Case Report

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# Diagnosis and management of intraspinal tuberculoma with osseous involvement: a case report

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**Introduction and importance:** Intraspinal tuberculoma is rare and challenging situation, which results in serious neurological dysfunctions.

**Case presentation:** This case report shows an intraspinal tuberculoma with osseous involvement in a 31-year-old male patient with subacute progressing neurologic deficit. His medical history included tuberculosis of pulmonary and intestinal 8 years previously, at which time he had been treated with intestinal obstruction operation and antituberculosis treatment. A quadruple antituberculosis treatment was carried out after admission; however, his neurological condition was steadily worsening. He underwent debulking of mass for decompression and pathological analysis revealed intraspinal tuberculoma. The patient was prescribed a 12-month course of antituberculosis therapy, and a good clinical outcome was obtained subsequently.

**Clinical discussion:** This case was treated by microsurgical resection and antituberculosis therapy, and the outcome was favourable.

**Conclusion:** Intraspinal tuberculoma should be considered when an intraspinal mass is found with a history of tuberculosis, it can be effectively diagnosed by MRI and treated by the combination of medical and surgical treatments.

**Keywords:** antituberculosis therapy, intraspinal tuberculoma, microsurgical, MRI, pathologic diagnosis

## Introduction

The central nervous system (CNS) tuberculosis mainly results from a primary tuberculosis pulmonary lesion that disseminates to the brain, spinal cord, meninges and surrounding tissues via blood, accounting for about 1–5% of all tuberculosis types[1,2]. The CNS tuberculosis is an extremely destructive manifestation of tuberculosis with a fairly high fatality and disability rates[3]. Tuberculous meningitis is the most common type of CNS tuberculosis, tuberculoma is unusual, and intraspinal tuberculoma is extremely rare[4]. Intraspinal tuberculoma is a benign and curable disease; however; delayed diagnosis and treatment can lead to significant neurological sequelae[5]. MRI is the modality of choice for the diagnosis of intraspinal tuberculoma, and the signal features of MRI include intramedullary or extramedullary lesions, space-occupying effect, lesions and spinal dural enhancement[6]. The accurate diagnosis of intraspinal tuberculoma needs surgical biopsy and histopathology. Although most patients are treated medically, surgical excision is frequently employed when spinal cord compression and associated symptoms is presented[7]. Herein, we present a rare case of intraspinal tuberculoma, detected on clinical symptoms, medical history and MRI scans, and accurately diagnosed via pathological examination. Finally, he was treated with a combination of antituberculosis therapy and surgical excision successfully.

### HIGHLIGHTS

- We report a patient with intraspinal tuberculoma with a typical clinical course.
- Intraspinal tuberculoma should be considered when a case of spinal tumour syndrome with a medical history of tuberculosis.
- MRI scans, especially contrast-enhanced MRI, is an effective method for the diagnosis of intraspinal tuberculoma.
- A combination of antituberculosis chemotherapy and microsurgical resection is the optimal treatment for intraspinal tuberculoma patients with a sudden or progressive neurologic deficit.

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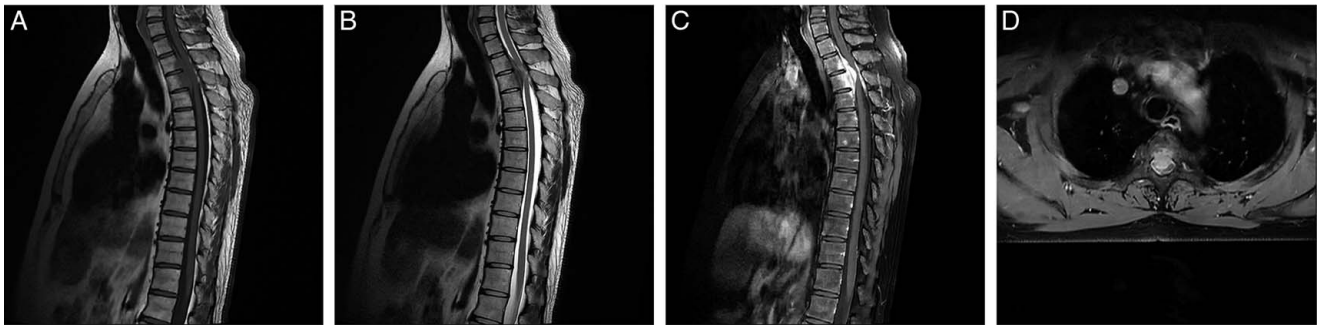


**Figure 1.** Intraspinal tuberculoma of the thoracic spinal cord. An extradural lesion in the ventral of intraspinal at T2–T4 causing significant spinal cord compression. (A) Isointense on T1WI. (B) Isointense on T2WI, with slight hyperintense on T2WI of the adjacent spinal cord. (C) Obvious homogeneous enhancement after contrast enhancement. (D) Accompanied by diffuse enhancement of spinal meninges.

This case report has been reported in line with the surgical case report (SCARE) 2023 criteria[8].

## Case report

A 31-year-old male was admitted to the authors' hospital and presented with cough and chest pain, and progressive asymmetric onset lower limbs hypesthesia and paraparesis for 2 months, which was ascending in nature. The progressive asymmetric lower limbs weakness and hypesthesia caused difficulty in standing and walking. He also developed urinary incontinence and perianal hypaesthesia with the condition progress. The medical history of patient revealed a diagnosis of tuberculosis of pulmonary and intestinal over 8 years ago, and followed by intestinal obstruction operation and antituberculosis treatment for 12 months.

At admission, his pulse rate was 81/min, respiratory rate was 19/min, and blood pressure was 152/81 mmHg. His weight 64 kg and height 170 cm. The physical examination showed papilledema was absent and spine palpation revealed no tenderness or deformity. Neurologic examination showed his higher mental functions and cranial nerves were normal, both upper limbs had normal tone, power, and reflexes. The remarkable clinical sign was the diminished tactile sensation and pain sensation below T4. Right lower limb revealed Grade 3 power, and left lower limb showed Grade 4 power. Both lower limbs deep tendon reflexes (2 + ), knee and ankle reflexes were normal. Babinski reflex was negative bilaterally. There were no signs of meningeal irritation. MRI of the spine demonstrated a $4.5 \times 1.3 \times 0.9$ cm extradural lesion in the ventral of intraspinal at T2–T4, causing significant spinal cord compression. The lesion was isointense on T1WI and T2WI images with significantly homogeneous enhancement, intramedullary signal at T2–T3 levels was subtle increased abnormality on T2WI image, and diffused the enhancement signs of spinal meninges was observed (Fig. 1). Computerized tomography (CT) of thoracic spine revealed osseous destruction of the vertebral bodies at T2–T4; however, no dominant pulmonary nodules or masses were observed (Fig. 2).

Based on patient's medical history, physical signs, and features of CT and MRI images, a diagnosis of T2–T4 intraspinal tuberculoma was made. The patient was started on a quadruple antituberculosis therapy, while, his neurological condition has worsened. There is no doubt that intraspinal tuberculoma with spinal cord compression warrants surgical resection. For improving the neurologic symptoms and neurological deficit, the maximum resection of space-occupying lesion is the goal of surgery. Patient underwent surgery for excision of the lesion, which was

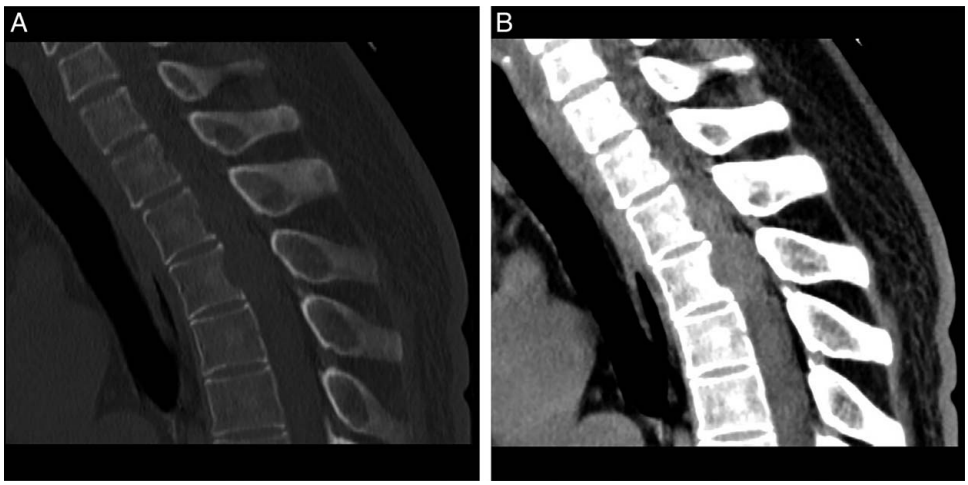


**Figure 2.** Computed tomography scans showed the destruction of vertebral bodies at T2–T4 levels. A, Bone window. B, Soft-tissue window.

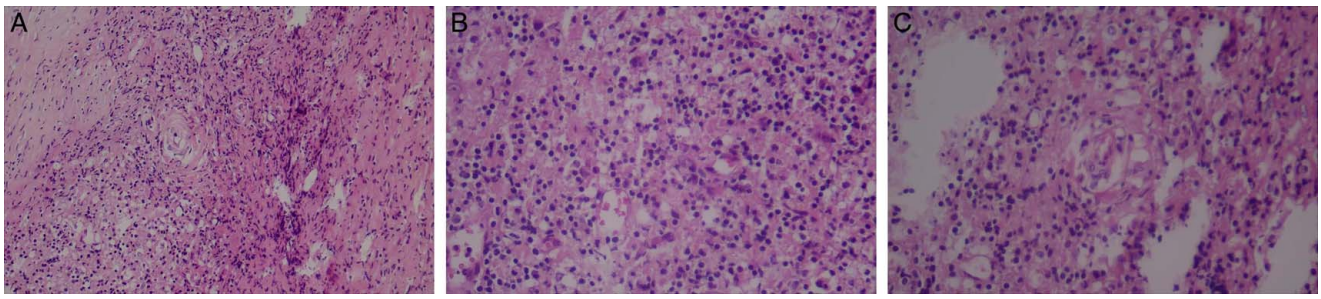


**Figure 3.** Hematoxylin and eosin (H&E) staining of the lesion revealed caseating granulomas with chronic lymphoplasmacytic inflammatory infiltrate. A, x40. B and C, x400.

performed through posterior approach in prone position. T2–T4 laminectomy followed by median right lateral durotomy was performed. The grey lesion was anterior to the spinal cord and spanning three vertebral levels, the thickened dural was covered with a grey of granulation tissue. Due to the main lesion located deeply on the spinal cord ventrally, only a part of lesion was removed for decompression. Postoperative histopathology examination showed infiltration of chronic inflammation cells and granulomatous inflammation consistent with tuberculoma (Fig. 3). Acid-fast staining (–), PAS (–), PCR amplification of mycobacterium tuberculosis DNA (–), CD163 (+), CD1a (–), CD34 (–), CD45 (+), CD68 (+), CK (–), EMA (–), GFAP (–), Ki-67 (+ 10%), Langerin (–), PR (–), SOX10 (–), STAT6 (–), Vim (+). Antituberculosis therapy was continued for a period of 12 months. Patient was discharged 2 weeks later postoperatively, and disorders of lower extremities motor and sensory were improved. At 6 months after surgery, patient's lower limbs paraparesis and hypesthesia, perianal hypaesthesia and bladder function were completely recovered. Neurologic examination showed his upper and lower limbs had normal tone, power (Grade 5 power), and reflexes. The tactile sensation and pain sensation below T4 was normal. MRI images showed that the lesion volume significantly lessened, and spinal cord compression was decompressed completely (Fig. 4).

## Discussion

Tuberculosis is a chronic bacterial infection by mycobacterium tuberculosis, which is back in the limelight[9,10]. The CNS tuberculosis is a dangerous situation that causes neurological deficits via attacking neural and perineural tissues. Intraspinal tuberculoma is an infectious granulomatosis caused by mycobacterium tuberculosis invade into spinal dural, spinal cord, vertebral and perineural tissues. Blood, cerebrospinal fluid (CSF) and directly invading were primary routes of infection[6]. The lesion of intraspinal tuberculoma can exist in epidural, intradural, and intramedullary space, causing spinal cord compression. Due to the distribution of blood supply to spinal cord, thoracic segment receives nearly 45% of spinal cord blood supply resulted in intraspinal tuberculoma was most commonly found in the thoracic segments[11]. Our patient is a 31-year-old male with a history of tuberculosis of pulmonary and intestinal, MRI and CT images of the spine demonstrated a contrast-enhancing extradural lesion with vertebral body destruction at T2–T4 causing significant spinal cord compression.

MRI is well-suited for diagnosing intraspinal tuberculomas, which has advantages in displaying the location, shape, and signal features of lesions. MRI features of intraspinal tuberculomas including: long-fusiform or plaque-like shapes are mostly observed in extramedullary tuberculomas, round or round-like shapes are mostly observed in intramedullary tuberculomas; MRI signals are isointense on T1WI and T2WI in most newly formed intramedullary and extramedullary tuberculomas, while, due to caseous necrosis appears in tuberculomas, MRI signals are mainly isointense on T1WI and hypointense on T2WI; Tuberculomas typically have a rich blood supply and often exhibit marked homogeneous enhancement in extramedullary lesions in most cases, when necrosis occurs in lesions, rim enhancement is observed in most intramedullary tuberculomas[6]. In our case, the lesion displayed isointense on T1WI and T2WI,

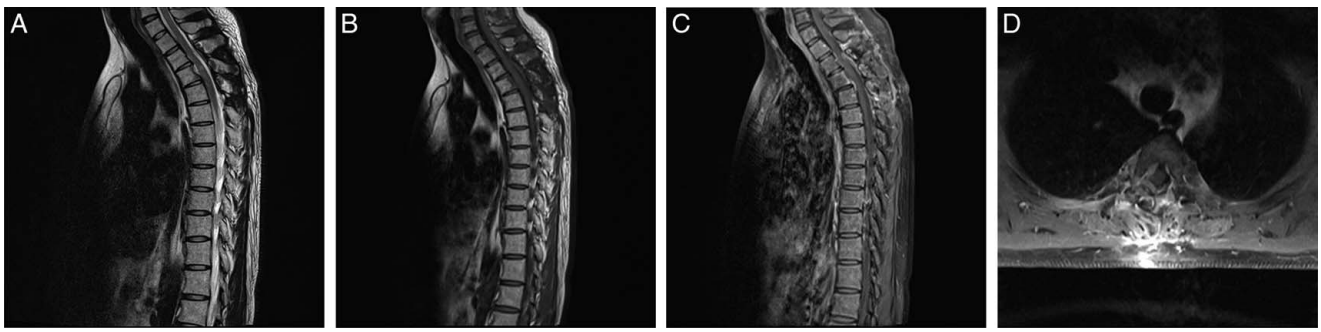


**Figure 4.** MRI examination after 6 months of treatment. T1WI, T2WI and enhancement scans showed disappearance of lesion and complete decompression of the spinal cord. A, T1WI. B, T2WI. C, Contrast-enhanced. D. Axial view.

obvious homogeneous enhancement was noted on contrast-enhanced scan, indicating that it is a newly formed extramedullary tuberculoma without caseous necrosis. Previous study reported that extramedullary tuberculomas were more likely to be detected early due to nerve compression symptoms, this may explain why caseous necrosis was less common in extramedullary tuberculomas than in intramedullary tuberculomas[6].

Antituberculosis therapy is a safe, effective and inexpensive option for tuberculosis. Based on guideline, HRZE regimen (including isoniazid, rifampicin, pyrazinamide, ethambutol) is recommended the first-line treatment for tuberculosis meningitis[12]. However, medical treatment remains unvalidated for tuberculoma. Early surgical decompression is required for patients with noticeable neurological deficits to avoid permanent neurological sequelae. For single lesion, the resection of lesion for spinal cord decompression is the goal of surgery. For multiple lesions, the goal of surgery is the resection of most space-occupying lesions. For the remaining smaller lesions or the deep and critical site lesions can be treated with antituberculosis drugs. For patients with tuberculoma and tuberculosis meningitis, the combination of surgery and HRZE regimen should be applied[13]. In our case, the patient was treated with a standard antituberculosis therapy and surgical excision of tuberculoma, and achieved a good neurological outcome.

## Conclusion

Intraspinal tuberculoma is often observed in young people, which presents as subacute spinal cord compression and neurological deficits. MRI plain and contrast-enhanced scans are the first and credible means in the diagnosis of intraspinal tuberculomas, which can display the scope and shape of lesions as well as the surrounding structures clearly. The optimal treatment is a combination of microsurgical resection and antituberculosis chemotherapy for intraspinal tuberculomas with spinal cord compression and neurological deficits.

## Ethical approval

This is a case report. Therefore, it did not require ethical approval from ethics committee.

## Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editor-in-chief of this journal on request.

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## Author contribution

S.W. and F.H. contributed to writing the case information and discussion. B.S. diagnosed the case, collected the data, and preserved the pictures. Y.Y. and W.Z. contributed to the process of original draft preparation and introduction. Y.M. revised it critically for important intellectual content, contributed to review and editing. Q.O. edited the rough draft into the final manuscript.

## Conflicts of interest disclosure

The authors declare that there are no conflicts of interest.

## Research registration unique identifying number (UIN)

Not applicable.

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Not applicable.

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