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Original Article

Surgical Decompression and Postoperative Rehabilitation of Traumatic Thoracolumbar Junctional Spinal Injury; A Demographical Observation in A Tertiary Care Hospital.

Rahman AU[1], Chowdhury SMNK [2], Sanaullah M [3], Shawli FJ [4], Hossain I [5], Jabbar A [6], Reza HMT [7], Islam A [8], Zahid MM [9], Day SG [10], Hossain I[11], Bhowmick S [12]

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Contribution to Authors: Dr. Md. Arad -Ur- Rahman, Dr. Md. Ismail Hossain, Dr. Mohammad Sanaullah

Manuscript Priparation: Dr. Md. Arad -Ur- Rahman, Dr. Md. Ismail Hossain,

Data Collection: Dr. Fatima Jahan Shawli, Dr. Md Abdul Jabbar, Dr. Hossain Mohammad Tanveer Reza, Dr. Asiful Islam, Dr. Samir Gopal Day, Dr. Md. Imran Hossain, Dr. Susmita Bhowmick, Dr. Mohammed Moinuddin Zahid

Editorial Formatting: Dr. S. M. Noman Khaled Chowdhury, Dr. Md. Ismail Hossain,

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Abstract:

Traumatic spinal cord injury (SCI) is a severely debilitating condition that puts a person into neurological dysfunction and loss of independence, with an increased rate of both mortality and morbidity. Thoracolumbar spine (T11-L2) is one of the most vulnerable locations for injury for its biomechanics. The outcome is more devastating if not treated immediately

Lorem Ipsum

Materials and Method: This is prospective study where 45 patients were included by selection criteria who were admitted in the Department of Neurosurgery of Chittagong Medical College Hospital (CMCH) with traumatic SCI from T11 to L2 and treated by decompression and stabilization with pedicle screw from July 2023 to January 2024.

Results: Overall, the median (interquartile range) age was 28 years, Range (17 to 65 years). There was male preponderance (84.4%) and the male: female ratio is 5.4:1. (28.9%) presented with complete injury. The most commonly reported mode of injury was fall from tree (40%), level of fracture L1 (48.8%) and burst fracture (55.5%) was the commonest type. The median interquartile range (IQR) time interval from injury to admission was 2 days (0.04 to 4.25 days) and from injury to decompression was 9 days (0.03 to 28 days).

Conclusions: Management of traumatic thoracolumbar spinal injury is not only a medical issue but a cumulative effort for educational, infrastructural improvement and professional safety law endorsement as well as social and occupational rehabilitation to bring them a quality life.

Key words: Demography, Thoracolumbar junction, Rehabilitation.

Introduction:

Traumatic spinal cord injury (SCI) is a severely debilitating condition that puts a person into neurological dysfunction and loss of independence, with an increased rate of both mortality and morbidity. It's increasing (750 cases per million worldwide) for last decade due to rapid changes in life style.(1) . The incidence is much higher at thoracolumbar junction as because of the biomechanics of the spine. Here the axial load is transferred to a more mobile lumbar spine than that of the rigid thoracic spine.

Up to 75% of thoracolumbar spinal injuries occur in T10-L2. Approximately 45% develop neurological symptoms, with 26% incomplete and 19% complete injury.(2). In developing countries due to occupational preference, young, predominantly male persons in good health are commonly affected by traumatic spinal injury. The outcome is more devastating than the developed countries due to lack of safety measures, adequate knowledge of primary care and infrastructures.

1 Dr. Md. Arad -Ur- Rahman, Neurosurgeon, MO (OSD), Directorate General of Health Services; Phone: +8801710563467; E-mail: aradsmc@gmail.com; Orcid ID: 0009-0008-1351-4592.
2. Dr. S. M. Noman Khaled Chowdhury, Professor & Ex-Head, Dept. of Neurosurgery, Chittagong Medical College; Phone: +8801819019415; E-mail: ncdmc1971@gmail.com
3. Dr. Mohammad Sanaullah, Associate Professor, Department of Neurosurgery, Chittagong Medical College; Phone: +8801711171088; E-mail: dr.shamimctg@yahoo.com; Orcid ID: 0009-0005-8168-7450.
4. Dr. Fatima Jahan Shawli, Lecturer, Department of Microbiology, National Institute of Traumatology and Orthopaedic Rehabilitation (NITOR); Phone: +8801722480665; E-mail: shawlimay1@gmail.com; Orcid ID: 0009-0007-1435-0123.
5. Dr. Md. Ismail Hossain, Assistant professor (Neuro trauma), Dept. of Neurosurgery, Chittagong Medical College; Phone:+8801818113412; E-mail: ismailneuro@gmail.com
6. Dr. Md Abdul Jabbar, AR (Surgery), Rajshahi Medical College hospital; Phone: +88001743999842; E-mail: jabbar.k15@gmail.com
7. Dr. Hossain Mohammad Tanveer Reza, AR , National Institute of Neurosciences & Hospital; Phone: +8801717508956; E-mail: rezans2312@gmail.com
8. Dr. Asiful Islam, Registrar (Neurosurgery), Evercare Hospital Chattogram; Phone: +8801767352926; E-mail : asifislam9392@gmail.com ; Orcid ID: 0009-0003-7562-9161.
9. Dr. Mohammed Moinuddin Zahid, AR, Dept. of Neurosurgery, Chittagong Medical College Hospital; Phone: +8801915964227; E-mail : zahidkumu222@gmail.com
10. Dr. Samir Gopal Day, Registrar (Paediatric Neurosurgery), Dept. of Neurosurgery, Chittagong Medical College Hospital; Phone:+8801719118686; E-mail: samirtro.178@gmail.com; Orcid ID: 0009-0004-5751-6574.
11. Dr. Md. Imran Hossain, Resident Surgeon(Neurotrauma), Chittagong Medical College Hospital; Phone: +88001819634119; E-mail: dr.imran_39@yahoo.com
12. Dr. Susmita Bhowmick, HMO, Dept. of Neurosurgery, Chittagong Medical College Hospital; Phone: +8801521400663; E-mail: sbshakti2810@gmail.com

Address of Correspondence: Dr. Md. Arad -Ur- Rahman, Neurosurgeon, MO (OSD), Directorate General of Health Services; Phone: +8801710563467; E-mail: aradsmc@gmail.com; Orcid ID: 0009-0008-1351-4592.

Materials and Method

This is prospective research where out of 69 patients with traumatic SCI from T11 to L2 admitted in the Department of Neurosurgery of CMCH, 45 was treated by decompression and stabilization with pedicle screw from July 2023 to January 2024 and were included in this study. Ethical clearance was achieved from Ethical Review Committee of CMCH prior to the study. Patients with traumatic brain injury, history of previous spine surgery, spinal tumour, infection or pathological fractures, injury at other levels were excluded from the study. The neurological status of injury was scaled by American Spinal Injury Association (ASIA).(3). Categorical data had been presented as frequency, percentage and continuous data were expressed as median and 25%–75% interquartile range (IQR).

Results

During the study period, 45 out of 69 study participants managed surgically for traumatic SCI from T11 to L2 level were included. Overall, the median (interquartile range) age was 28 (21-45) years and age ranged between 17 and 65 years in the present study. There was male preponderance (84.4%) and the male: female ratio is 5.4:1. (Table 1). Out of 45 patients 5(11.1%) were uneducated, 19(42.2%) reached at primary level, 11(24.4%) at secondary level, 6(13.3%) at higher Secondary level and only 4(8.9%) were at graduation level (Table 2). Most of the patients were day labourer 21(46.7%), followed by serviceman 7(15.6%), student 5(11.1%), farmer 5(11.1%), driver 4(8.9%) and 3(6.7%) were housemaker. (Table 3)

Table 1: Age and sex distribution of the patients (N=45)

Age (in years**)**		
	Median (IQR)	28 (21-45)
	Range	17-65
Sex		
	Male	38 (84.4%)
	Female	7 (15.6%)

Table 2: Distribution of patients according to their level of education (N=45)

Level of education	Number of patients	Percentage
Uneducated	5	11.1
Primary level	19	42.2
Secondary level	11	24.4
Higher Secondary level	6	13.3
Graduation level	4	8.9

Table 3: Distribution of patients according to their occupations (N=45)

Occupation	Number of patients	Percentage
Day laborer	21	46.7
Serviceman	7	15.6
Student	5	11.1
Farmer	5	11.1
Driver	4	8.9
Housemaker	3	6.7

All 45 patients presented with neurological deficits at emergency. 13(28.9%) presented with complete injury that is ASIA grade A and others had incomplete injury where 7(15.5%) had grade B, 12(26.6%) had grade C and 13(28.9%) had ASIA D on admission (Table 4). The median (interquartile range) time interval from injury to admission was 2 days (0.04 to 4.25 days), from injury to decompression was 9 days (0.03 to 28 days) and median (IQR) interval between admission and decompression was 5.67 days (0.26 to 27.5 days). (Table 5)

Table 4: Preoperative neurological status of the patients (N=45)

Pre-op neurology in AIS	Number of patients	Percentage
A	13	28.9
B	7	15.5
C	12	26.6
D	13	28.9
E	0	0

Table 5: Distribution of patients according to different time intervals

Time interval	IQR (days)	Range
Injury to admission	2 (0.4 - 2.33)	(0.04– 4.25)
Injury to decompression	9 (2.25 - 16)	(0.3- 28)
Admission to decompression	5.67 (1.72 - 14.87)	(0.26 - 27.5)

The most commonly reported mode of injury was fall from tree 18(40%) followed by fall from height other than the tree 12 (26.7%), RTA 9 (20.0%), 5(11.1%) were injured by fall of heavy object and one (2.2%) was attacked by animal (Table 6). At single level, L1 fracture (48.8%) was the most common, followed by D12 (15.5%) and L2(15.5%) and D11 was least frequent (4.4%). In multilevel D12& L1 (11.1%) was frequently occurring fracture followed by L1 & L2 (4.4%). In fracture type most of the patient had burst fracture 25(55.5%), followed by distraction 9(20%), translation 7(15.5%) and 4 (8.8%) had compression fracture. (Table 7)

Table 6: Distribution of patients according to mode of injuries (N=45)

Mode of injury	Number of Patient	Percentage
Fall from tree	18	40
Fall from height other than tree	12	26.7
Road traffic accident	9	20
Fall of heavy object	5	11.1
Animal attack	1	2.2

Table 7: Distribution of patients on preoperative radiological findings (Level of injury and fracture type) of the patients (N=45)

Level of injury	Number of patients	Percentage
D 11	2	4.4
D 12	7	15.5
L1	22	48.8
L2	7	15.5
D12 & L1	5	11.1
L1 & L2	2	4.4
Fracture type		
Compression	4	8.8
Burst	25	55.5
Distraction	9	20.0
Translation	7	15.5

Table 8: Distribution of patients according to the Length of hospital stay

Length of hospital stay	Number of patients	Percentage
0-7 days	3	6.7
8-14 days	14	31.1
15-21 days	14	31.1
22-30 days	7	15.6
>30 days	7	15.6

From 45 patients 3(6.7%) stayed at hospital for (0-7) days, 14(31.1%) for (8-14) days, 14(31.1%) for (15-21) days, 7(15.6%) for (22-30) days and 7 (15.6%) patient's length of hospital stay was more than 30 days.

Discussion

A total of 45 study participants with traumatic thoracolumbar junction SCI managed surgically in the Department of Neurosurgery, CMCH were included in final analysis.

A total of 45 study participants with traumatic thoracolumbar junction SCI managed surgically in the Department of Neurosurgery, CMCH were included in final analysis. The primary analysis signifies that; traumatic thoracolumbar spinal injury is more common in young and male persons. This may be due to our culture where male was more involved in high-risk job than female. The overall median age was 28 years and age ranged between 17 and 65 years in the present study with male preponderance (84.4%) and male to female ratio of 5.4:1, like a previous study from Bangladesh Karim and associates showed the mean age was 33.12 ± 8.57 years (range 20 - 60 years) and 87.5% of male predominance.(4) .Other studies conducted in different countries like Haghnegahdar and associates reported similar age and sex distribution where the mean of the age was 29.74±11.4 years.(5)

Most of the patients were day laborers 21(46.7%), followed by serviceman 7(15.6%), student 5(11.1%), farmer 5(11.1%), driver 4(8.9%) and housemaker 3(6.7%).

Maximum patients came from poor education background where 5(11.1%) were uneducated, 19(42.2%) couldn't cross the primary level and 11(24.4%) were able to manage secondary, 6(13.3%) higher secondary and only 4(8.9%) at graduation level. According to Rahman and collogues (76.3%) patients were illiterate and (21.1%) had primary level education.(6). This indicates that there are some improvements of education in last decade. The patients were the main, even only earning member of the family. The study reflects that their physics is the only capital for earning. That's why their comorbidity and loss of independence has a great impact on the socioeconomic condition of the family as well as in the society.

The most commonly reported mode of injury was fall from tree 18(40%) followed by fall from height other than the tree 12 (26.7%), RTA 9 (20.0%). Choudhury and associates also observed fall from height as the commonest 106 (72.6%) mode of injury in our country which differ from another study by Karim and collogues, where they showed (66.67%) from RTA and (33.33%) from fall from height.(4) (7). Another study from outside by Haghnegahdar and associates showed (56.2%) cause was RTA.(5). In this study fall from tree reports most common mode of injury as a mass amount of patient came from the hilly areas where they worked in the fruits garden. It also brings a necked fact before our eyes that there is a huge deficit in safety measures at working places.

Out of 45 patients (28.9%) presented with complete injury that is ASIA grade A and others had incomplete injury where (15.5%) had grade B, (26.6%) had grade C and (28.9%) had ASIA D on admission. Rahimi-Movaghar and associates have shown in their study that (46%) had ASIA grade A.(8)and (49.6%) in Badhiwala et al.,(9). The median (interquartile range) time interval from injury to admission was 2 days (0.04 to 4.25 days), from injury to decompression was 9 days (0.03 to 28 days) and median (IQR) interval between admission and decompression was 5.67 days (0.26 to 27.5 days). A previous study form Bangladesh found that, mean (±SD) time interval between injury and surgery was 8.9 ± 10.11 days (range 2 - 60 days).(6).

As none of the study participant had polytrauma and severe comorbidity, hemodynamic stabilization before surgery was not required. Most of cases, the delay was due to time spend for presentation at the hospital from injury, poor infrastructures in the hilly area, poor socioeconomic condition to bear the instrumentation cost, delay in decision making and giving consents. Availability of OT, anesthesia, surgeon was also factors that increase the interval from admission to decompression as the study site is the only public referral hospital in this region owing the facilities for spinal surgery and provide services to the patients from south-eastern region of the country and results in unintended delay in surgery.

The present study reveals L1(48.8%) as the commonest level of injury, followed by D12(15.5%), and L2(15.5%). The most frequent fracture type observed as the burst fracture (55.5%), followed by distraction (20%), translation (15.5%) and (8.8%) had compression fracture. Karim and associates (2020) found L1 as the commonest (41.67%) level and burst as the commonest (91.67%) fracture type. Other studies have shown the same picture.
This study shows most of the patient (31.1%) had to spend 15 to 21 days at hospital even (15.6%) patient spent more than 30 days at hospital which is a big overload for the hospital management with limited resources.

Conclusions

The physical and psycho-social disability in traumatic thoracolumbar spinal injury is not only a medical issue. Several factors like financial, educational, infrastructural, professional safety measures, social awareness, government initiatives in health care system, annual health budget, employment law are tightly integrated with its management. What we have seen in the present study is not the full picture. Further multi-center research is time demand to find out more specific factors increasing the mortality and morbidity and answers to minimize them.

Present study shows almost all patients were in their productive life, who even didn't think of their present condition just before the event. Most of the cases they are the only earning member of the family.

It's very hard to provide proper treatment like imaging and instrumentation at due time without financial support from government. Most of all rehabilitation of these disabled patient like social rehabilitation, occupational rehabilitation is the prime concern after medical management. So, our recommendation is to take integrated management by the government to provide these people not only with the life but quality of life.

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