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Original Research Article

Role of computed tomography in traumatic head injury evaluation

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ABSTRACT

Background: Cranio-cerebral injuries are most common cause of hospital admission following trauma, and it is associated with long-term morbidity and mortality. CT is the single primary modality in the evaluation of patients with acute head injuries.
Objective: To assess the prognostic significance of CT in the outcome of a patient of head injury. To observe the sequential anatomic progress of pathologic processes as a response of the brain to head injury and their correlation with Glasgow Coma Scale.
Materials and Methods: This study was carried in patients of head injury. The patients with a head injury, craniofacial trauma who underwent CT scanning were included in the study. Patients were scanned using dual Slice CT, Siemens somatom Emotion duo. A P-value of less than 0.05 was considered statistically significant.
Results: Total 100 patients were included, incidence of head injuries was more in males than females. Headache was the commonest presentation. Contusions were the most common intraparenchymal injury found in 48, followed by EDH in 46 patients, followed by SDH and SAH which accounted for 43 and 27 respectively. Intraparenchymal hematoma was found in 20 of patients and DAI in 13, intraventricular hemorrhage in 8 patients.

1. Introduction

Traumatic brain injury (TBI) is a prevalent and potentially devastating problem. In a rapidly developing country such as India, urbanization and industrialization is the important cause for increased road transportation this leads to head injuries due to road traffic accidents.[1] Head injury is most common cause of hospital admission following trauma, and it is associated with long-term morbidity and mortality. The rapid growth of the motor vehicle industry, liberalized economic policies of government, aggressive media promotion and poor public transport systems have contributed to increasing vehicles and a change in the transportation scenario of India.[2] India accounts for about 10% of road accident fatalities worldwide.[3] The accident rate of 101 per 1000 vehicles in India is also amongst the highest in the world. The total number of fatalities due to road traffic accidents has increased at an average rate of about 8% per year since 2003.[4,5] Conventional CT is more available, cost-effective, requires shorter imaging time and easy to perform on patients on ventilator support, in traction, or agitated is the initial imaging modality of choice during the first 24 h after the injury.[6–8]

With these, a study was taken to study the various clinical-radiological patterns of head injuries and also to correlate the CT features with clinical operative findings

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2. Material and Methods

This is a hospital study carried out in patients of head injury referred to the f Dr. D.Y. Patil Medical College, Pimpri, Pune from July 2012 to September 2014 Informed written consent was taken from all the participants. The patients with a head injury, craniofacial trauma who under Went CT scanning were included in the study. Patients on a ventilator and with Glasgow coma scale < 6 and who did not submit consent were excluded from the study

The patients were scanned using Philips 128 Slice CT machine after taking consent. A standard protocol was adopted for performing CT brain with 256 x 512 matrix. A digital scout radiograph was obtained with kVp of 120 and 100 mAs. Scanning was done parallel to the orbito-meatal line by taking 5 mm thin axial sections in helical mode with 120 kVp and 130 mAs. Images were obtained at brain and bone window settings.

Statistical analysis: Statistical analysis was presented in mean, SD and percentage. Chi square test and Spearman's correlation coefficient were used for comparison of CT findings of different variables and parameters. P-value was also calculated. All statistical analyses were conducted using the SPSS statistical package.

3. Results

In our study, total of 100 patients with Traumatic Brain Injury were included. Gender wise, the incidence of head injuries was 76(76%) among males and 24(24%) among females (Table 1). In this, 27(27%) were found to be normal scans and 73(73%) were found to be abnormal scans.

Table 1: Gender wise distribution.

Gender	Number	Percentage
Female	24	24
Male	76	76
Total	100	100

Table 2: Age wise distribution.

Age group	Total no. of patients	Percentage
1-10	17	17
11-20	16	16
21-30	25	25
31-40	20	20
41-50	12	12
51-60	7	7
61-80	3	3
Total	100	100

The most common age group affected was between 21-30 years followed by 31-40 years.

Head injury were evaluated. Contusions of brain were the commonest intracranial lesion noted in 48 patients (48%) and fractures were the commonest of all lesions accounting for 70 cases (70%). Other lesions which were seen on CT scan are cerebral edema 52 (52%), extradural hematoma 46 (46%), subdural hematoma 43 (43%), midline shift 38 (38%), subarachnoid haemorrhage 27 (27%), intra-parenchymal hematoma 20 (20%), and intraventricular haemorrhage 08 (8%), shear injury 8 (8%) and pneumocephalus 34 (34%).

Table 3: Symptoms wise distribution.

Symptoms	Total no. of patients	Percentage
Loss of consciousness	52	52
Headache	62	62
Bleeding from ear	9	9
Bleeding from nose	14	14
Bleeding from mouth	2	2
Vomiting	46	46
Seizures	10	10
Black eye	38	38

Presenting Symptoms: Headache was the most common clinical presentation (62%) followed by loss of consciousness (52%).

3.1. Distribuation of brain hemorrhage

Contusions and extradural hematoma were commonly observed in our case series followed by subdural hematoma % Subdural Hematoma 43 % subarachnoid hemorrhage. Intraventricular hemorrhage was least observed.

Table 4: Distribuation of brain hemorrhage.

Distribution of haemorrhages	Number	Percentage
Extradural hematoma	46	46
Subdural hematoma	43	43
Subarachnoid haemorrhage	27	27
Intraparenchymal haemorrhage	20	20
Intraventricular haemorrhage	8	8
Contusions	48	48

Intraventricular Hemorrhage: Intra-ventricular hemorrhage was found in 8 % patients of the total scans. Primary intraventricular hemorrhage was more commonly found in 63% cases. Dilatation of the ventricles (Hydrocephalus) was found in 25 % of the cases.

4. Discussion

Head injury is a frequent cause of death and Disability in developing countries like India. The incidence of TBI is increasing as traffic increases, besides other confounding factors such as industrialization, falls and ballistic trauma. CT facilitates a comprehensive diagnosis and targeted interventions.

The neuroradiology of head trauma has undergone dramatic changes since the advent of computed tomography, which has helped significantly to modify the timely management of head trauma.

Our study showed less than 13% were elderly (> 60 years) patients. The patients included in our study ranged from 1 year to 80 years of age. 45 % of affected patients were in the age group of 21-40 years and the elderly group comprised only 7 % of the total cases. Priyanka et al. also found similar result in their study.[9] Kumar et al. in 2008 evaluated 1699 patients and found that 54% patients in the age group of 21-40 years.[10] Venkata Ramanana Rao D, et al. found in his study the incidence of TBIs is common among 21 – 40 years (48.9%) age group followed by 41 – 60 years age group (28.3%) and < 20 years age group (11.7%). The incidence among the > 61 years age group was 11.2%.[11]

Headache was the most common clinical presentation (62%) in the patients of head injury in our study followed by loss of consciousness 52 % and vomiting in 46 %.%. In a study carried out by Bhandari et al. in 2010,[12] showed loss of consciousness as most common mode of presentation following head injury (66.7%), followed by vomiting (46.3%), basal fracture signs (26.3%), depressed fracture on palpation constituted about 7.8 % and in 3.1% cases seizures were the initial mode of presentation following head injury.[13] An another study Priyanka et al. found similar result in their study.[9]

Contusions were the most common intraparenchymal injury found in 48 %, followed by EDH in 46 % patients, followed by SDH and SAH which accounted for 43 % and 27 % respectively. Intraparenchymal hematoma was found in 20 % of patients and DAI in 13 %, intraventricular haemorrhage in 8 % and midline shift in 38 %. D Venkata Ramanana Rao D found in their study Among all intracranial traumatic lesions (ITL) the incidence of multiple ITLs (MICTL) were the most common [78 (35%)]. Next common ITLS were Contusions subarachnoid hemorrhage (CSH) [29 (13%)] followed by epidural hematomas (EDH) [20 (9%)], subdural hematomas (SDH) [15 (6.7%)], subarachnoid hematomas (SAH) [11 (4.9%)] and intra cerebral hematomas (ICH) [11 (4.9%)]. The incidence of fractures was 123 (52.5%) and the death rate was 12.6% (28).[14] Saini NS et al. did a study of 110 patients in 2010 and found extradural hematoma in 19%, subdural hematoma in 35 % and subarachnoid haemorrhage in 95%.[11]

5. Conclusion

As per the study findings, it was concluded that 21 – 40 years is the common age group prone for head injuries, incidence of head injuries was more in males than females. Parenchymal contusions, Subdural and extra dural hematoma were equally encountered findings in our study while subarachnoid haemorrhage was seen less frequently while intraventricula rhaemorrhage was rare.

6. Source of Funding

None.

7. Conflict of Interest

The author declares that there is no conflict of interest.

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