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Study of skull fractures in fatal road traffic accident cases from rural Haryana

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ABSTRACT

Introduction: Head injury is an important cause of mortality throughout the worldwide. The Head region is considered as one of the most vulnerable part of the body. Therefore, it is involved frequently and lead to morbidity and mortality in road traffic accidents (RTA). **Aim:** The present study was thus conducted to analyze the patterns of skull fractures in fatal road traffic accident cases amongst RTA victims brought to tertiary care hospital in rural Haryana. **Methods:** All the cases of fatal road traffic accidents subjected to medico legal autopsy at the department of forensic medicine of MM Institute of medical sciences. The detailed analysis of these cases was based on the inquest report, medical records, if patient was admitted in the past and evaluation of autopsy reports. **Results:** Of total 639 medico legal autopsies were conducted during the study period, 56.81% were of RTA. Fracture of skull was present in 85%. Combination of vault and base fracture was the most common (48.23%) distribution of skull fracture. Fracture of the vault of skull alone was seen in 36.47%. Commonest type of fracture present in the skull vault was linear/fissured fracture (54.83%) constituting 68 out of 124 sites followed by comminuted fracture being 40 out of 124 sites (32.25%). Middle cranial fossa was the commonest fossa involved. 36% died within 24 hours after the accident. 33% victims survived beyond 24 hours but died within one week. **Conclusion:** Skull fractures are not uncommon in fatal road traffic accident cases. Combination of vault and base fracture are commonly observed. Commonest type of fracture present in the skull vault was linear/fissured fracture. Middle cranial fossa was the commonest fossa involved. Data generated here can be utilized for implementing effective emergency services to reduce the trauma related mortality of fatal accidents.

Key Words: Skull Fractures, Road Traffic Accidents, and Injury.

Introduction

Road traffic injuries are as a result of "accidents or random events" does not hold good any more as evidence from research shows that like all injuries Road traffic injuries are partially predictable and hence preventable[1]. Road Traffic Accidents (RTAs) have emerged as a major global public health problem of this century and are now recognized as "veritable neglected pandemic"[2].

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Fatalities and injuries resulting from road traffic accidents are a major and growing public health problem in India.

India faces more than 15 fatalities and 53 injuries every hour as a consequence of road crashes. These numbers translate into one RTA every minute and one road accident death every four minutes. However, this is an underestimate, as not all injuries are reported to the police [3]. If the trend continues, the total number of road traffic deaths in India would increase by 100% between 2013 and 2027[4].

Head injury has been defined as "a morbid state, resulting from gross or subtle structural changes in the

scalp, skull, and/or the contents of skull, produced by mechanical forces"[5]. The head being the most vulnerable part of the body is involved frequently and lead to morbidity and mortality in road traffic accidents[6]. The present study was therefore conducted to analyze the patterns of skull fractures in fatal road traffic accident cases amongst RTA victims brought to tertiary care hospital in rural Haryana.

Materials and methods

All the cases of fatal road traffic accidents during the period of three years from June 2010 to May 2013 subjected to medico legal autopsy at the department of forensic medicine of MM Institute of medical sciences. The detailed analysis of these cases was based on the inquest report, medical records, if patient was admitted in the past and evaluation of autopsy reports. Hospital records and police records also served as study tools wherever needed. Hospital records included the clinical data of the patient including investigations and procedures, survival period, time and cause of death. Information pertaining to the time and manner of road traffic accident will be sought from the police records. These were then correlated with the post-mortem findings to conclude the analysis of each case.

For the purpose of study, a RTA was defined as any vehicular accident occurring on a public road or highway and includes vehicle accidents where the place of occurrence is unspecified. A detailed proforma for the purpose of recording socio-demographic profile of victims, epidemiological data, pattern and severity of injuries sustained, pattern of skull fracture and cranial trauma and other relevant data etc was prepared for the purpose of filling observations of the present study. Type of skull Fracture, anatomical location of fracture of skull vault, anatomical location fracture of base of skull, types of intracranial hemorrhages and other relevant data were also captured.

Informed consent was obtained from relatives wherever applicable. Institutional ethics committee (IEC) permission was obtained before the commencement of the study. All the questionnaires along with other relevant data were coded for computer entry. After compilation of the collected data, analysis was done using Epi-Info version 6. The results were expressed using appropriate statistical methods.

Results

During the present study, a total of 639 medico legal autopsies were conducted during the study period, out of which 303 cases (56.81%) were of RTA. Fracture of skull was present in 85% out of 303 Cases. Fractures were grouped in to fracture of vault alone, base alone, facial bones and combination of vault and base. Combination of vault and base fracture was the most common (48.23%) distribution of skull fracture. Fracture of the vault of skull alone was seen in 36.47%, whereas base of skull alone was fractured in 11.78%. Fracture of facial bones was present in 3.52% cases only. (Table 1)

Table 1: Distribution of skull fractures

Site	Number of cases	Percentage
Vault alone	31	36.47
Base alone	10	11.78
Vault & base	41	48.23
Facial bones	3	3.52
Total	85	100

Commonest type of fractures present in the skull vault were linear / fissured fracture (54.83%) constituting 68 out of 124 sites followed by comminuted fracture being 40 out of 124 sites (32.25%) and depressed fracture being 13 out of 124 sites (10.48%). Sutural fracture was present in only 3 cases (2.43%). (Table 2)

Table 2: Distribution of fractures of the vault of skull

Type of fracture of vault	Number	Percentage
Linear/fissured	68	54.83
Comminuted	40	32.25
Depressed	13	10.48
Sutural	3	2.43
Total	124	100

Middle cranial fossa was the commonest fossa involved, having 33 fractures out of 68 (48.54%) followed by anterior cranial fossa having 21 out of 68 (30.88%) and posterior cranial fossa with 14 out of 68 fractures (20.58%). (Table 3)

Table 3: Fractures of the base of skull

Site	Linear	Comminuted	Total
Anterior cranial fossa	15	6	21 (30.88)
Middle cranial fossa	25	8	33 (48.54%)
Posterior cranial fossa	11	3	14 (20.58%)
Total	51	17	68 (100%)

Period of survival following accident

In our study, 36% died within 24 hours after the accident. 33% victims survived beyond 24 hours but died within one week. The number of cases decreased with increase in survival period. Only 4% victims survived for more than 4 weeks. The victim who survived for shortest period of 1 hour had fracture of skull, clavicle, patella and leg bones. The victim who survived for maximum period i.e. 34 days after the accident died due septicemia (intestinal perforation). (Figure 1)

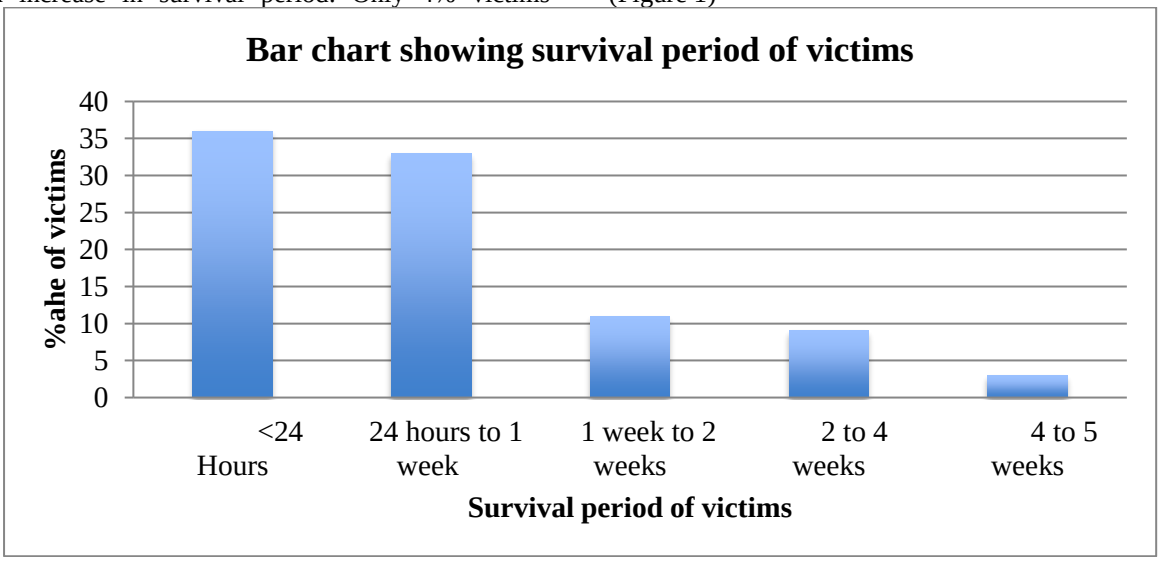

Figure 1: Period of survival of study subjects following accident

Discussion

In this study it was observed that commonest skull vault fracture was linear / fissured fracture (54.83%) constituting 68 out of 124 sites followed by comminuted fracture being 40 out of 124 sites (32.25%). Another study from Rajasthan by is also in concordance with our observations[7]. He observed that dominant type of skull fracture found was the linear (fissured) fracture in 43.04% cases followed by basilar fracture in 17.73% and least commonly depressed fracture in 3.78% cases. Another study from Mangalore also revealed that skull fractures were present in 88.88% of the cases, fractures of the vault were found in 88%, base of the skull in 35.97% and combination of both in 35% of cases[8].

Another study from Maharashtra recorded a similar finding in his study[9]. Linear fracture of skull with basal fracture was the commonest type seen 23 (24.21%) of the total cases, followed by linear fracture only (16.84%) and least common was the depressed fracture, observed in 14.74% of the total cases. Skull vault fracture was seen in 80 of the total cases, out of which linear fracture was the commonest.

In our study we observed that the combination of vault and base fracture was the most common (48.23%) distribution of skull fracture. Fracture of the vault of skull alone was seen in 36.47%, whereas base of skull alone was fractured in 11.78%. Fracture of facial bones was present in 3.52% cases only. Our findings confirm the results of another study from Bihar.10 Kumar S et al. observed that 71% cases had fracture of the skull bones. Fracture vault of skull was found in 61.97% cases and in 29.58% cases both vault and base were involved. Fissured fracture was found in 63.64% cases

and comminuted type in 16.89% of cases. Temporal region had highest number (50) of fractures.

Honnunger RS et al. in his study revealed that the frontal bone fracture was the most common bone fractured in the head (69.01% of cases)[11]. Temporo-parietal region was involved predominately in 16 (20%) cases, followed by fronto-parieto-temporal region (17.50%)[9].

Regarding fractures of base of skull, we found that middle cranial fossa was the commonest fossa involved, having 33 fractures out of 68 (48.54%) followed by anterior cranial fossa having 21 out of 68 (30.88%) and posterior cranial fossa with 14 out of 68 fractures (20.58%). The result of this study is in agreement with previous study from Haryana. The base of skull had maximum fractures at anterior and middle cranial fossae and least number at posterior cranial fossa (4.17%)[10]. Our findings confirm the results of another study from Karnataka[12].

Conclusion

Skull fractures are not uncommon in fatal road traffic accident cases. Combination of vault and base fracture are commonly observed. Commonest type of fracture present in the skull vault was linear/fissured fracture followed by comminuted fracture. Middle cranial fossa was the commonest fossa involved. A big proportion of victims succumb to death in 24 hours. Data generated here can be utilized for implementing effective emergency services to reduce the trauma related mortality of fatal accidents.

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