e-ISSN: 0975-5160, p-ISSN: 2820-2651

Available online on www.ijtpr.com

International Journal of Toxicological and Pharmacological Research 2024; 14(2); 215-219

Original Research Article

Clinico-Epidemiological Profile and Early Outcome in Traumatic Spine injuries: an Observational Study

Gaurav Prakash[1], Vishal Kumar[2], Rishabh Kumar Singh[3]

[1]Assistant Professor, Department of Orthopedics, Sree Narayan Medical Institute and Hospital, Saharsa, Bihar, India

[2] Senior Resident, Department of Orthopedics, Jakir Hossain Medical College and Research Institute, Raghunathganj, Murshidabad, West Bengal,India

[3]DNB Resident, Department of Orthopedics, Anup institute of Orthopedics and Rehabilitation, Patna, Bihar, India

Received: 08-01-2024 / Revised: 10-02-2024 / Accepted: 27-02-2024

Corresponding Author: Dr. Vishal Kumar

Conflict of interest: Nil

Abstract

Aim: The aim of the present study was to assess the epidemiology, clinical features and early outcome in traumatic spine injuries at a tertiary hospital.

Material & Methods: The present study was single-center, prospective, observational study, conducted in Department of Orthopedics, Sree Narayan Medical Institute and Hospital, Saharsa, Bihar, India for the period of 1 year. 200 patients were included in the study.

Results: Out of 200 patients, most of the patients were in the age group 51-60 (32%) and 41-50 (30%). Mean age was 51.59 years. Majority of the patients were male 70% while 30% patients were female. In present study, majority of traumatic spine injuries were due to road traffic accidents (52%), followed by fall from height (45%) and assault (3%). Majority of spine fractures occurred at cervical (40%) followed by Lumbar (30%) followed by thoracic (20%) vertebral level. Out of 100 patients, 55 patients (55%) had no associated injuries. Common associated injuries were hemoperitoneum (12%), head injury (11%), fracture humerus (9%) and fracture clavicle (6%). Out of 100 patients, 54% patients had no Neurodeficit and 46% patients had Neurodeficit. On pre -operative assessment 50% patients had ASIA score of E, 11% had ASIA score of D, 17% had ASIA score of C, 7% had ASIA score of B and 15% had ASIA score of A. Follow up ASIA score after 2 weeks in patients was A in 14% patients, B in 8%, C in 16%, D in 12, E in 50%. Follow up ASIA score after 3 months in patients was A in 8% patients, B in 5%, C in 6%, D in 15%, E in 68%. Follow up ASIA score after 6 months in patients was A in 9% patients, B in 5%, C in 4%, D in 16%, E in 66%. Follow up ASIA score after 9 months in patients was A in 8% patients, B in 6%, C in 4%, D in 20, E in 60%. Follow up ASIA score after 12 months in patients was A in 12%, D in 28, E in 60%.

Conclusion: Complication rates were higher in patients treated non-operatively. Leading causes in deaths at cervical level were due to respiratory failure and leading causes of deaths in thoracic and lumbar vertebral level were due to secondary complications of long-standing bed sores.

Keywords: Traumatic Spine Injury, Road Traffic Accidents, Cervical Vertebral Level, ASIA Score.

Introduction

The repercussions and cost of care for individuals with acute traumatic spinal cord injury (TSCI) may be rather large, and its associated aftermath have an immense strain on the sufferers and care providers, particularly when considered from economic, psychological, and social perspectives.[1-5] Therefore, clinical predictors of these injuries, that may be improved upon to assure a better neurological and functional result is very desired both to the patients and physicians alike. Epidemiological statistics on TSCI first investigated into in the previous 40 years, concentrated largely on descriptive epidemiology (incidence rates, age, gender, race, cause of injury, degree and completeness of damage).[6]

A traumatic cervical spinal fracture (TCSF) is typically caused by severe violence; if this is combined with a dislocation, the risk of CSCI is greatly increased. The intervertebral discs separate the vertebral bodies and evenly spread the loads among them. These discs degenerate with age and become more susceptible to injury.[7] TCSF/dislocation has received a great deal of attention worldwide.[8,9] However, cervical disc

herniation and bulging have not been well-studied. The posterior ligamentous complex includes the intervertebral disc, ligamentum flavum, and interspinous and nuchal ligaments; this complex plays a critical role in cervical spine stability.10Assessment of neurological deficit is done by ASIA SCORING (American Spinal Injury Association), Sub-axial Cervical Spine Injury Classification System (SLICS) and Thoraco-lumbar injury classification and severity score (TLICS). [11]

Hence the present study was undertaken to study epidemiology, clinical features and early outcome in traumatic spine injuries at a tertiary hospital.

Material & Methods

1. The present study was single-center, prospective, observational study, conducted in Department of Orthopedics, Sree Narayan Medical Institute and Hospital, Saharsa, Bihar, India for the period of 1 year. 200 patients were included in the study.

Inclusion Criteria: All patients with traumatic spine injuries attending OPD or admitted in emergency, willing to participate in study

Exclusion Criteria: Non traumatic patients with spine ailments

Methodology

Study was explained to patients/relatives and written informed consent was taken for participation and follow-up. All the patients received in emergency room were managed according to ATLS protocol (general examination, primary and secondary surveys to identify associated injuries). Patient was log rolled for examination of the back. Note was made for any bruises, swellings and palpated for kyphotic angulations, step-off and point tenderness which was present in injuries to osteo-ligamentous complex. Radiological imaging (X-rays, CT scan, and MRI) were done. After clinical and radiological examination patients further treatment options (operative/non operative) were planned. All patients admitted for surgical intervention would be assessed pre operatively with complete hemogram, renal function tests/liver function tests, blood sugar levels(FBS and PP), PT/PTI/INR, blood grouping, neurological status as per American spinal injury association (ASIA impairment scale), pain –back pain using visual analogue scale (VAS), imaging such as radiographs- cervical and thoracolumbar spine (AP/Lat view)- Vertebral body height, NCCT of affected spine, MRI of affected spine.

After fitness, patients underwent surgery at our center. Standard post-operative care was provided to all patients. Patients were discharged appropriately as per surgery protocol. All patients who reported were followed up in OPD/telephonically after every 4 weeks till 1 year. Patients were studied for: Survivorship, Neurological status, Nutritional status, Complications like bed sores, urinary tract infections, upper respiratory tract infections and Sexual functions. Radiologically patient was reviewed for the deformity.

statistical Analysis

Data was collected and compiled using Microsoft Excel. The presentation of the Categorical variables was done in the form of number and percentage (%). On the other hand, the presentation of the continuous variables was done as mean ± SD and median values. The comparison of the variables which were qualitative in nature were analyzed using Fisher's Exact test. The data entry was done in the Microsoft EXCEL spreadsheet and the final analysis was done with the use of Statistical Package for Social Sciences (SPSS)software version 21.0. For statistical significance, p value of less than 0.05 was considered as significant.

Results

Table 1: Distribution of age (years) in males and females

Age in years	Male (n=140)	Female (n=60)	Total
≤20	2	0	2 (1)
21-30	8	4	12 (6)
31-40	8	6	14 (7)
41-50	44	16	60 (30)
51-60	48	16	64 (32)
61-70	28	12	40 (20)
>70	2	6	8 (4)
Mean±SD	55.05±11.59	53.27±13.97	51.59±12.38

Out of 200 patients, most of the patients were in the age group 51-60 (32%) and 41-50 (30%). Mean age was 51.59 years. Majority of the patients were male 70% while 30% patients were female.

Table 2: Distribution of mode of injury, injury level and associated injuries of study subjects

Mode of injury	N	%
RTA	104	52
Fall from height	90	45
Assault	6	3
Injury level		
Cervical	80	40
Cervical and Lumbar	2	1
Cervical and sacralala	2	1
Cervical and thoracic	10	5
Lumbar	60	30
Lumbarandsacralala	4	2
Thoracic	40	20
Thoracic and Lumbar	6	3
Associated injuries		
No associated injuries	110	55
Hemoperitoneum	24	12
Head injury	22	11
Fracture humerus	18	9
Fracture clavicle	12	6
Others	14	7

In present study, majority of traumatic spine injuries were due to road traffic accidents (52%), followed by fall from height (45%) and assault (3%).Majority of spine fractures occurred at cervical (40%) followed by Lumbar (30%) followed by thoracic (20%) vertebral level. Out of 100 patients, 55 patients (55%) had no associated injuries. Common associated injuries were hemoperitoneum (12%), head injury (11%), fracture humerus (9%) and fracture clavicle (6%).

Table 3: Distribution of pre -operative assessment of study subjects

Pre-operative assessment	Frequency	Percentage
Neurological status		
With neurodeficit	92	46
Without neurodeficit	108	54
ASIA score		
A	30	15
B	14	7
C	34	17
D	22	11
E	100	50%

Out of 200 patients, 54% patients had no Neurodeficit and 46% patients had Neurodeficit. On pre -operative assessment 50% patients had ASIA score of E, 11% had ASIA score of D, 17% had ASIA score of C, 7% had ASIA score of B and 15% had ASIA score of A.

Table 4: Distribution of follow up ASIA score of study subjects

Follow up ASIA score	After 2 weeks	After 3 months	After 6 months	After 9 months	After 12 months
A	28 (14%)	16 (8%)	18 (9%)	16 (8%)	24 (12%)
B	16 (8%)	10 (5%)	10 (5%)	12 (6%)	-
C	32 (16%)	12 (6%)	8 (4%)	8 (4%)	56 (28%)
D	24 (12%)	30 (15%)	32 (16%)	40 (20%)	-
E	100 (50%)	136 (68%)	132 (66%)	120 (60%)	120 (60%)

Follow up ASIA score after 2 weeks in patients was A in 14% patients, B in 8%, C in 16%, D in 12%, E in 50%. Follow up ASIA score after 3 months in patients was A in 8% patients, B in 5%, C in 6%, D in 15%, E in 68%. Follow up ASIA score after 6 months in patients was A in 9% patients, B in 5%, C in 4%, D in 16%, E in 66%. Follow up ASIA score after 9 months in patients was A in 8% patients, B in 6%, C in 4%, D in 20, E in 60%. Follow up ASIA score after 12 months in patients was A in 12%, D in 28, E in 60%.

Discussion

Spinal cord injury is an insult spinal cord resulting in a change either temporary or permanent, in its normal motor, sensory, or autonomic function.

Traumatic Spinal Cord Injury (TSCI) is a devastating neurological injury, causing paralysis, sensory loss and sphincter disorder in different degrees and indirectly imposes a significant burden on the health care system. [12] Internationally incident rates for traumatic spinal cord injuries range from 10.4-83 cases per million of population with significant differences between different countries or regions. [13] The incidence of traumatic spinal cord injury (TSCI) in the developing countries is 25.5/million/year.[14]People with Spinal cord injury are 2 to 5 times to die prematurely than people without Spinal cord injuries depending on the health-care system capacity. [15] Etiologically, more than 90% of spinal cord injuries cases are traumatic and caused by incidences such as road traffic accidents, violence, sports or falls. [14] Spinal cord injury is a two-step process that involves Primary (combination of the initial impact as well as the subsequent persisting compression) and Secondary injury (series of physiological and biochemical changes after which are primary mechanical injury). [16]

Out of 200 patients, most of the patients were in the age groups 51-60 (32%) and 41-50 (30%). Mean age was 51.59 years. Majority of the patients were male 70% while 30% patients were female. In the series of Chamberlain JD et al [17] out of 932 patients, male to female ratio was 1.88:1. The mean age in tetraplegics was 53.5 years and in paraplegics was 43.8 years. Over all mean age was 48 years. In present study, majority of traumatic spine injuries were due to road traffic accidents (52%), followed by fall from height (45%) and assault (3%).Majority of spine fractures occurred at cervical (40%) followed by Lumbar (30%) followed by thoracic (20%) vertebral level. Out of 100 patients, 55 patients (55%) had no associated injuries. Common associated injuries were hemoperitoneum (12%), head injury (11%), fracture humerus (9%) and fracture clavicle (6%).

Sommer et al [18] reported epidemiology, treatment, clinical and radiological results of 283 patients with spine fractures in a five-year period. The operation rate ranged from 42% of cervical to 9% of thoracic and 24% of the lumbar spine. He found good radiological results concerning the correction of the wedge compression and the collapse of the lumbar vertebral body by fixation with an internal fixator. After a follow-up of 2-5 years, nearly 80% of conservatively, as well as surgically, treated patients had residual back pain. Shamim MS et al [19] in series of 54 patients with complete SCI, in which 50% received surgical treatment, they found the operated group spent a longer period in rehabilitation. They also had a longer hospital stay, were associated with more complications, especially those related to infections and also had a significantly higher cost of treatment when compared with the group treated conservatively. Pandey Vket al [20] concluded in his study with 23-month average follow-up revealed that 17% of patients who underwent surgery for spine fractures died, all after discharge.

Out of 200 patients, 54% patients had no Neurodeficit and 46% patients had Neurodeficit. On pre -operative assessment 50% patients had ASIA score of E, 11% had ASIA score of D, 17% had ASIA score of C, 7% had ASIA score of B and 15% had ASIA score of A.Follow up ASIA score after 2 weeks in patients was A in 14% patients, B in 8%, C in 16%, D in 12, E in 50%. Follow up ASIA score after 3 months in patients was A in 8% patients, B in 5%, C in 6%, D in 15%, E in 68%. Follow up ASIA score after 6 months in patients was A in 9% patients, B in 5%, C in 4%, D in 16%, E in 66%. Follow up ASIA score after 9 months in patients was A in 8% patients, B in 6%, C in 4%, D in 20, E in 60%. Follow up ASIA score after 12 months in patients was A in 12%, D in 28, E in 60%. In a study, 70% of patients initially diagnosed as ASIA A didn't convert, as did 90% with ASIA D. On the whole 68% of total patients didn't convert, while 30% of patients improved and 2% deteriorated. [21] Middendrop et al [22] in his series of 273 patients observed that ASIA A were 161, ASIA B were 37, ASIA C were 43, and ASIA D were 32. 42(26%) converted from ASIA A, 27(73%) from ASIA B, 32(75%) from ASIA C, 5(16%) from ASIA D.

Conclusion

Complication rates were higher in patients treated non-operatively. Leading causes in deaths at cervical level were due to respiratory failure and leading causes of deaths in thoracic and lumbar vertebral level were due to secondary complications of long-standing bed sores. Despite limited sources, outcomes of SCI patients in India appear favourable with evidence of clinical improvement and low mortality. In-country like India Road traffic accident in young population is the most common cause of SCI. Adequate traffic education and public awareness, in implementing traffic rules and road safety measures may reduce RTAs. Establishment of physical rehabilitation programs is needed to maximize functional outcomes and minimize secondary complications, and efforts should be made to improve the follow-up of SCI patients.

References

1. Kang Y, Ding H, Zhou H, Wei Z, Liu L, Pan D, Feng S. Epidemiology of worldwide spinal cord injury: a literature review. Journal of Neurorestoratology. 2018;6(1):3.
2. Lifshutz J, Colohan A. A brief history of therapy for traumatic spinal cord injury. Neurosurg Focus. 2004 Jan 15;16(1):E5.
3. Ihegihu C, Ugezu A, Ndukwu C, Chukwuka N, Ofiaeli R, Ihegihu E. A review of traumatic

spinal cord injuries at the Nnamdi Azikiwe University Teaching Hospital, Nnewi, Nigeria. Tropical Journal of Medical Research. 2014 Jan 1;17(1):31-.
4. GBD 2016 Traumatic Brain Injury and Spinal Cord Injury Collaborators. Global, regional, and national burden of traumatic brain injury and spinal cord injury, 1990-2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet Neurol. 2019 Jan; 18(1):56-87.
5. Ackery A, Tator C, Krassioukov A. A global perspective on spinal cord injury epidemiology. J Neurotrauma. 2004 Oct;21(10): 1355-70.
6. Devivo MJ. Epidemiology of traumatic spinal cord injury: trends and future implications. Spinal Cord. 2012 May;50(5):365-72.
7. Obalum DC, Giwa SO, Adekoya-Cole TO, Enweluzo GO. Profile of spinal injuries in Lagos, Nigeria. Spinal Cord. 2009 Feb;47(2):134 -7.
8. Wang H, Xiang Q, Li C, Zhou Y. Epidemiology of traumatic cervical spinal fractures and risk factors for traumatic cervical spinal cord injury in China. Clinical Spine Surgery. 2013 Dec 1;26(8):E306-13.
9. Leucht P, Fischer K, Muhr G, Mueller EJ. Epidemiology of traumatic spine fractures. Injury. 2009 Feb 1;40(2):166-72.
10. Pirouzmand F. Epidemiological trends of spine and spinal cord injuries in the largest Canadian adult trauma center from 1986 to 2006. Journal of neurosurgery: Spine. 2010 Feb 1;12(2):131-40.
11. Rasoulinejad P, McLachlin SD, Bailey SI, Gurr KR, Bailey CS, Dunning CE. The importance of the posterior osteoligamentous complex to subaxial cervical spine stability in relation to a unilateral facet injury. The Spine Journal. 2012 Jul 1;12(7):590-5.
12. Stahel PF, VanderHeiden T, Finn MA. Management strategies for acute spinal cord injury: current options and future perspectives. Current opinion in critical care. 2012 Dec 1;18(6): 651-60.
13. Nadeau M, McLachlin SD, Bailey SI, Gurr KR, Dunning CE, Bailey CS. A biomechanical assessment of soft-tissue damage in the cervical spine following a unilateral facet injury. JBJS. 2012 Nov 7;94(21):e156.
14. Rahimi-Movaghar V, Sayyah MK, Akbari H, Khorramirouz R, Rasouli MR, Moradi-Lakeh M, Shokraneh F, Vaccaro AR. Epidemiology of traumatic spinal cord injury in developing countries: a systematic review. Neuroepidemiology. 2013 Jun 13;41(2):65-85.
15. Chhabra HS, Arora M. Demographic profile of traumatic spinal cord injuries admitted at Indian Spinal Injuries Centre with special emphasis on mode of injury: a retrospective study. Spinal Cord. 2012 Oct;50(10):745-54.
16. Chen Y, Tang Y, Vogel L, DeVivo M. Causes of spinal cord injury. Topics in spinal cord injury rehabilitation. 2013 Jan 1;19(1):1-8.
17. Chamberlain JD, Deriaz O, Hund-Georgiadis M, Meier S, Scheel-Sailer A, Schubert M, Stucki G, Brinkhof MW. Epidemiology and contemporary risk profile of traumatic spinal cord injury in Switzerland. Injury epidemiology. 2015 Dec;2(1):1-1.
18. Sommer C, Bereiter H. Epidemiology, treatment and long-term results of spinal fractures at a non-university affiliated central hospital with special reference to fractures of the lumbar spine. Helvetica ChirurgicaActa. 1994 Apr 1;60(4):539-45.
19. Shamim MS, Ali SF, Enam SA. Non-operative management is superior to surgical stabilization in spine injury patients with complete neurological deficits: A perspective study from a developing world country, Pakistan. Surgical Neurology International. 2011;2.
20. Pandey VK, Nigam V, Goyal TD, Chhabra HS. Care of post-traumatic spinal cord injury patients in India: an analysis. Indian journal of orthopaedics. 2007 Oct;41(4):295.
21. Jaglal SB, Munce SE, Guilcher SJ et al. Health system factors associated with rehospitalisation after traumatic spinal cord injury: a population-based study Spinal Cord 2009;47(8):60 4-09.
22. van-Middendorp JJ, Hosman AJF, Pouw MH et al. ASIA impairment scale conversion in traumatic SCI: is it related with the ability to walk? A descriptive comparison with functional ambulation outcome measures in 273 patients. Spinal Cord 2009;47(7):555- 60.