

Research Article

Pattern of Skull Fracture in Central Southern Region of Nepal

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ABSTRACT

Background & Objectives: Skull is the important structure which covers one of the vital organs, brain. Fracture of skull may lead to trivial to serious types of brain injury. So, this study aimed

to observe pattern of skull fracture in a tertiary care hospital.

Material and Methods: Descriptive cross-sectional study was carried out among 248 patients visiting to the emergency and neurosurgery department of National Medical College having skull fracture. Data have been collected from history and examinations and radiological investigations. The data were collected by using proforma. Statistical analysis was performed using SPSS 22.0

Results: Road traffic accident (51.6%) was the major mode of injury causing skull fracture followed by fall from height (17.5%) and physical assault (13.7%). Vault fractures were seen in 65.6% of subjects. Linear fracture fractures were observed in 147((51.7%) followed by depressed fractures 51(17.9%). Temporal bone fractures were present in 97(34%) of subjects followed by frontal bone fractures 40 (14%).

Conclusion: Vault fractures were commonly observed among the skull fracture. Linear fracture was seen in majority of subjects. The most common bone involved was temporal bone.

Keywords: Fracture of skull, Road traffic accident, Fall from height

INTRODUCTION

Head is the most notable part of the body. For this region, it is usual target for injuries caused by various blunt trauma such as vehicular accidents, fall from height, physical assault etc. [1]. About one third of head injuries lead to fracture of skull and always accompanied by brain injury with some extent [2,3]. Skull base fractures are frequently associated with fatal head trauma, because complicating conditions like brain contusion, axonal injuries and intracranial hemorrhages are mostly associated with it [4,5,6]. Temporal bone involvement is seen in majority of skull fracture [7]. Among vault fractures, linear vault fractures are common followed by depressed and comminuted fractures [8]. Isolated vault fractures do not have a statistically significant effect on mortality [9].

The present study aimed to observe the pattern of skull fracture with its association with demographic profile and mode of injuries so as to it could be helpful for clinicians in early diagnosis and treatment as well as forensic experts to deal with medicolegal issues regarding head injuries. Because of only few available reports about pattern of skull fractures in developing countries, this study was conducted to evaluate the pattern of skull fracture in mid-southern region of Nepal.

MATERIALS AND METHODS

The present cross-sectional study was conducted in the Emergency Department (ED) and neurosurgery department of National Medical College Teaching Hospital from February 2022 to February 2024. Prior to conduct study ethical clearance has been taken from Institutional Review Committee

(IRC) of the same institute with reference number F- NMC/582/078-079.

Sample size was calculated by using the formulae below:

$$n = Z^2 p (1-p) / e^2$$

$$= (1.96)^2 \times 0.20 \times (1-0.20) / (0.05)^2$$

$$= 245 \leq 248$$

Where,

n= required sample size

z= confidence interval (CI) at 95% (standard value of 1.96)

P= prevalence for acute organophosphorus poisoning, 20% [8].

q = 1-p

e = degree of accuracy desired, 5%

An informed consent was taken prior to examination from the conscious patients and the same was taken from legal guardians in case of unconscious or minors. All cases of skull fractures were included in this study, brought dead and head injuries without skull fractures were excluded from this study. History regarding demographic profile were taken from the patients or their relatives. Types of fractures and intracranial hemorrhages were recorded from radiological reports.

Data were analyzed using SPSS 22. Variables like age, gender, modes of injuries, types of skull fractures, time of injuries were analyzed and expressed as frequency while categorical variables were compared using Chi-square test. P value less than 0.05 was considered statistically significant.

RESULTS

Table 1 presents the demographic profile of patients sustaining skull fractures. Out of 248 patients of skull fractures, 160 (56.1%) were male and 88 (30.9%) were female with male:

female ratio 1.81:1. The most common age group sustaining fracture was 31-40 years (31.6%) followed by >40 years (16.5%), 21-30 years (16.1%), 11-20 years (14.4%) and 0-10 years (8.4%). Road traffic accidents (51.6%) were the commonest mode of injuries followed by fall from height (17.5%), physical assault (13.7%) and others (4.2%).

Injuries mostly took place between 13:00 to 18:00 hours 100 (35.1%) followed by between 19:00 to 24:00 hours 59(20.7%), between 7:00 to 12:00 hours 55 (19.3%) and between 1:00- 7:00 hours 34(11.9%).

Table 2 depicts the clinical profile of patients sustaining skull fractures. Among 248 cases

Table 1: Demographic profile of patients sustaining skull fractures (N=248)

Variables	Categories	Frequency (%)
Gender	Male	160 (56.1)
	Female	88 (30.9)
Age group (years)	0-10	24 (8.4)
	11-20	41 (14.4)
	21-30	46 (16.1)
	31-40	90 (31.6)
	>40	47 (16.5)
Time of injury (hours)	7:00-12:00	55 (19.3)
	13:00-18:00	100 (35.1)
	19:00-24:00	59 (20.7)
	1:00-7:00	34 (11.9)
Modes of injuries	Road traffic accidents	147 (51.6)
	Fall from height	50 (17.5)
	Physical assault	39 (13.7)
	Others	12 (4.2)

Table 2: The clinical profile of the patients sustaining skull fractures (N=248)

Variables	Categories	Frequency (%)
Site of skull involved	Vault	187 (65.6)
	Base	61 (21.4)
Types of fracture	Linear	147 (51.6)
	Depressed	51 (17.9)
	Communitied	31 (10.9)
	Others	19 (6.7)
Skull bone involved	Temporal bone	97 (34)
	Frontal bone	40 (14)
	Parietal bone	28 (9.8)
	Ethmoid	9 (3.2)
	Sphenoid	7 (2.5)
	Combined	30 (10.5)
Intracranial hemorrhage	Epidural	102 (35.8)
	Subdural	79 (27.7)
	Subarachnoid	26 (9.1)
	Combined	41 (14.4)

of skull fractures, 187(65.6%) constitutes skull vault fractures and 61(21.4%) constitutes skull base fractures. Linear fracture 147 (51.6%) was the most common type of fracture followed by depressed fractures 51 (17.9%), comminuted fractures 31 (10.9%) and others 19(6.7%). The commonest bone involved was temporal bone 97 (34%) followed by frontal bone 40 (14%), occipital bone 37 (13%), combination of two or more bones 30 (10.9%), parietal bone 28 (9.8%), ethmoid 9 (3.2%) and sphenoid 7 (2.5%). Among the intracranial hemorrhages, epidural hemorrhage 102 (35.8%) was the commonest hemorrhage followed by subdural 79 (27.7%), combined 41 (14.4%) and subarachnoid 26 (9.1%).

DISCUSSION

This study was conducted in a tertiary hospital using data obtained from emergency department and neurosurgery department to observe the pattern of skull fracture in mid-southern region of Nepal. From this study, it has been revealed that men are more vulnerable to sustain injuries to the head leading to fracture of skull. In this study male: female ratio is 1.81:1, which is similar to the other studies [9,10,11]. The reason behind this may be that the men are the primary bread owners of their family and they have to spend more time outside the home. The most common age group involved is 31-40 years. Most of the studies showed 21-40 age group be the most vulnerable [8,12,13]. This age group is highly active in day to day life, easily involved in risk taking activities like violence, drug addiction, disobeying traffic rules etc. leading to head injuries.

Most of the injuries took place between 13:00 to 18:00 hours followed by 19:00-24:00 hours. Modi AD et al. [14] and Oberoi SS [15] in their studies reported similar findings. Most of the outdoor activities like purchasing goods, visiting friends and relatives, taking part in recreational activities usually take place after office time or school/college time. Similarly people get intoxicated by alcohol in the evening may result in participation in violent acts or careless driving resulting in head injury that may lead to fracture of skull. In this study major mode of injury leading to skull fracture was road traffic accidents followed by fall injuries. Similar findings were reported from the various studies [8,12,13,16]. Mokolane NS et al [12] reported assault (46.7%) being the most common cause of head injury leading to skull fracture.

Vault fracture was found in the most cases as compared with skull base fracture. Similar results were observed by other researchers too [9,18]. In our study, the temporal bone was the commonest bone to be fractured followed by frontal bone. Similar results were observed by Arora S and Hashmi ZA et al [18,19]. Temporal bone being the thinnest bone and it is posited at vulnerable site in skull may be the reason for its common involvement. Other studies showed frontal bone being the most common bone to be fractured [20,21]. Most common type of fracture was linear fracture followed by depressed fracture, which is consistent with the findings of

other studies too [22,23]. It is due to the fact that in most of the cases impact on head is due to broad resisting surface like ground or the agent striking the head has broad surface. In this study the most common type of intracranial hemorrhage is epidural hemorrhage. This finding is in coherence to the study conducted by Vittala H. [13]

CONCLUSION

Vault fracture is more common than the base fracture with the most common mode of injury being the road traffic accident followed by fall injuries and physical assault. Linear fracture is the most common fracture. Temporal bone is the most common bone involved. As the economically productive age group is the common victims of road traffic accidents, fall from height or physical assault, So, these age group targeted safety rules awareness campaign should be conducted. Initiation from the government authorities should be taken to improve emergency health services and road infrastructure to reduce morbidity and mortality.

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Sah et al.,

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