



STUDY OF MRI MORPHOLOGY OF SPINAL TUBERCULOSIS.

Radiodiagnosis

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ABSTRACT

OBJECTIVE: To study the morphology of tuberculosis of spine on MRI.

METHODS AND MATERIALS: A retrospective study was done in the department of Radiodiagnosis, PESIMSR, Kuppam. This study includes 37 patients with suspected Spinal Tuberculosis, who were referred to the department of Radiodiagnosis between 2019 Jan to 2021 July. Informed consent was taken from all the patients. This study was done on GE Signa Explorer 1.5 Tesla.

RESULTS: A total of 37 cases were included in the study. Of these 37 cases, 31 were males and 6 were females. The most common age group involved was between 20-40 years, seen in 15 cases followed by 41-60 yrs seen in 14 cases and 61-90 yrs seen in 8 cases.

Lumbar vertebrae were commonly affected accounting for 86% of total cases (32cases) followed by dorsal and cervical vertebrae accounting for 8% and 5 % respectively (3 and 2 cases respectively).

Intervertebral disc involvement (Discitis) was most commonly seen in 32 cases followed by vertebral endplate involvement (27 cases) in our study. Prevertebral & paravertebral involvement were found in 20 and 23 cases respectively .

In our study, 19 cases had shown the involvement of posterior elements .Epidural soft tissue component was seen in 22 cases. Psoas abscess and paraspinal involvement were seen in 9 and 8 cases respectively.

CONCLUSION: MRI helps in the early assessment of the extent and severity of disease compared to X-ray and CT scan. It is valuable in detecting early marrow changes, intervertebral disc involvement, extradural abscess and cord compression.

KEYWORDS

MRI, Pott's spine, Spondylodiscitis, Tuberculosis

INTRODUCTION:

Tuberculosis is caused by aerobic bacteria, Mycobacterium tuberculosis. Lungs are the most commonly affected organs in primary tuberculosis. In musculoskeletal tuberculosis, spine is most commonly affected. It occurs secondary to pulmonary tuberculosis by hematogenous spread via both arteries and veins.

Percival Pott was the first person to describe spinal tuberculosis (TB) in the year 1779. Hence, It is also known as Tubercular spondylitis / Pott's disease.

It is one of the most common infections of the spine in countries like India where TB is prevalent due to poverty, poor hygiene, malnutrition. The incidence of tuberculous spondylitis is on the rise due to new drug-resistant strains and association with HIV cases. In some countries like Africa, the number of reported cases of tuberculosis has doubled or tripled due to the spread of HIV cases(1).

The involvement of the spine can be of the following types: Anterior, posterior, central and paradiskal types. The involvement of intervertebral disc / vertebral body accounts for about 50% of all musculoskeletal tuberculosis.

MRI gives us information about the involvement of intervertebral disc, vertebrae and extension to extradural space, pre and paravertebral regions. Also, the surgical choice between anterior and posterior decompression is made based on MRI.

Advanced spine MR imaging techniques, including Diffusion, Diffusion tensor imaging, and Perfusion imaging are suggested when conventional CT and MR imaging findings are negative/equivocal.

Although CT gives excellent details regarding bony lesions than MRI, MRI is preferred over CT because it has higher sensitivity for the detection of the early inflammatory bone marrow changes, endplate changes in the vertebra(5) and soft tissue involvement (2,3).

MRI is less sensitive in the detection of calcifications in the psoas, pre/paravertebral abscess than CT scan.

MATERIALS AND METHODS:

A retrospective study was conducted among 37 patients with suspected Spinal Tuberculosis, who were referred to the department of Radiodiagnosis. Informed consent was taken from all the patients. This study was done on GE Signa Explorer 1.5 Tesla.

Study Design: Retrospective Study.

Study location: This study was done in the department of Radio diagnosis, PESIMSR, Kuppam.

Study Duration: January 2019 to July 2021.

Sample size: 37 patients.

INCLUSION CRITERIA: Patients with backache and who were suspected of spinal tuberculosis.

EXCLUSION CRITERIA:

- 1)Traumatic spine.
- 2)Other Infective/Inflammatory Spondylitis.

RESULTS:

Lumbar vertebrae were most commonly affected accounting for 86% of total cases (32 cases) followed by dorsal and cervical vertebrae accounting for 8% and 5% respectively (3 and 2 cases).

Table 1: Showing vertebral involvement.

Type of vertebrae	No. of cases	%
Lumbar vertebrae	32	86%
Dorsal vertebrae	3	8%
Cervical vertebrae	2	5%

Sex distribution: Males were more commonly affected than females. 31 out of 37 cases were found to be males i.e 83%, 6 out of 37 cases were found to be females i.e 16 %.

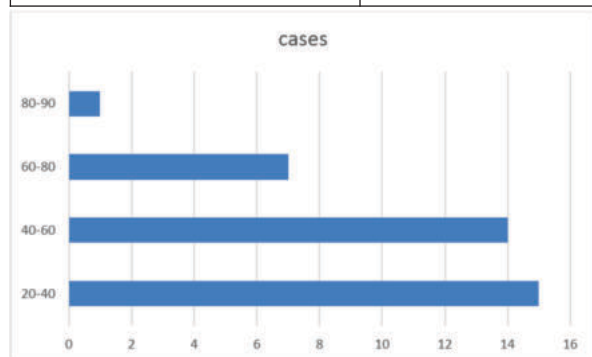
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**Chart 1: Showing sex distribution.**

Age distribution: The most common age group involved was between 20-40 years, 15 out of 37 cases. Between 41-60 years, 14 out of 37 cases were seen. Between 61-80yrs, 7 out of 37 cases were seen. Between 81-90 yrs, 1 out of 43 cases was seen.

Table 2: Showing age distribution.

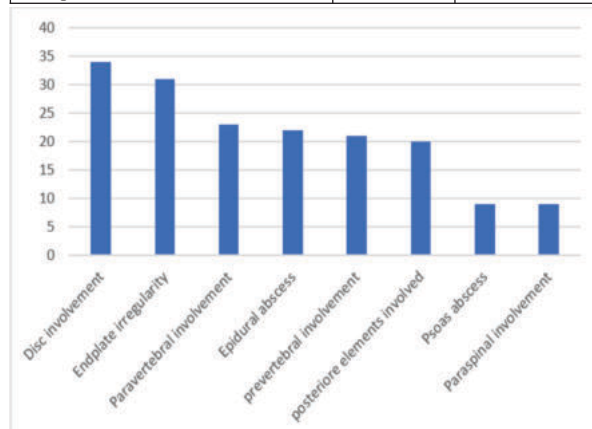
Age distribution	cases
20-40	15
41-60	14
61-80	7
81-90	1

**Chart 2: Showing Age distribution.**

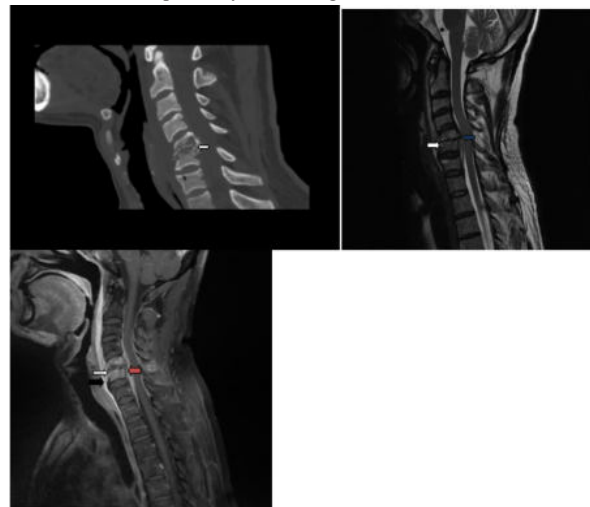
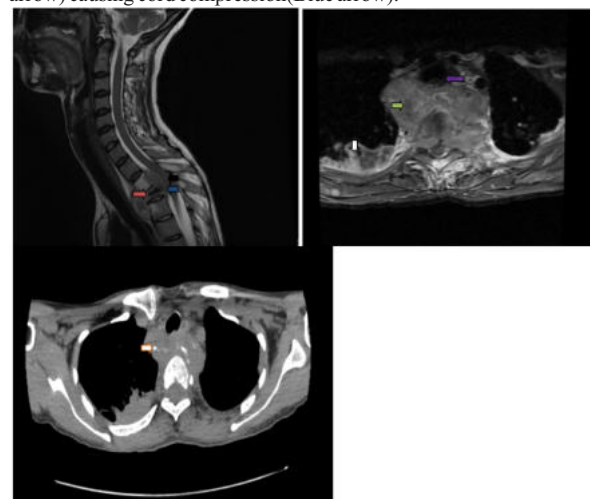
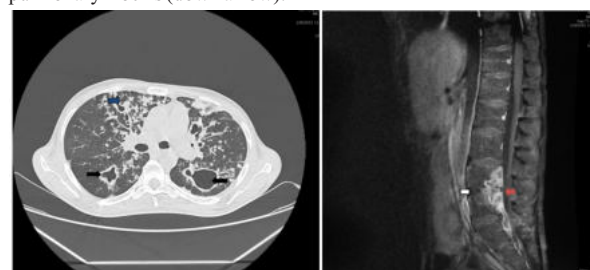
The mean age group affected: 20-40 years.

Table 3: Showing MRI imaging findings

Imaging findings	No. of cases	Percentage
Disc involvement	32	86%
Endplate irregularity	27	72%
Paravertebral involvement	23	62%
Epidural abscess	22	59%
Prevertebral involvement	20	54%
Posterior elements involved	19	51%
Psoas abscess	9	24%
Paraspinal involvement	8	21%

**Chart 3: Showing MRI imaging findings.**

The spectrum of findings on MRI: Endplate irregularity and Intervertebral disc involvement were commonly seen in about 27 and 32 cases accounting for 72% and 86% respectively. 20 and 23 cases had shown prevertebral and paravertebral involvement respectively accounting for 54% and 62 % respectively. The epidural abscess was found in 22 cases(59%). Involvement of posterior elements was found in 19 cases(51%). Psoas abscess and paraspinal involvement were seen in 9 and 8 cases respectively accounting for 24 % and 21 %.

**Fig 1:** CT sagittal reformatted image, MRI T2 Saggital image and MRI Postcontrast T1-Saggital Image of Cervical spine of the same patient showing C5-C6 Infective Spondylodiscitis(White arrow) with enhancing prevertebral (Black arrow) and Epidural components(Red arrow) causing cord compression(Blue arrow).**Fig 2:** MRI T2 Saggital, MRI STIR axial image above D3 vertebral level, CT axial reformatted images of the upper dorsal spine of same patient showing Subtotal collapse of D3 vertebral body(Red arrow) ,prevertebral abscess(Green arrow) with calcifications(orange outline arrow) causing tracheal displacement(purple arrow),epidural abscess (Blue arrow)causing cord compression(Black arrow) and active pulmonary Koch's (down arrow).**Fig 3:** HRCT Chest showing Cavitary lesions (Black arrow) with Tree-In-Bud appearance (Blue arrow) in bilateral lung fields - Active pulmonary Koch's and MRI Postcontrast T1 -Saggital image of

Lumbar spine of same patient showing L4-L5 Infective spondylodiscitis(White arrow) with Epidural abscess(Red arrow)

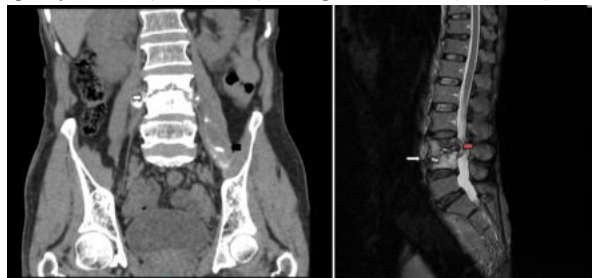


Fig 4 : CT coronal reformatted image and MRI STIR Saggital image of Lumbar Spine of same patient showing L3-L4 Infective Spondylodiscitis (White arrow) with Epidural abscess (Red arrow) and calcifications in Left Psoas Abscess(Black arrow).

DISCUSSION :

MRI Evaluation of 37 cases who were suspected of spinal tuberculosis was done. Of total cases, male predominance was observed accounting for 83%. The mean age group affected was between 20-40 years of age. Thoracic and the thoracolumbar spine were most commonly involved, comprising 48% to 67% of the lesions (8) and the lumbar spine about 27%(12) and cervical spine is less frequently involved, But In our study Lumbar spine was most commonly involved (86%) followed by the thoracic and cervical spine (8% and 5% respectively).

The average number of vertebrae affected per patient was 2-3 noted by Kim et al(11) and Al-Mulhim et al (9) in their studies. Similarly in our study, 97% of our cases show about 2-3 vertebral involvement and single vertebral involvement was seen in 2%. Xing et al(13) noted single vertebral involvement in 23% of their cases which was higher than our study.

In our study, involvement of intervertebral disc (Discitis) was seen in 32 cases (86%). Sashikumar et al also found intervertebral disc involvement in 85% of the cases. Our findings are similar to this study. (4)

Posterior elements involvement was found in 19 cases in our study (51%). It was found to be 39 % and 41 % higher than the other studies like Desai et al (5) and Sinan et al where posterior element involvement on MRI is seen in 12% and 10% respectively.

Our study shows epidural abscess in 51% of our cases, which was 10 % and 26 % lesser than the study done by Al Mulhim et al (9) and Shashikumar MR et al(4).

Prevertebral and paravertebral involvement was seen in 54% and 62 % respectively of all cases. It is slightly lower than the study done by Bhatnagar.S (14) where the incidence of prevertebral & paravertebral collections was 88% among total cases.

Psoas abscess was seen in 24 % of our cases, this was 21 % greater than the study done by Owolabi et al (10), where only 3% of our cases had shown psoas abscess.

The paraspinal abscess was seen in 21 % of our cases, but Kim et al give the incidence of paraspinal abscess at 55%- 96%(11).

CONCLUSION:

MRI is the imaging modality of choice for evaluating patients suspected with Tuberculosis spine. The superior contrast resolution of MR imaging is useful for showing contiguous vertebral involvement, disc involvement, prevertebral, paravertebral, epidural and paraspinal collections.

It helps in early diagnosis and planning correct treatment thereby preventing morbidity, especially in high-risk patients.

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