RESEARCH ARTICLE

ASSESSMENT OF TRAUMATIC BRAIN INJURY WITH CT SCAN

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ABSTRACT

Traumatic brain injury (TBI) is a major health issue responsible for considerable mortality and long-term morbidity worldwide. The present study was conducted to determine role of CT in TBI. 93 cases of traumatic head injury underwent CT scan obtained with Planmeca CT machine. All CT images were read by trained radiologist for the presence, absence of brain abnormalities. Out of 93 cases, males were 50 and females were 43. Diagnosis was mass effect in 10, cerebral edema in 12, subdural hematoma in 24, extradural hematoma in 30, intra cerebral hematoma in 7 and intra ventricular hemorrhage in 6 cases. The difference was significant ($P < 0.05$). CT scan found to be effective in assessment of brain injuries.

KEYWORDS

CT scan, Head injury, Subdural hematoma

1. INTRODUCTION

Amongst all traffic accidents, road traffic accidents claim largest toll of human life and tend to be the most serious problem world over. Worldwide, the number of people killed in road traffic accidents (RTA) each year is estimated at almost 1.2 million, while the number of injured could be as high as 50 million. Head injury is a major public health problem and has already attained epidemic proportions in India. As a result craniocerebral trauma places a huge financial and psychological burden upon the society (MacDorman et al., 2001).

Traumatic brain injury (TBI) is a major health issue responsible for considerable mortality and long-term morbidity worldwide, especially among subjects under the age of 44 years (Sosin et al., 1995). The incidence of traumatic craniocerebral injuries is approximately 1.6 million per year in the USA, resulting in 50,000 deaths and 70,000 patients with permanent disability. The aim of emergency imaging is to detect treatable lesions before secondary neurological damage occurs. There is evidence that prompt neurosurgical management of TBI can significantly improve outcome, especially if decompression is performed within 48 h of injury (Traumatic Brain Injury, 1997).

There is general agreement that patients considered at high or moderate risk for craniocerebral injury should undergo non-enhanced CT (NECT) early on admission. Whether patients with minor head injury should be imaged remains controversial (Brain Trauma Foundation, 2000). Clinical risk factors considered as predictive of need for neurosurgical intervention or of clinically important brain damage in patients with mild or minor TBI include failure to reach a Glasgow Coma Scale (GCS) score of 15 within 2 hours, the presence of a suspected open skull fracture or a basal skull fracture, vomiting, an age over 60 or 65 years, drug or alcohol intoxication, deficits in short-term memory and seizure (Polin et al., 1997). The present study was conducted to determine role of CT in TBI.

2. MATERIALS AND METHODS

The present study was conducted in 93 cases of traumatic head injury reported to the department of Radiodiagnosis. Written consent was taken from patient's family members.

General information such as name, age, gender etc. was recorded. In all patients CT scan was obtained with Planmeca CT machine. All CT images were read by trained radiologist for the presence, absence of brain abnormalities. The results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

3. RESULTS

Table 1: Distribution of patients

Total- 93		
Gender	Males	Females
Number	50	43

Table 1 shows that out of 93 cases, males were 50 and females were 43.

Table 2: Etiology of head injury in reported patients

Etiology	Number	P value
Fall	7	0.01
RTA	56	
Physical violence	30	

Table 2 shows that common etiology found to be fall in 7, RTA in 56 and physical violence in 30 cases. The difference was significant ($P < 0.05$).

Table 3: Diagnosis based on CT findings

Diagnosis	Number	P value
Mass effect	10	0.04
Cerebral edema	12	
Subdural hematoma	24	
Extradural hematoma	30	
Intra cerebral hematoma	7	
Intra ventricular Hemorrhage	6	

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Table III, graph I shows that diagnosis was mass effect in 10, cerebral edema in 12, subdural hematoma in 24, extradural hematoma in 30, intra cerebral hematoma in 7 and intra ventricular hemorrhage in 6 cases. The difference was significant ($P < 0.05$).

Figure 1: Diagnosis based on CT findings

4. DISCUSSION

Traumatic brain injury (TBI) is an extremely common and potentially devastating problem. Studies have estimated that nearly 1.6 million head injuries occur in the United States each year, resulting in over 50,000 deaths and over 70,000 patients with permanent neurological deficits. TBI accounts for up to 10% of the health care budget and an estimated annual cost to society of \$30 billion (Stiell et al., 2001). Because prompt proper management of TBI sequelae can significantly alter their course especially within 48 hours of the injury, neuro-imaging 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. Imaging also can be important in the chronic therapy of TBI, identifying chronic sequelae, determining prognosis, and guiding rehabilitation (Teasdale et al., 1974). The present study was conducted to determine role of CT in TBI.

In present study, out of 93 cases, males were 50 and females were 43. Gupta PK et al evaluated CT scans of head injury patients to study nature and location of lesions and found that Cerebral edema was detected in 63.4% of the cases, followed by skull fracture (62%), hemorrhagic contusion (46.3%), and epidural hematoma (30.4%) (Gupta et al., 1998). Acute subdural hematoma was present in 19.4% and subarachnoid hemorrhage was seen in 28.8% patients, midline shift in 24.3% patients, pneumocranium in 12% and intra-ventricular hemorrhage in 10.7% of the patients. Cases of head injury with fractures of the skull tend to have more complications and are more often fatal than those without fracture.

We found that common etiology found to be fall in 7, RTA in 56 and physical violence in 30 cases. Doddamani RS et al conducted a study among 201 patients of traumatic brain injury who were followed with serial CT scans for a maximum of up to 5 scans to determine the role of serial CTs in demonstrating changes in intracranial lesions and the influence on management (Doddamani et al., 2012). The study concluded that repeat CT scans resulted in management changes even in patients with no clinical deterioration and thus may be of value in detecting changes at an early stage.

We observed that diagnosis was mass effect in 10, cerebral edema in 12, subdural hematoma in 24, extradural hematoma in 30, intra cerebral hematoma in 7 and intra ventricular hemorrhage in 6 cases. The introduction of advanced CT techniques such as dual-energy CT for cervical CTA has allowed more accurate and faster bone subtraction as compared with threshold-based bone subtraction. Dual-energy CT allows

better visualization of the neck vessels, especially in their intraosseous segments, namely the petrous portions of the carotid arteries and vertebral arteries coursing through the foramina transversaria (Singh et al., 2012).

Outcome prediction in TBI has been notably difficult. Mortality correlates with the severity of injury based on the GCS score (Biswas et al., 2003). TBI has also been classified according to damage severity as demonstrated by neuroimaging. The Marshall CT score was published in 1992 and proved to correlate the presence of intracranial abnormalities on CT with intracranial pressure (ICP) and outcome. The Marshall CT classification identifies six groups of patients with head trauma based on the following parameters on CT: the presence of a focal mass lesion and/or diffuse intracranial abnormalities including brain swelling and midline shift (Kual et al., 2005).

5. CONCLUSION

Authors found that CT scan found to be effective in assessment of brain injuries.

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