Solitary Pontine Tuberculoma
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Abstract

A 66-year-old man, with a history of pulmonary tuberculosis 40 years before admission, complained of headache and dysarthria that lasted for 2 weeks and was followed by diplopia. MRI revealed an isolated nodular lesion in the pons with a marked enhancement mimicking brain tumor and other diseases. Antituberculous drugs were started under the presumptive diagnosis of tuberculoma. The lesion was completely resolved after 9 months of treatment and thus, the final diagnosis was confirmed. An empiric administration of antituberculous drug may be an important and non-invasive diagnostic tool as well as a treatment in such cases. (Internal Medicine 41: 738-742, 2002)

Key words: tuberculosis, brainstem, antituberculous drug, magnetic resonance imaging (MRI)

Introduction

Reports of solitary pontine tuberculoma, i.e. isolated intrinsic pontine tuberculoma accompanied with little or no meningeal reaction, are rare, and such reports demonstrate no specific clinical or radiological features (1-4). Brainstem biopsy harbors certain risks of deadly complications, such as bleeding or meningeal spread of infection, and it may be inappropriate to diagnose tuberculoma that is potentially a benign disease (1, 4, 5).

We present a case of solitary pontine tuberculoma, in which MRI clearly depicted resolution of the lesion, and the administration of antituberculous drugs under the presumptive diagnosis of tuberculoma was useful in making a final diagnosis as well as for a non-invasive treatment.

Patient Report

A 66-year-old right-handed Japanese man was admitted to our department for the evaluation of double vision on seeing the right-hand side. He also had a headache and a slight difficulty in speaking. He had suffered from pulmonary tuberculosis 40 years earlier, which was still symptom free on admission. He had undergone resection of a small atheroma on the left neck 2 years previously and recovered completely. He had suffered from non-tuberculotic pneumonia and duodenal ulcer 1 year before admission and recovered completely. He was a habitual smoker of 1 pack/day for several decades.

From the end of January 1997, he gradually felt left-sided headache and slight sluggishness in speech. From February 8, he was aware of diplopia especially when he saw the right-hand side. On February 14, he consulted a general physician and was pointed out to have left trochlear nerve palsy. He was admitted to our department on February 15, 1997.

On physical examination, he was well nourished with blood pressure of 102/72 mmHg and regular pulse of 72/min. There was no abnormal finding in his chest and abdomen including respiratory sound and lymph nodes. On neurological examination he was alert and well oriented. He showed no neck stiffness or other signs of meningeal irritation. A slight gaze limitation was observed to the downward and medial direction in the left eye. Hess chart examination revealed slight palsy of the left trochlear nerve and abducent nerve. Right hemisensory disturbance including face (face 5/10~hand 9/10) and subtle weakness of bilateral soft palate were also found. He exhibited a slight right hemiparesis; grasping power was 25 kg in the right hand and 26 kg in the left, respectively. Deep tendon reflexes were not exaggerated and no pathological reflex was observed.

Routine blood examination showed an increase in white blood cell count of 9,950/mm³ and C-reactive protein of 10.1 mg/dl. There was a certain amount of alpha-Streptococcus homophilus in culture from his sputum, but no Mycobacterium tuberculosis was detected. Two weeks after oral administration of antibiotics, the above inflammatory reaction and bacteria from sputum culture disappeared. Other data in hematology, serum chemistry or immunology were all within normal range.

Chest roentgenogram showed several small and calcified...
nodules mainly in the right upper lobe. Chest computed tomo-
ography (CT) confirmed that these lesions were old tubercu-
losus foci, and no active lesion was detected. Brain CT revealed
a high-density lesion of 1 cm in diameter with a central low-
density spot in the left half of the middle pons. Brain MRI
depicted that this lesion was 1.5 cm in diameter and iso- to
slightly hyper-intensity with a central hypo-intensity core sur-
rounded by a hypo-intensity area on T1 weighted image (T1WI)
and hypo-intensity with a bright hyper-intensity core surrounded
by a vast hyper-intensity area on T2WI. Gadolinium-enhanced
(Gd) MRI presented a homogeneous and intense enhancement
of the pontine lesion (Fig. 1) accompanying mild enhancement
of meninges. There were no supratentorial brain lesions on MRI
study.

From his neurological and radiological findings, glioma, ma-
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Figure 1. MRI on admission. (A, B) Horizontal (A) or sagittal (B) view of the brainstem. Panels on the right-
hand-side show T2-weighted, T1-weighted and gadolinium (Gd)-enhanced T1-weighted image, respectively. (C,
D) Sagittal view on T1-weighted (C) or Gd-enhanced T1-weighted (D) image. Area adjacent to the tentorium
shows mild enhancement.
culoma were considered as differential diagnoses. Further examinations for screening these diseases were conducted. He presented clear and colorless cerebrospinal fluid (CSF) with pleocytosis of 65/3 mm$^3$ (lymphocytes 32, polymorphonuclear neutrophils 33) and protein level of 31 mg/dl. CSF and blood glucose level was 64 and 87 mg/dl, respectively. No culture was obtained and there was no evidence of *Mycobacterium tuberculosis* even by the DNA polymerase chain reaction.

![Figure 2](image)

**Figure 2.** Changes of the lesion depicted by MRI. (A) Serial changes of the lesion depicted by Gd-enhanced T1-weighted image. Upper panels represent sagittal section of the brainstem and lower panels show horizontal section of the middle pons. Parentheses show months or year from the initiation of antituberculous drug therapy. (B) Newly developed lesion in the right occipital lobe and its disappearance. See text for detail. (C) T2-weighted image of the middle pons at one year after the initiation of antituberculous drug therapy. See text for detail.
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method. Histological examination of CSF did not detect any evidence of malignancy. No abnormal level of myelin basic protein or oligoclonal band was detected in the CSF. Skin PPD test was weakly positive (12x11-mm redness without exudates). Antibody for human T cell leukemia virus was negative. Alpha fetoprotein, carcino-embryonic antigen and squamous cell carcinoma antigen were all within normal range. 201TI scintigraphy of the brain depicted no active lesion. Upper and lower gastrointestinal tract and colon failed to show any significant lesion except for duodenal ulcer scar. Abdominal echography was normal.

Considering the clinical picture, i.e. mild impairment of neurological function as compared with the size of the lesion depicted by MRI and the risk of biopsy, we initiated chemotherapy of isoniazid (INH), rifampin (RFP) and ethanbutol (EB) under a presumptive diagnosis of tuberculoma from March 4. His headache and diplopia were gradually resolved 1.5 months after initiation of chemotherapy. MRI revealed a significant reduction of the lesion two months after antituberculous drugs were started (Fig. 2). After chemotherapy for 9 months, the lesion nearly disappeared and the antituberculous drugs were discontinued. Follow-up MRI, however, showed a new lesion of 3 mm in diameter in the right occipital lobe, suggesting the paradoxical expansion of intracranial tuberculoma, and chemotherapy was resumed. This lesion faded away within two months from initiation of the second chemotherapy. One year after his admission, T2WI showed only a trace of hyper-intensity signal in the pons (Fig. 2).

Discussion

Although central nervous system (CNS) tuberculoma constitutes 15–50% of intracranial lesions in developing countries, it is far less common in industrialized countries (6), and in Japan also. The higher morbidity of tuberculosis, CNS tuberculosis in particular, among patients with human immunodeficiency virus (HIV) infection has drawn attention recently (7). However, CNS tuberculoma is still a rare clinical entity among healthy hosts.

Among intracranial tuberculoma, brainstem tuberculoma is rare and it accounts for 2.5–8% of all intracranial tuberculoma in large series studies (1, 2, 8). Tuberculoma is formed as a result of hematogenous dissemination of Mycobacterium tuberculosis. Therefore, CNS tuberculoma tends to occur in the region of higher blood supply such as frontal or parietal lobe of the cerebrum. Most cases of pontine tuberculoma accompany supratentorial or meningeal lesions, and solitary lesion in the pons is rare (4, 8).

CNS tuberculoma usually demonstrates the following features on MRI (3, 6, 9, 10). On T1WI of MRI, tuberculoma is shown as a slightly hyper- or iso-intensity signal area with a central hypo-intensity core surrounded by a hypo-intensity signal area and the reverse is found on T2WI. On Gd MRI, it shows a solid or ring enhancement. These findings would be based on histopathological changes such as granuloma with central caseation necrosis surrounded by edema, layers of collagen fibers and inflammatory cellular infiltrates (6, 11). In the present case, MRI findings matched well with the previous reports. However, tuberculomas showing a wide variety of signal intensities have also been reported (9, 12, 13), presumably reflecting different stages of tuberculoma. Additionally, malignant glioma, brain abscess, cysticercus granuloma, metastatic cancer or lymphoma resembles tuberculoma on the radiological study (6). MRI findings are not crucial to diagnose CNS tuberculoma. There is another report of brainstem tuberculoma of which the radiological features mimicked glioma, and the authors suggested that an antituberculous agent could be a useful diagnostic tool rather than radiological studies (14).

Although the intensity or duration of treatment varies case by case, INH (10–20 mg/kg/day) and RFP (10–20 mg/kg/day) with pyrazinamide (PZA15–30 mg/kg/day) or EB (15 mg/day), streptomycin (2 g/week) are used as the first-line drugs for CNS tuberculosis (6, 7). We used a combination of INH, RFP and EB, which is lung-oriented but the least toxic regimen, in the present case. In most cases, however, PZA is preferable for treatment of tuberculoma because of permeability through the blood-brain barrier and combination of INH, RFP and PZA is recommended, especially for patients without meningeal inflammation.

It has been observed that tuberculoma sometimes shows spontaneous expansion or reduction (3, 15) and even paradoxical expansion under treatment (16). Concomitant corticosteroid therapy may play a preventive role against tuberculoma (16). With continued active antituberculous treatment, eventual resolution of tuberculoma occurs. In the present case, treatment with INH, RFP and EB for 9 months caused nearly complete resolution of the tuberculoma as confirmed by MRI, but still brought about a paradoxical lesion in the occipital lobe. Thus, it is suggested that at least 12 months of therapy is necessary regardless of resolution of the lesion in such a case.

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References


