

Spinal Lesions: A Dilemma Despite All Diagnostics

Satvik N. Pai^{1*} and Mohan M. Kumar¹

¹Department of Orthopaedic Surgery, Sri Ramachandra Institute of Higher Education and Research, Ramachandra Nagar, Porur, Chennai, India.

Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

Article Information

Editor(s):

(1) Dr. Ikem, Innocent Chiedu, Obafemi Awolowo University, Nigeria.

Reviewers:

(1) David Mwenya Nakitare, Meru University of Science and Technology, Kenya.

(2) Sharath Burugina Nagaraja, ESIC Medical College and PGIMSR, India.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/75059>

Case Report

Received 12 August 2021
Accepted 24 October 2021
Published 01 November 2021

ABSTRACT

When a spinal lesion is encountered, pyogenic spondylodiscitis (bacterial), tuberculosis (TB) of the spine, and malignancy are close differential diagnosis that have to be considered. A combination of clinical history, examination findings, imaging modalities, blood investigations and histopathological examination should be used to conclusively differentiate between them. A 58 year old lady complained of pain in lower back for two months. She did not have any history of fever, weight loss or loss of appetite. She was diagnosed to have breast carcinoma seven months earlier, for which she had undergone left modified radical mastectomy six months back, and completed five cycles of chemotherapy two months back. On examination, she had tenderness in L5-S1 region. There were no neurological deficits. Erythrocyte sedimentation rate and C-reactive protein were found to be elevated. Blood culture showed no growth. Radiographs of the spine only showed spondylolisthesis of L5-S1. Radiograph of the chest showed an isolated, irregular, patchy lesion in the upper lobe of the right lung. Magnetic Resonance imaging (MRI) of spine showed a T2 hypo intense lesion involving the L5, S1 vertebral bodies and L5-S1 intervertebral disc. Positron Emission Tomography (PET) showed increased metabolic activity in the upper lobe of right lung and pre-vertebral region of L5-S1. Brochoalveolar lavage specimen was found to be negative for acid fast bacilli staining, negative for GeneXpert test for TB, and showed no growth on culture. We then performed a percutaneous biopsy of the L5-S1 lesion under intravenous sedation. The tissue specimen showed no growth on culture. The histopathological examination mild increase in lymphocytes and plasma cells suggestive of a reactive marrow. No evidence of granuloma or

*Corresponding author: Email: satvik.pai@gmail.com;

malignancy were present. The patient was then started on broad spectrum antibiotic, which was continued for 1 month. Patient showed symptomatic improvement within 15 days of initiation of antibiotics. She was followed up for a period of 2 years and found to have no recurrence of symptoms. Thus, in rare instances like our case, differentiating between tuberculosis of the spine, pyogenic spondylodiscitis can pose a diagnostic challenge despite all investigations.

Keywords: Spine; pyogenic spondylodiscitis; tuberculosis; malignancy.

1. INTRODUCTION

Lesions of the spine can sometimes pose challenges in diagnosis. Congenital conditions are easily distinguishable due to age group. Degenerative changes as well are easily discernable due to classical history and easily identifiable imaging features. Infective and malignant aetiologies however are not simple to differentiate. Hence, when a spinal lesion is encountered, pyogenic spondylodiscitis (bacterial), tuberculosis (TB) of the spine, and malignancy are close differential diagnosis that have to be considered [1]. A combination of clinical history, examination findings, imaging modalities, blood investigations and histopathological examination should be used to conclusively differentiate between them. We present a case where this differentiation was particularly challenging despite advanced imaging modalities being used.

2. CASE REPORT

A 58 year old lady complained of pain in lower back for two months. The pain was radiating to bilateral lower limbs. There was no history of bladder/bowel complaints. She did not have any history of fever, weight loss or loss of appetite. She was diagnosed to have breast carcinoma seven months earlier, for which she had undergone left modified radical mastectomy six months back, and completed five cycles of chemotherapy two months back. She was also a known case of systemic hypertension on treatment. She had no history of tuberculosis in the past, has no contact with a person with tuberculosis. She hailed from a high tuberculosis burden country and had received BCG vaccination following her birth. On examination, she had tenderness in L5-S1 region. There were no neurological deficits.

Blood investigations revealed haemoglobin to be decreased, while total count and platelet count were within normal limits. Erythrocyte sedimentation rate (ESR) was found to be elevated (126), as was C-reactive protein (CRP)

which was found to be 9.1. Blood culture showed no growth. Radiographs of the spine (Fig. 1) only showed spondylolisthesis of L5-S1. Radiograph of the chest (Fig. 2) showed an isolated, irregular, patchy lesion in the upper lobe of the right lung. Magnetic Resonance imaging (MRI) of spine (Fig. 3) showed a T2 hypo intense lesion involving the L5, S1 vertebral bodies and anterior soft tissue. The vertebral body involvement seemed homogenous, involving the upper part of the body of S1 vertebra and lower part of L5 vertebra. L5-S1 intervertebral disc was also found to be involved, with decrease in disc height, however the disc was not completely destructed. Anterior to the vertebral body, an ill-defined hypo intense lesion was visible, however there was no obvious abscess formed. A differential diagnosis of pyogenic spondylodiscitis, tuberculosis of spine and malignancy were all considered. Positron Emission Tomography (PET) (Fig. 4) showed an irregular, thick walled sub pleural cavity lesion with necrotic areas/fluid levels in the upper lobe of right lung with increased metabolic activity. It also showed a metabolically active pre-vertebral/pre sacral soft tissue thickening. No metabolically active lesion in the left anterior chest wall or elsewhere in the body were seen. The PET findings were thus suggestive of infective pathology, but could not rule out malignancy as well. After consultation with the pulmonologist, a Broncho-alveolar lavage (BAL) was performed. The bronchoalveolar lavage (BAL) specimen was found to be negative for acid fast bacilli (AFB) staining, negative for GeneXpert test for TB, and showed no growth on culture. Fungal staining and culture also showed no growth. We then performed a percutaneous biopsy of the L5-S1 lesion under intravenous sedation. The tissue specimen showed no growth on culture. The histopathological examination mild increase in lymphocytes and plasma cells suggestive of a reactive marrow. No evidence of granuloma or malignancy were present. Thus, we were unable to obtain any substantial tissue evidence of infection/malignancy. The patient was then started on broad spectrum antibiotic, which were

continued for 1 month. Patient showed symptomatic improvement within 15 days of initiation of antibiotics. She was followed up for a

period of 2 years and found to have no recurrence of symptoms.



Fig. 1. Radiographs of Lumbar and Dorsal spine showing spondylolisthesis of L5-S1; No other pathologies are visible on radiograph



Fig. 2. Chest radiograph showing an isolated, irregular, patchy lesion in the upper lobe of the right lung

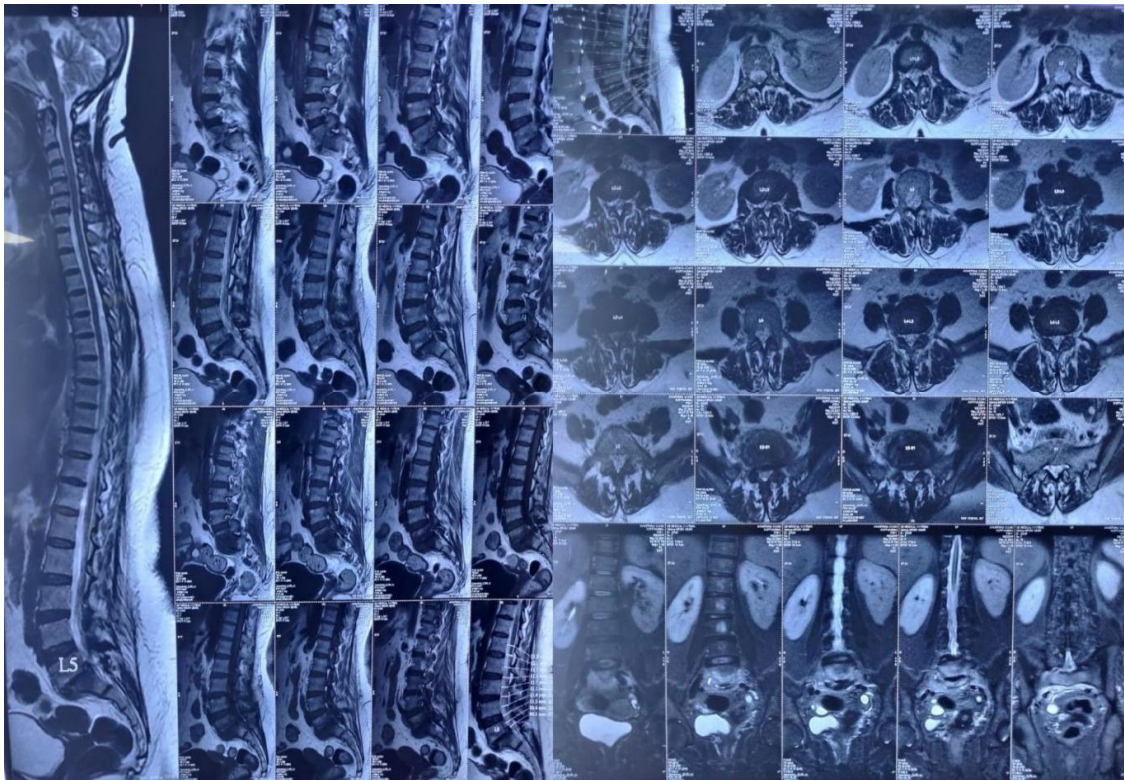


Fig. 3. Magnetic Resonance Imaging showing a T2 hypo intense lesion homogenously involving the L5, S1 vertebral bodies and anterior soft tissue. L5-S1 intervertebral disc was also found to be involved, with decrease in disc height, however the disc was not completely destroyed. Anterior to the vertebral body, an ill-defined hypo intense lesion was visible, but no obvious abscess

3. DISCUSSION

In terms of patient demographics, while both tuberculosis (TB) spine and pyogenic spondylodiscitis (PS) occur in adults, TB occurs in relatively younger patients i.e. 4th,5th and 6th decade of life, whereas PS tends to occur during advanced age i.e. 7th,8th,9th decades of life [2]. Incidence of malignancy increased with age, and any patient above the age of 40 years required malignancy to be a differential. TB spine patients usually presents with a chronic history of back pain or discomfort, whereas PS tends to be a more acute presentation. High fever is suggestive of PS, whereas as low grade, intermittent fever indicates TB spine. History of loss of weight, loss of appetite can be present in patients with TB spine and malignancy. Symptomatic involvement of other systems should raise the suspicion of malignancy. A history of previous pulmonary tuberculosis warrants a strong suspicion of TB spine, while a history of recent/concomitant malignancy elsewhere in the body demands it to be

considered as metastasis unless proven otherwise.

Inflammatory markers like erythrocyte sedimentation rate (ESR), C-reactive protein (CRP) are mildly elevated in TB, but markedly elevated in PS. Blood cultures could be positive in around quarter of PS cases [3]. Radiographs of the spine are often not specific enough to differentiate between these conditions. Destruction of vertebral body, decreased intervertebral disc space, irregular and fragmented endplates can occur in all the three conditions. The only clues may be the spinal segment involved and the number of levels involved. PS most commonly effects the lumbar segment, TB spine effects the thoracolumbar segment, and malignancy is most common in the thoracic segment [4]. TB While tuberculosis can sometimes have multilevel involvement, skip lesions are characteristic and most commonly seen in malignancy [5]. Involvement of more than 2 levels is uncommon in PS.

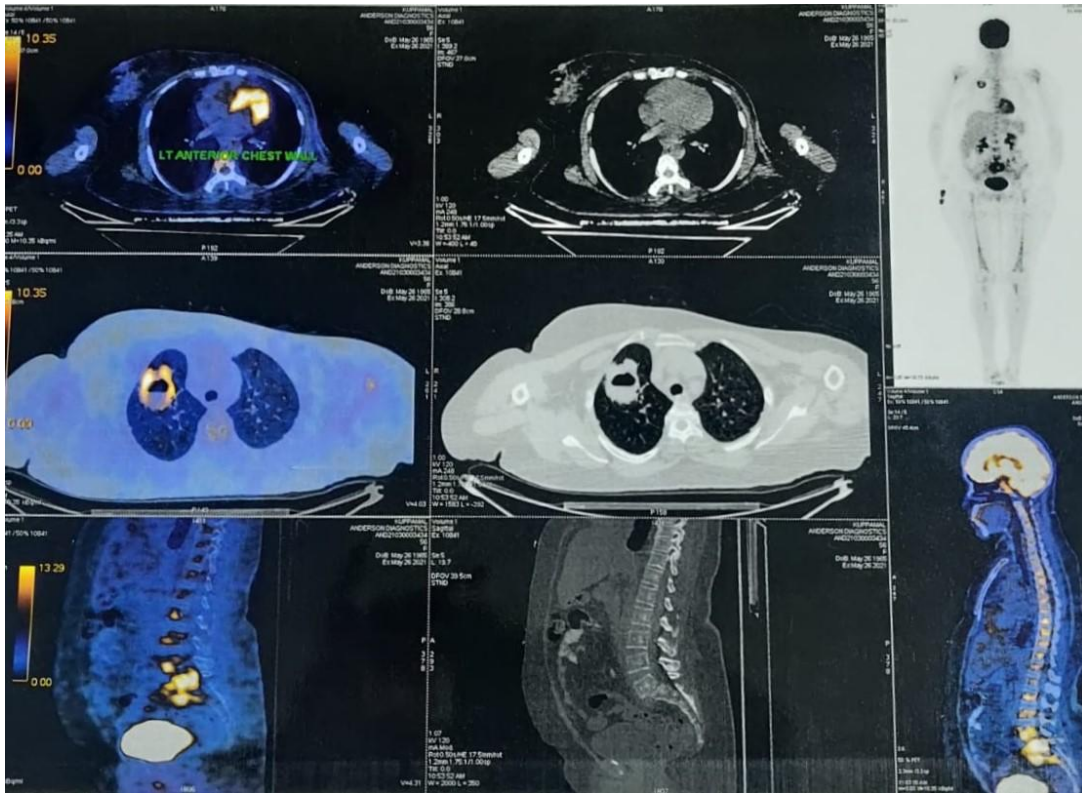


Fig. 4. Positron Emission Tomography showing an irregular, thick walled sub pleural cavity lesion in the upper lobe of right lung with increased metabolic activity. It also showed a metabolically active pre-vertebral/pre sacral soft tissue thickening. No metabolically active lesion in the left anterior chest wall or elsewhere in the body were seen

The two most important investigations to differentiate these conditions, are magnetic resonance imaging (MRI) and histopathological examination of a tissue sample. In MRI, the vertebral body is homogeneously involved in PS, whereas it is heterogeneously involved in TB spine [6]. The involvement in malignancy depends on the osteoblastic/osteolytic nature of the malignancy. Disc space involvement is an early and characteristic feature of PS [7], whereas it depends in TB spine on the anatomical type of TB spine- anterior/paradiskal/central/ posterior/ complete type. Pedicle involvement is a characteristic feature of malignancy. Disc space is typically spared in malignancy. Presence of an abscess is the most important finding to differentiate TB spine and PS from malignancy. A small abscess with a thick wall is indicative of PS, a large abscess with a thin wall is indicative of TB spine [8]. Soft tissue mass instead suggests malignancy. Histopathological examination remains the gold standard diagnostic investigation. Presence of atypical cells, metaplasia, and increased

nucleus: cytoplasm ratio, mitotic figures are all suggestive of malignancy [9]. PS shows increased neutrophils and also shows growth on culture. TB spine classically shows granulomas, and GeneXpert is a sensitive test to diagnose TB from the tissue sample [10].

The above mentioned features all demonstrate the vast number of differentiating factors that can be used to differentiate these conditions. But cases like ours, show us the diagnostic dilemma we may rarely encounter. Our cases had varying features of PS, TB spine and malignancy, thereby making it extremely difficult to rule out any of the conditions. We had to thus depend on experience and trial and error method of treatment in our case.

4. CONCLUSION

Differentiating between tuberculosis of the spine, pyogenic spondylodiscitis and malignancy of the spine is a challenge orthopaedic surgeons come across often. MRI and histopathological

examination remain the most important investigations for accurate diagnosis. However, in rare instances, like our case, it poses a diagnostic challenge despite all investigations.

CONSENT

Informed consent of the patient has been obtained from the patient for this publication.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Wang B, Fintelmann FJ, Kamath RS, Kattapuram SV, Rosenthal DI. Limited magnetic resonance imaging of the lumbar spine has high sensitivity for detection of acute fractures, infection, and malignancy. *Skeletal Radiol.* 2016;45(12):1687-1693. DOI:10.1007/s00256-016-2493-5
2. Babic M, Simpfendorfer CS. Infections of the Spine. *Infect Dis Clin North Am.* 2017; 31(2):279-297. DOI:10.1016/j.idc.2017.01.003
3. Márquez Sánchez P. Spondylodiscitis. *Espondilodiscitis. Radiologia.* 2016;58 Suppl 1:50-59. DOI:10.1016/j.rx.2015.12.005
4. Diehn FE. Imaging of spine infection. *Radiol Clin North Am.* 2012; 50(4):777-798. DOI:10.1016/j.rcl.2012.04.001
5. Chokshi FH, Law M, Gibbs WN. Conventional and Advanced Imaging of Spine Oncologic Disease, Nonoperative Post-treatment Effects, and Unique Spinal Conditions. *Neurosurgery.* 2018;82(1):1-23. DOI:10.1093/neuros/nyx491
6. Misra UK, Warriar S, Kalita J, Kumar S. MRI findings in Pott's spine and correlating clinical progress with radiological findings. *Neuroradiology.* 2020;62(7):825-832. DOI:10.1007/s00234-020-02402-2
7. Ahn KS, Kang CH, Hong SJ, Kim BH, Shim E. The correlation between follow-up MRI findings and laboratory results in pyogenic spondylodiscitis. *BMC Musculoskelet Disord.* 2020;21(1):428. Published 2020 Jul 2. DOI:10.1186/s12891-020-03446-4
8. Strauss SB, Gordon SR, Burns J, Bello JA, Slasky SE. Differentiation between Tuberculous and Pyogenic Spondylodiscitis: The Role of the Anterior Meningovertebral Ligament in Patients with Anterior Epidural Abscess. *AJNR Am J Neuroradiol.* 2020;41(2):364-368. DOI:10.3174/ajnr.A6370
9. Missenard G, Bouthors C, Fadel E, Court C. Surgical strategies for primary malignant tumors of the thoracic and lumbar spine. *Orthop Traumatol Surg Res.* 2020;106(1S):S53-S62. doi:10.1016/j.otsr.2019.05.028
10. Rajasekaran S, Soundararajan DCR, Shetty AP, Kanna RM. Spinal Tuberculosis: Current Concepts. *Global Spine J.* 2018;8(4 Suppl):96S-108S. DOI:10.1177/2192568218769053

© 2021 Pai and Kumar; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
<http://www.sdiarticle4.com/review-history/75059>