

# Frequency and Pattern of Cervical Spine Injuries at Liaquat University Hospital Jamshoro - A Retrospective Study of Three Years

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## ABSTRACT

**OBJECTIVE:** To find out the frequency and patterns of cervical spine injuries at Liaquat University Hospital Jamshoro and to compare it with other studies.

**STUDY DESIGN:** Retrospective descriptive study.

**PLACE AND DURATION OF STUDY:** Department of Neurosurgery, Liaquat University Jamshoro, from September 2005 to August 2008.

**PATIENTS AND METHODS:** The records of 46 patients between 13-70 years age presenting with cervical spine injuries were included. After resuscitation all the patients underwent thorough neurological examination. Cervical spine X-Rays and MRI advised. The retrieved data was collected on proforma. Frequencies and percentages were calculated for categorical data, whereas mean and SD were calculated for numerical data.

**RESULTS:** Out of 46 patients 39 were males, 7 patients were females. Mean age was 33 years (range 13-70 years). Majority (43.47%) of patients sustained injuries due to fall from height. Six (13.64%) patients sustained C1-C2 injuries, while rest of patients had lower cervical injury between C3-T1. Radiological studies showed vertebral body fracture with subluxation in 21 (45.6%) patients whereas only subluxation without fracture was observed in 10 (21.73%) patients. About 12 (26.08%) patients developed vertebral body fracture after injury, while 3 (6.51%) patients had only neurological cord injury without any bony or ligamentous injury. About 31 (67.39%) patients sustained incomplete cord injury while 15 (32.60%) patients had complete cord injury.

**CONCLUSION:** Majority of patients sustained cervical spine injuries after fall. Cervical spine injuries are common in young adult males. Subluxation associated with vertebral body fractures is the most common injury pattern.

**KEY WORDS:** Cervical Spine, Spinal Cord, Spinal Injuries, MRI, X-ray.

## INTRODUCTION

The cervical spine, being the most mobile portion of the spine, is the most common site of spinal injuries. The relative incidence of cervical spine injury is 60%, thoracic 8%, thoracolumbar 20%, lumbar 10%, sacral 2%.<sup>1</sup> An estimated 12000-14000 spinal cord injuries occur each year out of the total spinal column injuries in the U.S.<sup>2-7</sup> Nearly 10000 patients die each year as a result of an injury to the spinal cord.<sup>6,8-11</sup> Most patients 82% are males in 16-30 years age group.<sup>12</sup> Second smaller peak occur in people older than 55 years.<sup>13</sup> Most spinal cord and cervical spine fractures result from motor vehicle accidents (42-56%), fall from a height (19-30%), gunshots (12-20%), and sports related activities (6-7%).<sup>14</sup>

Cervical spine injuries cause a broad spectrum of disabling conditions, ranging from minor pains to quadriplegia and even death.<sup>15</sup> The extent of neurological deficit varies with the age, mechanism of injury, the type of injury, the type of pathology present, such as hematoma, bone fragments or disc material that may be intruding upon the spinal cord.<sup>5,6,14-18</sup> Some

patients suffer complete cord injury i.e no preservation of any motor and/or sensory function more than three segments below the level of injury at the time of initial injury and have fixed neurological deficits, whereas some patients suffer incomplete cord injury i.e preservation of any motor and/or sensory function more than three segments below the level of injury. Overall four patterns of injury are recognized on radiographic studies. Vertebral body fractures 26%, vertebral fractures with subluxation 30%, subluxation without vertebral fractures 24%, and spinal cord injury without radiographic evidence of fracture or subluxation 12%.<sup>13,14,19</sup> Atlanto-occipital dislocation may be present in 1% of patients with cervical spine injuries.<sup>20</sup> Acute C1 fractures account for 3-13% of cervical spine fractures.<sup>21</sup> Acute fractures of C2 represent 18-20% of cervical spine fractures.<sup>16,17,19,22</sup> Injuries to C1 may occur in isolation but 40% are associated with fractures of C2.<sup>14,23,24</sup> Nearly 75% of all cervical spine fractures occur between C4 and T1.<sup>2,5</sup> The most common level of cervical vertebral fractures is C5 and the most common level of subluxation injury is the C5-C6 interspace.<sup>2,5,6</sup> Subluxation associated with vertebral body

fracture results in a high incidence of spinal cord injury.<sup>11,19</sup> There is a small subset of adults who have signs of spinal cord injury, but who have no fracture or subluxation demonstrable on X-Rays or CT. This is much more common in children and has been called spinal cord injury without evidence of radiological abnormality<sup>25</sup> in which the spinal cord may undergo contusion, transection, infarction, stretch injuries or meningeal rupture.

The aim of this study is to find out the frequency and patterns of cervical spine injuries at Liaquat University Hospital Jamshoro and to compare it with other studies.

**PATIENTS AND METHODS**

In this retrospective study the records of patients were analyzed who presented with cervical spine injuries and were admitted at Neurosurgery department, Liaquat University Hospital, Jamshoro from September 2005 to August 2008, which represent 49.46% of all spinal injuries admitted during this period. Patients of either sex were included in the study. Patients having age below 12 years, severe head injury and associated malignant disease were excluded from the study.

Patients of cervical spine injuries were examined by registrar on call. ATLS protocol was followed and prompt resuscitation was carried out. During the primary survey, after applying hard cervical collar, patients were assessed and their treatment priorities were established based on their vital signs and the pattern of injuries.

Secondary survey that constituted a detailed head to toe examination and thorough neurological examination of every patient was done in ward and records were maintained. Cervical spine x-ray series which includes antero-posterior, lateral and open mouth radiographs of cervical spine which includes the cervico-thoracic junction and MRI cervical spine was advised. Retrieved information of every patient was recorded on a proforma. SPSS version 10 was used to analyze the data. Frequencies and percentages were calculated for categorical data, whereas means and standard deviations were calculated for numeric data.

**RESULTS**

During the study period, 93 patients were admitted with spinal injuries, out of which 46 patients had cervical spine injuries constituting about 49.46% of all spinal injuries. Nearly 13 (28.26%) patients were directly admitted to the accident and emergency department from the scene of trauma while 33 (71.74%) patients were referred from periphery hospitals. Patients' age ranged from 13-70 years as shown in **table I**. The majority of patients belong to the 3<sup>rd</sup> decade. Male to

female ratio was 5.5:1. Most of the patients were male constitute 39 (84.78%), whereas only 7 (15.21%) patients were females. Majority of patients (43.47%) sustained cervical spine injury due to fall from height, whereas 34.78% patients were victims of road traffic accidents. The detailed account of mechanism of injury is mentioned in **table II**. Associated injuries were noted in 13 (28.26%) patients, out of these, nine patients had head injury while two patients suffered chest trauma and two patients had long bone fractures. Six (13.64%) patients sustained C1-C2 injuries, while rest of patients had lower cervical injury from C3-T1. Among them commonest site is C5-C6 level. Radiological studies showed vertebral body fracture with subluxation in 21 (45.6%) patients whereas only subluxations without fracture were observed in 10 (21.73%) patients as mentioned in **table III**. Twelve (26.08%) patients developed vertebral body fracture after injury, while 3 (6.51%) patients had only neurological cord injury without any bony or ligamentous injury. About 31 (67.39%) patients sustained incomplete cord injury while 15 (32.60%) patients had complete cord injury. An interesting observation in this study was that 70-80% of patients who sustained complete cord injury developed high grade fever and bradycardia. Priapism was seen in only two patients.

**TABLE I: AGE DISTRIBUTION**

Age in years	No of patients	%
13-20	7	15.21
21-30	16	34.78
31-40	12	26.08
41-50	5	10.86
51-60	4	8.69
61-70	2	4.34

**TABLE II: MECHANISM OF INJURY**

Mechanism of injury	No of patients	%
Fall from height	20	43.47
Motor vehicle accident	16	34.78
Suicidal hanging	01	2.17
Assault	01	2.17
Diving	03	6.52
Sports related	01	2.17
Fall of heavy object over head or neck	04	8.69

**TABLE III: RADIOLOGICAL FINDINGS**

Radiological findings	No of patients	%
Subluxation only	10	21.73
Subluxation with vertebral body fracture	21	45.6
vertebral body fracture	12	26.08
SCIWORA	03	6.51

## DISCUSSION

Several factors contribute to differences in the frequency, type, location and incidence of cervical spine injuries. The cervical spine is the most vulnerable segment to injury. In this study it constitutes 49.46% of all spinal injuries whereas other studies show its incidence around 60%.<sup>1</sup> The age of these patients ranged from 13-70 years. Most of the patients in our study were males and were in 3<sup>rd</sup> decade. This observation is comparable with other studies,<sup>12</sup> and so this suggests that young adult males are more subjected to trauma. Regarding the cause of cervical spine injury, this study shows that majority of patients sustained cervical spine injury after fall from height whereas other studies<sup>14</sup> suggested motor vehicle accidents as the major cause of cervical spine injuries. In this study, majority of patients who presented with history of fall from height, came from desert area of the parker. Majority of them had fall from Kandi, a tree from which villagers used to cut leaves for their animals. Four patients had history of fall from camel were also from the same region. Remaining patients had history of fall from electric poles, and this is alarming and disappointing fact suggestive of unskilled persons who handle high tension wires without proper safety measures. In this study, 34.78% patients suffered from cervical spine injury in motor vehicle accidents and this is a less prevalent cause as compared to other studies.<sup>14</sup> It is partially explained by the fact that although there are infrequently observed safety measures such as seat belts during travelling but there are less number of high speed vehicles in this region. In this study, about 13.04% patients sustained higher cervical injury while rest of patients had lower cervical spine injury and this fact is comparable with other studies.<sup>2,5</sup> In this study, 45.6% patients sustained subluxation with vertebral body fracture, 21.73% had subluxation without vertebral body fracture, 26.08% had vertebral body fracture and SCIWORA was noted in 6.51% and these correlate with other studies.<sup>2,4,6,9,13,14,19</sup> Patients with a dislocation or fracture-dislocation have a higher incidence of neurological injury than patients with a fracture alone. This finding is to be expected because dislocation and fracture-dislocation cause a greater

degree of displacement, and more force is usually required to produce such displacement. High grade temperature and bradycardia was noted in 70-80% of patients having complete cord injury. The likely pathophysiology is not clear. Loss of sympathetic outflow, loss of vasomotor control and increased vagal activity are assumed to be underlying mechanism but this aspect needs to be explored in future studies.

## CONCLUSION

Majority of patients sustained cervical spine injuries after fall. Cervical spine injuries are common in young adult males. Subluxation associated with vertebral body fractures is the most common injury pattern.

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