Atypical fungal thoracic vertebral osteomyelitis resembling metastatic tumor and literature review of fungal vertebral osteomyelitis

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Case report

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Abstract

Case Description

Fungal vertebral osteomyelitis is a rare disease that difficult to diagnosis and cure. Because the early specific clinical manifestations of this disease are few and atypical, it is often missed or misdiagnosed, resulting in treatment delay and aggravation of the disease.

Objective

To report a rare case of cryptococcal osteomyelitis that resembles metastatic tumor happened in an immunocompromised patient with a history of mantle cell lymphoma and to review cases reported in literature.

Study Design

Based on imaging studies, metastatic tumor was highly suspected. For a further examination and therapy, the patient was referred to our spine clinic. After admission to our clinical, chest and abdominal CT were checked to evaluate the disease status.

Treatments

After general anesthesia, posterior thoracic pedicle screw fixation (T2.3.5.6) were performed, followed by posterior laminectomy and decompression of T4 vertebral body. The right facet joint of T3/4, costal transverse joint, right pedicle and transverse process of T4 vertebra were fully removed and curetted. After careful hemostasis, posterolateral bone grafting was performed. The nail-rod connection is fixed.

Outcomes

The postoperative intercostal neuralgia and chest pain were significantly relieved, without complications. The postoperative pathological results were suppurative inflammation with focal granuloma formation, dead bone formation and fungal (cryptococcal) infection.

Conclusions

When complicated with vertebral fungal spondylitis, no obvious abnormality and fever can be found. When pain or nerve dysfunction caused by spinal cord compression or nerve root compression occurs, surgical treatment can effectively relieve clinical symptoms.

Case Description

A 62-year-old female was admitted to our department because of a rise of back pain. She had a history of mantle cell lymphoma. She had been treated with chemotherapy for 2 years prior to admission. The Follow-up studies have not revealed any evidence of recurrence. About 2 months before visiting our clinic,

her back pain developed. At that time, she visited local pain clinics and was treated with medication and injection. Her intercostal neuralgia aggravated during the period of conservative treatment. Then, she received thoracic magnetic resonance imaging (MRI) (Fig.1) and the result of the exam showed hypointense at T4 vertebral body, right pedicle and lamina in T1-weighted image. In addition, computed tomography (CT) showed osteolytic lesion in T4 right vertebral body, pedicle and facet joint. (Fig.1) Based on imaging studies, metastatic tumor was highly suspected. For a further examination and therapy, the patient was referred to our spine clinic.

Treatment

After admission to our clinical, chest and abdominal CT were checked to evaluate the disease status. There was no evidence of distant metastasis to internal organ or thorax. Lab examinations showed slight elevation of C-reactive protein (CRP) (38.40 mg/L; normal range, 0–5 mg/L). However, antibody of aspergillus (IgG), galactomannan (GM) and Fungal D-glucan tests were all negative. CA-724 was the only one tumor marker that mildly elevated (47.93ng/ml, normal range, 0–6.9 ng/ml). percentage of Lymphocyte and monocytes were 15.80% (normal range, 20–50) and 10.40% (normal range 3–10), respectively. White blood cell (WBC) count was 3360/ μ L (normal range, 4000–10000/ μ L). Because she had a mantle cell lymphoma at this time, slight elevation of CRP was thought to be reasonable. In that period, her intercostal neuralgia aggravated and systemic symptom such as fever was not given enough attention. Because the patient has severe chest pain and intercostal neuralgia and is unable to sleep, he needs oral oxycodone tablets 40mg, twice a day, as well as morphine injection to assist in analgesia. And her SINS score was about 9, there was spinal instability, there were signs of surgical intervention, so we decided to give the patient surgical treatment.

The operation was performed with a posterior approach. First, posterior pedicle screw fixation was performed from T2.3–T5.6. Second, decompression was followed. T4 spinous process resection and right laminectomy were performed for decompression. Soft tissue invasion of right lamina, pedicle, right facet joint and right transverse facet joint were found during the operation. Fully scrape out the diseased tissue, saw rich blood supply, fully wash and implant allogeneic bone strips. Definitive pus-like discharge was not found, and soft material was identifiable in the center of T4 vertebral body. We obtained those materials and requested for pathologic examination. Before suturing the incision, we routinely washed the incision with saline more than 3000ml. Postoperative administration of common antibiotics to prevent infection.

Outcomes

Final pathologic result showed small yeast-like organisms with Gomori methenamine silver, Fontana Masson, periodic acid-Schiff and Alcian blue stains (Fig.2). No tumor cells were shown by cytokeratin immunohistochemical staining. Amphotericin B (50 mg/day) and fluconazole (800 mg/day) were applied intravenously for about 1 week until disseminated cryptococcosis was ruled out. Then, fluconazole (450 mg/day) was applied orally for about 1 year. At the 3-months follow-up, back pain

disappeared without any complications, and no specific abnormal findings were observed in plain radiographs (Fig.3).

Discussion

The incidence of fungal vertebral osteomyelitis has risen markedly in recent years because of several factors, primarily patient immunity and previous medical treatment.^{1, 2} Slenker AK report that the most common factors for hematogenously spread candidal osteomyelitis infections are prior surgery, abdominal surgery in particular (60%), at a noncontiguous site (44%), broad spectrum antibiotics (41%), intravenous drug abuse (26%), central venous line insertion (26%), immunosuppression (22%), and total parenteral nutrition (TPN) (16%).³ Prior surgical intervention (92%) is the most common factor associated with the contiguous spread of infection causing fungal osteomyelitis, in particular prior spinal (21%) or cardiothoracic surgery (52%). Because presenting features can be as nonspecific as back or neck pain alone, fungal vertebral osteomyelitis can be difficult to recognize in its early stages. The rarity of the disease often leads to its misdiagnosis as a bacterial or tubercular infection.^{4, 5} Appropriate treatment is often delayed, which can lead to poor outcomes. The outcomes of medical and surgical treatments are not always predictable. A gadolinium-enhanced MRI is still the gold standard for determining the lesion status, the treatment method, and the extent of surgery required. Computed tomography (CT imaging is valuable for biopsies, provides information about bone grafts and implants, and can be used as an alternative in patients for whom MRI is contraindicated. Fluorine-18 fluorodeoxyglucose positron emission tomography (F-FDG-PET) is a relatively novel way to detect infection and has the highest diagnostic accuracy for diagnosing chronic osteomyelitis.^{1, 2} As for the therapy for fungal osteomyelitis, If the diagnosis was before the endplate destruction, medical treatment can be the first option. If medical treatment failed and ESR and CRP levels were persistently elevated, the endplate had been destroyed at the initial presentation, the patient had neurological deficits, and epidural or paravertebral abscess accumulation, then surgical treatment is indicated for an open biopsy, decompression, and reconstruction. The surgical complication rate is high, and patients often need multiple surgeries to overcome the disease. However surgical treatment alone is inadequate for FVO. Antifungal treatment often takes more than 3 months to lower ESR and CRP levels.¹

The misdiagnosis and treatment delay of the patient in this case report should be responsible by the following

1. We have had very few patients with fungal spondylitis, so we lack the knowledge of diagnosis and differential diagnosis, especially in imaging.
2. The patient has a long history of hairy-cell leukemia. The results of MRI examination before admission showed that the patient was highly suspected of spinal metastasis. However, in cases where laboratory and other imaging examinations did not support spinal metastases, we did not undergo a vertebral biopsy before open surgery.

Although the incidence of fungal spondylitis has increased in recent years, due to the atypical of fungal osteomyelitis, it is still an infectious disease difficult to diagnose, identify and treat. In particular, its imaging features are often very similar to those of spinal tuberculosis, metastatic tumors, bacterial or tubercular infection. Therefore, strengthening the study of the imaging of fungal osteomyelitis, familiar with the treatment and prevention of this disease is the key to accurate diagnosis and treatment.

Conclusion

When patients with lymphoma complicated with vertebral bone destruction, preoperative biopsy is needed to determine the nature of the lesion and guide the need for surgical treatment. When complicated with vertebral fungal spondylitis, the patient may not have fever, and no obvious abnormality can be found in laboratory examination. when pain or nerve dysfunction caused by spinal cord compression or nerve root compression occurs, surgical treatment is feasible, combined with postoperative drug treatment. can effectively relieve clinical symptoms. (1146 words)

Declarations

Ethics approval and consent to participate

The study involving human participants were reviewed and approved by Institutional Review Board of Zibo Central Hospital (No. 2018-1-96).

Consent for publication

The patients provided their written informed consent to participate in this study and publication.

Availability of data and materials

All datasets generated for this study are included in the article.

Competing interest

The authors declare that they have no conflict of interest.

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Not application.

Authors' contribution statements

XW and DZ were responsible for initial design of this study. XW, JS, YL and TL were responsible for collection of clinical and radiologic materials. And XW, JS and ZW were responsible for writing the original manuscript. Finally, DZ was responsible for reviewing and revising this manuscript before submitting it.

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Figures

MRI

CT

Figure 1

MRI pictures showed that Hypointense at T4 vertebral body, right pedicle and lamina in T1-weighted image. CT pictures showed that osteolytic lesion in T4 right vertebral body, Pedicle of vertebral arch and facet joint.

A

B

C

Figure 2

Tissue culture study after operation with different staining methods. Pathological Diagnosis—Diffuse nuclear detritus, infiltration of neutrophils, lymphocytes, plasma cells and multinucleated giant cell reaction were found in the intertrabecular and extraperiosteal fibrous adipose connective tissue of a small amount of bone tissue. Fibroblasts and capillaries proliferated, some trabecular calcium salts precipitated, and no osteocytes were found in the bone fossa. Combined with glycogen PAS positive, suppurative inflammation with focal abscess inflammatory granuloma formation, dead bone formation and fungal (Cryptococcus) infection were considered. A: hematoxylin-eosin staining(H&E)(×200); B: immunohistochemical analysis(×200)

Figure 3

Radiographs 3 days after operation (A, B). The X-raxy (C), CT (D), MRI (E, F) pictures 3 months after operation.