Correlation of Glassgow coma scale score and CT brain findings in patients of head injury

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Abstract

Background and objectives: Head injuries contributes to most death in a trauma fatalities and extent of it could be assessed by both glassscow coma scale and ct scan of brain depends on which type and time of intervention is decided .

Material and Methods: It is a prospective observational study done at vadilalsarabhai general hospital in 108 patients of head injuryin consideration of history, general examinations,glassgow coma scale and CT brain findings from 1st January,2018 to 31st January 2018.

Results: Amongst the 108patients evaluated 101 had mild injury on Glasgow coma scale. 3 had moderate injury on Glasgow coma scale. 4 had severe injury on the Glasgow coma scale.Amongst the patients with mild injury 30 patients had significant CT scan findings. Amongst the patients with moderate injury 2 had significant CTscan findings. Amongst the patients with severe injury all of them had significant CT scan findings.P value was calculated using chi square test and was found to be significant with a value of more than 0.05.

Conclusion: In the study conducted correlating GCS score and CT scan findings it was observed that the male population was the most commonly involved with road traffic accidents being the most common etiology.While most of the patients presented with mild traumatic brain injury,even amongst those with a GCS score of 15 significant CT scan findings were observed.This points to the need of radiographic evaluation of all patients of head trauma it.While Glasgow Coma Scale remains the mainstay of clinical evaluation it necessitates the need of radiographic evidence to backup the clinical evaluation for urgent care and management of head trauma. While studies aimed at judicious use of CT Scan to avoid unnecessary radiation exposure are done it has to be emphasised that radiographic evidence is essential for the management of head trauma until such a time is there where in other blood tests and clinical tests are available that aid in the early diagnosis andmanagement of the same.

Key Words: Head Injury, GCS, CT Scan

Introduction

Truma has been defined as damage to the body caused by an exchange of environmental energy that is beyond the body's resilience. Trauma is the most common cause of death in people younger than 45 years of age and accounts for more years of life loss than cancer, heart disease, and stroke combined.Head injuries cause or contribute to death in most trauma fatalities. Motor vehicle accidents (MVAs) are the leading cause of head injury followed by falls, assaults, firearm wounds and others. Traumatic brain injury constitutes one of the main health problems worldwide, currently with a high and increasing incidence, representing an important cause of mortality among adolescents and young adults.

Traumatic brain injury (TBI) is a broad and inclusive term designating a wide range of pathology that results from an external force to the cranium and underlying brain.[1]Serious Traumatic injuries that can reduce quality of life.[2-8] Have a significant financial impact, and result in emotional, psychological[9] and physical complications in the all individuals.[10]

Traumatic brain injury can lead to pathological damage many of the most important of which can be fractured skull, Brain contusions well as various hemorrhage and hematoma (epidural, subdural, subarachnoid, inter traparanchymal and intraventericular).[11]

Head trauma (HT) is any injury that cause lesion or functional damage of cranium, meninges and brain. It is the most frequent lesion seen in trauma related-death.[12]

Patient who sustain head trauma are often assessed clinically using the Glascow coma scale.[13]TheGCS score provide a shorthand assessment of the patient's neurological functioning.[14,15]

The GCS has been used without modification since 1974 to assess the extent and severity of neurologic deficits and as a triage tool and prognostic indicator in patients with traumatic injuries. The GCS focuses on the importance of central nervous system function and consists of verbal, motor, and eye-opening responses.[16]

A CT scan is probably recommended for all patients with mild head injury because one in five will have an acute lesion detectable by the scan.[17] Because prompt proper management of TBI sequelae can significantly alter their course especially within 48 h of the injury, neuroimaging techniques, which can determine the presence and extent of the injury and guide surgical planning and minimally invasive

interventions, play important roles in the acute therapy of TBI.[18]

Imaging also can be important in the chronic therapy of TBI, identifying chronic sequelae, determining prognosis, and guiding rehabilitation. CT findings in TBI vary according to the trauma severity, that is, in accordance with the GCS score. The relationship among types of brain lesions demonstrated in CT, type of TBI (severity of the lesion) and prognosis are described by several authors in the literature[19,20]all of them reporting approximately the same variation: the more severe the TBI is, more numerous and severe are the findings in CT. Lower GCS and special CT scan findings including SAH, midline shift of more than 3 mm, and mass lesions are poor prognostic indicators after closed head injury.[21] Many times, the clinical status correlates well with the radiological findings in computed tomography (CT) scan.[22] On some occasions, they do not match. Most of the patients with GCS 15 do not have a positive finding in a CT scan. Still, some may have findings in CT scan. On few occasions, they may require intervention if there is deterioration in clinical condition or worsening of CT findings. Even though severe complications requiring neurosurgical intervention are usually rare in mild TBI patients, fear of the consequences of delayed treatment has led many to do CT scanning in patients with mild TBI. This follows the trend of increasing CT usage in diagnosis.[23,24] A certain percentage of patients with "mild" head injury who present with no or minimal disturbance unconsciousness subsequently deteriorate.[25] Incidence of this phenomenon often referred to as "talk and deteriorate" has been reported to between 1.0% and 3.0% of those patients who were initially diagnosed as having a mild head injury. Emergency physicians need to decide which patients need urgent imaging, who needs observation, and which patients can be sent home. Nearly 90% of head CT scans have negative results for clinically important brain injury.5 Only 1% of all cases of these cases require neurosurgical intervention. The incidence of abnormal CT findings in mild head injuries varies in various reports ranging from 5% to 28%, of which 0.76% to 8.57% required surgical interventions. Most physicians rely on clinical criteria such as GCS score, loss of consciousness, mode of injury, and changes in mental status to predict the probability of intracranial lesion; however, some studies have demonstrated that normal neurological examination does not reliably rule out intracranial lesions. This had led some authors to recommend liberal use of CT scanning even in patients with a GCS score 15 or a history of the significant mechanism of injury.

This study aims to correlate clinical assessment using Glasgow coma scale and CT scan findings in the patients of traumatic brain injury.

Aims and Objectives

1. To evaluate patient clinically and after resuscitation,if required,classify patient into mild moderate and severe brain injury according to Glasgow coma scale.
2. To evaluate CT brain findings in patients of traumatic brain injury.
3. To correlate clinical findings with radiological evidence of traumatic brain injury.

Material and Methods

Study type:prospective observational study

Study done at: Vadilal Sarabhai GeneralHospital Ahmedabad

Sample size:108 patients having history of head injury.

Study duration: 1st January, 2018 to 31st January, 2018 Each patient was evaluated clinically taking into consideration history, general examination. Classification done according to Glasgow Coma Scale andCT Brain (plain) findings evaluated.

Inclusion Criteria: Cases of head injury atV.S. Hospital from January 1st 2018 to January 31st 2018.

Exclusion Criteria

1. All patients less than 12 years of age.
2. Known hypertensive and diabetic patients receiving anti-coagulant drugs, patients with known bleeding disorder and those with history of previous cerebro-vascular accident were excluded.

The type of trauma was classified into road traffic accident, falls, assaults, and pedestrian injury. This followed by general physical examination and detailed examination of the central nervous system. Injuries involving the other systems of the body were also noted. After initial resuscitation, severity of cranio-cerebral trauma was graded with the help of GCS as follows:

Mild head injury 13 or higher

Moderate head injury 9-12

Severe head injury < 8

The patients were examined with CT scanner in the supine position having gantry tilt +/- 25 degree parallel to the scan plane to the orbito-meatal line. The scan range included base of skull to the vertex. The data was analyzed. The correlation between CT scan findings and the GCS score was evaluated using chi square test. P value <0.05 was considered significant.

Results

A study of randomly selected 108 patients with head injury was done at our hospital from 1st January

to 31st January 2018.In this prospective study, the predominance of young males wasobserved .out of 108 patients evaluated 71 were male and 37 were found to be female.
Average age of the patients was 31.17 years.

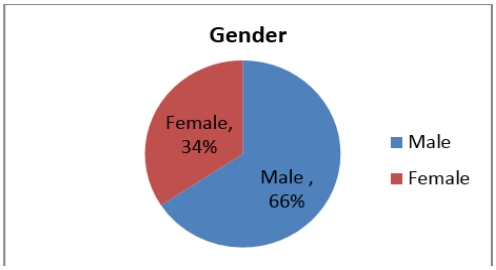

Table 1: Gender distribution

Of the patients evaluated 57 gave a history of Road Traffic Accident while 34 gave history of fall while 17 gave history of trauma due to fights.

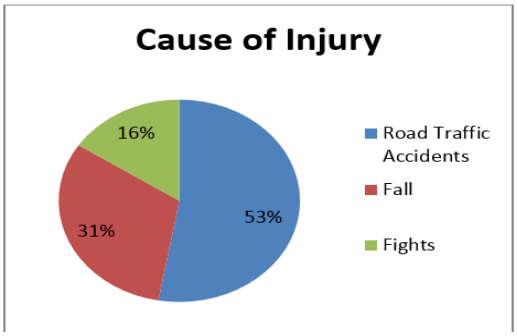

Table 2:Cause of injury

Amongst the 108patients evaluated 101 had mild injury on Glasgow coma scale.3 had moderate injury on Glasgow coma scale.4 had severe injury on the Glasgow coma scale.

Amongst the patients with mild injury 30 patients had significant CT scan findings.Amongst the patients with moderate injury 2 had significant CTscan findings.Amongst the patients with severe injury all of them had significant CT scan findings.

P value was calculated using chi square test and was found to be significant with a value of more than 0.05.

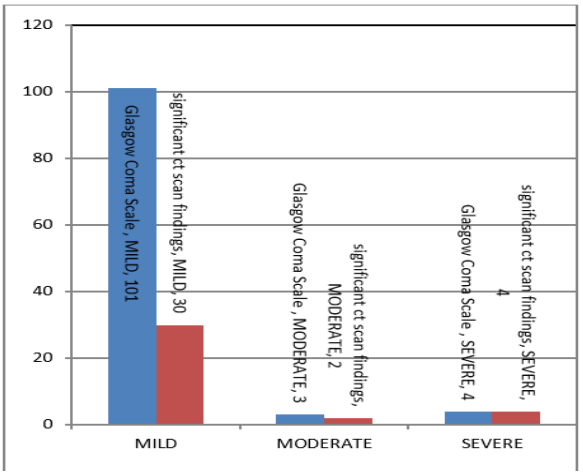

Table 3: GCS score and ct scan findings correlation

Among the patients with mild brain injury having a GCS score of 15(94 patients) CT scan findings were positive in 24 patients(25.5%).

In the CT Scan findings,EDH was seen in 9 patients.SDH was seen in 4 patients.SAH was seen in 15 patients.Contusion was seen in 4 patients and fractures were seen in 17 patients.

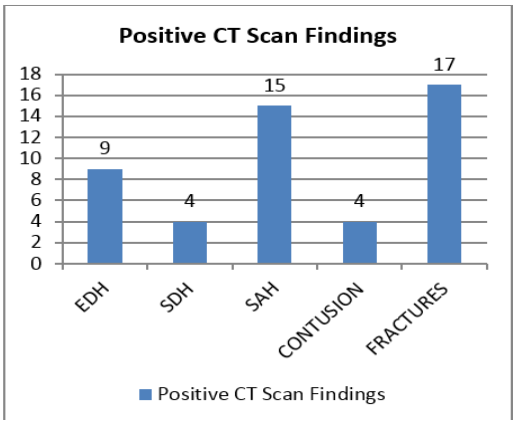

Table 4: Type of lesion on ct scan

Discussion

In our study a total of 108 patients were evaluated with history of head injury. The average age of the patients was found to be 31.17 years.The study population was predominantly male with 66% male patients and 34% female patients.Similar demographics were present in the study conducted by Gupta Prashant et al in their study CT Scan Findings and Outcomes of Head Injury Patients: A Cross-Sectional Study and by FabianaLenharoMorgado et al in their study Correlation between the Glasgow Coma Scale and computed tomography imaging findings in patients with traumatic brain injury.These could be due to male population being the most mobile population of the society.

The most common form of injury was due to road traffic accidents accounting for 52.7%(57

patients) of the total patients included in the study.34(31%) patients gave history of trauma due to fall. While 17(15%) patients gave history of trauma due to aggression and violence.Similar data was obtained by FabianaLenharoMorgado in their study Correlation between the Glasgow Coma Scale and computed tomography imaging findings in patients with traumatic brain injury,where they found the most common causes of head injury to be automobile accidents (52.9%).

Among the patients evaluated 101 patients(93.5%) had mild brain injury 3(2.7%) had moderate brain injury and 4(3.7%) had severe brain injury according to the Glasgow Coma Scale. In their study Correlation between the Glasgow Coma Scale and computed tomography imaging findings in patients with traumatic brain injury by FabianaLenharoMorgado 82.4% of patients had traumatic brain injury rated as mild, 2.0% as moderate and 15.6% as severe.

Amongst the patients evaluatedwith mild brain injury out of the 101 patients 30(29%) had positive ct scan findings while out of the 3 patients with moderate brain injury 2(66%) had positive ct scan findings. Out of the 4 patients with severe brain injury all 4 of them had positive ct scan findings.Also noticed was that among the patients having Mild injury having a GCS score of 15,25.5% presentedwith positive CT scan findings. Similar results were seen in the study Computed Tomography Scan Findings and Glasgow Coma Scale 15 in Head Trauma Patients by Raja S Vignesh et al where they evaluated patients with GCS Score of 15(Mild brain injury) found that Patients with findings in CT corresponded to 12.86% of the study patients.

Among the CT scan findings it was observed that EDH was seen in 9(24.4%) patients.SDH was seen in 4 patients(10.8%).SAH was seen in 15 (40.54%)patients.Contusion was seen in 4(10.8%) patients and fractures were seen in 17 patients(45.94%).Similar results were seen in their study Computed Tomography Scan Findings and Glasgow Coma Scale 15 in Head Trauma Patients by Raja S Vignesh et al Patients whofound About 39% of patients having fracture, 25% of patients had contusion, and 5% of patients multiple findings.Also in the study CT Scan Findings and Outcomes of Head Injury Patients: A Cross-Sectional Study Gupta Prashant et al where in the results revealed skull fractures (62.04%), intra-cerebral hematoma (46.33%), epidural hematoma (30.36%), subdural hematoma (19.37%), subarachnoid hematoma (28.79%), diffuse axonal injury, brain swelling and edema (63.35%), midline shift (24.34%), pneumocranium (12.04%) and intra-ventricular hemorrhage (10.73%) amongst the patients studied. While the type of trauma played a role in the type of injury the CT scan findings were also found to be operator dependent and mild variations observed.

Conclusion

Head injury is one of the most common complain patients present to the emergency department and urgent and accurate diagnosis along with treatment of the same remains the cornerstone of reduced morbidity and mortality of patients.

In the study conducted correlating GCS score and CT scan findings it was observed that the male population was the most commonly involved with road traffic accidents being the most common etiology.While most of the patients presented with mild traumatic brain injury,even amongst those with a GCS score of 15 significant CT scan findings were observed.This points to the need of radiographic evaluation of all patients of head trauma it.While Glasgow Coma Scale remains the mainstay of clinical evaluation it necessitates the need of radiographic evidence to backup the clinical evaluation for urgent care and management of head trauma. While studies aimed at judicious use of CT Scan to avoid unnecessary radiation exposure are done it has to be emphasised that radiographic evidence is essential for the management of head trauma until such a time is there where in other blood tests and clinical tests are available that aid in the early diagnosis and management of the same.

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