SPINAL MRI FINDINGS IN PATIENTS WITH SIGNS AND SYMPTOMS OF RADICULOPATHY IN SOKOTO, NORTHWESTERN NIGERIA

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ABSTRACT

Background: The aim of this study is to retrospectively assess spinal Magnetic Resonance Imaging (MRI) findings in patients with sign and symptoms of radiculopathy in Sokoto and its environs. MRI is generally more sensitive for depicting intrathecal pathology and soft tissue changes than plain radiography and computed tomography.

Method: We retrospectively retrieve the biodata, clinical information, MRI images and the radiologists' reports of 133 (one hundred and thirty three patients) from June 2010 to May 2011.The patients' age ranged from 8-70 years (mean age 42.4±SD12.7).The sex distribution of the patients was 76(57.1%) males and 57(42.9%) females. All the patients were referred from Neurosurgical, Neurology and Orthopedic units of Usmanu Danfodiyo University Teaching Hospital Sokoto and other Tertiary institutions. They presented with signs and symptoms of spinal pathologies. The patients had MRI of the spine using 0.2Tesla MRI machine by GE (General Electric).The data generated was analyzed using SPSS version 17.

Results: The patients' age ranged from 8-70 years (mean age 42.4±SD12.7) 76(57.1%) males and 57(42.9%) females. The commonest spinal MRI finding in this study was disc prolapse in 87(63%) patients. 19(14.3%) of the patients had normal spine. Pott's disease and spinal cord involvement following trauma were noted in 7(5.3%) each. Spinal meningioma was also documented in 1(0.8%) patient in this study. Spinal fracture from trauma and cases of spondylosis were noted in 6(4.5%) patients each.

Conclusion: Magnetic Resonance Imaging of patients with signs and symptoms of spinal disease revealed a high prevalence of spinal abnormalities. In view of the high yield from MRI examination. We suggest MRI as the first imaging modality for the assessment of suspected spinal pathologies.

Keywords: MRI, Spine, Sokoto, Nigeria

INTRODUCTION

Patients presenting with spinal symptoms often have imaging studies performed to determine if there is a significant structural abnormality in the spine. Plain film examination of the spine is the usual initial imaging technique but provides only limited or no diagnostic information. Magnetic Resonance Imaging (MRI) is generally more sensitive for depicting intrathecal pathology and soft tissue changes than the other modalities, either separately or in combination. MRI often has the capacity to differentiate which soft tissue changes are causing symptoms. The role of diagnostic imaging in patients with back pain is an important one in today's health care environment. Previous studies have demonstrated a high prevalence of morphologic abnormalities in both

symptomatic and asymptomatic individuals.[1,2] According to the United States(US) Census Bureau, between the years 2000 and 2010, the US population - aged 45 to 64 years and 65 years and over grew at rates of 31.5 percent and 15.1 respectively.[3] A similar trend was observed in Australia.[4] A recent cross sectional study suggests between 10-20 % of seniors over the age 70 reported more than 30 days of NP or LBP within the past year, with a significant proportion having diminished their physical activities due to neck pain (NP) (11 %) o low back pain(LBP) (15 %) within the past year.[5] The there is paucity of these data in our environment. However, radiographs are insensitive to disc herniaions and acute disc herniaions occur mostly in the 35–54 year age range. While degenerative disc bulges are more likely to occur in older individuals.[6] A recent systematic review and meta-analysis by Endean et al concluded that MRI findings of disc protrusion, nerve root displacement or compression and disc degeneration are all associated with LBP, but that individually, none of these abnormalities provides a strong indication that LBP is attributable to underlying pathology.[7] The aim of this study is to retrospectively assess spinal Magnetic Resonance Imaging (MRI) findings in patients with sign and symptoms of radiculopathy in Sokoto and its environs.

MATERIALS AND METHOD

We retrospectively retrieved the biodata, clinical information, MRI images and the radiologists' reports of 133 (one hundred and thirty three patients) from June 2010 to May 2011.The patients' age ranged from 8-70 years (mean age 42.4±SD12.7).The sex distribution of the patients was (57.1%) males and 57(42.9%) females. All the patients were referred from Neurosurgical, Neurology and Orthopedic units of Usmanu Danfodiyo University Teaching Hospital Sokoto and other Tertiary institutions. They presented with signs and symptoms of spinal pathologies. The patients had cervical, thoracic, thoracolumbar or lumbosacral MRI using 0.2Tesla MRI machine by GE (General Electric). MRI scans were done according to the departmental protocol, and were considered suitable for study if they included T1- and T2-weighted images of the cervical, thoracolumbar and lumbo-sacral spine and also axial T2-weighted images through the discs spaces. Each MRI scan was assessed by at least one or two radiologists according to a standardized protocol, and classified for the presence or absence of four abnormalities - disc herniation (protrusion, extrusion or sequestration); nerve root deviation or compression; disc degeneration and any other anomalies. Further details of the diagnostic criteria and the repeatability of the assessment are reported elsewhere.[8] The data generated was analyzed using the statistical Package for scientific Solutions (SPSS) version 17.The results were cross tabulated as frequency tables. Mean and ranges were used as appropriate to describe continuous variables. Significance was presumed for a p value <0.005.

RESULTS

The patients' age ranged from 8-70 years (mean age 42.4±SD12.7).The sex distribution of the patients under the study was 76 (57.1%) males and 57(42.9%) females. The commonest spinal MRI finding in this study was disc prolapsed in 87(63%) patients. 19(14.3%) of the patients showed normal appearances. Pott's disease and spinal cord involvement following trauma were seen in 7(5.3%) each. Spinal meningioma was also documented in 1(0.8%) patient in this study. Spinal fracture from trauma and cases of spondylosis were noted in 6(4.5%) patients each. Fig 1 is showing peak age of Disc prolapsed. **Age group in Patients with disc Prolapse is shown in Fig 2.** The regions **of investigation are shown in Fig 3.** Histogram showing clinical and radiological diagnosis is demonstrated in Fig 4. Sagittal MRI region of lumbosacral depicting a sizable disc prolapsed is shown in Fig 5. Multiple level disc prolapses with spondylotic changes is seen in Fig 6.

C5/C6 disc prolapsed with cord edema is demonstrated in Fig 7. Fig 8 shows Sagittal MRI of thoracolumbar region showing vertebral collapse of L1 with cord compression. Ethical approval for the study was obtained from Research Ethics Committee of Usmanu Danfodiyo University Teaching Hospital.

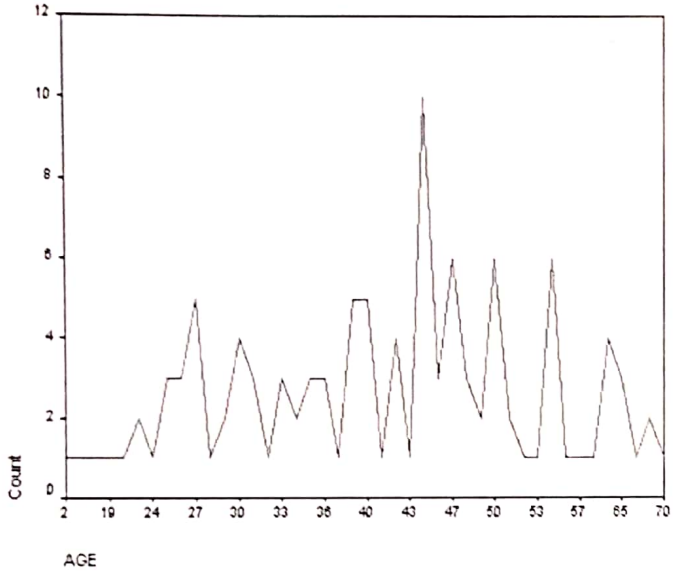

Fig. 1: This is a graph showing peak Age of Disc prolapsed.

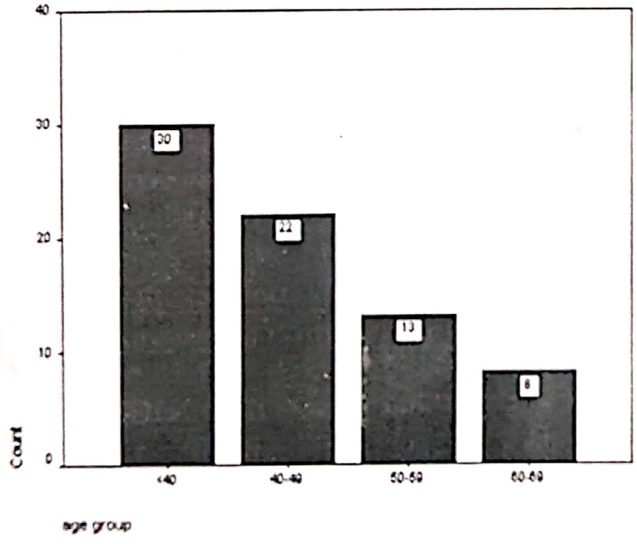

Fig. 2: Age group in Patients with disc Prolapse

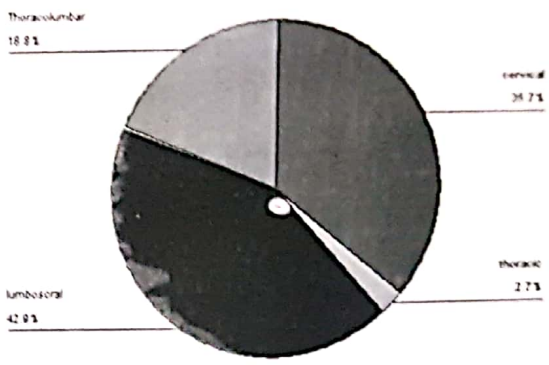

Fig. 3: This is a pie chart showing region of investigation

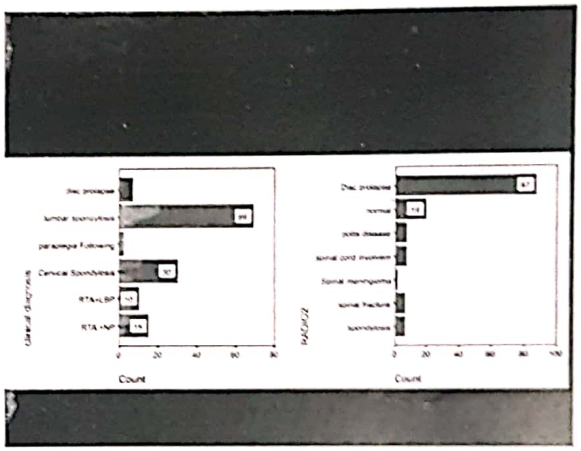

Fig. 4: Histograms showing clinical and radiological diagnosis

Fig. 5: Sagittal Magnetic Resonance Imaging region of lumbosacral showing disc prolapsed.

Fig. 6: **Sagittal Magnetic Resonance Imaging of the lumbar region showing multiple level disc prolapse with spondylotic changes.**

Fig. 7: **Cervical Magnetic resonance Image showing C5/C6 disc prolapsed with cord edema.**

Fig: 8 **Sagittal Magnetic Resonance Imaging of the thoracolumbar spine showing Traumatic injury to L1 with cord compression.**

DISCUSSION

Low back pain (LBP) and neck pain (NP) are the most common causes of physician visits in the United States with an enormous socioeconomic burden. Because of this burden, numerous studies have focused on its diagnosis and management. New technologies have been quickly adopted with the hope that they will improve our understanding of the physiopathology of the disease and assist us in alleviating patients' pain and discomfort. Unfortunately, previous studies have not been able to show that higher utilization of advanced imaging technology is associated with improvements in patient outcome. Current evidence suggests that most routine radiography of the spine is unnecessary during the initial evaluation of patients with LBP or NP unless specific clinical indicators suggestive of serious underlying conditions are present.[9,10,11] In our environment most of our patients presenting with LBP or NP are subjected to only plain x-ray examination because of availability x-ray services and the economic status of our patients, however with our center installation of 0.2Tesla Magnetic

resonance imaging (MRI) machine in 2010 some of the patients that can afford had the opportunity of having Magnetic resonance imaging (MRI) investigation.

A problem with MRI is the high prevalence of abnormal findings among individuals without LBP.[12] This high prevalence makes it difficult, or possibly even perilous, to attribute a patient's symptoms to certain imaging findings. The rationale for advanced imaging is frequently to identify rare but high-consequence conditions, such as metastases or infection. However, in the primary care population, less than 1% of all LBP patients have these conditions.[13] Therefore, the question remains how best to balance the high cost of procedures such as CT and MRI with their limited value in diagnosis and treatment of BP and NP patients. American Society of Spine Radiology, and American Society of Neuroradiology have defined herniated disk as a "localized displacement of nucleus, cartilage, fragmented apophyseal bone, or fragmented annular tissue beyond the intervertebral disc space".[14] In our study disc prolapsed was seen in 87(63%). Most of the MRI abnormalities tally with the clinical information, although frequent and disabling pain was more common in patients with initial evidence of disc degeneration. Other studies looking at the prognosis of LBP in relation to spinal pathology have produced inconsistent results. Among a group of patients treated by spinal fusion for chronic LBP, low disc height was associated with functional improvement after two years.[15]

A study has shown that degenerative changes were extremely prevalent; the only degenerative feature associated with self reported LBP was spinal stenosis. Intervertebral disc space narrowing (present in 63.9 % of spines), and facet joint osteoarthritis (64.5 %) were unassociated with LBP [16]. In our study disc prolapsed seen in 87(63%) patients and about 19(14.3%) show normal appearances. However, since age 65 or over is considered to be the age of presentation for spinal diseases, radiographs are often indicated at the time of initial presentation, especially if the patient has at least one additional symptom.

Additionally, lumbar spine radiographs are indicated in patients over 65 or those who have progressive neurologic deficits with suspected degenerative spondylolisthesis, lateral stenosis, or central stenosis. Oblique or flexion-extension radiographs, CT or MRI are not initially indicated in these patients and should be reserved for those with a failed 4–6 week trial of conservative care or deteriorating neurologic deficit or disabling leg pain. In contrast the peak age of our patients is 43-47 years this could be attributable to the fact that most of our patients are from the urban areas and can afford MRI investigations.

However, a study similar shows that radiographs are insensitive to disc herniations and acute disc herniations occur mostly in the 35–54 year age range. While degenerative disc bulges are more likely to occur in older individuals, they are not visible on radiographs either.[17] The purpose of diagnostic imaging is twofold: The first is to provide accurate anatomic information. The second, and perhaps most important, is to affect the therapeutic decision-making process.[18] The relevance of an imaging finding requires knowledge relative to the spectrum of changes, prevalence, importance, and behavior of change with time. MRI has become established as a valuable diagnostic procedure in cervical disc disease. Many authors have proposed the use of MRI is the diagnostic method of choice in cervical disc disease.[19,20,21,22] About 15 of our patient were diagnosed with cervical disc disease in the current study. One of limitations of our study was that all the patients were scanned using a 0.2Tesla MRI machine. About 5.3 percent of our patients shows features of pott`s disease. The best diagnostic modality for spinal TB is MRI.[23,24,25,26]

MRI is more sensitive than radiography and more specific than CT in the diagnosis of spinal TB. The anatomical pattern revealed by MRI, particularly the soft tissue and disc involvement, yields greater specificity. MRI can also provide the diagnosis of TB of the spine 4-6 months earlier than conventional methods, offering the benefits of earlier detection and treatment.[23] MRI allows for the rapid determination of the mechanism for neurologic compression and can distinguish between bone and soft tissue lesion (tuberculoma).

Meningiomas involving the spinal compartment are relatively rare in comparison to the intracranial compartment accounting approximately 1.2% of all Meningiomas of the central nervous system. Mostly, they are located in the intradural compartment, generally respecting the pial layer of the spinal cord. Isolated extradural spinal meningiomas are rare.[27,28,29,30] In the current study only one patient had spinal meningioma.

Five percent of our patient's presented with spinal trauma following Motor vehicle accidents (MVA). Vertebral fractures predominantly affect young men (traumatic injuries) and elderly women (osteoporotic fractures).[31] At the time of injury, the average age of patients with traumatic spine lesions is 32 years and 55% of those injured are aged 16–30 years. Approximately, half of spinal injuries occur in the cervical spine, the other half involves the thoracic, lumbar, and sacral areas. (MVAs) are the principal cause of spine trauma and account for approximately 40% of reported cases. Other injuries are typically the result of a fall or sporting activities.[32]

CONCLUSION

Magnetic Resonance Imaging of patients with signs and symptoms of spinal disease revealed a high prevalence of spinal abnormalities. In view of the high yield from MRI examination, we suggest MRI as the first imaging modality for the assessment of suspected spinal pathologies. The lack of radiation, high soft tissue contrast and capacity for multiplanar and three-dimensional imaging have made magnetic resonance imaging (MRI) the modality of choice for evaluating spinal cord diseases.

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