

Radionuclide cisternography in diagnostics of obstruction hydrocephalus in introduced ventriculoperitoneal shunt

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[Received 28 III 2004; Accepted 18 IV 2004]

Abstract

BACKGROUND: To confirm or exclude a diagnosis of internal obstruction hydrocephalus in an 8-year old girl with an introduced ventriculoperitoneal (V-P) shunt.

CASE REPORT: Establishing the V-P shunt is indisputably the route of choice in non-communicating hydrocephalus. The existence of a V-P shunt, however, is connected with numerous risks, especially of injuries, infection as well as increased intra-abdominal pressure — e.g. in pregnancy. The development of endoscopy in neurosurgery allows the creation of communication via the bottom of the third ventricle with basal cisterns, and the subsequent cancellation of a V-P shunt.

MATERIAL AND METHODS: We describe the case of an 8-year old girl with congenital internal hydrocephalus with an assumed obliteration of the Sylvian aqueduct with an established V-P shunt. An MR scan described the membrane in the area of the Sylvian aqueduct, but the disproportion between the dilatation of the lateral ventricles, third ventricle and fourth ventricle led the physician to doubt as to the accuracy of the diagnosis of internal obstruction hydrocephalus. Therefore we performed a radionuclide cisternography (in a modified manner), which proved an existing communication between the third and fourth

cerebral ventricle and which contradicted the clinical diagnosis of obstruction hydrocephalus.

Key words: congenital internal hydrocephalus, V-P shunt, MR, ¹¹¹In-DTPA cisternography

Case report

In a 9-month old girl, born premature in the 35th week of pregnancy, signs of immaturity and stagnation were observed in psychomotor development in time of the 2nd – 3rd trimester. A CT examination of the brain showed congenital triventricular hydrocephalus with the obliteration of the Sylvian aqueduct and a Dandy-Walker type abnormality of the posterior cranial fossa. The child was referred for a neurosurgical operation, and a V-P shunt was introduced — Omnishunt Onepiece Valve system. The post-operation course was without complications. The child was monitored by neurologists and further development was evaluated as very satisfactory. At the age of 8 years this child, thanks to the development of endoscopic neurosurgery, an endoscopic operation was considered in order to provide communication between the third ventricle and basal cisterns. Subsequently, a V-P shunt could be cancelled.

Based on the performed cisternography it was determined that the congenital hydrocephalus is not secondary to complete obstruction on the level of the Sylvian aqueduct.

Radionuclide imaging

Directly under the detector of a scintillation camera, keeping sterile conditions, we administered 18.5 MBq (0.5 mCi) ¹¹¹In-diethylentriaminepentaacetic acid (DTPA) in a V-P shunt reservoir, during which we intentionally compressed the peritoneal catheter. We acquired the sequence of scintigrams of dynamic study with 1 scan/30 sec. in a 128 x 128 matrix using a tomographic gamma camera Diacam (Siemens, Erlangen, Germany) with the use of collimator optimal for the detection of ¹¹¹In radiation, for a period of 10 minutes and subsequently also static scans after 3, 24 and 48 hours, with the duration of each scan lasting 5 minutes.

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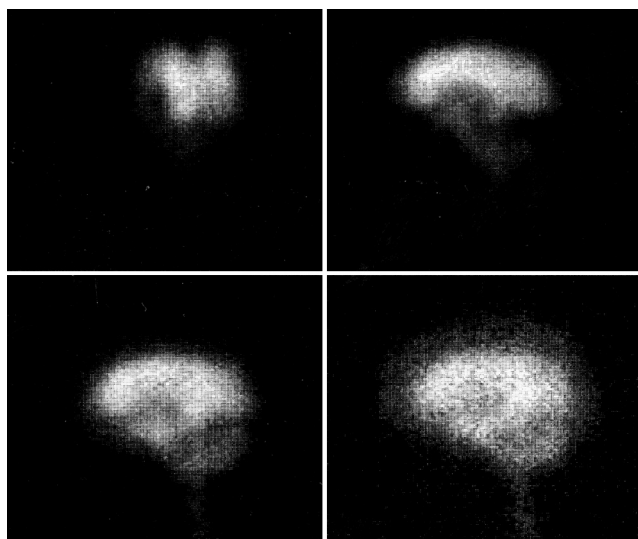


Figure 1. Static scintigrams after 3 hours in anterior view (upper left) and in left lateral (LL) view (upper right) and after 24 hours in LL view (down left) and after 48 hours also in LL view (down right).

On sequence scintigrams there was an obvious presence of the radiotracer in the lateral ventricles, but also in the third and later even in the fourth cerebral ventricle. On static scintigrams (Fig. 1) performed after 3, 24 and 48 hours we proved decelerated diffusion of the radiotracer together with cerebrospinal fluid (CSF) in subarachnoid space above the convexities of both hemispheres. The presence of radionuclide in the fourth cerebral ventricle and subarachnoid space did not confirm the obstruction form of hydrocephalus; it was in discrepancy to the MR scan (Fig. 2), where a membrane in the area of the Sylvian aqueduct is described. This discovery saved the child from an operation, the result of which may not have been necessarily positive and naturally not free of risks, either.



Figure 2. MR scan where a membrane in the area of the Sylvian aqueduct is described.

Comments

The case study emphasises the importance of radionuclide cisternography, or modification of its conventional method, for understanding the kinetics of CSF, which thus continues to hold its place among techniques such as CT or MR.

References

1. Glasauer FE. Isotope cisternography and ventriculography in congenital anomalies of the central nervous system. *J Neurosurg* 1975; 43: 18–26.
2. Miyamori T., Okabe T., Hasegawa T., Takinami K., Matsumoto T. Dandy-Walker syndrome successfully treated with cystoperitoneal shunting. *Neurol Med Chir* 1999; 39: 766–768.
3. Phillips II WE, Burke GJ. Scintigraphic findings in cerebrospinal fluid ascites complicating a ventriculoperitoneal shunt. *Clin Nucl Med* 1996; 21: 586.