Original Research Article

Study of epidemiology, clinical features and early outcome in traumatic spine injuries at a tertiary hospital in Jammu region

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Abstract

Background: 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. Present study was aimed to study epidemiology, clinical features and early outcome in traumatic spine injuries at a tertiary hospital in Jammu region. **Material and Methods:** Present study was single-center, prospective, observational study, conducted in patients with traumatic spine injuries attending OPD or admitted in emergency. **Results:** Out of 282 patients, most of the patients were in the age group 51-60 (29.43%) and 41-50(29.08%). Mean age was 51.62 years. Male to female ratio was 2.4:1. Majority of traumatic spine injuries were due to road traffic accidents (54.96%), followed by fall from height (43.26%) and assault (1.77%). Majority of spine fractures occurred at cervical (41.84%) followed by Lumbar (27.30%) followed by thoracic (19.50%) vertebral level. 49.29% patients had neurodeficit. On pre -operative assessment 50.71% patients had ASIA score of E, 15.60 had ASIA score of C, 12.06% had ASIA score of D, 13.48% had ASIA score of A and 8.16% had ASIA score of B. Mean of SLICS score was 3.66 and mean duration of TLICS score was 3.8. Total deaths in our study were 30. **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.

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INTRODUCTION

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.[1] 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.[2] The incidence of traumatic spinal cord injury (TSCI) in the developing countries is 25.5/million/year.[3] 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.[4] Etiologically, more than 90% of spinal cord injuries cases are traumatic and caused by incidences such as road traffic accidents, violence, sports or falls.[3] 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).[5] Assessment of

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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).[6] Present study was aimed to study epidemiology, clinical features and early outcome in traumatic spine injuries at a tertiary hospital in Jammu region.

MATERIAL AND METHODS

Present study was single-center, prospective, observational study, conducted in Department of Orthopedic surgery, at Government Medical College, Jammu, India. Study duration was of 1 year (October 2019 to December 2020). Study was approved by institutional ethical committee.

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

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. 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

Out of 282 patients, most of the patients were in the age group 51-60 (29.43%) and 41-50(29.08%). Mean age was 51.62 years. Majority of the patients were male (70.92%) while 29.08% patients were female. Male to female ratio was 2.4:1. Peak age in female patients was 51-60 years (31.71%) and in male patients was 41-50 years. The mean age in female was 55.06 years and in male was 50.21 years.

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

Age (in years)	Female (n=82)	Male (n=200)	Total (n=282)
≤ 20	0	4 (2%)	4 (1.42%)
21-30	3 (3.66%)	10 (5%)	13 (4.61%)
31-40	6 (7.32%)	18 (9%)	24 (8.51%)
41-50	17 (20.73%)	65 (32.50%)	82 (29.08%)
51-60	26 (31.71%)	57 (28.50%)	83 (29.43%)
61-70	19 (23.17%)	36 (18%)	55 (19.50%)
>70	11 (13.41%)	10 (5%)	21 (7.45%)
Mean ± SD	55.06 ± 13.62	50.21 ± 12.98	51.62 ± 13.33

In present study, majority of traumatic spine injuries were due to road traffic accidents (54.96%), followed by fall from height (43.26%) and assault (1.77%).

Table 2: Distribution of mode of injury.

Mode of injury	Frequency	Percentage
RTA	155	54.96%
Fall from height	122	43.26%
Assault	5	1.77%

Majority of spine fractures occurred at cervical (41.84%) followed by Lumbar (27.30%) followed by thoracic (19.50%) vertebral level. Other injuries were 4.96% at both thoracic and lumbar vertebral level, 3.55% at both cervical and thoracic vertebral level, 2.13% at Lumbar and sacral vertebral level, 0.35% at both cervical and lumbar vertebral level, 0.35% at both cervical and sacral spine level.

Table 3: Distribution of injury level of study subjects.

Injury level	Frequency	Percentage
Cervical	118	41.84%
Cervical and Lumbar	1	0.35%
Cervical and sacral ala	1	0.35%
Cervical and thoracic	10	3.55%
Lumbar	77	27.30%
Lumbar and sacral ala	6	2.13%
Thoracic	55	19.50%
Thoracic and Lumbar	14	4.96%

Out of 282 patients, 161 patients (57.09%) had no associated injuries. Common associated injuries were hemoperitoneum (9.57 %), head injury (9.22 %), fracture humerus (6.74 %) and fracture clavicle (6.38 %). Others were fracture calcaneum (2 patients), fracture tibia (4 patients), fracture forearm (3 patients), etc.

Table 4: Distribution of associated injuries of study subjects.

Associated injuries	Frequency	Percentage
No associated injuries	161	57.09%
Hemoperitoneum	27	9.57%
Head injury	26	9.22%
Fracture humerus	19	6.74%
Fracture clavicle	18	6.38%

Mean interval between time of injury and time of report in hospital was 20.73 hours. Maximum duration of injury was 5 days and minimum duration was 0.5 hrs. The mean operative interval between day of trauma and day of surgery was 9.44 days. The mean interval between day of admission and day of surgery was 8.77 days.

Table 5: Descriptive statistics duration of injury (hours) of study subjects.

Variable	Mean ± SD	Median (25^{th} - 75^{th} percentile)	Range
Duration of injury (hours)	20.73 ± 27.06	9(3-24)	0.5-144
Operative interval between day of trauma and day of surgery	9.44 ± 10.19	8(6-10)	2-90
Operative interval between day of admission and day of surgery	8.77 ± 10.26	7(5-9)	2-90

Out of 282 patients, 50.71% patients had no Neurodeficit and 49.29% patients had Neurodeficit.
On pre -operative assessment 50.71% patients had ASIA score of E, 15.60 had ASIA score of C, 12.06% had ASIA score of D, 13.48% had ASIA score of A and 8.16% had ASIA score of B. Mean of SLICS score was 3.66 and mean duration of TLICS score was 3.8. 74.11% patients were treated conservatively and 25.89% patients were operated.

Table 6: Distribution of pre -operative assessment of study subjects.

Pre-operative assessment	Frequency	Percentage
Neurological status		
With neurodeficit	139	49.29%
Without neurodeficit	143	50.71%
ASIA score		
A	38	13.48%
B	23	8.16%
C	44	15.60%
D	34	12.06%
E	143	50.71%
SLICS		

Mean ± SD	3.66 ± 2.9	
Median(25th -75th percentile)	4(1-7)	
TLICS		
Mean ± SD	3.8 ± 2.43	
Median (25th -75th percentile)	4 (1-6)	
Management		
Operative management	73	25.89%
Treated conservatively	209	74.11%

Follow up ASIA score after 2 weeks in patients was A in 13.48% patients, B in 8.16%, C in 15.60%, D in 12.06, E in 50.71%. Follow up ASIA score after 3 months in patients was A in 8.27% patients, B in 5.12%, C in 5.91%, D in 14.57, E in 66.14%. Follow up ASIA score after 6 months in patients was A in 8.60% patients, B in 4.52%, C in 4.07%, D in 16.29, E in 66.52%. Follow up ASIA score after 9 months in patients was A in 8.22% patients, B in 6.85%, C in 4.11%, D in 19.86, E in 60.96%. Follow up ASIA score after 12 months in patients was A in 14.29 patients, C in 10%, D in 23.81, E in 61.90%.

Table 7: 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	38 (13.48 %)	21 (8.27 %)	19 (8.60 %)	12 (8.22 %)	3 (14.29 %)
	B	23 (8.16 %)	13 (5.12 %)	10 (4.52 %)	10 (6.85 %)	
	C	44 (15.60 %)	15 (5.91 %)	9 (4.07 %)	6 (4.11 %)	5 (23.81 %)
	D	34 (12.06 %)	37 (14.57 %)	36 (16.29 %)	29 (19.86 %)	
	E	143 (50.71 %)	168 (66.14 %)	147 (66.52 %)	89 (60.96 %)	13 (61.90 %)

Total deaths in our study were 30 out of 282 patients. Patients survival was 84.68% in patients with cervical spine injury, 92.11% in patients with thoracic spine injury and 93.90% in lumbar spine injury.

Table 8: Distribution of patient survival in cervical, thoracic and lumbar.

Patient survival	Cervical (n=124)	Thoracic (n=76)	Lumbar (n=82)
No	19 (15.32%)	6 (7.89%)	5 (6.10%)
Yes	105 (84.68%)	70 (92.11%)	77 (93.90%)

DISCUSSION

The spine injury besides a medical problem to the individual and health system is a social problem for society since it takes away the capacity to work, make the patient dependent on others not only for day to day mobility but also for the financial support. All these together has influence on the physical, psychosocial and financial well-being on individual, family and the society. World over the spine injuries are common, however the profile of patients and injuries as well as the outcome vary in different regions because of many other medical and non-medical reasons. In our study we enrolled 282 patients with a mean age of 51.62 years with peak age of 51-60 years (29.43%). The mean age in female patients was 55.06 years and in male patients it was 50.21 years. The mean age of female is slightly more as osteoporosis is very prevalent in our region, making higher age women more vulnerable to vertebral fractures with less amount of force. In our study male patients were 70.92% and 29.08% were female. Male to female ratio was 2.4:1. Male predominance in our study is due to male dominant professions like climbing trees, doing labour works, driving etc., whereas most of females are limited to only house hold works. In the series of Chamberlain JD *et al.*,[7] 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. Johansson *et al.*,[8] out of 346 patients, 72.3% were males and 27.7% were females. The mean age in this study was 58.9 years. The mean duration of injury and reporting of patient to the hospital in our study was 20.73 hours. The road connectivity in our region is very poor, due to hilly areas there are frequent landslides, not every place is connected with road, thus making the transportation very difficult and patient may deteriorate neurologically because of improper transportation. The mean interval between day of trauma and day of surgery is 9.44 days which is actually a delayed time, as most of studies recommend it should be as early as possible.

The decision regarding surgery or non-operative treatment is based on certain classifications[1,9,10]

For cervical spine injuries SLICS classification is used. Score below 4 indicates conservative treatment, score of 4 is as per surgeons preference and a score above 4 indicates surgical intervention.

For Thoracolumbar injuries TLICS classifications is used Score below 4 indicates conservative treatment, score of 4 is as per surgeons preference and a score above 4 indicates surgical intervention.

Ahuja *et al.*,[11] in a study of 313 patients, 182 patients were operated early and underwent surgery within 24 hours and 131 patients were operated after 24 hours. The primary end point was change in American Spinal Injury Impairment Scale (AIS) at the end of 6 months. The group who underwent surgery under 24 hours, 19.8% demonstrated a 2 or more grade improvement in AIS at 6 months, whereas 8.8% of patients show same improvement who had undergone surgery after 24 hours. Complications rate was 24.2% in early group and 30.5% in late group. Patients survival was 84.68% in patients with cervical spine injury, 92.11% in patients with thoracic spine injury and 93.90% in lumbar spine injury. From above we can conclude that that higher is the level of injury, less is the percentage of survival. The mean day of death after treatment in cervical spine injury was 17.58, thoracic spine injury was 179.17 and lumbar spine injury was 167. In cervical spine injury, patients survival was 27.28% with preoperative ASIA A, 66.67% with ASIA B, 92.31% with ASIA C, 100% with ASIA D and 98.48% with ASIA E. In thoracic spine injury, patients survival was 75% with preoperative ASIA A, 71.43% with ASIA B, 94.12% with ASIA C, 100% with ASIA D and 100% with ASIA E. In lumbar spine injury, patients survival was 50% with preoperative ASIA A, 75% with ASIA B, 100% with ASIA C, 100% with ASIA D and 100% with ASIA E. In lumbar ASIA A were 8 patients out of which 4 died due to long standing bed sores. 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.[12] Middendrop *et al.*,[13] 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. The deterioration in spinal injuries begins from the time of transport, especially in cervical spine. A spinal board provides a rigid support used especially in pre-hospital trauma care; its use should be encouraged. Patient should present to hospital as early as possible and surgical procedure if indicated has to be performed at the earliest available opportunity.

CONCLUSION

Out of 282 traumatic spine injury patients, peak age of 51-60 years (29.43%) with male to female ratio of 2.4:1. Road traffic accidents was the leading cause, 41.84% of the patients sustained injuries at cervical vertebral level, 27.30% at Lumbar vertebral level, 19.50% at thoracic vertebral level. 50.71% patients had no neurodeficit and 49.29% patients had neurodeficit. Complication rates were higher in patients treated non-operatively. Out of 282 patients, 30 patients died. 19 patients died who at injury at cervical level, 6 patients had injury at thoracic level and 5 patients had injury at lumbar level, the 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.

REFERENCES

1. Stahel PF, VanderHeiden T, Finn MA. Management strategies for acute spinal cord injury: current options and future perspectives. Curr Opin Crit Care 2012;18(6):651-60.
2. Wyndaele M, Wyndaele JJ. Incidence, prevalence and epidemiology of spinal cord injury: what learns a worldwide literature survey. Spinal Cord 2006;44(9):523-29.
3. Rahimi-Movaghar V, Sayyah MK, Akbari H et al. Epidemiology of traumatic spinal cord injury in developing countries: a systematic review. Neuroepidemiology 2013;41(2):65–85.
4. Lidal IB, Snekkevik H, Aamodt G et al. Mortality after spinal cord injury in Norway. J Rehabil Med 2007;39(2):145-51.
5. Chen Y, Tang Y, Vogel LC, Devivo MJ. Causes of spinal cord injury. Top Spinal Cord Inj Rehabil 2013;19:1–8.
6. 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;50(10):745-54.
7. Chamberlain JD, Deriaz O, Hund-Jeorjiadis M et al. Epidemiology and contemporary risk profile of traumatic spinal cord injury in Switzerland. Injury epidemiology 2015;2:28.
8. Johansson E, Luoto TM, Vainionnpaa A et al. Epidemiology of traumatic spinal cord injury in Finland. Spinal Cord 2020;4;1-8.
9. Srivastava MK, Gupta AK, Jauhari S et al. Effect of Age on outcome of Traumatic Spinal cord Injury Rehabilitation –A Retrospective Study. Inter J of Sci Res 2017;6(7):601-03.
10. Stein DM, Pineda JA, Roddy VT, Knight WA. Emergency neurological life support: traumatic spine injury. Neurocrit Care 2015;23(Suppl.2):S155–64.
11. Ahuja CS, Badhiwala JH, Fehlings MG. Time is spine": the importance of early intervention for traumatic L cord injury. Spinal cord 2020;58:1037-39.
12. 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):604-09.
13. 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.

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