

Original Article**Spinal cord injury, Clinical Profile and its Management at Tertiary Care Center in Nepal****Prakash Kafle¹, Babita Khanal², Dipak Kumar Yadav¹, Deepak Poudel³ and Iype Cherian¹**¹Department of Neurosurgery, ²Department of Pediatric, ³Department of Anesthesiology and Critical Care, Nobel Medical College Teaching Hospital, Biratnagar, Nepal

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DOI: <http://dx.doi.org/10.3126/jonmc.v8i1.244450>**Abstract****Background**

Spinal cord injury causes serious disability among patients. More than 40 million people worldwide suffer from Spinal cord injury every year. Most of them are young men. More than 10% of trauma victims sustain spine injury and have higher mortality than other injuries.

Materials and Methods

This is a prospective observational hospital based study of traumatic spine injury cases admitted at Nobel Medical College Teaching Hospital, Biratnagar, Nepal from November 2017 to October 2018.

Results

Total of 352 cases were observed and 36 cases who meet the inclusion criteria for surgical intervention were analyzed. Most common affected age group was between 31-40 years with mean age of 40 years. Out of total cases, 81% were male. Most common cause for spine injury was road traffic accident. Cervical spine was the most common injury (66.7%) and C5- C6 subluxation being common radiological diagnosis. ASIA-C neurology status (41.7%) on presentation being most common neurological status. Head injury was the most common associated injury. Anterior cervical discectomy and fusion was the most common surgical procedure performed. Superficial surgical site infections were observed in two cases and hardware failure was seen in one case.

Conclusion

The epidemiology of traumatic spine injuries in eastern region of Nepal is similar with other developing countries. In present study, most common cause of spine injury was motor vehicle accidents followed by fall injuries and seen in male. Prevention of road traffic accident might decrease the incidence of spine injury there by reducing the national burden.

Keywords: *Spinal cord injury, Road traffic accidents, Injury*

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Introduction

Spine injury is a challenge for the family, primary health care provider, ambulance driver and the tertiary health care center like our where the prognosis will totally depend on many factors not only related to the injury but also with the care provided during the transport to the health care service centre. In developing countries like ours, there are no paramedics and trained health workers who would receive the case on the site of accident. Patients are taken to the nearby health center where there are no facilities available for the spine injury. Patient has to visit many centers before reaching to the tertiary center.

The other reasons for delayed presentation could be due to difficult geographical terrain, lack of awareness of prompt necessity for medical treatment and financial problems. During that period patients are not immobilized and they have to spend more time during transportation. It has been reported that more than 67% patient don't arrive to the tertiary center on time [1].

Spine injuries have great impact on both patient and families. The great pioneer in the field of spinal cord injury (SCI) rehabilitation, Sir Ludwig Guttmann (1976) have stated that severe SCI is undoubtedly one of the greatest disasters to human beings [2]. More than 10% trauma victims sustained spine injury and have higher mortality than other injuries [3]. The present study aims to investigate the epidemiological profile of the patient with SCI presenting to Nobel Medical College Teaching Hospital, one of the tertiary care center with round the clock neurosurgeons and 34 neuro dedicated ICU in the eastern region of country.

Materials and Methods

This is a prospective observational study of traumatic spine injury conducted in the department of Neurosurgery from November 2017 to October 2018 after the ethical clearance from the institutional review committee of Nobel Medical College Teaching Hospital, Biratnagar Nepal. All the participants had signed the consent

for the study. All the spine injury cases who were managed surgically were included in the study. Those patients who had both spine and head trauma and died due to head injury were excluded. Sampling was done by non probability sampling method. All the data were collected and electronically transferred and analyzed using the software for Statistical Package for the Social Sciences (SPSS) version 20

Results

In the present study, total of 352 cases were observed and 36 cases who meet the inclusion criteria were analyzed and are shown in figure 1. Those cases that didn't required surgery and denied for surgery were excluded from the study. Out of 36 cases 3 were lost on the follow-up.

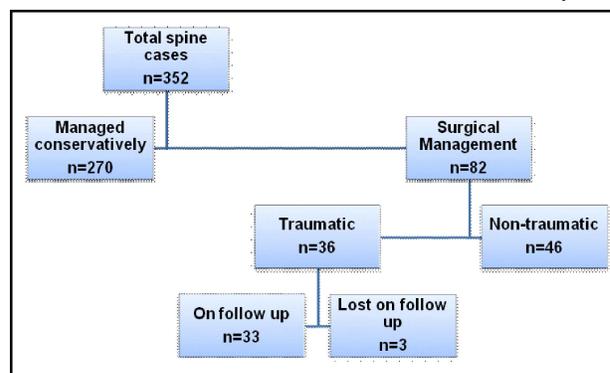


Figure 1: Cases division

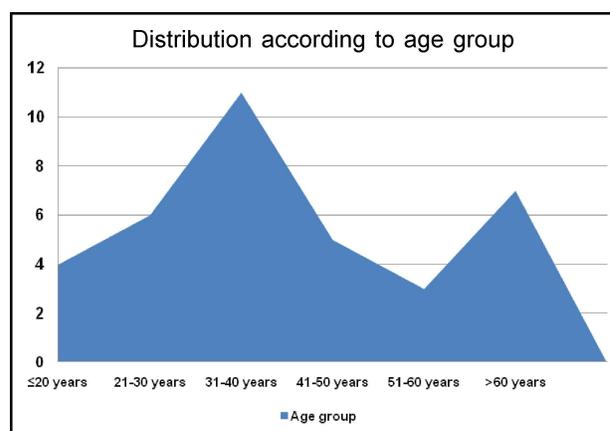


Figure 2: Age group distribution

Age Distribution

The most common affected age group in this study was between 31-40 years which comprises of 30.6% followed by 21-30 years and others were shown in figure 2. Minimum age at presentation was 16 years where as maximum age was

73years. Mean age of the study population was 40 years.

Sex Distribution

There was a male preponderance of spine injury in the present study which comprises of 81% (n=29).

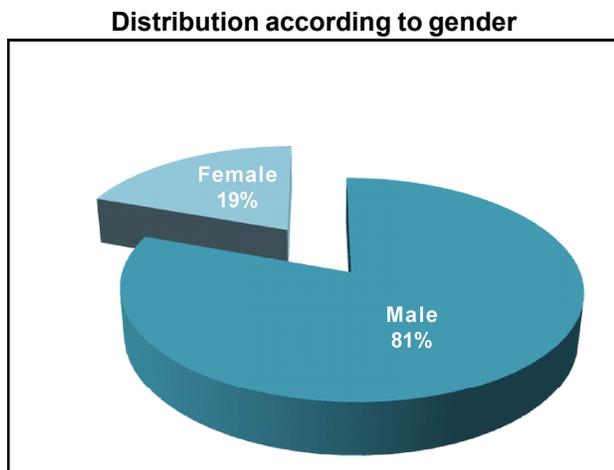


Figure 3: Distribution according to gender

Mode of injury

In the present study, modes of injury were due to road traffic accident and fall. Most common mode of injury was road traffic accident (78%). However there were different types of fall as shown in table 1.

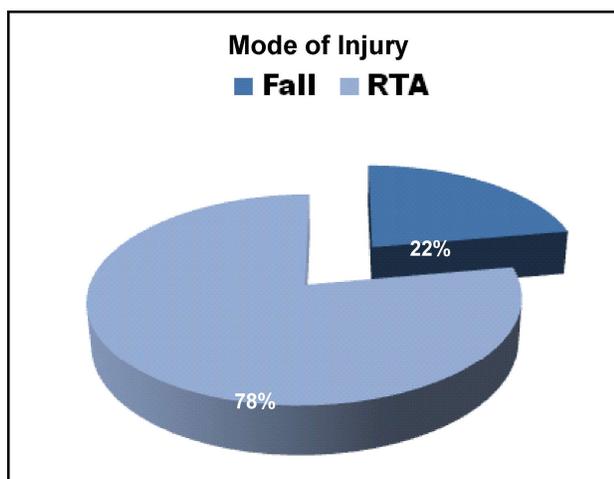


Figure 4: Mode of injury

Neurological Status

The Presenting neurological status was graded as per the American Spine Injury Association (ASIA) grading system. Most of the patient were ASIA-C (n=15, 41.7%) followed by ASIA-A. There was no patient of ASIA-E with mechanical instability in operated group.

Table 1: Types of fall

Types of fall	Frequency(n)	Percentage (%)
Tree	2	33.3
Hill/roll over	3	50
Buildings	1	16.7
Total	6	100

Table 2: ASIA Neurology status

ASIA Neurology status	Frequency(n)	Percentage (%)
A	9	25.0
B	8	22.2
C	15	41.7
D	4	11.1
Total	36	100.0

Level and types of injury

The most common level of injury was found at cervical region (66.7%) followed by lumbar region as shown in table 3 and different types of injury as shown in table 4 were seen where C5C6 subluxation (25%) was most common as shown in table 3 and 4.

Table 3: Level of injury

Level of Injury	Frequency(n)	Percentage (%)
cervical	24	66.7
Thoracic	3	8.3
Lumbar	8	22.2
Mixed	1	2.8
Total	36	100.0

Associated injuries

There were minor injuries in most of the cases however major associated injuries with spine injury was head injury and maxillofacial injury in 8.3 % and 5.6% respectively.

Treatment

Anterior cervical discectomy and fusion was the most common surgical procedure done followed by posterior instrumentation in the form of pedicle screw fixation. Other surgical procedures carried out were as shown in the table. Intraoperative

cerebrospinal fluid leak were seen in 14% of the cases.

Table 4: Injury Types

Injury Types	Frequency (n)	Percentage (%)
C2 Odontoid Fracture	3	8.3
C5 Compression Fracture	1	2.8
C5 Burst Fracture	1	2.8
C5 C6 subluxation	2	5.6
C5 compression fracture	3	8.3
C5C6 subluxation	9	25.0
C6 subluxation	1	2.8
C6C7 Spondyloptosis	1	2.8
C6C7 subluxation	2	5.6
C6C7 subluxation	1	2.8
D12 Compression fracture		
with D11 subluxation	1	2.8
D3D4 subluxation	1	2.8
D8 Burst Fracture	1	2.8
L1 Burst Fracture	2	5.6
L1 Compression Fracture	1	2.8
L1 D12 multiple level fracture	1	2.8
L2 burst fracture	2	5.6
L3 Burst Fracture	2	5.6
L4 Burst Fracture	1	2.8
Total	36	100.0

Table 5: Associated Injury

Associated injury	Frequency(n)	Percentage (%)
Chest	1	2.8
Abdomen	1	2.8
Maxillofacial	2	5.6
Head	3	8.3
None	29	80.6
Total	36	100.0

Table 6: Surgery

Surgery	Frequency(n)	Percentage (%)
ACDF*	13	36.1
Pedicle screw	12	33.3
Wiring	2	5.6
Lateral Mass	3	8.3
Corpectomy and fusion	5	13.9
Odontoid screw	1	2.8
Total	36	100.0

* ACDF- Anterior cervical discectomy and fusion

Hospital stays and follows up

Average duration of hospital stay was 7 days. About 6% of patient had hospital stay of more than 30 days. Three months follow up rate was 91.7% and there were three cases who had in hospital mortality. Preoperative and post-operative ASIA impairment scale at 3 months follow-up is as shown in table 8.

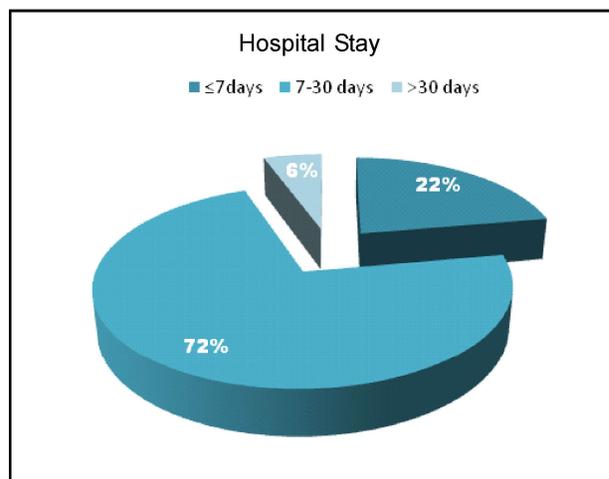


Figure 5: Hospital Stay

Table 7: Three months follow-up Neurology status

Three months follow-up Neurology status	Frequency(n)	Percentage (%)
A	7	21.2
B	1	3
C	7	21.2
D	12	36.4
E	6	18.2
Total	33	100

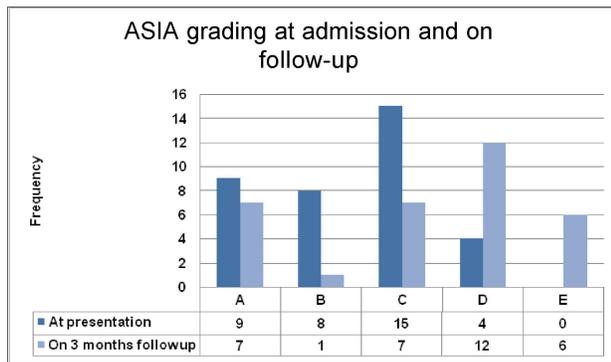


Figure 6: ASIA grading at admission and on follow-up

Those patient who had ASIA impairment grade A did not improve after surgery and two cases had hospital mortality so 7 patients were followed on 3rd months with same neurological status. Neurological Outcome at 3 months follow-up is shown in table 8.

Table 8: Neurological Outcome at 3 months follow-up

ASIA grading at admission	Frequency	ASIA grading on 3 months follow-up					Remarks In hospital mortality
		A	B	C	D	E	
A	9	7	-	-	-	-	2
B	8	-	1	3	4	-	-
C	15	-	-	4	7	4	-
D	4	-	-	-	1	2	1
E	0	-	-	-	-	-	-
Total	36						

Discussion

There lies variation in incidence of traumatic SCI between developed countries and developing countries. Developed countries [4-5] have higher incidence of SCI as compared to developing countries [6-10]. Such variation may be due to the lack of incomplete data entry regarding prehospital data and less research on this topic. In the present study, the most common cause of spine injury was motor vehicle accident (78%) followed by fall (22%), where as in a case series from India, fall injury was found to be the leading cause of SCI [11]. Generally, MVA is the leading cause in developed countries [4-5].

The most commonly affected age group in present study is between 31-40 with the mean

age of 40 years whereas in developed countries average age was 30.7 to 48.5 years and it was <30 years in developing countries [12].

In our study, there was (81%) male and (19%) female with male to female ratio of 4.3:1. China reported the lowest male to female ratio of 1.73:1[13] whereas India [6&16], Pakistan [14] and Bangladesh [15] had the highest ratio. Higher incidence in males may be because of male gender being exposed to most of the outdoor activities.

Cervical is the most common level of injury (66.7 %), which is comparable to the other studies done in developed [17] and developing countries [18]. C5-C6 subluxation was the most common injury in the cervical level. In our study, 25% had ASIA-A neurology status. Among developing countries, only Pakistan had a higher percentage of tetraplegia, equal to 71.1% [19]. There were no associated injuries in 80.6 % of patients however, head injury were associated in 8.3% in present study. In 14% patient had perioperative cerebrospine fluid (CSF) leak dueto primary impact of injury as compared to the other study with iatrogenic CSF leak [20]. In our setting most of the patients were discharged at seventh postoperative day after suture removal. Only 6% had more than 30 days of hospital stay.

Although the injury severity remains the same over the years, whereas the overall management and mortality has decreased [21]. Various reasons lie behind this improvement. Some are like wider availability of trauma centers with multidisciplinary units. Postoperative complications encountered in this study were surgical site infections in two-patient and implant failure in one patient. In our study preoperative and postoperative ASIA impairment scale at 3 months follow-up were studied and compared. Those patients who had ASIA impairment grade A did not improve after surgery on 3 months follow-up. There were significant improvement in other ASIA impairment scale from B to C,D; C to D,E and D to E. In our study, there were three in hospital mortality after

surgery. The cause of mortality in all three was not related to primary pathology. It was due to chest infections.

Conclusion

Spine cord injury is still a national burden not only for developing country but also for developed one. Morbidity and mortality associated with spine cord injury is very high round the globe. However, the dominant cause of spine cord injury is different in different literature but in present study, RTA has been found to be the most common mode of injury. Strict implementation of legislation, road safety measures, and zero alcohol tolerance may reduce the incidence of spine cord injury.

Conflict of interest

None

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