6 months. For 2 months a progressively ataxic gait had been observed. At the age of 9 months the child was said to have had “torticollis,” described as intermittent tilting of the head to the right, for a period of 2 weeks.

Examination. Neurological examination disclosed no evidence of papilledema, ataxia, or sensory impairment. However, hypoaactive reflexes, weakness of the right sternocleidomastoid muscle, and impairment of convergent gaze were noted. The patient was discharged by her neurologist.

Second Examination. The patient was readmitted 5 months later on October 27, 1947, because of marked unsteadiness of

Received for publication November 10, 1967. Revision received February 26, 1968.
* Read at the Annual Meeting of the American Academy of Neurological Surgery, Key Biscayne, Florida, November 9, 1967.
gait and turning of the head to the right for 2 weeks. Neurological examination now revealed papilledema of 3 diopters with retinal hemorrhages, nystagmus in all planes, left peripheral facial weakness, and hyperactive reflexes of the left extremities with a positive left Babinski sign. The patient had adiadochokinesis of the left, and ataxia of the right, arm and leg. The electroencephalogram was diffusely abnormal, the CSF protein 192 mg%, and the ventricular fluid protein at ventriculography, 10 mg%. Ventriculography indicated a mass lesion of the brain stem.

Operation. On November 13, 1947, suboccipital craniectomy revealed tonsillar herniation and a normal-looking cerebellum but a yellow bulging appearance of the floor of the 4th ventricle. Needling in the midline yielded 30 cc of yellow fluid from a sizable pontine cyst containing a mural nodule, which was partially removed. Despite this decompression it was apparent that the medulla as well as pons was still partly invaded by tumor. The pathological diagnosis was astroblastoma.

X-Ray Therapy. Three courses of x-ray therapy were given, 2000 r each through two ports, in November, 1947, February, 1948, and April, 1948, making a total of 6000 r.

Postoperative Course. The postoperative course was remarkably smooth. By January, 1948, there was no papilledema but moderate optic pallor. Extraocular movements were now normal except for persisting nystagmus. The deep tendon reflexes were equal and normal throughout. There was no imbalance, ataxia, or sensory disturbance. The patient has continued to look and feel well to the present time. She was married in 1960, 13 years after surgery and has one child living and well.

Case 3. This 13-year-old boy was admitted in May, 1957, with a 6-month history of progressively frequent headaches and vomiting.

Examination. Neurological examination showed 5 diopters of papilledema with striate hemorrhages, poor convergence, diplopia on right or left lateral gaze, moderate ataxia, but no nystagmus or other abnormal neurological findings. The patient's appearance and obesity suggested Froehlich's syndrome. Ventriculography revealed an intraventricular pressure of over 800 mm of water, and a dilated ventricular system caused by aqueductal obstruction apparently due to a glioma of the mid brain.

Operation. On May 28, 1957, when the vermis was split following a suboccipital craniectomy, a grayish vascular tumor arising from the mid brain and roof of the aqueduct of Sylvius was disclosed. The aqueduct was dilated and completely blocked by the tumor, estimated as 8 mm in diameter. Biopsy of the tumor led to bleeding, so further removal was not attempted. A soft rubber catheter was therefore introduced into the third ventricle along the floor of the aqueduct to relieve the persisting CSF block. The outer end of the tube was anchored in the subarachnoid space at the level of the cisterna magna (Fig. 1). This allowed a free escape of clear CSF. The dura was closed in water-tight fashion. The pathological diagnosis was astrocytoma (Fig. 2).

X-Ray Therapy. After a somewhat stormy 2 days, the patient experienced a rapid smooth recovery, with remarkably speedy resolution of the advanced papilledema. A