

## “Pattern of Skull Fractures due to Blunt Force”

B.K. Gopal<sup>1</sup>, Ameena Ahamed<sup>2</sup>, Faraz Ahamed<sup>2\*</sup>, Shashmira Bhaskar Tonse<sup>2</sup>

### Abstract

The study of pattern of skull fractures is important as head being the most exposed and prominent part of body becomes most susceptible to injuries, as a result of violence or accidents. The skull fractures cause by blunt force offer varying diagnostic and medico-legal problems to the forensic experts and also to the clinicians. 83 cases of skull fractures due to blunt trauma were selected from the dead bodies sent for post-mortem examination from November 2013 to October 2014 to Kempegowda Institute of Medical Sciences Hospital, Bangalore. Out of the 83 cases, majority were found to be co-existing with intracranial injuries, but few cases showed the presence of skull fractures alone. Maximum cases were in the age group of 31-40 years, most common cause being road traffic accidents followed by fall from height and then by assault. Of the various skull fractures, fissured fracture was the commonest type followed by comminuted fracture and then by depressed fracture.

**Key Words:** Head Injury, Blunt Trauma, Skull fracture, Fissured fracture

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### Introduction:

The history of trauma parallels the history of the evolution of man, with his aggressive instincts, creative ability and endless ambition to conquer the environment without regard to the price he must pay to achieve goals.

“Head Injury” as defined by National Advisory Neurological diseases and Stroke Council, USA (1969) is a “morbid state resulting from gross or subtle structural changes in the scalp, skull and/or contents of the skull, produced by mechanical forces.” Head Injury is a considerable public health issue, with high rates of mortality and morbidity.<sup>1</sup> Injury to the brain without fracture of skull is not uncommon, though fracture of skull is usually accompanied by

some degree of injury to the brain.<sup>2</sup>

The study of pattern of skull fractures in these cases is important as head being the most exposed and prominent part of body becomes most susceptible to injuries. The skull fractures, especially by blunt force offer varying diagnostic and medico-legal problems to the forensic experts and also to the clinicians.

Head Injury cases are presently increasing at an alarming rate in all world communities, especially in more densely populated areas with fast and heavy traffic flow along with rapid growth of industrialisation. No injury to the head is too trivial to be ignored or so serious as to be despaired of.<sup>3</sup> These head injuries are generally sustained by road traffic accidents, fall from height, assault by blunt force, etc. There are only a few reports from developing countries about the pattern of skull fractures. The present study is aimed at describing the skull fractures according to age, sex, injury mechanism, location and type of skull fracture.

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<sup>1</sup> Assistant Professor, <sup>2</sup> Tutor, Department of Forensic Medicine, Kempegowda Institute of Medical Sciences, Bangalore, India.

**Correspondence:** Dr. Faraz Ahamed

Mail: [far.raaz@gmail.com](mailto:far.raaz@gmail.com)

Mobile: +91 9964107417

### Material and Method:

In the present study, 83 cases of skull fractures caused by blunt force were selected from the autopsies conducted from 1<sup>st</sup> November 2013 to 31<sup>st</sup> October 2014 (study period of 12 months) at Kempegowda Institute of Medical Sciences and Hospital, Bangalore. Only those cases were selected which had definite history of head injury by blunt force e.g. road traffic accidents, fall from height, assault by blunt weapons etc.

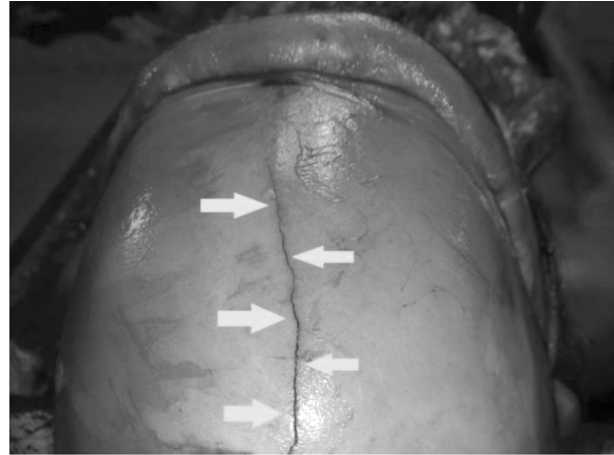
Cases of head injury where the skull and brain were completely destroyed were not selected for the present study. Cases of intracranial injury without any skull fractures were also not selected for the study. A detailed post-mortem examination was carried on every case. Brief history pertaining to the injury was recorded from the relatives and eye witnesses regarding the cause and manner of injury, time and place of injury, period of survival following the head injury and approximate age of the person.

After recording preliminary information, the external examination of the whole body was done. External injuries were examined with special attention towards the injuries of head. The nature of injuries like abrasions, contusions, lacerated wounds and fractures and their type, location and dimensions were carefully noted. Evidence of bleeding from natural orifices was also noted.

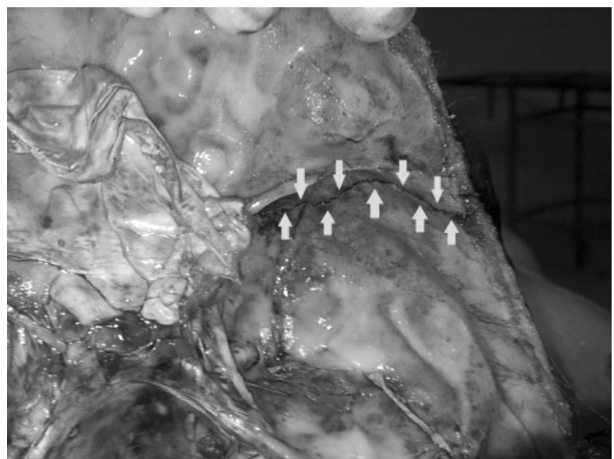
Head Injuries were examined methodically. The inner aspect of the scalp was examined for evidence of any contusions or haematomas. Fractures of the skull were examined in detail as to the type (depressed, fissured, sutural, comminuted, hinge, ring), extension and location. Injuries to the meninges and their blood vessels and corresponding intracranial haemorrhages were noted. Dura at the base of the skull was stripped off to visualise the fractures if any.

### Observation and Results:

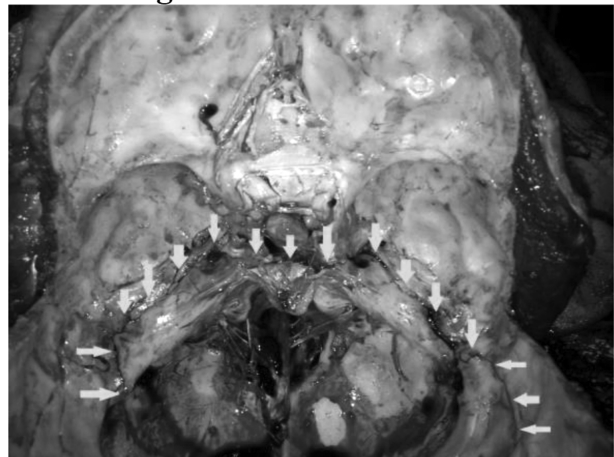
A total of 83 cases were included in the study and observed. It is significant to note that in 83 cases of skull fractures due to blunt force, 64



**Pic 1: Linear Fracture of the vault of skull**



**Pic 2: Linear Fracture of the base of skull**



**Pic 3: Hinge Fracture**

cases (77.1%) had skull fractures with intracranial haemorrhages and injury to the scalp, 16 cases (19.3%) sustained skull fractures with intracranial haemorrhages without injury to scalp, one case (1.2%) sustained skull fracture with injury to the scalp without any intracranial

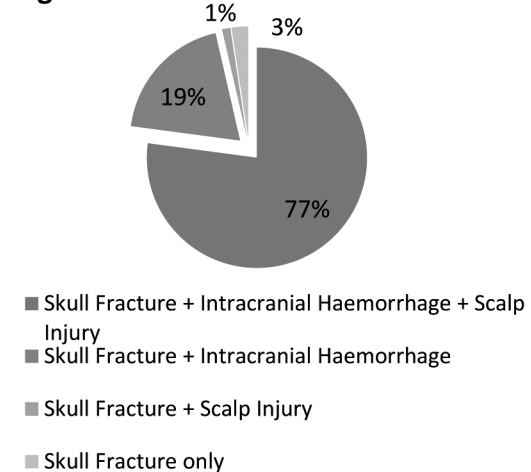
haemorrhage, 2 cases (2.4%) sustained fracture of the skull alone. (Fig. 1)

Out of the 83 cases, the maximum cases (28.9%) were noted in the age group of 31-40 years (Fig. 2).

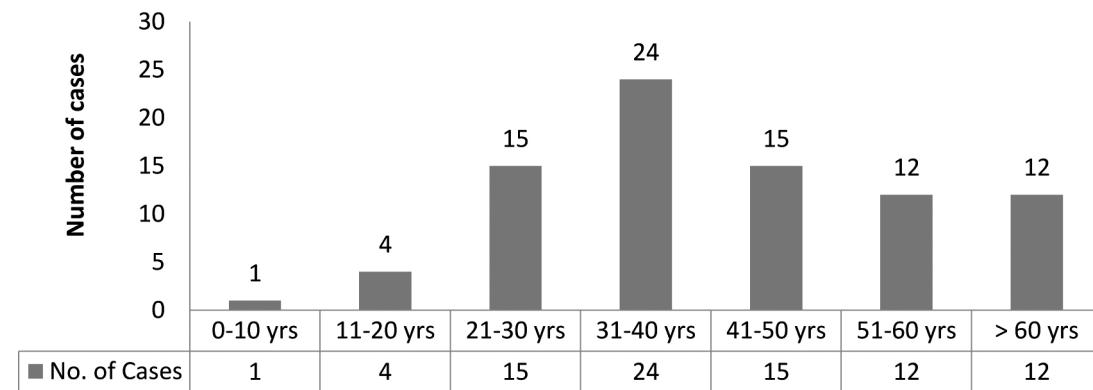
The number of male subjects affected was significantly higher than the female counterparts. Out of 83 cases, 70 were males (84.3%) (Fig. 3)

The most common cause of the fractures being Road Traffic Accidents (63.9%) (Fig. 4). Out of the 83 cases, vault of the skull alone was fractured in 19 cases (22.9%), base of the skull was alone fractured in 29 cases (34.9%) and both vault and base were involved in majority of cases

**Fig 1: Incidence of Skull Fractures**



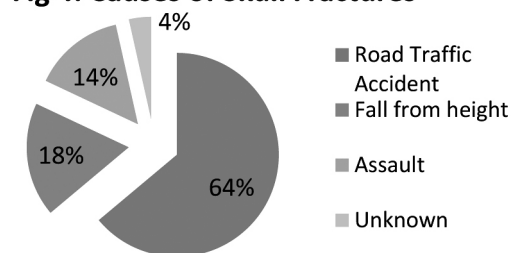
**Fig 2: Age incidence of Skull Fractures**



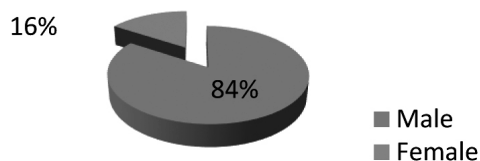
(42.2%) (Fig. 5)

In the present study, out of various types of skull fractures, 61 cases (73.5%) sustained fissured fractures, 31 cases (37.3%) sustained comminuted fractures, 6 cases (7.2%) showed the presence of depressed fracture, whereas hinge fracture was noted in 5 cases (6%) and sutural fracture in one case (1.2%). (Fig. 6)

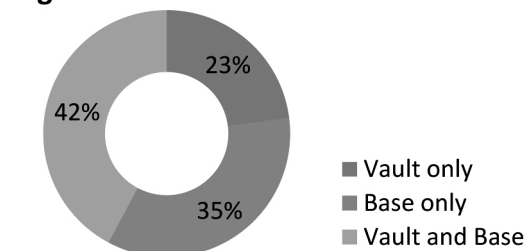
**Fig 4: Causes of Skull Fractures**

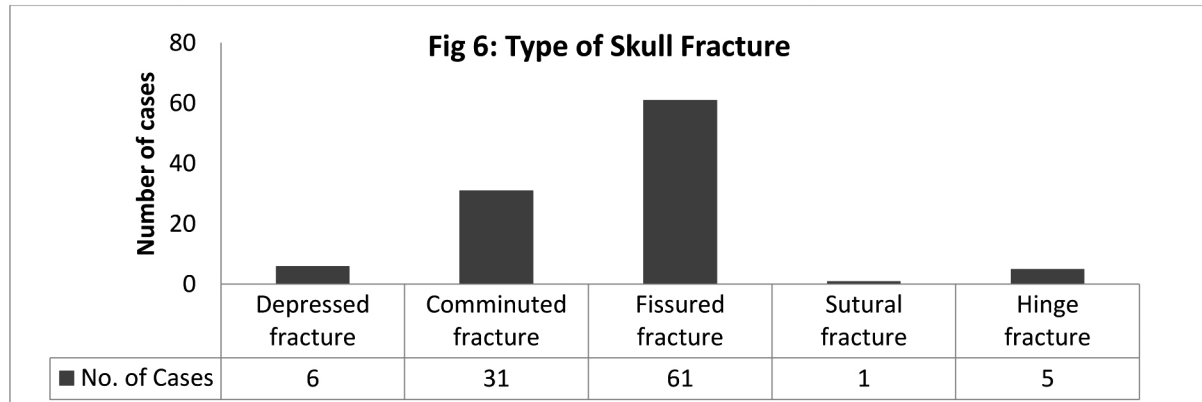


**Fig 3: Sex incidence of Skull Fractures**



**Fig 5: Location of Skull Fractures**





### Discussion:

The incidence of head injury is increasing everyday so it is imperative that knowledge of this subject must increase rapidly both in its preventive and practical aspects as well as its scientific aspects because many of these cases are either preventable or curable.

In a study of cranio-cerebral injuries by blunt force by Thangaraj M<sup>4</sup>, most of the cases were due to fall from height (34%) and road traffic accidents (32%). In the present study however, road traffic accidents accounted for 64% of the cases and fall from height only 18%. The commonest age group was found to be 31-40 years (28.9%).

External injuries may or may not be present in all cases of head injury.<sup>5</sup> Wounds of the scalp due to blunt force must be looked upon as potentially serious no matter how they are produced.<sup>6</sup> These statements hold good in the present study also. In 21.7% of cases of trauma to the head by blunt force, there were no external injuries on the head but these had severe cranial or intracranial lesions which proved fatal.

The dominant type of skull fracture found was linear (fissure) fracture in 43.04% cases, followed by comminuted and depressed fracture in a study by Pathak A.<sup>7</sup> Another study by Manish K et al<sup>8</sup> showed that linear fracture (38.8%) was the commonest fracture followed by comminuted

fracture (27.7%) and depressed fracture (11.1%) which is consistent with the present study. In addition to these the present study showed the presence of hinge fracture in 6% of cases and sutural fracture in 1.2% of cases. Skull vault was fractured in 23% of cases, basilar fractures were seen in 35% cases and in majority of cases (42%) both the vault and base were fractured.

### Conclusion:

The following conclusions were drawn from the present study;

- Common causes of skull fractures are Road Traffic Accidents, fall from height and assault by blunt weapons
- Commonest age group affected is 31-40 years
- Skull fractures can occur without any evidence of injury to scalp.
- Skull fractures may or may not be associated with intracranial injuries.
- Commonest type of skull fracture is the fissure fracture followed by comminuted fracture.

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