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Case Report

Imaging findings of cryptococcal infection of the thoracic spine

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SUMMARY

Cryptococcosis with thoracic spine involvement is extremely rare, with most cases occurring in immunosuppressed patients. We report a case of cryptococcosis of the thoracic vertebrae confirmed by histopathology. The immunocompetence of the patient is a most interesting feature of this case. Laboratory investigations were normal, but the erythrocyte sedimentation rate was raised. A computed tomography scan showed an eccentric lytic lesion with a clear boundary at T2–T3. Magnetic resonance imaging showed the endplates of the T2 and T3 vertebral bodies to be involved, but without significant loss of the intervertebral disk height. A prespinal and large paraspinal soft tissue component was spreading along T1–T4, and the pleura and dural sac at the level of T2–T3 had thickened abnormally. ^{18}F-fluorodeoxyglucose positron emission tomography/computed tomography showed abnormal uptake in the lesion. The above-mentioned clinical and imaging information will help improve our understanding of this rare disease.

1. Introduction

Cryptococcosis with bone involvement is uncommon, comprising only 5% of all cryptococcal infections.[1] Radiological findings of cryptococcal bone lesions are non-specific. We report a case of cryptococcosis of the thoracic vertebrae in an immunocompetent patient with complete imaging data in order to raise general awareness about cryptococcosis of the spine.

2. Case report

A 67-year-old woman presented with a 4-month history of progressive back pain and occasional pain radiating bilaterally to the shoulders and chest, without fever, night sweats, cough, or headache. She had no medical history of diabetes, tuberculosis, sarcoidosis, leukemia, lymphoma, AIDS, or Hodgkin's disease. Her erythrocyte sedimentation rate (ESR) was 80 mm/1st h (normal 0–20 mm/1st h), and her C-reactive protein (CRP) level was 24.43 mg/l (normal 0–5.0 mg/l). A preoperative blood count, rate of CD4/CD8 ratio, blood coagulability, liver and renal function, blood sugar levels, and tumor markers were all normal. Serological tests were negative for HIV. The serum cryptococcal antigen was positive.

A transverse computed tomography (CT) scan showed an eccentric lytic lesion with a clear boundary at T2 and T3 (Figure 1). The entire left half of the vertebral body and a portion of the spinal column enclosure were involved. The lesion was well-defined and surrounded by lamellar ossification, and irregular sequestrum could be observed in certain parts. The density of the lesion was uniform and the CT number was 45 Hounsfield units (HU); no calcification or necrosis was observed within it. The cortical area of the vertebral body had been destroyed, and the lesion had extension into the soft tissues. All of these findings are characteristic of a tumor. The endplates of the T2 and T3 vertebral bodies were involved, without significant loss of intervertebral disk height.

A lateral radiograph of the thoracic vertebrae revealed the T2–T3 disk to be normal. A T1-weighted magnetic resonance image (MRI) of the thoracic spine demonstrated a paraspinal soft tissue lesion with vertebral erosion at the level of T2–T3 as an area of diffuse low signal intensity (Figure 2). A T2-weighted MRI showed an area of heterogeneous high signal intensity (Figure 2). A prespinal and large paraspinal soft tissue component was shown to be spreading along T1–T4, and the pleura and dural sac at the level of T2–T3 were involved. A contrast-enhanced fat-suppressed T1-weighted MRI

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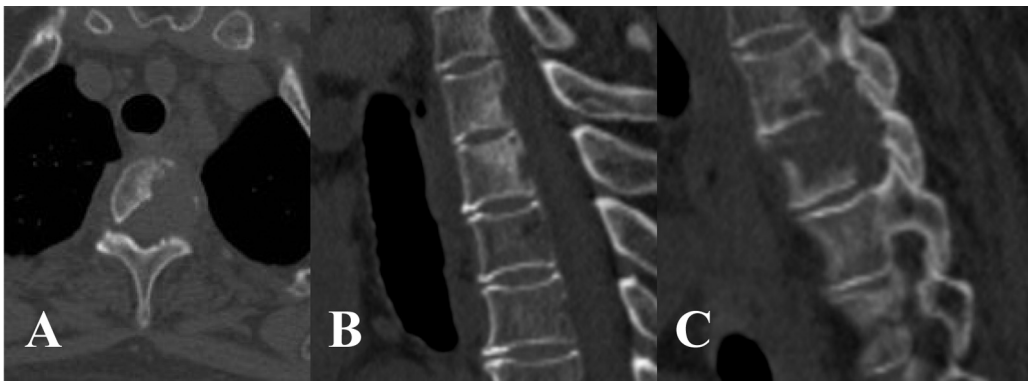

Figure 1. (A) Transverse CT scan of the thoracic spine showing a lytic lesion at vertebra T2. (B) Sclerosis surrounding the lesions at T2 and T3. (C) The endplates of the T2 and T3 vertebral bodies were involved, without significant loss of intervertebral disk height.

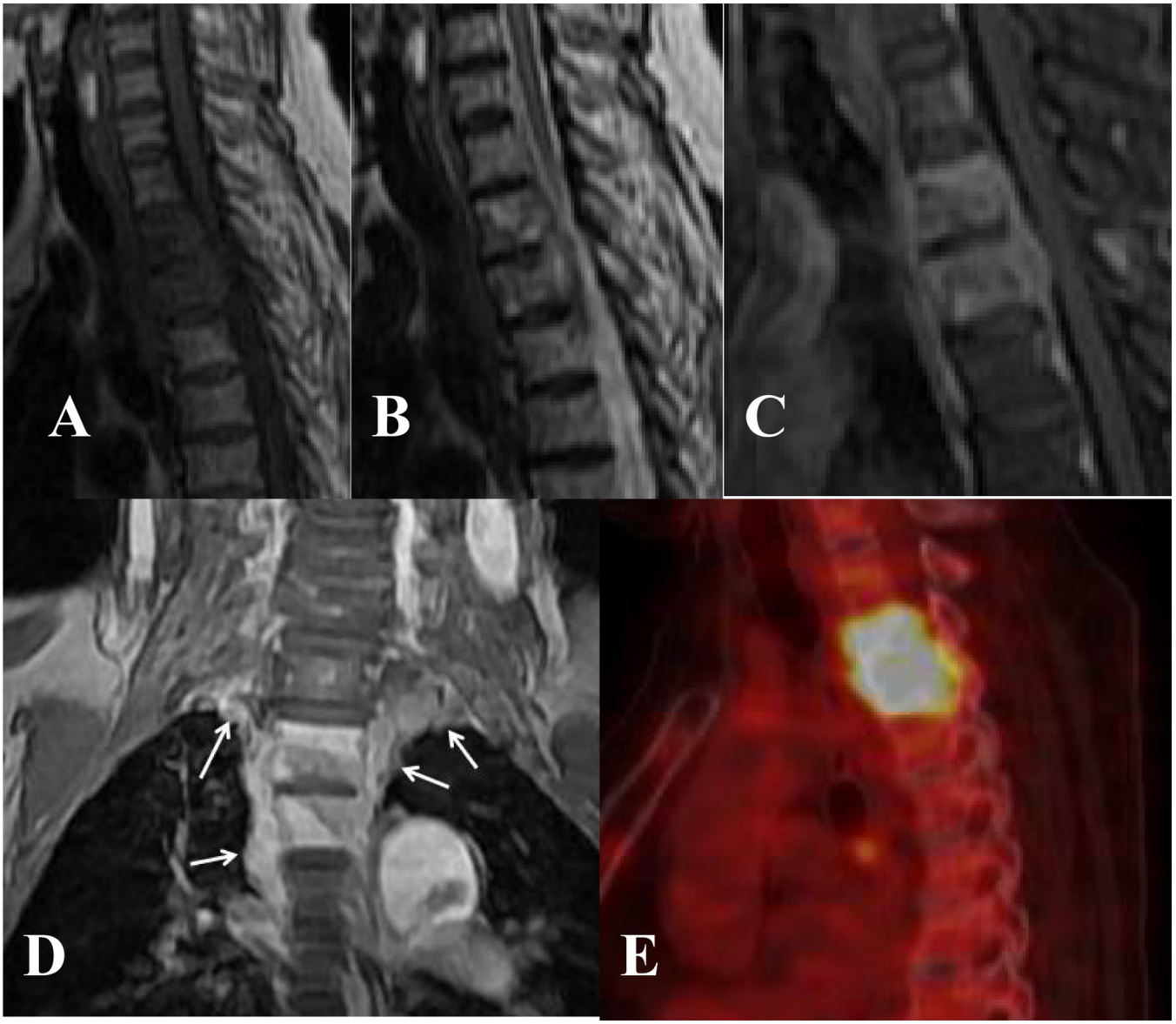

Figure 2. (A) Sagittal T1-weighted image of the thoracic spine showing areas of diffuse low signal intensity in T2 and T3. (B) Sagittal T2-weighted MRI of the thoracic spine revealing a high-intensity zone of edema around the areas of isointensity of T2 and T3. (C) Contrast-enhanced sagittal T1-weighted MRI demonstrating diffuse enhancement of abnormal areas without disk involvement. (D) Coronal contrast-enhanced T1-weighted scan showing the pleura and dural sac, where localized thickening (arrows) suggests an inflammatory process. (E) ^{18}FDG PET-CT revealing abnormal uptake in the lesion, with the SUV_{max} measured as 14.5.

revealed a locally thickened pleura and dural sac, which are characteristic of inflammatory changes. The shape and signal of the T2–T3 intervertebral disk were normal (Figure 2); the endplates of T2 and T3 were rough. ^{18}F-fluorodeoxyglucose positron emission tomography/CT (^{18}FDG PET-CT) identified an area of increased uptake in the lesion. The standardized uptake value (SUV) was measured as 14.5 (Figure 2). Beyond that, no abnormal uptake was revealed to indicate a tumor or infection in other parts of the body.

The operative findings were consistent with the CT and MRI findings. The vertebral body and pedicle of T2–T3 were damaged and the lesion was yellow and granulated. The patient underwent lesion clearance followed by intramedullary nailing and allogeneic bone transplantation.

Histopathology showed sequestrum and non-caseous necrosis tissue in the lesion. Numerous foreign body giant cells, lymphocytes, eosinophils, epithelioid cells, and macrophages were observed. Numerous intracellular and extracellular round-to-oval encapsulated fungal organisms (in histiocytes within granulomas) were observed (Figure 3). The fungal organisms were dyed to two-tone. A diagnosis of cryptococcal granulomatous inflammation was made.

The patient received a total of 8 weeks of intravenous voriconazole 400 mg daily and then oral fluconazole 150 mg daily for the next 4 weeks. Follow-up examinations of ESR, CRP, and blood count were normal, and the serum cryptococcal antigen was negative.

3. Discussion

Cryptococcosis usually occurs in patients with tuberculosis, diabetes, leukemia, lymphoma, organ transplantation, AIDS, and histoplasmosis.[2] Occasionally, it can occur in a small subset of immunocompetent hosts, with an incidence estimated at 0.2 per million per year.[3] The incidence of cryptococcal infection of the bone is extremely low and this usually occurs in immunocompetent hosts.[4] The symptoms of cryptococcosis are atypical, and it is difficult to diagnose with a simple physical examination. Hence, biopsies and microbial cultures are essential to make a definitive diagnosis. The common sites of isolated bone cryptococcosis are the lumbar spine, pelvis, ribs, and skull.[1] It has recently been reported in the literature that cryptococcal infection of the thoracic spine is on the increase.[2,5–7] Spinal infections are characterized by a raised ESR (sensitivity 76–81%[8]) and CRP (sensitivity 100%[9]). The serum cryptococcal antigen test has been reported to have an accuracy of 66% in immunocompetent patients with cryptococcosis.[9] Our case had been in good condition previously, and laboratory investigations were normal apart from a raised ESR and CRP, indicating cryptococcosis in an immunocompetent host.

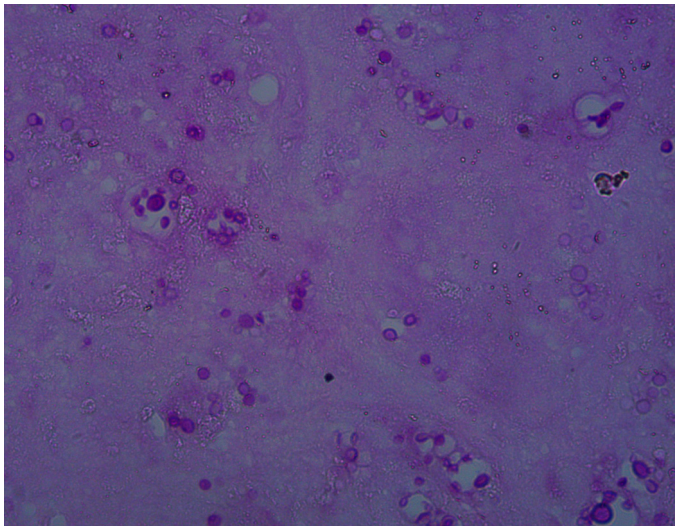

Figure 3. Numerous fungal organisms are seen within and outside the giant cells (periodic acid–Schiff (PAS)–Alcian blue stain, ×400).

MRI has been used widely to evaluate inflammatory conditions of the vertebral body and disk. Modic et al. found a sensitivity of 96% in the assessment of vertebral osteomyelitis.[10] According to reports in the literature, the imaging findings of cryptococcosis of the thoracic spine may lack specificity, resulting in the need for further examinations to differentiate the disease from tuberculosis.[5,11,12] Our case presented a lytic lesion with irregular patchy sequestrum at T2–T3, which was surrounded by reactive broad sclerosis. Reactive ossification in spinal tuberculosis is extremely rare, and the sequestrum and calcification within it are usually mottled. Cryptococcosis of the spine with intervertebral disk involvement is unusual; MRI shows signal intensity of the intervertebral disk to be normal. In our case, the endplates of T2–T3 were involved, whereas the intervertebral disk remained complete. The classical presentation of spinal tuberculosis with destruction of the intervening disk is seen in around 70% of patients.[5] The disk is involved because pyogenic organisms produce proteolytic enzymes that allow them to spread into the digested disk and endplates of adjacent vertebrae, whereas Cryptococcus does not.[13] Most cases of spinal tuberculosis present as extensive paraspinal abscesses; our case of cryptococcal infection of the spine presented with a localized paraspinal soft tissue mass.

Differentiation between cryptococcosis and a malignant tumor of the spine is important. Invasion of the adjacent vertebral body is common in cryptococcosis, as opposed to the presence of a malignant tumor with multiple spine involvement and saltatory growth. The paraspinal soft tissue mass of the malignant tumor is circumscribed. However, the soft tissue mass of cryptococcosis appears more frequently to spread and the boundaries of the mass are usually ill-defined. The imaging findings of cryptococcosis are, in fact, similar to ours. The lesions in our case caused the localized thickening of the pleura and dural sac.

It is difficult to distinguish cryptococcal vertebral infection from spinal tuberculosis in a surgical specimen, or on its demonstration in culture, if fungal spores are not observed within it. The histological findings of cryptococcal bone lesions are non-specific, consisting of sequestrum and abscess. The pus, caseous necrosis, and granulation within cryptococcal lesions resemble those of tuberculosis. Therefore, viewing the fungal spores under a microscope is essential for a diagnosis of cryptococcal spinal infection.[5] According to the Infectious Diseases Society of America (IDSA), surgery should be performed for patients with persistent or refractory bone disease, while Zhou et al.[14] consider that surgery will raise the risk of disseminating the infection. We hold the opinion that the combination of antifungal chemotherapy and surgery can reduce the burden of infection and improve the stability of the spine.

In conclusion, it is still difficult to make a preoperative diagnosis of cryptococcal spine infection. A biopsy and fungal cultures are necessary to confirm the diagnosis. Our findings confirm that cryptococcal spinal infections can be identified in manifestations both of vertebral infections, such as destruction of contiguous vertebral bodies and endplates and extensions into paraspinal soft tissues, and of vertebral tumors, such as erosions and lytic lesions of vertebral bodies, simultaneously together, with active blood flow in the intact intervertebral disks.

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