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A comparative study of findings of CT scan and post mortem examination of head injury cases in Bikaner region

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Abstract
Background: Head injury is a significant public health problem worldwide and is predicted to surpass many diseases as a major cause of death by 2020.
Methods: The study was carried out in the Department of Forensic Medicine and Toxicology in association with Trauma center of S.P. Medical College and Associated Group of Hospitals, Bikaner, after institutional ethical clearance.
Results: Out of 100 cases 88.00% were male and 12% were female. Maximum cases (38.00%) were from 21-30 year age group and minimum cases (3.00%) were from 0-10 year age group. The most interesting factor which came across during the study was the contribution of 89.00% cases of the Traffic Accidents. Skull fracture was observed in 75 cases at autopsy and the same finding observed only 67 cases in CT scan, making disparity in 10.66%.Extradural haemorrhage (EDH) was observed in 14 cases at autopsy, and same was documented only in 12 cases on CT scan, thus making disparity in 14.28% cases. Subdural haemorrhages (SDH) were observed in 68 cases at autopsy and 60 cases on CT scan making disparity in 11.76% cases. Subarachnoid haemorrhages (SAH) were observed in 79 cases at autopsy and 60 cases on CT scan making disparity in 24.05% cases. Intracerebral haemorrhage (ICH) was observed in 10 cases at autopsy and 4 cases on CT scan making disparity in 60.00% cases. Brain oedema was observed in 26 cases at autopsy, and same was documented only in 18 cases on CT scan, thus making disparity in 30.76% cases. Cortical contusions were observed in 49 cases at autopsy and 39 cases on CT scan making disparity in 20.40% cases. Laceration of brain was observed in 2 cases but was not observed in any case on CT scan.
Conclusion: It was observed that although CT scan is a useful tool for the diagnosis of various kinds of lesions of head injury, autopsy was found to be more effective in detecting them.

Keywords: CT scan, post mortem examination, head injury cases

Introduction
Head injury is a significant public health problem worldwide and is predicted to surpass many diseases as a major cause of death by 2020. Data indicate that majority of traumatic brain injury cases (60%) are as a result of road traffic accident, followed by falls (20-30%), and violence (10%). Traumatic head injury is a leading cause of death and disability in children and adults. Each year in India nearly 2 million people are injured with about 1 million deaths due to head injury [1].

Among all the regional injuries, the injury to the head and neck are most common and important in day to day practice of Forensic medicine as head accommodates one of the most vital organs of the body- The brain. The external injury on the head and the face may or may not be the representative of internal injury and the extent of danger of the impact. A thorough interpretation from the external and internal injuries to skull and its contents in light of the modern non-invasive/ diagnostic tools available at hand with the treating surgeon is necessary. The findings are recorded and evaluated after these non-invasive diagnostic procedures (conventional radiography, USG, CT scan, MRI). It is essential to corroborate and correlate the findings, if death of the injured occurs, at the time of autopsy [2].

Materials & Methods

This study was carried out in the Department of Forensic Medicine and Toxicology in association with Trauma center of S.P. Medical College and Associated Group of Hospitals, Bikaner, after institutional ethical clearance.

Epidemiological data viz. age, gender, occupation, date and time of incident were collected from police, patient, their relatives, and Bed Head Tickets (BHT) of Trauma Center, PBM Hospital, Bikaner. These data along with the findings of CT scan (Head) and post mortem examination were recorded in specially designed proforma in which excepted preliminary criteria of study like fracture, EDH, SDH and ICH data are mentioned.

Finally the details were analyzed and the conclusions were drawn after comparing and discussing with similar type of the works carried out by foreign and Indian authors. The gross features of the injuries to skull and its contents were photographed and recorded.

This study was conducted on total 100 numbers of cases.

Inclusion Criteria and Exclusion Criteria

Inclusion Criteria:

All cases of death due to acute head injury in whom CT scan were done before death, admitted in Trauma Center, PBM Hospital, Bikaner, and subsequently post mortem examinations were conducted, would be included in the study.

Exclusion Criteria

1) All those cases that have sustained head injuries received dead in mortuary.
2) The cases who were not subjected to CT scan examination.
3) The cases that have been operated for head injury during their course of admission.

Observations

Out of 100 cases maximum cases (38.00%) were from 21-30 year age group and minimum case (3.00%) were from 0-10 year age group. Out of 100 cases 88.00% were males and 12% were females.

Table 1: Distribution of cases of head injuries by External cause

External cause	No. of cases	Percentage (%)
Traffic accident	89	89.00
Fall	4	4.00
Assault	7	7.00
Unknown	0	0.00
Total	100	100.00

The most causative factor which was came across during the case study was the handful contribution of 89.00% cases of the Traffic Accidents followed by 7.00% cases of assault and rest 4.00% from fall.

Table 2: Comparison of skull fracture observed at autopsy and as reported on CT scan

Parameters	Autopsy	CT scan	Disparity	
	No.	No.	No.	%
Skull Fracture	75	67	8	10.66

As per table no. 2, Skull fractures were observed in 75 cases at autopsy and the same finding observed only 67 cases in CT scan, making disparity of 10.66%.

Table 3: Comparison of Intracranial haemorrhage observed at autopsy and CT scan

Haemorrhage	Autopsy	CT scan	Disparity	
			No.	%
EDH	14	12	2	14.28
SDH	68	60	8	11.76
SAH	79	60	19	24.05
ICH	10	4	6	60.00

As per table no.3, EDH was observed in 14 cases at autopsy, and these were documented only in 12 cases on CT scan, thus making disparity in 14.28% cases. SDH were observed in 68 cases at autopsy and 60 cases on CT scan making disparity in 11.76% cases. SAH were observed in 79 cases at autopsy and 60 cases on CT scan making disparity in 24.05% cases and Similarly, ICH was observed in 10 cases at autopsy and 4 cases on CT scan making disparity in 60.00% cases.

Table 4: Comparison of Traumatic Brain Injury observed at autopsy and CT scan

Brain Injury	Autopsy	CT scan	Disparity	% of Disparity
Brain oedema	26	18	8	30.76%
Contusion	49	39	10	20.40%
Laceration	2	0	2	100%

As shown in Table no.4, brain oedema was observed in 26 cases at autopsy, and same was documented only in 18 cases on CT scan, thus making disparity in 30.76% cases. Cortical contusions were observed in 49 cases at autopsy and 39 cases on CT scan making disparity in 20.40% cases. Similarly, laceration of brain was observed in 2 cases but was not observed in any case on CT scan.

Discussion

The present study entitled "A Comparative study of findings of CT scan and Post mortem examination of head injury cases in Bikaner region" was undertaken on the cases of acute head trauma brought for postmortem examination in the department of Forensic Medicine and Toxicology through department of Neurosurgery of S.P. Medical College, and Associated Groups of Hospital, Bikaner.

The most causative factor which came across during the study was the handful contribution of 89.00% cases of the Traffic Accidents followed by cases of assault 7.00% and rest 4.00% fall. Ravi Kumar *et al.* [3] observed that most common cause of head injury was road traffic accident 32 (50%). This study is also consistent with Ravi Kumar *et al.* [3] and Reddy *et al.* [4].

In the present study, Skull fractures were observed in 75 cases at autopsy and the same finding observed only 67 cases in CT scan, making disparity of 10.66%.

Jacobsen *et al.* [5] conducted similar study and observed that Sphenoid (lesser wing) fractures were not detected in CT scan where as detected during autopsy in 5 cases. CT scan failed to detect fracture of greater wing of sphenoid in 10 out of 15 cases, and petrous temporal bone fractures were not detected in 9 out of 15 cases. Our observation was also in agreement with Jacobsen *et al.* [5]

In our study, Extradural haemorrhage (EDH) was observed in 14 cases at autopsy, and same was documented only in 12 cases on CT scan, thus making disparity in 14.28% cases.

Subdural haemorrhages (SDH) were observed in 68 cases at autopsy and 60 cases on CT scan making disparity in 11.76% cases. Subarachnoid haemorrhage (SAH) were observed in 79 cases at autopsy and 60 cases on CT scan making disparity in 24.05% cases and Similarly, ICH was observed in 10 cases at autopsy and 4 cases on CT scan making disparity in 60.00% cases.

Sharma and Murari [6] in their study have observed that among EDHs 66.7% were diagnosed in both CT scan and autopsy; whereas 33.3% of them remained undiagnosed by CT scan, which is consistent with our observation. The SDHs were diagnosed in both CT scan and autopsy, and no mismatch was noted & hence it is not in agreement with our observation. Among SAHs 64.3% were diagnosed in both CT scan and autopsy; whereas 35.7% of them remained undiagnosed by CT scan, which is consistent with our observation. Among ICHs, 70% were diagnosed in both CT scan and autopsy; whereas 30% remained undiagnosed by CT scan & hence it is not in agreement with our observation.

In our study, brain oedema was observed in 26 cases at autopsy, and same was documented only in 18 cases on CT scan, thus making disparity in 30.76% cases. Acute massive cerebral swelling within 30 minutes after close head injury is documented by a computer tomography (CT scan), which rapidly resolved by steroid treatment. Waga S. [7] has pointed out that in over 70% of the patients undergoing CT within the first 24 hours following trauma were considered to have a contusion, whereas over 80% of the patients whose CT's were performed after 24 hours had apparent oedema on CT scan.

Regarding the brain oedema similar findings were observed by Goyal *et al*. [8] where oedema of the brain was detected at autopsy in 9 cases out of them oedema was detected only in 5 cases during first CT scan and in 2 cases on repeat CT scan which might be due to development of oedema of the brain as an early response to the injury to the brain.

Conclusion

It was observed that although CT scan is a useful tool for the diagnosis of various kinds of lesions of head injury, autopsy was found to be more effective in detecting them.

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