International Journal of Research in Medical Science
www.medicalpaper.net
Online ISSN: 2664-8741; Print ISSN: 2664-8733; Impact Factor: RJIF 5.42
Received: 04-11-2019; Accepted: 05-12-2019; Published: 14-01-2020
Volume 2; Issue 1; 2020; Page No. 13-16

Outcome of severe head injury management: A study in a tertiary care hospital

Shahriar Kabir Khan[1*], Mahabubur Rahman[2], Anisur Rahman Bhuiyan[3], Rajee Mahmud Talukder[4], Sobroto Kumar Roy[5], Jayanto Kumer Podder[6]
[1] Assistant Professor, Department of Radiology, Sheikh Sayera Khatun Medical College Hospital, Gopalgonj. Bangladesh
[2] Assistant Professor, Department of Neurology, Sheikh Sayera Khatun Medical College Hospital, Gopalgonj, Bangladesh
[3] Assistant Professor, Department of Medicine, Sheikh Sayera Khatun Medical College Hospital, Gopalgonj, Bangladesh
[4] Assistant Professor, Department of Medicine, Shaheed Monsur Ali Medical College Hospital, Dhaka, Bangladesh
[5] Junior Consultant, Department of Medicine, 250 Bedded General Hospital, Gopalgonj, Bangladesh
[6] Associate Professor, Department of Cardiology, Jashore Medical College, Jashore, Bangladesh

DOI: https://doi.org/10.33545/26648733.2020.v2.i1a.18

Abstract
Introduction: Head injury continues to be a great challenge not only for the public but also for the neurosurgeon. India has the distinction of having the highest rate of head injury in the world. In Bangladesh head injury is a headache for the surgeon.
Aim of the study: The aim of this study was to assess the several steps and final outcome of severe head injury patient management.
Materials and Methods: This was a prospective observational study of severe head injury patients admitted in the Department of Medicine, Sheikh Sayera Khatun Medical College, Gopalgonj, Bangladesh during the period from January 2018 to December 2018. A total of 86 severe head injury patients of all age groups were admitted and treated. In all cases; age, sex, mechanism, severity, other associated injuries, computed tomography (CT) findings, management, and Glasgow outcome scale were analyzed.
Results: In this study among 86 participants 67 (78%) were male and 19 (22%) were female. On the other hand, as final outcome we found death was 31.40% (n=27), persistent vegetative state was 3.49% (n=3), severe disability was 5.81% (n=5), moderate disability was 3.49% (n=3) whereas the 'good recovery' was 55.81% (n=48).
Conclusion: Generally outcome of head injury depends on initial presentation. Early recognition and prompt management contribute to decrease mortality as well as disability of patients. CT-scan facility in district hospitals and upazilla health complexes; early referrals of head injury patients to higher centers and neurosurgical intensive care can decrease the mortality in head injuries.

Keywords: head injury, computed tomography (CT), glasgow coma scale, glasgow outcome scale

1. Introduction

Traumatic brain injury (TBI) is a condition occurring as a result of the application of an external force to the brain and it is associated to consciousness changes that can cause cognitive, physical and psychosocial functional disorders1. It is the most common cause of death and disability among all neurological diseases in early decades of life [1]. Head injury continues to be a challenge not only for the public but also for the neurosurgeon. It is an important cause of high morbidity and mortality, particularly in young and productive age group patients. In spite of marked improvements in pre-hospital care, operative skills and overall management of head injuries, mortality/morbidity of severe head injury has not changed over the last decades due to urbanization, industrialization, and increase in vehicular population. Over 5.56 million accidents occur worldwide per year with 1.2 million deaths annually and 3400 death/day. India has the distinction of having the highest rate of head injury in the world. In 1990, 80,000 people were killed in road traffic accidents, which increased to 150,000 deaths per year in 2011. Pedestrians and motorcyclists are the most common victims of road traffic accidents in India. Traumatic brain injuries are a leading cause of morbidity, mortality, disability, and socio-economic losses in India and other developing countries. Head injuries can be classified according to severity 80% as mild (Glasgow coma scale [GCS] 13-15), 10% moderate (GCS 9-12), the remainder are severe in nature (GCS 3-8). Severe head injury accounts for more than 50% of trauma- related deaths; these usually occur following road traffic accidents, assaults, and falls. Assessment of the head injury patient begins with the advanced trauma life support protocol of ensuring patency of the airway with cervical spine control while maintaining good oxygenation and tissue perfusion [2]. This aims to prevent the development of secondary brain injury. Between 5% and 10% of head injuries have an associated cervical spine injury [3]. Such an injury can be excluded in almost all cases with a combination of computed tomography (CT), magnetic resonance imaging, or flexion-extension radiography of the neck and should clinical suspicion indicate it. Once the clinician is satisfied that the patient is resuscitated with a stable cardiorespiratory status, neurological assessment can occur. The neurological examination begins with an assessment of patient's conscious level using the GCS. The severity of the head injury can be based on this initial GCS score. Pupil size and reaction to light are also assessed. Asymmetry of limb movement may help in diagnosing an underlying intracranial lesion. Observations on the blood pressure, pulse, and respiratory rate are also essential. All patients with multiple injuries and those with severe head injuries should have blood

samples analyzed for baseline estimations - full blood count, electrolytes and urea, coagulation screen, blood gases, alcohol level, and blood group. Although the severe head injury is only a relatively small part of the head injury picture, mild, and moderate injuries combined are 5 times as common surgeons are more involved in the care of patients with severe head injuries where care is more complicated. Maximum mortality occurs in this severe group. The present prospective observational study is designed to elucidate demographic profile, epidemiology, management, and outcome of severe head injury patients.

2. Objectives

a. General objective

- To assess the several steps and final outcome of severe head injury patient management.

b. Specific Objectives

- To evaluate the causes of head injuries for several patients.

3. Methodology and Materials

This prospective observational study was conducted in the Department of in the Department of Medicine, Sheikh Sayera Khatun Medical College, Gopalgonj, Bangladesh, Bangladesh during the period from January 2018 to December 2018. All head injury patients were registered and the study was carried out on severe head injury group patients after getting post-resuscitation GCS. Detailed history and careful clinical examination were performed on each patient. GCS was noted in each case. Laboratory investigations done were hemoglobin, total and differential leukocyte counts, hematocrit, blood urea and serum creatinine, random blood sugar, and serum electrolytes, X-rays skull, chest, limbs, and spine (where indicated) were done. Plain CT head was done every case. Patients were managed into conservative and surgical groups. Outcome was measured at the time of discharge using Glasgow outcome scale. The study was approved by the ethical committee of the mentioned hospital. The proper written consent was obtained from all the participants before starting the main intervention. A predesigned questioner had been used for collecting the basic data from the participants. Different tables and figures were used to display the findings of this study.

4. Result

In this study among 86 participants 67 (78%) were male and 19 (22%) were female. In this study in analyzing the age of the participants we found 16.28% of them were from <10 years' age group whereas 11.63% were from 10-20 years' age group, 26.74% were from 21-30 years' age group, 22.09% were from 31-40 years' age group, 9.30% were from 41-50 years' age group, 8.14% were from 51-60 years' age group, 5.81% were from >60 years' age group. In analyzing the causes of severe head injury we found road traffic accidents in 47.67% cases, fall from height in 19.77% cases, assaults in 18.60% cases, falling objects in 3.49% cases and in 10.47% cases the causes was miscellaneous. On the other hand, in this study through CT scan it was found (lesion) that, extradural hematoma was in 9.30% cases, subdural hematoma was in 9.30% cases, contusions was in 18.60% cases, frontal was in 9.30% cases, temporal was in 3.49% cases, parietal was in 1.16% cases, occipital was in 1.16% cases, multiple was in 2.33% cases, brain stem lesions was in 1.16% cases, intra-ventricular blood was in 2.33% cases, subarachnoid bleed was in 4.65% cases, infarcts was in 1.16% cases, brain edema was in 4.65% cases, diffuse axonal injury was in 5.881% cases, pneumocephalus was in 4.65% cases and fractures was in 20.93% cases. In final outcome we found death was 31.40% (n=27), persistent vegetative state was 3.49% (n=3), severe disability was 5.81% (n=5), moderate disability was 3.49% (n=3) whereas the 'good recovery' was 55.81% (n=48).

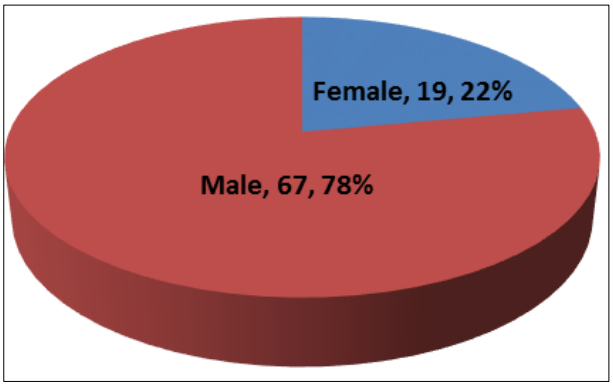

Fig 1: Gender distribution of participants (N=86)

Table 1: Age distribution of the participants (N=86)

Age (Years)	n	%
<10	14	16.28
10-20	10	11.63
21-30	23	26.74
31-40	19	22.09
41-50	8	9.30
51-60	7	8.14
>60	5	5.81
Total	86	100

Table 2: Causes of severe head injury (N=86)

Cause/Mode	n	%
Road traffic accidents	41	47.67
Fall from height	17	19.77
Assaults	16	18.60
Falling objects	3	3.49
Miscellaneous	9	10.47
Total	86	100

Table 3: Lesion found on CT scan of participants (N=86)

Lesions	n	%
Extradural hematoma	8	9.3
Subdural hematoma	8	9.3
Contusions	16	18.6
Frontal	8	9.3
Temporal	3	3.49
Parietal	1	1.16
Occipital	1	1.16
Multiple	2	2.33
Brain stem lesions	1	1.16
Intra-ventricular blood	2	2.33
Subarachnoid bleed	4	4.65
Infarcts	1	1.16
Brain edema	4	4.65
Diffuse axonal injury	5	5.81
Pneumocephalus	4	4.65
Fractures	18	20.93

Table 4: Final outcome (N=86)

Outcome	n	%
Death	27	31.40
Persistent vegetative state	3	3.49
Severe disability	5	5.81
Moderate disability	3	3.49
Good recovery	48	55.81
Total	86	100

5. Discussion

In a study they stated, 'In severe head injury group, the highest incidence (27.3%) was found in the third decade followed by 23.3% in the fourth decade which is similar various studies [4-7]. in which the highest incidence of severe head injuries reported in the third decade'. In the current study among 86 participants 67 (78%) were male and 19 (22%) were female. We found road traffic accident as the leading cause of severe head injury accounting for 47.67% of patients. It was followed by fall with the incidence of 19.77% and assault with incidence of 18.60% which is in unison with other similar studies [8, 9]. In the present study, 41.86% cases were brought to the hospital within 5 h of injury and out of this most of them were were brought within 24 h. Our percentage of patient's referral within 6 h of injury is lower than studies from developed countries [9, 10]. This stresses the need of good transportation facility from primary health centers and district hospitals to tertiary centers in Bangladesh. Compared to the study of Jennett *et al*., alcohol positivity (38.3%) is lower in the present study (18.6%). In total 44 cases had associated injury, which is higher from similar studies [9-11]. The higher incidence of associated injuries is attributed to maximum cases of soft tissue injuries in present series. Contusion was the most common finding on CT imaging 43 cases showed contusions; frontal lobe is the most common site. Other findings were fractures, extradural hematoma, subdural hematoma, subarachnoid bleed, brain edema, diffuse axonal injury, and intraventricular bleed. Findings of present series are more or less similar to CT findings of Selladurai *et al* [10]. Contusion is the most common finding in both the studies. Surgical intervention was required in 39 patients. The remaining cases of severe head injury were managed conservatively with proper chest physiotherapy, tracheostomy (where prolonged intubation required), ventilatory support, RT feeding, and nursing care. Percentage of surgical management varied from study to stud [12]. This may be due to the type of head lesions in different patients varies from study to study. Overall mortality was 31.40%, good recovery 55.81%, and severe disability 5.81%. These results are comparable to the study of Levati *et al*. [13]. In the present study, the outcome was evaluated according to the state of the patient at the time of discharge. This is the reason for the variation in results of the outcome. The factors related with bad prognosis were delayed (>1 day) interval between injury and admission, patients with GCS 3-5, age >60 years, CT findings: Brain edema, acute SDH, SAH, and dilated pupil. Chaudhury *et al*.,[14]. in 472 cases of severe head injuries, found GCS<8, advanced age, dilated pupil, extensor rigidity, and altered blood pressure as risk factors with bad prognosis. The aim of this study was to assess the several steps and final outcome of severe head injury patient management. All the steps of this intervention were conducted to achieve the main objectives of this study.

Limitations of the study

This was a single centered study with a small sized of sample. So the findings of this may not reflect the exact scenario of the whole country.

Conclusion and recommendations

Early recognition and prompt management contribute to decrease mortality as well as disability of patients. CT-scan facility in district hospitals and upazilla health complexes; early referrals of head injury patients to higher centers and neurosurgical intensive care can decrease the mortality in head injuries. For getting more specific findings we would like to recommend for conducting more studies regarding the same issue with larger sized sample.

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