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An Analysis of Aetiology, Pattern and Outcome of Head Injury in Trauma Patients

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ABSTRACT

Background: Head injury is considered as a major health problem in developed and developing nations. Analysis of etiology, patterns, and outcome of head injury in trauma patient is essential for understanding and planning for better management.

Materials and Methods: The prospective observational study carried out among patients who presented with head injury at the tertiary care hospital, Mumbai from July 2015 to July 2017. Demographic details recorded were age, sex, blood pressure on arrival, Glasgow Coma Scale (GCS) score, the interval between injury and admission, associated injury, co-morbidities, hospital stay, and outcome.

Results: The age group at which maximum patients of head injury were admitted was 18-29 years (31%) followed by 40-49 years (21%). Eighty one percent patients were males and 19% patients were females, the male to female ratio being 4:1. Road traffic accidents (36% cases) were the commonest cause leading to acute head injury followed by accidental fall (21% cases). 47% patients presented with mild head injury according to GCS.

Conclusion: Head injuries mainly caused by vehicular accidents and affect mainly the young men. Road traffic accidents were the commonest mode of head injury, but railway accident had the worst outcome in our study. Factors associated with outcome were Pre-hospital delay, GCS on arrival, Blood pressure on arrival, Associated injury, Need for ventilator support, CT scan findings.

KEYWORDS: Head injury, Trauma, Road traffic Accident, Glosgow coma scale

INTRODUCTION

Head injury is considered as a major health problem in developed and developing nations. As per report by the ministry of road transport, Government of India (2018) a total of 4, 67,044 road accidents have happened in 2018 with 1, 51,417 people killed and causing injuries to 4,69,418 people. [1]Hence, India is leading the world in fatalities due to road accidents. Two major causes of early death in trauma are hemorrhage and head injury. Traumatic brain injury (TBI) is one of the most devastating types of injury. TBI is also associated with significant socioeconomic losses in India as well as in other developing countries. [2]

Worldwide it is a major public health problem and predicted to surpass many diseases as a major cause of death and disability by the year 2020.3 The majority (60%) cases are due to road traffic injuries (RTI), followed by falls (20-25%) and violence (10%). [3, 4]

It affects all ages; however, majority of road traffic injuries (RTI) occurs in young adults of productive age group. Approximately 8% of persons aged 65 and older visit the emergency department each year because of a fall-related injury. [5]Approximately 10% of falls in older people result in TBI, and consequently, falls are the most common cause of TBI in older adults.

The rehabilitation needs of brain injured persons are significantly high and increasing from year to year. India and other developing countries face the major challenges of prevention, pre-hospital care and rehabilitation in their rapidly changing environments to reduce the burden of TBIs. [6]

Preventive strategies can be developed by studying the patterns of head injuries. There is considerable uncertainty in the expected outcome of individual patients because of its heterogeneity. Therefore, we conducted this study to analyse the aetiology, patterns, and outcome of head injury in trauma patients.

MATERIAL AND METHODS

This prospective observational study carried out among patients who presented with head injury at the tertiary care hospital, Mumbai from July 2015 to July 2017. Patients who brought instate of cardiac arrest or found dead, excluded

from the study. All patients examined according to protocol, which included primary and secondary survey, appropriate blood and radiological investigation. All injuries adequately addressed and documented carefully in a form. All these patients followed up for a period of 30 days. The Institutional Ethics committee approved this study Thee number is ECARP/2015/176. Assessment of head injury was done using Glasgow coma scale (GCS) score as follows. The GCS of 13-15 as mild, 9-12 as moderate and less than 9 as severe head injury. The Glasgow outcome scale comprises five categories: death, vegetative state, severe disability, moderate disability, and good recovery. All the collected data entered in Microsoft Excel sheet and then transferred to SPSS software version 22 for analysis. Qualitative data presented as frequency and percentages and analyzed using chi-square test. P-value < 0.05 taken as level of significance.

RESULT

The age group at which maximum patients of head injury were admitted was 18-29 years (31%) followed by 40-49 years (21%). Eighty one percent patients were males and 19% patients were females, the male to female ratio being 4:1. Road traffic accidents (36% cases) were the commonest cause leading to acute head injury followed by accidental fall (21% cases). Out of 100 patients, 47% patients had mild head injury according to GCS. The data is as presented in Table 1

In this study, 45% patients presented to the hospital in >6hrs from the time of accident. Majority of the patients (82%), presented with head injury alone/ with CLW or Abrasion. 13% patients had a clinically palpable fracture associated with head injury. Majority (33%) of patients presented with IC bleed on admission followed by skull fracture (28%). Only 20% of patients required surgical intervention whereas rest treated conservatively. Overall 32% patients required mechanical ventilation. In our study, 56% patients had complete recovery on discharge, while 24% patients were discharged with some disability & 20% mortality. The data is as presented in Table 2

Railway accidents accounted for the highest percentage of deaths (43.75%). Road traffic accident had the second worst outcome (27.77%). Assaults and accidental fall had no mortality. This difference was statistically significant. This suggests that the type of accidents had a significant bearing on the prognosis. Mortality is more in patients who present to hospital after 6 hours of the incident and this difference was statistically insignificant.

Out of 69 patients who had mild or moderate head injury, 53 had complete recovery. In case of severe head injury, 15 patients out of 31 expired. As the GCS score improved, the mortality rate decreased drastically, being just 4.34% in mild head injuries and this difference was statistically significant.The data is as presented in Table 3

Patients who present to hospital with hypotension had more mortality (57.14%) and this difference was statistically significant. The data is as presented in Table 4

Prognosis was bad in patients who presented with associated injury in comparison to those who presented with head injury alone or with CLW or abrasion and this difference was statistically significant.Table 5 The presence of a co-morbid condition had an adverse effect on the outcome and is statistically significant. The data is as presented in Table 6

Age group (in years)	Frequency	Percent
18-29	31	31%
30-39	15	15%
40-49	21	21%
50-59	19	19%
60-69	9	9%
70-80	5	5%
Gender	**Frequency**	**Percent**
Male	81	81%
Female	19	19%
Type of Accident	**Frequency**	**Percent**
Railway accidents	16	16
Road traffic accidents	36	36
Accidental Fall	21	21
Fall from Height	15	15
Assault	12	12
GCS on arrival	**Frequency**	**Percent**
Mild (13-15)	47	47
Moderate (9-12)	22	22
Severe (3-8)	31	31

GCS: Glasgow's Coma Scale

Table 1: Demographic profile of the participants

Outcome	GCS Grade on admission			Total
	Mild N (%)	Moderate N (%)	Severe N (%)	
Recovery	41 (89.13%)	12 (52.2)	3 (9.7)	56
Disability	3 (6.52%)	8 (34.8)	13 (41.9)	24
Death	2 (4.34%)	3 (13.0)	15 (48.3)	20
Total	46 (100%)	23 (100)	31 (100)	100

GCS: Glasgow's Coma Scale, Chi square test, P value- < 0.05 (Significant)

Table 3: Outcome Compared With GCS Grade

Nature of Injury	**Frequency**	**Percent**
Head injury alone/ with CLW or Abrasion	82	82
Head injury and Pelvic/long bone injury	13	13
Head injury+ Chest/Abdominal injury	5	5
CT Brain Finding	**Frequency**	**Percent**
Normal	24	24
Skull Fracture	28	28
IC bleed	33	33
Midline Shift/ DAI	15	15
Treatment	**Frequency**	**Percent**
Conservative	80	80
Surgical	20	20
Mechanical Ventilation	**Frequency**	**Percent**
Yes	32	32
No	68	68
Outcome of patients	**Frequency**	**Percent**
Recovery	56	56
Disability	24	24
Death	20	20
Total	100	100

DAI: Diffuse Axonal Injury, CLW: Contused Lacerated Wound

Table 2: Various Parameters associated with head injury

Blood Pressure	**Recovery N (%)**	**Disability N (%)**	**Death N (%)**	**Total N (%)**
Hypotension	2 (14.20)	4 (28.6)	8 (57.1)	14 (100)
No Hypotension	54 (62.8)	20 (23.3)	12 (13.9)	86 (100)
Total	56	24	20	100

Table 4: Outcome in relation to blood pressure on arrival

Associated Injury	**Recovery** N (%)	**Disability** N (%)	**Death** N (%)	**Total** N (%)
Head injury alone/with CLW or abrasion	51 (62.2)	19 (23.2)	12 (14.6)	82 (100)
Head injury+ Pelvic/Long bone fracture	5 (38.5)	2 (15.4)	6 (46.2)	13 (100)
Head injury and Chest/ Abdominal injury	0	3 (60.0)	2 (40.0)	5 (100)
Total	56	24	20	100

Table 5: Outcomes Compared With Associated Of Injury

Comorbid Condition	Recovery N (%)	Disability N (%)	Death N (%)	Total N (%)
Present	6 (25)	8 (33.3)	10 (41.7)	24 (100)
Absent	50 (65.8)	16 (21.1)	10 (13.2)	76 (100)
Total	56	24	20	100

Table 6: Outcome Compared With Co-Morbid Conditions

Outcome	Normal N (%)	Skull Fracture N (%)	IC bleed N (%)	Midline shift/ DAI N (%)	Total N (%)
Recovery	22 (91.7)	18 (64.3)	12 (36.4)	4 (26.7)	56
Disability	1 (4.2)	6 (21.4)	13 (39.4)	4 (26.7)	24
Death	1 (4.2)	4 (14.3)	8 (24.2)	7 (46.7)	20
Total	24 (100)	28 (100)	33 (100)	15 (100)	100

Table 7: Outcome Compared with CT scan Findings

The maximum mortality was seen in patients showing a midline shift and/or diffuse axonal injuries on CT scan (46.66%). The second highest mortality seen in patients of intracranial bleed (24.24%) and this difference was statistically significant. The majority of patients with mild and moderate head injuries were managed conservatively (91.48% and 81.81% respectively). In case of severe head injuries with GCS <=8, operative intervention was required in more patients (38.70%) and this difference was statistically significant. Hence, GCS on admission played important role in deciding the management of the patients.

Out of 32 patients put on mechanical ventilation, 18 (56.25%) patients expired. Out of 68 patients who did not required ventilator support, 53 (77.94%) patients had complete recovery and this difference was statistically significant. The data is as presented in Table 7

DISCUSSION

This study conducted with an aim to study the etiology, pattern and outcome of the patients in cases of acute head injury. It was a prospective study carried out over a period of two years, which included patients with acute head injury.

In our study, majority of the patients were male with male to female ratio being 4:1. Though it was of no impact on outcome, this data was similar as compared to other studies. The maximum number of patients admitted was in the 18-29-year age group (31%). Sosin et al., reported that the maximum number of patients admitted in their study were in the age group 21-30 years. [7]

Road traffic accidents accounted for the maximum number of acute head injury patients admitted in our series (41%), followed by train accidents (26 %) and accidental falls (21%). Studies by Sosinet al., Kraus IF and John Burns Jr. also reported an incidence ranging from 30-40% of head injuries following vehicular accidents in their respective studies. [8, 9]

The time interval between the time of accident and admission at a Tertiary Institute also had a bearing on the outcome. The “Golden hour” in head injuries i.e. the first hour since time of accident has considerable importance. The outcome was statistically better in patients receiving initial resuscitation and treatment within the first hour. An 18 out of 26(69.23%) of our patients who reached our hospital within 1 hour recovered completely. The main reason for the delay in admission to our institute observed in referral cases, where patients sent from peripheral hospitals to our Institute. This was due to lack of resuscitative facilities, non-availability of advanced diagnostic modalities, lack of expertise in peripheral hospital and delay in transportation. In addition, there was lack of trained personnel available for pre-hospital care. Thus, there was delay in hospital arrival resulted in a mortality of 20.27% (15 out of 74 patients who was admitted after 1hour expired in our study). In the study of Valdivelu S et al. in 2015, it is reported that delay in hospital admission resulted in higher mortality (23.52%). [10]

In our study, 5 of the 100 patients presented with either chest /abdominal injury associated with head injury and 13 patients had associated fracture of Pelvis/ Long Bones.Prognosis is bad in patients who presents with associated injury in comparison to those who presents with head injury alone or with CLW or abrasion. Wilfred C Mezueet al., also reported a mortality rate of 43% in head injury patients associated with chest trauma. [11]

The average hospital stay in this study was 12.33 days. The duration of stay was directly proportional to the severity of injury. Mild head injuries had an average stay of less than 10

days.

In present study, 14 out of 100 patients were hypotensive on admission. Eight out of 14 patients expired accounting for a mortality of 57.14%. GCS on admission was one of the most important criteria in determining the outcome. [12, 13]As the GCS score decreased, the mortality increased significantly (15 out of 31 patients with severe head injury expired i.e. 48.31% mortality). Moderate head injuries had a better outcome (3 out of 23 patients with moderate head injury expired i.e.13.04 % mortality). This was comparable to other studies conducted by M. Babicet al. who reported a 73% morbidity and mortality in patients with a poor GCS score. [14]The findings on CT brain correlated well with the severity of injury and the outcome of the patient. In our study, seven out of the 15 patients (46.66%) with a CT scan finding of midline shift or diffuse axonal injury expired. 8 out of 33 patients (24.24%) with CT scan finding of IC bleed expired. Toutant et al., and Van Dongren et al., have shown CT scan findings to be an important predictor of severity and outcome. [15, 16]Patients with a CT scan finding of diffuse axonal injury had the worst outcome in their study (28.2% mortality). In our study, surgical intervention done in 20 out of 100 patients. Eight out of the 20 patients (40.00%) who needed surgical intervention expired, whereas 12 out of the 80 patients (15.00%) who treated with conservative management expired. In the study of A David et al., it was reported that 122 out of 468 patients (26.00%) who underwent surgery had a favorable outcome, whereas 118 out of 496 patients (24%) who were treated with conservative management had a favorable outcome. [17–19] Mechanical ventilation was required in 32 patients in our study. 18 out of these 32 patients (56.25%) expired.

CONCLUSION

Head injuries constitute a major illness in today's world. They are due to vehicular accidents and affect mainly the young men. Road traffic accidents were the commonest mode of head injury, but railway accident had the worst outcome in our study. Factors associated with outcome were prehospital delay, GCS on arrival, Blood pressure on arrival, Associated injury, Need for ventilator support, CT scan findings. Only about 20% of patients with head injury need surgical intervention and the CT brain was the main investigation for diagnosing. Conservative treatment was effective in mild and moderate head injuries. Nursing care and physiotherapy are useful adjuncts in management of head injuries. Overall the outcome was favorable with 56 out of 100 patients (56%) having a complete recovery. Prevention is the best means of improving survival rates and decreasing costs in head injury.

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