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"MRI evaluation In Cases of Spinal tuberculosis."

Dr.Abidhussain S Sheliya
(3rd year Resident in SMIMER Medical college, Surat).

Dr.Jigar Aiya *(Assistant Professor, SMIMER Medical college,Surat)*
Dr. Nirav Kadvani *(Assistant Professor, SMIMER Medical college, Surat)*
Dr. Nehal Diwanji *(Professor, SMIMER Medical college,Surat)*
Dr.Virajkumar Rathva *(3rd year Resident, SMIMER Medical college, Surat)*
Dr. Kaushal Vekariya *(2nd year Resident, SMIMER Medical college, Surat)*

Aims &Objectives: -

- *To study the disease pattern in patients of spinal tuberculosis by Magnetic Resonance Imaging.*

Material and Methods: -

The present study was carried out in the Department of Radiodiagnosis, in a tertiary care teaching hospital. 40 patients who underwent MR imagingofSpineduringtheperiodbetween October2021to September 2022 wererandomly consideredforthisstudy. The study type was cross sectional study.

This study has been performed using a 1.5T PHILIPS ACHIEVA MRI scan machineusing spinal coil.Sequences used were T1axial and sagittal, T2 axial, sagittal and coronal, STIR in sagittal and coronal planes. T1+ contrast, DWI and ADC sequences will be used whenever possible.

ThefollowingfeatureswereassessedbyMRI:

- *Compartment of spine involved: Epidural/ Intradural/Intramedullary/Multiple*
- *Epiduralinvolvementassessedforthefollowing*

1. *Extent of vertebral involvement: body / posteriorinvolvement –signalchanges.*
2. *Wedgingorcompression.*
3. *Involvementofdisc.*
4. *Subligamentousextension.*
5. *Extentofabscess:Epidural/paravertebral/psoas.*
6. *Spinalcordchanges.*

- *Intradural/intramedullary:Natureandenhancementofthe lesions.*

Inclusion criteria: -

- *Patients of all ages and both sex with clinically suspected or proven spinal tuberculosis.*

Exclusion criteria: -

- *Patient who are previously diagnosed with spinal tuberculosis and have taken surgical treatment.*
- *Follow up cases who are on antitubercular treatment.*
- *Patients who have claustrophobia, freshly implanted MRI incompatible prosthesis. Patient with aneurysm clips, ferromagnetic implants, and pacemakers.*
- *Patients not willing to participate.*

Result –

The majority of the 40 patients were males (n=26) in the 31-40 years age group (50%). The most common clinical presentation was backache (75%) with a localized kyphotic deformity followed by fever (62.5%), malaise (47.5%) and weight loss (22.5%). The Thoracic spine was the commonest site of the disease (35%) followed by the thoracolumbar region (30%). An intervertebral disc involvement, pre and paravertebral collections, subligamental extension of the abscess were commonly seen, with an epidural collection occurring in more than 75 % of the cases. In addition, few cases also showed intramedullary and intradural involvement.

Conclusion -

The MRI scan is highly sensitive in the detection of various pathological processes of spinal tuberculosis and their pattern of occurrence. The extent of soft tissue involvement disease is best assessed by MRI which help in guiding the surgical treatment as well as to monitor the response to treatment during follow up.

Keywords: -

Spinal tuberculosis, Magnetic resonance imaging, Epidural, Abscess enhancement

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I. Introduction

Tuberculosis (TB) is caused by Mycobacterium tuberculosis. TB is more common particularly in developing countries. The most common extrapulmonary location of TB is the spine, accounting for more than 50% of musculoskeletal TB.1 In the developing countries, the disease has an aggressive course, particularly in children and young adults resulting in abscess formation. Consequently, neurologic complications and spinal deformities are frequently observed.2 Magnetic resonance imaging (MRI) is now the preferred imaging modality for patients with suspected spinal TB.3 MRI is the most valuable method for detecting early disease and is preferred technique to define the activity and extent of infection. It shows not only bony involvement but also the edema and soft tissue swelling.4 TB of spine is caused primarily by hematogenous spread of pulmonary infection in most of the cases. The infection typically begins from the anterior part of vertebral body, spreads to the disc and causes bone destruction and formation of abscess. Subligamental extension of abscess beneath the anterior longitudinal ligament and the intervertebral disc is involved with subsequent loss in disc height. As the vertebral bodies collapse into each other, a sharp angulation (or kyphos) develops. Caseation and cold abscess formation may extend into the neighbouring vertebra or escape into the paravertebral soft tissue. Cord compression and edema is noted either due to pressure by the abscess or displaced bone or due to involvement of spinal artery resulting in neurological deficits.4 It is also important to differentiate between tuberculosis and pyogenic spondylitis. Disc involvement is seen early in pyogenic infection and later in tuberculosis. Calcification is characteristic of tuberculosis.4 The purpose of the study is to describe various radiological features of spinal tuberculosis and evaluate the role of MRI in assessing the extent of disease.

II. Result

The study included total 40 patients, with an age range of 21-60 years with majority of them in the 31–40 year age group (Table 1). There were 26 males (65%) and 14 females (35%) (Table 1).MRI scan showed that most affected level of the spine was thoracic spine seen in 35% (Table 2) of the cases followed by thoracolumbar (30%), and lumbar vertebra (20%). Various clinical presentations such as fever, backache, weight loss, malaise were noted with most common being backache (75%) in 30 cases (Table 3). Intervertebral disc involvement was seen in 85% of the cases with an epidural component occurring in 75% of the cases (Table 4). Cord oedema was noted in 10% of the cases.

Table1:Age and sex distribution.

Agegroup	Male (26)	Female (14)	Percentage (overall)
21-30	2	2	10
31-40	14	6	50
41-50	6	4	25
51-60	4	2	15

Table2:Regional distribution of TB spine.

Region	No of cases	Percentage
Cervical	4	10
Thoracic	14	35
Thoracolumbar	12	30
Lumbar	8	20
Multiplelevels	2	5

Table3:Clinical profile of patients with spinal TB.

	Fever	Backache	Malaise	Weight Loss
No ofcases	24	30	18	12
Percentage	60	75	45	30

Table 4: Extent of tuberculosis spine in various compartment

Features	No of cases	Percentage
Intervertebral disc involvement	34	85
Wedgecollapseofbody	18	45
Completedestructionofvertebra	8	20
Subligamental extension	18	45
Epiduralcollection	30	75
Intraduralinvolvement	4	10
Intramedullaryinvolvement	2	5
Preandparavertebral collections	24	60

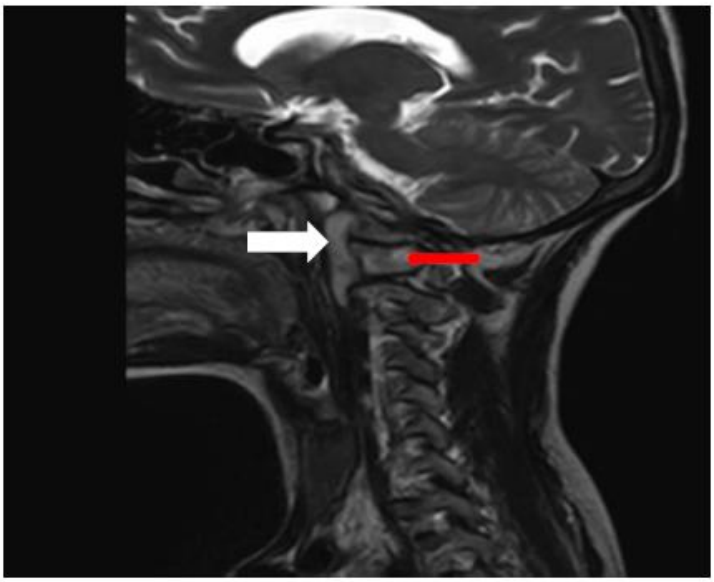

Figure 1: Sagittal T2 WI showing Prevertebral collection with subligamental extension is seen in the cervical region (white arrow). Note the hyperintensity of affected cervical vertebrae (red arrow).

Figure 2A and 2B:Coronal STIR and Sagittal T2 WI showing erosion of T12 and L1 vertebra with marked wedging of L1 vertebra (Yellow arrow). Bilateral psoas abscess (White arrow) noted with anterior epidural collection (red arrow) compressing over thecal sac.

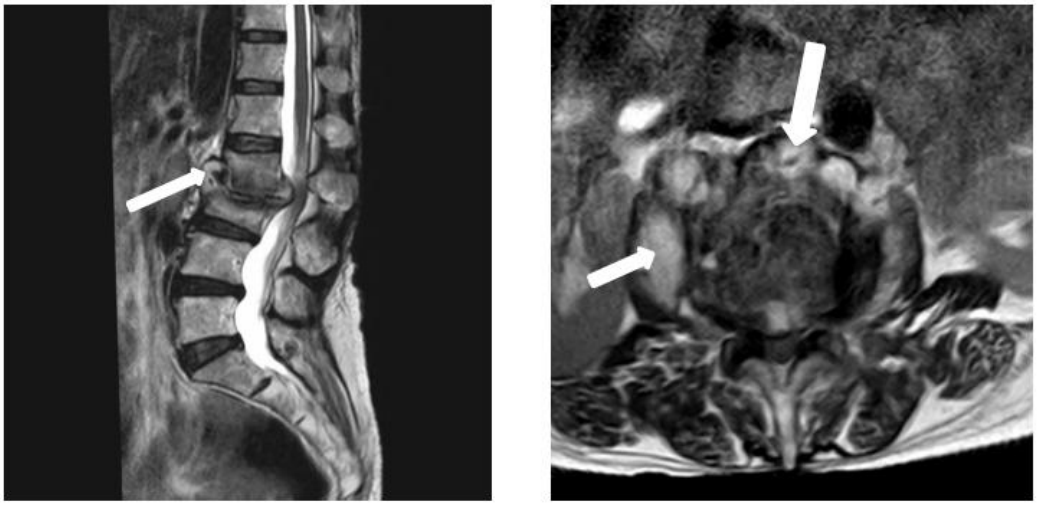

Figure 3A and 3B: Sagittal and axial T2 WI showing erosion of L2 and L3 vertebra. Multiple well defined pre vertebral and para vertebral collections are seen (White arrow).

Figure 4: Sagittal T2 WI showing multiple level involvement. There is altered marrow signal intensity involving D11 and D12 vertebra. Similar altered marrow signal intensity noted involving L3 and posterosuperior corner of S1 vertebra (White arrow). There is severe wedging of D12 vertebra with kyphotic deformity (Red arrow).

Figure 5: Sagittal T1W post contrast image showing nodular enhancement in thoracic cord suggestive of intramedullary involvement.

III. Discussion

Tuberculosis has prevailed as a major public health issue especially in developing countries in which poverty, malnutrition, overcrowding, poor hygienic conditions and the presence of drug-resistant strains are the predisposing factors which aid in spread of the disease. Tuberculosis of the spine is clinically important form of extrapulmonary tuberculosis accounting for majority of the musculoskeletal tuberculosis cases.1 First described in 1782 by Percival Pott, a British orthopaedic surgeon usually occurs due to haematogenous seeding of the vertebra from a distant source. The disease usually begins as a focal lesion which is a combination of osteomyelitis and arthritis. Typically, more than one vertebra is involved and usually affects the anterior aspect of the vertebral body adjacent to the subchondral plate and from there on spreads to involve adjacent intervertebral discs. As the disc is vascularized in children it can be a primary site whereas in adults, disc disease is secondary to the spread of infection from the vertebral body. Further with involvement of bone, wedge collapse (figure 1) and vertebral destruction (figure 4) occurs which results in kyphosis. Epidural abscess formation (figure 2) results in narrowing of the spinal canal diameter with resultant cord compression and neurological deficits.[5]

In the present study, we have attempted to depict the various spectrum of presentations of spinal TB with clinical correlation.

The regional distribution of vertebra in our study was similar to the findings of DJ Kotzke5 and Sajid Ansari.10 Shanley DJ6 evaluated radiographic manifestations of tubercular spondylitis like intraosseous and paraspinal abscess formation as seen in our study mentioned in Figure 2 & 3, paraspinal abscesses in the lumbar region gravitate along the psoas sheath which can extend to the femoral region and cause erosion of overlying skin.[5,6]

MRI is the gold standard of imaging in TB Spondylitis due to its superior soft tissue resolution and multiplanar capability. The classic pattern of spread starting anteriorly and moving to involve opposing vertebrae via subligamentous spread is clearly seen on MRI. As was observed in our study, T1- weighted images usually show hypointense signal within the affected vertebral marrow. On T2-weighted images a relative hyperintensity was noted within the diseased tissues.7 Meningeal involvement which indicate active inflammation and rim enhancement around intraosseous and paraspinal soft tissue abscesses, which are rarely seen in non-tubercular abscesses are best demonstrated on contrast enhanced MRI.[8]

In our study, we had 2 cases showing intramedullary tuberculomas (Figure 5), On MRI tuberculomas appear as low or intermediate signal intensity on T1W images and low signal on T2W images (Low signal on T2W images is due to caseous necrosis in the tuberculoma, which has high protein content). Post contrast study

shows ring / nodular enhancement.9 The extent of spinal cord involvement, nerve root integrity and involvement of posterior elements and response to therapy is best assessed by MRI.[10-12]

It is important to differentiate tuberculous spondylitis from pyogenic spondylitis because proper treatment of the different types can reduce the rate of disability and functional impairment.13,14 MRI has been shown to be accurate in differentiating tuberculous spondylitis from pyogenic spondylitis. The presence of a well-defined paraspinal abnormal signal, a thin and smooth abscess wall, subligamentous spread to three or more vertebral levels, and multiple vertebral or entire body involvement are more suggestive of tuberculous spondylitis than pyogenic spondylitis.14 Early recognition and prompt treatment are therefore necessary to minimize residual spinal deformity and/or permanent neurological deficit. Conservative treatment by anti-tubercular drugs has shown favourable results in early diagnosed cases as anti- tuberculous drugs will be able to reach the tuberculous caseous material and cavities in spine.15 However in patients with severe bone involvement along with cord or root compression, surgical treatment is the only benefitable measure.[16]

IV. Conclusion

MRI is a very valuable tool in the evaluation of spinal TB. The MRI scan is highly sensitive in the detection of various pathological processes of spinal tuberculosis and their pattern of occurrence and also provides excellent depiction of soft tissue involvement, cord involvement and nerve root integrity. It is an accurate modality in differentiating spinal TB from pyogenic spondylitis and aids in diagnosing spinal TB in early stages and hence prompt treatment minimizes spinal deformity and permanent neurological deficits. Serial MRI scans can also be used to assess the disease response to treatment.

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References

Hodgson AR, Skinsnes OK, Leong CY. The pathogenesis of Potts paraplegia. J Bone Joint Surg Am. 1967;49:1147–56.
[1]. Ho EKW, Leong JCY. The pediatric spine: principles and practice. In: Weinstein SL, ed. Tuberculosis of the spine, 3rd ed. New York: Raven, 1994:837–49.
[2]. Kotevoglu N, Tasbasi I. Diagnosing tuberculous spondylitis: patients with back pain referred to a rheumatology outpatient department. Rheumatol Int. 2004;24:9-13.
[3]. Bajwa GR. Evaluation of the role of MRI in spinal Tuberculosis: A study of 60 cases. Pak J Med Sci. 2009;25(6):944-7.
[4]. Kotzé DJ, Erasmus LJ. MRI findings in proven Mycobacterium tuberculosis (TB) spondylitis.
[5]. Shanley DJ. Tuberculosis of the spine:imaging features.AJR. Am J Roentgenol. 1995;164:659-64.
[6]. Sharif HS, Clark DC, Aabed MY, Haddad MC, Al Deeb SM, et al. Granulomatous Spinal Infections: MR Imaging. Radiology. 1990;177:101-7.
[7]. Sharma A, Goyal M, Mishra NK, Gupta V, Gaiwak SB. MR Imaging of Tubercular Spinal Arachnoiditis. AJR. 1997;168:807-12.
[8]. Prakash ML, Sarwagi R, Ramkumar, Srilatha K, et al. Spinal intramedullary tuberculoma: typical, atypical presentation on magnetic resonance imaging. Journal of Case Reports. 2013;3(2):404-9.
[9]. Sinan TH, Al Ismail M, et al. Spinal tuberculosis: CT and MRI features. Ann Saudi Med. 2004;24(6):437-41.
[10]. Ansari S, Rauniyar RK, Dhungel K, et al. MR evaluation of spinal tuberculosisAl Ameen J Med Sci. 2013;6(3):219-25.
[11]. Narlawar RS, Shah JR, Pimple MK, Patkar DP, Patankar T, Castillo M. Isolated tuberculosis of posterior elements of spine: magnetic resonance imaging findings in 33 patients. Spine. 2002;27:275- 81.
[12]. Arizono T, Oga M, Shiota E, Honda K, Sugioka Y. Differentiation of vertebral osteomyelitis and tuberculous spondylitis by magnetic resonance imaging. Int Orthop. 1995;19:319–22.
[13]. Jung NY , Jee WH , Ha KY et al Discrimination of Tuberculous Spondylitis from Pyogenic Spondylitis on MRI. AJR. 2004;182:1405–10.
[14]. TB infection Apley's system of Orthopedic and fracture, 8th edition, Arnold, Oxford University Press Inc, New York 2001.
[15]. Sinha S, Singh A, Gupta V. Surgical management and outcome of tuberculosis at lantoaxial dislocation: A 15 years experience. Neurosurgery. 2003;52(2): 331-9.