Isotope Cisternography in Hydrocephalus with Normal Pressure

Case Report and Technical Note

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“Normal pressure hydrocephalus” is a recently recognized clinical entity. Since intellectual deterioration is one of its principal manifestations, it may be counted among the pre-senile dementias. Soon after its recognition came the report of its successful surgical management in the form of ventriculo-atrial shunting. It therefore seems desirable to develop a simple and safe test to identify those patients who can be expected to benefit from the shunting procedure.

On the basis of our experience, we believe that isotope cisternography and ventriculography offer information in the diagnosis of normal pressure hydrocephalus which is not available by other means. It is a safe and relatively simple examination. This report will discuss isotope cisternography and ventriculography in relation to hydrocephalus with normal pressure. It will also describe a typical case in which this procedure played an important part both in the diagnosis and in the postoperative treatment after the successful establishment of a ventriculo-atrial shunt.

Technique

The patient receives 10 drops of Lugol’s solution three times a day for 3 days, beginning 1 day before the injection of isotope. This minimizes the uptake of liberated I by the thyroid gland.

On the morning of the examination, a lumbar puncture with a No. 22 gauge needle is performed, the cerebrospinal fluid pressure is measured, and samples are collected for routine laboratory analysis. Then 100 microcuries of I human serum albumin are injected. Since the flow of the isotope is independent of the patient’s position, it is not necessary to confine the patient to any particular body posture after injection. However, we advise the patient to stay in bed for a few hours to minimize leakage of isotope from the subarachnoid space at the puncture site.

Scanning of the head in anterior and lateral positions is done at 3, 6, and 24 hours after injection. When the isotope flow is unusually slow, we often add a 48-hour scan. We use either a photoscanner with a 3-inch crystal or an Anger camera for this purpose.

The normal 3-hour scan shows radioactivity in the cervical spinal canal and in the basilar cisterns (Fig. 1). Six hours after injection, the activity reaches the frontal poles and the Sylvian fissures. At 24 hours, most of the isotope is collected along the superior sagittal sinus, with an even and symmetrical distribution over both cerebral convexities in the anterior view. Very little is ever seen in the occipital areas.

In our experience with over 40 patients, only an occasional mild temperature elevation or headache a few hours after injection of the isotope has been observed. There has been no aggravation of the pre-existing symptoms during or after this procedure.

The only serious complication has been a single case of aseptic meningitis, which occurred in a questionable cerebrospinal fluid leak within a few hours after injection of the isotope and which responded to symptomatic treatment; this case and a similar one have been reported in detail elsewhere.

Case Report

A 55-year-old white man was admitted on December 5, 1965, 1 year after an automobile accident in which he had received
Fig. 1. Normal isotope cisternogram, anterior and left lateral views, 3, 6, and 24 hours after injection of radiolodinated human serum albumin into the lumbar subarachnoid space.

sculp lacerations. He had been treated at a local hospital after the accident, where skull films had been reported as negative and a scalp laceration of the left occipital region had been sutured. He had been conscious, but had no recollection of the accident until 4 days later. A lumbar puncture was not performed. The only abnormal finding noted at the time of discharge was an uncertain and shuffling gait.

Because of progressive awkwardness of his right limbs, difficulty in walking, loss of balance, poor memory for recent events, blurred vision, and frequent right-sided headaches, he was referred to the Neurosurgical Service at Edward J. Meyer Memorial Hospital.

Examination. Physical examination was normal. There was moderate impairment of memory. Cranial nerve functions were normal. Deep tendon reflexes were equal with plantar flexor responses. Coordination and perception of all sensory modalities were intact. There was a mild, right-sided weakness. The patient’s gait was unsteady, shuffling, and broad-based. Bowel and bladder control were normal.

The spinal fluid was clear, with a protein content of 14 mg% and a pressure of 100 mm. Cervical spine films showed spondylosis with disc degenerations at C-5 through C-7. Chest and skull X-rays were normal. An Hg-203 brain scan was also normal. Electroencephalography showed a moderately severe slow wave abnormality in the fronto-temporal regions.

A pneumoencephalogram showed a rather marked symmetrical communicating hydrocephalus (Fig. 2). Only a small amount of air could be seen in the basilar cisterns and none over the cerebral hemispheres. A left carotid arteriogram showed only stretching of the anterior cerebral artery, indicating dilated ventricles. The patient deteriorated markedly following the air study, with increased headaches, confusion, and aggravation of his symptoms lasting for several days. A considerable amount of residual air remained in the lateral ventricles on follow-up skull films.

It was assumed that obliteration of the subarachnoid space of the cerebral hemispheres had caused alteration of the cerebrospinal circulation, and to ascertain this a cisternogram was performed. Six hours after injection of the isotope, the cerebral ventricles were partially filled; isotope could also be seen in the basilar cisterns and in the cerebrospinal canal. At 24 hours, all the isotope was in the ventricles (Fig. 3). The size and shape of the ventricles were quite comparable to those seen on the pneumoenceph-