Neuroradiological Findings of Paretic Neurosyphilis: 
A Case Report

Hitoshi SAITOH, Koji YAZAKI, Fumihito YOSHII and Yukito SHINOHARA

Department of Neurology, Tokai University School of Medicine
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Neuroradiological findings of a patient with paretic neurosyphilis are described. A 50-year-old male patient showed personality changes, severe dementia and some neurological deficits. Serological analysis of serum and cerebrospinal fluid demonstrated the presence of antibodies to Treponema pallidum. Computed tomography showed diffuse cerebral cortical atrophy and ventricular dilatation, and magnetic resonance (MR) imaging revealed some small abnormal signals in the white matter. Single photon emission tomography using 123I-N-isopropyI-p-iodoamphetamine (IMP-SPECT) indicated decreased activities, most markedly in the right frontal and bitemporal cortices. Although the neuroradiological findings were nonspecific, the MR imaging and IMP-SPECT findings were interesting because they have not been described previously to our knowledge.

(Key Words: Neurosyphilis, Paretic neurosyphilis, Cranial computed tomography, Magnetic resonance imaging, Single photon emission tomography)

INTRODUCTION

At present, it is rare to find neurosyphilis in developed countries because of the availability of treatment with penicillin. However, there has recently been a worldwide increase in the incidence of early syphilis, particularly among homosexuals, and therefore, a corresponding future increase in the incidence of neurosyphilis can be expected.

Paretic neurosyphilis is one of the most malignant syphilitic manifestations, and it is a rare presentation of neurosyphilis (5). To our knowledge, magnetic resonance (MR) imaging and single photon emission tomography (SPECT) findings of patients with this disease have not been reported previously.

This report describes the neuroradiological imaging findings, including those of brain CT, MR imaging and SPECT, in a patient with paretic neurosyphilis.

CASE REPORT

The patient was a 50-year-old male admitted to our hospital with a convolution spreading from left-sided to generalized, accompanied by disturbance of consciousness. His parents had died long ago, and he was living alone in poor circumstances. On admission, anticonvulsant therapy was given and the next day, the disturbance of consciousness completely returned to normal.

A general physical examination on the second hospital day was normal except for anemia. A neurological examination disclosed personality changes and severe dementia, weakness of the upper extremities which was more marked distally, and systemic loss of pain sensation. The deep tendon reflexes of all extremities were hyperactive and Babinski's sign was positive bilaterally. There was marked difficulty in performing finger-nose and heel-shin tests, as well as difficulty with rapid alternating movements of both hands beyond what might be caused by his weakness. He needed assistance to maintain a standing position. He also suffered from urinary and fecal incontinence. 

Hematological examination revealed anemia...
(RBC 283 × 10^4/μl, Hb 9.6 g/dl and Ht 28.2%) and elevation of the blood sedimentation rate (61 mm/hr). Serum VDRL, TPHA and FTA-ABS titers were positive at ≥ 640x and > 320x, respectively.

Cerebrospinal fluid (CSF) examination disclosed an opening pressure of 120 mm CSF, cell count of 3/mm³, protein concentration of 63 mg/dl (gamma-globulin of 34.6 mg/dl), and glucose concentration of 55 mg/dl. The CSF VDRL and TPHA tests were also positive. Electroencephalography (EEG) was abnormal, with generalized delta and theta activity which was predominantly right-sided. Paretic neurosyphilis was diagnosed, and the patient was treated with penicillin G (24 million units/day) intravenously daily for 3 weeks. His mental state improved slightly but the other neurological findings and the serum and CSF TPHA titers did not change. Repeated EEC showed generalized slow alpha activities with intermittent delta and theta activity which was predominantly on the right side.

Brain CT scans were obtained on the 1st and 2nd hospital days, and disclosed enlargement of the lateral ventricles together with cortical atrophy which mainly affected the right temporal lobe (Fig. 1). MR imaging was performed on the 14th and 80th days. MR images also showed enlargement of the lateral ventricles with cortical atrophy predominantly of the right temporal lobe. Some small abnormal signals were noted in the white matter (Figs. 2A and B). These findings did not change in repeated MR examinations. A [123I] N-isopropyl-p-iodoamphetamine (IMP) SPECT examination was performed on the 24th day, and showed decreased activity in the frontal, temporal and parieto-occipital lobes, which was predominantly right-sided, but no abnormality was observed in the infratentorial region (Figs. 3A, B, and C).

![Fig. 1.](image-url) Brain CT scans obtained on the 2nd hospital day show a cavity in the septum pellucidum, enlargement of the lateral ventricles, and cortical atrophy, which was predominant in the right temporal lobe.
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Fig. 2A. Axial MR images were obtained on the 14th hospital day. The T1-weighted image is shown here (SE500/16). There is a cavity in the septum pellucidum, enlargement of the lateral ventricles and cortical atrophy chiefly affecting the right temporal lobe.

Fig. 2B. T2-weighted image (SE5000/100). There are some small abnormal signals located in the white matter.
Axial 123IMP-SPECT imaging was performed on the 24th hospital day. This image shows decreased activity in the frontal, temporal and posterior lobes, which is predominantly right-sided (arrowhead).

Coronal 123IMP-SPECT image showing decreased activity of the parietal and temporal lobes (predominantly right-sided) (arrowhead).
DISCUSSION

The clinical features of our patient were similar to those in previously described patients with paretic neurosyphilis (3). Cerebral tumor, cerebrovascular disease, metabolic abnormalities and demyelinating diseases might have been suspected in this patient. However, the clinical course and the laboratory findings left no doubt as to the diagnosis of paretic neurosyphilis.

The major symptoms and signs of this disease are psychiatric and neurological. The psychiatric problems range from personality changes and emotional lability to dementia. Pathological studies of paretic neurosyphilis have shown that the brain is shrunken due to cortical atrophy, which is most marked in the anterior portion. Microscopic changes are mainly found in the meninges, blood vessels and the cortical cells. The leptomeninges and perivascular spaces show widespread thickening with lymphocytic infiltration. The degenerative changes are always diffuse, but the cortex of the frontal and temporal regions are usually affected the most severely (5).

There are only two previous reports of CT findings in this disease. Godt et al. (2) reported that CT scans of a patient with syphilitic brain atrophy showed a moderate degree of diffuse cortical and subcortical atrophy. Ganti et al. (1) also reported that CT scans of a patient with this disease demonstrated pronounced lucency of the white matter and they emphasized that neurosyphilis should be included in the list of diseases causing demyelination and dysmyelination. To confirm the lesions in the white matter found by CT scanning, we also carried out MR imaging. Our MR imaging findings showed diffuse cortical atrophy, although it was not especially marked, in the frontal and temporal lobes. Some slight abnormalities, that were not apparent on CT films, were observed in the white matter.

SPECT provides functional information which can not be obtained by morphological examinations such as CT and MR imaging. Sokoloff (4) reported that the level of functional activity in the structural and functional components of the central nervous system regulate the local rate of energy metabolism, so that local blood flow is adjusted to the local metabolic demand. SPECT findings in our patient revealed decreased activities, most markedly in the right frontal and bitemporal cortices. However, we could not find any corresponding laterality of clinical symptoms and signs in this
Although abnormal lesions seen on neuroradiological examination of our patient corresponded to the reported pathological findings in paretic neurosyphilis, they were nonspecific. However, the MR imaging and IMP-SPECT findings are particularly interesting because to our knowledge these have not been described previously.

REFERENCES