A Case of Unilateral Hydrocephalus Secondary to Occlusion of One Foramen of Monro

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Hydrocephalus is dilatation of a part or whole of the ventricular system as a result of excessive collection of cerebrospinal fluid under increased pressure. Unilateral hydrocephalus would therefore indicate an obstructive dilatation of the ventricular system on one side, i.e., involving a part or whole of one lateral ventricle. This should not be confused with enlargement of a lateral ventricle as a result of atrophy and shrinkage of cerebral tissue. In these cases cerebrospinal fluid is not under increased pressure and the ventricle has become enlarged passively. Thomas in 1914 and Dandy in 1919 experimentally produced unilateral hydrocephalus in animals by occlusion of one foramen of Monro. Since then unilateral obstructive hydrocephalus caused by pathology involving one foramen of Monro has been recognized. Cases have been reported in which either pedunculated intraventricular tumors causing a ball-valve obstruction, or tuberculous masses and adhesions, or nonspecific inflammatory lesions or bacterial meningitis and ventriculitis have resulted in occlusion of one foramen of Monro and given rise to unilateral ventricular dilatation. In the following case gliomatosis in the region of the basal ganglia caused an obstruction at the foramen of Monro and gave rise to unilateral hydrocephalus.

Case Report

K.D., a 3-day-old infant, was admitted to The Children’s Memorial Hospital on Feb. 4, 1961, with a large head. Gestation and delivery were normal. The mother had no illness or trauma during the pregnancy. The only other sibling was 5½ years of age and was normal.

Examination. The circumference of the head was 41 cm., and the chest measured 38 cm. The veins of the scalp were dilated, and the anterior fontanel was wide and bulging. The optic discs looked normal, external ocular movements seemed full and the child blinked to threat. All her limbs moved well, and reflexes and tone were within normal limits.

Roentgenograms of the skull showed a large dolichocephalic head with thin calvarium and open sutures. Bilateral subdural taps were negative. Right lateral ventricle was tapped with size 20 spinal needle at a depth of about 2½–3 cm., from the surface. Approximately 30 cc. of cerebrospinal fluid were removed and replaced with 15 cc. of air and 1 cc. of indigo carmine. A left ventricular puncture was not attempted. Lumbar puncture was attempted unsuccessfully about 15 min. later. Ventriculography (Fig. 1) revealed a markedly dilated right lateral ventricle, the dilatation being more marked in the parieto-occipital region. No air was visualized in the left lateral or third ventricle despite all manoeuvres to “shake air” across to the left side. Roentgenograms taken the following day were unchanged. Therefore a left ventricular puncture was performed. The ventricle was encountered at a depth of about 4 cm. and 8–10 cc. of clear colorless cerebrospinal fluid were removed and replaced with an equal amount of air. A further medial approach resulted in puncture of right lateral ventricle, from which bluish cerebrospinal fluid was aspirated. Thus it was clearly demonstrated that there was no communication between the two lateral ventricles. Roentgenograms revealed a small normal left lateral ventricle which was pushed over to the left by the dilated right ventricle (Fig. 2); the third ventricle was still not visualized. The content of protein in the cerebrospinal fluid from the right side was 84 mg. per cent; unfortunately that from the left side was not obtained.

The diagnosis of unilateral right-sided hydrocephalus caused by occlusion of foramen of Monro was postulated.

Operation. On Feb. 9, 1961, an exploratory craniotomy was performed using a right frontal transventricular approach. The gyri in the frontal region were flattened. The ventricular cavity was very large but was devoid of all the natural anatomical landmarks. Neither the foramen of Monro nor the thalamostriate vein could be identified. In the region of the thalamus there was a diffuse mass protruding into the ventricular system. Two small bits of tissue were taken for histological examination. This area was rather vascular and Gelfoam was needed to control bleeding. An unsuccessful attempt was then made to establish a communication with the left lateral ventricle through the septum. As the child’s condition was not very satisfactory, the operation was terminated.

Course. The child’s condition deteriorated further and she expired a few hours later.

Autopsy. A minimal amount of blood was found in the subarachnoid space. The right cerebral hemisphere was swollen and expanded particularly in the posterior parietal and occipital regions. Through a horizontal section, at a depth of about 8.0 to 9.5 cm., both lateral ventricles were exposed. The right lateral ventricle was markedly dilated, much more so in the parietal, occipital, and temporal regions. A small amount of hemorrhagic substance was adherent to the ependymal surface at the site of biopsy. The posterior horn contained clotted blood. The left lateral ventricle was normal in size. A coronal section through the region of the third ventricle showed it to be of normal size. The foramen of Monro on the left side was normal, and a probe passed easily from the third ventricle into the left lateral

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Unilateral Hydrocephalus from Occluded F. Monro

Fig. 1. The right lateral ventricle is dilated. The left lateral and third ventricles are not visualized.

Fig. 2. After introduction of air into left lateral ventricle a normal-sized left lateral ventricle is shown, which is pushed over to the left by the dilated right lateral ventricle.
ventricle. On the right side, when viewed from the third ventricle, the foramen of Monro had a normal configuration and a probe passed through it appeared at the site of the mass from which the biopsy was taken. This mass occupied the region of the basal ganglia (Fig. 3) and projected into the right lateral ventricle. There was poor differentiation of grey and white matter at this site. The tissue completely obliterated the right foramen of Monro.

*Microscopic Report.* Sections of the mass (Fig. 4), the region of the basal ganglia and several cortical areas were studied with hematoxylin and eosin, phosphotungstic-acid hematoxylin and Holzer stains. The ependymal layer over the mass was disrupted at places and the cells appeared generally flattened. There was marked proliferation of subependymal astrocytes around the ventricle. The astrocytic proliferation extended deeply in the region of the mass. The cells were slightly larger in size and uniform. Besides the diffuse infiltration, they formed small loose islands and perivascular cuffs in the ventricular wall. The wall of the left anterior horn showed a similar structure. Several cortical areas and parts of the basal ganglia did not reveal any remarkable changes. The appearances indicated the diagnosis of subependymal gliomatosis.

**Summary**

A unique case of unilateral obstructive hydrocephalus secondary to occlusion of one foramen of Monro by gliomatosis in a 3-day-old infant is reported.
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References