CORRELATION OF CLINICAL FINDINGS WITH ICU DISCHARGE STATUS IN TRAUMATIC BRAIN INJURY

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Abstract

Trauma is one of the most common causes of death and lifelong disability in the early decades of life, of which the majority of cases are neurological trauma. Traumatic brain injury remains an important cause of death and disability in young adults. So, objective of this study was to correlate the clinical findings with patients' ICU discharge status in traumatic brain injury. 130 subjects were included in the study. The present study was an observational prospective study undertaken to evaluate the correlation between clinical findings and patients' ICU discharge status following acute trauma. The study was conducted in the Department of Neurosurgery, Krishna Medical College and Hospital. All the patients presenting to the hospital with a history of head injury and polytrauma to admit Department of Neurosurgery in the intensive care unit (ICU) were included as the study population. A careful history was collected from the patient and/or attendants to reveal the mechanism of injury and the severity of trauma. The outcome at ICU discharge will be concerned with the patient's aliveness status. According to age ranged between 25 years and > 80 years with a mean age of 45.83±14.47 years. The majority of patients were in the age group of 41 - 50 years (30.77%) followed by elderly patients aged > 60 years represented (15.38%). In gender majority of patients were males (60.77%) and females (39.23%). The male: female ratio was 1.55:1. Although more males suffered TBI, more females had a better outcome. (p=0.907). According to the cause of head injury, Road traffic accidents represented the most frequent cause of TBI (56.15%), followed by assault (1.5%), fall (23.8%), IC bleed (11.5%) and headache (6.9%). The history of alcohol consumed was given by (37.69) % of patients. Patients according to CT scan findings. It was observed that the majority of patients were having normal CT findings (52.31%) and (47.69%) of patients had abnormal CT findings. It is very essential on part of clinician to know the clinical parameters that are significantly associated with such patient's outcome. Since, knowledge of such parameter (s) is indispensable in management of the treatment of better recovery, this study was undertaken to correlate the clinical findings with traumatic brain injury patients ICU discharge status.

Keywords: Clinical findings, ICU discharge status, Acute Head Trauma.

Ethical Statement: - Ethical clearance was obtained from the Krishna Institutes of Medical Sciences Deemed to be University, Karad for conducting this Observational study (Ref. No. KIMSDU/IEC/01/2020). Since, the record set was obtained from Krishna Hospital they were

informed about the study and obtained written permission to use those record data's for conducting and publishing the study.

Introduction

Trauma is one of the most common causes of death and lifelong disability in the early decades of life, of which the majority of cases are neurological trauma. Traumatic brain injuries due to road traffic accidents (RTA) are the second most common cause of death, only next to cancer. Traumatic brain injury remains an important cause of death and disability in young adults. Traumatic brain injury with an estimated 10 million cases a year worldwide[1], is a major cause of death and disability among a predominantly young population. Studies have shown that nearly 1.6 million head injuries occur in the United States each year, resulting in over 50,000 deaths and over 70,000 patients with permanent neurological deficits. Accurate prediction of the long-term outcome soon after an emergency admission to hospital and neurological assessment (with or without brain imaging) can be useful in several ways clinically, for communication with relatives and other healthcare professionals, and as an aid to decision making about whether to pursue active management[2] in research, to generate hypotheses about the biological mechanisms leading to poor outcome and retrospectively as part of a clinical audit process[3]. Furthermore, the development of methods for case-mix adjustment is essential for non-randomized treatment comparisons and clinical epidemiology. For example, the patients in this study were part of a project to measure and assess the importance of the long-term functional outcomes of episodes of physiological derangement or "secondary insults[4]", recorded in the intensive care unit. It was important to have a well-validated and reproducible model of prognosis using only baseline admission data, thus allowing assessment of the independent significance of the "secondary insults", or the "added value" of the complicated task of recording and validating such measurements[5].

Many studies have used both prospective and retrospective clinical information to derive baseline predictive models, either specific to traumatic brain injury[6-15], or for patients in the intensive care unit in general[16-18]. With a few notable exceptions[10,19-21], these studies have used relatively small patient samples, little or no internal model checking procedures, no external validation of the final predictive model, and no comparisons with existing models. Many of the modeling strategies have begun with a large set of potential predictors from which were selected some "best" candidates determined on purely numerical or statistical criteria. This black-box approach to the problem ignores the very real differences in simplicity, cost, and immediacy between the candidate predictors. The sex and approximate age of the patient will almost always be known, whereas an immunoassay result, even if it is a strong predictor of the future, requires specialist input, time to get the result, and funding. In this paper, we have developed a simple model for the prediction of survival after moderate or severe traumatic brain injury using computed tomography variables as the main consideration for selecting variables.

Materials & Methods

Study Design: - The present study was observational prospective study undertaken to evaluate the correlation between clinical findings and ICU discharge status in patients following acute craniocerebral trauma.

Study Procedure: - The study was conducted in Department of Neurosurgery, Krishna Medical College and Hospital. All the patients presenting to the hospital with history of head

injury and admitted to Department of Neurosurgery were included as study population. This study was carried out during May 2020 to Apr 2022 at Krishna Medical College and Hospital.

Sample Size: - Total sample size was 130 patients with history of head injury and admitted to Department of Neurosurgery during the study period were included in the study.

Inclusion criteria: - All patients with head injury and polytrauma and patients with acute craniocerebral trauma.

Exclusion Criteria: - Pregnant women, patients with known bleeding disorder. The selected subjects were visited and the questionnaire was administered after a written informed consent was obtained from the participants. All patients admitted with head injury and polytrauma, a careful history was collected from the patient and/or attendants to reveal the mechanism of injury and the severity of trauma. The patients were then assessed clinically to evaluate their general condition and the local injury.

Glasgow Coma Scale (GCS)

- Mild= GCS score ≥ 13
- Moderate= GCS score 9-12
- Severe= GCS score 3-8

Glasgow Outcome Score

- Grade I= Death.
- Grade V= Good Recovery.

All consecutive patients with traumatic brain injury admitted to the regional trauma centre at the KIMSDU, Karad were enrolled in the study if they were aged 25 or more and had an admission or last known Glasgow coma scale score (GCS) <12, or of 13–15 with concomitant systemic. Data collected on all patients on admission included age, sex, GCS, cause of injury, pupil response, clinical factors, brain CT result, and prior consumption of alcohol, each of which has previously been suggested as important prognostic factors. The clinical findings were coded using data taken from the patient's case notes.

Statistical Analysis

Data were analyzed according to history, clinical examination and Investigations. Data were entered in an excel sheet and analyzed using IBM SPSS v23. Frequencies and percentage analyses were done. Cross-tabulation and Chi-square analyses were done to find the relationship and association between various variables. The p-values of <0.05 were considered to be statistically significant.

Results: Table 1. Age Distribution

Age Group	
25-30	20(15.39%)
31-40	31(23.85%)
41-50	40(30.77%)
51-60	19(14.62%)
>61	20(15.38%)

The distribution of patients according to age. It was observed that the majority of patients were in the age group of 41 - 50 years 40(30.77%) followed by elderly patients aged > 60 years represented 20(15.38%).

Table 2. Gender Distribution

Gender	
M	79(60.8%)
F	51(39.2%)

According to gender observed that the majority of patients were males (60.77%) and females (39.23%). The male: female ratio was 1.55:1. Although more males suffered TBI, more females had a better outcome. (p=0.907).

Table 3. Cause of Head Injury

Cause of head injury	
ASS	2(1.5%)
FALL	31(23.8%)
HEADACHE	9(6.9%)
IC BLEED	15(11.5%)
RTA	73(56.2%)

According to the cause of head injury, Road traffic accidents represented the most frequent cause of TBI (56.15%), followed by assault (1.5%), fall (23.8%), IC bleed (11.5%) and headache (6.9%).

Table 4. Clinical Findings at Presentation

Clinical Findings	
Loss of Consciousness	36(27.7%)
Vomiting	42(32.3%)
Convulsion	6(4.6%)
ENT bleed	29(22.3%)
Alcoholic Consumed	49(37.7%)
CT Findings	68(52.3%)

The clinical findings at the presentation of patients observed that majority of patients presented with vomiting (32.31%) followed by loss of consciousness (27.69%). The other clinical presentation includes ENT bleeding (22.31%) and convulsion (4.62%). The history of alcohol consumed was given by (37.69) % of patients. Patients according to CT scan findings. It was observed that the majority of patients were having normal CT findings (52.31%) and (47.69%) of patients had abnormal CT findings.

Table 5. Distribution of Patients according to Type of Brain Injury by GCS Score

GCS SCORE	
Mild (GCS score ≥ 13)	74(56.92%)
Moderate (GCS score 9 - 12)	28(21.54%)
Severe (GCS score 3 - 8)	28(21.54%)

GCS, score we observed that majority of patients had a mild injury (56.72%) followed by severe type (21.54%) and moderate injury also among 28 (21.54%) patients.

Table 6. Distribution of Patients according to Outcome of Brain Injury

GOS SCORE	
I(Death)	21(16.2%)
V(Recover)	109(83.8%)

According to the outcome of brain injury, most patients had good recovery 109 (83.8%). Death was observed among only 21 (16.2%) patients.

Table 7. Correlation of Clinical Findings and ICU discharge status

Variables		**ICU Discharge Status**		**t value**	**p value**
		I(Death)	**V(Recovered)**		
Age Group	**25-30**	2(1.54%)	18(13.85%)	**7.5**	**0.11(NS)**
	31-40	4(3.08%)	27(20.77%)		
	41-50	4(3.08%)	36(27.69%)		
	51-60	4(3.08%)	15(11.54%)		
	>61	7(5.38%)	13(10%)		
Gender	**Male**	13(10%)	66(50.77%)	**0.014**	**0.907(NS)**
	Female	8(6.15%)	43(33.08%)		
Cause of head injury	**Assault**	0(0.0%)	2(1.54%)	**13.21**	**0.010(S)**
	Fall	5(3.85%)	26(20%)		
	Headache	0(0.0%)	9(6.92%)		
	IC Bleed	7(5.38%)	8(6.15%)		
	RTA	9(6.92%)	64(49.23%)		
Vomiting	**Absent**	9(6.92%)	64(49.23%)	**3.72**	**0.054(NS)**
	Present	18(13.84%)	70(53.85%)		
Loss of consciousness	**Absent**	3(2.31%)	39(30%)	**23.92**	**<0.0001(S)**
	Present	6(4.62%)	88(67.69%)		
Ent bleeding	**Absent**	15(11.54%)	21(16.15%)	**6.1**	**0.01(S)**
	Present	12(9.23%)	89(68.46%)		
Convulsion	**Absent**	9(6.92%)	20(15.38%)	**1.21**	**0.27(NS)**
	Present	21(16.15%)	103(79.23%)		
Alcohol consumed	**Absent**	0(0.0%)	6(4.62%)	**4.04**	**0.04(S)**
	Present	9(6.92%)	72(55.38%)		
CT Findings	**Abnormal**	21(16.15%)	41(31.54%)	**27.47**	**<0.0001(S)**
	Normal	0	68(52.31%)		

The above table shows a correlation between demographical variables, clinical findings and ICU discharge status. It was observed that age group, gender, vomiting and convulsion showed a statistically not significant relation with ICU discharge status ($p > 0.05$). Cause of head injury, loss of consciousness, ENT bleeding, alcohol consumed and CT findings showed a statistically significant relation with ICU discharge status ($p<0.05$).

Discussion

The present observational study was conducted to study the correlation of clinical findings with ICU discharge status in acute head trauma.

All patients admitted to Krishna Hospital with a history of head trauma during the study period of May 2020 to Apr 2022 were included in the study. A sample size of 130 cases who were admitted to the Neurosurgery Department in Krishna Hospital with head injury and polytrauma, both sexes were enrolled in the study.

Written informed consent was obtained from the participant patient or his/her relatives. The study was approved by the Ethical Committee of the Institute. All the patients were investigated for basic investigations and special investigations like clinical scans.

In the present study, it was observed that the majority of patients were in the age group of 41 - 50 years 40(30.77%) followed by elderly patients aged > 60 years represented 20(15.38%).

In a study done by David F Signorini et al[22]. (98%) were followed up for survival at 1 year. In the present study, it was observed that (83.8%) patients were followed for survival.

In a study done by Chantal W.P.M. Hukkelhoven et al[23]. They included seven predictive characteristics—age, motor score, pupillary reactivity, hypoxia, hypotension, computed tomography classification, and traumatic subarachnoid hemorrhage. In the present study, included five predictive characteristics- age, gender, cause of injury, clinical findings and CT findings.

In a study done by JI-Yao Jiang et al[24]. The prognosis of young patients was much better than that of the aged ($p < 0.05$). In the present study, it was observed that the majority of patients were in the age group of 41 - 50 years 40(30.77%) followed by elderly patients aged > 60 years represented 20(15.38%).

In a study done by Fabiana Lenharo Morgado et al[25]. on the correlation between the Glasgow Coma Scale and clinical findings in patients with traumatic brain injury observed mean age of the entire series was 37.77 ±18.69 years.

The majority of patients were males (60.77%) and females 39.23%. Navdeep Singh Saini et. al studied factors predicting outcomes in patients with a severe head injury, where the majority of patients were males (85.45%).

Aiman Mohammed Imtiaz et al.[26] studied the importance of clinical findings scans in acute traumatic brain injury and observed out of 100 cases included in the study 72% were males, while females constituted only 28%.

The majority of patients had RTA (56.2%) followed by falls (23.8%) and assault (1.5%). Navdeep Singh Saini et al[27]. studied factors predicting outcomes in patients with a severe head injury, where the majority of patients with road traffic accidents (83.64%) is the most common mode of head injury.

In a study done by Fabiana Lenharo Morgado et al[25]. on the correlation between the Glasgow Coma Scale and cranial clinical findings in patients with traumatic brain injury observed the most common causes of head injury were automobile accidents (52.9%), falls (20.6%), pedestrian injuries (10.8%), falls to the ground (7.8%) and aggression (6.9%).

It was observed that majority of patients presented with vomiting (32.3%) followed by loss of consciousness (27.69%). The other clinical presentation includes ENT bleeding (22.31%) and convulsion (4.6%). The history of alcohol consumed was given by 37.7% of patients.

Conclusion

RTA was considered the most common external cause of TBI in both the youngest and the elderly. The proportion of transport accidents was highest in young men. The majority of hospitalised patients have mild TBI. A majority of the patients had a good recovery.

The correlation between clinical findings and ICU discharge status showed a statistically significant relation with ICU discharge status.

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