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MR Imaging of Chronic Cerebral Paragonimiasis

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Paragonimiasis is a rare disease that is widely distributed throughout the Far East and Southeast Asia. The disease results from the ingestion of freshwater crabs or crayfish contaminated with the lung fluke, the genus *Paragonimus*. With the exception of the most common and usually primary site (the lung), paragonimiasis occurs most frequently in the brain [1, 2]. Radiologic manifestations of chronic cerebral paragonimiasis include the characteristic "soap-bubble" appearances of calcifications on plain skull films [3, 4]. Brain CT findings are summarized as multiple, densely calcified areas with round and nodular shapes, surrounded by a large region of low density [5, 6]. To our knowledge, however, MR imaging of paragonimiasis has not been described previously. We present a confirmed case in which MR provided a much more precise definition of chronic cerebral paragonimiasis.

Case Report

A 37-year-old woman was admitted complaining of headaches and visual disturbances. The patient had been raised on Kyushu Island, where paragonimiasis is endemic. At the age of 8, she had a high fever and generalized convulsions, and she had the same kind of convulsions during the ensuing years. On admission, her neurologic examination revealed right homonymous hemianopia. Plain skull films showed round and nodular calcified areas approximately 2 cm in diameter in the left temporooccipital region. CT showed multiple, densely calcified areas with a variety of nodular shapes, associated with surrounding areas of low density in the left temporal and occipital lobes (Figs. 1A and 1B). However, the soap-bubble–like appearances only became apparent with the proper window setting. Four-vessel angiography did not contribute to the diagnosis.

MR was performed on a 0.5-T Magnetom M* system. Images were obtained with a head coil; a 10-mm thickness and two acquisitions were used. The MR study revealed multiple nodules with various sizes in the left temporal and occipital lobes. Each of the two main nodules had an area of peripheral low intensity and central hypo- and isointensity to gray matter on T1-weighted images. The lesions on T2-weighted images had a peripheral low intensity and, in contrast, a relative hyperintensity in the center (Figs. 1C–1E). The remaining small nodules had low intensity compared with gray matter on images with both short-TR and long-TR pulse sequences. Around these lesions, widespread T1- and T2-prolonged areas were distinctively shown in the ipsilateral cerebral hemisphere. The widening of cortical sulci in the associated hemisphere was clearly demonstrated on T1-weighted images.

A left temporooccipital craniotomy was performed. Two granulomas with smooth surfaces were removed. The incised cortex and subcortex around the lesions were yellowish brown, suggestive of gliosis. Representative microscopic sections of the granulomas showed many *Paragonimus* ova along the inner aspect of the capsule, which consisted of collagenous connective tissue. Many of the ova consisted only of a shell without a yolk (Fig. 1F). Since multiple small lesions were present anteromedial to the nodules, the patient was treated with Bithionol.† The postoperative course was uneventful.

Discussion

In the CNS, the reactions to the *Paragonimus* fluke are arachnoiditis, granulomas, and encapsulated abscesses [1]. Although necrosis of the lesion and gliosis of the surrounding tissues due to arachnoiditis lead to local cerebral atrophy, almost all the granulomas and abscesses result in dense calcifications. Therefore, the soap-bubble appearance (multiple intracranial calcified areas with round or oval shapes that are visible on plain skull films) is radiographically characteristic of chronic cerebral paragonimiasis. CT findings are basically the same as those of the plain skull films, except for the associated appearances in the surrounding tissue, such as low-density areas around the calcifications. On CT scans, the high sensitivity to calcification makes calcified granulomas appear so dense that the soap-bubble appearance becomes apparent only at high window levels. The soft-tissue contents within the granulomas or abscesses are not accurately shown within the dense marginal calcifications. Although MR often fails to reveal small, partially calcified foci, its multiplanar ability and excellent contrast discrimination disclose large chronic granulomas of cerebral paragonimiasis as a complex of both a peripheral low-intensity area and central hypo- and isointensity areas on T1-weighted images, and a peripheral low-

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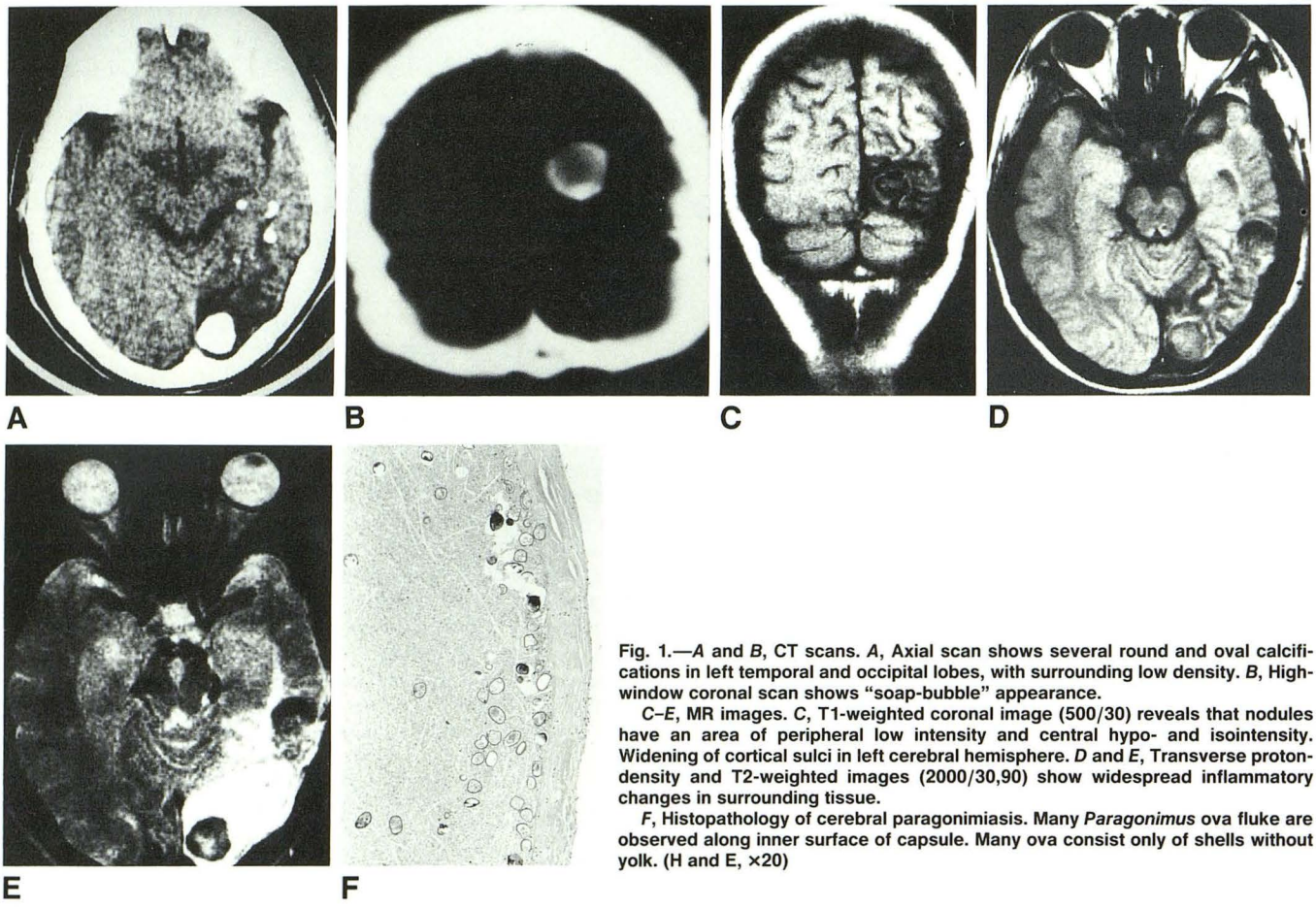

Fig. 1.—*A* and *B*, CT scans. *A*, Axial scan shows several round and oval calcifications in left temporal and occipital lobes, with surrounding low density. *B*, High-window coronal scan shows "soap-bubble" appearance.

***C–E*, MR images. *C*, T1-weighted coronal image (500/30) reveals that nodules have an area of peripheral low intensity and central hypo- and isointensity. Widening of cortical sulci in left cerebral hemisphere. *D* and *E*, Transverse proton-density and T2-weighted images (2000/30,90) show widespread inflammatory changes in surrounding tissue.**

***F*, Histopathology of cerebral paragonimiasis. Many *Paragonimus* ova fluke are observed along inner surface of capsule. Many ova consist only of shells without yolk. (H and E, ×20)**

intensity area with a central high-intensity area on T2-weighted images. A peripheral area of lower intensity on both T1- and T2-weighted images reflects the conglomeration of calcified ova of the fluke on the inner surface of the capsule, which are observed on microscopic examinations. Moreover, MR shows more precisely than CT the surrounding widespread inflammatory changes, such as gliosis of the surrounding tissues and the widening of cortical sulci in the associated cerebral hemisphere.

MR provides more detailed information on the soft-tissue contents of the calcified granulomas. Also, it exactly depicts the important information: the gliosis of the surrounding tissue and the local cerebral atrophy.

REFERENCES

1. Kim SK, Walker AE. Cerebral paragonimiasis. *Acta Psychiatr Neurol Scand [Suppl]* **1961**;153:1–85
2. Higashi K, Aoki H, Tatebayashi K, Morioka H, Sakata Y. Cerebral paragonimiasis. *J Neurosurg* **1971**;34:515–527
3. Galatius-Jensen F, Uhm IK. Radiological aspects of cerebral paragonimiasis. *Br J Radiol* **1965**;38:494–502
4. Oh SJ. Roentgen findings in cerebral paragonimiasis. *Radiology* **1968**;90:292–299
5. Yoshida M, Moritaka K, Kuga S, Anegawa S. CT findings of cerebral paragonimiasis in the chronic state. *J Comput Assist Tomogr* **1982**;6:195–196
6. Udaka F, Okuda B, Okada M, Tsuji T, Kameyama M. CT findings of cerebral paragonimiasis in the chronic state. *Neuroradiology* **1988**;30:31–34