Neuroradiology (1993) 35: 213–215

Neuro radiology

Disseminated tuberculomas in spinal cord and brain demonstrated by MRI with gadolinium-DTPA

W.-C. Shen[1], T.-Y. Cheng[2], S.-K. Lee[1], Y.-J. Ho[1], and K.-R. Lee[3]

[1] Department of Radiology, [2] Section of Neurology, Department of Internal Medicine, Taichung Veterans General Hospital, Taichung, Taiwan
[3] Institute of Life Science, National Tsing-Hua University, Taiwan

Summary. Intramedullary tuberculoma is rare, and there has been no report of concurrent intramedullary and intracerebral tuberculomas. We report a 30-year-old man with miliary tuberculosis of the lung. He suffered sudden paraplegia due to tuberculomas in the thoracic spinal cord and MRI showed more tuberculomas in the cervical spinal cord, brain stem, and cerebral and cerebellar hemispheres. The tuberculomas were isointense on the T1-weighted images, and hyperintense on the T2-weighted images; there was marked enhancement with intravenous gadolinium-DTPA. All the tuberculomas were very small 1 year after antituberculous chemotherapy.

Key words: Intramedullary spinal tuberculoma – Tuberculoma, intracranial – Tuberculosis – Magnetic resonance imaging

Intramedullary spinal tuberculomas are very rare. Lin [1] and MacDonell et al. [2] found only 148 cases reported between 1828 and 1990. Jena et al. [3] added another case report in 1991, but there is no report of simultaneous spinal cord and brain tuberculomas. There are only three reports of MRI in intramedullary tuberculomas [2–4], none of which described contrast enhancement. We report a case of disseminated tuberculomas involving the spinal cord, and brain, studied by MRI with gadolinium-DTPA enhancement.

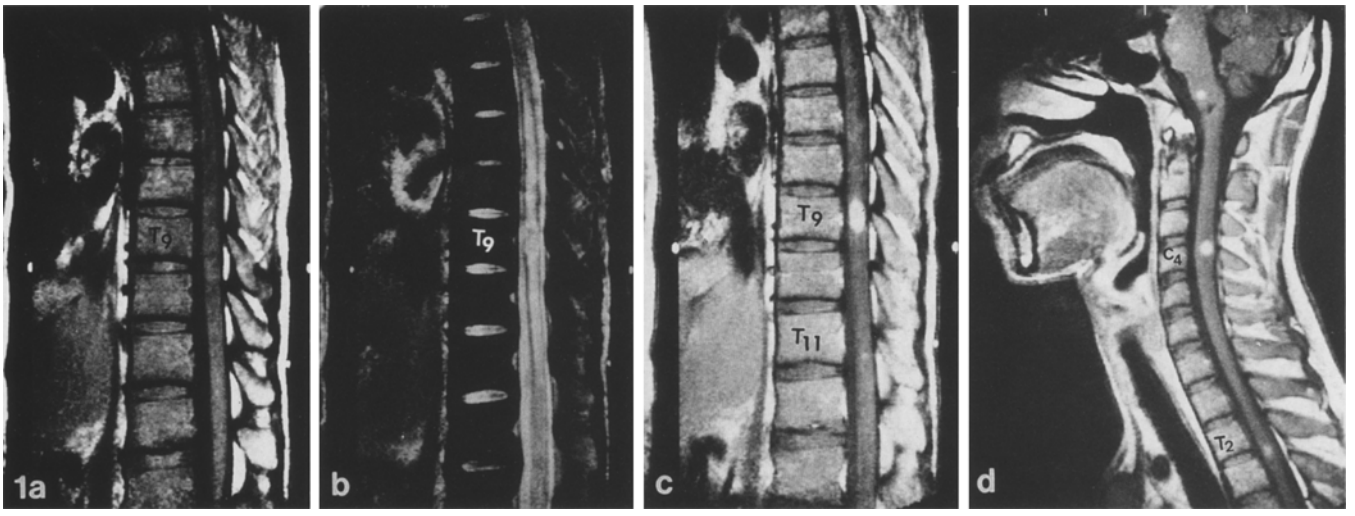
Case report

A 30-year-old man came to our emergency room with intermittent urinary retention, constipation, and high fever for 1 week, and then sudden onset of bilateral weakness of the legs. Examination showed muscle power of both limbs to be only grade 2/5, a sensory level below T10; his temperature was 39.8 °C. A chest radiograph showed miliary lesions in both lungs, and miliary tuberculosis was suspected. Tubercle bacilli were also found in the gastric juice. MRI of the thoracic spine was carried out after a normal myelogram: it showed two nodular lesions in the spinal cord, isointense on T1-weighted images (Fig. 1 a) and hyperintense on T2 weighted-images and associated with diffuse spinal cord oedema (Fig. 1 b). However, the lesions enhanced appreciably with intravenous gadolinium-DTPA (Fig. 1 c). MRI of the cervical spine revealed several nodular lesions in the cervical and upper thoracic spinal cord (Fig. 1 d), as well as lesions in the brain stem and cerebellum. MRI of the brain was therefore performed and numerous lesions were found in the brain stem, and cerebral and cerebellar hemispheres (Fig. 2).

Antituberculous chemotherapy, including ethambutol, INAH, rifampicin, and vitamin B was begun and the patient steadily improved. One year later, he had almost totally recovered from his paraplegia, and MRI showed the lesions to be very small (Fig. 3).

Discussion

Tuberculomas involving the central nervous system are still common in developing countries [5–9]. The majority are intracranial, and the proportion of intracranial to intramedullary lesions ranges between 20:1 [10] and 48:1 [1]. Most intramedullary tuberculomas are thoracic [2] and very few are cervical [3, 4]. Before the advent of MRI, myelography was the principal imaging procedure used in establishing the location of the spinal cord lesion. The findings were non-specific, so diagnosis depended on surgical findings and pathology. CT was rarely used for diagnosis of spinal cord tuberculomas [4]. In recent years, three papers have reported MRI of intramedullary tuberculomas [2–4], and in two cases, MRI detected tuberculoma directly [3, 4]. In the report of Jena et al. [3], the lesion was a hypointense nodule with central hyperintensity on T2-weighted images, reflecting a tuberculoma containing caseous necrosis [3]. In none of the three cases was contrast medium given. In our case, after intravenous gadolinium-DTPA T1 weighting showed multiple enhancing nodular lesions in the thoracic and cervical spinal cord and in the brain, although clinically no brain lesion was suspected. MRI characteristics of the intracranial tuberculomas (Fig. 2) were quite similar to those in the spinal cord (Fig. 1). Intracranial tuberculomas are well documented on brain CT, with variable appearances [5, 9–11]. Reports of MRI in intracranial tuberculoma appeared from 1987 onwards [6–8, 12–14], but most did not include gadolinium-DTPA enhancement.



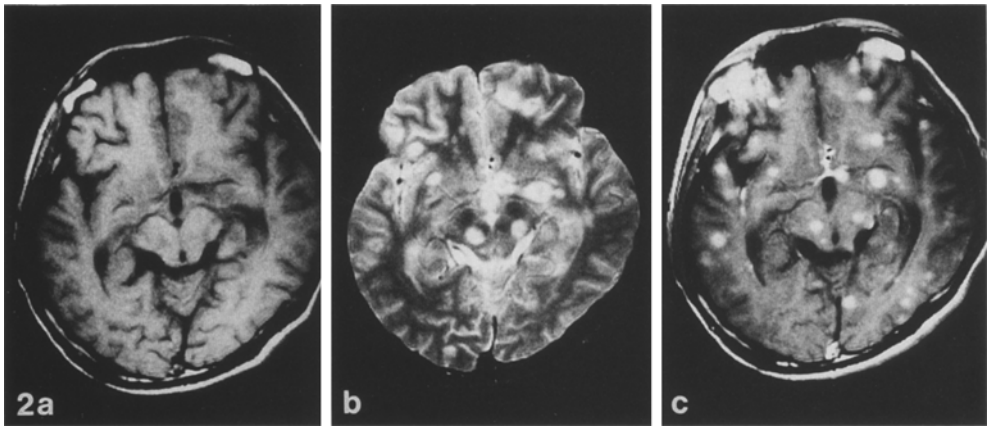
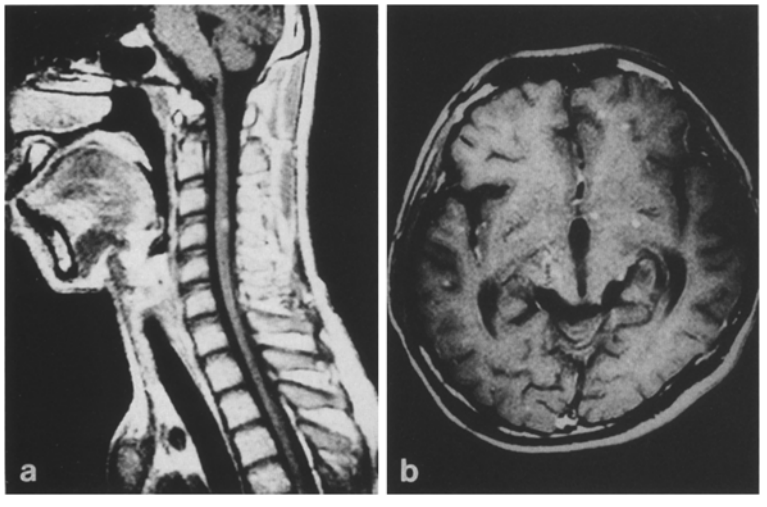


Fig. 1. **a** T1-weighted MRI (TR/TE 646/20 ms). No abnormality is seen: the lesions are isointense with the normal spinal cord. **b** T2-weighted image (TR/TE 2566/80 ms). There is a hyperintense lesion in the spinal cord at T9, associated with extensive hyperintensity above and below, indicating diffuse oedema. **c,d** T1-weighted images with intravenous gadolinium-DTPA. Nodular enhancing lesions are seen in the spinal cord at T9, T11, T2–3 and C_4. There are also several nodules in the brain stem and cerebellum



▲

Fig. 2. **a** T1-weighted image (TR/TE 600/20 ms). All the lesions are isointense with brain, and therefore invisible. **b** T2-weighted image (TR/TE 2800/80 ms) Multiple hyperintense nodules are seen in the cerebral hemispheres and midbrain. **c** T1-weighted image with intravenous gadolinium-DTPA. Numerous enhancing nodules are seen

Fig. 3. One year after antituberculous chemotherapy. T1-weighted image (TR/TE 500/20 ms) with gadolinium. The lesions are now very small

In one series [8], gadolinium-DTPA was given and the tuberculomas showed homogeneous enhancement, one patient having tuberculomas disseminated throughout the entire brain, as in our case.

Intramedullary tuberculomas are usually solitary; only two cases of double tuberculoma have been reported [2, 4]. Our case, is thus quite unusual. Furthermore, in one review [2], 69 % of intramedullary spinal tuberculomas had extraspinal tuberculosis, pulmonary disease being most common, but there was no report of intramedullary spinal tuberculoma associated with intracranial tuberculoma, or even of any case associated with tuberculous meningitis, so our case is quite uncommon.

After adequate chemotherapy, the majority of patients with intramedullary tuberculomas improved neurologically and no surgical removal was necessary [2]. Clinical and MRI follow-up of our patient showed the treatment to be very effective.

Acknowledgement. This study was supported in part by the grants VGHTH78-037-03 from the Taichung Veterans General Hospital and National Tsing-Hua University.

References

1. Lin TH (1960) Intramedullary tuberculoma of the spinal cord. Neurosurgery 17: 497–499
2. MacDonell AH, Baird RW, Bronze MS (1990) Intramedullary tuberculomas of the spinal cord: case report and review. Rev Infect Dis 12: 432–439
3. Jena A, Baneriji AK, Tripathi RP, Gulati PK, Jain RK, Khushu S, Spara ML (1991) Demonstration of intramedullary tuberculomas by magnetic resonance imaging: a report of two cases. Br J Radiol 64: 555–557
4. Rhoton EL, Ballinger WE, Quisling R, Sypert GW (1988) Intramedullary spinal tuberculoma. Neurosurgery 22: 733–736
5. Dyk A van (1988) CT of intracranial tuberculomas with specific reference to the "target sign". Neuroradiology 30: 329–336
6. Gupta RK, Jena A, Sharma A, Guha DK, Khushu S, Gupta AL (1988) MR imaging of intracranial tuberculomas. J Comput Assist Tomogr 12: 280–285
7. Salgado P, Del Brutto OH, Talamas O, Zenteno MA, Rodríguez-Carbajal J (1989) Intracranial tuberculoma: MR imaging. Neuroradiology 31: 299–302
8. Chang KH, Han MH, Roh JK, et al (1990) Gd-DTPA enhanced MR imaging in intracranial tuberculosis. Neuroradiology 32: 19–25
9. Jinkins JR (1991) Computed tomography of intracranial tuberculosis. Neuroradiology 33: 126–135
10. Whelan MA, Stern J (1981) Intracranial tuberculoma. Radiology 138: 75–81
11. Welchman JM (1979) Computerized tomography of intracranial tuberculoma. Clin Radiol 30: 567–573
12. Just M, Higer HP, Betting O, Bockenbeimer S, Pfannenstiel P (1987) MRI in cranial tuberculosis. Eur J Radiol 7: 276–278
13. Schoeman J, Hewlett R, Donald P (1988) MR of childhood tuberculous meningitis. Neuroradiology 30: 473–477
14. Riva M, Crippa S, Di Palma F, Gerini AM, Soresi E, Scoccia S (1990) Disseminated tuberculosis of the central nervous system responsive to rifabutin. Ital J Neurol Sci 11: 163–169

Dr. W-C Shen
Department of Radiology
Taichung Veterans General Hospital
Taichung, 407 Taiwan
Republic of China