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Clinical Profile Of Head Injury Patients Of A Tertiary Care Center In Western Maharashtra, India.

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ABSTRACT

Head injury is a common presentation in emergency departments, accounting for about one million visits each year. It is a leading cause of mortality and disability in children and adults both. A prospective observational study was conducted at Department of Surgery, Sassoon General Hospital, Pune from 2019-2021 over a duration of two years. The objective of the study was to assess the clinical profile of the head injury patients in relation to etiology, pattern of head injury, management, and outcome. 201 patients were enrolled which included the patients of head injury > 18 years of age admitted in surgical wards, excluding pregnant head injury patients and those patients with polytrauma. These patients were followed throughout their treatment and were monitored. The demographic variables, clinical and laboratory parameters - CT scan findings were assessed and correlated with primary outcome or survival and mortality. 90% were males. RTA was the commonest etiology of TBI. Time between Trauma to arrival to hospital (hours) ranged between 1-36 hours. Subarachnoid hemorrhage was found in 64(31 %). conservative management was done in 142(70.6%) of the cases whereas 59(29.4 %) cases underwent operative treatment. 169(84%) fully recovered and were discharged. Non usage of protective gears like helmets and consumption of alcohol were seen to be associated with poor outcome in these patients. This study will help to formulate the policies to reduce the morbidity and mortality of the head injury patients and will also help to promote the usage of safety gears like helmets and abstinence from alcohol during the travel. Knowledge about the causes, pattern, and distributions about head injury patients from this study will be helpful in policymaking, research, health management, and rehabilitation.

Keywords: head injury, CT scan, hemorrhage, helmets.

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INTRODUCTION

Head injury is a common presentation in emergency departments, accounting for about one million visits each year. It is a leading cause of mortality and disability in children and adults both. Head injuries account for one-third of all trauma admissions. Mild head injury accounts for around 70% to 85% of all patients with head injuries [1, 2]. Every year, an estimated 1.5 million people die as a result of a Traumatic brain injury (TBI) and hundreds of millions require emergency care. The rates of mortality and disability vary depending on the severity and causes of the TBI, however the rates of negative outcomes (death, vegetative state, and severe disability) after TBI can be more than 20% [3].

Head injuries can be divided into 2 types that is primary brain injury-injury sustained at the time of impact and secondary brain injury which is secondary to primary injury. Head injury is common in young and middle age group, males more common than females, majority of them are bread earners for family. Depending on the severity of head injury the patient may have various presentations which impact the management protocols. Some may require neurosurgical intervention in critical care unit or conservative management.

GCS is a widely used and accepted prognostic indicator for both traumatic and non-traumatic altered consciousness levels. It assesses a head injury patient's best ocular, motor, and vocal responses [4-6].

The inter-observer dependability of the score has been confirmed, and it increases with training and experience in various scenarios [7]. Furthermore, the GCS has been recognized as a reliable measure for monitoring head injury patients and identifying when their condition deteriorates. Because the scores are associated to either mortality or disability, the scale is also an indicator of injury severity [8]. The majority of severe TBIs are caused by motor vehicle related accidents and falls [9].

In today's modern era, computed tomography is the most important technology for diagnosing and treating head injury [10]. CT scanning is a cost-effective method for diagnosing and following up on head injury patients, and a follow-up CT scan is usually performed when there are signs and symptoms of clinical deterioration or when the GCS score falls by >2. Understanding about traumatic brain injury, its impact on socioeconomic status, and CT scans being cost effective, sensitive, and specific in preventing and limiting mortality and morbidity in head injury patients, as well as providing their families with good quality of life and socioeconomic status.

Management of patients with head injuries focuses primarily on assessing the risks of, and preventing or limiting, secondary brain injury [11, 12]. The main aim of assessing patients with head injuries in EDs is to identify the risk of clinically important brain injury, injury to the cervical spine and the potential need for imaging. Early detection and appropriate treatment can minimize, or help to avoid, long-term disability or death from head injury-related complications [13].

The primary objective was to the study the etiology and pattern of head injuries in the patient. The secondary objectives were to study the role of GCS in management of head injury and the outcomes of the patients related to recovery, residual disease, co morbidities, disability, and mortality.

MATERIALS AND METHODS

A Prospective Observational study was conducted at Sassoon General Hospital, Pune a tertiary care center in a teaching Hospital in Western Maharashtra. The study was conducted from 2019-2021. Ethical clearance was obtained from the Institutional Ethics committee. The study population were patients with Head injury admitted to Trauma ICU, Surgical Ward. The inclusion criteria were patients of head injury > 18 years of age. The exclusion criteria were Head injury patients below 18 years of age, pregnant patients with head injury and patients of head injury with polytrauma involving chest and/or abdominal trauma. The patients were enrolled in the study after obtaining consent from the relatives. The patients were examined and clinically evaluated on admission. The GCS was monitored daily from day of admission till day 7 of admission. During the course of admission, the patients clinical and neurological status were assessed and documented. Need of neurosurgical intervention, critical care management were assessed. Patient's neurological status, neurological deficit, disabilities were assessed. Radiological, biochemical, physiotherapy related evolution and assessment were done.

Case record sheets and validated proformas were used for data collection. Detailed history, physical examination findings, biochemical and radiological investigations were documented in the validated proforma and variables noted. These variables were then correlated with the primary outcome that is mortality. Demographic variables included age, gender, etiology of TBI, time between trauma and arrival to hospital. Apart from these demographic variables, laboratory parameters CT scan findings were assessed and correlated with primary outcome. Treatment details during the hospital course were also evaluated. The primary outcome of the patient was survival or mortality. Survival was classified as recovery, residual disease, and disability. Good outcome was grouped as discharge, recovery, residual disease and poor outcome was grouped as mortality and severe disability.

Due to scarcity of data from epidemiological studies of head injury admitted patients, the incidence of head injury patients at Sassoon General Hospital was found. The average incidence was found to be 14.5 % thus P (Expected prevalence or proportion) was considered 14.5 %. Confidence Interval – We calculated Z value for 95% confidence interval. Z=1.96 for 95% CI. Level of significance (d) - It was taken as 5%. N= sample size was calculated using the formula

$$N= Z2 \times P (1-P)/ d2 \quad N= 1.96x1.96x14.5x85.5/(5x5)$$

N= 190.51 rounded off to 191. To accommodate for the withdrawal of consent, incomplete data and loss to follow up an additional 5% was added to the calculated sample size. Thus adjusted sample size = 191+ 5%(191)=200.52 rounded off to 201 Therefore, we selected sample size is of 201 patients of head injury admitted in surgical wards in our institution.

Primary data were collected in paper based proforma and the data was then entered in Microsoft Excel spreadsheets 2016. Statistical analysis was done on IBM SPSS STATISTICS VERSION 20. Categorical variables were taken in the form of frequencies and proportions and cross tabulations were done for the chosen parameters and column proportions were compared using Chi square test. Continuous variables were expressed in the descriptive statistics tables as means, standard deviation, maximum and minimum value. P value < 0.05 were considered significant and p value < 0.01 were considered highly significant.

RESULT

In the present study there was very high male preponderance in the cohort with 182 (>90%) cases being males. M: F ratio was found to be 9.6:1. In the present study a large majority of cases 126(62.7%) belonged to 20-40 years age group. 49(24.4 %) cases were in 5th and 6th decade of life respectively. More than half 106(52.7%) cases were referred from outside.

In this study the most common cause of traumatic brain injury was Road Traffic accident (RTA) 158(78.6%) followed by fall at home 27(13.4%) and fall from height 16(8%). Among them, 74(37%) cases were driving the vehicle when they met an RTA, 51(25.5 %) cases were pillion riders in the vehicle which met an RTA. 14(7%) were bystanders and 18(9%) were walking on the road. In 86(42.8%) the impact was from front side, 40(19.9%) from backside, 48(23.9%) from side and 27(13.4%) were the head on collisions. Only 12(6%) cases were wearing safety gears like helmets, etc. prior to an RTA. The smell of alcohol at presentation was observed in 72(35.8%) cases suggesting alcohol intake prior to traumatic brain injury. In 46(22.9%) cases the history of loss of consciousness was present. Time between Trauma to arrival to hospital (hours) ranged between 1-36 hours. 98(48.8%) cases arrived between 1-5 Hrs. The average duration between trauma and arrival to hospital was 3.1±3 hours.

In this study GCS Score on admission day ranged between 3 to 15 with average score of 12±3. Average GCS score increased till day 7 to 15±0. On the day of admission, majority of the patients 159(79.1%) had GCS between 11 to 15. 29(14.4 %) had score between 6-10 while 13(6.5%) cases had score between 3-5. In our study conservative management was done in 142(70.6%) of the cases whereas 59(29.4 %) cases underwent operative treatment. In the present study, Out of 201 cases, of TBI there was mortality of 20 (10%) cases. 169(84.1%) cases got recovered fully and discharged. Two (1%) cases recovered with gradually resolving left sided facial palsy. 6 (3%) cases recovered with sequalae. 2 cases (1%) had Right upper limb weakness and palsy each.

In this study average age of the patients was significantly higher in poor outcomes (44.8 ± 16.7) subgroup than good outcome subgroup (37.3±12.7) ($p<0.05$). In the poor outcome subgroup the percentage of cases with history of fall at home was 10(31.3 %) which was significantly higher than subgroup with good outcomes 17(10.1%). Percentage of operative cases in poor outcome subgroup was 50 % which was significantly higher than percentage of cases in good outcome subgroup. ($p<0.001$).

Hemorrhagic contusion was the commonest finding seen in 78(38.8%) cases. Subarachnoid hemorrhage was found in 64(31.8%). Skull bone fractures were observed in 36(17.9%) cases. Epidural hematoma was in 34(16.9%) cases while there was midline shift in 64(31.8%) patients. In 24(11.9%) patients undisplaced bone injury was observed. 16(8%) showed Pneumocephalus and 7(3.5%) cases had hemosinus. CT scan showed improvements or resolutions in 140(70%) cases upon follow up whereas in 6(3%) cases it was persistent. In 16(8%) cases no abnormality was detected. Conservative management was done in 142(70.6%) of the cases whereas 59(29.4 %) cases underwent operative treatment.

ICU stay ranged between 0 days (no stay) to 6 days. Maximum duration of Stay in hospital was 15 days. 163(81.1 %) patients required either no stay or stay of 1 day in ICU. 19(9.5%) required stay between 2-3 days. 14(7 %) stayed in ICU for 4 to 5 days and 5(2.5 %) stayed > 5 days. Majority of the patients 153(77%) needed total stay in hospital between 7 to 9 days.

Out of 201 cases, of TBI there was mortality of 20 (10%) cases. 169(84.1%) cases got Recovered fully and discharged. Two (1%) cases recovered with gradually resolving left sided facial palsy. 6 (3%) cases recovered with sequalae. 2 cases (1%) had Right upper limb weakness and palsy each. On follow up at 14 days 2 cases (1%) each had Left sided Facial palsy, Right upper limb weakness and right facial palsy. 165(82.1 %) patients showed normal reaction to light during Pupils Examination on admission. 26(13 %) showed no reaction and 8(4 %) showed unequal reaction.

Percentage of female patient among poor outcomes group was significantly higher 12(18.8%) compared to male patients 6(7.1 %) ($p<0.05$). The average age of the patients was significantly higher in poor outcomes (44.8 ± 16.7) subgroup than good outcome subgroup (37.3±12.7) ($p<0.05$). There was no statistically significant difference in final outcomes among patient admitted directly and referred from other centers. ($p>0.05$). In the poor outcome subgroup, the percentage of cases with history of fall at home was 10(31.3 %) which was significantly higher than subgroup with good outcomes 17(10.1%). The percentage of cases with history of loss of consciousness among bad outcome subgroup (56.3%) was significantly higher than good outcome subgroup (16.7%) ($p<0.001$). Average duration of ICU stay in poor outcome subgroup was significantly higher (2.8 ±1.9 days) compared to average ICU stay of good outcome subgroup (0.3 ±0.4 days) ($p<0.0001$). Average duration of ward stay in poor outcome subgroup was significantly lower (2.7 ±7.1 days) compared to average ICU stay of good outcome subgroup (7.1 ±1.2 days) ($p<0.0001$).

DISCUSSION

India being one of the fast-developing nations in the world with a high population density, the road traffic incidents are showing increasing trend [10]. About 10% of worldwide RTA fatalities were accounted to India. The importance of the problem of TBI is always underestimated due to the lack of research and good quality data in India. This study was conducted to bridge this gap. We undertook a prospective study of TBI admitted to surgery ward to investigate the etiology and pattern of head injuries in and to consider how head injuries are managed in response to GCS of 201 consecutive patients. It also aimed at an assessment of the outcome, including recovery, residual disease, co-morbidity, disability, and mortality.

It was observed that there was a preponderance of males over females and maximum number of victims was young adults, as they are active in day-to-day outdoor life and hence exposed to greater risk as compared to persons belonging to other age groups. Our study findings also correlate with various studies [14, 15]. A study by NIMHANS [16] reported that each very year, nearly 14,000 persons (8,000 officially reported) are injured in road accidents with a fatality rate of 6-7% in just Bengaluru city. In a NIMHANS study [16] it was observed that only less than 5% of the injured were wearing a helmet at the time of injury. Alcohol consumption has been found to be a major risk factor in the metro cities with study reporting nearly one-fourth of the patients being under the influence of alcohol at the time of injury [16].

Alcohol not only influences occurrences, but also poses problems in diagnosis and management of injured persons.

GCS is a widely used and accepted prognostic indicator for both traumatic and non-traumatic altered consciousness levels. It assesses a TBI patient's best ocular, motor, and vocal responses [6]. The inter-observer dependability of the score has been confirmed, and it increases with training and experience in various scenarios [7]. Furthermore, the GCS has been recognized as a reliable measure for monitoring TBI patients and identifying when their condition deteriorates. Because the scores are associated to either mortality or disability, the scale is also an indicator of injury severity. Kiran Kumar et al [17] reported that the mean GCS at presentation was 11.9 ± 4.1 (range 3–15). In this study, patients were classified by GCS as mild TBI in 129 (52.2%) patients; moderate in 71 (28.7%) and severe in 47 (19.0%) patients.

NIMHANS study reported the outcome of traumatic brain injuries based on Glasgow Outcome Scale revealed that 6% died in the course of hospital stay, 4% were in a persistent vegetative state, 15% were severely disabled, 47% were moderately disabled and 29% had recovered at the end of the hospital stay. Kamal et al [14] who reported that Surgical intervention (craniotomy) was done in 49.12% of patients.) had unfavourable outcome at 6 months. Average GCS Score at presentation in poor outcome subgroup was 7.3 ±4.2 whereas in good outcome subgroup it was 13.3 ±2. The mean difference was highly significant t ($p<0.0001$) This finding was supported by Kiran kumar et al [17]. Mortality risk was higher in patients with severe TBI.

Strength and Limitations

The prospective study with the large number of TBI enrolled at the tertiary care teaching center with follow up studies of CT has provided a spectrum of TBI profile. This study provided a comprehensive description of variables associated with moderate and severe TBI from the initial injury. This study had also some limitations. It is plausible that only a certain proportion of all traumatic brain injuries will reach the hospital, and many of those with severe injuries may have died in the pre hospital setting, and many with mild injuries may not have sought clinical care. This center being tertiary care center may have introduced bias toward the inclusions of more severely injured patients. Long term follow up could not be kept due to limitation of time and resources which could have thrown more light upon outcomes.

CONCLUSION

This is an important study from the western indian population that gave data on the admission characteristics, mortality and follow up data of the patients. Most of the injuries occurred due to RTAs, more common among the economic productive age group and mostly in males. There was a very high mortality and disability in as a consequence of traumatic brain injury. The preventable factors like use of helmet and avoiding drink and driving could potentially save many victims of RTA. Knowledge about the causes, pattern, and distributions about TBI patients from this study will be helpful in policymaking, research, health management, and rehabilitation.

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