Original Research Article

Role of CT scan in the management of head injury patients at tertiary health care centre

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Abstract

Background: Neuroimaging is fundamental to the diagnosis and management of patients with traumatic brain injury. Cranial computed tomography (CT) has been established as an accurate diagnostic modality in neuroradiology. **Aim:** To evaluate the role of CT in patients sustaining head injury and to emphasize its importance in the management of the patients with head injury. **Material and Methods:** A total number of 150 patients within 48 hours presenting with head injury were included in the study. Clinical evaluation of the patients was done on presentation and patient was assigned a Glasgow Coma Score (GCS). CT was obtained in all these patients. **Results:** Abnormal scans were present in 100% of patients with a GCS score of 3–8, 96.55% in patients with a GCS score of 9–12 and 35.78% of patients with a GCS score of 13–15.CT scan should be mandatory in patients with GCS score of 13 and 14.Patients with GCS score of 15 with normal mental status and no neurological deficit should be treated by observations alone. **Conclusion:** The good correlation of CT findings with clinical manifestations and GCS justify the use of CT in head trauma.
Key Words: Head injury, Glasgow Coma Score, CT scan, management.

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Received Date: 16/10/2017 Revised Date: 27/11/2017 Accepted Date: 08/12/2017
DOI: https://doi.org/10.26611/1004122

Access this article online

Quick Response Code:

Website: www.medpulse.in

Accessed Date: 10 December 2017

INTRODUCTION

The constant increase in high velocity accidents and violence over the past decade has made the matter of acute head trauma one of the prime importance in today's medical practice. Head injury is considered as a major health problem that is a frequent cause of death and disability.[1] Neuroimaging is fundamental to the diagnosis and management of patients with traumatic brain injury. Cranial computed tomography (CT) has been established as an accurate diagnostic modality in neuroradiology. It remains the mainstay for initial diagnostic evaluation of head trauma patients. The fast examination time, lack of contraindications and high accuracy for detecting hemorrhages have made CT the diagnostic study of choice for initial evaluation of head injury. Moreover, it provides a more accurate picture of intracranial lesion secondary to head trauma than any other diagnostic procedure.[2] The purpose of thepresent study was to evaluate the role of CT in patients sustaining head injury and to emphasize its importance in the management of the patients with head injury.

MATERIAL AND METHODS

A total number of 150 patients presenting with head injury in the emergency to the Department of Radio Diagnosis, Assam Medical College and Hospital, Dibrugarh, over a period of one year. Only those patients who presented within 48 hours of sustaining the head injury were included in the study. Prior to the study, ethical approval from the Institutional Ethical Committee was taken. Informed consent was also taken for all the patients involved in the study. Clinical evaluation of the patients was done on presentation and patient was assigned a Glasgow Coma Score (GCS) by responses to graded stimulation of three simple, standardized, neurological function test. Computerized tomography was obtained in all these patients. The equipment used for computerized tomography was Model SOMATOM AR

TX SCANNER (SIEMENS), a third generation scanner. The parameters used were a 512 x 512 matrix, 130 KV, 70 mA, and an acquisition time of 3 seconds. The images were viewed in both soft tissue and bone algorithm Pictures were obtained with use of centers and windows that were optimal for ensuring brain and bone details. Diagnosis were made according to standardized radiological criteria. The scans were reviewed by two senior Radiologists to prevent interpretive errors.

RESULTS

A total of 150 patients who sustained head injury were analysed. 136 patients (90.67%) were male and the remaining 14 (9.33%) were females (Sex ratio M: F = 9.7:1). The highest frequency of head trauma occurred in the 21-30 years age group (34%).The commonest mode of injury were road traffic accidents (56.67%) followed by fall from height (28.57%) in children and 23.77% cases in adults. There was a good correlation between the clinical manifestations and gross lesions identified on CT scan. The number and intensity of tissue abnormalities on CT scans increased proportionately with the severity of clinical signs and symptoms. However, no variable either alone or in combination could predict the severity of head trauma on CT (Table 1).

Table 1: Clinical presentations in relation to CT scan findings

Clinical feature	Frequency	Abnormal CT scan	Percentage
Loss of consciousness	94	56	59.57%
Convulsions	03	03	100%
Lucid interval	13	13	100%
Orofacial Bleed	31	22	70.97%
CSF leakage	02	02	100%
Tachycardia	36	23	63.89%
Bradycardia	18	14	77.78%
Hypotension	05	03	60%
Hypertension	25	18	72%
Normal breathing	99	50	50.5%
Tachypnea	38	28	73.68%
Cheyne-Stroke breathing	13	10	76.92%
	80	23	28.75%
Normal pupil	70	65	92.86%
Abnormal pupil			

Abnormal scans were present in 100% of patients with a GCS score of 3–8, 96.55% in patients with a GCS score of 9–12 and 35.78% of patients with a GCS score of 13–15.

Table 2: Distribution of CT findings in relation to GCS

GCS	Normal CT	Relevant positive CT	Total
3-8	-	26	26
9-12	1	28	29
13-15	61	34	95
Total	**62**	**88**	**150**

The GCS score correlated well with the CT findings, lower the GCS score higher the frequency of abnormal entities on CT scan. Patients with GCS scores of 13 to 14 had abnormal scans in 87.5% and 80% cases respectively. Therefore, CT scan should be mandatory in patients with GCS score of 13 and 14. Patients in moderate grade (GCS score 9–12) and severe grade (GCS score 3–8) had a relevant positive scans in 96.55% and 100% respectively. Mild Head Injury (MHI) accounted for a large proportion of cases of head injury (63.34%). Most patients with MHIs (67.37%) had GCS score of 15. Only 8 of the 64 patients with GCS score of 15 had a relevant positive scan, of which 2 were EDHs and the rest were insignificant lesions which had low implication in prognosis and further management. The omission of CT in each of these 6 patients would not have led to any untoward sequelae. Both the patients with EDHs had focal deficits. Patients with GCS score of 15 with normal mental status and no neurological deficit should be treated by observations alone, which will result in proper equipment use and will reduce the financial burden on the hospital administration as well as to the patient. Close clinical observation in a well-staffed setting is advisable to detect change in GCS score to guide the decision regarding further management.

DISCUSSION

Cranial trauma is consequently a source of major disability and a huge financial and psychological burden upon society. Neuroimaging is fundamental to the diagnosis and management of patients with traumatic brain injury (TBI). Majority of patients found to be in third decade of life. This age group is the most active groups of society who spend most of their time out of their houses for work and to earn the livelihood are more prone to accidents. The male: female ratio of 9.7:1 observed. The reason for male predominance is that males move out of their homes more frequently and are more actively working outdoors than females. The commonest mode of injury in the present study in both adults and children was road traffic accidents (56.67%). A study in Ghana and another in Nigeria showed road traffic accidents were the commonest causes of head injury.[3] Loss of consciousness (LOC) was the most common clinical presentation in patients with head injury which was similar to the study done by Bhandari *et al*[4] and Agrawal *et al*.[5]LOC for variable time length was observed in 62.67% patients. A relevant positive scan was present in 59.57% of these patients. Kelly *et al*[6] reported that 33 of the 36 patients with a minor injury with or without LOC for up to 5 minutes demonstrated no identifiable abnormality on either CT or MR. In the present study a good correlation was found between the

clinical manifestations and gross lesions identified on CT scans. However, no variable either alone or in combination could predict the severity of head lesion on CT. This is consistent with the observation made by Livingston *et al* that no variable alone or in combination could reliably discriminate between patients who would have a negative or positive scan.Studies in Brazil, presented positive CT findings in a quarter of cases mild head trauma[7] while in Ghana the proportion nearly half of the mild head injury cases with positive CT findings.[8] A study in Nigeria,[3] patients with moderate to severe head injury showed abnormal CT findings in 87 % patients. Use of routine serial head CT in patients without neurologic deterioration is not supported by the findings of Brown *et al*.[9] It is generally accepted that a subset of patients are likely to benefit from repeat CT scan. As a rule, patients showing clinical worsening are subject to CT scan. Frequent use of CT scan at the hands of clinicians for evaluation patients of head Injury has posed two questions, viz. cost effectiveness and other if it is really necessary to expose all the patients of mild head injury to CT. The good correlation of CT findings with clinical manifestations and GCS justify the use of CT in head trauma. However, it should be performed only when clinically necessary which helps to reduce cost and avoids unnecessary exposure to radiation.

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Source of Support: None Declared
Conflict of Interest: None Declared