Moderate to Severe Traumatic Brain Injury - An Institutional Experience

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Abstract:
Background: Traumatic brain injury (TBI) is a significant public health problem and is a leading cause of mortality in India. Incidence of head injuries is increasing over the years may be due to an increase in vehicular traffic and non-adherence to traffic rules.
Aims and Objectives
1) To evaluate and describe clinical characteristics of moderate to severe traumatic brain injury patients.
2) To Assess the outcome and validate the Impact score.
Materials and Methods: This is a retrospective and prospective study of all the patients admitted to Government general hospital, Guntur between June 2019 and August 2019, with TBI and GCS at admission of 12 or less.
Results: The Total number of cases admitted with moderate to severe TBI was 136 during the period of 3 months. 42.7 years was the mean age of TBI patients and male to female ratio was 5.8:1. Mortality rate was 38.2% and majority(88%) of them belonged to severe TBI group.
Conclusion:Most of the TBI's occur among the productive age group males and carry a very high mortality rate. Impact model for prognostic assessment may not be highly accurate at our institute; however Impact model can still give a good and objective way of assessing the prognosis in moderate to severe TBI.
Key Word: Head Injury; Moderate to Severe TBI; Impact score; Mortality.

I. Introduction

Traumatic brain injury (TBI) is among the oldest and most common medical afflictions affecting humankind. In the USA alone, approximately 1.7 million sustain TBI each year, of which 52,000 people die[1]. In India the total number of deaths due to RTA cases was 1,37,726 in 2018. TBI is the main cause of one-third to half of all trauma-related deaths[2]. Severe TBI is defined by a GCS score of 3 to 8, moderate TBI by GCS of 9 to 12, and mild TBI by GCS 13 to 15. Accurate prediction of long-term outcome after an emergency admission to the hospital is useful as an aid to clinical decision making in patients with head injury. In 1991, Marshall et al. proposed a CT scan classification of head injury to predict outcome[3]. Similarlyin an attempt to predict and improve outcomes of TBI, multiple clinical trials have been designed all over the world, but most of them have failed[4].IMPACT(International Mission for Prognosis and Analysis of Clinical Trials in TBI) scoring was proposed with the purpose of advancing knowledge of prognosis, trial design, and treatment in TBI. To date, the IMPACT project has enabled validation of prognostic models and standardization of data series and provided evidence-based recommendations to improve the sensitivity and efficiency of clinical trials. On the basis of a comprehensive prognosis analysis, researchers from the IMPACT project[5] have developed a simple tool to predict 6-month outcomes in adults with moderate-severe TBI. This tool includes 3 models of increasing complexity: IMPACT Core (age, motorresponse, pupillary reactivity), IMPACT Extended Core(hypoxia, hypotension, tomographic findings accordingto Marshall's computed tomography [CT] classification, presence of subarachnoid hemorrhage [SAH], presenceof epidural hematoma), and IMPACT Lab (glucose and hemoglobin levels on admission). This tool provides an estimate of the expected results at 6 months in terms of mortality and functional outcome. It is necessary to validate the IMPACT model in neurotrauma centers in order to ensure applicability

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II. Material And Methods

This Retrospective and prospective study was carried out on patients of Department of Neurosurgery at Government General hospital, Guntur from June 2019 to August 2019. A total of 136 patients are included in this study.

Study Design: Retrospective and Prospective observational study

Study Location: This is a tertiary care teaching hospital based study done in Department of Neurosurgery at Government General Hospital, Guntur.

Study Duration : June 2019 to August 2019.

Sample size: 136 patients.

Inclusion criteria:
1. All the patients with Traumatic brain injury and GCS on presentation of 12 or less

Exclusion criteria:
1. Patients who were brought dead to the hospital
2. Patients with alcohol abuse

III. Result

Total number of cases of RTA admitted during the study period of 3 months from June 2019 to August 2019 was 302 patients. Patients with GCS equal or less than 12 were 136 (45%) and were taken into the study.
Males accounted for 85% (116) and 15%(20) were females with male to female ratio of 5.8:1
Age of the patients was ranging from 14 years to 80 years and the median age was 42.7

Table no 1: Shows Age distribution of the patients

Age	Number(n)
Less than 20	10 (7.35%)
20-30	10 (7.35%)
30-40	37 (27.2%)
40-50	33 (24.3%)
50-60	18 (13.2%)
More than 60	28 (20.6%)

Figure shows Age distribution
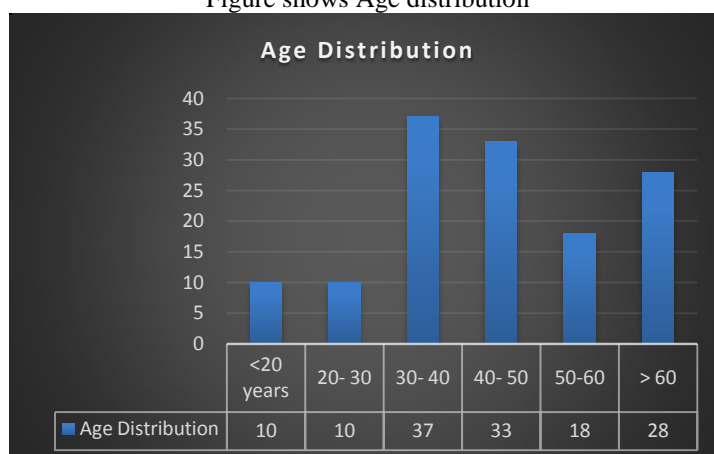
The most common modality of injury was RTA, followed by fall from height, followed by assault.
Most of the patients(55.9%) belonged to Severe TBI category with GCS of 8 or less.
Prognostic marker Impact scoring was performed for all the patients and the mean scores obtained were compared with our outcome.
Most of the patients presented with TCDB(Traumatic coma data bank[6]) 2 category on admission CT, and 70(54.4%) patients had SAH, and 60(44.1%) patients had EDH. The mortality rate among the moderate to severe TBI was 38.2%(52) during the 6 months follow up.

Table no 2: GCS of Patients at admission

GCS	(n)
Moderate (9-12)	60 (44.1%)
Severe (8 or less)	76 (55.9%)

Figure shows GCS at Presentation
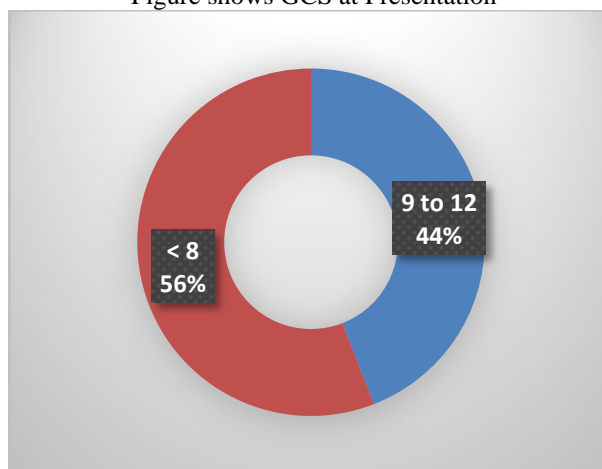
Among Moderate TBI (GCS 9-12), Mortality was seen in 10% (6), which is significantly lower than the Mortality seen in Severe TBI group, where the mortality rate is 60%(46) (P value< 0.01). 88% (46) of deaths belonged to severe TBI group. 18 patients among the severe TBI had GCS of 3, Pupils bilaterally not reactive and other 18 had GCS of 4 or 5 at the time of admission. The prognosis of such patients is dismal and has accounted for the high Mortality.

40 patients out of 136 cases required and underwent surgery, and rest were managed conservatively. 60% (24) among the patients undergoing surgery recovered, and Mortality was seen in 40%(16).

Table no 3: Characteristics of the patients

Model	Admission Characteristics	Value
Core	Age (Avg)	42.7 Years
	Motor score	**(n)**
	None	18 (13.2%)
	Extension	12 (8.8%)
	Abnormal flexion	10 (7.4%)
	Normal Flexion	10 (7.4%)
	Localizes	86 (63.2%)
	Obeys	0 (0%)
	Pupils	**(n)**
	Both reacting	90 (66.1%)
	One	8 (5.9%)
	None	38 (28%)
Extended	Hypoxia (n)	48 (35.2%)
	Hypotension (n)	22 (16%)
	CT Classification	**(n)**
	I	14 (10.2%)
	II	39 (28.6%)
	III	36 (26.4%)
	IV	13 (9.5%)
	V	26 (19.1%)
	VI	8 (5.9%)
	Traumatic SAH (n)	74 (54.4%)
	Epidural Mass (n)	60 (44.1%)
Lab	Glucose (Avg)	120 mg/dl
	Hemoglobin	9 g/dl

Figure shows the TCDB classification of CT findings in TBI patients
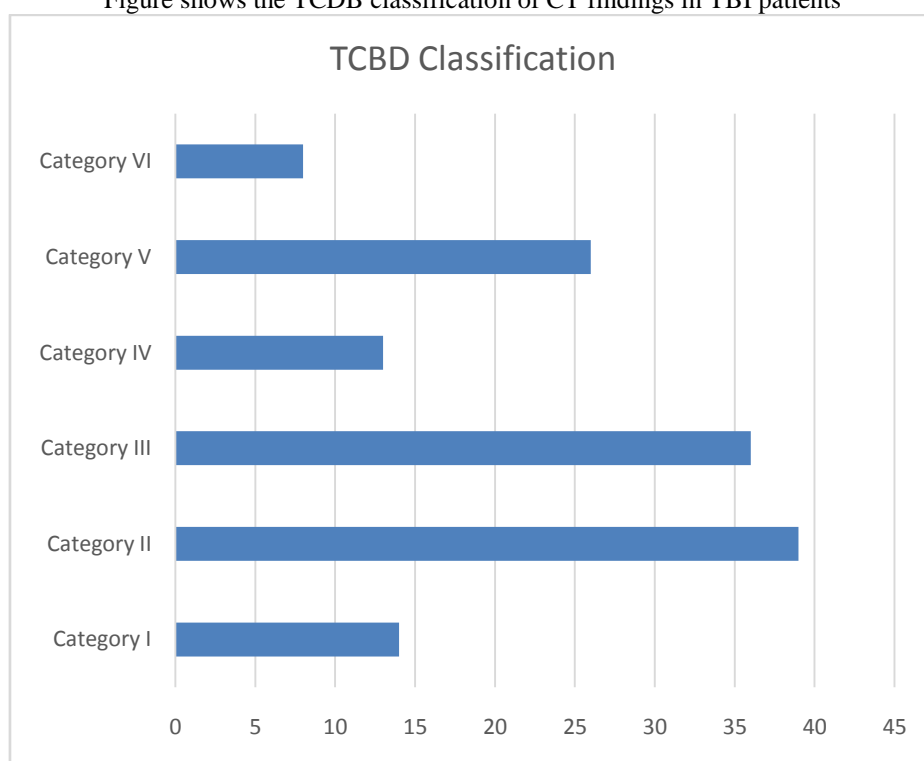
Table no 4: Average of Mortality rates at 6 months as calculated using Impact model

Average Predicted mortality based on Impact score at 6 months	
Core Model	32.2
Core + CT	30.9
Core + CT+ Lab	28.8

IV. Discussion

India is one of the countries with the highest number of TBI's in the world. The problem of Traumatic brain injury is underestimated due to the lack of research and good quality data in India. Males were 5.8 times more commonly affected than females in our study, similar to as shown by other studies[7]. The mean age group in our was 42.7 years, which is a productive age and leads to huge losses and sufferings to the family. Compared to the study in North India by Vineet et al[8], where the mean age group was 32 years, our study had a older mean age group(42.7 years). Low Glasgow coma score on admission was significant risk factor for Mortality.Mortality rate was 10% in our study for moderate TBI group, which is less compared to 32% seen in Vineet Kumar et al[8]study. The Mortality was very high (60%) in severe TBI group, which is comparable to the same study.

Surgical intervention rate in our study was about 30%. similarly, other studies have reported surgical intervention rate between 37-67%.Average Mortality rate predicted for our patients by calculating prognosis using impact score is shown in Table 4. Mortality rateappears to be higher in our study (38.2%) compared to the predicted scores by Impact model. The higher Mortality rate could be because of the loss of time due to delay in patient presentation at our hospital.

Prognostic models are handy during the decision making in neurosurgical practice. Prognostic models give an objective way for prognosis assessment and to explain the patient's relatives and assist patient's relatives to take an informed decision. There have been a lot of prognostic assessment tools for patients with a traumatic brain injury like Injury severity scale, Abbreviated injury scale, the revised trauma scale, TRISS, and others. All these studies indicate that there is a definite need for a useful tool for prognostication in traumatic brain injury. We have used the IMPACT model for predicting the outcome at 6 months after trauma, based on the admission parameter.

V. Conclusion

To conclude, Most of the injuries in our study occurred due to road traffic accidents, more common among the productive age group, and mostly in males. There was a very high rate of Mortality (38.2%), especially in the Severe TBI group. Prognosis assessment by the Impact model may not be very accurate for

assessment in our population, but it gives an objective and standard tool for guidance in management. Knowledge about causes, patterns, and severity of the condition will help in policy-making, management, and rehabilitation in developing countries.

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