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Original Research Article

STUDY OF COMPUTERIZED TOMOGRAPHY BRAIN SCAN IN PATIENTS WITH TRAUMATIC HEAD INJURY

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Abstract

Background: Traumatic brain injury (TBI) was classified to mild, moderate or severe depending on the level of patient's consciousness and neurologic functioning levels. The Glasgow Coma Scale (GCS) always used scale to determine the severity. The good eye opening response, verbal response and the motor responses, determine the score on a scale of 3- 15 (EMV-score). The sum of the numeric scores of each of the categories is the represented score. Also, the score can be documented by the individual components.

Objectives of this study: The objective of the study is to find to assess the CT brain scan findings with clinical sequele in mild traumatic head injury patients presented to our tertiary care hospital.

Materials and Methods: All patients referred for CT scan in the department of Radiodiagnosis, included those patients presented with mild head injury (GCS 13-15 with history of loss of consciousness, vomiting, headache, amnesia, focal neurological deficits). Mild head injury with History of coagulopathy, drug or alcohol consumption, previous neurosurgical procedures, pre-trauma epilepsy. Patients with GCS <13 and multiple trauma were excluded. Radiological investigations: Plain X-ray for skull [(linear or depressed fracture), chest, cervical , dorsal , lumbar spine and others], Computed tomography of the spine If there is suspicious lesion in plain X-ray imaging, CT brain to define intracranial pathologies and skull fractures.

Results & Discussion: In the present study, we included 60 mild traumatic brain injury patients (GCS 13-15) of both the gender. Out of 60, males were 46 (76.6%) and females were 14 (23.33%). The mean age in the patients were 26.62±9.87 years. Patients presented with only headache were 42 (70%), Nausea and Vomiting were 4 (6.66%), headache, nausea and vomiting were 7 (11.66%) and Headache, Nausea, Vomiting & Loss of Consciousness were 16 (26.66%). The causes for TBI

included road traffic accidents accounting for 63.33%, fulling dawn 23.33% and direct head injury accounted for 13.33%. The clinical sequel shows that 2 patients had CSF leak, 1 patient had FND and 1 patient had abnormal pupils. CT findings in these patients showed 3 had skull fractures, 3 had contusion, 2 had epidural hemorrhage, 2 had subarachnoid hemorrhage and 45 patients had negative CT findings. 8.33% had positive CT findings and they required emergency surgical intervention.

Conclusion: In the present study CT findings in traumatic brain injury patients showed 3 had skull fractures, 3 had contusion, 2 had epidural hemorrhage, 2 had subarachnoid hemorrhage and 45 patients had negative CT findings. 8.33% had positive CT findings and they required emergency surgical intervention.

Key-words: computerized tomography, mild traumatic head injury, road traffic accidents & Glasgow coma scale.

INTRODUCTION

Traumatic brain injury (TBI) was classified to mild, moderate or severe depending on the level of patient's consciousness and neurologic functioning levels. The Glasgow Coma Scale (GCS) always used scale to determine the severity. The good eye opening response, verbal response and the motor responses, determine the score on a scale of 3- 15 (EMV-score). The sum of the numeric scores of each of the categories is the represented score. Also, the score can be documented by the individual components. The patient with a Glasgow Coma Score of 15 could be documented as E4-M6-V5, while the intubated patient would be scored as E4-M6- Vtube. A TBI with a GCS of 13-15 considered a mild TBI, 9-12 considered a moderate TBI while 3-8 considered a severe TBI. The GCS has limited ability for outcome prediction. The motor response considered the significant outcome predictor. Many classifications for the severity of injury including the loss of consciousness (LOC) and the duration of post-traumatic amnesia (PTA). The PTA reflects the overall severity of injury[1].

The TBI severity determined by the speed, nature and location of the impact, in addition to complications like hypoxemia, intracranial hemorrhage hypotension, or the increase of intracranial pressure, which may cause secondary injury, hours or days after the trauma [2].

Studies find individuals with mild head injuries have abnormal findings in CT scans 10-20% of the time [3].

CT imaging is typically used as a day-of-injury assessment tool and has a categorical rating similar to a Glasgow Coma Scale (GCS). However, these scores from brain imaging do not correlate to long-term neuropsychological outcomes due to the fact that they are not sensitive enough to detect microscopic changes in the CNS[4].

Just as important, the lack of sensitivity of CT imaging detecting mild damage could be a function of the type of injury within mTBI. As described before, mild TBI is usually associated with a brief

loss of consciousness (LOC) which is referred to as uncomplicated mTBI. When this LOC is brief with the presence of a space-occupying lesion, however, this is referred to as mild-complicated TBI. Some research has shown that patients with complicated mTBI will perform worse on the neuropsychological test than uncomplicated mTBI patients [5].

OBJECTIVES OF THE STUDY:

The objective of the study is to find to assess the CT brain scan findings with clinical sequele in mild traumatic head injury patients presented to our tertiary care hospital.

MATERIALS AND METHODS

Study site

This study was conducted at the Department of Imaging, at our tertiary care hospital.

Study population

Patients presented with mild traumatic head injury (GCS 13-15) referred to the radiology department for CT scan.

Study design

Observational cross-sectional Study

Inclusion Criteria

All patients referred for CT scan in the department of Radiodiagnosis, included those patients presented with mild head injury (GCS 13-15 with history of loss of consciousness, vomiting, headache, amnesia, focal neurological deficits). Mild head injury with History of coagulopathy, drug or alcohol consumption, previous neurosurgical procedures, pre-trauma epilepsy.

Exclusion Criteria: Patients with GCS <13 and multiple trauma.
All subjects in the study were subjected to full history taking, clinical examination and CT scan brain.

Technique and Tools

- With prior informed & written consent procedure were explained to the patient.
- Detailed clinical history along with clinical examination findings was recorded.
- Thorough GPE and Neurological examination was done.
- Radiological investigations: **Plain X-ray** for skull [(linear or depressed fracture), chest, cervical , dorsal , lumbar spine and others], **Computed tomography of the spine** If there is suspicious lesion in plain X-ray imaging, **CT brain** to define intracranial pathologies and skull fractures.

Statistical Analysis

Statistical evaluation was performed by statistical package for the social sciences (SPSS) version 17. Data was presented as tables, bar diagrams and pie charts. For continuous variables, mean ± standard deviation was given, and if the data was skewed, then median was given. For statistical calculations, Student's independent sample two-tailed t-test and chi square test was used. A p value <0.05 was considered statistically significant.

RESULTS

This study includes mild traumatic brain injury patients (no=60) patients who came in the department of radio diagnosis, of our tertiary care hospital for CT brain scan.

Table 1: Shows demographic and clinical presentation of study subjects

Variables	Number of Patients 60
Age (years)	26.62±9.87
Males	46 (76.6%)
Females	14 (23.33%)
Headache only	42 (70%)
Nausea & Vomiting	4 (6.66%)
Headache, Nausea & Vomiting	7 (11.66%)
Headache, Nausea, Vomiting & Loss of Consciousness	16 (26.66%)

Table 2: Causes of TBI in the subjects studied

Variables	Number of Patients 60
RTA	38 (63.33%)
Fulling dawn	14 (23.33%)
Direct head injury	8 (13.33%)

Table 3: Clinical Examination & CT findings of the subjects studied

Variables	Number of Patients 60
CSF leak	2 (3.33%)
FND	1 (1.66%)
Abnormal pupils	1 (1.66%)
Positive CT findings	5 (8.33%)
Skull fractures	3 (5%)
Contusion	3 (5%)
Epidural hemorrhage	2 (3.33%)
Subarachnoid hemorrhage	2 (3.33%)
Negative CT findings	45 (75%)

DISCUSSION:

In the present study, we included 60 mild traumatic brain injury patients (GCS 13-15) of both the gender. Out of 60, males were 46 (76.6%) and females were 14 (23.33%). The mean age in the patients were 26.62±9.87 years. Patients presented with only headache were 42 (70%), Nausea and

Vomiting were 4 (6.66%), headache, nausea and vomiting were 7 (11.66%) and Headache, Nausea, Vomiting & Loss of Consciousness were 16 (26.66%). The causes for TBI included road traffic accidents accounting for 63.33%, fulling dawn 23.33% and direct head injury accounted for 13.33%. The clinical sequel shows that 2 patients had CSF leak, 1 patient had FND and 1 patient had abnormal pupils. CT findings in these patients showed 3 had skull fractures, 3 had contusion, 2 had epidural hemorrhage, 2 had subarachnoid hemorrhage and 45 patients had negative CT findings. 8.33% had positive CT findings and they required emergency surgical intervention.

Demographically, our results were in agreement with Taha and Barakat [6], they examined 1756 patients with traumatic head injury, in which the males were (82.7%) and the females were (17.3%) with a mean age of 26.57 ± 18.4 years.

A study of Haydel et al. [7], who examined and scanned a mild head injury patients were at emergency unit to find intracranial injuries. 78.2% of patients were males and (21%) were females, their age ranged between 6 to 85.

Comper et al. [8] reported that age more than 60 years is high-risk factor in patients with minor head injury. But, there is no specific age in which the risk suddenly increases. The underlying pattern of a gradual progressive increase in intracranial complications, and became notable and clinically relevant over 60 years of age.

In our study most of the patient's age below 60 being the oldest one was 55 years. Patient with positive CT findings, their median age were 18.0 ranging from 1.0 to 45.0.

In another study by Lagares et al. [9] who found that (35.5%) patients suffered from fall, (22.8%) had a direct head blow, (5.3%) were pedestrians and (36.4%) motor vehicle accident.

A study of Langlois et al. [10], revealed that the four main causes of TBI were falls, motor vehicle accidents (MVA), struck by/against events, and assaults. the fall is a major cause of head injury 28% ,then MVA 20% and assault by 11%,struck by 19% and other 22% .

Hsiang et al. [11] reported a high correlation between headache and mild head injury. Nausea and vomiting are however non-specific symptoms that may, for example, be associated with intoxication and substance abuse rather than as a direct consequence of head injury. In our study, patients with significant findings on CT also reported a higher incidence of vomiting (15%) and headache (21%) than those with insignificant or negative CT finding..

A study of Willer et al. [12]. reported that a headache and vomiting was significantly (p, 0.001) in relation to the occurrence of subsequent clinical deterioration in patients with a GCS of 15 on hospital admission.

In our study, headache was associated with positive CT findings in 28.6% of patients with a P value of 0.03 which is significant, but nausea and vomiting seen with positive CT in 14.3% which is insignificant.

In the study of Saboori et al. [13], the recording of “questionable” LOC/amnesia was not correlated with a higher incidence of abnormalities on CT scans. It is recognized that patients without LOC but with a skull fracture may develop an epidural hematoma. Moreover, in children, an epidural hematoma can develop in the absence of either LOC or skull fracture.

The current study, the occurrence of LOC is associated with nausea and vomiting in (24.0%) with p value 0.3 which is insignificant to positive CT brain.

Our findings in the current study revealed that out of 9.3% of the participants who had positive CT findings, the skull fractures were 43% then contusion by 32% and Epidural hemorrhage by 21.5%

and least one was Subarachnoid hemorrhage by10.7%. none of the participants in our current study had subdural hemorrhage.
A meta-analysis study of Geijerstam and Britton [14] revealed that the most frequent CT findings were (based on 11) studies that differentiated the pathological findings: Skull fracture (3.2%), intracranial haemorrhage/ contusion (2.8%), subdural- (1.3%), epidural- (1.0%) and subarachnoid haemorrhage (1.0%).

CONCLUSION:

In the present study CT findings in traumatic brain injury patients showed 3 had skull fractures, 3 had contusion, 2 had epidural hemorrhage, 2 had subarachnoid hemorrhage and 45 patients had negative CT findings. 8.33% had positive CT findings and they required emergency surgical intervention.

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