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Outcome of Traumatic Brain Injury Patients Following Road Traffic Accidents in Remote Rural Areas of North East India: Our Experience in Jorhat Medical College and Hospital

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Abstract

Introduction: Traumatic brain injury (TBI) is a leading cause of death and disability with a huge socioeconomic burdens in the India. It is estimated that nearly 1 million people die every year in India due to TBI following a road traffic accident. There is unavailability of neurosurgeon in some rural remote locations.

Aim: This study evaluates and describes the epidemiological, clinical characteristics and outcome of patients with TBI following road traffic accidents admitted and treated in the General Surgery department of JMCH.

Materials and methods: In this retrospective study, consecutive 100 patients with head injury, admitted in the department of General Surgery over a period of 3 months (from November 2021-January 2022) were included. Post-resuscitation GCS was used for categorising the severity of head injuries and outcome was assessed at discharge using GOS**.**

Results: Out of 100 TBI cases included in the study;79 patients were males and 21 females, maximum age group was of 34-45 years .There were EDH 20 cases, SDH 27 cases, SAH 18 cases and contusions 35 cases. Overall mortality rate was 5%, with severe headinjury patients experiencing a mortality rate of 22%. A single on call Neurosurgeon was guiding and supervising general surgeons when and if required. All the patients were treated in a setting without a dedicated neurosurgical facility.

Conclusion: Management of TBI in a general surgery set up is feasible. Head injury patients following RTA can be treated in a remote and rural area even with a limited resource.

Keywords: traumatic brain injury,TBI, road traffic accident,RTA, GCS, GOS

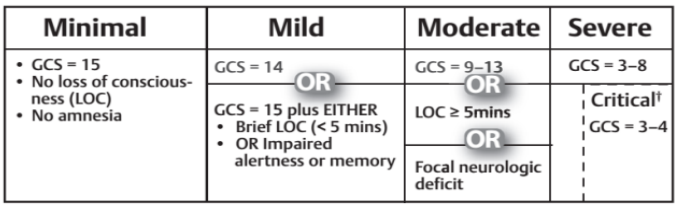
Introduction: Traumatic brain injury (TBI) is an insult to the brain from an external mechanical force, possibly leading to permanent or temporary impairment of cognitive, physical and psychological functions with or without altered state of consciousness[1].TBI is a leading cause of death and disability with a huge socioeconomic lossesin the Indian subcontinent. It is estimated that nearly 1 million people die every year in India[2].Due to rapid surge in urbanisation, motorisation and economical liberation, many Asian countries have an increased risk of TBI. Road traffic accidents(RTA). The majority of head injuries(60%) result from road traffic incidents. The prevalence of brain injury is highest in low- and middle-income countries (LAMIC), where 85% of the global population resides.[3,4] According to the World Health Organization (WHO), about 90% of fatalities resulting from injuries take place in these particular environments. Head injury is the primary cause of impairment in those under the age of 40, resulting in severe disability for 150-200 individuals per million each year. [5] India has one of the highest accident rates in the world, with 35 accidents occurring per 1000 automobiles.[6]. Nevertheless, governments in low- and middle-income countries (LAMIC) like India have not allocated sufficient resources towards the prevention, care, and rehabilitation of head injuries.

Jorhat medical college and hospital (JMCH) is a 750 bedded hospital situated in a remote rural area of Jorhat district of Assam in North East India. In 2015, department of Neurosurgery was established. However COVID pandemic aftermaths lead to unavailability of in house Neurosurgeon. There were no dedicated neurosurgery wards, neuro-critical facilities and trained staffs in managing neurosurgery cases. All the traumatic brain injury cases were managed in the department of General surgery by General surgeons and the critically ill patients were transferred to general ICU for the better management. S single on call Neurosurgeon was guiding and supervised general surgeons as and when required in managing traumatic brain injury cases. This study is our humble effort to evaluate the feasibility of management of head injury cases by a general surgeon with less resource.

Figure 1: Glasgow Outcome Scale

Score	Glasgow Outcome Scale (original)[4]
1	death—most deaths ascribable to primary head injury occur within 48 hrs
2	persistent vegetative state—unresponsive & speechless. After 2–3 weeks, may open eyes & have sleep/wake cycles
3	severe disability (conscious but disabled)—dependent for daily support (may be institutionalized, but this is not a criterion)
4	moderate disability (disabled but independent)—travel by public transportation, can work in sheltered setting (exceeds mere ability to perform "activities of daily living")
5	good recovery—resumption of normal life despite minor deficits ("return to work" not reliable)

Figure 2: Head injury severity



Aims and Objectives

- To determine the epidemiology and demographic profile of traumatic brain injury
- To evaluate clinical outcome of head injury patients at discharge with GOS (Glasgow Outcome Score)
- To evaluate the in hospital mortality

- To assess the feasibility of management of head injury cases by a general surgeon with less resources in a rural setup.

Materials and Methods

Patients with head injury admitted under other departments and patients who were not admitted were excluded from study. Post-resuscitation GCS was used for categorizing the severity of head injuries and outcome was assessed at discharge using GOS. All patients were managed as per laid down departmental protocols. Based on the post-resuscitation GCS, the head injury was categorised as minor head injury (GCS 13-15), moderate head injury (GCS 9-12) and severe head injury (GCS 8 or less).

Place of study

The study was conducted in Jorhat medical college hospital.

Period of study

The data were collected retrospectively for the period of 3 months from November 2021 to January 2022.

Data collection

Head injury patients following road traffic accident evaluated and treated in general surgery department were included in the study. Data were collected using patients' data sheets from the case files available in medical record office. Data were recorded in a predefined proforma.

Statistical analysis

Data were presented in tables and graphs. Simple descriptive data analysis was done using Microsoft excel.

Clearance from institute ethical committee was sought for. However, being a retrospective surgical audit,such clearance is not mandatory for this study.

Observation and Results

A consecutive 113 traumatic brain injury patients were included in our study from November 2021 to January 2022. Among 113 patients, 3 patients data were lost, 4 patients were in pediatric age group, which was excluded and 6 of the patients left against medical advice, hence a total of 100 patients were included. Maximum number of patients with head injury were in the age group of 34-44 years. Majority of the patients comprised of the male gender. Maximum cases were of hemorrhagic contusions and moderate head injury (GCS 9-13)

Amongst the 15 mild head injuries, 14 (93.3%) were managed conservatively and 1 (6.9%) underwent operative treatment. In the 76 moderate head injuries, 52 (68.4%) were managed conservatively and 24 (31.6%) underwent surgery. Of the 9 severe head injuries, 9 (100%) were managed conservativelyand none underwent surgery.

Table 1: Age group distribution

Age group(year)	Number
14-24	13
24-34	22
34-44	30
44-54	15
54-64	10
64-74	08
74-84	02

Figure 3:Age group distribution

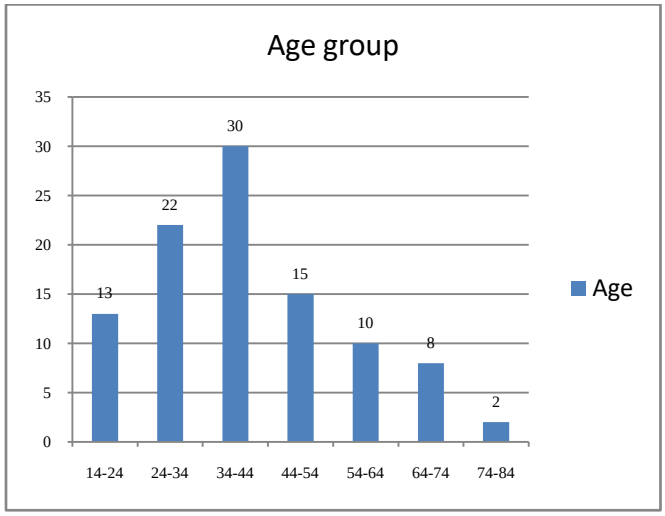


Table 2: Gender distribution

Gender	Number
Male	79
Female	21

Figure 4: Gender distribution

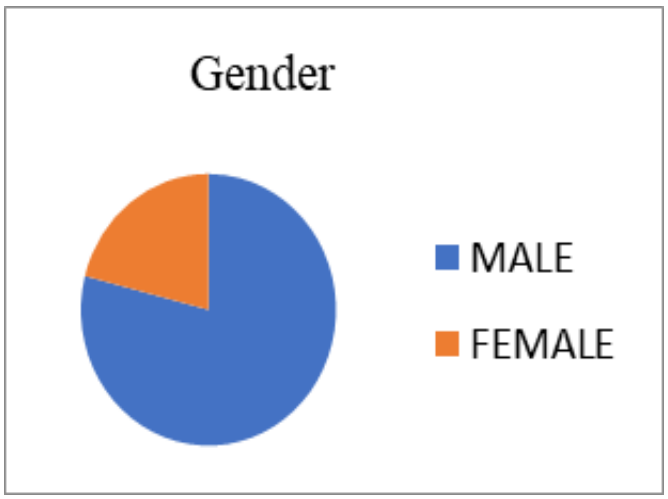


Table 3: Distribution of types of head injury

TBI	Number of cases
CONTUSION	35
SDH	27
EDH	20
SAH	18

Figure 5: Distribution of types of head injury

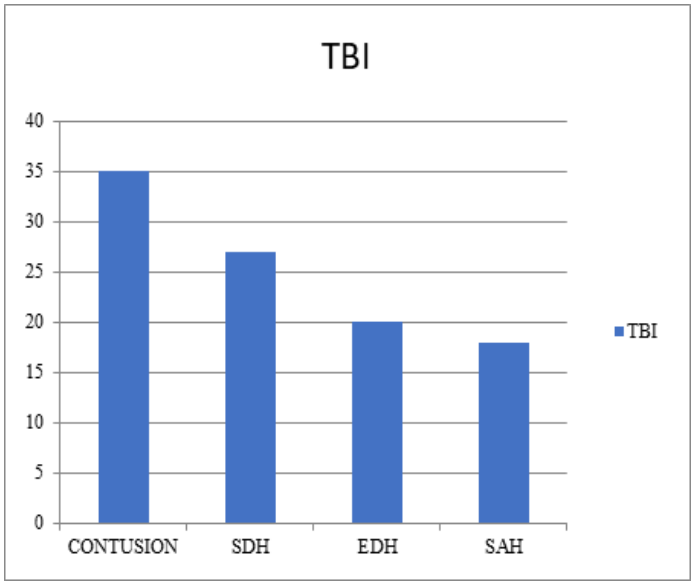


Table 4: Post resuscitation GCS

TBI	Mild head injury	Moderate head injury	Severe head injury
Contusion	10	20	05
SDH	04	20	03
EDH	05	15	05
SAH	02	15	01

Figure 6: Post resuscitation GCS

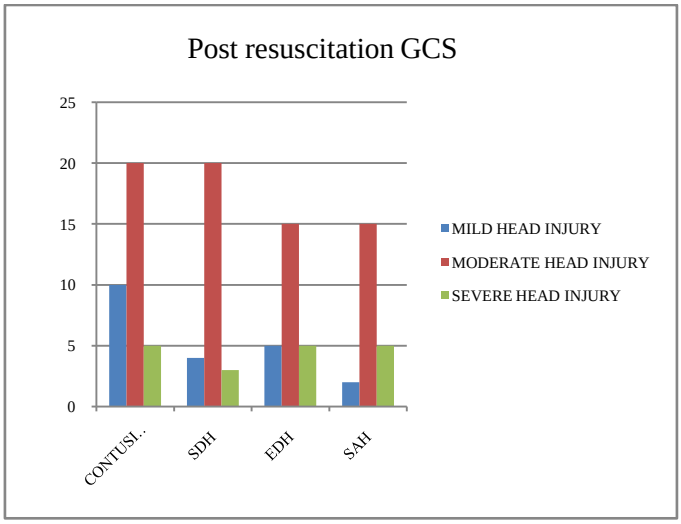
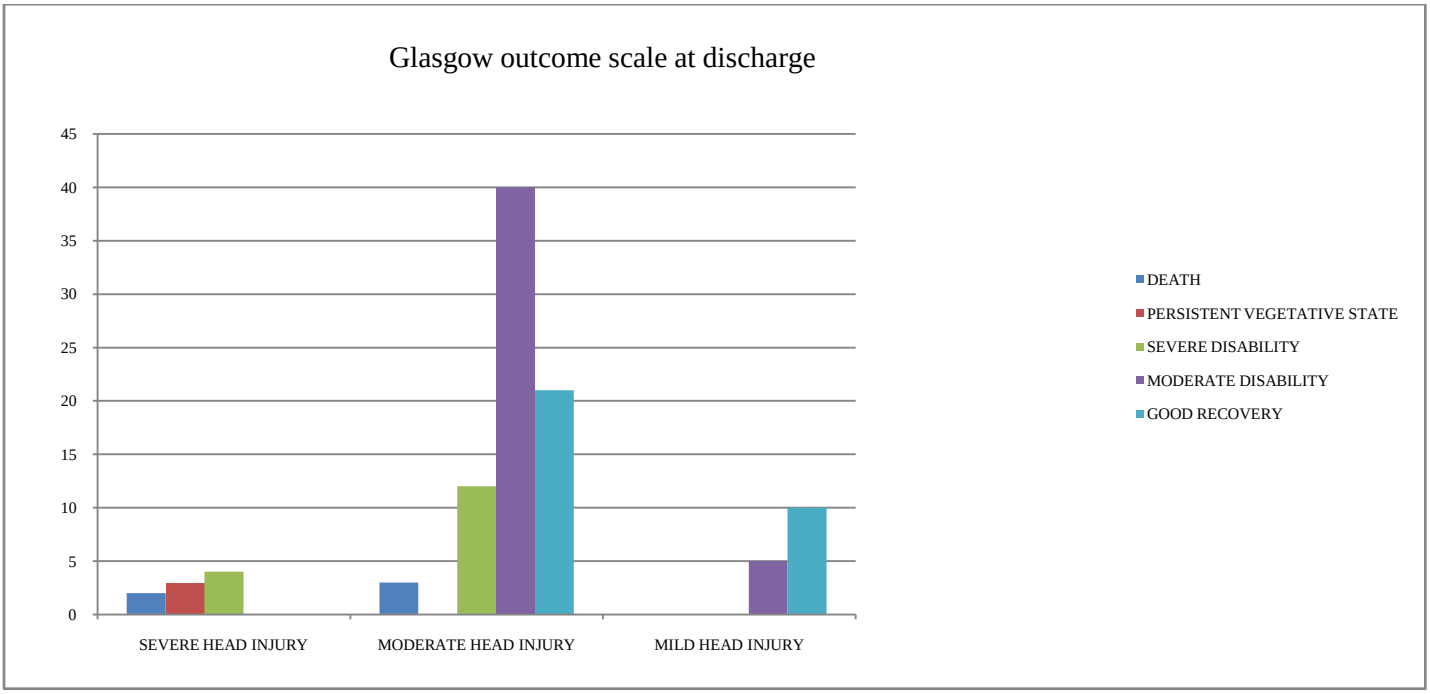


Table 5: Glasgow outcome scale at discharge

GCS severity	Glasgow outcome scale- at discharge				
	Death	Persistent vegetative	Severe disability	Moderate disability	Good recovery
Severe head injury	02	03	04	00	00
Moderate head injury	03	00	12	40	21
Mild head injury	00	00	00	05	10
Total	05	03	16	45	31

Figure 7: Glasgow outcome scale at discharge



Discussion

It is seen that in our study that, maximum number of patients with head injury were in the age group of 34-44 years and majority of the patients comprised of the male gender which is similar to the study conducted by Sharma S et al [17]

Despite advancements in the treatment of individuals with traumatic brain injuries, there has not been a significant decrease in the fatality rates associated with such injuries. In a study Fakhry et al. Found a mortality rate of 28.8% among patients with serious head injuries.[6]. Published various data have demonstrated that in a low and middle income countries may have a combined fatality rate of as high as 51% for severe brain injuries, whereas high income countries have a mortality rate upto 30%.[3].The current study shows an overall mortality rate of 5%, with sever head injury patients experiencing a mortality rate of 22% (n2/9). 31% of patients were discharged with good recovery and 45% with moderate disability who can take care of self independently. 16% of patients had severe disabilities at discharge needed support for daily activities. 3 % were in persistent vegetative state totally dependent on others for care.

Our research reveals that traumatic brain injury predominantly affects individuals in the young adult age

range within our region. Patients present at the emergency department in a deteriorated condition, with limited first-aid and pre hospital care. Our analysis suggests that the demographic group in their peak productive years experience the greatest influence, with the majority of individuals being male. One potential explanation may be that the male population assumes the role of principal earners for their families and hence participate more frequently in outdoor activities. M. K. Goyal, et al [16] reviewed 140 cases of acute head trauma in S.M.S. Hospital, Jaipur and assessed the age distribution, mode of injury and CT findings. They concluded that majority of injuries occurred in the age group of 21–40 years (66% males) due to road traffic accident which can be compared with our study.

Delivering neurosurgical treatment within general surgery settings is a difficult task (8). However the majority of patients in a rural remote location require medical attention primarily for trauma-related injuries, with a substantial portion of neurotrauma cases being treated by general surgeons.(9) While orthopedics and neurosurgery account for majority of emergency practices; a general surgeon who received additional training in these fields can carry out the management . The most of the casualties that result in a trauma are handled by accident and emergency staff, and most patients do not require the participation of specialists unless there are unique circumstances involved(10). The absence of trauma centers is likely to result in the transportation of seriously injured patients to facilities that are inadequately equipped to provide appropriate treatment, thereby leading to substandard care and compromised results.(11) General surgeons practicing in rural locations, where there is limited access to specialized support, require specialized training to function with greater autonomy, offer healthcare for a wider spectrum of diseases and more critically ill patients, and execute a wider range of medical procedures.

Several individuals with traumatic brain injuries (TBI) are not facilitated to receive treatment at dedicated trauma care centre and instead seek care at primary or secondary health centers, or unfortunately, may have died from their injuries at the scene. Also, the highways in India are not segregated and pass through rural areas. Furthermore, people tend to disregard the use of helmet and do not adhere to road safety rules. Over speeding with drunk and driving is also a leading issue of road traffic accident (14, 15).

Our findings shows that traumatic brain injury is manageable in a general surgery set up by a general surgeon with limited resources even with a paucity of dedicated neurosurgical facility. This is supported by other authors also in available literature.

The obstacles to rural and remote medical practitioners are manifolds including limited opportunities, high costs associated with staying skilled in advanced procedures, lack of support and help from the concerned local health authorities, family challenges, and perceived medico-legal issues.

Our study population is lesser in numbers. It is a retrospective study with some limitations like selection bias and recall bias. Further prospective study with a large population is required to overcome these limitations.

Conclusion

We may conclude that management of traumatic brain injury patients is feasible in a general surgery set up. It is difficult but not impossible to manage traumatic brain injury patients in a remote rural area. This study

encourages general surgeons to manage head injury patients in resource constraint areas of low and middle income countries. However it needs judicious use of resources and understanding of limitations and constraints. Policy makers and concerned health care authorities can use our study findings to establish a trauma care system for management of TBI in resource constraint remote rural areas.

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