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Original Research Article

Evaluation of traumatic spinal injury using low tesla MRI scan in a semi-urban environment of Nigeria

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ABSTRACT

Background: Spine injuries following trauma could present with profound life-altering consequences. Most spine injuries follow motor vehicle accidents, falls, and violence. Neurological injuries are common sequelae of spine trauma with huge medical, financial, and social consequences. Magnetic resonance imaging (MRI) allows better visualization of the supporting structures and the spinal cord in such trauma. To evaluate the patterns of traumatic spine injuries on low Tesla MRI scans in a semi-urban environment in the North Central Region of Nigeria.
Methods: A retrospective study involving 92 patients who had spine MRI scans using a 0.2T machine following trauma to the spine from 2017 to 2021 at the Jos University Teaching Hospital.
Results: The male gender was the most affected accounting for 83.7% with age group 21-40 years being the most affected (54.3%), followed by age group 41-60 (26%). Over half (52.2%) of the patients had cervical spine injuries, 39.1% had thoracic spine injuries, and lumbar spine injuries were seen in 19.6% of the patients. On Spinal cord involvement, the study revealed that 19 (20.7%) were normal,13 (14.1%) had contusion (Haemorrhage) while 45 (48.9%), 7 (7.6%), 10 (10.9%), and 10 (10.9%) had compression, edema, partial transection and complete transection respectively.
Conclusions: 0.2T MRI was able to identify spinal injuries and these injuries mostly affect young adult males with the cervical spine being the most affected. Road Traffic-related incidents were the leading mechanism with Assault from ethno-religious crises and Injury arising from collapse mining ponds adding to it.

Keywords: MRI scan, Traumatic spinal injuries, Trauma

INTRODUCTION

Injury to the spine is common in Nigeria and worldwide and can be caused by a variety of mechanisms including motor vehicle accidents, falls, workplace accidents, and domestic violence.[1] It can present with different severity, and prognosis and can affect different structures ranging from the bones, soft tissues, and spinal cord. The presentation may range from asymptomatic to neurological dysfunction to even fatality. Spinal trauma can have a direct effect on the increase in economic cost and hospitalization as well as on the social and economic development of society.[1] Studies have shown that trauma to the spine is a major cause of death and disability in males, especially those within the economically productive age group causing significant human and economic losses.[2-4] n the USA, an estimated 40 per million cases of spinal injury with over 12 thousand cases of paraplegia are reported every year.[2] About 4000 and 1000 of the patients die even before admission to the hospital or after hospital admission respectively.[1,2] Globally, road traffic accidents (RTA) and fall from heights account for most of the cases with a lesser contribution from gunshot injuries and domestic violence in urban settings. Spinal cord injury mainly affects young people, mostly males, causing significant morbidity with huge human and

economic losses. In the United Kingdom, an estimated 50,000 people are living with spinal cord injuries, and approximately 2500 newly injured people are added to the above estimate.[2] The imaging assessment of traumatic spinal injury has dramatically changed over the years. A shift from the use of conventional radiography to multidetector computed tomography (CT) has been observed over. The use of CT has provided faster and more accurate evaluation of the spine.[5]

Magnetic resonance imaging (MRI) is now the modality of choice for critical follow-up studies in patients with severe trauma to the spine. It is the most acceptable modality in the assessment of extra-osseous injuries such as spinal cord injury, epidural hematomas, and ligamentous disruption in patients with negative CT studies. In comparison with CT, MRI allows better visualization and assessment of damage to the anterior, posterior and interspinous ligaments. It also helps identify chronic changes such as disc spondylosis, end plate marrow changes, and focal disc herniation.[6] T1 sequences are excellent for surveying the anatomy and caliber of the spinal cord. T2 images with or without fat saturation identify epidural fluid collections, ligamentous disruption, edema, and herniated discs.[7]

This study was conducted to evaluate the pattern of traumatic spinal injury using a low tesla MRI in a low-resource environment in North Central Nigeria.

METHODS

Study type

This is a retrospective study of traumatic spine injuries (TSI) findings on MRI scans done in the Department of Radiology at Jos University Teaching Hospital.

Study duration

The study period was from August 2018 to April 2021.

Inclusion criteria

Nine two patients who had come to the emergency ward of this hospital with suspected spinal injuries following trauma and who met the inclusion criteria were included in this study. The institution-based nature of this study may limit the scope of the results, as some cases of Spinal traumas in Jos go to other institutions or remain at home due to the biting economic situation in the country.

Statistical analysis

The data was collated and analyzed using Statistical Package for the Social Sciences version 11 software. Continuous variables are presented as means±SD., whereas categorical variables are presented as frequencies.

RESULTS

The study included 77 (83.7%) males and 15 (16.3%) females with more than half (54.3%) aged between 21-40 years. There was no difference between the age and sex distribution of patients (χ2 f=3.258, p value=0.525) (table 1).

Causes of injury

The major cause of traumatic spinal injury was a road traffic accident (RTA) representing 46.7%. Other causes include Fall from Height (23.9%), and Assault (20.9%) while other causes formed 18.5% (Figure 1).

Table 1: Age–sex distribution of patients (n=92).

Age (years)	Sex		Total
	Male (n=77)	Female (n=5)	
<20	15 (19.5)	1 (6.7)	16 (17.4)
21-40	39 (50.6)	11 (73.3)	50 (54.3)
41-60	21 (27.3)	3 (20.0)	24 (26.1)
61-80	1 (1.3)	0 (0.0)	1 (1.1)
≥81	1 (1.3)	0 (0.0)	1 (1.1)

χ2 f=3.258, p value =0.525, f=Fisher's Exact Test.

Table 2: Distribution of level of spinal Injury.

Level of injury	F	%
Cervical spine only	44	47.8
Cervico-thoracic	4	4.3
Thoracic spine only	26	28.3
Thoraco-lumbar spine	6	6.5
Lumbar spine only	10	10.9
Lumbosacral spine	2	2.2
Total	92	100.0

Table 3: Distribution of patients by osseous injury.

Osseous injury	F	%
Vertebral body		
Yes	47	51.1
No	45	48.9
Posterior element		
Yes	5	5.4
No	87	94.6
Dislocation/subluxation		
Yes	58	63.0
No	34	37.0
Intervertebral disc		
Yes	16	17.4
No	76	82.6
Normal		
Yes	1	1.1
No	91	98.9

Level of spinal injury

The study revealed the following levels at which the injury occurs, cervical spine only (52.2%), cervico-thoracic spine (4.3%), thoracic spine only (39.1%), thoraco-lumber spine (6.5%), lumbar spine only (19.6%) and lumbo-sacral spine (2.2%) (Table 2 and Figure 2).

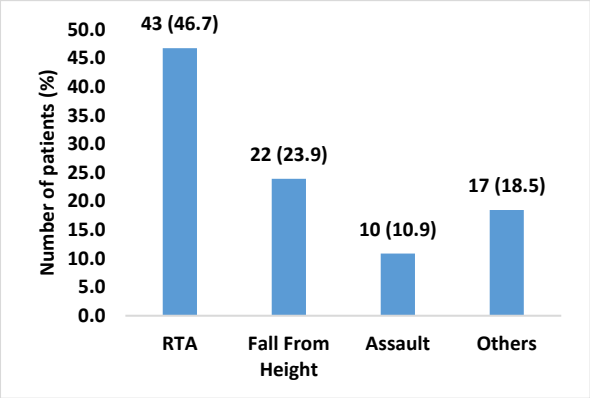

Figure 1: Distribution of patients by cause of injury (n=92).

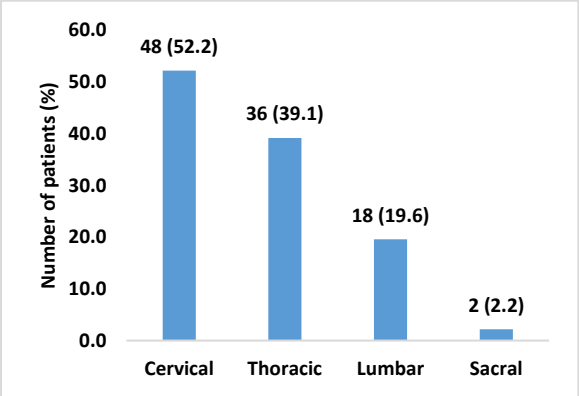

Figure 2: Distribution of level of spinal injury (n=92).

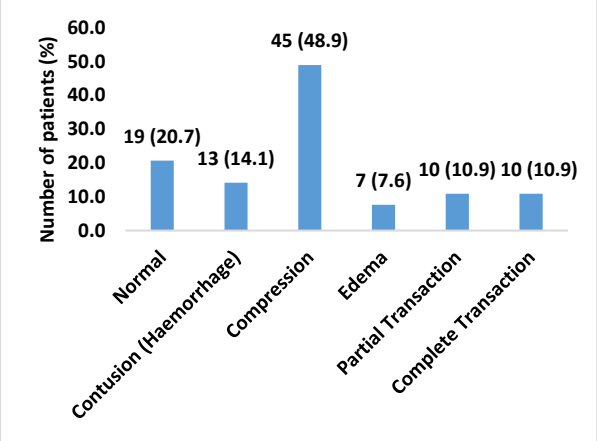

Figure 3: Distribution by spinal cord involvement (n=92).

Osseous injury

Finding on Osseous Injury revealed that 47 (51.1%) had Vertebral body involvement, while 5 (5.4%), 58 (63.0%), and 16 (17.4%) had Posterior element, dislocation/ subluxation and intervertebral disc respectively (Table 3).

Spinal cord involvement

Spinal cord involvement in the study revealed that 19 (20.7%) were normal. However, 13 (14.1%) had contusion (Haemorrhage) while 45 (48.9%), 7 (7.6%), 10 (10.9%) and 10 (10.9%) had compression, edema, partial transaction and Complete transaction respectively (Figure 3).

DISCUSSION

Traumatic spinal injury (TSI) has been on the rise in Jos and the environment due to the rise in the collapse of mining pits, recurrent unrest from ethno-religious, Road traffic accidents and herder-farmers conflicts over the years. This retrospective review tries to evaluate the characteristics of spinal injuries on magnetic resonance imaging (MRI) scans done at the radiology department of Jos University Teaching Hospital.

The study revealed that an overwhelming number of TSI evaluated at the facility during this period were males accounting for 83.7% with 54.3% in the age group (21-40 years). This finding corroborates other studies and further highlights the devastating effect of TSI on the economy due to the loss of the most productive age group. These effects are not limited to the individual but rather affect the family, society, and national economy.[1,2,4,8,9,10,12]

Road traffic accidents were found to be the most common cause of TSI in our study, followed by falls from height, assault, and others. Assault and others here include victims from the herder-farmer conflicts, ethno-religious conflicts, and those affected by the collapsed mining ponds in our environment. This finding has remained a consistent pattern as reported globally by researchers.[1,2,4,11]

A study by Johny PB et al, Nagvekar RA et al, and Yawar Haider et al, showed 62%, 50% and 53.4% of the injury were due to falls from heights, while 37%, 28.5% and 39.6% were due to road accidents respectively.[1] Rehabilitation of our dilapidated road network, better driving culture amongst our drivers plying these roads and adherence to road traffic regulations could go a long way to turn these tides.[9,10]

Our study also revealed, the cervical spine region to be the most affected region of the spine in traumatic spine injury in our environment, closely followed by the thoracic, lumbar and the sacral region being the least affected. The cervical segment of the spine is mostly affected due to the greater freedom of movement at this level and the most likely to be injured in rapid deceleration accidents as seen

in RTA. These findings are in tandem with previous studies.[1,8,9,20] While some studies reported that lumbar spine region is the most affected.[2,12-14] Injuries to the spinal column and the spinal cord affects predominately young healthy individuals with important socioeconomic consequences. Approximately 14-20% of osseous spinal fractures are accompanied by spinal cord injury and because of the potential for tremendous morbidity and even mortality, prompt diagnosis and appropriate management of an unstable spine injury is critical.[17-19] The osseous components involved, our study revealed vertebral body injury and dislocation/subluxation at the disc level as the commonest accounting for 51.1% and 63% respectively. Johny PB et al, and Nagvekar RA et al, reported similar findings.[1,9]

Spinal cord injuries can have a devastating neurological impairment to the survivor depending on the degree of severity. Imaging using MRI has been established as a very important investigative management tool in patients with suspected spinal cord injury. This study revealed that 19 (20.7%) were normal, 13 (14.1%) had spinal cord contusion (Haemorrhage) while 45 (48.9%), 7 (7.6%), 10 (10.9%) and 10 (10.9%) had Compression, edema, partial transaction and complete transaction respectively. Shrestha S et al, in their study in Nepal, shows about half (49.51%) had no neurological deficit (ASIA E), 29.13% had complete neurological injury (ASIA A) and 21.36% had incomplete neurological injury (ASIA B, C and D).[18,19]

CONCLUSION

Traumatic spinal injury in Jos, North Central Nigeria is common and comes with a devastating economic burden to the patient, family, and the community. It is mainly due to RTA with Assault from ethno-religious crises and Injury arising from collapse mining ponds adding to it. Young male adults are the most affected demographics because they are the most economically buoyant and productive age group in any society and hence likely to be exposed to numerous physical activity-related hazards.

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REFERENCES

1. Bollipo JP, Rao PB. Evaluation of spinal injuries by MRI. Int Surg J. 2019;6(2):542-6.
2. DC Obalum, SO Giwa, TO Adekoya-Cole and GO Enweluz. Profile of spinal injuries in Lagos Nigeria. Spinal Cord. 2009;47:134–7.
3. Cornelius Mahdi Ishaku, Buba Kabaju Jaw. Pattern and outcome of traumatic spinal cord injury managed at university of Maiduguri teaching Hospital, Nigeria: a retrospective study. Niger Postgrad Med J. 2021;28:39-44.
4. Kawu AA. Pattern and presentation of spine trauma in Gwagwalada-Abuja, Nigeria Nigerian Journal of Clinical Practice. 2012;15:12-8.
5. Munera F, Rivas LA, Nunez DB, Quencer RM. Imaging evaluation of adult spinal injuries: Emphasis on multidetector CT in cervical trauma. radiology.rsna.org 2012;3(263):645-60.
6. Potter K, Saifuddin A. MRI of chronic spinal cord injury. Brit J Radiol. 2003;76(905):347-52.
7. Utz M, Khan S, Connor DO, Meyers S. MDCT and MRI evaluation of cervical spine trauma. Insights Imaging. 2014;5:67–75.
8. Ochie K, Okpala OC, Ohagwu CC, Eze CU. Profile of MRI findings and neurologic impairment in spinal cord injury patients at Lagos university teaching hospital, Nigeria. World J Med Sci. 2013;8(4):418-23,
9. Nagvekar RA, Nagvekar P. Low tesla MRI in acute spinal injuries: a study in a teaching hospital. Inter J Advances Med. 2017;4(1):108-11.
10. Haider Y, Bhat TA, Beigh IA. Spine injury patterns in adults: a retrospective study in a tertiary care institute of North India. JMSCR. 2012;7(9):657-61.
11. Holmes BD, Brazauskas R, Ameh EA, Olaomi OO, Cassidy LD. When walking is bad for your back: a cohort study of risk factors for traumatic spinal injury in Abuja. Pan Afr Med J. 2019;33:60.
12. Shrestha S, Dhakal GR, Marasini RP, Joshi KM. Epidemiological and demographic characteristics of patients with traumatic spinal injury and its neurological outcome. Nepal Orthopae Asso J (NOAJ). 2021;7(2):3-6.
13. Liu P, Yao Y, Liu MY, Fan WL, Chao R, Wang ZG, et al. Spinal trauma in mainland China from 2001 to 2007: an epidemiological study based on a nationwide database. Spine. 2012;37(15):1310-5.
14. Tafida MA, Wagatsuma Y, Ma E, Mizutani T, Abe T. Descriptive epidemiology of traumatic spinal injury in Japan. J Orthop Sci. 2018;23(2):273-6.
15. Nidharshan S. Anandasivam, Nathaniel T. Ondeck, Paul S. Bagi, Anoop R. Galivanche,Andre M. Samuel.et al. Spinal fractures and/or spinal cord injuries are associated with orthopedic and internal organ injuries in proximity to the spinal injury. NASSJ. 2021;6:10-15.
16. Qureshi MA, AB, Pasha IF, Asad A, Malik AS, et al. Epidemiology of non-disaster spinal injuries at a spine unit. J Coll Physi Surg Pak. 2010;2(10):667-70.
17. Luc van Den Hauwe, Pia C. Sundgren, Adam E. Flanders. Spinal trauma and spinal cord injury (SCI). Diseases of the Brain, Head and Neck, Spine. 2020. Available at: https://www.ncbi.nlm.nih.
18. Riggins, Richard MD, Kraus JF. The risk of neurologic damage with fractures of the vertebrae. J Tra: Injury, Infection, and Critical Care.1977;17(2):126-33.
19. NSCSC. Spinal cord injury facts and figures at a glance. 2013. Available at: https://www.nscisc.uab. Accessed on 16th October 2013.

20. Venu M. Nemani, Han Jo Kim. The management of unstable cervical spine injuries. clinical medicine insights. Trauma Inten Med. 2014;5:7–13.

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