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Radiodiagnosis

MR IMAGE SPECTRUM OF SPINAL TUBERCULOSIS

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ABSTRACT Spinal Tuberculosis is the commonest form of skeletal tuberculosis. The diagnosis is made on clinical and radiological grounds. MRI is the best diagnostic modality for the diagnosis of Spinal Tuberculosis. Here we present MR image spectrum of Spinal tuberculosis

KEYWORDS : MRI, spine, tuberculosis

Tuberculosis is one of the major health problems in the world[1]. It is a leading cause of disease burden, mainly in the developing countries. The worst affected population is young which is economically productive. The increasing incidence of HIV has contributed to resurgence of this disease, even in the developed countries. As a result, mortality in cases of tuberculosis has increased many times. The World Health Organization declared tuberculosis a global emergency in 1993.

Skeletal involvement occurs in 1-3% patients with tuberculosis[2]. Spinal Tuberculosis is the commonest form of skeletal tuberculosis and comprises of 50% all cases of skeletal tuberculosis[3]. The diagnosis is made on clinical and radiological grounds. Clinically, onset of symptoms is insidious and disease progression is slow. The patient presents with persistent back pain, low grade fever, weight loss and other non- specific constitutional symptoms.

Plain X-rays of spine are the first radiological evaluation to be carried out in cases of suspected tuberculosis[4-5]. Early changes are loss of normal curvature of the spine due to spasm of paravertebral muscles and reduced intervertebral disc space. They are difficult to demonstrate and are non specific. Typical abnormal changes like reduced IVD space, vertebral destruction and compression, and paravertebral abscess can hardly be seen before six months. More than 50% of the vertebra has to be destroyed before a lesion can be seen on a plain radiograph.

Tuberculosis may infect all or part of the vertebral body. The vertebral body is more involved than the appendages. The tubercle bacilli begin its destruction in cancellous bone and eventually extend to the cortex. The infection gradually spreads to adjacent vertebrae. The infection spreads to involve the adjoining discs by extension beneath the anterior and posterior longitudinal ligaments or penetration of the subchondral bone plate. Well defined margin of distinction are usually present. Reactive sclerosis or periostal reaction in the adjoining vertebral body is absent. With progression of disease, there is vertebral body collapse leading to angulation and gibbus formation. Severe Kyphosis results in spinal cord compression and disfigurement. Other characteristic features are skip lesions, interosseous abscess, subligamentous spread and epidural extension. Paraspinal spread may involve the psoas muscle. Calcification with the abscess is virtually pathognomonic of tuberculosis. There is absence of new bone formation.

MRI is the best diagnostic modality for diagnosis of Spinal Tuberculosis[6-10]. It is more sensitive than Radiography and more specific than CT. The advantages of MRI are high contrast resolution, direct multiplanar scanning, ability to detect marrow infiltration and epidural spread prior to morphological changes. The ability of MRI to detect tuberculosis of the spine earlier than other techniques could reduce bone destruction and deformity and diminish the need for surgical intervention. MRI provides the diagnosis of the TB of the spine 4-6 months earlier than conventional methods, offering the benefits of earlier detection and treatment. In those regions of spine in which visualization of lesions by radiography is difficult, such as in occipital cervical and cervico- thoracic junctions and in the posterior elements, MRI has proved very valuable.

Here we present MR image spectrum of Spinal tuberculosis. On MR images, vertebral marrow changes, intraosseous abscesses, paraspinal soft tissue abscesses, discitis, scoliosis and kyphosis, skip lesions, spinal canal encroachment, and root distortion are features pointing to tuberculosis. These features are readily detected on routine sagittal, axial and coronal images using T1- and T2- weighted sequences. With the multiplanar capability of imaging, the disease is readily shown at distant sites in cases with skip lesions. T1- weighted images usually show decreased signal within the affected vertebral marrow. On T2-weighted images a relative increase in signal intensity is noted within the diseased tissues.

Irregularity of end plates with loss of normal signal intensity on both T_1 and T_2 weighted images is seen. Depending on the progress and stage of the disease, three different patterns of infection are seen: Osteitis, Osteitis with an abscess, and Osteitis with or without an abscess plus discitis. The anatomical pattern revealed by MRI, particularly the soft tissue and disc involvement, yields greater specificity. The high contrast resolution greatly improves the detection of intraosseous abscesses, subligamental spread, epidural extension of infection, which is helpful in asymptomatic cases to reach the presumptive diagnosis. MRI is important in the evaluation of spinal cord and the nerve root integrity in the asymptomatic patient. MRI is also helpful in follow up cases. In countries where tuberculosis is endemic a therapeutic trial is a practical alternative to biopsy.

To conclude, early detection of Spinal Tuberculosis is key to its successful treatment. Timely treatment can avoid extensive investigations, treatment delay and adverse long term outcomes like neurological complications. MRI is an ideal modality for detecting tuberculosis spine disease early, assessing the extent of disease, identifying complications and for assessing response to treatment.

Fig 1: T_1 sagittal scan: Compression of L2 vertebra and discitis L1-L2 level: early tuberculosis

Fig 2: Axial MRI scan shows loss of normal marrow signal in vertebra: early tuberculosis

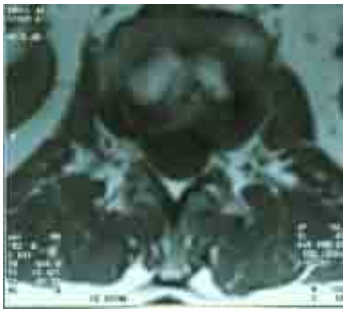

Fig 3: T2 coronal scan shows the infected vertebra and paraspinal collection: advanced tuberculosis

Fig 4: T2 sagittal images show multiple level infection: Skip lesions. The disc height and signal are normal. Protrusion of mass seen into the canal at D7, L1 and L3 levels.

Fig 6: Sagittal MRI shows gibbus deformity D12- L1 level with mass compressing upon the canal contents.

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