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Original Research Article

Role of Computed Tomography in the Diagnosis, Treatment and Prognosis of Patients with Traumatic Head Injury

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Abstract: ***Background:*** Traumatic brain injury is defined as damage to the brain caused by external mechanical forces such as: A. Sudden acceleration or deceleration, pressure wave or projectile penetration, resulting in temporary or permanent impairment of brain function. B. In a rapidly developing country like Bangladesh, urbanization and industrialization have led to an increase in road traffic, which is the main cause of head injuries due to road accidents. ***Objectives:*** To evaluate the prognostic importance of CT on the outcome of head injury patients. Observation of the sequential anatomical course of pathological processes in the brain response to head injury and correlation with Glasgow Coma Scale. ***Methods:*** This is a hospital study carried out in patients of head injury referred to the BSM Medical University Hospital from July 2022 to August 2023. Total 120 patients were included; incidence of head injuries was more in males than females. The study included patients with head and craniofacial trauma who underwent CT scans. Patients were examined with a dual-slice CT, Siemens Somatom Emotion Duo. A P value of less than 0.05 was considered statistically significant. ***Results:*** Total 120 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 58, followed by EDH in 52 patients, followed by SDH and SAH which accounted for 52 and 32 respectively. Intraparenchymal hematoma was found in 24 of patients and DAI in 16, intraventricular hemorrhage in 10 patients. ***Conclusion:*** 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.

Keywords: Computed Tomography, in The Diagnosis, Traumatic Head Injury.

INTRODUCTION

In numerous literatures the terms "head harm (HI) and demanding mind harm (TBI)" have getting used interchangeably. However, there are foundation to disagree or range in opinion [1]. The grading of the severity of head trauma performs a crucial function in acute affected person control and making plans a case-suitable follow-up protocol. In a

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swiftly growing united states along with Bangladesh, urbanization and industrialization is the vital purpose for accelerated avenue transportation this results in head accidents because of avenue visitors injuries [2]. Head harm is maximum not unusual place purpose of health center admission following trauma, and it's far related to long-time period morbidity and mortality. Cranio-cerebral accidents are maximum not unusual place purpose of health center admission following trauma, and it's far related to long-time period morbidity and mortality [3]. CT is the unmarried number one modality withinside the assessment of sufferers with acute head accidents. Most sufferers are young, wholesome individuals of the operating populace who're crucial to the financial system similarly to emotional burden of struggling for themselves and their families [4]. A paradigm shift during the last decade is perceptible; a feel of urgency for activate prognosis and neuroimaging evaluation of trauma is visible. Neurotrauma in the current scenario is not only identified, but evaluated and quantified. Previously, the mainstay of diagnosis of intracranial traumatic lesions was at best clinical evaluation, plain roentgenograms of skull, and cerebral angiography. 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 Bangladesh [5].-The accident rate of 101 per 1000 vehicles in Bangladesh is also amongst the highest in the world. Head CT has eased diagnosis and paved the way for classification of TBIs based on etiology, pattern of injury in correlation with pathoanatomical distribution, and CT scoring systems viz, Marshall CT score and Rotterdam CT score that have aided in prognosticating outcomes in neurotrauma [6]. The number one purpose in treating sufferers with craniocerebral trauma because of any purpose is to keep the affected person`s lifestyles and final neurological function. Optimal control of those sufferers relies upon on early and accurate prognosis and consequently neuroimaging has a crucial function [7]. The total number of fatalities due to road traffic accidents has increased at an average rate of about 8% per year since 2003 [7, 8]. Conventional CT is extra available, cost-effective, calls for shorter imaging time and clean to carry out on sufferers on ventilator support, in traction, or agitated is the preliminary imaging modality of preference at some stage in the primary 24 h after the harm [9-11]. With these, a have a look at turned into taken to have a look at the numerous medical-radiological styles of head accidents and additionally to correlate the CT functions with medical operative findings.

MATERIAL AND METHODS

This is a hospital study carried out in patients of head injury referred to the BSM Medical University Hospital from July 2022 to August 2023. 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.

RESULTS

In our study, total of 120 patients with Traumatic Brain Injury were included. Gender wise, the incidence of head injuries was 91 (75.8%) among males and 29(24.2%) among females (Table 1). The most common age group affected was between 21-30 years followed by 31-40 years. In this, 32 (2.6%) were found to be normal scans and 88 (73.4%) were found to be abnormal scans.

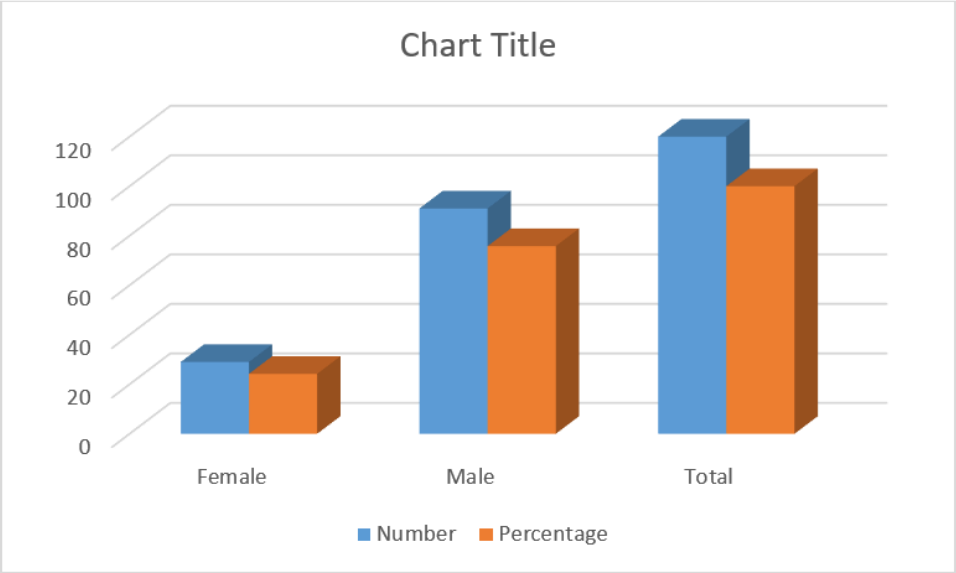

Fig-1: Gender wise distribution

Table 1: Age wise distribution

Age group	Total no. of patients	Percentage
1-10	20	16.6
11-20	19	15.8
21-30	30	25
31-40	24	20
41-50	14	11.6
51-60	8	6.6
61-80	5	4.1
Total	120	100

Head injury were evaluated. Contusions of brain were the commonest intracranial lesion noted in 58 patients (48.3%) and fractures were the commonest of all lesions accounting for 84 cases (84.0%). Other lesions which were seen on CT scan are cerebral edema 62 (51.6%), extradural hematoma 55 (45.8%), subdural hematoma 52 (43.3%), midline shift 46 (38.3%), subarachnoid haemorrhage 32 (26.6%), intra-parenchymal hematoma 24 (20%), and intraventricular haemorrhage 10 (8.3%), shear injury 10 (8.3%) and pneumocephalus 41 (34.1%).

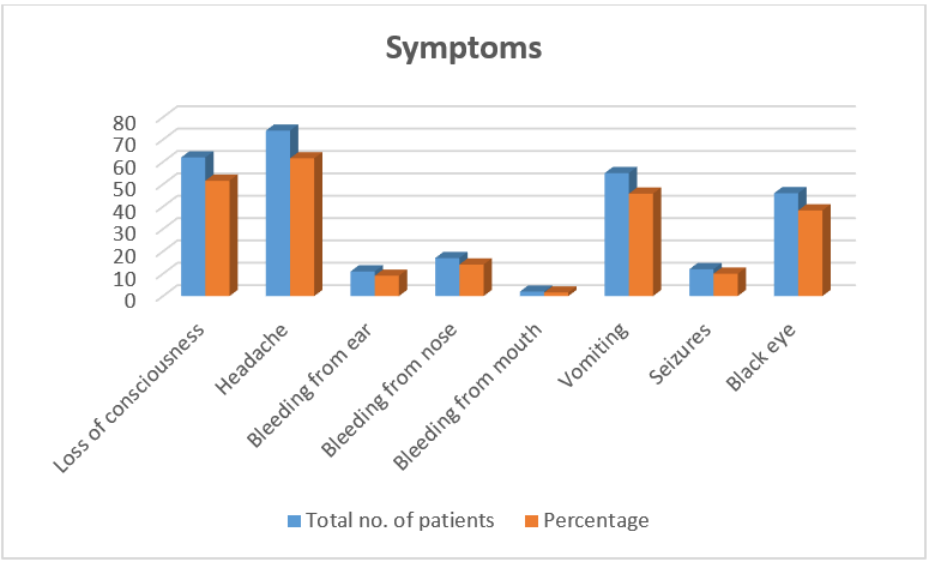

Table 2: Symptoms wise distribution

Presenting Symptoms: Headache was the most common clinical presentation (61.6%) followed by loss of consciousness (51.6%).

Distribution of brain hemorrhage: Contusions and extradural hematoma were commonly observed in our case series followed by subdural hematoma 26.6% Subdural Hematoma 43.3 % subarachnoid hemorrhage. Intraventricular hemorrhage was least observed.

Table 2: Distribution of brain hemorrhage

Distribution of haemorrhages	Number	Percentage
Extradural hematoma	55	45.8
Subdural hematoma	52	43.3
Subarachnoid haemorrhage	32	26.6
Intraparenchymal haemorrhage	24	20
Intraventricular haemorrhage	10	8.3
Contusions	58	48.3

Intraventricular Hemorrhage: Intra-ventricular hemorrhage was found in 8.3% patients of the total scans. Primary intraventricular hemorrhage was more commonly found in 63.3% cases. Dilatation of the ventricles (Hydrocephalus) was found in 25 % of the cases.

DISCUSSION

CT was used as the primary imaging modality for all cases of post-traumatic injury. Because clinical conditions can deteriorate rapidly after traumatic head injury, early diagnosis can help make timely and effective treatment decisions [9-12]. Due to its rapidity, easy access, cost-effectiveness, and high sensitivity for hemorrhage detection, patient outcomes and mortality are primarily planned based on CT findings [13]. The definition of mild and severe head trauma has been problematic. Marshall *et al.,* compiled various CT imaging features and proposed a classification system to organize and group traumatic brain injury patients [14]. This system allows identification of patients at risk of deterioration due to intracranial hypertension, allowing for the possibility of early intervention. However, SAH secondary to trauma was not considered as a factor in patient classification in this scoring system. In developing countries such as Bangladesh, head trauma is a common cause of death and disability. The incidence of traumatic brain injury increases with increasing traffic volume, among other confounding factors such as industrialization, falls, and ballistic trauma. CT allows comprehensive diagnosis and targeted intervention. Neuroradiology in head trauma has undergone dramatic changes since the introduction of computed tomography, which has contributed greatly to changes in the timely treatment of head trauma. Our study showed less than 13.3% 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 6.6% of the total cases. Priyanka *et al.,* also found similar result in their study [12]. Kumar *et al.,* in 2008 evaluated 1699 patients and found that 54.1% patients in the age group of 21-40 years [13]. 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% [15]. Headache was the most common clinical presentation (61.6%) in the patients of head injury in our study followed by loss of consciousness 51.6 % and vomiting in 45.8 %. In a study carried out by Bhandari *et al.,* in 2010 [16], 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 [17]. An another study Priyanka *et al.,* found similar result in their study [12]. Contusions were the most common intraparenchymal injury found in 48.3 %, followed by EDH in 45.8 % patients, followed by SDH and SAH which accounted for 43.3% and 26.6 % respectively. Intraparenchymal hematoma was found in 20 % of patients and DAI in 13.3 %, intraventricular haemorrhage in 8.3 % and midline shift in 38.3 %. 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) [18]. 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% [15]. This study has been performed on a small set of patients. This

may be attributed to a large number of patients being referred for surgical intervention and thus being excluded from the study. Also, the Glasgow Coma Scale (GCS) scores and Rotterdam CT scores were not correlated. We included patients who had no surgical intervention after the first CT and most cases with severe traumatic brain injury were excluded. As our institute is not a primary trauma care center, input of total cases on average is lesser as compared to corresponding designated primary trauma care centers catering to this area. Thus, further validation of the study on larger and more diverse populations in varied tiers of health care institutions in order to produce a general consensus is warranted.

CONCLUSION

Our findings showed that the most common age group for head trauma was 21 to 40 years old, with men suffering from head trauma more frequently than women. In our study, parenchymal contusions and subdural and epidural hematomas were similarly observed, but subarachnoid hemorrhage was less common and intraventricular hemorrhage was rare.

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