Research Article

Role of magnetic resonance imaging in evaluation of spinal paraparesis

Kapil Vyas[1], Ravinder Kumar[2]

[1]Department of Radio Diagnosis, Pacific Medical College and Hospital, Udaipur, Rajasthan, India.
[2]Department of Radio Diagnosis, Geetanjali Medical College and Hospital, Udaipur, Rajasthan, India.
Correspondence to: Kapil Vyas, E-mail: dr.vyas.kapil@gmail.com

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Abstract

Background: There may be various causative factors for the spinal paraparesis. Magnetic resonance imaging (MRI) is considered very useful for differential diagnosis.

Objective: To check the usefulness of MRI imaging in differential diagnosis of nontraumatic spinal paraparesis at our institute.

Materials and Methods: Fifty patients of nontraumatic spinal paraparesis were included in the study. MRI was performed as per the standard protocol. Sociodemographic findings and MRI findings were recorded on the predesigned pro forma. Descriptive statistics in the form of frequency and percentages were reported.

Result: The most common causative factor of paraparesis in this study was tuberculosis of spine (34%). Metastases were observed in nine (18%) patients, trauma in eight (16%), transverse myelitis in eight (16%), spondylosis in three (6%), spinal cord tumors (including neurofibroma, meningioma, dermoid, and astrocytoma) in four (8%), and central cause in one (2%).

Conclusion: MRI is a very useful imaging technique for differential diagnosis of spinal paraparesis at our institute.

KEY WORDS: Magnetic resonance imaging, MRI, spinal paraparesis, spinal tuberculosis, spinal tumor

Introduction

Spinal paraparesis is a serious condition where compression or injury of spinal cord leads to sensory and motor symptoms and signs. The compression may be because of various infective, neoplastic, and rheumatic reasons.[1] Proper diagnosis of causes of such compression is needed for better management of such patients. Magnetic resonance imaging (MRI) is considered as the best tool for differential diagnosis for the spinal paraparesis.[2,3] For diseases such as spinal tuberculosis (TB), a strong correlation is found between neurological recovery and MRI findings.[4]

In some institutions, MRI is now the primary imaging study for most spinal evaluations; in others, computed tomography (CT) and myelography still play a primary role. MRI techniques permit, in most instances, a clear differentiation of the spinal cord throughout its length or in parts, without ionizing radiation or intrathecal introduction of contrast media.[1]

This study was designed to analyze the performance of MRI for differential diagnosis of nontraumatic spinal paraparesis at our institution.

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Materials and Methods

The study was conducted in a tertiary-care hospital and in collaboration with MRI center attached to the Department of Radio Diagnosis of a tertiary-care hospital. Approval from

Institutional Ethics Committee was taken before starting the study. Patients with clinical diagnosis of paraparesis were explained about the study in the language they can understand, and those patients who were ready to give consent were included.

The clinical history, neurological examination finding, and appropriate investigations were recorded in predesigned pro forma. All the patients were evaluated by MRI of spine and MRI of brain (in appropriate cases). Imaging characteristics of various radiological modalities such as X-rays, CT, and MRI were recorded in all patients as per need. Management and final diagnosis were also noted. The results were analyzed and studied.

The MRI scans were performed using a superconducting 1.5 T permanent magnet scanner (Achieva, Philips) using standard spine coil for acquisition of images. Axial, coronal, and sagittal scans were obtained using multislice, multiecho sequences with slice thickness of 5 mm. The data acquisitions were done using a matrix of 256 × 256.

Statistical Analysis

Descriptive statistics was used in the form of frequency and percentage.

Result

Age of patients ranged from 15 to 80 years. Maximum number of patients was in fifth decade (12, 24%) followed by second and third decades. Duration of symptoms varied from a day to few years. Most of the patients showed acute onset (76%), 14% subacute onset, and remaining 10% chronic onset. The most common (52%) presentation was weakness of both lower limbs (LL), followed by complete inability to walk.

Of 50 patients, no abnormality was detected in 25 patients; in the rest of 25 patients, vertebral body involvement was seen in 23 patients (45%). A disc involvement was noted in 13 (26%) patients. Involvement of posterior elements was detected in four patients (8%). Paraspinal shadow was present in 10 of 50 (20%) cases. Dorsal and dorsolumbar spine involvement was the most common pattern seen in 28% of patients. Lumbar involvement was seen in 16%. Cervical and cervicodorsal involvement was seen in 2% and 4% of patients, respectively. It was normal in 50%. On the basis of X-ray spine, the major diagnosis was TB spine in 10 (20%) patients, metastases in five (10%), trauma in six (12%), spondylosis in two (4%), while one patient showed neurofibromatosis. A total of 25 of 50 (50%) patients showed no diagnosis on X-ray spine. Compressive paraparesis was found in 74% of patients, while noncompressive paraparesis was seen in 26% of patients. Dorsal region spine was the most common site of involvement in this study (16 of 50). The next common sites of involvement in decreasing order of frequency were dorsolumbar (seven of 50 patients), lumbar (seven of 50 patients), cervicodorsal (three of 50 patients), lumbosacral (one of 50 patients), cervical (one of 50 patients), and cervico-dorsolumbar regions (one of 50 patients).

The affected vertebral bodies showed T1 hypointense and T2 hyperintense in about 94% of patients. This pattern was seen in patients with Pott's spine and trauma, while T1 hypointensity with T2 heterogenous signal was seen in metastases.

Intervertebral disc involvement was seen in 22 (44%) patients. Abnormal signal was seen in six (12%) patients, herniation in eight (16%) and destruction in six (12%). Abnormal signal with decreased height was found in two (4%) patients, while normal in 28 (56%). Dorsal spine was the commonest site of compression seen in 23 (62%) patients, with cord compression. Lumbar region was the site in 10 (27%) of patients; cervical and multiple sites were seen in 2 (5.4%) patients. Involvements of the spinal cord showed altered signal in 36 (72%) patients, edema in 31 (62%), compression in 37 (74%), expansion in five (10%), space-occupying lesion in two (4%), and leptomeningeal enhancement in one (2%).

Confirmation of final diagnosis was done by histological confirmation or response to treatment. The most common causative factor of paraparesis in this study was TB spine (34%). Metastases were seen in nine (18%) patients, trauma in eight (16%), transverse myelitis in eight (16%), spondylosis in three (6%), spinal cord tumors (including neurofibroma, meningioma, dermoid, and astrocytoma) in four (8%), and central cause in one (2%).

Discussion

This study was done to explore the MRI findings in spinal paraparesis. MRI is an ideal method for evaluating infections of the spine. It is extremely sensitive in detecting and delineating infective lesions irrespective of their spinal location.

As per this study, the TB of spine is the most common cause for spinal paraparesis. Similar findings were also observed in other studies done in the Indian patients. In a study by Srivastava and Sanghavi,[5] MRI was done on 40 patients of spinal paraparesis, and it was observed that spinal TB account for the 30% cases. While in similar studies, done for the nonIndian patients, neoplasm was considered as an important reason for the spinal paraparesis.[6] This difference may be because of more prevalence of TB in India.

In this study, acute onset of symptoms was most commonly seen in 76% of patients followed by 14% with subacute and remaining 10% with chronic onset. Complete inability to walk was the most common symptom present in 52% patients, followed by weakness of both LL in 48% patients. Root pains were seen in 24% patients, and 30% patients showed constitutional symptoms. Sensory symptoms were seen in 26% of patients, and 26% showed involvement of bladder. Similar findings were also seen in other studies conducted with the same objectives.[7]

Compressive paraparesis was found in 74% of patients, while noncompressive paraparesis was seen in 26%. These findings are comparable to findings of a study by Ahmed et al.,[6] where 68.7% patients were of compressive and 29.4% noncompressive paraparesis. Pattern of involvement in Pott's spine in epidural abscess was present in 82% of patients in

this study. In the studies by Al-Mulhim et al.[8] and Loke et al.,[9] it was found to be 60.7% and 53.3%, respectively. Pattern of involvement in Pott's spine in paraspinal abscess was present in 71% of patients according to the study by Al-Mulhim et al and 73.3% according to the study by Loke et al., which are in accordance with 76% found in this study. Pattern of involvement in Pott's spine in subligamentous spread was seen in 59% patients. In the study by Loke et al.,[9] subligamentous spread was reported in 66.6% of cases, which is slightly higher to that found in this study.

This study has some limitations. The sample size is less and selected purposively and findings of MRI, particularly of neoplasia were not confirmed by CT scan for better differential diagnosis. On the basis of this study, it can be concluded that MRI using spin-echo technique provides an excellent demonstration of spinal cord. The ability to image the cord directly rather than indirectly as in myelography, absence of bone artifact as in CT, and multiplanner capabilities indicate that MRI is the procedure of choice in the examination of spinal cord.

Conclusion

MRI is a very useful imaging technique for differential diagnosis of spinal paraparesis at our institute.

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