



(RESEARCH ARTICLE)



Spinal tuberculosis: MRI findings in a case series of 35 patients

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Abstract

Tuberculosis (TB) remains a major health burden worldwide. Ten million people were diagnosed with TB in 2020. With 1.5 million deaths in 2020, TB is the 13th cause of mortality and the second most common cause of infectious deaths, preceded only by COVID-19. The vast majority of cases are reported from low- and middle-income countries. MRI of the spine is a reliable tool for the diagnosis of TB spondylitis. Findings such as involvement of the endplates and vertebral body, thoracic spine, para-spinal collection and psoas abscesses and relative sparing of the intervertebral disc are highly suggestive of spinal TB rather than other diagnoses. Combined with Gene Xpert tests, MRI can render very high diagnostic accuracy. This is essential for early detection of tuberculous disease of the spine and timely initiation of medical treatment. We present a series of 35 patients with typical MRI findings of spinal tuberculosis.

Keywords: Magnetic Resonance; MRI; Spinal tuberculosis; Pott's disease; Spondylitis

1. Introduction

Tuberculosis (TB) remains a major health burden worldwide. According to the world health organization [1], 10 million people were diagnosed with TB in 2020. With 1.5 million deaths in 2020, TB is the 13th cause of mortality and the second most common cause of infectious deaths, preceded only by COVID-19. The vast majority of cases (98%) are reported from low- and middle-income countries [1].

Spinal TB, described by Pott in 1779 [2] and known as Pott's disease, is the commonest form of skeletal TB [3], representing about 50% of cases, although musculoskeletal TB contributes only about 10% of extra-pulmonary TB, the incidence of which in turn is 1-3.7% of all TB cases [3, 4, 5]. However, spinal TB is an important health concern due to its serious complications, including neurological consequences such as paraplegia as well as debilitating spine deformities.

Early and accurate diagnosis of TB is necessary to start timely treatment, before the development of complications. Imaging plays an important role in diagnosis of TB in general and spinal TB in particular. Magnetic resonance imaging (MRI) is the imaging modality of choice for the diagnosis and assessment of cases of spinal TB as well as for the follow-up and post-therapeutic evaluation of the response to medical and surgical interventions.

In this case series, we present MRI findings in 35 patients, diagnosed with tuberculous spinal disease (Pott's disease) that were retrospectively retrieved from our MRI records spanning the period from May 2021 to June 2022.

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2. Case series

This series includes 35 patients that have undergone MRI of the spine in the period May 2021- June 2022 in Orotta Hospital in Asmara, Eritrea. Eighteen of them are females (51.4%). Mean age is 52.6 years (range 8-80). The main MRI findings are: partial or complete destruction of the vertebral endplates, vertebral body and/or posterior elements, collection (cold abscess) in different locations, abnormal bone marrow signals and deformity of the spine. The most common affected segment of the spine is the thoracic (dorsal) spine (21 cases, 60%). Only 3 cases showed involvement of the posterior arch of the vertebrae, the majority (32 cases, 91%) involved either the end plates only, mostly anteriorly or the end plates and the body of vertebrae. Most cases are associated with a collection of tuberculous pus (cold abscess), with 30 patients (86%) demonstrating fluid collections on MRI. Findings are summarized in table 1 and figures 1-3.

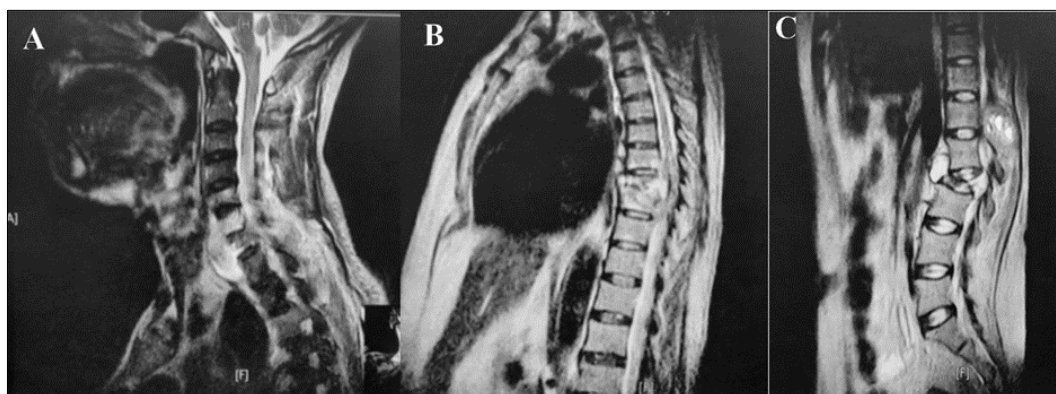


Figure 1 Spinal tuberculosis in different vertebral segments. Destructive TB spondylitis affecting the cervical (A), thoracic (B) and lumbar spine (C) with kyphotic deformity

Table 1 MRI findings

Affected vertebrae	Single vertebral body	5
	Multiple vertebrae	30
	Cervical only	1
	Thoracic only	16
	Lumbar only	10
	Thoracic and lumbar	3
	Cervical and thoracic	2
	Lumbar and sacral	1
	Thoracic +thoraco-lumbar or thoraco-cervical	21
Collection (cold abscess)	No collection	5
	Intra- or epidural only	3
	Psoas abscess	4
	Bilateral para-spinal	6
	Anterior, posterior and bilateral para-spinal	17
	Abdomino-pelvic collection	1
	Extension into the thigh	1
Deformity	Kyphosis (gibbus)	1
	Kypho-scoliosis	1
Pulmonary involvement	Past or current history of pulmonary TB	5

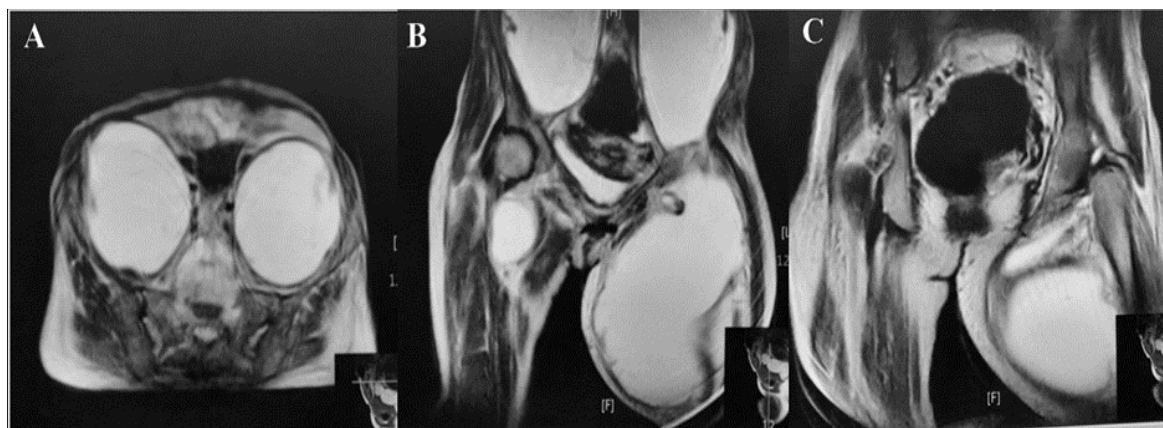


Figure 2 T2 weighted MR images of a patient presenting with a left thigh swelling, with Pott's disease and bilateral psoas abscesses, extending down into the thighs

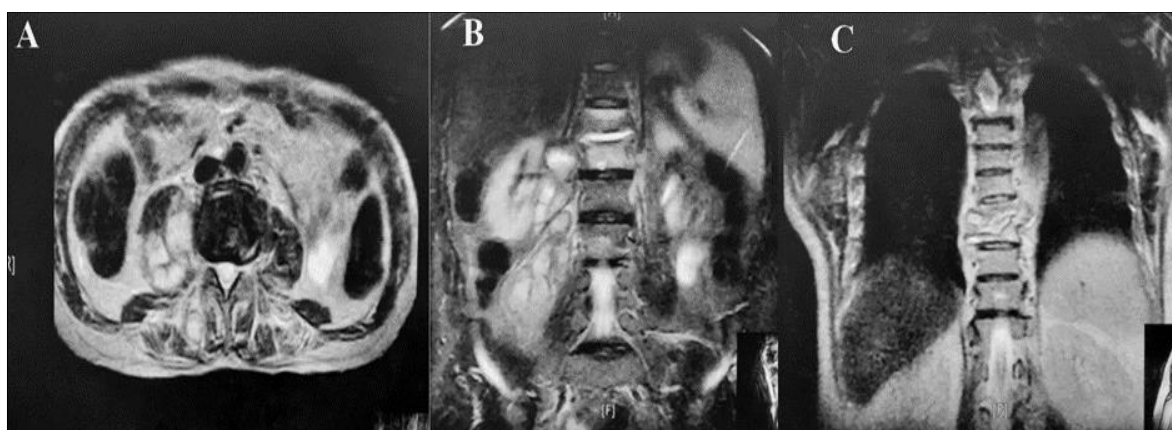


Figure 3 Axial T2WI showing bilateral psoas abscesses (A, B) and bilateral para-spinal collections (C)

3. Discussion

There is a relative paucity in publications addressing the MRI findings in spinal TB [6], although Pott's disease is the commonest manifestation of skeletal TB [7]. However, MRI has a proven role as the imaging modality of choice in tuberculous spondylitis [8] and is the most commonly used imaging modality [9]. Early diagnosis is necessary to avoid complications and instate treatment early. Diagnosis is usually confirmed by the identification of the acid fast bacillus *Mycobacterium tuberculosis*, which is considered the gold standard [8]. However, MR has a high sensitivity for the detection of spondylitis, and the radiologist can provide a diagnosis with high certainty as to avoid unnecessary biopsy [10]. Most cases of tuberculosis can be confidently diagnosed on the basis of a combination of typical clinical features, including the triad of neurological deficit, fever and back pain [6], plain x-rays, MRI findings and rapid laboratory tests. Some studies claim that Gene Xpert genetic test is even more sensitive than histopathology, culture and smears [11]. The aim of early diagnosis is to prevent complications, restore early mobilization, and return the patient to normal life activities [5]. Although multi-drug resistant tuberculous strains are in the rise, most cases respond very well to medical treatment. Surgery is reserved only for decompression of neurological complications that do not respond to medical therapy, the restoration of stability of the spinal column, and the correction of any severe deformity [4, 12, 13]. MR signs that favor a diagnosis of tuberculosis rather than the other differential diagnostic entities include: thoracic involvement, endplate abnormal signals, intact posterior vertebral septum, skip lesions, kyphotic deformity, early disc sparing, collapse of vertebral body [10] and cold abscesses, seen in about 70 % of cases [14]. Other diagnoses that might mimic tuberculosis of the spine include metastatic lesions, brucellosis and pyogenic spondylitis, among many others [15, 16]. Some authors advocate a six-predictor model to differentiate TB spondylitis from pyogenic spondylitis based on patterns of bone destruction [17]. In our patients' series, diagnosis was confirmed by Gene Xpert test and all patients were commenced on medical anti-tuberculous treatment. Most patients had involvement of the thoracic (dorsal) spine, in keeping with findings published previously [8, 14]. Cervical TB pathology was seen in only 3 patients, and it is well

reported as a rare finding [18]. Collections, typically not surrounded by inflammatory reaction (cold abscesses) were seen in 86% of these patients, making this an even more common feature of the disease, although rare presentations like retropharyngeal abscess and chest wall collections [19] were not seen. Presence of psoas abscess is typical in many cases of Pott's disease and is considered a red flag [20]. Only 14% of our patients series had either past history or concurrent involvement of the lungs (pulmonary tuberculosis), this is in contrast with the higher association reported elsewhere [14]. The diagnosis of TB spondylitis is more challenging when the lungs are not involved [21], however, taking into consideration the prevalence and epidemiology of the disease in patients' population such as ours, with an incidence of 81 per 100,000 population [22], the diagnosis of TB spondylitis is highly likely.

4. Conclusion

MRI of the spine is a reliable tool for the diagnosis of TB spondylitis. Findings such as involvement of the endplates and vertebral body, thoracic spine, para-spinal collection and psoas abscesses and relative sparing of the intervertebral disc are highly suggestive of spinal TB rather than other diagnoses. Combined with Gene Xpert tests, MRI can render very high diagnostic accuracy. This is essential for early detection of tuberculous disease of the spine and timely initiation of medical treatment.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest.

Statement of ethical approval

Approval of the Research Ethics Board was obtained.

Statement of informed consent

Not applicable.

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