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Evaluation of acute head injury by computed tomography scan in College of Medical Sciences-Teaching Hospital, Chitwan

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Abstract

This study was conducted to evaluate the computed tomography findings in patient with acute head injury and to emphasize the importance of computed tomography scan in head injury.

One hundred consecutive patients presenting to the emergency department with head injury were evaluated by computed tomography scan of the head. Seventy five patients (75%) were male and twenty five (25%) were females. The age of the patients ranged from three to seventy years and the most affected age group was between thirty and forty (40%). The common causes of head injury were motor vehicle accident (70%), fall injury (25%) and physical assault (5%). The most common computed tomographic findings were: cerebral contusions (52%), skull fractures (41%), intracerebral hematomas (24%), diffuse cerebral edema (23%), midline shift (18%), subdural hematomas (15%), subarachnoid hemorrhage (13%), diffuse axonal injury (8%), intraventricular hemorrhage (6%), extradural hemotomas (4%), pnemocephalus (2%) and normal scans were found in (5%).

In conclusion, computed tomography is the mainstay in the imaging of head injury and helps in the patient management.

Key Words: Computed tomographic findings, head injury.

Introduction

Head injury significantly contributes to deaths from trauma.[1] Head injury causes immediate death in 25% of acute traumatic injuries. Patients with severe head injury have a 30-50% mortality rate, and those who survive are often left with severe neurological deficits that may induce a persistent vegetative state.[2]Approximately 8% of all deaths in the United States can be attributed to injuries while nearly 50% of these deaths are from brain injury.[3]The traumatic brain injury can be broadly classified into the following.[4]

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A. Primary Lesions

1. Skull fracture, scalp hematoma
2. Extracerebral hemorrhage
   - -Epidural hematoma
   - -Subdural hematoma
   - -Subarachnoid hemorrhage
3. Intraxial Lesions
   - - Diffuse axonal injury
   - - Cortical contusions
   - - Deep cerebral gray matter injury
   - - Brainstem injury
   - - Intraventricular hemorrhage

B. Secondary Lesions

1. Cerebral herniation

2. Traumatic ischaemia, infarction
3. Diffuse cerebral edema
4. Hypoxic injury

Computed Tomography(CT) remains the mainstay for initial diagnostic evaluation of head trauma victims. The fast examination time, wide availability, lack of contraindications and high accuracy for detecting hemorrhages have made CT the diagnostic study of choice for initial evaluation of head injury patients.[5]

Chitwan district is centrally located connecting all the major highways in Nepal. This region is very much prone for automobile accidents because of the highways.

Since CMS-TH is located in Chitwan, this study was undertaken to evaluate CT findings in patients presenting with head injury.

Materials and methods

This study was conducted during six months period from January 2010 to May 2010 in the department of Radiodiagnosis at CMS-TH and one hundred consecutive patients presenting to the emergency department with head injury were evaluated by CT scan of the head. The age, sex and the mode of head injury were also noted. CT scan was done in dual slice siemens CT scanner (Somatom Spirit). Plain(non contrast) CT was obtained in all patients taking 5x5mm contiguous axial sections from base of skull to the vertex. The CT findings of the patients were noted and analyzed as per the study objectives.

Results

One hundred patients who presented with head injury were evaluated by CT scan head seventy five (75%) were males and twenty five (25%) were females. The age ranged from three to seventy years. The most commonly affected group was between thirty and forty years (30%). The most common cause of head injury was motor vehicle accident (70%) followed by fall injury (25%) and physical assault (5%). Ninety five (95%) of the patients had abnormal CT findings while only 5% of patients were found to have normal findings.

The most common CT findings in descending order of frequency were cerebral contusions (52%), skull fractures (41%), intracerebral hematomas (24%), diffuse cerebral edema (23%), midline shift (18%), subdural hematomas (15%), subarachnoid hemorrhage (13%), diffuse axonal injury (8%), intraventricular hemorrhage (6%), extradural hematomas (4%) and pnemocephalus (2%). Most of the patients had multiple types of lesions and individual lesions were tabulated separately in descending order of frequency as shown in Table1.

Table1: CT findings in head injury patients (n=100)

CT scan findings	No of patients (n=100)	Percentage of patients (%)
Normal brain scan	5	5
Cerebral contusions	52	52
Skull fractures	41	41
Intracerebral hematomas	24	24
Diffuse cerebral edema	23	23
Midline shift	18	18
Subdural hematoma	15	15
Subarachnoid hemorrhage	13	13
Diffuse axonal injury	8	8
Intraventricular hemorrhage	6	6
Extradural hematomas	4	4
Pnemocephalus	2	2

Discussion

Head injury is a common problem worldwide affecting relatively younger group in general and male sex in particular.

In this study younger age group between thirty and forty years (30%) were mostly affected . In a similar study by Elesha et al [6] they reported that 44% of the affected patients were also between thirty and forty years. This may be because the younger age group drove vehicles carelessly and many of them were found to be under influence of alcohol.

The male to female ratio in this study was 3:1 which was similar to that study conducted by Mebrahtu et al .[7] Males were found to be more prone to head injury mainly because they travel more and get involved in fights more often as compared to females.

In this study, the most common cause of head injury was motor vehicle accident accounting for 70%, followed by fall injury (25%) and physical assault(5%). Zimmermann et al[8] noted that automobile accident (39.5%) was the most common cause of head injury . Similarly he noted fall injury in 29% but physical assault in 21.3%.

Cerebral contusion was the most common finding in our study accounting for 52%. Asaleye et al [9] in a similar study noted cerebral contusions as one of the commonest finding in 54% of their patients. The cerebral contusions were mainly noted in inferior frontal and temporal lobes. This is because cerebral contusions occur when brain contacts a dural ridge or bony protuberance when differential acceleration or deceleration forces are applied.

In contrast, cerebral contusions were noted less frequently in study by Mebrahtu et al [7] and Zimmermann et al.[8] They noted cerebral contusion in only16.4% and 21.3% of their patients respectively.

The next common finding was skull fractures accounting for 41% which was similar to study done by Asaleye et al[9] who noted skull fracture in 42% of their patients.

The other common findings in our study was intracerebral hematomas (24%),cerebral edema (23%), midline shift (18%),subdural hematomas (15%), diffuse axonal injury(8%), intraventricular hemorrhage (6%), epidural hematomas(4%) and pnemocephalus (2%).

Diffuse axonal injury was found in only 8% of patients in our study. This may be due to less sensitivity of CT scan in demonstrating these lesions. Small non hemorrhagic contusions and diffuse axonal injuries, in particular, may not be readily visible on CT scan in the acute phase.[5]

Only 5% of patients had normal CT scan in this study. Most of the patients with normal findings had only minor trauma or history of physical assault. Patients with abnormal CT findings had moderate to severe head injuries noted in 95% patients in this study indicating CT scan as an essential diagnostic tool for evaluation of head injury in such patients.

Conclusion

CT scan is the study of choice for initial assessment of the moderate to severely traumatized patient where rapid triage for evacuation of treatable intracranial hematoma is of paramount importance.

With the use of CT in head trauma patients many unnatural deaths due to head trauma can be prevented.

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