AJNR

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AJNR Am J Neuroradiol 1985, 6 (4) 638-640
http://www.ajnr.org/content/6/4/638.citation

Disseminated Human Subarachnoid Coenurosis: Computed Tomographic Appearance

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A single, fatal case of disseminated subarachnoid coenurosis in an infant is presented to illustrate the computed tomographic (CT) findings. The larval stage of *Multiceps multiceps* (dog tapeworm) is always confined to the cerebrospinal fluid (CSF) pathways where the cysts may be imaged with CT. Previous reports of this rare human infestation do not include high-resolution CT [1–5]. Standard CT of the brain, myelography, and thin-section CT after metrizamide injection into the CSF were performed in the case described. Pathologic material and a literature review are provided.

Case Report

An 18-month-old American Indian girl was initially seen at the age of 12 months because of delayed development, dehydration, vomiting, and a rash over her abdomen and chest. Physical examination revealed a generalized macular rash, pharyngitis, and hypotonia. Microcytic anemia was noted, with a hemoglobin of 10.7 g/dl. The sedimentation rate was 17 mm/hr. The rectal temperature was 37.7°C. Extremity films, obtained because of suspected lead poisoning, were negative. The anemia was treated.

Six weeks later, the child was seen again because of progressive neurologic dysfunction. Physical examination revealed papilledema and spastic quadriplegia. There was no rash. Hemoglobin was 12.2 g/dl. A CT scan revealed massive obstructive hydrocephalus (fig. 1A) with transependymal resorption. A ventriculoperitoneal shunt was placed, at which time the ventricular CSF was noted to be cloudy and xanthochromic, containing numerous polymorphonuclear leukocytes and monocytes, with a protein of 150 mg/dl. Attempted metrizamide-enhanced CT of the posterior fossa was unsuccessful due to inadequate opacification. The spinal fluid obtained from this examination revealed a protein of greater than 1000 mg/dl. Pantopaque myelography revealed an irregular, noncommunicating cyst in the lumbar region, with a block near the thoracolumbar junction. One week later, a metrizamide-enhanced CT examination (GE 8800 using overlapping 5.0-mm-thick scans) of the posterior fossa and upper cervical region was performed successfully (figs. 1B–1D). Three days later, a posterior fossa exploration was performed, and hundreds of clear, gelatinous floating cysts were encountered varying in size from 2 to 10 mm. Large aggregates of cysts were attached to the meninges, medulla, and brainstem extending into the fourth ventricle (fig. 1D). Frozen section revealed cysts containing visible scolices, initially thought to represent *Echinococcus granulosus*. Permanent sections revealed *Taenia multiceps* (figs. 1E and 1F). Chemotherapy was initiated, and the patient awakened and was able to speak. Spastic quadriparesis persisted. A subsequent lumbar laminectomy revealed numerous intrathecal degenerating cysts. Follow-up CT scans demonstrated some ventricular decompression. Scans of the chest and abdomen showed no evidence of parasitic disease outside of the subarachnoid space. During the following months, numerous shunt revisions were required because of frequent malfunction. The patient died from pneumonia and septicemia about 6 months after the initial surgery. Permission for autopsy was refused.

An epidemiologic study of the patient's village revealed extremely poor sanitation, with overcrowding of humans and varying species of dogs. There were a number of infested semiwild dogs roaming the reservation. The child had received some unidentified potions from the local medicine man before initial hospitalization. Several of the village inhabitants were serologically positive for *Coenurus cerebralis*, but had no clinical disease.

Discussion

Coenurosis is a rare parasitic infection in man. Previous reports of human infestation thoroughly discuss the epidemiology and pathology [1–5]. Previous reports describing radiologic findings were written before the development of high-resolution CT [1]. Pachymeningitis, arachnoiditis, and hydrocephalus are described with human cerebral coenurosis. The purpose of this report is to present the CT findings, as the pathologic alterations and radiologic findings may be similar to those observed with the infestations caused by *Echinococcus granulosus* and cysticercosis [1–7].

Coenurus cerebralis represents the larval stage of the dog tapeworm *Multiceps multiceps*. The life cycle is similar to that of *Echinococcus granulosus*, in that humans may become intermediate hosts after ingesting ova. Sheep, rabbits, and some omnivorous rodents also have been described as intermediate hosts [2–5]. The unilocular cysts are always confined to the CSF pathways, in contrast to the parenchymal lesions of *Echinococcus granulosus* and *Cysticercus* [1, 2, 6–8]. The cysts may be single or multiple, and range in size from 2.0 mm to several centimeters (figs. 1B–1D). The cysts are com-

Received November 28, 1984; accepted after revision March 15, 1985.
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AJNR **6:638–640, July/August 1985** 0195–6108/85/0604–0638 $00.00

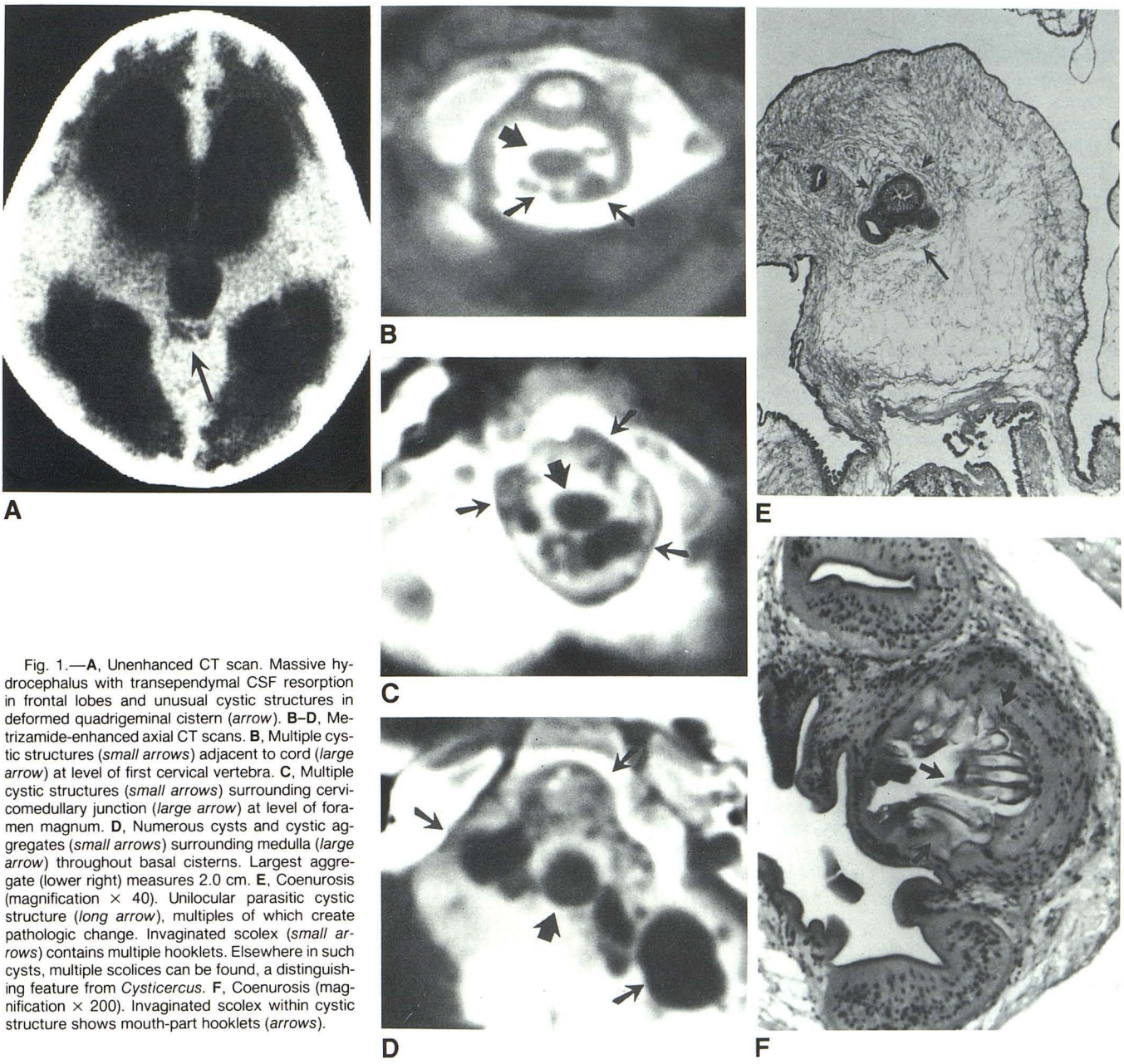

Fig. 1.—**A**, Unenhanced CT scan. Massive hydrocephalus with transependymal CSF resorption in frontal lobes and unusual cystic structures in deformed quadrigeminal cistern (*arrow*). **B–D**, Metrizamide-enhanced axial CT scans. **B**, Multiple cystic structures (*small arrows*) adjacent to cord (*large arrow*) at level of first cervical vertebra. **C**, Multiple cystic structures (*small arrows*) surrounding cervicomedullary junction (*large arrow*) at level of foramen magnum. **D**, Numerous cysts and cystic aggregates (*small arrows*) surrounding medulla (*large arrow*) throughout basal cisterns. Largest aggregate (lower right) measures 2.0 cm. **E**, Coenurosis (magnification × 40). Unilocular parasitic cystic structure (*long arrow*), multiples of which create pathologic change. Invaginated scolex (*small arrows*) contains multiple hooklets. Elsewhere in such cysts, multiple scolices can be found, a distinguishing feature from *Cysticercus*. **F**, Coenurosis (magnification × 200). Invaginated scolex within cystic structure shows mouth-part hooklets (*arrows*).

monly found within the ventricles, where they may be attached to the ventricular wall or free-floating. Obstructive hydrocephalus may result either from direct foraminal blockage by the cysts or from foraminal closure resulting from ependymitis and swelling. Chronic or subacute meningitis and arachnoiditis are commonly observed, possibly resulting in communicating hydrocephalus. Fourth ventricular foramina are especially prone to blockage from the cysts and arachnoid adhesions [1, 2].

The metrizamide-enhanced CT scans clearly demonstrate the cystic clusters throughout the basal cisterns and upper spinal canal. At surgical exploration, the greatest concentrations of both free-floating and clustered cyst aggregates were found in the floor of the fourth ventricle and basal cisterns, as suggested in figure 1D. Pathologically, the cysts were unilocular, with many of the cysts containing multiple scolices, which may be a distinguishing feature of *Coenurus cerebralis* (figs. 1E and 1F).

ACKNOWLEDGMENT

We thank Geoffrey Witrak for the photomicrographs.

REFERENCES

1. Danziger J, Bloch S. Tapeworm cyst infestations of the brain. *Clin Radiol* **1975**;26:141–148

2. Hermos JA, Healy GR, Schultz MG, Barlow J, Church WG. Fatal human cerebral coenurosis. *JAMA* **1970**;213:1461–1464
3. Templeton AC. Human coenurosis infection: a report of 14 cases from Uganda. *Trans R Soc Trop Med Hyg* **1964**;62:251–255
4. Becker BJP, Jacobson S. Infestation of the human brain with *Coenurus cerebralis*: a report of three cases. *Lancet* **1951**;2:198–202
5. Becker BJP, Jacobson S. Infestation of the human brain with *Coenurus cerebralis*: Report of a fourth case. *Lancet* **1951**;2:1202–1204
6. Zee CS, Segall HD, Miller C, et al. Unusual neuroradiological features of intracranial cysticercosis. *Radiology* **1980**;137:397–407
7. Bentson JR, Wilson GH, Helmer E, Winter J. Computed tomography of intracranial cysticercosis. *J Comput Assist Tomogr* **1977**;1:464–471
8. Rodriguez-Carbajal J, Salgado P, Gutierrez-Alvarado R, Escobar-Izquierdo A, Aruffo C, Palacios E. The acute encephalitic phase of neurocysticercosis: computed tomographic manifestations. *AJNR* **1983**;4:51–55