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En-plaque tuberculomas of tentorium in a pregnant woman: follow-up with MRI (2003:2b)

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Abstract En-plaque tuberculoma is a rare manifestation of CNS tuberculosis and presents as a solitary, focal, caseous plaque-like lesion. It is difficult to differentiate en-plaque like meningeal tuberculoma from true primary or secondary meningeal neoplasia. Good response to antituberculosis treatment in a patient with tuberculosis history and typical MR findings confirm the diagnosis. We present the follow-up MR imaging findings of a case in which an en-plaque tuberculoma on tentorium was diagnosed during pregnancy in a patient with a history of tuberculosis. To the best of our knowledge, en-plaque tuberculomas of tentorium during pregnancy have not been reported before.

Keywords Tuberculoma · Pregnancy · Magnetic resonance imaging

Introduction

Extrapulmonary tuberculosis occurs mostly in immunocompromised patients and is observed in 20% of the cases [1]. Central nervous system (CNS) involvement occurs in 2–5 % of all patients with tuberculosis and in 10% of patients with AIDS-related tuberculosis [2]. Pregnant women have increased susceptibility to a variety of infections due to suppressed or altered maternal immune response during pregnancy [3]. En-plaque tuberculoma is a rare manifestation of CNS tuberculosis mimicking primary or secondary meningeal neoplasia [2, 4]. The history of infection and imaging findings are important in the differential diagnosis.

We present the MR imaging findings of a case in which an en-plaque tuberculoma on tentorium was diagnosed during pregnancy. Although intracerebral tuberculomas have been reported in two pregnant women previously [5, 6], to the best of our knowledge, en-plaque tuberculomas of tentorium during pregnancy have not been reported before.

Case report

A 25-year-old woman at 20 weeks' gestation presented with fever, moderate loss of hearing, headache and neck pain. She had a family history of tuberculosis and had been treated with a four-drug regimen [isoniazid (INAH), rifampicin (RMP), ethambutol (EMB), pyrazinamid] for 5 months, 2 years previously. Chest X-ray obtained with abdominal protection was normal. On physical examination, Kernig and Brudzinski signs were positive and she had neck stiffness. Anisocoria and strabismus were detected. The non-enhanced CT examination revealed enlargement of the third, temporal horns and body of lateral ventricles. Suspicious hypodense areas in the right posterolateral side of the brain stem were seen.

The lumbar puncture of cerebrospinal fluid (CSF) showed 45 mg/dl protein, 29 mg/dl glucose (blood glucose level 108 mg/dl), and 111 mEq/l chlorine. Sixteen polymorphonuclear leukocytes (PML) and 2 lymphocytes were observed on the microscopic evaluation of CSF. An antibacterial treatment of cefotaxim (2.0 gm q6h IV) for 8 days was administered. A vision disturbance developed on the 7th day of the treatment. On ophthalmic examination, bilateral posterior pole edema was observed. The other cranial nerve dysfunction or lateralizing motor deficits were not observed. Three days later, focal-generalized convulsions appeared. The non-enhanced T1-weighted MR examination revealed isointense and hypointense lesions on the cerebellum, tentorium, left occipital lobe, suprasellar region and the posterior region of the third ventricle. The lesions appeared hypointense centrally and hyperintense peripherally on T2-weighted images.

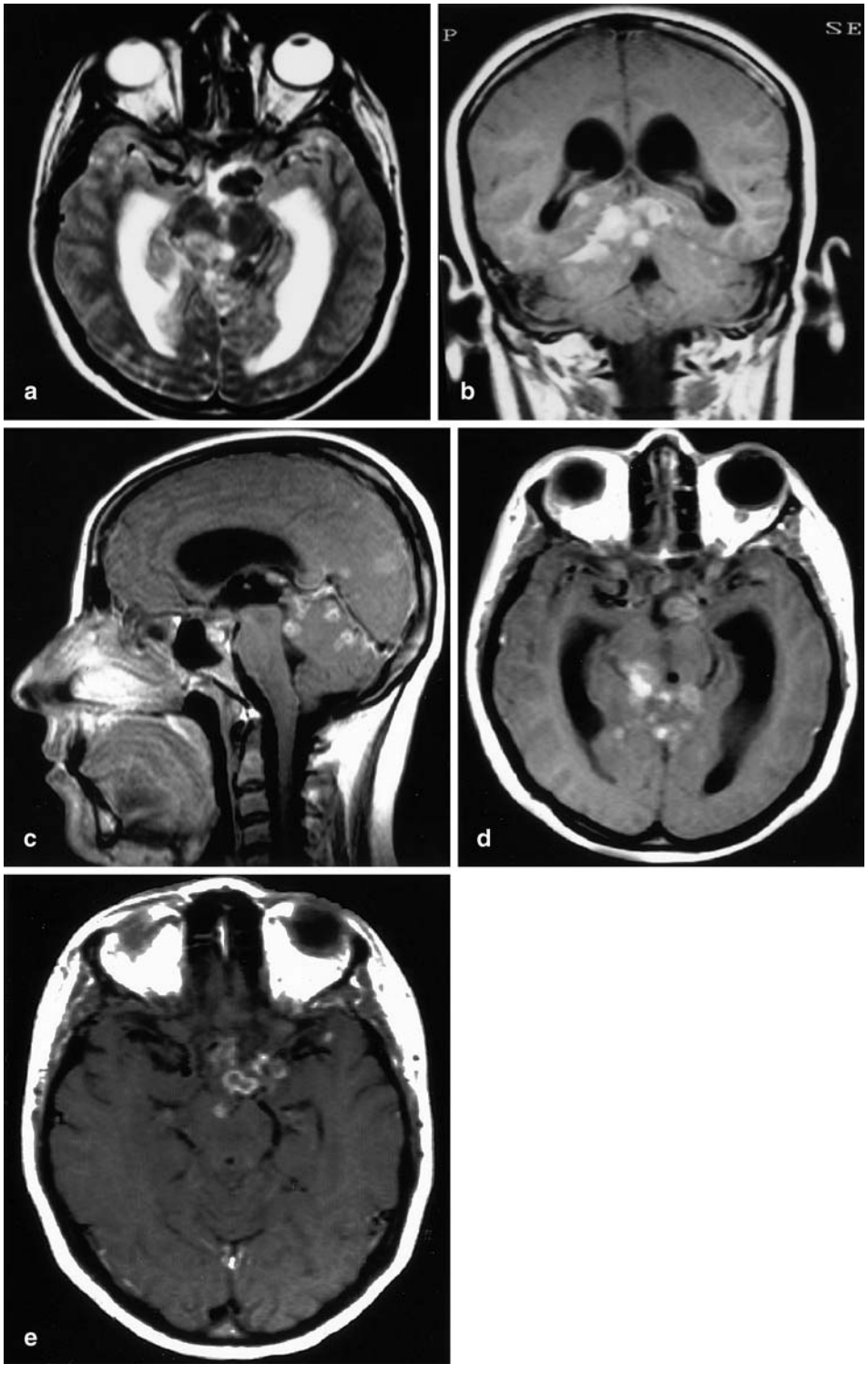

Fig. 1 25-year-old pregnant woman with en-plaque tuberculoma on tentorium. **a** Axial T2-weighted MR image (TR 3500, TE 100 ms) reveals lesions which are hypointense centrally and hyperintense peripherally in the suprasellar region and posterior to the right cerebral pedicle. The temporal horns are dilated due to hydrocephalus. **b** Coronal T1-weighted image (TR 500, TE 15 ms) enhanced with intravenous Gd-DTPA demonstrates dural thickening and en-plaque lesion. **c** Enhanced sagittal image (TR 500, TE 15 ms) shows ring-like contrast enhancement (target sign) in lesions. The image reveals also compression of the cerebral aqueduct with tuberculoma. **d** Enhanced axial image (TR 500, TE 15 ms) obtained before antituberculosis treatment shows multiple enhancing lesions in suprasellar region and posterior to the right cerebral pedicle. **e** Enhanced axial image (TR 475, TE 15) obtained after 8 months' antituberculosis treatment shows disappearance of the tuberculomas on tentorium, cerebellar hemisphere and cerebral aqueduct. In the suprasellar region, the remaining tuberculomas with diminished size are seen

Gd-DPTA- enhanced MR imaging showed ring-like contrast enhancement in these lesions. There was significant thickening of the right tentorium together with en-plaque-like tuberculomas with contrast enhancement, some of which had a tendency to conglomerate. Non-communicating hydrocephalus was seen on MR images due to compression of cerebral aqueduct by tuberculomas. There was also compression to the right cerebral pedicle posterolaterally and of the left lateral aspect of the optic chiasm.

The second lumbar puncture of CSF revealed 320 mg/dl protein, 14 mg/dl glucose (synchronous blood glucose level: 121 mg/dl) and 111 mEq/L chlorine. Direct microscopic evaluation of CSF revealed 17 PML and 34 lymphocytes. Ehrlich-Ziehl-Neelsen stain-

ing of CSF showed *Mycobacterium tuberculosis.* After the isolation of the microorganism, a three-drug regimen (INAH, RMP and pyrazinamid) was administered for 2 months and followed by a two-drug regimen (INAH, RMP) for 18 months. Methylprednisolone treatment (1 mg/kg/day) for 45 days was also administered.

The clinical and CSF findings improved from the 12th and 20th day of the treatment, respectively. The accuracy of the diagnosis was supported by the good response to antituberculosis drugs, which was shown by control MR imaging. The rest of pregnancy was without problem. A healthy child was born by vaginal delivery. The child was normal on clinical examination after birth and antituberculous treatment was not administered. Control MR imaging of the patient after 8 months showed disappearance of the tuberculomas on the tentorium, cerebellar hemisphere and cerebral aqueduct, while a few tuberculomas in the suprasellar region were observed with decrease in diameters.

Discussion

CNS tuberculosis evolves through various pathologic stages including cerebritis, noncaseating granuloma, and centrally caseous tuberculoma or tuberculous abscess [2, 7]. It is believed that tuberculosis affecting the CNS occurs by hematogenous spread from a primary source in the lung, abdomen or genitourinary tract. It is known that direct hematogenous seeding of the meninges is relatively rare. Bacilli may enter the CSF in regions of absent blood-brain barrier such as the choroid plexus. Rupture of a subependymal tubercle into the subarachnoid space usually causes tuberculous meningitis. Subependymal foci may remain quiescent indefinitely but may destabilize at any time, rupturing into the subarachnoid space. This may follow head trauma or be associated with general depression of host immunity as a result of alcoholism or other factors [8]. Many factors, such as cytokines, PGE_2, glucocorticoids, progesterone may suppress both the cellular and humoral immune responses during pregnancy [3]. In our case, the patient's history of antituberculosis treatment the reactivation of tuberculosis due to suppression of suggested immune system during pregnancy.

Meningitis and tuberculoma are the two most common forms of intracranial tuberculosis. Tuberculous meningitis is by far the most common manifestation and especially involves the basal cisterns. Extraaxial tuberculomas, which appear as focal meningeal nodular thickening, may result from tuberculous meningitis. Hydrocephalus and infarcts commonly occur. Tuberculomatous infiltration of the meninges produces basal fibrogelatinous exudates leading to cisternal block of the CSF pathways, hydrocephalus, and arteritis. The hydrocephalus may or may not remit after drug therapy [7]. In our case, tuberculomas compressed the cerebral aqueduct, leading to non-communicating hydrocephalus, and improved after antituberculosis treatment.

En-plaque tuberculoma is a rare manifestation of CNS tuberculosis and presents as a solitary, focal, caseous plaque-like lesion, globular or irregular in outline. It is situated deep in a sulcus in relation to the meninges [4]. The CT findings of en-plaque tuberculoma were described for the first time by Welchman in 1979 [9]. The en-plaque tuberculoma with dural base may mimic a meningioma and dural metastases. It is difficult to differentiate en-plaque-like meningeal tuberculoma from true primary or secondary meningeal neoplasia [2]. Parenchymal tuberculomas of brain usually occur in the white matter, around the corticomedullary junction or periventricular area. They tend to be multifocal or conglomerate groups of usually centrally caseated nodules [7]. In our case, en-plaque-like tuberculomas were conglomerated on the right tentorium, cerebellum, left occipital lobe, suprasellar region and the posterior part of the third ventricle. It is reported that the tuberculoma lesions had a bright central core surrounded by a peripheral hypointense zone on T2-weighted images. The central core was demonstrated to be hypointense while the periphery was isointense on T1-weighted images [10, 11]. MR imaging with Gd-DTPA enhancement demonstrated multiple mass lesions with ring enhancement. This type of enhancement was considered as a target sign and is strongly suggestive of tuberculoma [7, 10]. Histologically, the core of central mixed intensity corresponded to caseation necrosis plus adjacent cellular infiltrates [11]. In our case, tuberculomas appeared isointense and hypointense on T1-weighted images and centrally hypointense and peripherally hyperintense on T2-weighted images. After administration of GDPTA, the lesions showed peripheral ring-like enhancement, representing the target sign.

The prognosis is poor in the case of relatively uncommon cerebral localization and miliary dissemination, especially if treatment is initiated in late stages. MR imaging is important in the evaluation of tuberculosis therapy and prognosis [1]. The treatment of brain tuberculomas is primarily medical. Surgical excision is necessary in patients with raised intracranial pressure secondary to the lesion and not responding to medical therapy [10]. It is reported that with antituberculosis therapy, MR imaging revealed an initial increase, but eventually a decrease in size and disappearance of intracranial lesions [10]. In our case, MR imaging after 8 months revealed disappearance of tuberculomas on tentorium, in cerebellar hemisphere and cerebral aqueduct, but only a few smaller tuberculomas on the suprasellar region were detected.

On long-term followup with MR imaging, the central core of the tuberculoma changes gradually to hypointense on T2-weighted images and hyperintense on T1-weighted images, respectively. The change of the central core on MR imaging may represent organization of caseated necrosis [10]. In our case, similar MR imaging findings were observed after 8 months.

We believe that this is the first MR description of en-plaque-like tuberculomas of the tentorium in a pregnant woman with a history of antituberculosis treatment in the radiology literature. This case will enhance familiarity and recognition of conglomerating en-plaque-like tuberculomas.

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