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Hydatid cyst of the ambient cistern radiologically mimicking an arachnoid cyst

Case report

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Hydatid cysts of the posterior fossa are extremely rare. Intracranial hydatid cysts are more common in children and occur more frequently in the supratentorial space. A 7-year-old boy was admitted to the emergency department because of intense headache, nausea, vomiting, and progressive drowsiness that developed within the period of a week. On radiological examination a round, 2.5 × 2.5-cm cystic lesion appeared in the ambient cistern and caused hydrocephalus as a result of extrinsic aqueductal stenosis. The cyst was successfully removed using the puncture, aspiration, irrigation, and resection technique via an infratentorial-supracerebellar approach with the patient in the sitting position.

The authors here described an unusual case of a hydatid cyst in the left ambient cistern with hydrocephalus due to extrinsic aqueductal stenosis, which seems to be the first such case in the literature. Hydatid cyst may be considered in the differential diagnosis of arachnoid cysts of the quadrigeminal cistern to determine which surgical procedure to perform and to avoid unexpected complications.
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Key Words • **ambient cistern** • **child** • **hydrocephalus** • **intracranial cyst** • **intracranial hydatid cyst** • **posterior fossa**

Hydatid cysts of the posterior fossa are extremely rare.[7,12–14] Their rarity is borne out by the few reports in children.[3,8,9,12]

Clinically, symptoms and neurological signs depend on the size and location of hydatid cysts of the posterior fossa. In general, clinical findings can include either increased intracranial pressure due to mass effect[5] or hydrocephalus due to obstruction of the CSF pathways in the posterior fossa.[4,10,11,14] Moreover, most hydatid cysts are located intraaxially, that is, in the cerebellar hemisphere, fourth ventricle, or pons; those with an extraaxial localization, as in the cistern, are very uncommon. Only 2 patients with extraaxial cysts have been reported in the relevant literature, and the cysts in these cases caused cranial nerve palsies.[2,6]

In the present report, which appears to be the first in the literature, we describe an unusual case of a hydatid cyst in the left ambient cistern in a patient who presented with hydrocephalus due to extrinsic aqueductal stenosis.

Case Report

History and Examination. This 7-year-old boy was admitted to the emergency department because of intense headache, nausea, vomiting, and progressive drowsiness that developed within the period of a week. He had no history of trauma. On initial neurological examination, he was roused with difficulty. The remainder of the examination was within normal limits except for pupil edema. During routine laboratory and radiological examinations, his neurological status progressed to nontraumatic coma.

Immediate brain CT studies were performed to identify a surgical emergency. Computed tomography scanning showed enlarged lateral and third ventricles, and a round cystic lesion 25 × 25 mm in size was seen at the midbrain level in the posterior fossa. In addition, there was no evidence of calcification or surrounding edema.

Because of severe and acute supratentorial hydrocephalus, the patient's clinical condition required immediate placement of a temporary EVD. The drain was placed and left 15 cm above the head for possible upward herniation. A day after inserting the drain, the child improved symptomatically. We preferred to perform MRI prior to another surgical procedure to assess the morphology of the cystic lesion. Magnetic resonance images demonstrated the cyst lateral to the midbrain in the ambient cistern (Fig. 1A and B). The cyst distorted the midbrain and caused extrinsic aqueductal stenosis, but there was no contrast enhancement (Fig. 1C and D). Fluid-attenuated inversion recovery sequences also revealed a round cystic

Abbreviations used in this paper: EVD = external ventricular drain; PAIR = puncture, aspiration, irrigation, and resection.

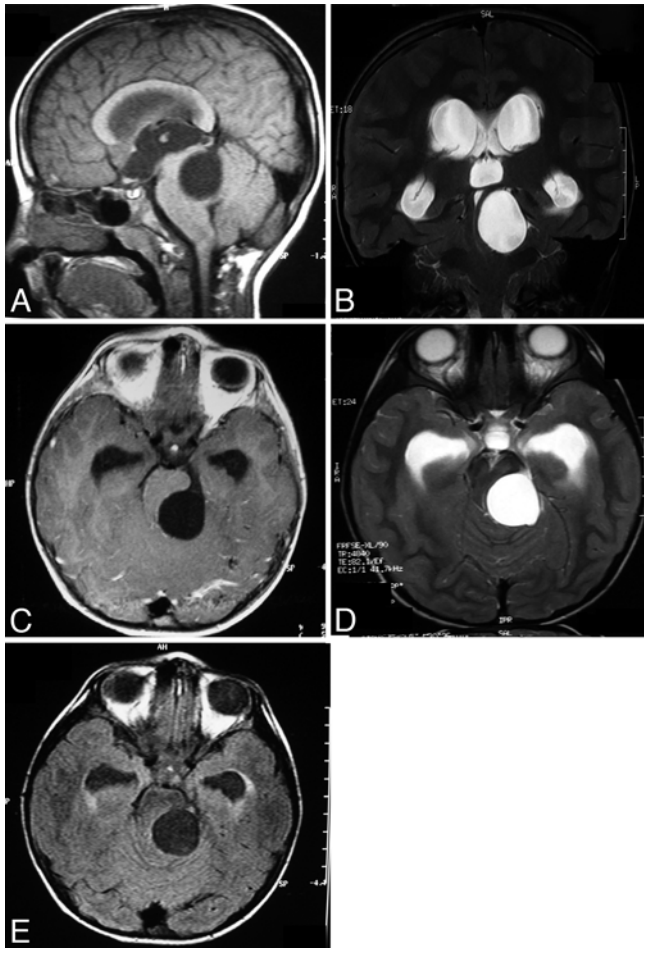

Fig. 1. Preoperative MR images obtained in a 7-year-old boy presenting with intense headache, nausea, vomiting, and progressive drowsiness. **A:** Midsagittal T1-weighted MR image showing a hypointense cystic mass compressing the midbrain and no visibility of the aqueduct of Sylvius because of distortion of the midbrain. **B:** Coronal T2-weighted MR image showing a hyperintense cystic lesion with no peripheral edema. The cyst is pushing the midbrain laterally and causing extrinsic aqueductal stenosis. **C:** Axial T1-weighted MR image with Gd showing a hypointense, well-defined border mass without contrast enhancement in the left ambient cistern. **D:** Axial T2-weighted MR image showing a hyperdense cystic lesion, distortion of the midbrain, and dilated temporal horns with periventricular edema. **E:** Axial FLAIR sequence revealing a hypointense cystic lesion of the ambient cistern with the same signal as CSF, which is suggestive of an arachnoid cyst.

lesion in the ambient cistern (Fig. 1E). Typically, CT and MR imaging findings revealed a nonneoplastic cyst, as in an arachnoid cyst.

Operation. Since the preoperative diagnosis was hydatid cyst, surgical intervention was performed through a midline suboccipital craniectomy with the patient in a sitting position. The cyst was reached using an infratentorial-supracerebellar approach and located in the left ambient cistern (Fig. 2 left). After opening the arachnoid membrane at the left ambient cistern, the upper part of another distended dense spherical cyst membrane was seen. Because of the deep location and a high risk of neurological deficit, a rubber drain could not be placed between the cyst wall and surrounding neural tissue. The

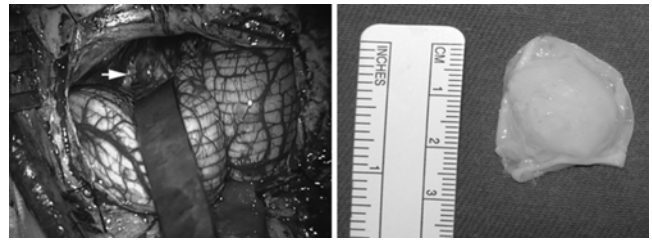

Fig. 2. Left: Photograph showing the deep-seated cyst cavity in the left ambient cistern after total removal of the cyst wall *(white arrow)*. **Right:** Photograph of the macroscopic appearance of the cyst wall.

cyst was punctured, and the fluid was aspirated with a needle to prevent contamination. The cyst cavity and surrounding neural tissue was irrigated with a hypertonic saline solution for a few minutes, and the cyst wall was totally removed (Fig. 2 right). Histopathological examination confirmed the diagnosis of hydatid cyst.

Postoperative Course. The patient's postoperative course was uneventful, and the EVD was left 15 cm above his head for the first 48 hours. The EVD was gradually elevated over the next 3–5 days and then clamped. The patient's neurological status remained good, and the EVD was removed. He was discharged from the hospital on postoperative Day 10 and was also treated with albendazole (15 mg/kg per day) for 3 months. Magnetic resonance images obtained 3 months after surgery showed complete resection of the cyst and patency of the sylvian aqueduct. The child's neurological status was normal at follow-up examinations, and no reenlargement of the cyst or ventricular size change was observed on 6- and 9-month follow-up MR images.

Discussion

Intracranial hydatid cysts are more common in children and more frequently located in the supratentorial space.[3,6,8,9] In contrast, an infratentorial location is very uncommon.[5,12–14]

Anatomically, hydatid cysts in the posterior fossa can be located in 3 different tissues: intraparenchymal tissue, as in the cerebellar vermis or cerebellar hemisphere; CSF pathways, as in the fourth ventricle or sylvian aqueduct; and subarachnoid space, as in the cisterns of the posterior fossa.[12] In neurosurgical practice, most hydatid cysts in the posterior fossa occur in intraaxial locations, whereas extraaxial locations are extremely rare. In particular, only 2 cases of cisternal hydatidosis in children have been reported, and the cysts in both cases were located in the prepontine cistern.[2,7]

Clinically, symptoms and neurological signs depend on the size and intra- or extraaxial location of the hydatid cyst. Intraaxial cysts may cause cerebellar signs and symptoms of increased intracranial pressure with either mass effect of the cyst or hydrocephalus due to intrinsic compression of CSF pathways in the posterior fossa. Extraaxial hydatid cysts can cause cranial nerve deficits. The cisternal hydatid cyst in our case, solely located in the left ambient cistern and causing obstructive hydro-

cephalus due to extrinsic aqueductal stenosis, has never been described before.

A cyst of the ambient cistern should be differentiated from arachnoid cysts of the quadrigeminal cistern to determine a suitable surgical procedure. The latter, originating in the quadrigeminal plate region, is located in the supratentorial space and may have different extensions toward surrounding regions, such as the ambient cisterns laterally, because of loci minoris resistentia. Recently, cysts of the quadrigeminal cistern were classified according to their anatomical and radiological appearance.[1] Type I cysts have supratentorial and infratentorial extension, Type II cysts have infratentorial extension, and Type III cysts have lateral extension toward the temporal lobe. In particular, Type II and III cysts should be considered in the differential diagnosis, because Type II cysts associated with hydrocephalus are confined to the infratentorial space and Type III cysts have a significant asymmetrical expansion toward the temporal fossa. Arachnoid cysts of the quadrigeminal cistern and associated hydrocephalus can be effectively treated via endoscopic approaches.[1]

The ideal treatment for hydatid cysts in the posterior fossa is surgical, and the cyst must be removed unruptured. The Dowling technique, or "hydatid birth," is preferred for totally removing a cyst and refers to extraction by forcing saline solution around the lesion (hydrostatic expulsion).[13] This technique is especially successful in treating superficial lesions of the cerebral and cerebellar cortex. In cysts involving eloquent areas such as the brainstem, however, the morbidity associated with the Dowling procedure is high.[7,10,11] The PAIR technique involves puncture with a needle followed by aspiration, irrigation, and resection. The cyst cavity is washed with saline (3% NaCl) for a few minutes. This technique is usually reserved for problematic cases of deep-seated, tightly surrounded cysts that cannot be delivered by irrigation and cases in which hydrostatic expulsion may cause a serious deficit.[5,13]

Sometimes hydatid cysts cannot be differentiated from arachnoid cysts even using advanced imaging techniques. The arachnoid cyst is not as round, is not surrounded by brain tissue, and may communicate with other cisterns of the infra- and supratentorial spaces of the brain.[13] On the other hand, hydatid disease appears as a cystic mass, spherically shaped, and appears similar to CSF on CT scanning and MR imaging. In addition, perifocal edema and rim enhancement are not present unless the hydatid cyst is infected.[3,9] Since the cyst in our case was round and located solely in the ambient cistern, the preoperative diagnosis was a deep-seated hydatid cyst. We also used the PAIR technique because of this deep-seated localization.

Conclusions

In summary, a hydatid cyst of the ambient cistern in a patient presenting with extrinsic aqueductal stenosis is an unusual cause of hydrocephalus and may be considered in the differential diagnosis of arachnoid cysts in the quadrigeminal cistern. If the hydatid cyst is deep seated or located around the brainstem, the PAIR technique might be helpful to the neurosurgeon in avoiding serious complications.

Disclosure

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

Author contributions to the study and manuscript preparation include the following. Conception and design: Sanlı. Acquisition of data: Sanlı. Drafting the article: Sanlı. Critically revising the article: all authors. Reviewed submitted version of manuscript: all authors. Approved the final version of the manuscript on behalf of all authors: Sanlı. Administrative/technical/material support: all authors. Study supervision: Sanlı.

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