Case Reports

Percallosal Sump Ventriculostomy for Shunt-Dependent Hydrocephalic Patient with Small Ventrices*

Case Report

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The treatment of hydrocephalus has challenged physicians from the time of its identification, and new procedures have simply introduced new challenges. Scores of shunting operations have been devised to divert cerebrospinal fluid to the pleural and peritoneal cavities, or the blood stream. Complications of shunting include meningitis, catheter colonization and septicemia, catheter obstruction by choroid plexus and proteinaceous material, catheter occlusion secondary to venous thrombosis, or investment by omentum, separation of shunt components, thromboembolic phenomena, cardiac arrhythmias, tube migration, and tube embolization.

In this paper we will describe an operation used to overcome a less frequently reported result of ventricular shunting, namely, that in which formerly hydrocephalic ventricles become too small to permit satisfactory functioning of ventricular catheters, no matter how positioned or revised.

Case Report

The patient had developed hydrocephalus secondary to aqueductal stenosis in early infancy (Fig. 1 left). He had been hospitalized three times previously: in 1961 at the age of 2 months for the establishment of a Torkildsen shunt; in May, 1967, for shunt revision because of intermittent obstruction of the ventricular apertures of the catheter; and in August, 1967, for installation of a ventriculoatrial shunt of the Pudenz type (Fig. 1 right).

Present Admission. The patient was admitted again on December 11, 1967, at the age of 6 years, because of lethargy and increasingly severe headaches, relieved by vomiting.

Examination. His head was of normal size. The Pudenz pump diaphragm depressed easily but rose only after much delay. Ventriculography at the time of establishment of the ventriculoatrial shunt (Fig. 1 right) had shown the ventricular end of the Pudenz catheter to lie in the anterior horn rostral to the foramen of Monro and just across the midline, presumably in a fenestrated septum pellucidum; the cardiac end of the shunt lay in the superior right atrium.

Operation. The Pudenz pump in the right posterior parietal burr hole was exposed, and both catheters were proven patent by observing falls to low levels of saline in manometers connected to them. The ventricular catheter was then shortened 1.0 cm to bring its tip closer to the foramen of Monro.

First Postoperative Course. However, on the fifth postoperative day after this adjustment, the patient again had headaches, relieved by vomiting. The pump diaphragm again depressed easily but rose only after the elapse of some time. It was evident that similar further manipulations of the catheter within the miniscule slit-like ventricles would be futile. Despite the micro-ventricles, the patient was shunt-dependent, and it was obvious that the catheter apertures were being intermittently obstructed by closely opposed ventricular walls and would have to be liberated by some entirely different procedure.

Second Operation. On December 21, 1967, a left frontal craniotomy crossing the midline was fashioned beneath a coronal scalp incision. The interhemispheric fissure was traversed and the right lateral ventricle

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entered through a small opening in the corpus callosum. The ventricular catheter was found snugly embraced by the ventricular walls (Fig. 2). The sump, a short segment of No. 16 red rubber catheter with multiple side holes (Fig. 3), was then inserted through the opening in the corpus callosum into the common anterior horn, the septum pellucidum being absent as a result of the former hydrocephalus, and thence into the anterior body of the right ventricle. As this was done the ventricular end of the Pudenz catheter, which was patent and free of any particulate matter, was teased into the deep end of the sump (Fig. 4). From its superficial end, a second Pudenz ventricular catheter was led out into a pericranial tunnel directed posteriorly. This latter catheter was placed as a "sleeper" for use if difficulties recurred, when it might be connected to the already present Torkildsen tube to the cisterna

Fig. 1. Left: Ventriculogram of patient when 7 weeks of age in 1961. Anteroposterior projection demonstrating hydrocephalus without filling of the aqueduct or fourth ventricle. Right: Ventriculogram of patient in August, 1967, at the time of ventriculo-auricular shunting. Note the opaque tip of the newly installed catheter lying just across the midline in the very small frontal horns. The discontinuity of the Torkildsen tube is the result of a non-radio-opaque segment inserted at one of the former revisions.

Fig. 2. Operative photograph (December 21, 1967) looking through the split callosum into the lateral ventricles. The ventricular end of the Pudenz catheter is seen embraced by the walls of the frontal horn. Absence of the septum pellucidum is also documented.

Fig. 3. The fenestrated No. 16 red rubber catheter segment and "sleeper" utilized as a percallosal sump. The ventricular end is the connection end of the catheter whose larger internal diameter may enhance the sump's functioning.