

# **ROLE OF MULTI DETECTOR COMPUTED TOMOGRAPHY AND MAGNETIC RESONANCE IMAGING IN SPINAL TRAUMA AT TERTIARY CARE CENTRE- AN OBSERVATIONAL STUDY.**

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## **ABSTRACT**

The common causes of spinal trauma are blunt injuries -motor vehicle accidents, falls, diving accidents, sport injuries, assaults. Penetrating injuries like stab wounds or gunshot wounds are rare causes of spinal trauma. MRI is an excellent diagnostic modality for evaluation of spinal trauma. Our study is to evaluate the role of magnetic resonance imaging (MRI) and MDCT as a non-invasive diagnostic tool in patients with acute and chronic spinal trauma and to compare these findings with those of patients' clinical profile. Retrospective observational study on clinically indicated 50 patients with a history of spinal injury and who had undergone MDCT and MR imaging of spine from 2019 to 2021 were included in study after informed consent. The study group consisted of 38 male patients and 12 female patients. The group included was from 14years - 85 years.

**INCLUSION CRITERIA:** 1.Patients with history of SPINAL TRAUMA and those presented with pain, instability caused by mechanical stress and autonomic dysfunction, referred to radiology department of OSMANIA GENERAL HOSPITAL.

**EXCLUSION CRITERIA:** Patients with claustrophobia, pregnant women, patients with spinal tumours, patients with spinal infections.

MDCT was performed on Hitachi sceneria 128 slice CT in both soft tissue and bone algorithms without contrast administration

Results are analyzed under SPSS Software showing dorsal spine was the most commonly involved (in 38% of the cases); RTA(68%) was the most common causes of spinal injury followed by fall from a height (20%). Most common skeletal injury in cervical spine was posterior elements fracture (44%); wedge compression (31%) and

burst fracture (31%) in dorsal spine and burst fracture (48%) in lumbar spine.

**Keywords:** MRI, CT, Road Traffic Accidents, Spinal Injuries, Cervical spine, Dorsal spine, Lumbar Spine

## INTRODUCTION.

- The common causes of spinal trauma are blunt injuries -motor vehicle accidents, falls, diving accidents, sport injuries, assaults. Penetrating injuries like stab wounds or gunshot wounds are rare causes of spinal trauma.. Our study mainly focused on MDCT and MRI findings in spinal trauma and to evaluate the role of magnetic resonance imaging (MRI) and MDCT as a non-invasive diagnostic tool in patients with acute and chronic spinal trauma and to compare these findings with those of patients' clinical profile and neurological outcome to assess prognostic and clinical value of MRI and MDCT.
- **Materials and Methods**
- We retrospectively evaluated 50 patients with a history of spinal injury and who had undergone MDCT and MR imaging of spine from 2022 to 2023 were included in study after informed consent.
- **INCLUSION CRITERIA** : 1. Patients with history of SPINAL TRAUMA and those presented with pain, instability caused by mechanical stress and autonomic dysfunction, referred to radiology department of OSMANIA GENERAL HOSPITAL.
- **EXCLUSION CRITERIA** : Patients with claustrophobia, pregnant women, patients with spinal tumours, patients with spinal infections.
- MDCT was performed on Hitachi scanner 128 slice CT in both soft tissue and bone algorithms without contrast administration .MRI was performed on a 1.5 Tesla (General electrical medical system) without contrast administration.

## DISCUSSION

Fifty patients who presented to our hospital with the history of spinal trauma and underwent MDCT and MRI of spine in a time period from November 2019 to October 2021 were included in the study.

Out of 50 patients, 38 were males and 12 were females. Out of 38 male patients, 11 had injury to the cervical spine, 17 to dorsal spine and 10 to the lumbar spine. Out of 12 female patients, 3 had injury to the cervical spine, 2 to the dorsal spine and 7 to lumbar spine.

Of the 50 patients, 14 had injury to the cervical spine, 19 to the dorsal spine and 17 to lumbar spine. In the cervical spine commonest level of involvement was C3-C4; in the dorsal spine D11-D12 was commonly involved and in the lumbar spine L1 vertebra was commonly involved.

SCIWORA (spinal cord injury without radiographic abnormality): Noted in 6 cases most common region was dorsal spine followed by lumbar and cervical region.

The dorsal spine was the most commonly involved (in 38% of the cases); the lumbar, cervical spines were involved in 34% and 28% respectively. C2, C3/C4; D11/D12; L1 were the most

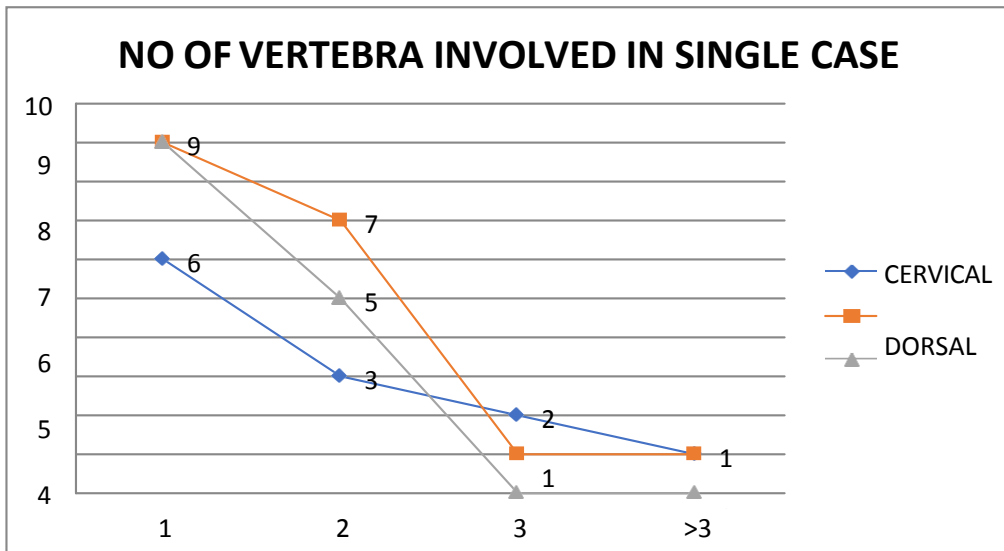
commonly involved. The dorso-lumbar junction is more prone to injury due to the change in the curvature and centre of gravity of the dorsal and lumbar spine.

The dorsal spine was the most commonly involved (in 38% of the cases); RTA(68%) was the most common causes of spinal injury followed by fall from a height (20%).Most common skeletal injury in cervical spine was posterior elements fracture (44%); wedge compression (31%) and burst fracture (31%) in dorsal spine and burst fracture (48%) in lumbar spine.Cord compression

(34%) was the common presentations of cord injuries followed by cord edema (26%), and cord edema had better prognosis compared to cord compression and haemorrhage; worse neurological outcome was seen with cord transection and haemorrhage.MDCT was able to detect most of the skeletal injuries both body and posterior elements of vertebra with more than 95% sensitivity.MRI was able to detect most of the skeletal injuries though less sensitive in detecting posterior element fractures (72.7% sensitivity).We encountered 4 cases of cord transection, one case of nerve root avulsion,one case of pneumorrhachis. MRI was able to detect intervertebral disc injury with 100% sensitivity.Though MRI overestimated anterior longitudinal ligament injury, Interspinous ligament injury and underestimated Ligamentum Flavum injury; it has good sensitivity in depicting ligamentous injuries.

Table-1 SKELETAL LEVEL INJURY

CERVICAL		LUMBAR		LUMBAR	
LEVEL	NO OF CASES	LEVEL	NO OF CASES	LEVEL	NO OF CASES
C1	0	D1-D4	1	L1	7
C2	3	D5-D9	5	L2	5
C3/C4	3	D10-D12	11	L3	1
C4/C5	2			L4	1
C5/C6	2			L5	1
C6/C7	1				



Graph-1 Number of vertebra involved in single case

Table.2 SKELETAL INJURIES AT CERVICAL SPINE

Hyperflexion sprain	1
Compression fracture	3
Flexion tear drop fracture	1
Bilateral facet dislocation	2
Unilateral facet dislocation	1
Burst fracture	1
Posterior element fracture	7



Image.1 Sagittal MDCT showing anterior wedge fracture of L1 and L2

## Summary

Magnetic resonance imaging is the only tool available for depicting the changes within the cord, ligaments and paraspinal soft tissues which helps in the management of the patients and in predicting the prognosis of recovery. In our study MDCT and MRI were complementary to each other in evaluation of spine injuries. MRI was significantly superior to MDCT in the diagnosis of bone marrow edema, PLC injuries, disc herniations, spinal cord contusion, edema and haemorrhage.

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