Treatment of Obstructive Lesions of the Aqueduct of Sylvius and the Fourth Ventricle by Interventriculostomy*

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The treatment of stenosis of the aqueduct of Sylvius, though rarely necessary, is still a challenge to the neurosurgeon. Among 44 autopsied cases of infantile hydrocephalus studied several years ago, I found 29.5 per cent with stenosis of the aqueduct of Sylvius. Sporadic attempts at treatment have been made and various operative measures devised, some of which are well known and some even forgotten. I shall make no attempt to review the extensive literature or discuss the relative merits of various procedures, but will simply report a group of patients with stenosis treated by interventriculostomy (3rd–4th).

In 1920, Dandy reported 2 patients, aged 1 and 5 years, in whom he dilated the aqueduct and left a portion of rubber catheter in place for 2 to 3 weeks. The older child died of pneumonia 7 weeks later but the other was reported well after 1 year. A similar procedure has been performed occasionally by others, though there do not seem to be many published cases. In 1922, Dandy stated that "strictures of the aqueduct of Sylvius recur after any attempt to restore the lumen," and proposed 3rd ventriculostomy. In 1945, Dandy stated that strictures of the aqueduct can be opened easily, but with rare exceptions they will recur. He advocated 3rd ventriculostomy by a temporal approach as the operation of choice.

In the past I have attempted to explore and catheterize the aqueduct of Sylvius in infants. It seemed to be a dangerous procedure which I discontinued. However, a few of these patients grow to adolescence or adulthood, when surgery becomes somewhat more simple.

The first patient of this group was operated upon on March 26, 1947. A plastic tube of tigon was left in the aqueduct permanently. The result was successful, and the patient has survived more than 17 years. Soon after this patient had been operated on, I visited Sweden and found that Norlén had just placed a specially-designed spiral of thin metal wire in the aqueduct of a child with a brain tumour, and 2 such cases were reported by him in 1949. Leksell had devised the method of dilating the aqueduct with a rubber catheter and introducing a specially designed spiral of tightly wound metallic wire into the aqueduct for permanent drainage. In 1949 he reported 10 cases in children and adults, 3 of whom died soon after operation. As Leksell remarked, "It is doubtful whether operative intervention is on the whole indicated in this group of extreme cases."

The purpose of the present report is to record the long-term follow-up of a small trial series of patients treated by intubation of the aqueduct of Sylvius with rubber and plastic tubing.

Case Reports

Case 1. C.S.P., a 12-year-old girl, was admitted March 17, 1947, complaining of headache, vomiting, a staggering gait, poor memory and failing vision, progressing over the last 3 months. She was never bright at school, but with the onset of headache her work deteriorated.

Examination. She was an overweight, fidgety child with a large head. There were numerous café au lait areas and blue spots (von Recklinghausen's syndrome) over the trunk. The optic discs were pale and the margins indistinct. She had horizontal and vertical nystagmus, incoor-
nation of the extremities, unsteadiness of gait, and bilateral plantar extensor reflexes.

Roentgenograms (Fig. 1) revealed the evidence of chronic increased intracranial pressure. Ventriculography (Fig. 2a and b), March 26, 1947, showed extensive ventricular dilation with obstruction at the upper end of the aqueduct. Encephalography the same day filled the subarachnoid cisterns but failed to show the 4th ventricle. The electroencephalogram showed a persistent abnormality from all regions of the head with a disturbance of alpha rhythm by slow-wave activity. There were high-voltage sharp waves with foci of phase reversals mostly from the left and right parietal regions.

Operation. On March 26, 1947, the aqueduct of Sylvius was explored via the 4th ventricle and was found to be occluded. The aqueduct, seen at its lower end, was no larger than a pinpoint and did not appear to pass fluid. It was gently dilated with appropriately sized, round-ended probes. There was a point of slight resistance at the cephalad end. A plastic tube of tigon was inserted and left to function permanently.

Postoperative Course. Postoperative x-rays on March 28 showed the tube to be in place and a ventriculogram on April 8 demonstrated that oxygen passed to the 4th ventricle and the cervical subarachnoid space (Fig. 2c and d).

Postoperatively there was transient slight deviation of the eyes without diplopia. On April 9 there was no nystagmus, no extraocular paresis and no diplopia. The plantar reflexes were flexor. The patient had become bright, alert, cooperative and cheerful, and the incoordination of gait had improved. She was discharged on May 13.

In 1954 and 1957 she was reported to be symptom free and functioning as well as could be expected for a person of her ability. In follow-up letters of 1962 and 1964, 15 and 17 years postoperatively, she complained of headaches and some fainting spells. Although it is possible that the tube should be removed and replaced, the symptoms have not as yet warranted re-admission.

Case 2. T.C., a 5-year-old boy, entered the hospital, November 24, 1949, with complaints of unsteady gait and convulsions for 10 days.

Fig. 1. Case 1. X-ray of skull before operation demonstrated separation of all cranial sutures, prominent convolutional markings and enlarged pituitary fossa.

Fig. 2 (a) and (b). Case 1. Preoperative ventriculogram showed symmetrical lateral ventricles of enormous size. The anterior portion of the aqueduct of Sylvius could be visualized for a distance of about 2 mm. The rest of the ventricular system was not filled.