Folia Neuropathologica

Cervical spinal tuberculosis

Teresa Wierzba-Bobrowicz[1], Elżbieta Michalak[2], Radosław Michalik[3], Tomasz Stępień[1]

[1]Department of Neuropathology, Institute of Psychiatry and Neurology, Warsaw, Poland, [2]Department of Pathology, Institute of Mother and Child, Warsaw, Poland, [3]Department of Neurosurgery, Institute of Psychiatry and Neurology, Warsaw, Poland

Folia Neuropathol 2010; 48 (4): 300-304

Abstract

Cervical spinal tuberculosis is a rare variant of extra-pulmonary tuberculosis. We present the case of Vietnamese woman, aged 48, who was admitted to the Department of Neurosurgery because of a cervical spine (C7) compression fracture. Several months earlier, the patient complained of neck pain and numbness of the hands. On physical examination, the woman was subfebrile and complained of pain over the cervical spinal area. Neurological examination revealed no focal motor weakness. The roentgenograms of chest, pelvis and cranium were without pathological changes. Abdominal ultrasonography was normal. Radioisotope bone-scanning showed abnormal accumulation of isotope in the lower cervical region, thoracic vertebra, as well as in the articulations of knees and shoulders and in the left tibial bone. An MRI scan revealed compression fracture of the C7 vertebral body with infiltration of paraspinal tissues at the vertebral column with indentation of osseous masses into the spinal canal. The lesion resembled neoplasm metastasis. The neoplasm infiltrating vertebral body C7, two discs, C6-C7 and C7-Th1, and ligament were removed surgically. Neuropathological examination of the removed material showed typical granulomatous inflammation with characteristic infiltrate of lymphocytes, epithelioid macrophages and Langhans-type multinucleated giant cells. The spoligotyping method confirmed the presence of Mycobacterium tuberculosis complex in the specimens.

Key words: tuberculosis, cervical spine, compression fracture, spoligotyping.

Introduction

Tuberculosis (tubercle bacillus – TB) is a major global health problem. It is a communicable disease caused by *Mycobacterium tuberculosis* or *Mycobacterium bovis*, including the attenuated BCG strain.

Every year eight million new cases are detected and about three million people die from this disease worldwide. Extra-pulmonary TB may involve any organ systems and clinical symptoms are non-specific [3]. Extra-pulmonary TB is more common in childhood and in patients with HIV/AIDS [5,6,10,17].

Spinal tuberculosis is a rare variant of TB, comprising less than 3% of cases. Skeletal tuberculosis lesions may simulate primary or metastatic disease [2,15,19]. Lumbar and thoracic regions are often involved, whereas TB occurrence in the cervical spine is uncommon [18].

We report herein the case of a Vietnamese woman who had cervical spinal TB, initially treated as compression fracture, and probably other inflammatory foci in the bone system.

Communicating author:

Teresa Wierzba-Bobrowicz, MD, PhD, Department of Neuropathology, Institute of Psychiatry and Neurology, Sobieskiego 9, 02-957 Warsaw, Poland, e-mail: bobrow@ipin.edu.pl

Case report

A 48-year-old Vietnamese woman was admitted to the Department of Neurosurgery, Institute of Psychiatry and Neurology, because of a cervical spine (C7) compression fracture. Five months earlier, the patient complained of neck pain and numbness of the hands. Ten years ago she had a total hysterectomy (the operation took place in Vietnam; documentation was lacking).

On physical examination, the patient was subfebrile and complained of pain over the cervical spinal area.

Neurological examination revealed no focal motor weakness.

Complete blood cell count revealed a moderate increase in neutrophils (Neut) 80.95% (38.0-70.0), platelet count (PLT) 576.0 K/µL (130-450), and glucose 114 mg/dl (74-106), and a moderate decrease in lymphocytes (LYM) 14.2% (21.0-50.0), mean corpuscular volume (MCV) of erythrocytes 76.6 fL (81-99) and mean corpuscular haemoglobin (MCH) in erythrocytes 26.9 pg (27-31), whereas electrolytes, creatinine and albumin were normal. Tumour markers were estimated, showing the following values: cancer antigen CA 125, 7.6 U/ml; CA 19-9, 62.03 U/ml; and carcinoembryonic antigen (CEA), 1.4 ng/ml. The patient's HIV serology was non-reactive. Abdominal ultrasonography was normal. The roentgenograms of chest, pelvis and cranium were also normal. Radioisotope bone scanning showed abnormal accumulation of isotope in the lower cervical region, thoracic vertebra Th7, knee and shoulder articulations and the left tibial bone (Fig. 1). An MRI scan showed compression fracture of the C7 vertebral body with infiltration of paraspinal tissues at the vertebral column with indentation of osseous masses into the spinal canal. The lesion resembled neoplasm metastasis.

The neoplasm infiltrating vertebral body C7, as well as two discs, C6-C7 and C7-Th1, and ligament (posterior longitudinal ligament, PLL) were removed surgically. The masses of soft tissue looked like metastasis. After the operation, the masses of soft tissue and bone were sent to a laboratory for neuropathological examination.

Methods

For morphological examination tumour tissues were fixed in 4% formaldehyde buffered to pH 7.4 and embedded in paraffin. The specimens were stained using H&E, Gomori's, van Gieson and Ziehl-Neelsen methods. Immunohistochemical reactions according to the labelled streptavidin-biotin complex methods with DAB as chromogen were performed in 5 µm sections using antibodies to GFAP (DAKO, 1 : 500), CD 20 (Novocastra, clone L26, 1 : 50), CD 45 RO (Novocastra, clone UCHL1, 1 : 100), LCA (Novocastra, clone RP2/18 and RP2/22, 1 : 75), Ki 67 (DAKO, clone MIB-1, 1 : 100), CD 68 (DAKO, clone PG-M1, 1 : 100) and cytokeratin (DAKO, clone AE1/AE3, 1 : 50).

The paraffin specimens were used for detecting the *Mycobacterium tuberculosis* complex strain using spoligotyping (spacer oligonucleotide typing) methods. This is a PCR (polymerase chain reaction)-based method allowing for analysis of the amplification of a highly polymorphic direct repeat (DR) locus in the *M. tuberculosis* genome [1].

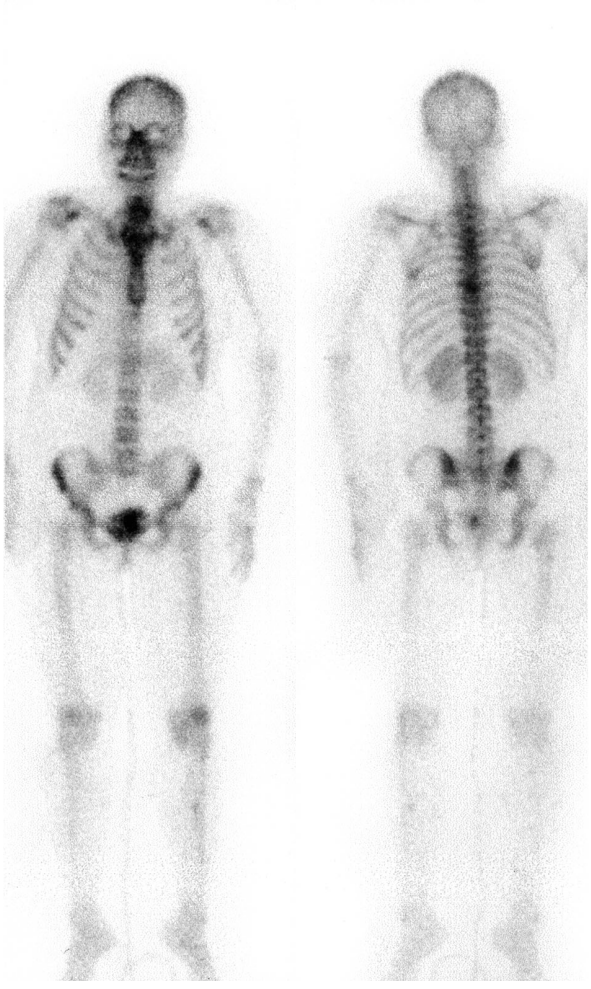

Fig. 1. Radioisotope bone-scanning. Abnormal accumulation of isotope in the lower cervical region, thoracic vertebra Th7, the articulations of knees and shoulders and in the left tibial bone.

Results

Microscopically, masses of necroses with central caseous necrosis were observed in the specimens of soft tissue and bone (Fig. 2). Areas of central caseous necrosis were typically surrounded by reticular fibres and inflammatory infiltrate, as well as by infiltration of bones (Fig. 3A,B). The inflammatory infiltrate was composed of lymphocytes and epithelioid histiocytes, macrophages and Langhans giant cells with strongly positive immunoexpression of CD68, indicating that they are an active form of macrophages (Figs. 4-6). Epithelioid histiocytes were of various shape and size (Fig. 7A,B). The Langhans-type multinucleated giant cells varied and sometimes contained calcification (Fig. 8). Plasma cells were occasionally observed (Fig. 6). The wall of blood vessels was thickened. Numerous collagen fibres were seen inside the

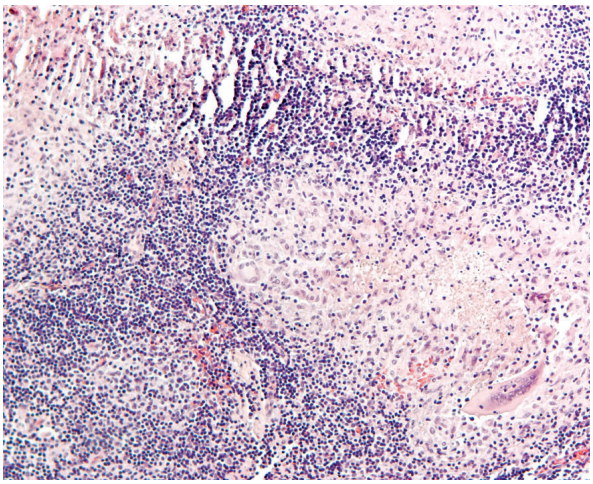

Fig. 2. Cervical spine tuberculosis. Typical granulomatous inflammation with area of central caseous necrosis. HE × 200.

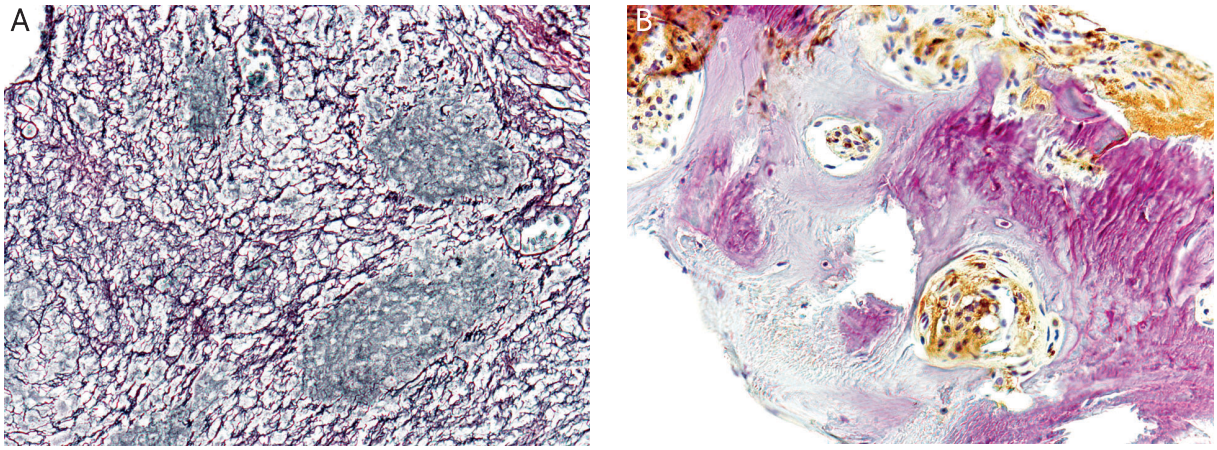

Fig. 3. Tuberculosis. **A.** Reticular fibers around central caseous necrosis. Gomori's method. × 200. **B.** Inflammatory infiltrating bones. LCA × 200.

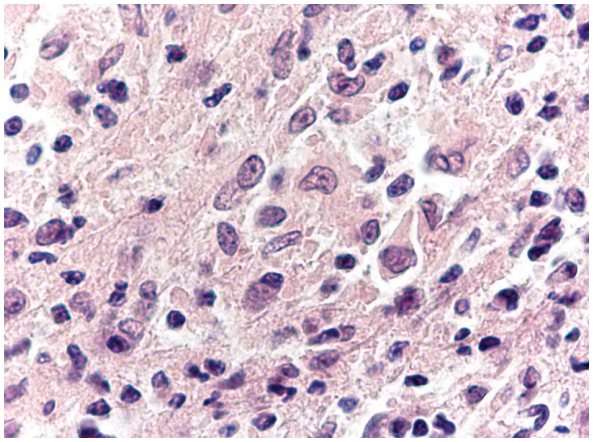

Fig. 4. Part of granuloma in spine tuberculosis. Characteristic infiltrate of epithelioid histiocytes. HE × 400.

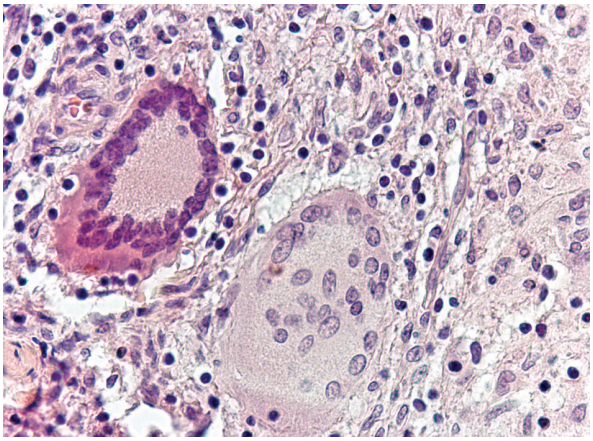

Fig. 5. Part of granuloma in spine tuberculosis. Characteristic multinucleated giant cells of Langhans type. HE × 400.

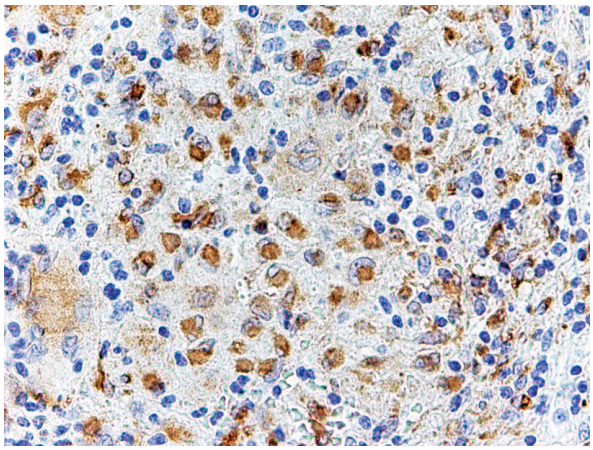

Fig. 6. Part of granuloma in spine tuberculosis. Strong immunoexpression of CD 68 in epithelioid histiocytes and multinucleated giant cell. CD 68 × 400.

wall and around the vessels (Fig. 9). Acid-fast bacilli were not seen with Ziehl-Neelsen stain. The spoligotyping method confirmed the presence of *Mycobacterium tuberculosis* complex in these specimens.

Discussion

Cervical spinal tuberculosis is an uncommon pathology, which therefore is very difficult to recognize. Typical TB granulomatous inflammation resembles malignant deposits in the spine, which are more frequent [4,8].

Our case is an excellent example of wrong interpretation of TB as primary or metastatic neoplastic disease. Our patient had a total hysterectomy ten years ago. The roentgenogram of the chest was normal. The tumour marker, cancer antigen CA 19-9, was moderately increased (62.03 U/ml).

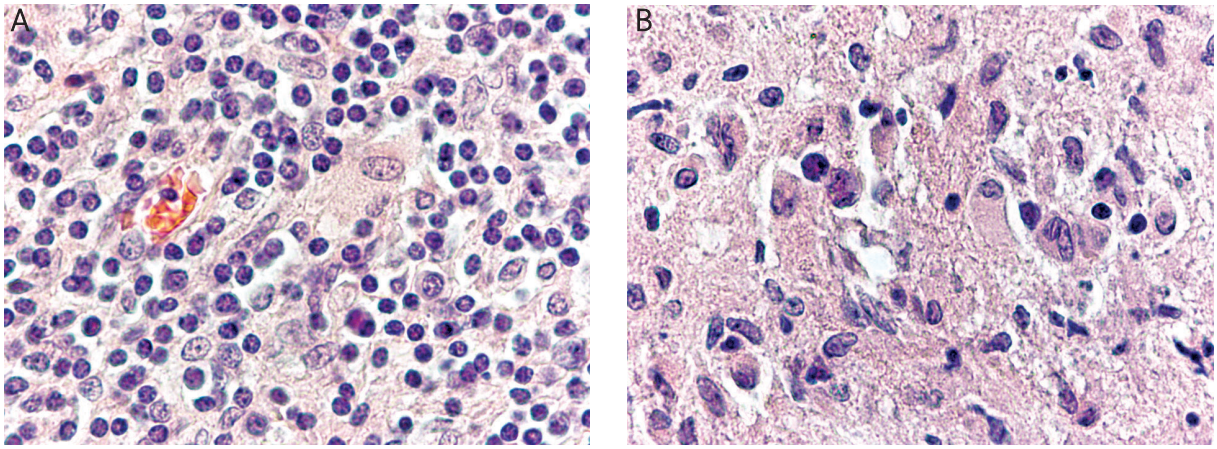

Fig. 7. Part of granuloma in spine tuberculosis. **A.** Infiltrate of lymphocytes and epithelioid histiocytes. HE × 200. **B.** Epithelioid histiocytes. HE × 400.

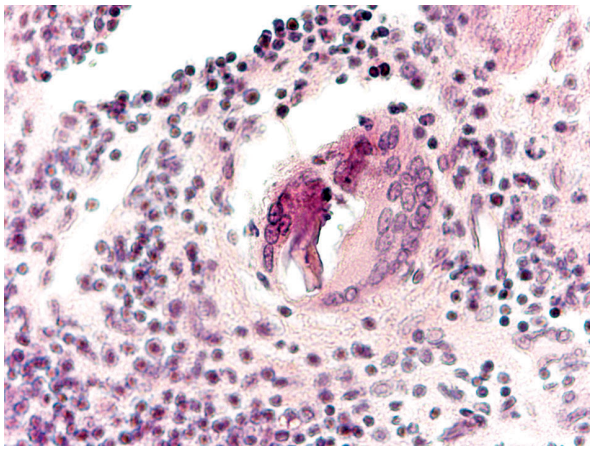

Fig. 8. Part of granuloma in spine tuberculosis. Calcification in multinuclear giant cell. HE × 200.

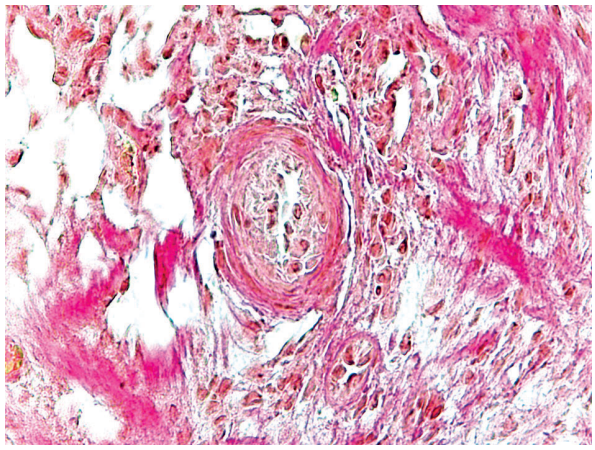

Fig. 9. Part of granuloma in spine tuberculosis. Numerous collagen fibers inside the wall and around the vessel. Van Gieson x 630.

Primarily, antigen CA 19-8 was determined in neoplastic cells of the large intestine [7]. Nowadays, it is known that the level of this marker increases in pancreatic cancer, carcinoma of the stomach and cholangioma (70-100%). The correlation between the developmental stage of this neoplasm and the CA 19-9 level is also known. However, the specificity of tests based on this antigen is rather limited because of its increased concentration, for example in the case of pancreatitis and liver pathologies [12,16]. In our case, radioisotope bone scanning showed abnormal accumulation of isotope in two regions of the vertebra, as well as in articulations and long bone, which suggests a multifocal disease process. An MRI scan showed compression fracture of the C7 vertebral body with infiltration of paraspinal tissue at the vertebral column with indentation of osseous masses into the spinal canal. The presented case was similar to those of bone and spinal neoplastic metastasis [4]. Therefore, other conditions such as TB, pyogenic infection, neurosarcoidosis, syphilis and fungal osteomyelitis should also be taken into consideration [9,11,13,14]. Neuropathological examination of the tissue removed surgically showed typical granulomatous inflammation with characteristic infiltrate of lymphocytes, epithelioid macrophages and Langhans type multinucleated giant cells. Unfortunately, acid-fast bacilli were not seen with the use of the Ziehl-Neelsen staining method. The spoligotyping method was applied to identify the pathogenic factor. Spoligotyping is a novel PCR-based method. This genotyping technique allows one to analyse strain-dependent polymorphisms found in spacer sequences present within the direct repeat genomic region of *Mycobacterium tuberculosis* complex strains. The spoligotyping method confirmed the presence of *Mycobacterium tuberculosis* complex in our specimens. *Mycobacterium tuberculosis* complex consists of the following bacilli pathogenic for humans: *Mycobacterium* (*M.*) *tuberculosis*, *M. africanum*, *M. bovis*, including BCC strain, and *M. microti*.

This group of bacilli is responsible for the development of the classic form of tuberculosis. Diagnostic procedures of TB should include serological examination, and neuropathological investigation of specimens obtained from the lesion, including the detection of acid-fast bacilli with Ziehl-Neelsen staining, or DNA fragments of *Mycobacterium tuberculosis* complex, using spoligotyping.

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