jnm/CASE REPORT

POSTERIOR FOSSA CYST DEMONSTRATED BY ISOTOPE CISTERNOGRAPHY

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In a patient with a postoperative cyst in the posterior fossa, CSF imaging (cisternography) was used in diagnosis, including evaluation of the relationship between the cyst and the CSF space. Although air studies may be equally effective in establishing the presence of those intracranial cysts which communicate with the CSF space, cisternography provides more precise information regarding the flow pattern of CSF in relation to the cyst. Such information, as illustrated by the case presented here, may be of considerable value in planning surgical management.

The diagnosis of a cyst in the posterior fossa commonly represents a difficult clinical problem. Diagnostic studies including brain scans often fail to localize the cyst. The present report concerns a patient in whom the diagnosis of a postoperative pseudomeningeal cyst in the posterior fossa was clearly established by the use of radioisotope cisternography. More importantly, the cisternogram proved particularly useful in evaluating the CSF flow into and out of the cyst. The latter features were decisive in influencing surgical management.

CASE REPORT

A 34-year-old man underwent removal of bilateral acoustic neurinomas through a suboccipital approach in one stage. Three weeks after surgery, the patient suddenly developed severe headache, nausea, and vomiting. He became febrile and had neck stiffness. A mild fluctuant bulging was noted in the suboccipital region at the operative site. The spinal fluid pressure on lumbar puncture was normal; the fluid showed a marked polymorphonuclear pleocytosis and a reduced glucose content. Although repeated smears and cultures of the CSF were negative for micro-organisms, brain abscess was suspected. A brain scan showed no change from the study performed before surgery; there was no evidence of abscess in the supratentorial or the infratentorial space (Fig. 1). Under fluoroscopic control, percutaneous needle puncture of the fluctuant suboccipital mass was performed; cloudy fluid containing numerous white blood cells (similar to the lumbar CSF) was aspirated and replaced with air. Radiographs taken with the patient in various positions showed a cystic cavity vaguely outlined in the suboccipital region. Diagnosis of a pseudomeningeal cyst was made, but the air-contrast study did not demonstrate the dynamics of communication between the cyst and the CSF space. The patient's general condition was such that a pneumoencephalogram or a ventriculogram was regarded as hazardous. A radioisotope cisternogram was performed in an effort to delineate further the cyst and to study its relationship to the CSF pathways.

Cisternogram. One millicurie of ^{169}Yb-diethylinetriamine penta-acetic acid (DTPA) was injected into the lumbar subarachnoid space. Serial images were obtained with the scintillation camera at 2, 6, and 24 hr. Figure 2A and B shows the pattern obtained by CSF-imaging at 6 hr, indicating the presence of a cyst located posterosuperior to the cisterna magna and communicating with the subarachnoid space. In addition, there was prompt entry but delayed exit of isotope from the lateral ventricles, characteristic of communicating hydrocephalus. (A preoperative pneumoencephalogram had also revealed ventricular dilatation.) At 24 hr (Fig. 2C and D), the cyst remained clearly visualized, indicating stasis (delayed clearance).

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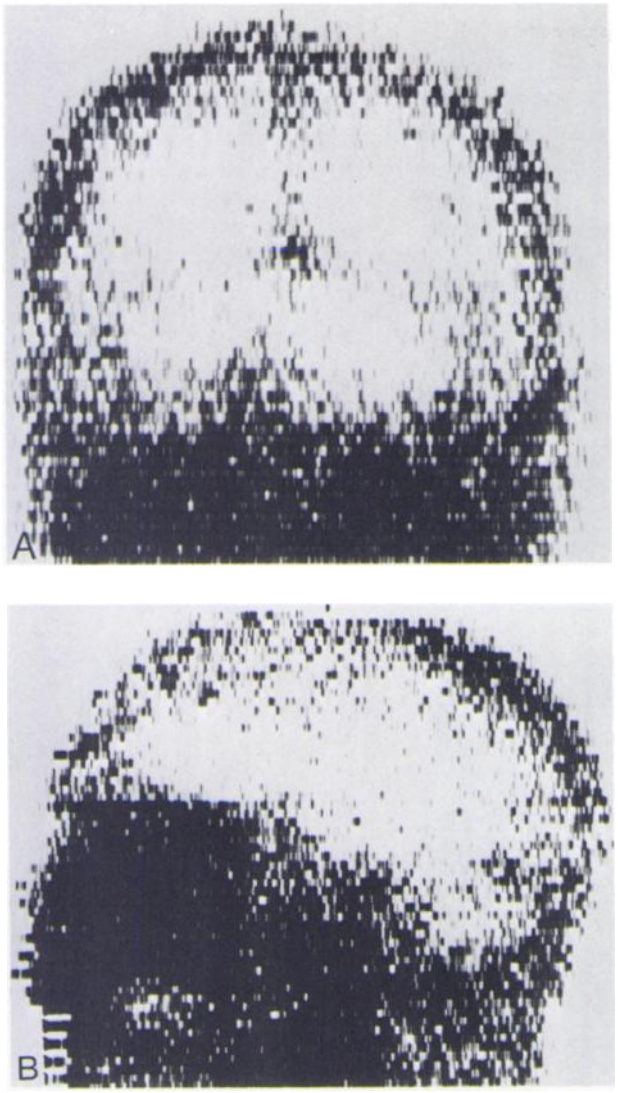

FIG. 1. Rectilinear brain scan (^{99m}Tc-pertechnetate), several days before bilateral removal of acoustic neurinomas: posterior (A) and left lateral views (B). Brain scan clearly revealed large neurinoma later found at surgery in left cerebellopontine angle but failed to show 1.5-cm tumor in right angle. Repeat brain scan 3 weeks postoperatively showed no change from preoperative study shown here.

Suboccipital re-exploration. Based on the information provided by the cisternogram, the posterior fossa was re-explored under local anesthesia. Since it was possible to anticipate the precise location and nature of the lesion, it was necessary to re-open only a portion of the previous bimastoid incision. Beneath the suboccipital muscle layer, which was found to be intact, a large fluid collection was seen in the midline extending laterally to both sides overlying the cerebellar hemispheres. Gelfoam applied at the initial operation to serve as a replacement for the dura which had been left widely open was removed. The cisterna magna which had been left intact at the original operation did not appear to communicate with the cystic space which lay beneath the muscle layer. The arachnoid membrane of the cisterna magna was opened widely to permit free flow of CSF between the subarachnoid space and the cyst. The arachnoid membrane, which was thicker than usual, was tacked back on itself with several sutures to prevent its closure. Postoperatively the patient improved rapidly. The aseptic meningitis cleared and the suboccipital cyst did not refill.

DISCUSSION

Cisternography, which involves imaging of the anatomy and dynamics of the CSF pathways, has become an accepted procedure in the evaluation of hydrocephalus (*1,2*). More recently, cisternograms have also been used as a means of studying localized enlargements of the CSF space (*3,4*). The technique may be regarded as being complementary to, rather than as a substitute for, pneumoencephalography. Air studies are clearly superior in providing anatomical detail, but patterns of CSF movement are better revealed by cisternography. It has been observed that a radiopharmaceutical will sometimes penetrate areas that cannot be filled with air (*5*).

In the case presented here, the posterior fossa cyst was at first identified by the injection of air directly into the cyst cavity. It was not possible, however, to determine by this means the dynamics of

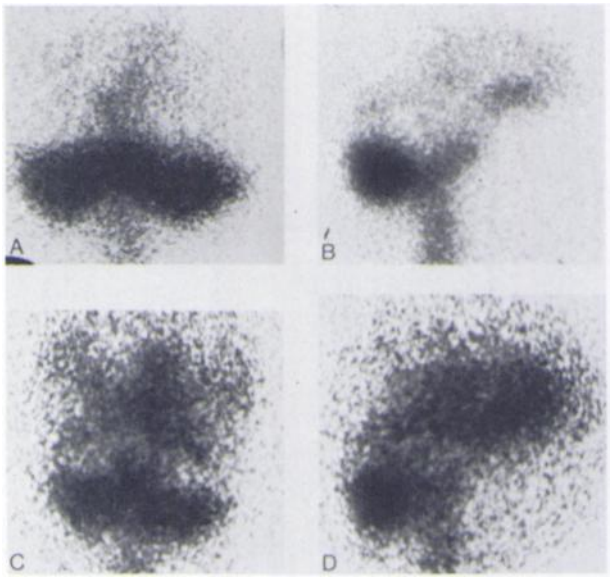

FIG. 2. Cisternogram, scintillation camera views, after injection of isotope into lumbar subarachnoid space (agent: ^{169}Yb-DTPA chelate). In 6-hr posterior view (A), there is abnormal accumulation of radiopharmaceutical extending lateral to midline activity seen in basal cisterns. In right lateral view (B), abnormal activity is localized posterosuperior to cisterna magna and in communication with basal cisterns. In 24-hr posterior (C) and right lateral (D) views, abnormal activity seen earlier at 6 hr has persisted, indicating delayed outflow (stasis) from cyst. Remaining activity has progressed from basal cisterns and is present in lateral ventricles and over cerebral hemispheres.

flow between the cyst and the adjacent CSF pathways. It is conceivable that a subsequent pneumoencephalogram or ventriculogram may have provided this additional information. It is unlikely, however, that an air study would have revealed the quantitative aspect of CSF stasis in the cyst. Furthermore, the use of cisternography spared the patient the discomfort and risk that may be associated with an air study in the presence of a mass lesion in the posterior fossa. As in this case, brain scans are generally of little help in detecting cysts although the scan did help to exclude a brain abscess as the source of the patient's difficulty.

The mechanism by which clearance of the radiopharmaceutical from the cyst was delayed is uncertain. The delay may have been due to decreased absorption of CSF from the cyst. Alternatively, a mechanical ball- or check-valve mechanism may have been a factor whereby CSF readily entered the cyst but from which exit was delayed. Regardless of the precise mechanism, the information provided by the cisternogram proved invaluable in planning surgical management. Identification of the cyst in which stasis was evident suggested the presence of a defect in the arachnoid, permitting CSF to leak into the cyst which could not readily re-enter the subarachnoid circulation. The cerebellopontine angle cisterns, which had been opened bilaterally at the time of the original operation, may well have been the source of the CSF leak. The formation of the cyst may have been the result of back-pressure related to impaired CSF-absorption, as evidenced on the cisternogram by the presence of communicating hydrocephalus.

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