SPECTRUM OF SKULL FRACTURES IN TRAUMATIC BRAIN INJURY (TBI) – A CROSS SECTIONAL STUDY

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ABSTRACT

BACKGROUND

Traumatic brain injury (TBI) is a considerable cause of morbidity and mortality in India and around the world. Head injury provides one of the major contributions to death and better practical understanding of intracranial injuries is essential to the forensic expert. The cross sectional CT imaging makes the radiologic contribution to forensic autopsy more valuable and may improve accuracy of forensic investigation. To this reason we retrospectively evaluated the patterns of skull fractures on CT scan imaging of deceased patients.

METHODS

This cross sectional analysis was conducted in the department of forensic medicine Career institute of Medical Sciences, Lucknow over a period of two years 2013-2015. In this study, we reviewed images of all the deceased patients (died in our hospital) who underwent CT scanning at index admission for head injury. Demographic details and mode of injury was recorded from available data. Age was presented using mean and standard deviation, gender, mode of injury and type of skull fractures were presented as numbers and percentages.

RESULTS

Linear skull fractures were 172 out of which RTA due to unknown was 99 followed by fall of unknown reason was 32, RTA fall from two wheeler was 32. The cause of death in all these cases was due to head injury associated with fracture of skull or intracranial hemorrhages or brain injury.

CONCLUSION

Majority of fatal head injuries are due to road traffic accidents (RTA) especially in younger and middle age, followed by fall from height. The common skull fracture type was linear (fissured) skull fractures followed by depressed fractures. Retrospective CT evaluated has reinforced reporting medico legal of these cases.

KEYWORDS

Traumatic brain injury (TBI), Road Traffic Accidents (RTA), Linear skull fractures, CT Scan.

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INTRODUCTION: Road traffic accidents (RTA) are world's most serious health problem. It is a sixth leading cause of death in India with a greater contribution of hospitalization and disabilities in young and middle-age populations as per WHO.[1] Traumatic brain injury (TBI) is a considerable cause of morbidity and mortality in India and around the world.[2] Head injury provides one of the major contributions to death and better practical understanding of intracranial injuries is essential to the forensic expert. The radiological imaging techniques are relied upon for inferring the nature of injury in all medico-legal injury either presence or absence of skull fracture simple or grievous.[3] CT scanning is as effective as conventional radiographs in depicting linear, comminuted, and depressed skull fractures.

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The degree of skull depression is easily measured on CT scans and skull sutures can be readily distinguished from fractures by their symmetry and corticated margins.[4] Majority of skull fractures and intracranial injuries are associated with extracranial trauma. CT scans reliably depict extra calvarial soft-tissue injuries like subgaleal hematomas, avulsed soft tissues and scalp edema.[5] The cross sectional imaging makes the radiologic contribution to forensic autopsy more valuable and may improve accuracy of forensic investigation.[6] Investigation of deceased is of importance for different reasons, including jurisprudence, education, science and quality control.[7] To this purpose we reviewed images of all the deceased patients (died in our hospital) who underwent CT scanning at index admission for head injury.

METHODS: This cross sectional analysis was conducted in the department of forensic medicine Career Institute of Medical Sciences over a period of two years. In this study, we reviewed images of all the deceased patients who underwent CT scanning at index admission for head injury.

Spiral CT scanner (SIEMENS make SOMATOM with volume zoom +4) was used for imaging. Demographic details and mode of injury was recorded from available data.

STATISTICAL ANALYSIS: Age was presented using mean and standard deviation, gender, mode of injury and type of skull fractures were presented as numbers and percentages.

RESULTS:

Skull fracture type						
Mode of Injury	**Comminuted**	**Depressed**	**Depressed Comminuted**	**Linear**	**Total**	**%**
Fall unknown	0	3	1	32	36	18.8
RTA unknown	3	6	0	99	108	56.3
RTA Fall from Two Wheeler	0	6	1	32	39	20.3
RTA hit by four wheeler	0	0	0	5	5	2.6
RTA hit by Two Wheeler	0	0	0	4	4	2.1
Total	**3**	**15**	**2**	**172**	**192**	**100.0**

Table 1

Linear skull fractures were 172 out of which RTA due to unknown was 99 followed by fall of unknown reason was 32, RTA fall from two wheeler was 32. The cause of death in all these cases was due to head injury associated with fracture of skull or intracranial haemorrhages or brain injury.

DISCUSSION: Injuries from RTA will be the third most common cause of disability worldwide and the second most common cause in the developing world.[8] Motor vehicle related injuries can be arbitrarily divided in to collision between the patient and the external environment and acceleration or deceleration forces acting on the patient's internal organs.[9-10]

Fractures of the lower extremities are also common in motorcyclists, occurring in approximately 40% of motorcyclists hospitalized for non-fatal injuries.[11] The addition of cross-sectional imaging to forensic autopsy allows the radiologist and forensic pathologist to view postmortem anatomy in 2 and 3 dimensions without dissection. In fatal head injuries subdural haemorrhage and subarachnoid haemorrhage are the two common type of haemorrhages in which SDH is mainly traumatic in origin with broad etiology.[12] Sharma and Murari[13] observed that compared to a CT scan, autopsy was found to be more effective in detecting various lesions of head injury. However, in contrary, Goel et al[14] observed that CT scans detected fewer fractures (55.2 per cent) compared to conventional autopsy findings. Jacobsen et al observed that fracture details important from a forensic point of view were better delineated in CT images on reconstruction into multi-planar and maximum intensity projection.[15] Avneesh in his study evaluated, linear fractures (29%) of the skull vault were the commonest type followed by comminuted (18%) and depressed type (13%), most often present in the parietal followed by temporal and frontal regions.[16] Akhilesh Pathak in his study, out of all skull fractures, 65% were fissured fractures followed by comminuted (18%) and depressed fractures (12%) were observed.[17] However, a linear or minimally depressed fracture may be easily overlooked on CT scans, particularly when viewed with narrow windows. Often, a small streak artefact caused by a misaligned fracture may be a clue.

CONCLUSION: Most of the fatal head injuries are due to road traffic accidents especially in younger age followed by fall from height. The common Skull fracture type was linear (fissured) skull fractures followed by depressed fractures. Retrospective CT imaging has facilitated in reconfirming and better medico legal reporting of the cases.

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