Cerebral Sparganosis: Increased Uptake of Technetium-99m-HMPAO

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Cerebral sparganosis is an extremely rare intracranial parasitic infectious disease. We report findings of 99mTc-HMPAO cerebral perfusion SPECT in a case with cerebral sparganosis. SPECT revealed an irregularly shaped area with markedly increased 99mTc-HMPAO uptake in the parasitic infectious region of the cerebral cortex. Both white and gray matter was involved, the white matter involved predominantly. Decreased perfusion to the right cerebellum, suggesting cross cerebellar diaschisis, was also demonstrated. This article illustrates that cerebral sparganosis is one of the causes of increased 99mTc-HMPAO uptake in the cerebral cortex and should be considered clinically if present.

Key Words: sparganosis; technetium-99m-HMPAO; cerebral perfusion SPECT

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Cerebral sparganosis is an extremely rare central nervous system (CNS) parasitic infectious disease caused by the plerocercoid larva, called sparganum, of Spirometra mansonioides (1,2). Most cases of cerebral sparganosis have been reported from Korea, Japan, China, Taiwan and Southeast Asia (2-9).

This article demonstrates the findings of 99mTc-HMPAO cerebral perfusion SPECT in a case with cerebral sparganosis.

CASE REPORT

A 74-yr-old man patient presented to our hospital with seizure and progressive weakness of the right side of his body for 1 mo. The patient did not have a fever. Neurological examination revealed decreased sensation and muscle power of the right side of the body. The white blood cell count on admission was 5,900/mm³, and the differentiation showed 70% granulocytes, 19% lymphocytes, 4% eosinophils and 7% monocytes. EEG revealed continuous, focal, slow waves over the left frontotemporal parietal area. Brain CT revealed a cystic, enhancing mass lesion at left temporal area (Fig. 1). Brain MRI also revealed a mass lesion with hypointensity on T1-weighted images and hyperintensity on T2-weighted images (Fig. 1) with heterogeneous enhancement at the left temporal area. Based on the clinical presentations, examinations, CT and MRI findings brain tumor was suspected.

Technetium-99m-HMPAO cerebral perfusion SPECT was arranged to evaluate the regional blood flow to the intracranial mass lesion. SPECT imaging was performed using a triple-head gamma camera equipped with fan-beam collimators. Acquisition was started 20 min after an intravenous injection of 925 MBq (25 mCi) 99mTc-HMPAO in 120 projections, 3° apart, in a 128 × 128 matrix.
The raw data were reconstructed using the filtered backprojection method with a Butterworth filter.

SPECT images revealed a large irregularly shaped area of markedly increased $^{99m}$Tc-HMPAO uptake at the left temporal area extending from the anterior lower portion to the medial and superior portions of the left temporal lobe (Fig. 2). Both white and gray matter of the left temporal lobe was involved, the white matter being involved predominantly. The left thalamus was displaced medially and posteriorly. There was also decreased $^{99m}$Tc-HMPAO uptake at the right cerebellar cortical region (Fig. 2), suggesting cross cerebellar diaschisis (CCD).

For the purpose of final diagnosis, surgical biopsy using the stereotactic technique was performed. A 3 $\times$ 3 $\times$ 3 mm sample of tissue was removed from the left temporal lesion. The histopathological findings revealed many oval shaped foreign bodies and elongated intergumentary structures surrounded by numerous granulomatous and astroglial cells (Fig. 3). The diagnosis of cerebral sparganosis was confirmed.

DISCUSSION

Sparganosis is an incidental parasitic infectious disease which may occur after drinking untreated water contaminated with copepods, or after eating inadequately cooked flesh of fish, frog or snake contaminated with sparganum (1,2). We thought our patient had been infected through drinking inadequately treated water, which is the most common infected mode of sparganosis (1,2), although there was no obvious history of such infection.

Sparganosis usually involves the skin and skeletal muscle tissues (1,2). CNS involvement is extremely rare (2-9). The pathway of CNS involvement is not yet known, but the foramina of the skull base may be the route of entry (2). If the CNS is involved, the frontal, parietal and temporal lobes of the brain are most commonly infected, with the white matter of the cerebrum being involved predominantly (2,10). The parasite in the cerebrum may initiate an intense inflammatory reaction, causing accumulation of eosinophils, lymphocytes, plasma, giant, granulomatous and astroglial cells surrounding the parasite (2,7,11).

The clinical presentations of cerebral sparganosis vary depending on the site of infection (2,10). The most common presentation is seizure followed by slowly progressive hemiparesis, which was the chief complaint from our patient. However, the clinical presentations of cerebral sparganosis are like some other slow progressive CNS diseases, such as brain tumors, and
are not specific to cerebral sparganosis. Although both CT and MRI provide sensitive modalities for the detection of cerebral sparganosis, their findings, mimicking brain tumors, are not specific to the diagnosis of cerebral sparganosis (6,10,12). Because cerebral sparganosis often mimicks brain tumors in clinical presentations as well as in CT and MRI findings, it is difficult to diagnose and differentiate from a brain tumor before pathological proof of parasite from surgical specimen (2,8).

Increased 99mTc-HMPAO uptake lesions in the cerebrum have been reported in cases of brain tumor, acute encephalitis, ictal epileptic focus, luxury perfusion, auditory or photic stimulation, schizophrenia and others (13-20). The mechanisms of increased 99mTc-HMPAO uptake in cerebral sparganosis are not known. It may be closely related to the increased blood flow, intense inflammatory reaction, surrounding hyperemia, change of tissue pH or damage of blood brain barrier (14,15). However, the increased blood flow, inflammatory reaction and surrounding hyperemia may play the most important roles.

There are some characteristics of intracranial increased 99mTc-HMPAO uptake lesion in this case. The first characteristic is that both white and gray matter were involved, with the white matter being involved predominantly. This characteristic matches the intracranial lesion found in cerebral sparganosis, which usually affects white matter predominantly (10). The second characteristic is the markedly increased uptake of 99mTc-HMPAO, which may reflect the intense inflammatory reaction usually present in cerebral sparganosis (2,7,11). The third characteristic is the irregular shape of the lesion. An irregularly shaped lesion may favor an infectious lesion rather than a tumor lesion that is usually round or oval in shape. If these three characteristics are present in the case with slow progressive neurological manifestations, then the possibility of a parasitic infection such as cerebral sparganosis should be considered.

Based on the previous cases reported, brain tumor is a reasonable consideration in the case of an intracranial increased 99mTc-HMPAO uptake lesion with slow progressive neurological manifestations. However, brain tumor usually shows decreased or normal 99mTc-HMPAO uptake (16,17,21). In the reviews of focal intracranial increased 99mTc-HMPAO uptake lesions, Meyer et al. (14) and Broich et al. (15) indicated that an inflammatory lesion should be considered more readily than a tumor in the case of an intracranial increased 99mTc-HMPAO uptake lesion. Cerebral sparganosis is a chronic infectious disease and is one of the possibilities causing increased 99mTc-HMPAO uptake lesion, especially when the above mentioned characteristics exhibiting.

Because the lesion was located at the left middle cerebrum, CCD was present in our case. It reflects deactivation of right cerebellum secondary to the impaired cross corticopectocerebellar pathway damaged by the intracranial parasitic lesion.

CONCLUSION

This article illustrates that cerebral sparganosis may cause a characteristicliy increased 99mTc-HMPAO uptake lesion in the cerebrum, and this should be considered in an intracranial increased 99mTc-HMPAO uptake lesion in patients with slow progressive neurological manifestations, especially in those patients who live in Asia or have immigrated from Asia.

REFERENCES