FEATURES OF CT CISTERNOMGRAM IN ARACHNOID CYST OF QUADRIGEMINAL CISTERN

TAKASHI HAYASHI, AKIHiko KURATOMI AND SHINKEN KURAMOTO

Department of Neurosurgery, Kurume University School of Medicine, Kurume, 830, Japan.

Received for publication May 24, 1980

The authors report a case of an infant girl referred to our clinic because of an enlarged head and a delay in taking her first steps. Hydrocephalus was diagnosed, a ventriculo-peritoneal shunt was performed immediately, and a Metrizamide CT cisternogram was run. The features of Metrizamide CT cisternogram of the arachnoid cyst situated in the tentorium at the posterior of the third ventricle are described and the mechanism of fluid accumulation in the cyst.

INTRODUCTION

Diagnosis of arachnoid cysts has been facilitated by the increased use of the CT scanner (Hayashi, T. et al, 1977; 1979 a ; 1979 b ; 1980). Recently, we encountered a case of arachnoid cyst of the quadrigeminal cistern, and we now present Metrizamide CT cisternogram findings, and comments on the mechanism of fluid accumulation in the cyst.

CASE REPORT

A 22-month-old female was referred to our clinic because of an enlarged head and a delay in taking her first steps. At birth, she had weighed 3,240 gm, head circumference was 35 cm. Based on these factors, her condition was diagnosed as hydrocephalus, and a ventriculoperitoneal shunt was performed immediately.

Neurological Findings

Ataxic gait and esotropia, as well as disturbance of conjugate upward gaze, were apparent, however, there was neither papilledema nor pyramidal signs. Hearing disturbance was not noted.

Neuroradiological Findings

Vertebral angiogram - An anteroposterior view revealed that the bilateral posterior cerebral arteries had undergone stretching with lateral displacement of the perimesencephalic segments, and the cisternal segments of the superior cerebellar arteries were widely separated. On lateral view, the posterior cerebral arteries were raised, arch-like, along the tentorial incisura, and the superior cerebellar arteries were markedly displaced downward. The posterior thalamoperforating artery was distended; the medial posterior choroidal artery was distended and displaced forward.

Metrizamide ventriculogram - Metrizamide was injected via the ventricular tube of the V-P shunt. The third ventricle was markedly pressed forward, and only the anterior half, including the massa intermedia, was visible. The body and bottom half of the trigons of the lateral ventricles were not seen. Furthermore, the aqueduct of Sylvius
was completely occluded, so that the fourth ventricle was not visible.

**CT Scanning**

Conventional CT scanning - The third ventricle and the inferior horn of the lateral ventricle were greatly enlarged. At the posterior of the third ventricle, between the bilateral trigons of the lateral ventricle, a large cystic lesion appeared as a semi-oval, low density area with no contrast enhancement.

Metrizamide CT ventriculogram - Metrizamide visible in the ventricle did not enter the cyst, indicating that the cyst did not communicate with the ventricular system. Furthermore, Metrizamide did not transfer to the basal cistern, apparently due to obstruction of the aqueduct by the large cyst (Fig. 1).

**Fig. 1.** Metrizamide CT ventriculogram. Metrizamide, visible in the ventricles, does not enter the cyst, indicating that there is no communication between the ventricular system and the cyst. There is no Metrizamide in the basal cisterns, apparently because of obstruction of the aqueduct by the large cyst.

Metrizamide CT cisternogram - Metrizamide injected intrathecally into the spinal subarachnoid space, made it possible to observe cerebrospinal fluid (CSF) circulation in the subarachnoid space and to determine the relationship between the cyst and the adjacent subarachnoid space. Scanning 2-6 hours after injection revealed that while Metrizamide had transferred to the Sylvian fissure and the subarachnoid

**Fig. 2.** Metrizamide CT cisternogram. Scanning 2-6 hours after intrathecal injection reveals that while Metrizamide has transferred to the sylvian fissure and the subarachnoid space adjacent to the cyst, it has not entered the cyst. At 24 hours, Metrizamide is spread over the whole subarachnoid space, and a small amount can be seen in the cyst itself. Metrizamide retained in the subarachnoid space adjacent to the cyst forms a "halo" around the cyst. At 48 hours, Metrizamide spread over the subarachnoid space has already begun to the cyst is somewhat delayed and Metrizamide in the cyst has increased.
space adjacent to the cyst, it had not entered the cyst. At 24 hours, the scan showed that Metrizamide had spread over the whole subarachnoid space, and a small amount was visible in the cyst. Furthermore, retention of Metrizamide in the subarachnoid space adjacent to the cyst resulted in a "halo" surrounding the cyst. At 48 hours, Metrizamide had already begun to disappear from the subarachnoid space, clearance from the subarachnoid space adjacent to the cyst was somewhat delayed, and in the cyst, Metrizamide had increased slightly (Fig. 2, 3, 4).

**DISCUSSION**

Arachnoid cysts are associated with some developmental disorders of the brain and its adjacent tissue. There are two theories on the pathogenesis of this disease. One is that an abnormal dilatation of the subarachnoid space coincides with the defective brain tissue and forms a subarachnoid cyst after its loculation (Robinson, R. G., 1971). The other theory is that an intrarachnoid cyst is formed because of a genetic anomaly in the systemic formation of subarachnoid space (Starkman, S. P., 1958).

*Fig. 3.* Curves demonstrate, respectively, increasing and decreasing of Metrizamide indicated by Hounsfield's number in remote subarachnoid space to the cyst (1), in the cyst (2), and in the lateral ventricle (3). 3 hours after the administration of Metrizamide, it reaches maximal value in Hounsfield's number. Intracystic Metrizamide concentration increases gradually and it shows plateau 9 hours after the administration (2).
The increase in intracystic fluid may be explained by three different mechanisms, as suggested by Dyck and Gruskis (1977). It may be based on 1) the osmotic pressure difference between the fluid retained in the cyst and the CSF in the adjacent subarachnoid space; 2) the presence of secretory ependymal tissue in the cyst wall per se; or 3) the cyst wall’s containing slits, resulting in a ball-valve mechanism that allows CSF to flow into the cyst. Thus, in an intra-arachnoid cyst, the fluid increase may be due mainly to mechanism 1), whereas, in the case of a subarachnoid cyst, because of adhesion of the arachnoid membrane, mechanism 3) can be considered.
A Metrizamide CT cisternogram gave better information about the area between the subarachnoid space and the cyst, by making it possible to observe the circulation of the CSF in the cyst and the adjacent subarachnoid space at the same time. In the case reported by Handa et al. (Handa et al., 1977), a Metrizamide CT cisternogram showed an arachnoid cyst that did not communicate with the subarachnoid space. However, the cyst in the present case was a communicating type; a small amount of Metrizamide had entered the cyst after 24 hours, and its subsequent clearance from the cyst occurred after clearance from the distant subarachnoid space. Therefore, the pattern was slow-filling into the cyst and delayed clearance from it. Also characteristic of these cases is the formation of a "halo" by Metrizamide retained in the subarachnoid space around the cyst. Moreover, clearance of this "halo" also occurred later than clearance of the Metrizamide from remote areas of the subarachnoid space.

Different mechanisms are thought to be involved in the increase in fluid content of the communicating and non-communicating types of cyst. In the latter type, an osmotic mechanism is probably the major factor. Furthermore, the incomplete communicating type cyst described here showed a time difference between filling and clearance, as seen by the Metrizamide CT cisternogram; this also may be findings that the intracystic content is increased by osmotic mechanism.

REFERENCES


