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Traumatic spinal fractures: presentation and prognosis

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ABSTRACT

Background: The bulk of spine injuries that result in permanent injury happen as a result of vehicle accidents. Objective of the study was to estimate the incidence, outcome, and causes of spinal fractures.
Methods: From January 2018 to December 2019, data were obtained from the trauma register database of all traumatic spinal injuries admitted to the section of trauma surgery, department of Meenakshi medical college hospital and research institute, Kanchipuram, Tamil Nadu. Demographic information as well as injury severity Ratings were gathered. SPSS (trial version 24) was used for analysis.
Results: A total of 513 (14%) of the 3665 patients referred to the trauma surgery section had spinal injuries, with an average age of 34.2 11 years. The leading causes of cervical injuries (p0.05) were motor car collisions (38.5%) and accidents from great heights (20.3%). The injury level scale ranged from 4 to 70. In 25% of cases, lumbar injury was linked with thoracic injury ($p<0.001$). A mixture of thoracic and Lumber injuries is associated to a cervical injury in 35% of cases ($p<0.001$). A total of 4.4 percent of injuries were linked to neurological deficits. Fifty-nine cases of spine fractures were surgically treated, with 12 of them having neurological deficits. The overall mortality rate was 3%.
Conclusions: In these areas, spinal fractures are rare. The most common neurological deficits are caused by cervical and thoracic spine injuries. Young males are the most vulnerable group, and accident prevention services in the workplace and enforcement of traffic laws should be prioritized for them.

Keywords: Spinal fractures, Cervical injury, Trauma, Lumbar injury, Road traffic accidents, Thoracic spinal injury

INTRODUCTION

Isolated spinal injuries (SI) and spinal cord injuries (SCI) can also be affected by traumatic damage to the spinal vertebrae. Spinal cord injury (SCI) often results in profound and long-term damage, which is distressing from a physical, psychological, and socioeconomic standpoint. Furthermore, from the standpoint of public health, these injuries place a huge burden on society. The estimated annual cost of SCI care in the United States is $9.7 billion.[1] The public health agency of Canada reported that the hospital expenses associated with SI were $61.6 million in 2000-2001.[2] Motor vehicle collisions (MVA), crashes, and sporting or athletic events are the most common causes of SI and SCI. After spinal injuries, survival has been shown to improve, as has gratitude for patterns of appearance and complications.[3,4] Every year, approximately 900 people experience a SCI, with men between the ages of 15 and 34 constituting 80% of the victims.[2] The current construction boom in India, combined with the country's rapid population development, has resulted in the documentation of the process of spine injuries and their consequences. This study was carried out to determine the prevalence and causes of spinal injuries, as well as the associated neurological deficit and mortality, based on an understanding of the current epidemiology of acute traumatic spinal injuries and spinal cord injuries in various communities, which is essential for public resource

distribution and the development of local prevention services.

METHODS

Study design

It was a retrospective record-based study; from January 2018 to December 2019, data were obtained from the trauma register database of all traumatic spinal injuries admitted to the section of trauma surgery, department of Meenakshi medical college hospital and research institute, Kanchipuram, Tamil Nadu.

Selection criteria

The report involved all patients that diagnosed with spinal injuries that necessitated hospitalization.

Patients who died at the scene or were pronounced dead in the accident and emergency room were not included in the study.

Method used

When the patients arrived, they were both properly evaluated and resuscitated using advanced trauma life support (ATLS) procedures. Demographic information such as age and gender were gathered, as well as injury data such as cause of injury, preventive measures used, radiological imaging, injury severity scores (ISS), and location of spinal trauma (i.e., cervical, thoracic, lumbar, and sacral vertebrae). There was a connection discovered between cervical, thoracic, and lumbar injuries and acute treatments. A detailed assessment and testing for sensory control and movement, as well as the NEXUS criterion, were used to assess the severity of spinal cord injury in the emergency room.[5] Emergency diagnostic tests, such as plain X-rays and computerized tomography (CT) scans, were required if the injured person complained of neck pain, was not completely awake, or showed clear signs of fatigue or neurological damage. The existence of a neurologic deficit and hospital all-cause mortality were among the outcomes.

Ethical approval

The current study has been approved by the college institutional ethics committee.

Statistical analysis

The data was documented and transferred to a Microsoft excel spreadsheet. As applicable, data is viewed as proportions, medians, or Mean±SD. To investigate variations in categorical variables between reference classes, the chi-square test was used. The student 't' test was used to examine the continuous variables. $P<0.05$ were considered significant. Statistical package for the social sciences (SPSS) (trial version 24) was used for analysis.

RESULTS

As per Table 1, 3665 patients were admitted to the hospital during the study period among them 513 (14%) had spinal fractures. The age range from 5 years to 88 years with the mean age was 34.2±11 years. 87 % of injuries were seen in male's especially young males ranging between 18-27 years. The most common mechanism of injury was MVA (38%) followed by falls (20.5%). The most common level of spinal fracture was lumbar (42%) followed by thoracic (22.2%) than cervical (19.4%). Around 4% of individuals had neurological deficits and 3% died due to injury.

Table 1: Patient details and injury characteristics.

Characteristics	Percentage (%)
Mean age (years)	34.2±11
Males	87
Mechanism of injury	
Motor vehicle accidents (MVA)	38
Falls	20.5
Pedestrians' injury	11.4
Level of spinal fracture	
Cervical	100 (19.4)
Thoracic	114 (22.2)
Lumbar	214 (42)
Sacral	85 (16.4)
Outcomes	
Neurological deficit	4
Mortality	3

Table 2: Association between causes and levels of spinal fractures.

Levels	MVA (%)	Falls (%)	Pedestrians (%)	P value
Cervical	19.2	20.4	12.6	0.001*
Thoracic	38	16	12	0.001*
Lumbar	45.5	50.5	36	0.001*
Sacral	18.5	8.5	22.5	0.01*
Neurological deficit	6.4	4.2	5.2	0.11

*$p<0.05$ is statistically significant

According to Table 2, MVA was the most frequent mechanism of injury in patients with lumbar and thoracic injury (45.5%and 38%, respectively, p=0.001 for each). Fall from height was a more evident cause of lumber injuries (50.5%), p=0.01, while sacral injuries were more frequently observed in pedestrian injuries (22.5%), p=0.01. In total, 21 of the 514 cases reported injuries associated with neurological deficits (4%). Cervical spine injuries are more likely to cause psychological issues (6.4%). There was a connection between thoracic spine injuries and neurological deficits (4.2%). The occurrence

of the deficit has been identified in lumbar spine fractures (5.2%). But it was not found to be statistically significant.

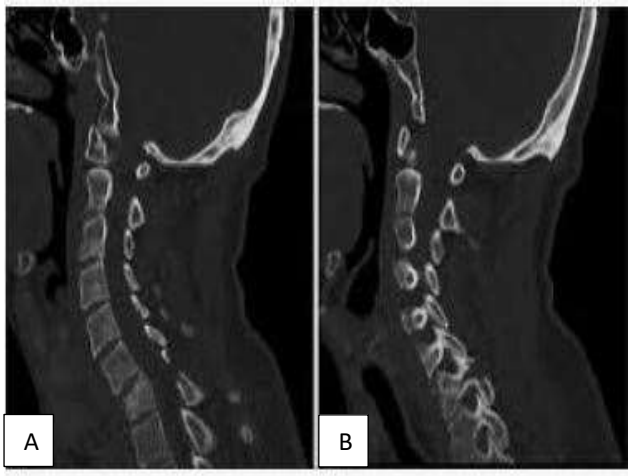

Figure 1: CT cervical spine fracture showed multiple fractured vertebrae. (A) Multiple cervical vertebral fractures, including C5 transverse process, C6 vertebral body, and C6 posterior column, and C7 transverse process comminuted fracture, (B) an MRI scan of a 36-year-old woman's cervical and thoracic spine revealed fracture-dislocation at T6-T7 vertebral stages, with left anterolateral displacement and overriding of the T6 vertebral bodies over the T7 vertebral bodies.

DISCUSSION

This study looks at patients who had spinal injuries who were cared for two years at a tertiary care hospital. As a result, due to the lack of a Neurosurgery department, all cases of spinal fractures are referred from other hospitals or primary care facilities. As a result, this research will provide an overall estimate of the frequency, causes, and outcomes of severe spinal injuries, which can then be used to determine the best approach for local injury prevention programs. During the study period, 3665 patients were admitted to the hospital, with 513 (14%) of them suffering from spinal fractures. The age range from 5 years to 88 years with the mean age was 34.2±11 years. 87 % of injuries were seen in males' especially young males ranging between 18-27 years. MVA (38%) was the most frequent mechanism of injury, followed by falls (20.5%). The most common level of spinal fracture was lumbar (42%) followed by thoracic (22.2%) than cervical (19.4%). Around 4% of individuals had neurological deficits and 3% died due to injury. In our research, the causes of injury at various levels of the spine varied. MVA was the leading cause of lumbar and thoracic fractures, with falls coming in second. As compared to lumber and thoracic injuries, sacral injuries were the least frequent. The latter, on the other hand, was associated with the highest rate of spinal cord damage and neurological deficit. The current study found that the overall level of neurological deficits was 4%. Furthermore, injuries to the lumbar and thoracic spines are the most likely to be associated with injuries to other levels of the spine (37.3% and 40.2 % respectively). Karacan et al described that "581 cases with SCI with an annual incidence of 12.7 per million in Turkey. In that study, the most important cause of SCI was MVC (49%) and falls (36.5%)".[6] Western studies reported that "an annual incidence of SCI varying between 15 and 52.5 cases per million with 80% of cases are young males and 5% are children".[7-9] Quadriplegia (53%) and paraplegia (33%) were the most common neurological disabilities.[8] Data from the university of California reported that "cervical spine injuries comprise one-third of all spinal fractures and one-half to two-thirds of all spinal cord injuries. Of all spine injuries, 30% include the thoracic spine and 42.5% the lumbosacral spine".[10] Per year, almost 12,000 new casualties occur, mostly affecting men (82%). The estimated age at the time of injury is 31 years. Causes of SCI included MVC (37%), violence (28%), and fall (21%). In the United States, the graduated licensing program has been shown to minimize crashes among young drivers by 20-30%. According to the most recent statistics from Qatar, the mean MVC-related mortality rate per 100,000 people between 2000 and 2006, prior to the installation of cameras, was 19.9±4.1. About 2015 and 2019, the average mortality rate was lower: 14.7±1.5 (p=0.03). The number of nonfatal serious injuries decreased as well, but the rate of minor injuries increased.[12]

CONCLUSION

In India, spinal fractures are not uncommon. In our nation, motor vehicle accidents and falls are the leading causes of spinal injuries, with about 4% of cases resulting in a spinal cord injury with neurological deficit. Young males are the most visible group of the population, with a greater emphasis on accident reduction programs on the workplace and traffic law enforcement. When a doctor diagnoses a spinal injury at one stage, he or she should keep an eye out for fractures at higher levels.

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