Magnetic Resonance Imaging's role in the diagnosis of early tuberculous spondylitis: a case report.

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Abstract

Tuberculosis of the spine (Pott's disease) is a disease of public health importance and associated with socio-economic burden. The disease is prevalent in developing countries and a high index of suspicion is required in patients with back pain. Radiologic imaging plays a crucial role in diagnosis, monitoring response to therapy, assessing complication and also offer image guided therapy. Pott's disease is prevalent in developing countries such as Nigeria and most importantly sub-Sahara Africa. Early diagnosis and treatment is important in order to avert life threatening sequelae such as spinal deformities, cord compression and neurological deficits. Pott's disease was confirmed on percutaneous aspiration biopsy for microscopy and culture in this case. The role of magnetic resonance imaging in diagnosis was also emphasized.

Keywords: *Tuberculosis, Spondylitis, Magnetic Resonance Imaging, Developing countries*

Introduction

Tuberculous spondylitis also known as Pott's disease is a rare extra pulmonary manifestation of tuberculosis. Skeletal tuberculosis accounts for about 35% of extrapulmonary disease with the spine affected in 50-60% of cases[1]. Any part of the spine can be affected but the thoraco-lumbar junction is the most common site of involvement[1]. Pott's disease is prevalent in developing countries such as Nigeria and most importantly sub-Sahara Africa. It is rare in developed countries, although recent reports have documented sudden increase in prevalence in industrialised nations due to immigration and as tubercular strains resistant to antimicrobial therapy emerge[2]. Males are affected more commonly than females with reported male to female ratio of 4:3 and the mean age of patient is 45–60 years[1,2]. Two peaks are reported concerning risk factors: one between 20 and 30 years, related to immigration and HIV, and the other between 60 and 70 years, related to immunosuppression and comorbidities[1,3]. Early diagnosis and treatment is important in order to avert life threatening sequelae such as spinal deformities, cord compression and neurological deficits.

This case is presented to increase awareness about Pott's disease in recent times, emphasize the need for high index of suspicion and highlight the role of magnetic resonance imaging in diagnosis.

Case Report

A case of a 32 year old commercial bus driver referred from a private hospital to the orthopaedic outpatient clinic of Irrua specialist Teaching Hospital (ISTH) with a 3 month history of recurrent mid back pain and weight loss. The patient was a heavy cigarette smoker, with a history of alcohol and drug abuse, and concomitant HIV infection ($CD4^{+}T$ cell count 370 cells/μL) on highly active antiretroviral therapy such as efavirenz, emtricitabine, and tenofovir. Eighteen months prior to presentation, he had a contact with someone with chronic cough and was not screened for active or latent tuberculous infection. He was admitted due to a three-month history of severe

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back pain and weight loss with no respiratory symptoms and no neurological signs. There was no history of vomiting or trauma to the back. Patient was married in a monogamous setting with two (2) children. He was neither hypertensive nor diabetic. He was not a known sickle cell disease patient.

Physical examination revealed an acutely ill-looking, conscious and alert man, febrile (37.7^{0}C), not pale, anicteric, acyanosed and not dehydrated. Pulse rate was 72 beats per minutes, regular and of good volume, heart sounds I and II heard with no murmur. Respiratory rate was 20 cycles per minutes. Chest was clinically clear. Abdominal examination was grossly normal. The musculoskeletal examination showed tenderness over the ninth thoracic vertebral level with differential warmth, there was no obvious swelling or spinal deformity. The central nervous system was unremarkable. Laboratory investigation revealed normal packed cell volume (37%) but erythrocyte sedimentation rate (ESR) was elevated 90mm/hr.

A provisional diagnosis of Pott's disease was made. The patient was referred to the radiology department of ISTH for a thoracic spine X-ray. The thoracic spine radiograph (Figure 1) showed a uniformly collapsed T9 vertebral body with bilateral para-vertebral soft tissue mass devoid of calcifications or lucencies suggestive of abscess formation. Based on these findings a Magnetic resonance imaging (MRI) of the thoracic spine was requested which revealed flattened T9 vertebral body and a para-vertebral soft tissue mass with epidural extension suggestive of abscess formation: hypointense on T1 and hyperintense on T2 with rim contrast enhancement. There was also minimal spinal cord compression. The disc spaces and posterior elements were preserved (Figure 2).

Based on these findings a diagnosis of tuberculous spondylitis was made and multiple myeloma being a differential. A percutaneous aspiration biopsy was performed. The microscopy smear of the acid-fast bacilli (AFB) and the culture of Mycobacterium tuberculosis (MT) were positive, with no drugs resistance. The patient was placed on isoniazid (H), rifampicin (R), pyrazinamide (Z), and ethambutol (E) (HRZE) for 4 months, due to slow radiological resolution of the vertebral lesions, and remained on therapy with HR for 2 years. He currently has no symptoms or significant vertebral sequelae.

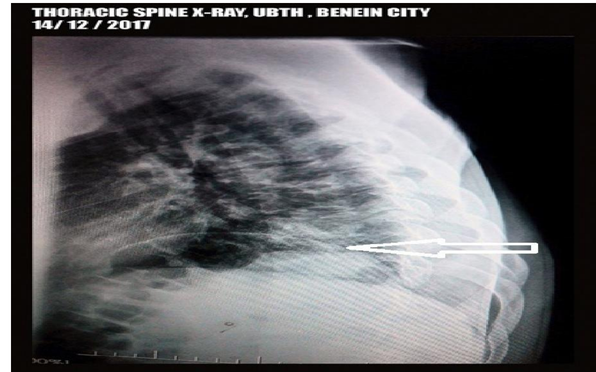

Figure 1: Plain antero-posterior radiographs of the dorsal spine showing a uniformly collapsed T9 vertebra (small arrows) associated with paravertebral soft tissue mass (large arrows). The contiguous disc spaces appear normal

Figure 1: plain lateral radiograph of the dorsal spine showing a uniformly collapsed T9 vertebra (arrow). The contiguous disc spaces appear normal

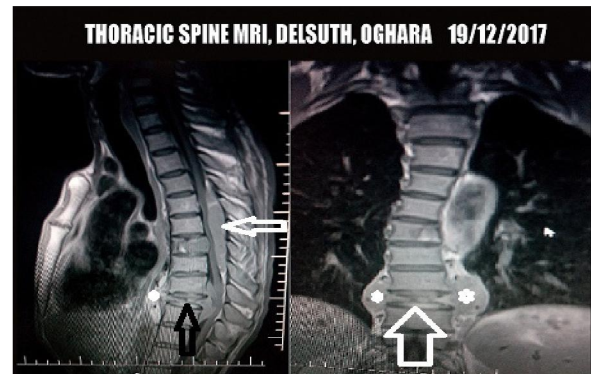

Figure 2: Sagittal and coronal T1-weighted contrast enhanced magnetic resonance images showing a uniformly collapsed T9 vertebra (vertical arrows) associated with para-vertebral soft tissue mass with rim enhancement suggestive of abscess formation (asterisks), there is epidural extension(open small arrow). Contiguous disc spaces appear normal

Discussion

Pott's disease occurs more commonly in males than females with reported male to female ratio of 4:3. The index case was a male. The mean age of patient is 45–60 years, although two peaks are reported concerning risk factors: one between 20 and 30 years, related to immigration and HIV, and one between 60 and 70 years, related to immunosuppression and

comorbidities[1,3]. The index case was 32 years old and HIV positive.

Spinal involvement is usually a result of haematogeneous spread of *Mycobacterium tuberculosis* into the dense vasculature of the cancellous bone of the vertebral bodies. The primary infection site is either a pulmonary focus or other extra osseous foci such as lymph nodes, gastrointestinal, or any other viscera[4]. Pulmonary tuberculosis is not detected in about 50% of spinal tuberculosis cases[3]. This was the scenario in the index case as the chest radiograph done was normal.

Other conditions and factors predisposing to spinal tuberculosis include; poverty, overcrowding, illiteracy, malnutrition, alcoholism, drug abuse, diabetes mellitus, immunosuppressive treatment, chronic peritoneal dialysis, previous tuberculous infection and HIV infection[4]. The index patient was a low income earner, chronic alcoholic, heavy cigarette smoker with drug abuse as well as HIV positive.

Pott's disease usually has an insidious onset of back pain, stiffness, local tenderness and in the later stages of the disease, severe spinal deformity due to acute kyphotic angulation occurs[3,4]. Non-specific constitutional symptoms such as fever as well as neurological symptoms and complications may occur in the acute and late stages of the disease[3]. The index patient had recurrent back pain with local tenderness as well as low grade fever. Any part of the spine can be affected but the thoraco-lumbar junction is the most common site of involvement[1]. The lower thoracic spine was involved in the index case.

Early diagnosis is essential for prompt treatment and prevention of important sequelae including neurological compromise and spinal deformities[1,3]. In the index case, the diagnosis was made with MRI which was confirmed on microscopy and culture of percutaneous aspirate. CT helps to define the extent of the disease and is the best method to detect calcified foci, which may be seen in tuberculous infections and rare in pyogenic infections. Spinal MRI is more sensitive in early stages of the disease since it provides better soft tissue contrast than CT and permits a better visualization of the epidural space and spinal cord. The overall sensitivity and specificity of MRI for the diagnosis of spinal tuberculosis is 100% and 88.2% respectively which renders MRI the best radiological method for the diagnosis of tuberculous spondylitis. MRI is also helpful to clarify the need for surgical intervention, since it is the most precise radiological method to assess nervous system involvement and spine instability[3]. The typical MRI findings in tuberculous spondylitis are a vertebral body disease with intervertebral disc involvement. Typically more than one (up to 10) adjacent vertebral bodies are involved with predilection for the anterior subchondral bone followed by involvement and destruction of the intervening intervertebral discs[4]. Reactive sclerosis is typically absent[5]. Vertebral body collapse (anterior wedging) and progressive kyphosis then follows. Extension of the tuberculous process posteriorly into the spinal canal forms epidural abscess resulting in neurological complications[4,5]. There was associated epidural abscess without neurological complications in the case presented. Subligamentous extension of a tuberculous abscess can be seen as erosions of the anterior surface of the vertebral bodies distant from the primary infection site. More frequently detected extension is anterolaterally, forming para-vertebral and/or psoas abscess[6]. Para-vertebral abscesses form early and are easily seen in the thoracic region as posterior mediastinal masses as was observed in the case presented. Para-vertebral psoas abscess can extend to the groin and thigh[5]. A healed psoas abscess may calcify[5].

Any tuberculous vertebral lesion, which does not have the typical features mentioned above, is referred to as atypical spinal tuberculosis[6].Increasingly more common atypical spinal tuberculosis is in the form of spondylitis without discal involvement, showing multifocal vertebral involvement without associated disc destruction. The infection typically commences at the superior or inferior vertebral end-plates anteriorly then extends by subligamentous extension over multiple vertebral segments[6]. MRI shows subligamentous abscess and abnormal signal involving multiple vertebral segments with preserved discs. These features except for multifocal vertebral involvement were observed in the index case. Similar findings were reported by Sarangapani *et al* in a young patient that was misdiagnosed as a metastatic disease[7].

Other atypical patterns of spinal tuberculosis include: isolated involvement of the vertebral posterior elements, skip lesions and a central vertebral body lesion in which vertebral collapse can occur producing

a vertebra plana appearance seen mostly in children[7]. MRI shows signal abnormalities within the vertebral body with preserved disc, and this lesion is indistinguishable from lymphoma or metastasis[6,7]. There was solitary vertebral involvement with vertebra plana and preserved disc space in the index case.

This central form of atypical spinal tuberculosis can be as a single or multiple vertebral involvements. Single vertebral tuberculosis is exceedingly rare[7].Although this was observed in the index case.

Conclusion

Early tuberculous spondylitis should be considered in a recent back pain and Magnetic Resonance Imaging may assist in confirmation of the suspicion. MRI could assist in locating the associated abscess and drainage. Lastly, accurate diagnosis will lead to cure on antitubercular drugs.

References

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