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A Retrospective Study on Cause of Death in Head Injury Patients with GCS 13 and above in Salem District

Parthiban Durai Samy[1], L. Sankar[2]

Abstract

Introduction: Mlld traumatic brain injury is defined by the American Congress of Rehabilitation Medicine as involving an alteration in consciousness (amnesia or confusion), less than 30 minutes of loss of consciousness, or less than 24 hours of post traumatic amnesia, with focal neurological deficits that may or may not be transient. *Materials and Methods:* This retrospective study was conducted in 2016-2018 in Department of Neurosurgery, Government Mohan Kumaramangalam Medical College Salem. 45 cases got selected based on the GCS criteria. These patients case sheets were collected from the following data's were collected from the case sheets. Age, sex, date of admission, date of surgery (if performed), date of death, diagnosis, mode of injury, history of loss of consciousness, vomiting, ENT bleed, seizures, GCS at the time of admission, associated injuries, first CT scan brain findings, other investigations done, opinions obtained from other departments for associated injuries or medical conditions, preliminary investigations, date of deterioration, cause of deterioration as evidenced by supporting investigations or examination findings. *Results:* Majority of the patient (23 patients) who were admitted with mild head injury and have died had bifrontal or frontal contusions alone or in association with contusions in other areas of the brain. 20 patients had subdural hemorrhage, which includes acute and chronic, 5 patients had extradural hemorrhage, 19 patients had a subarachnoid hemorrhage, 19 patients had skull fractures visible on CT scans and 7 patients had pneumocephalus. Many patients had more than one finding on a CT scan. *Conculsion*: Focal injuries are those visible injuries limited to a well circumscribed part of the brain whereas diffuse injury is one in which there is no visible macroscopic structural damage to the brain, but associated with widespread dysfunction of the brain. Even in its mildest form, diffuse injury may be assisted only with alterations in neuronal excitability, neurotransmission related injuries and/or receptor related injuries. In its more severe cases it may be associated with structural damage at microscopic levels without any visible mass lesion.

Keywords: Head Injury; Glass Coma Scale; CT Findings; Fractures

Introduction

Traumatic brain injury is the most common cause of death and long term morbidity worldwide and in India and the incidence is rising due to growing population and mechanical life wherein people need to move to distant places for their work [1]. The incidence of TBI varies from a wide range of 67 to 317 per lakh population and mortality out of this injury is around 50% for severe injury and 4-8% for moderate injury. In India, higher incidence of accidents are due to lack of awareness of road safety measures, inadequate safety measures of automobile designs, drunken driving and voluntary violation of traffic rules by both the civilian and the rider [2]. Other causes of head injury apart from RTA that are common in India includes assault and accidents that occur in relation to trains, wherein people again fail to follow the safety measures and become a victim for these high-velocity injuries. Recent advances in telecommunication, widespread internet usage, and computerized systems have actually aided in mass communication and reduced the time gap of the victim to reach the healthcarepersonnel [3]. High morbidity and mortality are associated

Author's Affiliation: [1]Assistant Professor [2]Associate Professor, Department of Neurosurgery, Government Mohan Kumaramangalam Medical College, Salem, Tamil Nadu 636109, India.

Corresponding Author: L. Sankar, Associate Professor, Department Of Neurosurgery, Government Mohan Kumaramangalam Medical College, Salem, Tamil Nadu 636109, India.

E-mail: drsankarmch@gmail.com

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with head injuries of patients with GCS 8 and below. But in cases of mild head injuries, wherein patient initially presents with GCS 13 and above with minimal CAT scan findings, when they die it leaves a severe mental stress on the family and the treating medical team. Indeed it creates more stress on the treating team to face the deceased family members [4]. With this in our mind we wanted to know the causes for death in patients presenting with mild head injury.

Materials and Methods

This retrospective study was conducted in 2016-2018 in Department Of Neurosurgery, Government Mohan Kumaramangalam Medical College, Salem. 45 cases got selected based on the GCS criteria. These patients case sheets were collected from the following data's were collected from the case sheets. Age, sex, date of admission, date of surgery (if performed), date of death, diagnosis, mode of injury, history of loss of consciousness, vomiting, ENT bleed, seizures, GCS at the time of admission, associated injuries, first CT scan brain findings, other investigations done, opinions obtained from other departments for associated injuries or medical conditions, preliminary investigations, date of deterioration, cause of deterioration as evidenced by supporting investigations or examination findings. Inclusion criteria: The following criteria were taken for study. All head injury patients admitted in the Department of Neurosurgery with a GCS 13 and above at the time of admission immaterial of the mode ofinjury. All age groups and both the genders were taken forstudy. Patients managed both surgically andconservatively.

Exclusion Criteria: Only patients with GCS 12 or less at the time of admission were excluded from the study.

Statistical Analysis

Statistical analysis Collected data were verified prior to computerized data entry. The Statistical Package for Social Sciences (Version 21.0; IBM Corporation, Armonk, NY, USA) was used for the statistical analysis of data. Descriptive statistics (eg, frequency, mean, and standard deviation) were applied. Pearson's correlation coefficient and tests of significance (eg, unpaired t-test) were applied. A significant p-value was considered at #0.05.

Results

Table 1: Age Group

Age	Frequency	Percentage
21-30	7	15.6
31-40	9	20.0
41-50	12	26.7
51-60	11	24.4
60 and above	6	13.3
Total	45	100.0

From the data analyzed from 45 patients, it was found that mild death in mild head injury was common the third, fourth and fifth decades while it is comparatively less in the extremes of ages (second and the sixth decades) (Table 1).

Table 2: GCS

GCS	Frequency	Percentage
13	13	28.9
14	15	33.3
15	17	37.8
Total	45	100.0

At the time of admission, the calculated GCS was predominantly 15 even in mild head injury (Table 2).

Table 3: LOC

LOC	Frequency	Percentage
Present	29	64.4
Absent	16	35.6
Total	45	100.0

History of loss of consciousness was present in only 16 patients while 29 patients did not have a loss of consciousness (Table 3).

Table 4: Ent Bleeding

ENT Bleeding	Frequency	Percentage
Present	13	28.9
Absent	32	71.7
Total	45	100.0

History of bleeding from the ear, nose, and throat probably indicating a skull base fracture was present in 13 patients while 32 patients did not have this complaint (Table 4).

Table 5: Seizures

Seizures	Frequency	Percentage
Present	5	11.1
Absent	40	88.9
Total	45	100.0

History of seizures was present only in 5 patients while the majority did not have an episode of

seizure at the time of admission (Table 5).

Table 6: Type of Injury

Type of injury	Frequency	Percentage
Focal injury	10	22.2
Diffuse injury	11	24.4
Focal injury with mass effect	5	11.1
Focal injury with mass effect & midline shift	8	17.8
Diffuse injury with mass effect	3	6.7
Diffuse injury with mass effect & midline shift	8	17.8
Total	45	100.0

Table 7: Clinical Findings in Different Aspects of Injury

Bifrontal or frontal contusions	Frequency	Percentage
Present	23	51.1
Absent	22	48.9
Total	45	100.0

Contusions in other lobes of the brain	Frequency	Percentage
Present	11	24.4
Absent	34	75.6
Total	45	100.0

Subdural hemorrhage	Frequency	Percentage
Present	20	44.4
Absent	25	55.6
Total	45	100.0

Extradural hemorrhage	Frequency	Percentage
Present	5	11.1
Absent	40	88.9
Total	45	100.0

Subarachnoid hemorrhage	Frequency	Percentage
Present	19	42.2
Absent	26	57.8
Total	45	100.0

Skull fractures	Frequency	Percentage
Present	19	42.2
Absent	26	57.8
Total	45	100.0

Pneumocephalous or pneumoventricle	Frequency	Percentage
Present	7	15.6
Absent	38	84.4
Total	45	100.0

Oro-faciomaxillary injuries	Frequency	Percentage
Present	5	11.1
Absent	40	88.9
Total	45	100.0

At the time of admission, diffuse injury and the focal injury was equally present in the subgroup while midline shift was present in 16 patients and only mass effect with no midline shift was present in 8 patients. Majority of the patient (23 patients) who were admitted with mild head injury and have died had bifrontal or frontal contusions alone or in association with contusions in other areas of the brain. 20 patients had subdural hemorrhage, which includes acute and chronic, 5 patients had extradural hemorrhage, 19 patients had a subarachnoid hemorrhage, 19 patients had skull fractures visible on CT scans and 7 patients had pneumocephalus. Many patients had more than one finding on a CT scan. Associated injuries in the study population revealed 4 patients with long bone injuries requiring orthopedic intervention for immobilizing these fractures. The oro-faciomaxillary injury was present in 5 patients. (Table 6 and 7).

Discussion

From the data analyzed it was found that in patients who have died with mild head injury (GCS 13 and above), the majority tend to deteriorate within the first week of injury with an incidence of 82.2% [5]. This denotes that the complications tend to be more prevalent in the first week of injury and those patients with bifrontal and or frontal contusions tend to deteriorate much more than other intracranial pathologies [6]. The initial clinical and radiological presentation at the time of injury might not actually be the same and tend to vary significantly [7]. It was also observed that in our study only 28.9% had CT scan changes at the time of deterioration while the majority did not show any new or worsening intracranial pathology that could attribute to the deterioration and mortality [8]. This has been confirmed by many studies that were conducted on head injury patients, they have concluded that many preventable causes can be found in those patients who have deteriorated [9]. It was found that in order of statistical significance, aspiration ($p<0.003$) was found to be mostly associated with mortality in mild head injury patients. Suspected patients should be taken an x-ray of the chest or a CT scan of the chest to know the presence of consolidation of

a lobe. Early bronchial toileting, repeated cultures and appropriate antibiotic therapy along with chest physiotherapy, bronchodilators, inhalational steroids, and nebulizers should be started at the earliest to prevent complications [10]. Prevention is always better than combatting this complication and hence paramedics and patients relatives should be educated to start small feeds in a propped up position for these patients. Making the patient to lye down soon after feeds should be avoided. Patients who have difficulty to swallow should be started with nasogastric or nasojejunal tube feeds. Patients with poor GCS and in whom delayed recovery is anticipated can be considered for percutaneous enterogastric feeds [11]. BI consists of two separate forms: primary and secondary brain injury. The primary brain injury regarding the damage caused by the impact accident leads to a skull fracture, vascular or parenchymal damages, and concussion. The primary brain injury consequently led to an increase in brain bleeding and increased intracranial pressure. The secondary brain injury that occurred after hours and days following primary brain injury is the result of a complex process. The secondary injury occurred by different factors such as hypoglycemia, hyperglycemia, hypoxia, hypotension, and anemia [12]. Complication due to secondary brain injury included hematomas, vasospasm, hydrocephalus, cerebral edema, intracranial hypertension, infection, and seizures. In this study, a large group of ICU trauma patients was evaluated. On the other hand, data were collected from a Level 1 trauma center that provides the highest level of surgical care which this strong point of this study [13].

Conclusion

Intracranial pathology may not be the only cause for delayed deterioration in mild head injury patients. Early clinical detection, appropriate investigations, and early interventions can reduce these mortalities and morbidities in a great way. High morbidity and mortality are associated with head injuries of patients with GCS 8 and below. But in cases of mild head injuries, wherein patient initially presents with GCS 13 and above and who are supposed to live, when they die it leaves a severe mental stress on the family and the treating medical team. Indeed it creates more stress on the treating team to face the deceased familymembers.

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