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Original Research Article

Clinico-Epidemiological Study of Fatal Head Injuries in an Autopsy

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Abstract: ***Introduction:*** Head injury is a significant public health problem worldwide. Traumatic head injury is a leading cause of death and disability in children and adults in their most productive years. The morbidity and mortality due to head injury is on the rise and is one of the prime importance in today's medical practice. ***Objective*****:** To assess the clinico-epidemiological study of fatal head injuries in an autopsy. ***Methods*****:** The present study was conducted of the Department of Forensic Medicine & Toxicology, Dhaka Medical College Hospital, Dhaka, Bangladesh from January to June 2022. Total 250 patients included in this present study. We selected only fatal head injury cases due to mechanical violence. However, we included severe facial injury cases too as these cases were associated with head injury. But, the present study doesn't involve crushed head injury or survived cases, referred or LAMA cases brought in the hospital. ***Results:*** Maximum cases were seen in the age range of 21-30yrs, 57 cases (22.8%). Maximum cases were seen amongst males, 196 cases, 78.4%. The commonest causes of fatal head injuries are Road Traffic Accident (RTA) cases. Other important causes of fatal head injuries are fall from height, assault & railway accidents. External head injuries were mainly seen on frontal and parietal regions. Amongst the scalp injuries lacerations were very common seen in 114 cases, 36.19%. Skull bone fractures were frequently seen in fatal head injury cases. Presence of skull bone fractures are associated more frequently with fatal complications. Though linear fractures are common in general we observed the comminuted fractures as the commonest type of skull fractures in fatal head injury cases, seen in 73 cases, (58.4%). Depressed fractures were less common in fatal cases. Involvement of cranial fssa was seen in 108 cases. Linear type of fractures both transverse and horizontal type was more common seen in 66 coases amongst the 108 cases of cranial fossa involvement i.e. 61.11%. Involvement of middle cranial fossa was high seen in 45 cases of the 108 cases i.e. (41.66%). Presence of comminuted skull bone fractures is associated with higher rate of mortality. ***Conclusion*****:** Most of the cases were due to road traffic c accidents and males are more prone to get Head injury. Other important causes of fatal head injuries are fall from height, railway accidents and assaults in descending order. To reduce the morbidity and mortality it's high time for the concerned authority to take appropriate actions.

Keywords: Clinico-Epidemiological, Fatal Head Injuries, Autopsy.

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INTRODUCTION

Head injury is a significant public health problem worldwide. Traumatic head injury is a leading cause of death and disability in children and adults in their most productive years. The morbidity and mortality due to head injury is on the rise and is one of the prime importance in today's medical practice [1]. Here, the forces are restricted to those that are applied externally to the head, thus excluding the surgical ablations and internally acting forces such as increased intracranial pressure resulting from oedema, hydrocephalus and mass occupying lesions without any antecedent trauma to the head [2]. Most of the published outcome studies in head injuries relate to closed severe head injuries (SHI) [3, 4]. The series evaluating the outcome include diffuse injuries or pertain to specific group of cerebral lesions. Approximately 1.5–2 million persons are injured, and 1 million die every year in India due to fatal head injuries [5]. Its fatality and final outcome depend on different mechanisms including types and amounts of head injuries and their anatomical locations. The analysis of prognosis in head injury is crucial depending up on the specialized care team involved in their management. The present study examines the pattern of head injury with reference to fatality and it is observed that when there was involvement of multiple fractures of the skull the survival period was relatively shorter. There are not many studies on factors affecting the outcome of operated head injuries. The few available studies also relate only to single operable traumatic ceberbral lesions [6, 7]. Operated head injuries form a special group in head injuries. This group includes patients of varying degrees of coma with Glasgow Coma Score (GCS) varying between 3 and 15. These patients are subjected to additional risks in the form of exposure to various anesthetic and non anaesthetic pharmacological agents and major fluid and intravascular volume changes in the intraoperative period. In addition, the effect of inflammatory response to the surgical procedure on the recovery of injured brain remains ill defined. Considering these exclusive features, a study of the outcome of the operated head injuries would have a great clinical relevance.

MATERIALS & METHODS

Department of Forensic Medicine & Toxicology, Dhaka Medical College Hospital, Dhaka, Bangladesh from January to June 2022. Total 250 patients included in this present study. We selected only fatal head injury cases due to mechanical violence. However, we included severe facial injury cases too as these cases were associated with head injury. But, the present study doesn't involve crushed head injury or survived cases, referred or LAMA cases brought in the hospital. All relevant information like name, age, sex, religion, occupation, marital status, injuries were collected from police papers, hospital case sheets, history taking from relatives. This information was tabulated along with our autopsy findings for study and comparison with the works of other authors.

RESULTS

Table 1: According to age & sex patients (N=250)

Age Group (In years)	Male	Female	Total
0-10	5	4	9 (3.6%)
11-20	14	5	19 (7.6%)
21-30	57	7	64 (25.6%)
31-40	41	12	53 (21.2%)
41-50	42	10	52 (20.8%)
51-60	13	8	21 (8.4%)
61-70	17	6	23 (9.2%)
Above 70	7	2	9 (3.6%)
Total	196	54	250 (100%)

There were 250 cases of fatal head injuries whose postmortem examinations. Maximum cases were seen in the age range of 21-30yrs, 64 cases (25.6%). In the 0-10years age category there were 9 cases of fatal head injury, 5 boys and 4 girls. In the above 70 years age category there were 9 cases, 7 males and 2 females out of which 5 cases were from road traffic accidents. Majority of the victims were males (196 cases, 78.4%). The numbers of female victims were 54 only (21.6%) as shown in (Table 1).

Table 2: Cases distribution according to cause injury (N=250)

Cause	Male	Female	Total
RTA	160 (64.0%)	29 (11.6%)	189 (75.6%)
Fall from height	19 (7.6%)	8 (3.2%)	27 (10.8%)
Assault	10 (4.0%)	4 (1.6%)	14 (5.6%)
Railway Accidents	16 (6.4%)	4 (1.6%)	20 (8.0%)
Total	205 (82.0%)	45 (18.0%)	250 (100%)

RTA contributes the maximum number of cases, 75.6% (Table 2). Other important causes of fatal head injuries are fall from height, railway accidents and assaults in descending order. There were 315 total external injuries seen on the scalp as shown in Table 3. So far external injuries are concerned, lacerations were seen most common, 114 lacerations (36.19%).

Table 3: Patterns of scalp injuries (N=250)

Site	Abrasions	Contusions	Lacerations	Total
Frontal	38 (12.06%)	30 (9.52%)	35 (11.11%)	103 (32.7%)
Rt. Parietal	11 (3.5%)	14 (4.44%)	18 (5.71%)	43 (13.65%)
Lt. Parietal	10 (3.17%)	12 (3.8%)	18 (5.71%)	40 (12.69%)
Rt. Temporal	15 (4.8%)	15 (4.76%)	14 (4.44%)	44 (14.0%)
Lt. Temporal	15 (4.8%)	20 (6.34%)	15 (4.8%)	50 (15.87%)
Occipital	12 (3.8%)	9 (2.85%)	14 (4.44%)	35 (11.11%)
Total	101(32.06)	100 (31.74%)	114(36.19%)	315 (100%)

N.B:- n=315, percentage calculation is based on total number of scalp injuries

Table 4: Patterns of skull fractures (250)

Fracture Type	Frontal	Parietal	Temporal	Total
Linear	17 (13.6%)	13 (10.4%)	12 (9.6%)	42 (33.6%)
Depressed	5 (4.0%)	3 (2.4%)	2 (1.6%)	10 (8.0%)
Comminuted	13 (10.4%)	20 (16.0%)	40 (32.0%)	73 (58.4%)
Total	35 (28.0%)	36 (28.8%)	54 (43.2%)	125 (100%)

N.B.:-n=125, we exclude those cases showing no skull fracture

Overall 101 abrasions were seen on different parts of the head which is about 32.6% of all injuries on the head region Abrasions were more common on frontal region including the forehead region, 38 abrasions which is about 12.6% of all injuries on head. Contusions are also more common on frontal region, 30 contusions which is about 9.2% of all injuries. Altogether there were 125 different types of skull bone fractures out of which linear and comminuted fractures were more common in fatal head injury cases (Table 4).

Table 5: Patterns of cranial fossa fracture (N=250)

Fracture	Ant. Cranial Fossa	Middle Cranial Fossa	Post. Cranial Fossa	Total
Linear	16 (14.81%)	28 (25.92%)	22 (20.37%)	66 (61.11%)
Comminuted	12 (11.11%)	17 (15.74%)	13 (12.1%)	42 (38.88)
Total	28 (25.92%)	45 (41.66%)	35 (32.40%)	108 (100%)

In 108 cases there was involvement of cranial fossa. Linear type of fractures both transverse and horizontal type was more common seen in 66 cases amongst the 108 cases of cranial fossa involvement i.e. 61.11%. Involvement of middle cranial fossa was high seen in 45 cases of the 108 cases i.e. (41.66%) as shown in Table 5. Altogether there were 42 linear fractures which were about 33.6% of all fractures seen. Linear fractures were most commonly seen on the frontal bone which was followed by parietal and temporal bones in descending order. There were 10 depressed fractures altogether out of which 5 were on the frontal, 3 on the parietal and 2 on the temporal regions (Table-5).

Table 6: Patterns of intracranial injuries (N=250)

Type of Injury	No of Cases	%
Extra-Dural hemorrhage	43	21.5
Sub-Dural hemorrhage	51	25.5
Sub-Arachnoid hemorrhage	53	26.5
Intracerebral hemorrhage	10	5.0
Contusions	31	15.5
Lacerations	12	6.0
Total	200	100

Bad prognosis is associated with comminuted type of skull fractures. For convenience and easy comparison with the works of previous studies we divide the intracranial injuries as shown in Table 6. Out of the total 250 fatal head injury cases we found visible intracranial injuries in 200 cases. Extra-Dural hemorrhage was seen in 43 cases, 21.5%. The most common intracranial hemorrhage was sub-arachnoid hemorrhage which was seen in 53 cases, 26.7%. The brain matter contusions and lacerations were seen in 31 and 12 cases respectively (Table 6).

Table 7: Cases distribution according to survival period (N=250)

Survival Period	No of cases	%
Brought dead	125	50.0
1 – 6 hours	55	22.0
6 – 24 hours	60	24.0
1 – 3 days	50	20.0
3 days – 1 week	25	10.0
More than 1week	22	8.8

There were as many as 125 brought in dead cases (50.0%) out of the 250 fatal head injury cases. If we take together then majority of death occurred within 24 hours of the incident as shown in Table 7. In one case of sub arachnoid hemorrhage death was delayed about 4 months 9 days and later died due to late complications. So far the gender is concerned, males outnumbered females with male to female ratio of 4:1.

DISCUSSION

Head injured patients requiring surgical intervention merit special consideration. They may be in varying degrees of coma depending on the severity of injury. In addition to various primary and secondary events that affect the outcome of diffuse injuries, a number of additional intraoperative and postoperative risks exist in these patients. Various anaesthetic and nonanaesthetic agents used in this setting may significantly affect intracranial pressure volume dynamics, cerebral blood flow and cerebral metabolism. Major fluid and intravascular volume changes might take place in the perioperative period, which might affect the intracranial dynamics and influence the occurrence of brain oedema and ischemia. There were 250 cases of fatal head injuries whose postmortem examinations. Maximum cases were seen in the age range of 21-30yrs, 64 cases (25.6%). In the 0-10years age category there were 9 cases of fatal head injury, 5 boys and 4 girls. In the above 70 years age category there were 9 cases, 7 males and 2 females out of which 5 cases were from road traffic accidents. Majority of the victims were males (196 cases, 78.4%). The numbers of female victims were 54 only (21.6%) as shown in Table 1. In one case of sub arachnoid hemorrhage death was delayed about 4 months 9 days and later died due to late complications. So far the gender is concerned, males outnumbered females with male to female ratio of 4:1. If we consider age wise then incidence was higher in the age group 21-30 yrs, 64 cases (25.6%). Male dominance & age wise pattern is more or less similar with the works of other authors [3-6] with similar explanation that younger age group males are more mobile and engaged in outdoor activities. In our study Road Traffic Accidents were the commonest causes of fatal head injuries seen in 189 cases, 75.6%. The motor-cyclists were the commonest group of victims, comprising 31.90% cases, followed by Light Motor Vehicle users comprising 21.40% cases which were closely followed by pedestrians constituted 15.21% of the cases. Head injury is also quite common in fall from height (seen in 27 cases, 10.8%) and assault (seen in 14 cases, 5.6%). Present study is in accordance with the study done by Chen CL et al., [7] which showed 70% road traffic accident, 15.3% fall from height and assault 8.7% and the result of Kremer C et al., [8] also match with this study. In the present study, in cases due to assaults, depressed and comminuted types of skull fractures were common. External head injuries were mainly seen on frontal and parietal regions. Amongst the scalp injuries lacerations were

very common seen in 114 cases, 36.19%. Study conducted by Tyagi et al., [9] Pathak A et al., [10] and Anand Menon, Nagesh K R reported scalp injuries to be present in 76%, while Gupta S et al. reported 89% of scalp laceration. Our finding was consistent with the works of Lalit et al [6]. We observed the comminuted fractures as the commonest type of skull fractures in fatal head injury cases, seen in 73 cases, (58.4%). This finding is not in agreement with the works of Pathak A et al., [10] Menon A, Nagesh K R [11-13]. Depressed fractures were less common in fatal cases. Incidence of skull bone fractures was high in fatal head injury cases. The present study is also in agreement with the works of other authors [3 14, 15]. In our study subarachnoid hemorrhage was the most common type of intracranial hemorrhages seen in 53cases, 26.5% which was very closely followed by subdural hemorrhages with 51 cases, 25.5%. However, some authors [6, 16, 17] has reported that sub-dural hemorrhage as the most common intracranial hemorrhage in their studies. But our finding regarding intracranial hemorrhage is consistent with the works of Chandra J et al., [4] and Sreekanth S et al., [18] who have reported subarachnoid hemorrhage as the commonest intracranial hemorrhage. In the present study we observed that short duration of survival was commonly associated with larger collection of extradural or subdural hemorrhage specially when there was concomitant presence of comminuted skull fractures. In majority of the brought in dead cases there were fractures of skull bones. Cases with fractures of the skull tend to have more complications and are more often fatal than those without fracture. In this regard our observation was consistent with the works of Banerjee KK et al., [19] and Lalwani S et al., [20].

CONCLUSION

Most of the cases were due to road traffic c accidents and males are more prone to get Head injury. Other important causes of fatal head injuries are fall from height, railway accidents and assaults in descending order. No age group is immune to fatal head injury however young adult age groups are more prone. In fatal cases we see association with multiple fractures of the skull bones. To reduce the morbidity and mortality its high time for the concerned authority to take appropriate actions.

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