Section: Emergency Medicine

Original Research Article

A PROSPECTIVE STUDY ON ROAD TRAFFIC ACCIDENTS WITH CRANIO CEREBRAL INJURY AND CORRELATION BETWEEN NON-CONTRAST COMPUTED TOMOGRAPHY FINDINGS AND GLASGOW COMA SCALE

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Received : 10/01/2024
Received in revised form : 22/02/2024
Accepted : 07/03/2024

Keywords:
Glasgow Coma Scale, traumatic brain injury, road traffic accident, computed tomography.

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DOI: 10.47009/jamp.2024.6.2.236

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (2); 1181-1183

Abstract

Background: Head injuries are a major global healthcare issue. Traumatic brain injury (TBI), commonly known as craniocerebral trauma, is a major cause of death and disability among young adults, with half of the cases resulting in unfavourable outcomes. This study aimed to identify the correlation between non-contrast computed tomography (CT) findings and the Glasgow Coma Scale (GCS) in assessing craniocerebral trauma. **Materials and Methods:** This observational prospective study included 50 patients with acute (less than 24 hours) craniocerebral trauma over a period of one year at the Government Erode Medical College. The patient's level of consciousness was determined using the Glasgow Coma Scale (GCS), and a brain CT scan without contrast media was performed. **Result:** The majority of the population belonged to males, accounting for 76% (n = 38), and females accounted for 24% (n = 12). It has been found that the major causes of head injuries are road traffic accidents, followed by fall injuries. The distribution of patients according to consciousness level was 54% with mild TBI (GCS score 12–14), 28% with moderate TBI (GCS score 11–8), and 18% with severe TBI (GCS score less than 7). **Conclusion:** This study found that the prevalence of road traffic accidents was higher than that of other causes of cerebral injury. Using the GCS and CT together increases the chances of assessing the severity of the risk for the patients, which helps in making clinical decisions about their treatment plan.

INTRODUCTION

Head injuries are a major global healthcare issue. They are the third leading cause of death in certain age groups, after cancer and cardiovascular diseases. Many Asian countries have higher rates of traumatic brain injuries (TBI) as a result of increased urbanisation, motorisation, and economic liberation.[1] A head injury is a major cause of death and disability among young adults, with half of the cases ending in unfavourable outcomes. Trauma resulting from road traffic accidents (RTA) is a significant contributor to head injuries and accounts for 70% of brain injury-related deaths. Most patients with severe injuries survive with severe morbidity, whereas a small minority remain in a vegetative state. Poor results are correlated with advancing age.[2]

Traumatic brain injury (TBI), commonly known as craniocerebral trauma, can lead to financial hardship for the patient, their family, and society as a whole because of the high cost of care and, in certain situations, the patient's inability to return to work. In the developed world, there are many studies focusing on TBI that measure various aspects of the condition, including incidence, imaging, treatment, outcome, and quality of life after treatment.[3] As a crucial component of the diagnostic toolkit for head injuries, brain CT is still the method of choice for evaluating head trauma. This is also known as neurocranial imaging. It is easily accessible in the majority of hospitals and is essential for prompt diagnosis.[4]

Long-used in clinical settings, the Glasgow Coma Scale (GCS) allows quick classification of traumatic brain injury (TBI) as mild, moderate, or severe based only on physical examination findings, eliminating the need for specialized tools. The traditional classification of traumatic brain injury is performed using the GCS. GCS scores range from 13 to 15 for mild brain injuries, 9–12 for moderate injuries, and

ISSN (O): 2687-5365; ISSN (P): 2753-6556

3–8 for severe injuries.[5] Blood clotting in intracranial tissues causes stroke, which in turn causes intracerebral haemorrhage. Most patients with hypertension also experience hypertension. The GCS is the first criterion used to gauge the severity of head injury. It is not advisable to use GCS alone to evaluate brain injuries; instead, it should be used in conjunction with CT scanning.[6]

Aim

This study aimed to identify the correlation between non-contrast computed tomography (CT) findings and the Glasgow Coma Scale (GCS) in assessing craniocerebral trauma.

MATERIALS AND METHODS

An observational prospective study was performed on 50 patients with acute (less than 24 h) craniocerebral trauma for one year at the Government Erode Medical College. The study was approved by the institutional ethics committee before initiation, and informed consent was obtained from all patients.

Inclusion Criteria

Patients aged 1–75 years who were involved in recent accidents with suspected brain injuries and had undergone both CT imaging and GCS assessment were included.

Exclusion Criteria

Patients with pre-existing neurological conditions, severe multisystem trauma requiring immediate surgery, recent brain injuries, incomplete medical records, or unwillingness or inability to provide informed consent were excluded.

The patient's level of consciousness was determined using the Glasgow Coma Scale (GCS), and a brain CT scan without contrast media was performed. A sixth-generation General Electric (GE) CT scan was utilised, and 5 mm and 10 mm sections were obtained for the infratentorial and supratentorial parts, respectively.

Statistical Analysis

The data collected during the study were formulated into a master chart using Microsoft Office Excel and statistical analyses were performed using the statistical software package SPSS V.17 for Windows.

RESULTS

Of the 50 patients in the study, the mean age was 35.5 ± 21.5, in the age range from 1 to 75 years. The majority of the population belonged to males, 76% (n = 38), and females, 24% (n = 12), with a male-female ratio of 3.1:1. [Table 1]

In analysing the causes of head injuries, it was found that the major causes of head injuries are road traffic accidents, which account for 60% of the total causes of head injuries, followed by fall injuries, which account for 20%, and physical assault and pedestrian injuries, which account for 12% and 8% of the causes, respectively. [Table 2]

On assessing the patients' consciousness levels using the Glasgow Coma Scale (GCS), and traumatic brain injury was assessed with a CT scan, the persons whose score was between 12 and 14 on the GCS were considered to have mild traumatic brain injury (TBI), which was found in 54% of the population; the patients who had GCS scores between 8 and 11 were considered to have moderate TBI, which was found in 28% of the population; and patients with a GCS score below 7 were found in 7% of the patients. [Table 3]

Table 1: Demographic details of the study

Age range (years)	1 - 75	
Mean age (±SD)	35.5 ± 21.5	
Gender	Male	Female
	38 (76%)	12(24%)
Male-Female Ratio	3.1:1	

Table 2: Causes of head injury

Causes	**Percentage**
Road traffic accident	60%
Fall injury	20%
Physical assault	12%
Pedestrian injuries	8%

Table 3: Distribution of patients based on patients' consciousness levels (GCS)

Consciousness levels	**Percentage of patients**
Mild TBI (GCS 12-14)	54%
Moderate TBI (GCS 8 – 11)	28%
Severe TBI (GCS <7)	18%

DISCUSSION

The present study demonstrated a correlation between non-contrast computed tomography findings and Glasgow coma scale assessment. Given the high mortality associated with craniocerebral lesions and the fact that early diagnosis and treatment will significantly reduce complications, it is critical to determine the accurate and prompt presence of these lesions in acute head trauma cases. Computed tomography (CT) scanning is currently the main modality for evaluating patients with acute head trauma. The patient's initial GCS score plays a

ISSN (O): 2687-5365; ISSN (P): 2753-6556

significant role in determining the course of treatment and potential long-term complications.

Our study shows traumatic head injuries are more common in males than females, with a male-female ratio of 3.1:1. In assessing the causes of traumatic head injury, more than half of the cases were due to road traffic accidents (RTA) (60%). The distribution of patients according to consciousness level was 54% with mild TBI (GCS score 12–14), 28% with moderate TBI (GCS score 11–8), and 18% with severe TBI (GCS score < 7). Thus, we found that traumatic brain injuries were associated with GCS score.

The results of CT scans and the way they relate to GCS scores are particularly significant for treatable lesions, such as brain herniations, EDH, cerebral oedema, mass effects, and midline shifts. Agarwal et al. found in their study of 120 patients that twenty per cent had severe TBI (GCS score ≤ 7), 25% had moderate TBI (GCS score 11–14), and five per cent had mild TBI (GCS score 12–14). Their study identified a greater proportion of CT findings in correlation with low GCS scores, which were deemed to be a risk factor for severity.[7]

Hannan et al, in their analysis of 138 patients, they found that the GCS scoring system alone was insufficient to evaluate brain injury; as such, it should be used in conjunction with other systems, such as the CT scan-based traumatic brain injury classification system, which has demonstrated that both the GCS at admission and the CT scan are highly significant predictors of clinical outcome.[8] Walle et al. discovered in their study of 237 patients that using a CT scan in addition to the Glasgow Coma Scale increases the accuracy of assessing the severity of head injuries.[9]

Angoro et al. 's study of 192 patients found that 50% of the subjects had moderate brain injuries. Moreover, he discovered that GCS was a predictor of the severity of CT scan findings and that CT was an accurate diagnostic tool in the assessment of head trauma.[10] Our study showed the importance of the association between non-contrast computed tomography findings and the Glasgow coma scale in assessing traumatic head injuries.

CONCLUSION

This study found that the prevalence of road traffic accidents was higher than that of other causes of cerebral injury. Using the GCS and CT together increases the chances of assessing the severity of the risk for the patients, which helps in making clinical decisions about their treatment plan.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556