Absence of Corpus Collosum and High-Pressure Hydrocephalus

Nancy A. Thompson-Spangler

Milwaukee Children's Hospital, Milwaukee, Wisconsin

Functional evaluation of complex developmental central nervous system abnormalities complements computed tomography (CT). Cisternography, while less anatomic than CT, adequately defines altered cerebrospinal fluid (CSF) flow patterns. Cisternography used in conjunction with CT can direct proper surgical correction.

Radionuclide cisternography, a minimally invasive diagnostic procedure, is an accepted examination for the evaluation of CSF dynamics (*1–3*). The value of cisternography is in assessing abnormal CSF flow and absorption after CT demonstrates an anatomic abnormality. An example of the complementary roles of cisternography and CT in evaluating a complex dysgenic cerebral malformation is detailed.

Case Report

A 20-month-old boy was followed from birth for a seizure disorder. He was re-evaluated because of increased seizure activity, failure to thrive, and progressive lethargy.

The patient was examined by CT four times over a period of one year. The CT demonstrated a large low density in the midline caused by considerable enlargement and elevation of the third ventricle, consistent with agenesis of the corpus collosum (Fig. 1). These findings remained static throughout the one-year period.

A radionuclide cisternogram was performed to evaluate bulk CSF flow. Indium-111-DTPA (200 μ Ci/m^2) was placed in the subarachnoid space. Images were obtained at 1-, 6-, 30-, and 48-hr postinjection (Fig. 2).

The one-hour images demonstrated transit of the radiopharmaceutical to basal cisterns and into the third and lateral ventricles. At 6 hr, the cerebral convexities were seen, as well as a superiorly displaced ventricular system. At 30 hr, the progressive exit of the radiopharmaceutical from the ventricular system was noted and was complete at 48 hr.

The cisternogram documented communicating hydrocephalus and confirmed the displaced ventricular system by the third ventricle and porencephalic cyst.

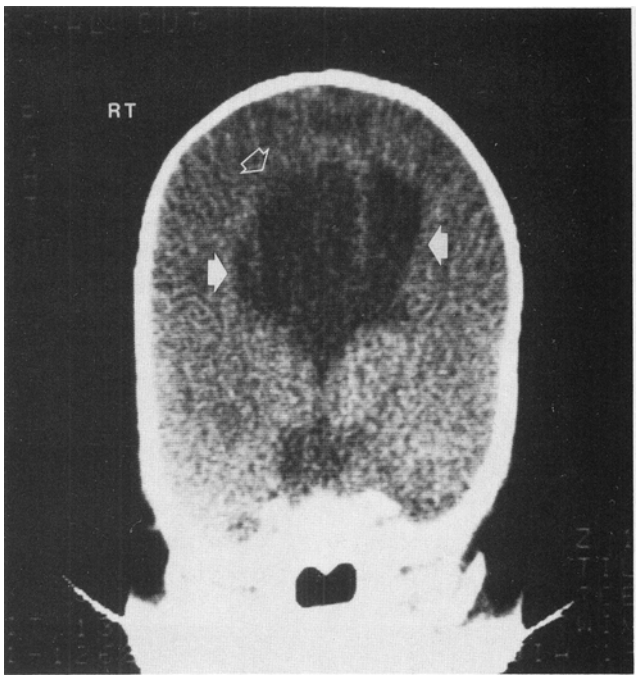

FIG. 1. CT coronal section; solid arrows mark lateral ventricles; open arrow marks porencephalic cyst.

At time of surgery ventricular pressure was increased. The diagnosis of high-pressure communicating hydrocephalus was confirmed and a ventriculoperitoneal shunt was established to correct the altered CSF flow.

Since surgery the child has had fewer seizures and he is less lethargic.

Discussion

Computed tomography is the most accurate diagnostic study used for initial evaluation of children with craniocerebral malformations (*4*). It classifies, follows, and determines prognosis. Because it is a nonfunctional study, demonstrating structure only, some patients require additional evaluation by radionuclide cisternography to yield physiologic information concerning CSF flow.

In this case, the cisternogram provided information that could not be obtained from the CT examination. Others

For reprints contact: Nancy A. Thompson-Spangler, Dept. of Nuclear Medicine, Milwaukee Children's Hospital, 1700 W. Wisconsin Ave. PO Box 1997, Milwaukee, WI 53201.

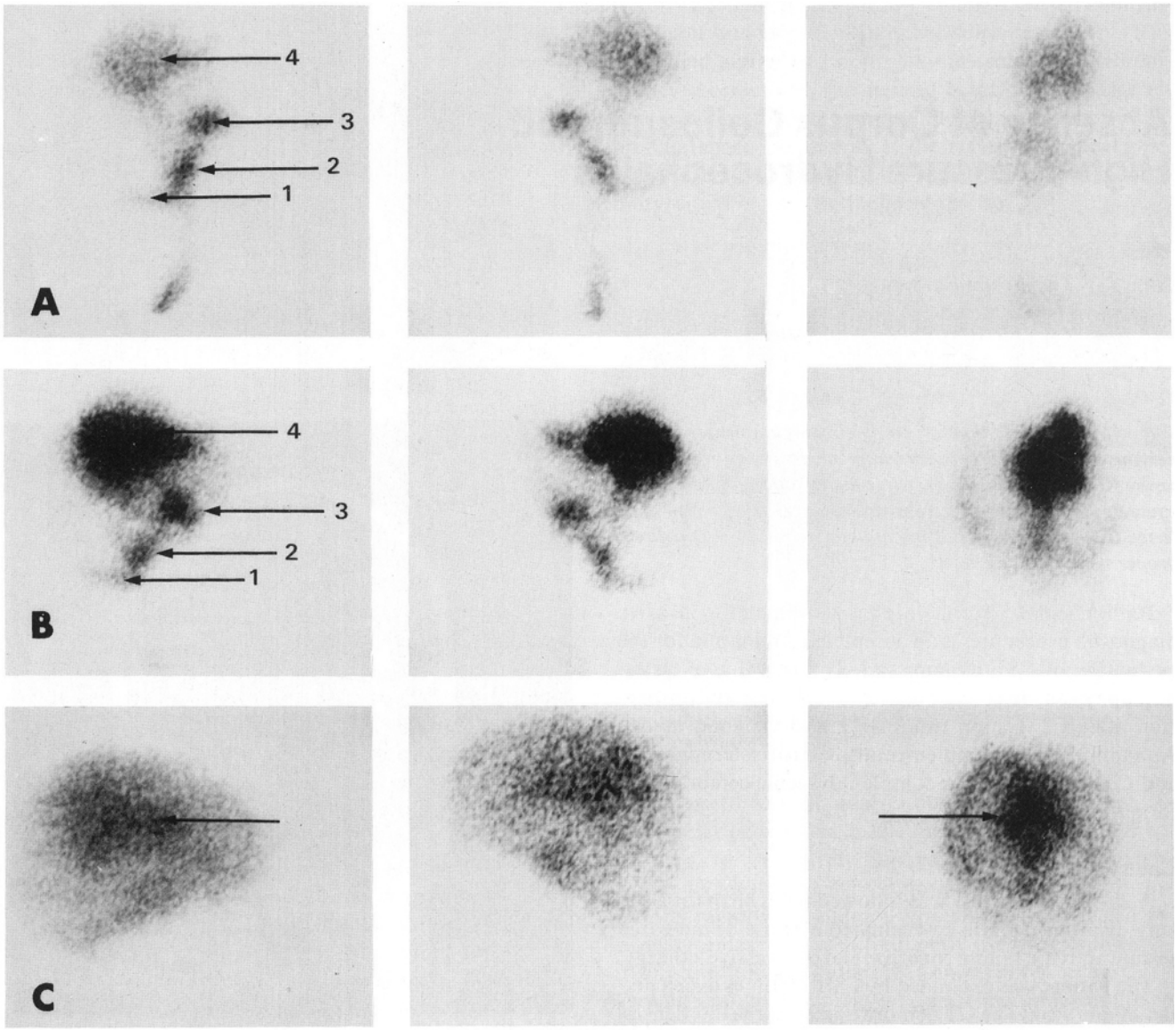

FIG. 2 (A): 1-hr cisternogram image—1) Cisterna magna; 2) prepontine cistern; 3) supracellar cistern; and 4) porencephalic cyst and lateral ventricles. (B): 6-hr cisternogram image—1)cisterna magna; 2) prepontine cistern; 3) supracellar cistern; and 4) porencephalic cyst and lateral ventricles. (C): 30-hr cisternogram image; arrows mark porencephalic cyst. Images are (left to right) left, right, and anterior.

have used cisternography successfully in diagnosis and treatment of congenital anomalies affecting CSF flow (*3*).

Conclusion

Radionuclide cisternography can complement computerized tomography by providing the physiologic information regarding CSF kinetics not obtained in a structural examination. In this way complex clinical problems are more easily understood because of the *combined* functional and anatomic data. Cisternography performed in conjunction with CT can circumvent the need for more invasive procedures.

References

1. Heller RM, James AE: Clinical applications of cisternography in the pediatric age group. *Am J Roentgenol Radium Ther Nucl Med.* 116: 590–597, 1972

2. James AE, Mathews ES, DeBlanc HJ, et al: Cerebrospinal fluid imaging: Its current status. *J Can Assoc Radiol.* 23: 157–167, 1972

3. Glasauer FE: Isotope cisternography and ventriculography in congenital anomalies of the central nervous system. *J Neurosurg.* 43: 18–26, 1975

4. Sty JR, Babbitt DP, D'Souza B: Pediatric radionuclide ventriculography. *Clin Nucl Med:* in press