ORIGINAL RESEARCH PAPER

Neurosurgery

CT FINDINGS IN THE VICTIMS OF ROAD TRAFFIC ACCIDENTS SUSTAINING TRAUMATIC BRAIN INJURY WHO PRESENTED TO THE EMERGENCY DEPARTMENT OF MGM MEDICAL COLLEGE AND HOSPITAL, NAVI MUMBAI

KEY WORDS: Traumatic Brain Injury, Computerized Tomography, Road Traffic Accidents.

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ABSTRACT

INTRODUCTION: Traumatic brain injury (TBI) is a leading cause of morbidity, mortality, disability and socioeconomic losses in India and other developing countries. Road Traffic Accident (RTA) is the leading cause of TBI. Computerized Tomography (CT) scan brain is the gold standard imaging for the TBI.

Methods: 100 patients, admitted to the Emergency Department of MGM Medical College and Hospital Navi Mumbai, from Jan 2017 to June 2017 were studied. CT scan findings were noted and analyzed.

Results: CT Scans revealed Skull fractures (35.57%), Epidural Hematoma (17.30%), Subdural Hematoma (12.50%), Subarachnoid Hemorrhage (26.92%), Contusions (20.19%), Intra-Cerebral Hematoma (5.76%), Edema (44.23%), Diffuse Axonal Injury (8.65%), and Pneumocephalus (7.04%).

Conclusion: CT scan has detected and precisely localized the parenchymal damage of brain and effectively predicted the prognosis.

INTRODUCTION

TRAUMATIC BRAIN INJURY (TBI) is defined as "brain damage resulting from external forces, as a consequence of direct impact, rapid acceleration or deceleration, a penetrating object (e.g., gunshot) or blast waves from an explosion. The nature, intensity, direction and duration of these forces determine the pattern and extent of damage."[1]

Traumatic brain injury (TBI), according to the World Health Organization, will surpass many diseases as the major cause of death and disability by the year 2020.[2]

Traumatic brain injuries (TBIs) are a leading cause of morbidity, mortality, disability and socioeconomic losses in India and other developing countries.[3] It is estimated that nearly 1.5 to 2 million persons are injured and 1 million succumb to death every year in India.[3] Its incidence is rising at epidemic proportions in regions with rapidly increasing motorization because of industrialized development.[3]

Road Traffic Accidents (RTA) are the most significant cause of head injuries world-wide, followed by falls and assault. Irrespective of the mechanisms resulting in TBI, patients are classified clinically according to their level of consciousness and the anatomic distribution of their injuries.[4] The clinical severity of intracranial injuries is commonly assessed according to the degree of depression of the level of consciousness as assessed by the Glasgow Coma scale (GCS).[4]

With the advent of CT scan by Sir Godfrey Newbold Hounsfield, the management traumatic brain injury was completely revolutionized after 1971.[6]

Sir Godfrey Newbold Hounsfield, CBE, FRS, was an English Electrical Engineer who shared the 1979 Nobel Prize for Physiology or Medicine with Allan McLeod Cormack for his part in developing the diagnostic technique of X-ray computed tomography(CT).[7]

Clinical profile (GCS) and CT findings are correlated to decide management if to be operated or conserved. TBI is greater than ever with the emergence of decompressive craniotomy and multimodality monitoring techniques together with modern neurological intensive care, which have combined to produce dramatic reductions in mortality rates from around 80% for severe TBI in the 1950s to about 20% for severe TBI reported by many of the specialized centers in the last 5 years.[5]

Once TBI has occurred, it is clear that the reduction in mortality rates reported since the 1960s is due primarily to the synergistic effects of better prehospital care, more rapid detection and evacuation of intracranial hematomas, and prevention of secondary brain damage through intensive care techniques such as respiratory and cardiac support, decompressive craniotomy, intracranial pressure monitoring, osmotherapy, prevention of hyperthermia and infective complications. All these aspects emphasize the importance of the regional and temporal means by which the human brain responds to trauma.[5]

Head injury can present as a single injury or form a component injury in a polytrauma victim along with chest, abdominal, spinal or limb injuries. The emergency departments are flooded with cases of head injury with a variable spectrum ranging from skull fractures to intracranial bleeds to focal brain injuries.

Following things are seen on CT scan:
Fractures like linear fracture, depressed fracture, and basilar fractures.

Expanding or compressive hematomas like Epidural hematoma (EDH), Subdural Hematoma (SDH), Intracerebral hematomas (ICH), Contusions, Sub arachnoid hemorrhage (SAH), Intraventricular hemorrhage, Pneumocephalus , Cerebral Edema, Diffuse Axonal Injury (DAI), mid line shift, obliteration of basal cisterns and evidence of various types of herniation.

All above can be seen either alone or in various combinations.

Intracerebral Hematoma:
Intracerebral hematomas are homogeneously hyper dense, with sharp margins surrounded by a rim of decreased density.

Epidural Hematoma:
The radiological appearance of a typical epidural hematoma is biconvex, lentiform, biventricular, crescentic or irregular and is heterogeneous in attenuation, containing areas of hyper dense blood clot and isodense serum.

Acute Subdural Hematoma:

The typical appearance is a hyper dense crescent-shaped extra-axial collection with a convex lateral border and concave medial border overlying the cerebral convexity. Subacute subdural hematomas are nearly isodense with the underlying cerebral cortex while chronic SDH is seen as hypodense collection.

Subarachnoid Hemorrhage:
On CT scan, hyper density of acute hemorrhage is visualized in the sulci overlying the cerebral convexities, within the Sylvain fissures, basal cisterns, and inter-hemispheric fissure.

Contusions:
The lesion is characterized as areas of hemorrhagic necrosis with edema and appeared as areas of heterogeneous increased density mixed with areas of decreased or normal density.

Diffuse Axonal (Shear) Injury:
On CT, DAI lesions appears as small petechial hemorrhages seen at the grey-white junction of the cerebral hemispheres, corpus callosum, and the dorsolateral midbrain depending on the severity of the trauma.[1]

Brain Swelling and Edema:
Early CT scan showed compression of the lateral and third ventricles and peri mesencephalic cisterns.

Advantages of CT scan for evaluation of the head-injured patients include its sensitivity for demonstrating mass effect, ventricular size and configuration, bone injuries, and acute hemorrhage. CT offers widespread availability, rapidity of scanning, and compatibility with medical devices. Its limitations include insensitivity in detecting small and non-hemorrhagic contusions, particularly adjacent to bony surfaces. Likewise, diffuse axonal injuries (DAIs) that result in small brain lesions go undetected on CT. CT is relatively insensitive for detecting increased intracranial pressure or cerebral edema and for early demonstration of hypoxic-ischemic encephalopathy (HIE) that may accompany head injury. Potential risks of exposure to ionizing radiation warrant judicious patient selection for CT scanning as well as radiation dose management. Rapid CT scanning is readily available in most hospitals that treat head injured patients. Thus CT has value as a screening tool to triage minor or mild head-injured patients who require hospital admission or surgery, from those who can be safely discharged without hospital admission.[5]

Repeated CT scanning may be required if there is deterioration in GCS, especially in the first 72 hours after head injury, to detect delayed hematoma, hypoxic-ischemic lesions, or cerebral edema. CT has a role in subacute or chronic head injury for depicting atrophy, focal encephalomalacia, post traumatic hydrocephalus, and chronic subdural hematoma.[6]

AIMS AND OBJECTIVES:
1) To analyze the radiological profile of the head injury patients
2) To study the morbidity and mortality in these patients.

MATERIALS AND METHODS :
Study subjects:
Inclusion criteria: All cases of road traffic accident sustaining TBI presented to Emergency Department of MGM Medical College and Hospital, Navi Mumbai.

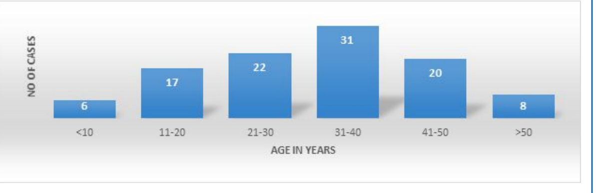
Exclusion criteria: Brought dead cases.
Study area: of MGM Medical College and Hospital, Navi Mumbai.
Study period: 1 January, 2017- 30th June 2017
Sample size: All cases of road traffic accidents sustaining TBI presented to Emergency department.
Study analysis: Data collected was analyzed and appropriate statistical measurement like ratios, percentages, proportions were used.

RESULTS:
Among 170 patients of RTAs, 108 cases sustained TBI in which 104 underwent CT scan brain. 4 patients who did not undergo CT scan, were those cases, diagnosed as TBI but, went to other hospitals nearer to their home after getting first aid.

Out of 104 cases, 79 (75.92%) were male while 25 (24.07%) were females.

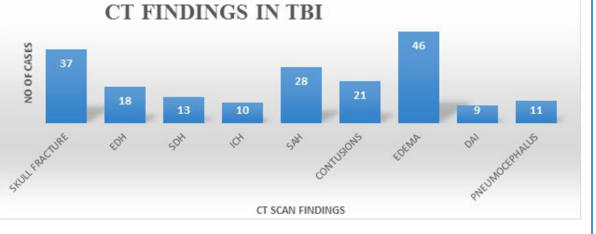
Out of 104 cases 87 (80.55%) showed abnormal CT scan while 17 (19.44%) showed normal CT scan.

In terms of age, maximum number of cases i.e.31(29.86%) were in the age group of 31-40 years, followed by 22(21.15%) cases from 21-30 years, 20(19.23%) cases from 41-50 years, 17(16.34%) cases from 11-20 years, while extremes of the ages contributed to less than 10%.



Graph No 1: Age wise distribution of the cases

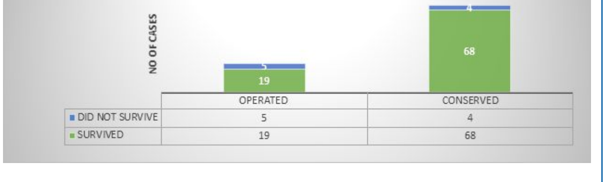
CT Scans revealed Skull fractures (35.57%), Epidural Hematoma (17.30%), Subdural Hematoma (12.50%), Subarachnoid Hemorrhage (26.92%), Contusions (20.19%), Intra-Cerebral Hematoma (5.76%), Edema (44.23%), Diffuse Axonal Injury (8.65%), and Pneumocephalus (7.04%).



Graph No 2: CT scan findings

Out of 87 cases, 19 (21.83%) cases were operated while 68 (78.17%) were conserved.

Among operated cases 5 did not survive while among conserved cases 4 did not survive contributing to 10.34% of the mortality in total.



Graph No 3: Outcome of the patients.

Discussion:
In our study we found that 71% of the cases belonged to 21 to 50 years of the age group which was same as reported by Gupta while it was 64% in the study by Bharti et al.

In our study we found that male to female ratio was 3:1 while it was 4:1 and 3.5:1 in the study by Gupta et al and Samuel et al respectively.

In our study we found that 35.57% cases had skull fracture while Samuel et al reported the same in 16.8% and Gupta et al in 62% of the cases.

In our study 44.23% cases were of cerebral edema while Gupta et al and Samuel et al reported the same in 63.4% and 30% respectively.

We found that the incidence of EDH and SDH were 17.30% and 12.5% respectively in our study while Gupta et al reported the same in 30.4% and 19.41% respectively. Incidence of SAH was nearly the same that is 28.8% and 26.92% respectively in our study and Gupta et al.

We also noted that the outcome in terms of mortality in our study was 10.2% where as other studies by Chandra shekhar et al and Samuel et al reported it to be less than 15%.

CONCLUSION:

Present study revealed that maximum number of cases of TBI were middle aged males. CT scan has precisely localized the parenchymal damage of the brain of TBI cases rapidly and non-invasively for prompt and effective management. Prompt intervention with the help of CT scan, has improved the outcome of the patient.

The high yield and diversity of CT scan findings in TBI patients justifies the appropriate use of CT in diagnosis and management of suspected TBI patients.

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