

CT Scan And MRI Evaluation In Case Of Spinal Tuberculosis In Modern Trends

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Abstract: Spinal tuberculosis is a very severe disease and causes increased rate of mortality and morbidity. Worldwide, this is a challenge for physicians to diagnose spinal tuberculosis. In this study we examine patients of different age groups, which are having various socio-economic status suffer from spinal tuberculosis which need to be evaluated successfully to help the physician with further management of the condition to better treatment.

Our aim is to evaluate the role of CT scan and MRI in case of spinal tuberculosis in modern trends. We examined referred patients to the Radiology Department with any kind of coincidental finding of spinal tuberculosis, neurological deficit or even those with already diagnosed cases of spinal tuberculosis which needed follow up radiological investigations were evaluated with either CT or MRI or both. The examination were performed on 1.5 Tesla Philips Achieva Nova MRI and Seimens 64 Slice Somatom Sensation MDCT machine. Most patients with spinal tuberculosis mainly presented with abscess, suffering from spinal infection with Pott's spine. Most of the lesions in patients were paradiscal with involvement of the articular discs. We find that MRI is more sensitive than CT scan in the diagnosis of spinal tuberculosis. Hence, CT plays no major role in the diagnosis of spinal tuberculosis. There is a wide spectrum of manifestations associated with spinal tuberculosis. Pott's spine were the commonest manifestations of spinal tuberculosis. MRI was more sensitive in the diagnosis of spinal tuberculosis as compared to CT. CT had no major significant role in the diagnosis of Spinal tuberculosis. Therefore, MRI is the preferred choice of investigation while evaluating spinal tuberculosis.

Key words: Tuberculous abscesses, paradiscal involvement, spinal tuberculosis, pathological investigations.

1. Introduction

Spinal tuberculosis remains a major public health issue and global problem of considerable magnitude. In recently, there has been a major problem of tuberculosis in this era. The infection of tuberculosis usually spreads through the hematogenous dissemination^[1]. The Mycobacterium tuberculosis is responsible organism for disease. Mycobacterium bovis is a frequent pathogen in the past and current now rare^[2]. Tuberculous involvement of the spinal is an important and serious type and involvement of extra-pulmonary tuberculosis. In developing countries spinal tuberculosis is a disease of younger age group, usually childhood and poor socioeconomic status^[3]. In developed countries, immune-compromised states, substance abuse and crowded conditions have contributed to a rejuvenation of tuberculosis. Its diagnosis is based on patient's history, clinical features, cerebrospinal fluid changes, imaging characteristics and culture-immunological tissue tests. The positive clinical features usually depend on the area being involved in disease. Spinal tuberculosis usually manifests as back pain, rarely para paresis or paraplegia and deformity of the spine. First of all X-rays are usually the primary investigation done for symptomatic patients, but these are helpful only in the late stages of the disease. Recent advances in technology have allowed to additionally utilize imaging modalities in the evaluation of central nervous system infections like PET, CT and MRI studies are preferably the modalities of choice in the spinal tuberculosis evaluation. CT scan and MRI are better modalities in radiodiagnosis, significant decrease has occurred in the morbidity and mortality of patients with spinal^[4,5].

CT scan is found to be very useful in case of spinal tuberculosis because of its ability to demonstrate focal osteopenia or bone destruction early in the course of the infection. It's useful to demonstrate

swelling of soft tissue and cellulitis, though, is disappointing. But MRI become the study of choice for evaluating patients with spinal complaints in currently. The advantages of MRI including soft tissue contrast resolution, a unique ability to detect end-plate, disc space multiplanar capability and changes of spinal cord. Further, it can demonstrate the subtle changes far earlier in the disease so that immediate management may be undertaken for diagnosis [6].

Hence, CT imaging is less helpful in the diagnosis of spinal tuberculosis, But MRI is the preferred choice for early diagnosis and Cerebrospinal fluid evaluation with culture and immunological tests for confirmation of the diagnosis of spinal tuberculosis.

2. Materials and methods

It was an observational study carried out in the Department of Radiology, Uttar Pradesh University of Medical Sciences, Saifai, Etawah, India. It is an observational, descriptive hospital based study on the 30 patients.

2.1. Selection of patients

2.1.1. Inclusion criteria

- Only patients which were willing to participate in this study were included.
- All Patients already referred to the department of radiology for sign and symptoms of neurological deficit and found to have positive findings were included in this study.
- Some cases needing a follow up were included in this study.

2.1.2. Exclusion criteria

- All patients unwilling were avoided from this study.
- Exclusion claustrophobic patients.
- Patients who are uncooperative for the procedure.

2.2. Modalities

- These were performed on 1.5 Tesla Philips Achieva Nova MRI and Seimens 64 Slice Somatom Sensation MDCT machine.

2.3. Protocol

Routine blood investigations were documented in all patients.

- Pathological investigations like: complete hemogram, which include Hb, TLC, DLC and ESR.
- Blood sugar testing: Random blood sugar estimation; fasting blood sugar and 2-3 hours post prandial if needed.
- Test for HIV and Hepatitis if needed.

3. Results

Here, patients with spinal tuberculosis mainly presented with Table 1, most patients suffering from of infection spine and presented with Pott's spine.

Table 1: Different types of spinal tuberculosis:

Type	No. of cases
Spinal Meningitis	1
Non osteomyelitis tuberculomas	2
Pott's Spine	27

As per Table 2, most of the lesions were paradiscal with articular discs involvement. Very rarely, a subligamentous lesion was observed and lesions involving the posterior elements were not observed in this study.

Table 2: Different types of lesion in spinal tuberculosis

Different types of lesion	No. of cases
Posterior elements	0
Subligamentous	2
Central	3
Paradiscal	25

As per Table 3, MRI is confirmative in spinal tuberculosis also. As per Table 4, MRI is more sensitive than CT scan in the diagnosis of spinal tuberculosis. MRI is also very sensitive in the diagnosis of spinal tuberculosis. However, CT scan don't plays a role in the diagnosis of spinal tuberculosis.

Table 3: MRI in diagnosis of spinal tuberculosis.

Findings	MRI		CT Scan		Total
	Positive	Negative	Positive	Negative	
Pott's spinal	27	0	0	0	27
Spinal meningitis	1	0	0	0	1
Intramedullary tuberculoma	2	0	0	0	2

Table 4: Sensitivity of CT scan and MRI in diagnosis of spinal tuberculosis.

Lesion	CT Scan	MRI
Spinal tuberculosis	-	100%

4. Discussion

4.1. CT scan in the diagnosis of spinal tuberculosis

Clinically features of spinal tuberculosis that can be seen on CT scan include destruction of anterior vertebral body, vertebral body collapse, narrowing of the disk space and large paraspinal soft tissue masses presenting abscess formation^[7, 8]. During the course of the infection, may be visualization of a cloaca and may result from drainage of the vertebral body abscess and spontaneous decompression. Paraspinal abscess form as a result of this drainage, which can then travel through planes (fascial), pleural effusion or psoas and flank abscess and lead to the development of mediastinal abscesses depending on the level of the direction of spread. Posterior extension of the paraspinal abscesses may lead to an epidural abscess formation, encroachment on the spinal canal and compression of the spinal cord. The areas of erosion or osseous destruction may be subtle in the early stages of infection, can be better demonstrated with reformatted sagittal and coronal CT images by scan. CT typically shows extensive osseous destruction, sequestrum formation and marked heterotopic bone formation in the more chronic stages of infection.

4.2. MRI in the diagnosis of spinal tuberculosis

30 patients under went to MRI for spinal evaluation out of these, 27 patients were diagnosed to have Pott's spine, 1 had spinal meningitis and 2 patients had intramedullary. All of these results were compared to the pathological findings or reports in these patients, and also observed that MRI had a sensitivity of about 100% in the evaluation of the spinal tuberculosis.

A study carried out by Valk J, he too also observed that MRI was preferred in the diagnosis of spinal tuberculosis as this technique allowed describing lesions of the spinal cord, meninges and epidural space more precisely^[9].

5. Conclusion

CT scan and MRI scans have proved to be valuable modalities in evaluating tuberculosis of the spine but in Pott's spine diagnosis MRI results increased the physician's confidence. However there has to be carefully and proper correlate between both physical examination as well as imaging results, a task that largely depends on the behalf of the patients referring physician. Tuberculomas and tubercular meningitis were the most common presentation of the intracranial tuberculosis. It was observed that there was no more significant difference between two diagnoses of these two pathologies, however MRI has proved to be more accurate in diagnosing these lesions. As

other studies have shown that histopathological correlation with imaging is an important in diagnosing intracranial tuberculosis, our study also shows the importance of this correlation and how it increases the accuracy of the diagnosis of intracranial tuberculosis.

The sensitivity of MRI was more in the diagnosis of spinal tuberculosis also as CT scan is not able to evaluate the extension of the lesion, the involvement of the articular discs and the compression of the spinal cord. However, bone destructions and calcifications were evaluated better on CT scan. Contrast studies were all the important in confirming the diagnosis in all the different manifestations of neuro-tuberculosis. Diffusion studies were also helpful in the evaluation of different intracranial manifestations of tuberculosis, but they were particularly important in the diagnosis of tubercular abscess. CT and MRI studies proved very important in the evaluation of follow up cases of neuro-tuberculosis and this further helped the clinician to set the treatment according to the improvement.

Even though MRI is the investigation of choice in almost all the cases, CT is advantageous as it is easily available, more cost effective, less claustrophobic and less time consuming. Hence, while MRI is the preferred investigation for evaluation of intracranial and spinal tuberculosis, CT scan is the initial investigation of choice. At the end, it is also important to remember the contributions that can be made by plain films and ultrasounds to optimize imaging of individual patients.

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7. References

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