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Case report

Extrapulmonary tuberculosis: a case report involving the spine and soft tissues ☆

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ABSTRACT

Tuberculosis (TB) is a major health concern worldwide, and its incidence is increasing in developed countries, especially among immigrant populations. Extrapulmonary TB with musculoskeletal involvement is often a difficult and delayed diagnosis, as the disease can mimic metastases or infection. We present a case of extrapulmonary TB affecting the spine and soft tissues of a Vietnamese-born patient living in the United States. We discuss the imaging findings associated with extrapulmonary TB of the spine. Familiarity with key imaging features of disease can lead to early suspicion and detection of the disease as well as timely treatment.

Introduction

Tuberculosis (TB) is a major health issue worldwide. The disease, caused by *Mycobacterium tuberculosis* (MTB), is responsible for 1.3 million deaths annually. Incidence of the disease is highest in the developing world. Though TB is less common outside of the developing world, its incidence in developed countries is increasing, especially in immigrant populations [1,2]. It is reported that extrapulmonary TB represents 10% of cases of TB. The musculoskeletal system is involved in half of these extrapulmonary cases. The most common musculoskeletal site affected is the spine, which is involved in nearly 2% of cases [1]. Variations in clinical presentation can result in difficulty and delay in the diagnosis of musculoskeletal TB, as advanced disease can often mimic malignancy or other infectious etiologies. Imaging plays a significant role in diagnosis of musculoskeletal TB, along with clinical symptoms and bacte-

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riological culture. Imaging features can aid in the early detection of the disease, leading to earlier diagnosis and treatment, and avoidance of unnecessary interventions [2,3]. We report a case of extrapulmonary TB of the spine in a 46-year-old male Vietnamese immigrant living in the United States.

Case report

A 46-year-old Vietnamese-born male with no reported past medical history was referred to our institution for diagnostic workup of chest and neck masses. The patient reported 2 months of a draining right neck mass as well as fatigue and 20 lb. weight loss. He also reported 2 weeks of a left neck mass, chest pain localized to a tender mass at the mid sternum, and diminished sensation in his right upper and lower extremities. Additional history was negative for fever, night sweats, cough, dyspnea, dysphagia, or gastrointestinal symptoms. Of note, the patient immigrated to the United States from South Vietnam when he was 20 years old and currently smoked 1 pack of cigarettes a day.

Clinical exam at the initial presentation showed a 3 × 1 cm erythematous, indurated, firm mass in the right neck that was mildly tender to palpation with evidence of recent drainage. The patient had left posterior neck fullness and a 6 × 3 cm fixed chest mass over the lower, central sternum that was mildly tender to palpation. The patient also had diminished sensation in his right upper and lower extremities and mildly decreased strength in the left lower extremity. The patient was afebrile, and all vitals were stable.

Initial blood tests revealed a normal white blood cell count (7.16 k/μL), normal lactate dehydrogenase (215 U/L), and normal uric acid (6.1 mg/dL). Erythrocyte sedimentation rate was elevated (>111 mm/h), and C-reactive protein was also elevated (90.8 mg/L). Blood cultures, fungal serology, and QuantiFERON-TB Gold testing were all negative.

Superficial fine needle aspiration taken from a nodule at the left base of the neck yielded abundant necrotic debris. Ultrasound guided attempts to sample less necrotic regions of the nodule were unsuccessful. A portion of the specimen was submitted for microbiology cultures.

Computed tomography (CT) with intravenous contrast revealed multiple large masses throughout the neck, posterior mediastinum, mid sternum, adjacent to the right first rib, adjacent to the lower thoracic spine, adjacent to the superior lumbar spine, and in the presacral space. Many of these masses led to osseous destruction, resulting in pathologic fractures of the mid sternum, the right first anterior rib, the left transverse processes of T1 and T6, the right pedicle of T7, and the right and left transverse processes of T10. There were diffuse osseous lesions in the cervical, thoracic, and lumbar spine. A large prevertebral mass was noted anterior to the C3 vertebral body, and an additional mass was noted in the left paraspinal musculature beginning at the C4 level and extending inferiorly to the T2 level (Fig. 1A). Lytic and sclerotic lesions were noted within the vertebral bodies of C1, C2, and C3, and within the cranial aspects of C4, C5, and C6. Disc space was preserved throughout (Fig. 1B). Based on these imaging features, our differential diagnosis included malignancy versus systemic infection.

A CT guided core needle biopsy of the sternal mass demonstrated abundant necrotizing granulomatous inflammation, suggestive of an infectious process. However, Grocott methenamine silver (GMS) and Fite stains were negative for fungal and acid-fast organisms, respectively. No malignancy was noted in the examined material. A portion of the specimen was also submitted for microbiology cultures.

Magnetic resonance imaging (MRI) of the spine confirmed diffuse infiltrative disease throughout the cervical, thoracic, and lumbar vertebral bodies resulting in multilevel neural foraminal and spinal canal encroachment. Extensive heterogenous soft tissue components were also confirmed, extending along the vertebral bodies and paraspinal muscles. Infiltrative processes with anterior destructive changes were noted in the C3 and C4 vertebral bodies. Enhancement following contrast administration was demonstrated here, with a large fluid collection extending along the prevertebral space (Fig. 2).

At 10 days after the CT guided core needle biopsy of the sternal mass, acid-fast bacilli (AFB) cultures of the specimen grew Mycobacterium tuberculosis complex. The patient was started on a regimen of rifampin, isoniazid, pyrazinamide, and ethambutol (RIPE). At 21 days after the fine needle aspiration of a left neck nodule, specimen cultures also grew Mycobacterium tuberculosis complex, confirming the diagnosis of extrapulmonary tuberculosis. The patient continued RIPE therapy as an inpatient for 2 months. He was then discharged to a long-term care facility with a recommendation of 9-12 months of continued rifampin and isoniazid treatment.

Discussion

Osteomyelitis is a common health problem frequently diagnosed with imaging. However, osteomyelitis of the spine accounts for only 2-4% of all cases of osteomyelitis. This is most commonly caused by pyogenic organisms. Nonpyogenic causes are less common, particularly in the United States. One such nonpyogenic infection is *mycobacterium tuberculosis* (MTB). MTB involvement of the spine, known as Pott's Disease, is the most common presentation of extrapulmonary TB [2]. This presentation of vertebral TB is usually the result of hematogenous spread [3].

MTB involvement of the spine is most commonly seen in the thoracic spine, though any level of the spine may be involved. Of note, the disk space is often preserved, in contrast to the diskitis osteomyelitis pattern frequently seen in pyogenic infections. This is because MTB does not produce proteolytic enzymes. The imaging differential diagnosis of vertebral TB includes other infections due to pyogenic and fungal causes, granulomatous diseases, and malignant processes such as metastases or lymphoma [2].

Imaging of TB of the spine may begin with radiographic studies, but Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) are the preferred imaging methods. CT will demonstrate osseous destructive changes. With contrast administration, CT will also show paraspinal abscess forma-

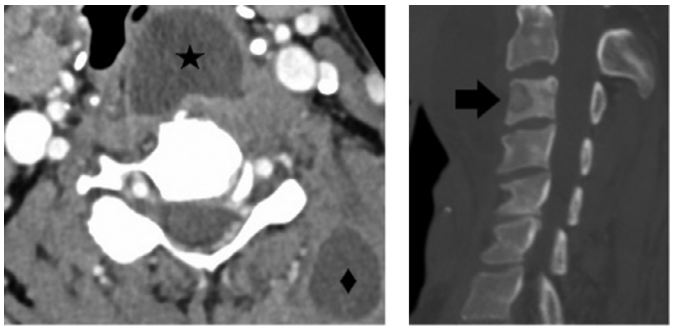

Fig. 1 – Axial post contrast CT image through the cervical spine at the C3 level in soft tissue window (Fig. 1A) demonstrates a soft tissue abscess anterior to the vertebral C3 vertebral body (star) and within the left paraspinal musculature (diamond). Sagittal CT image of the cervical spine in bone window (Fig. 1B) demonstrates a lytic region within the C3 vertebral body consistent with osteomyelitis. The disc space is preserved.

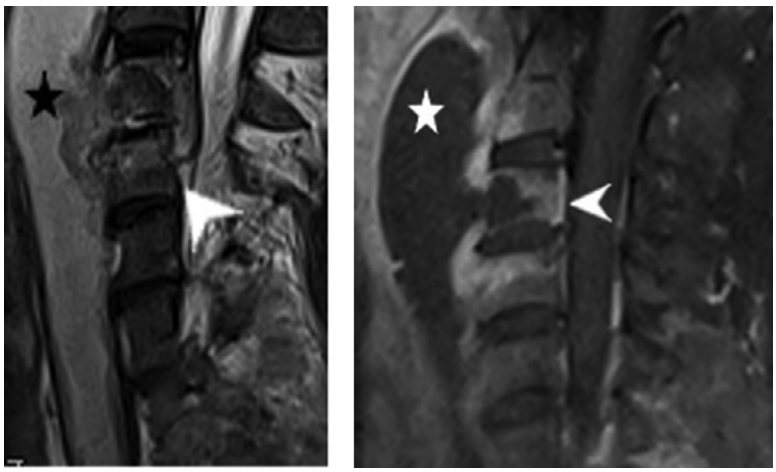

Fig. 2 – Sagittal T2 fat saturated image (Fig. 2A) demonstrates a large prevertebral mass with increased T2 signal, consistent with an abscess (star). Increased T2 signal is noted in C3 and C4 (arrowhead) relative to the other vertebral bodies, consistent with osteomyelitis. Sagittal T1 fat saturated post contrast image (Fig. 2B) demonstrates a large prevertebral, rim enhancing mass, consistent with an abscess (star). Abnormal enhancement is noted in C2, C3 (arrowhead), and C4 consistent with osteomyelitis.

tion. On MRI, T1-weigthed imaging will demonstrate low T1 signal within bone while fluid sensitive sequences, such as T2-weighted or short time inversion recovery (STIR) sequences, will show increased signal in the osseous structures. These signal changes are typical of osteomyelitis and are due to the replacement of normal bone marrow with inflammatory cells and hyperemia. Like CT, MRI can also demonstrate soft tissue abscess formation [2].

Four patterns of MRI have been described for vertebral TB. The most common pattern is paradiskal. In this pattern the infection originates in the vertebral body metaphysis which leads to vertebral body cartilaginous end plate erosion and subsequent disk space narrowing. Paraspinal and epidural abscess formation may occur with this pattern. Secondly is the anterior pattern. In this group, infection begins in the corner of the vertebral body and then spreads to adjacent vertebral bodies. This spread is the result of uplifting of the anterior longitudinal ligament and stripping of the periosteum of the bone by abscess formation. This pattern will demonstrate infection over multiple vertebral body levels, subligamentous abscess formation, and preservation of the disc space. This is the pattern represented by the case presented here. The third pattern is the central pattern. In this presentation only one vertebral body is infected, and the disk space is preserved. The vertebral body may collapse, mimicking malignancy. The final pattern is involvement of the posterior elements of the vertebrae. This pattern is rare and may be associated with abscess formation [2,3].

Our patient was a 46-year-old male who was a Vietnamese immigrant being evaluated for several painful masses of the

neck and thorax. MRI showed a prevertebral mass consistent with an abscess at the level of the cervical spine, involvement of the infection along several contiguous vertebral bodies, and preservation of disc space throughout. These imaging findings were consistent with the anterior pattern of vertebral TB. Diagnosis of TB was eventually confirmed by positive cultures of several of the infectious lesions.

Though its incidence is rising, TB is still an uncommon disease in the developed world. Diagnosis of extrapulmonary TB involving the spine can be difficult and is often delayed, due to rarity of the disease and variations in disease presentation. MRI and CT imaging can play significant roles in early detection of the disease. Imaging can also aid in performing diagnostic biopsies, surgical planning, and evaluation of patients during follow-up once treatment has been initiated. An early diagnosis is important to avoid unnecessary interventions, and timely initiation of proper treatment is crucial in preventing severe morbidity [1,2,3].

Patient consent

Written informed consent for publication of this case was obtained from the patient.

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