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Case Report

A Case of Spinal Tuberculosis; Challenges in Differentiating from Pyogenic and Fungal Spondylodiscitis in MRI

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Abstract

Musculoskeletal tuberculosis is about 1 - 13% of the overall TB and out of which 50% accounts for the infection of spine. Thoracic vertebra is the most involved site for spinal tuberculosis. In this report, we are presenting a case of 41 year-old female presented with weight loss, persistemt back pain and progressive weakness of bilateral lower limbs for 3 months duration. There are four patterns of involvement in spine namely; central, paradiscal, anterior and posterior. The most common is the paradiscal type of involvement. Magnetic Resonance Imaigng plays an impotant role in diagnosis, treatment, follow up as well as early detection of complications (extent of neural compromise, skip lesions and extent of soft tissue involvement) of spinal tuberculosis.

Keywords: *Back Pain; Magnetic Resonance Imaging; Tuberculosis; Spine*

Introduction

Musculoskeletal tuberculosis is about 1-13% of the overall TB and out of which 50% accounts for the infection of spine.

Clinical History

A 41-year-old-man had 3 months history of back pain. He had on and off history of fever for the same duration and has lost weight of 5 kilos for past 1 month. Now, presented with weakness of bilateral lower limbs for last 1 week and was paraplegic since last 2 days. Then, MRI with contrast was performed for further evaluation.

Imaging findings

T2 sagittal images of the thoracic vertebra shows partial collapse of the D10 vertebra as well as erosion of the superior end plate of D11 vertebra with loss of D10-D11 disc space. Ill-defined T2 high signal intensity prevertebral, paravertebral and epidural collection is seen at D9-D12 vertebral level which is significantly compressing the spinal cord at D10-D11 level displacing the spinal cord. Significant bulge is also seen in the anterior longitudinal ligament due to the mass effect of the prevertebral collection which suggest sub-ligamentous spread. The collection in the prevertebral as well as left paravertebral region is abutting the aorta and subtle high signal intensity is also seen in the posterior elements suggestive of marrow oedema. On post contrast T1 sagittal image, heterogeneous enhancement is seen in the pre-vertebral as well as epidural collection with non-enhancing areas. Non-enhancing areas suggest necrotic areas/abscess and homogenous enhancing areas represents phlegmon. The D10 and D11 vertebral body shows homogenous enhancement suggestive of marrow oedema. The prevertebral/sub-ligamentous collection or phlegmon has extended from the level of D9 vertebral body to D12 level. On axial image, the collection in the paravertebral region shows smooth peripheral enhancement in post contrast images suggestive of cold abscess.

Figure 1a: *T2 sagittal image of the thoracic vertebra shows partial collapse of the D10 vertebra as well as erosion of the superior end plate of D11 vertebra with loss of D10-D11 disc space. Ill-defined T2 high signal intensity prevertebral and epidural collection is seen at D9-D12 vertebral level which is significantly compressing the spinal cord at D10-D11 level displacing the spinal cord. Significant bulge is also seen in the anterior longitudinal ligament due to the mass effect of the prevertebral collection. The collection in the prevertebral as well as left paravertebral region just abutting the aorta. Subtle high signal intensity is seen in the posterior elements suggestive of marrow edema.*

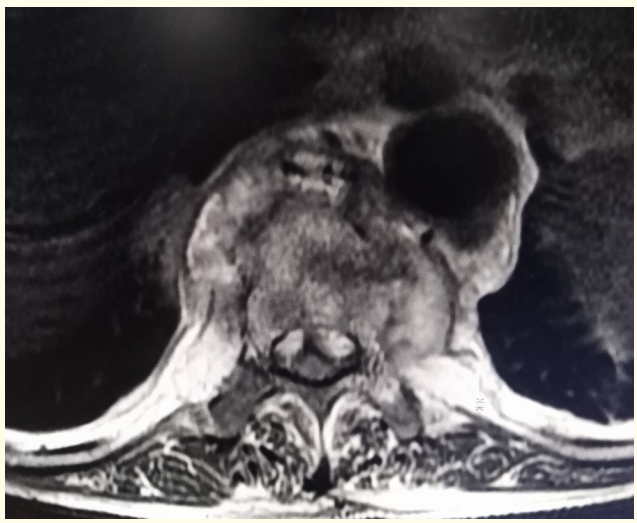

Figure 1b: *Axial T2 image shows T2 high signal intensity prevertebral and paravertebral collections. Epidural T2 high signal intensity component is seen which is significantly compressing the spinal cord at same level. Low signal intensity within the prevertebral region probably suggest calcification or eroded bone fragments of the vertebral body.*

Figure 1c: *T1 sagittal image of the thoracic vertebra shows partial collapse of the D10 vertebra and erosion of the superior end plate of D11 vertebra with loss of D10-D11 intervertebral disc space. T1 iso-signal intensity prevertebral, epidural collection is noted which is compressing the spinal cord at D10-D11 level.*

Figure 2a: *Post contrast T1 sagittal image showing heterogeneous enhancement in the prevertebral as well as epidural collection. The non-enhancing areas within suggest necrotic areas/abscess. The D10 and D11 vertebral body shows homogenous enhancement suggestive of marrow edema. The prevertebral/sub-ligamentous collection or phlegmon is extending from the level of D9 vertebral body to D12 level.*

Figure 2b: *T1 axial post contrast image shows the heterogeneous enhancement in the prevertebral, paravertebral as well as epidural collection with significantly compressing the spinal cord. The collection in the paravertebral region shows smooth peripheral enhancement with central non-enhancing area suggestive of cold abscess.*

Discussion

Tuberculosis (TB) is caused by *Mycobacterium tuberculosis,* which is a major cause of vertebral infection in developing country. Musculoskeletal TB is about 1 - 13% of the overall TB and out of which 50% accounts for the infection of spine. Predisposing factor of the tubercular infection are poverty, malnutrition and immune-compromised status like HIV. Spinal involvement is due to the haematogenous spread usually from the lung parenchyma into the dense vascular supply of the cancellous bone of the vertebrae. Batson's vertebral plexus, a valveless system which allows the blood in either direction and also rich arterial arcade in the adjacent vertebral bodies are responsible for the haematogenous dissemination of the disease. Thoracic vertebra is the most involved site for spinal tuberculosis [1,2].

There are 4 types/ patterns of vertebral tuberculosis. They are paradiscal, anterior, posterior and central. Paradiscal is the most common pattern which is starting the pathology adjacent to the intervertebral disc leading to the narrowing of the height of the disc by destruction of the disc or the herniation of the disc into the vertebral body. In the anterior pattern, anterior corner of the vertebral body is involved and the infection spreads beneath the anterior longitudinal ligament and spread into the multiple levels of vertebrae. Central pattern is the involvement of only one vertebra which eventually leads to collapse of the involved vertebra without involvement of the adjacent disc spaces. Posterior pattern is the rarest with involvement of the pedicels with intraosseous abscesses [3].

Typical clinical presentations of spinal tuberculosis is chronic back pain associated with on and off low grade fever, cough, chest pain or acute neurological deficit due to spinal cord compromise. Other presentations are deformity of the spine since the progression of the

spinal tuberculosis is slow and in chronic cases, cold abscess in the paravertebral muscles may occurred. Early diagnosis and treatment is the integral part of the evaluation of tuberculosis and differentiating between the pyogenic form of spondylodiscitis is challenging to prevent from the disabilities and lifelong morbidity. Therefore, imaging plays a vital part in this perspectives.

MRI is the modality of choice for spinal imaging with high sensitivity and specificity. However, it is not specific for the types of infection. It allows for the early detection of the severity of the neural compromise and the extent of the adjacent soft tissue involvement as well as the skip lesions [2,4].

Most important points in evaluation in the spinal tuberculosis and differentiating with pyogenic counterpart are characters of the paraspinal abscess, calcifications, pattern of enhancement of the collection, extent of subligamentous spread and levels of involvement of the vertebrae. Other supporting point is the involvement of the disc whether early or late in the course of the disease. In tuberculosis, well defined smooth thin walled paraspinal abscess, subligamentous spread of more than three vertebral levels, thoracic level of involvement, large areas of calcifications within the paraspinal collection and skip lesions are the most important findings. In contrast, pyogenic spondylodiscitis shows lumbar vertebral involvement, early involvement of the disc, thick walled paraspinal collection and less than 3 vertebral segments involvement. However, due to the late presentations of the spinal tuberculosis, most of the cases has involved disc. So, this involvement of the disc is not the major differentiating point [4]. Other possible differentials for the vertebral tuberculosis is Brucellosis which usually has intact vertebral structures, most frequent disc association, less soft tissue involvement and absence of deformity of spine [5]. In differentiating with the fungal infection like *Aspergillus*, band like T2 hypo intensity is noted in the subchondral region of the vertebral body probably due to the ferromagnetic and paramagnetic elements within the fungi and the paraspinal collection like pyogenic infection with thick and irregular wall. However, skip lesions and the subligamentous spread can be common findings in *Aspergillus* and tuberculosis [6].

Treatment depends on the severity of the imaging findings. Emergency decompression is a must in the case of severe neurological deficit due to the compression of the spinal cord. Otherwise, conservative management with immobilisation, physiotherapy and combination of the antimicrobials are important for the mild cases without severe neurological deficit [7]. In our case, emergency operation was done to treat spinal cord compression and later patient neurological status improved. The diagnosis was later confirmed to be tuberculosis on histopathology.

Conclusion

Diagnosis of tubercular spondylodiscitis is important for the early initiation of the treatment and spine rehabilitation because of its progression to spinal deformity. Differentiating with pyogenic spondylodiscitis as well as other fungal entities is important for early and prompt treatment. MRI plays an important role in differentiating these entities, leading to proper treatment of the patients and preventing the spinal deformity.

Final diagnosis

Tubercular Spondylodiscitis involving D10-11 vertebral level.

Differential diagnosis list

1. Pyogenic spondylodiscitis 2. Brucellar spondylodiscitis 3. *Aspergillus* spondylitis 4. Lymphoma 5. Old traumatic wedge compression fracture with spinal cord compression.

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