Austin Journal of Radiology

Open Access

Austin Publishing Group

Research Article

Role of MRI in Non-Traumatic Paraparesis and Tetraparesis

Birendra Raj Joshi*
Department of Radiology and Imaging, Tribhuvan University Teaching Hospital, Nepal

***Corresponding author:** Birendra Raj Joshi, Department of Radiology and Imaging, Tribhuvan University Teaching Hospital, Kathmandu, Nepal

Received: September 09, 2015; **Accepted:** November 24, 2015; **Published:** December 05, 2015

Abstract

Background: This study was performed to assess the frequency of various causes of non-traumatic paraparesis and tetraparesis based on the findings of Magnetic Resonance Imaging [MRI].

Patients and Methods: A total of fifteen patients who presented with non-traumatic paraparesis and tetraparesis were studied. MRI of spine of all patients and MRI of brain of selected patients were carried out. Based on MRI findings alone causes of non-traumatic paraparesis and tetraparesis were categorized.

Results: Twelve cases were of paraparesis and three cases were of tetraparesis. Male to female ratio was 2:1. Mean age was 32.7. Infective spondylitis is still one of the common causes of paraparesis in developing countries accounting for almost 33% .Spondylotic myelopathy is the single most common cause of non-traumatic tetraparesis.

Conclusion: MRI is useful in differentiating between various causes of cord compression like neoplastic, spondylotic and infective lesions. Clinical and imaging evaluation of patients vary according to different regions.

Keywords: Cord compression; MRI; Myelopathy; Paraparesis; Tetraparesis

Introduction

Paraparesis and tetraparesis refers to weakness of both limbs and all four limbs respectively. The causes of non-traumatic paraparesis and tetraparesis are cord compression and non-compressive myelopathies. Acute cord compression should be diagnosed and treated early to prevent permanent neurological deficit. Cord compresssion may be due to primary or metastatic neoplastic diseases, degenerative disease, infective spondylitis, epidural abscess or hemorrhage and syringomyelia. MRI outlines the level and extent of cord compression. It can also differentiate various causes and site of origin. The causes of non-compressive myelopathies are infections [1] of cord, demyelinating and neuronal degenerative diseases, post-infectious and post vaccination myelopathies [2], post radiation myelopathies, cord ischemia and nutritional deficiencies and toxins. This study was carried out to assess the frequencies of compressive and non-compressive causes of non-traumatic paraparesis and tetraparesis using MRI alone in adult patients.

Patients and Methods

This descriptive, non-interventional study was carried out from July to December 2013. A total of fifteen patients who were referred for MRI due to non-traumatic paraparesis and tetraparesis were studied. MRI of cervical, dorsal and lumbar spine was carried out in the study using 0.2 Tesla MRI machine. A combination of sagittal and axial T1 and T2 weighted images were obtained in all patients. Coronal T1WI and T2WI were taken in some patients. Slice thickness was varied from 3-6 mm. Contrast enhanced scanning was done in selected cases. Post contrast sagittal and axial T1WI were taken. Gadolinium 0.1mmol\kg of bodyweight was used as intravenous contrast agent. Special sequences like fat saturation T1WI were also taken in some cases.

Based on MRI findings causes of paraparesis and tetraparesis were divided into two main categories. All those patients in whom there was evidence of compression of thecal sac and spinal cord were grouped together as cord compression. All those patients in whom there was no evidence of cord compression and no intracranial cause were identified for their symptoms were grouped together as non-compressive myelopathies. Age, gender, presenting complaint and MR disease category were recorded and these variables were analyzed.

Results

There were 15 cases who were included in the study. Out of which 12 were of paraparesis and 3 were of tetraparesis. Male to female ratio was 2:1 (Table 1 & 2).

Discussion

MRI is the investigation of choice for spine pathologies. The

Table 1: Age and sex distribution of paraparesis and tetraparesis cases in our study.

	Paraparesis	Tetraparesis
Number of cases	12	3
Male : Female	8:4	2:1
Mean age	32.7	26.6

Table 2: Differences between cord compression and non-compression cases in our study.

	Paraparesis	Tetraparesis
Frequency of cord-compression	75%	66.7%
Frequency of non-Compressive myelopathies	25%	33.3%

Joshi. © All rights reserved

Citation: Joshi BR. Role of MRI in Non-Traumatic Paraparesis and Tetraparesis. Austin J Radiol. 2015; 2(7): 1040.

Table 3: Frequency of disease pattern in cord compression category.

MR Disease Category	Paraparesis	Tetraparesis
Infective Spondylitis	5	-
Extradural neoplastic lesions	2	-
Spondylotic myelopathy	-	-
Extradural non neoplastic lesions	-	1
Intradural extramedullary neoplastic lesions	-	1
Syringomgelia	1	-
Intramedullary neoplastic lesions	1	-

Table 4: Frequency of pattern in non-compressive myelopathy category.

MR Disease Category	Paraparesis	Tetraparesis
Non-compressive myelopathy with normal MRI	-	-
Non-compressive myelopathy with focal cord lesions	3	1

frequencies of the causes of paraparesis and tetraparesis of the study demonstrates that the most common cause of cord compression was infective spondylitis. Focal cord changes are common in non-compressive myelopathy. Intracranial pathology was absent in all cases. These findings are similar to findings in Pakistan [3]. Cervical spondylopathy was the commonest cause in the study done by Moore [4]. These facts should be taken into consideratoin when studies are reveiwed from different regions. Clinical and imaging evaluation of patients should be also vary according to different regions. MRI of brain is useful in excluding intracranial causes such as parasagittal meningiomas, bilateral infarcts and sagittal sinus thrombosis [5] (Table 3 & 4).

In infective spondylitis there is loss of height of the disc with decrease in signal on T1WI and increase in signal on T2WI. There is disappearance of low signal intra-nuclear cleft on T2WI. Decrease in marrow signal is present in T1WI and increase in T2WI. Marrow signal becomes isointense after gadolinium administration (Figure 1).

Abscess may be intraosseous, epidural or paravertebral in location. Abscess appears as a fluid intensity mass with rim enhancement of thick irregular wall. Intraosseous and large paraspinal thick rim enhancement is diagnostic of tuberculous spondylitis [6]. Vertebral body collapse and loss of disc space height are sequelae of infective spondylitis.

Figure 1: Infective spondylitis with epidural abscess and cord compression. T1WI shows isointense D10 and 11. Hyper intensity is present anteriorly, in posterior elements and D10\11 disc in T2WI. Spinal cord is compressed.

Figure 2: Sagittal T1WI & T2WI shows intradural extramedullary mass probably schwanomma.

Figure 3: Sagittal T1WI & T2WI shows intradural extramedullary mass probably myxopapillary ependymoma.

Tuberculosis of spine was the most common cause of compressive myelopathy in the studies in India and Nigeria [7,8]. The therapy for spinal TB should be conservative since the neurologic deficits are mainly secondary to the inflammatory process. Usually these lesions respond to medical therapy alone, and with early diagnosis one can avoid unnecessary surgical intervention [9].

Bulging of annulus fibrosis, herniation of nucleus pulposus, hypertrophy of spinal ligaments, spinal canal stenosis, abnormal signal in spinal cord at compression site and atrophy are present in spondylotic myelopathy [10].

MRI plays a central role in the imaging of spinal tumours including location and characterization. Common extradural neoplastic lesions are metastatic deposits, multiple myeloma and lymphoma. Meningioma and schwannoma constitute intradural extramedullary tumour. Ependymoma and astrocytoma is intramedullary tumour [11] (Figure 2 & 3).

Syringomyelia may be simple syrinx or tumour-associated syrinx. Intracranial causes of paraparesis are parasagittal meningioma and sagittal sinus thrombosis.

In non-compressive myelopathy focal areas of abnormal signal intensities in the cord are present. Areas of abnormal enhancement in the cord or meninges may point towards inflammatory cause. Areas of demyelination of brain or optic tracts may be seen in demyelinating non-compressive myelopathies and acute disseminated encephalomyelitis [12].

In the study regarding paraparesis and tetraparesis cases performed by Ahmed N, Akram H and Quereshi IA, four major disease categories were infective spondylitis [23%], extradural neoplastic lesions [21%], non-compressive myelopathies [26%] and spondylotic myelopathy [15%] [3].

Moore et al reported that the commonest diagnosis were cervical spondylotic myelopathy [23.6%], extrinsic neoplastic tumour [16.4%] and non-compressive myelopathies [22%] [4].

T2-weighted spin-echo scans provided maximal sensitivity for the detection of multiple sclerosis plaques, although they lacked specificity for a special disease. MRI is the only non-invasive test with which to screen reliably the craniocervical junction and the upper cervical level, both of which are diagnostically difficult regions. Case studies of various uncommon causes like arachnoid cyst, intramedullary lipoma and granulocytic sarcoma have been reported [13].

Acute transverse myelitis is the commonest cause of non-compressive myelopathy in India and Nigeria [7,8,14]. Metastatic Epidural Spinal Cord Compression (MESCC) occurs when cancer metastasizes to the spine or epidural space and causes secondary compression of the spinal cord. MESCC is a common complication of malignancy that affects almost 5% of patients with cancer. The most common symptom is back pain. MESCC is a medical emergency that needs rapid diagnosis and treatment if permanent paralysis is to be prevented: the diagnosis of MESCC is best made with MRI [15]. Soft tissue epidural disease rather than collapse is the predominant cause of cord compression [16].

Conclusion

Finally, we conclude that MRI is useful in differentiating between various causes of cord compression like neoplastic, spondylotic and infective lesions. Neoplastic lesions may be subcategorized according to their compartment of origin. Clinical and imaging evaluation of patients vary according to different regions. Infective spondylitis [caries spine] is still one of the common causes of paraparesis in developing countries accounting for almost 33%.

References

1. Nabatame H, Nakamura K, Matuda M, Fujimoto N, Dodo Y, Imura T. MRI of syphilitic myelitis. Neuroradiology. 1992; 34: 105-106.
2. Tartaglino LM, Heiman-Patterson T, Friedman DP, Flanders AE. MR imaging in a case of postvaccination myelitis. AJNR Am J Neuroradiol. 1995; 16: 581-582.
3. Ahmed N, Akram H, Qureshi IA. Role of MRI in differentiating various causes of non-traumatic paraparesis and tetraparesis. J Coll Physicians Surg Pak. 2004; 14: 596-600.
4. Moore AP, Blumhardt LD. A prospective survey of the causes of non-traumatic spastic paraparesis and tetraparesis in 585 patients. Spinal Cord. 1997; 35: 361-367.
5. Tsuruda JS, Shimakawa A, Pelc NJ, Saloner D. Dural sinus occlusion: evaluation with phase-sensitive gradient-echo MR imaging. AJNR Am J Neuroradiol. 1991; 12: 481-488.
6. Sharif HS, Morgan JL, al Shahed MS, al Thagafi MY. Role of CT and MR imaging in the management of tuberculous spondylitis. Radiol Clin North Am. 1995; 33: 787-804.
7. Chaurasia RN, Verma A, Joshi D, Misra S. Etiological spectrum of non-traumatic myelopathies: experience from a tertiary care centre. J Assoc Physicians India. 2006; 54: 445-448.
8. Owolabi LF, Ibrahim A, Samaila AA. Profile and outcome of non-traumatic paraplegia in Kano, northwestern Nigeria. Ann Afr Med. 2011; 10: 86-90.
9. Hristea A, Constantinescu RV, Exergian F, Arama V, Besleaga M, Tanasescu R. Paraplegia due to non-osseous spinal tuberculosis: report of three cases and review of the literature. Int J Infect Dis. 2008; 12: 425-429.
10. Van Goethem JW, van den Hauwe L, Ozsarlak O, De Schepper AM, Parizel PM. Spinal tumors. Eur J Radiol. 2004; 50: 159-176.
11. Cassidy JR, Ducker TB. intradural neural tumors. In: Frymoyer JW, (edi). The adult spine: principle and practice. New York: Raven Press. 1991; 889-903.
12. Koeller KK, Rosenblum RS, Morrison AL. Neoplasms of the spinal cord and filum terminale: radiologic-pathologic correlation. Radiographics. 2000; 20: 1721-1749.
13. Ringelstein EB, Krieger D, Hünermann B. Evaluation by MRI of paraparesis and tetraparesis of undiagnosed aetiology. J Neurol. 1987; 234: 401-407.
14. Prabhakar S, Syal P, Singh P, Lal V, Khandelwal N, Das CP. Non-compressive myelopathy: clinical and radiological study. Neurol India. 1999; 47: 294-299.
15. Cole JS, Patchell RA. Metastatic epidural spinal cord compression. Lancet Neurol. 2008; 7: 459-466.
16. Pigott KH, Baddeley H, Maher EJ. Pattern of disease in spinal cord compression on MRI scan and implications for treatment. Clin Oncol (R Coll Radiol). 1994; 6: 7-10.

Austin J Radiol - Volume 2 Issue 7 - 2015
ISSN : 2473-0637 | www.austinpublishinggroup.com
Joshi. © All rights reserved

Citation: Joshi BR. Role of MRI in Non-Traumatic Paraparesis and Tetraparesis. Austin J Radiol. 2015; 2(7): 1040.