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An Epidemiological Analysis and Clinical Characteristics of Head Injury Patients Admitted in Tertiary Care Centre, North India

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Original Research Article

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Abstract: Head injury is recognised as a major public health problem and it is a common cause of death and disability in young people. In developing countries like India accident rates are increasing as traffic increases besides other factors like industrialization, falls and assaults and exceed those of developed countries. The aim of this study was to study the hospital based epidemiological data of the head injury patients and to evaluate Glasgow Coma Scale (GCS) score, radiological findings, and surgical rates, the results of treatment and mortality rates. This Retrospective study was conducted in Department of Surgery and Department of Neurosurgery, Jawaharlal Nehru Medical College Hospital, Aligarh Muslim University, Aligarh, India between January 2016 to December 2017. All traumatic head injuries that resulted from any physical injury, motor vehicle accidents, falls, and assault and suicide attempt were included in our study. Maximum number of head injury patients was found in the second decade of life. There was preponderance of head injury in males. Majority of patients were industrial workers. The mode of injury in majority of patients was road traffic accident. The nature of injury in majority of patients was scalp lacerations 40.40% followed by SAH 27.66%, linear fracture 25.82%, SDH 22.08%, contusion 19.78%, depressed fracture 17.62%, EDH 16.46%,both skull fracture and brain injury 15.24%, brain edema 10.69%, multiple aerocele 8.38% and ICH 5.44% respectively. Majority of patients were having Glasgow Coma Scale (GCS) between 9 and 13. Conservative treatment was given in majority of patients 87.47% followed by surgical treatment (12.53%). Majority of patient's improved 96.79% and 3.21% expired during treatment. Our hospital covers large rural areas. This large population is potentially exposed to various hazards at work, quarrel, on road traffic and in play grounds. Head injured patients have ever been a common accident injury received at our hospital.
Keywords: Head injury, Road traffic accidents, Glasgow Coma Sale, extradural hematoma.

INTRODUCTION

Head injury is recognised as a major public health problem and it is a common cause of death and disability in young people and makes considerable demands on health services. In the world, road traffic accidents are one of the most common reasons of head traumas [1,2]. Epidemiological data are required to initiate appropriate preventive measures and to plan proper management. However, reliable statistics are difficult to extract from routinely collected data[3].

Traumatic brain Injury is a leading cause of mortality in patients younger than 45 years accounting for more than a third of all injury related deaths in United States. Each year 52,000 people die and another 80,000 suffer morbidity and traumatic brain injury. Although more severe injuries are associated with poorer outcomes, the moderately injured patients also are at risk[4]. In developing countries like India, Pakistan, Bangladesh, Srilanka accident rates are increasing as traffic increases besides other factors like industrialization, falls and assaults and they greatly exceed those of developed countries [5,6]. Head injuries account for one quarter to one third of all accidental deaths, and for two thirds of trauma deaths in hospital [3]. They are also the main cause of lifelong disability after trauma.

As for defining severity, most countries use the Glasgow Coma Scale (GCS) score [7], ranges from 3 to

15 and a convention has emerged that patients with a score of 8 or less are classed as severe head injury, those with a score between 9 and 13 are classed as moderate head injury, those with a score between 14 – 15 with loss of consciousness are classed as mild head injury, those with score 15 with no loss of consciousness are classed as minor head injury. Paediatric coma scales have been developed for assessing younger children [8].

Aim and Objectives

- To Study the hospital based epidemiological data of the head injury patients.
- To evaluate Glasgow Coma Scale (GCS) score, radiological findings, surgical rates, the results of treatment and mortality rates of the head injury patients.

MATERIALS AND METHODS

This Retrospective study was conducted in Department of Surgery and Department of Neurosurgery, Jawaharlal Nehru Medical College Hospital, Aligarh Muslim University, Aligarh, India between January 2016 to December 2017 .Total 4357 patients were enrolled in our study who were admitted in our emergency, department of surgery with head trauma. Data were obtained from central record section of our hospital. All traumatic head injuries that resulted from any physical injury, motor vehicle accidents, falls, and assault and suicide attempt were included in our study. The patients were evaluated for age, gender, trauma etiology, Glasgow Coma Scale, radiological findings, surgical rates, and the results of treatment and mortality rates. Head injury was classified as minor (GCS 15 with no loss of consciousness), mild (GCS 14-15 with loss of consciousness), moderate (GCS 9-13) and severe (GCS 3-8). Trauma mechanism classified as blunt high speed head trauma, blunt low speed head trauma and penetrating head trauma. The data of patients who underwent surgery were evaluated. We used descriptive statistics when calculating the patient's data as percent of average.

Inclusion criteria

- All patients presented to emergency department with head injury.

Exclusion criteria

- Patients of head injury having other injuries like blunt trauma chest, blunt trauma abdomen, spinal injury, bone fractures.
- Patients with coronary artery disease/ preexisting cardiac disorder, chronic obstructive pulmonary disease.
- Patients with pregnancy.
- Patients having underlying coagulation disorders.

OBSERVATIONS AND RESULTS

A total of 4357 patients with head injury were included in our study. Table 1 show that out of the 4357 patients, 3043 (69.84%) were males and 1314 (30.16%) were females. The ratio between two groups was 2.36:1.Table 2 shows that out of the 4357 patients, 930 patients (21.34%) were between 21 and 30 years and it was the most common age group presented to casualty with head injury. Table 3 shows occupation of the patients, 1079 patients (24.76%) were industrial workers, 997 patients (22.88%) were self employments, 897 patients (20.59%) were official workers, 605 patients (13.88%) were students, 465 patients (10.67%) were housewives and others were 314 patients (7.21%).Table 4 shows that blunt injury was the main cause of all head traumas (98.70%). In 1597 patients (36.65%) cause was blunt high speed head trauma, in 2703 patients (62.05%) cause was blunt low speed head trauma, in 43 patient (0.98%) cause was penetrating head trauma and in 14 patients (0.32%) cause was unknown. Table 5 shows mode of injury. In 60.18% mode of injury was road traffic accident, others were fall (29.79%), assault (8.19%), gunshot (0.64%) and others (1.19%). Table 6 shows that GCS score was between 3 and 8 in 1321 patients (30.32%) ,score between 9 and 13 was in 2277 patients (52.26%), score 14-15 with loss of consciousness was in 503 patients(11.54%) and score 15 with no loss of consciousness was in 256 patients (5.88%). Table 7 shows that non contrast computed tomography (NCCT) head was not performed in 251 patients (5.76%) due to normal neurological findings (GCS 15). CT findings were normal in 511 patients (11.73%) and radiological findings were present in 3595 patients (82.51%).Table 8 shows Fractures were detected in 2242 patients (51.46%) (Linear fractures in 1125 patients, depressed fractures in 768 patients and basilar skull fracture in 349 patients). Extradural hematoma (EDH) was detected in 717 patients (16.46%), subdural hematoma (SDH) in 962 patients (22.08%), subarachnoid haemorrhage (SAH) in 1205 patients (27.66%), cerebral oedema in 466 patients (10.69%) and contusion in 862 patients (19.78%).

Out of the 4357 patients, 546 (12.53%) patients were operated. In patients of extradural hematoma, subdural hematoma, contusion and depression fracture, surgery was performed according to general condition of patient and CT scan findings. Out of the 546 operated patients, extradural hematoma was in 227 patients (41.57%), subdural hematoma in 164 patients (30.03%), contusion in 107 patients (19.60%) and depression fracture in 48 patients (8.79%). Linear fractures, subgaleal haemorrhages, subarachnoid haemorrhages and cerebral oedemas were treated by medical treatment and continuous observation. Out of the 4357 patients, 140 patients (3.21%) died out of which 37 were operated patients and 103 were non operated patients. Mortality rate for

the operated patients was 6.78% and for non operated patients was 2.47%.

Table-1: Sex distribution

Sex	No. of patients (n=4357)
Male	3043 (69.84%)
Female	1314 (30.16%)

Table 2: Age wise distribution

Age (Years)	No. of patients (n=4357)
≤ 10	425 (9.75%)
11 – 20	707 (16.23%)
21 – 30	930 (21.34%)
31 – 40	826 (18.96%)
41 – 50	609 (13.98%)
51 – 60	393 (9.02%)
61 – 70	299 (6.86%)
≥71	168 (3.86%)

Table-3: Occupation of the Patients

Occupation	No. of patients (n= 4357)
Industrial workers	1079 (24.76%)
Self employments	997 (22.88%)
Official workers	897 (20.59%)
Students	605 (13.88%)
House wives	465 (10.67%)
Others	314 (7.21%)

Table-4: Head trauma mechanism

Trauma mechanism	No. of Patients (n=4357)
Blunt high speed	1597 (36.65%)
Blunt low speed	2703 (62.05%)
Penetrating	43 (0.98%)
Unknown	14 (0.32%)

Table-5: Mode of injury

Mode of injury	No. of Patients (n=4357)
Road traffic accident	2622 (60.18%)
Fall	1298 (29.79%)
Assault	357 (8.19%)
Gun shot	28 (0.64%)
Others	52 (1.19%)

Table-6: **Glasgow Coma Scale (GCS) score of head injury patients**

Glasgow Coma Scale (GCS) score	No. of Patients (n=4357)
3-8	1321 (30.32%)
9-13	2277 (52.26%)
14-15 with loss of consciousness	503 (11.54%)
15 with no loss of consciousness	256 (5.88%)

Table-7: Computed tomography (CT) head

Computed tomography (CT) head	No. of Patients (n=4357)

CT not performed	251 (5.76%)
Normal CT findings	511 (11.73%)
Radiological CT findings	3595 (82.51%)

Table 8: Radiological CT findings

Radiological CT findings	No. of Patients
Linear fracture	1125 (25.82%)
Depressed fracture	768 (17.62%)
Basilar skull fracture	349 (8.01%)
Extradural hematoma (EDH)	717 (16.46%)
Subdural hematoma (SDH)	962 (22.08%)
Subarachnoid haemorrhage (SAH)	1205 (27.66%)
Cerebral oedema	466 (10.69%)
Contusion	862 (19.78%)
Multiple aerocele	365(8.38%)
Intracranial haemorrhage (ICH)	237(5.44%)
Both(Skull fracture & brain injury)	664(15.24%)

DISCUSSION

In this modern era of busy traffic and industrialisation most people are being potentially exposed to various hazards everywhere in the world [9]. Head injury patients, next to the most common limb injury are initially managed by the general surgeon and orthopaedic surgeons, at times, may require neurosurgeons [10]. Day by day number of head injury patients is increasing due to industrialisation, mushrooming of population, uncontrolled traffic, poorly constructed roads and lack of civil sense in our part of country [11].

In our study, head trauma occurred more frequently among males than females. More than half of all head trauma cases (69.84%) were males. We found this preponderance of males from several studies [12,13]. In our study most common age group was between 21 and 30 years followed by 31-40 years. One of the most important reasons was binge drinking, that was the characteristic pattern of drinking in adults and the injuries of such patients typically result from biking accidents, assaults and falls. It is consistent with the study conducted by Thornhill S *et al.*[14] and Savola O *et al.*[15].

The predominant mechanism of head trauma was non-penetrating or blunt trauma (98.70%) in our study. Our findings are similar to the studies done by Alexandrescu *et al*. [16] and Padalino *et al*. [17].In our study the road traffic accidents take place at the top for modes of injury of the head traumas. Falls take the second place and assaults take the third place. The incidence of head injury due to road traffic accident is a major cause in our study because of poor traffic conditions in our city. The traffic though very slow moving is undisciplined and more trouble is aided by the poorly constructed roads. The next major cause of head injury is due to fall from height because patients belonging to this group are either children who fall from roof tops while playing / sleeping or have a fall from stair case or are labourers engaged in some kind of work in a factory. Assaults constitute the next important cause of head injury shows that crime rate is very high in our city. This data correlated with the literature [18,19].

In our study 256 patients (5.88%) had minor head injury, 503 patients (11.54%) had mild head injury, 2277 patients (52.26%) had moderate head injury and 1321 patients (30.32%) had severe head injury. This is contrary to the results of other studies [20, 21]. In our study, Non contrast head computed tomography was done in 4106 patients (94.24%) and pathological findings were detected in 3595 patients (82.51%). In emergency, Computed tomography (CT) of the head is a basis for making decision in head injured patients and also helpful in classify patients according to severity of damage, patterns of injury, pathophysiologic mechanisms and prognosis [22].

In our study, out of the 4357 patients, 546 (12.53%) patients were operated. The most common indication for the surgery was extradural hematoma (EDH) in 227 patients (41.57%). The second was subdural hematoma (SDH) in164 patients (30.03%). The incidence of EDH is higher in younger age group because of the development of EDH depends on the ease with which the dura can be stripped off from the inner surface of skull. The dura becomes adhered with bone in old age [23]. Out of the 4357 patients, 140 patients (3.21%) died out of which 37 were operated patients and 103 were non operated patients. Mortality rate for the operated patients was 6.78% and for non operated patients was 2.47%. Much of the morbidity and mortality in the head injuries is due to direct brain damage [24]. After the initial injury if patient survives consequently the secondary insult may further result into deterioration of the patient that is called as epiphenomenon or second incident. It include, Systemic

complications such as hypoxia or hypotension, an expanding intracranial haematoma such as subdural, extradural or rarely an intracerebral haematoma or brain oedema, meningitis and cerebral seizure etc[25].

CONCLUSION

This study showed the epidemiology of head trauma patients in our hospital. Our study reveals that the head injury is one of the major health problems. Maximum number of head injury patients (21.34%) was found in the second decade of life. There was preponderance of head injury in males. Majority of patients were industrial workers (24.76%) followed by self-employments (22.88%). The mode of injury in majority of patients was road traffic accident 60.18% followed by fall from height 29.79%, assault 8.19% and gun shot 0.64% respectively. The nature of injury in majority of patients was scalp lacerations 40.40% followed by SAH 27.66%, linear fracture 25.82%, SDH 22.08%, contusion 19.78%, depressed fracture 17.62%, EDH 16.46%,both skull fracture and brain injury 15.24%, brain edema 10.69%, multiple aerocele 8.38% and ICH 5.44% respectively. Majority of patients were having Glasgow Coma Scale (GCS) between 9 and 13. Conservative treatment was given in majority of patients 87.47% followed by surgical treatment (12.53%). Majority of patient's improved 96.79% and 3.21% expired during treatment. Appropriate medical care facilities (including trauma centres) need to be established at district level, sub-divisional/ tehsil level and block levels to provide prompt and quality care to head injury patients. The facilities at referral centre for the treatment of head injury patients need to be upgraded to cater to ever increasing number of such patients. In emergency the role of general surgeon for diagnosis, nursing and awareness of indications of specialized intracranial investigation is an important step to improve the overall outcome of such patients. Our hospital covers large rural areas. This large population is potentially exposed to various hazards at work, quarrel, on road traffic and in play grounds. Head injured patients have ever been a common accident injury received at our hospital. We believe this study will be important in our country in terms of epidemiological approach to head traumas.

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