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Radiology

Computerised Tomographic Evaluation of Acute Craniocerebral Trauma in Rural Population

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Abstract **Original Research Article**

Background: Computed tomography (CT) is a vital tool in the workup of patients with head trauma. Traumatic head injury has a high mortality and morbidity. Brain injury following trauma is the cause of death in about one-third of patients that die after trauma. ***Objective:*** The objective of present study was to determine utilization of the computerized tomographic (CT) scan in evaluation of acute craniocerebral trauma. ***Material and Methods:*** Institutional Ethics Committee (IEC) permission was sought before commencement of study. This was a descriptive type of cross sectional study and was conducted at tertiary care teaching hospital of medical college of western Maharashtra. This study conducted on 600 cases of acute head injury that had undergone CT scan was included. ***Results:*** The most common craniocerebral lesion detected on CT scan was oedema (36.3%) followed by fracture (24%) and contusion (24.0%). Overall mortality in present study was 10.66%. ***Conclusion:*** CT scan along with clinical evaluation and GCS could help in predicting the outcome of craniocerebral trauma or head injury.
Keyword: CT scan, Head injury, intracerebral hemorrhages, Hematoma.

INTRODUCTION

Trauma of any kind is inevitable; no one can avoid it but can be prepared for the consequences. Craniocerebral trauma or head injury is the hardest thing that anyone ever imagined. But what would be more absolutely hardest thing than head injury, is unable to give timely and accurate diagnosis of the injuries. Earlier the mainstay of diagnosis of intracranial traumatic lesions was clinical evaluation, plain radiograph and cerebral angiography etc. Each of these conventional modalities has their own limitations. As detail clinical evaluation is more time consuming, it cannot be performed when patient's condition is rapidly deteriorating. Plain radiographs and angiography has low sensitivity and specificity; so for accurate diagnosis it can't be reliable. Angiography could be hazardous invasive procedure for a patient who already having potential brain damage. Traumatic brain injury (TBI) is a major cause of morbidity and mortality worldwide. Imaging plays an important role in the evaluation, diagnosis, and triage of patients with TBI. Recent studies suggest that it will also help predict patient outcomes [1].

The advent of computed tomography (CT) scan has been a major breakthrough in imaging of traumatized patients and offers the potential for improvement in speed and diagnosis of injuries. CT scan demonstrates significant primary traumatic injuries including extradural, subdural, intracerebral, skull fractures, cerebral oedema, contusions, cerebral herniation etc. CT scan is a noninvasive, quick, cost effective modality which delivery timely and accurate diagnosis; which has direct bearing on decision of line of management[2]; like surgery is indicated or not. Even though some research has been done on CT scan uses, yet lot has still remained too learned in cases of injuries like craniocerebral or head trauma. With this background, present study was conducted to ascertain computerized tomographic evaluation of acute craniocerebral trauma with following aim and objectives in rural population.

Aim

To study computerized tomographic evaluation of acute craniocerebral trauma in rural population

Objectives

To determine utilization of the computerized tomographic (CT) scan in evaluation of acute craniocerebral trauma.

MATERIALS AND METHODS

Institutional Ethics Committee (IEC) permission was sought before commencement of study. This was a descriptive type of cross sectional study and was conducted at tertiary care teaching hospital of medical college of western Maharashtra. Hospital has a state of art infrastructure to provide comprehensive health care services to rural people. This centre served more than 3,00,000 population belonged the rural area. It's also act as standalone referral centre for the catchment area. Present study was conducted over the period of three years. In this study patients who were referred especially for the evaluation of craniocerebral traumatic injuries were reviewed. Total 600 cases of acute head injury that had undergone CT scan were included in the study after taking written informed consent. Patients who were not willing to participate; those having normal CT scan and, uneventful clinical course were excluded. Patients with congenital abnormalities of the head and those whose fall or injury were secondary to stroke were also excluded from the study. The CT scan was done using the General Electric (GE) Sytee 2000 I Hi speed CT scanner. On the CT gantry study participants were place in supine position [3]. Table was adjusted manually without causing much discomfort to the patients. After adjusting patients in 'zero position', head band was fastening across the forehead. With patients in supine position, 5 mm axial sections for the posterior fossa and 10 mm axial sections were taken thereafter. In addition high resolution sections were taken in areas of interest. Do precaution was ensure to while positioning children to avoid airway obstruction when flexing the head. Infants were kept warm with blankets because scanning room was usually cold and these infants have poor body temperature control. Intravenous contrast medium was avoided as it may worsen the consequences head injury and has minimal diagnostic information. The radiological features and anatomical distribution of the lesions on the CT. Images were assessed and documented.

RESULTS

In present study total 600 cases of acute head injury included. Out of that, 80% (480) were male and 20% (120) were female. The most common and least common age group involved in head injury was 19-49 years (63.6%) and 13 to 18 years (06%) respectively. Age and gender wise distribution of head injury depicted in table 01. On chi square test (χ^2) difference in between the age groups and gender affected in head injury found to be non-significantly associated. (Chi square test (χ^2):3.27, d.f.3, P<0.35 Non significant).

The most common craniocerebral lesion detected on CT scan was oedema (36.3%) followed by fracture (24%) and contusion (24.0%) (Graph 01). Out of all fractures 32.5% (52) fractures were isolated and remaining 67.5 (108) fractures were associated with one or multiple lesion. Fracture injury most commonly found to be associated with contusion (78) followed by pneumocephalus (44). Out of 34 extradural hematoma (EDH), 24 (70.5%) EDH patients had associated fracture. In present study, typical hyperdense pattern seen in 85% (34) cases of subdural haematoma (Table 02). In our series of all cases of 600 patients, 30 had intracerebral hemorrhages (ICH).

The most common location for traumatic ICH was frontal lobe (40%) followed by temporal lobe (26.66%). Out of 146 contusions, 53.50% (78) and 46.50% (68) were hemorrhagic and non-hemorrhagic respectively. Out of 600 patients a total 44 (7.33%) patients had various herniations in isolation or combination. In present study patients were grouped according to severity of injury based on Glasgow Coma Scale. GCS scores 13-15 and ≤ 13 were considered as minor and moderate to severe injury respectively. In present study 7.33% (44) patients had midline shift. In present the study out of 600 patients, 64 (10.66%)) were succumbed to cranio- cerebral injury. Of the total 64 recorded deaths 44 (68.7%) were due to mass lesion, while 20 (31.25%) were due to diffuse lesion. Outcome on the basis of GCS scores was shown in table no 03.

Table-01: Age and gender wise distribution of the patients

Sr. No.	Age groups (Yrs.)	Gender		Total
		Male	Female	
1	≤ 12 Yrs.	56	20	76
2	13Yrs.-18 Yrs.	30	06	36
3	19 Yrs.-49 Yrs.	312	70	382
4	≥50 Yrs.	82	24	106
	Total	480	120	600
	Chi square test (χ^2):3.27, d.f.3, P<0.35 Non significant			

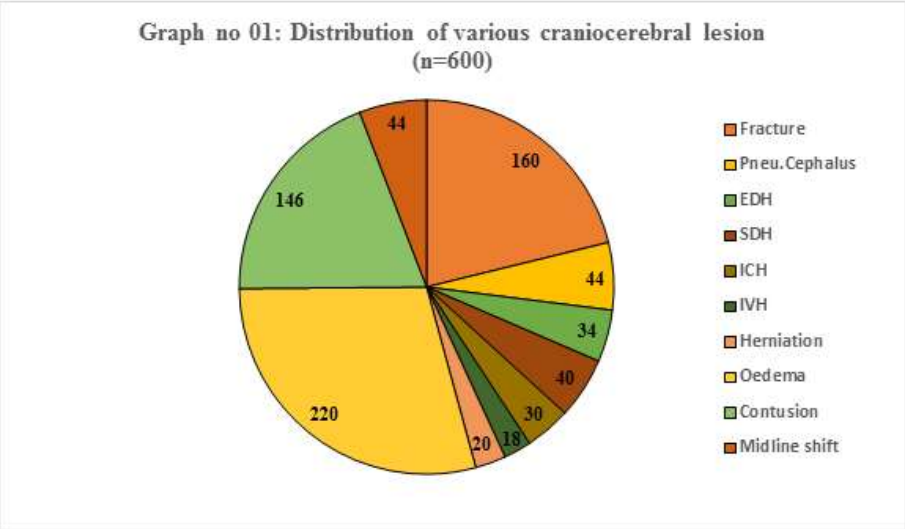

Fig-1

Table-02: Density pattern and distribution of subdural hematoma (SDH)

Sr. no.	Density Pattern	No of patients
1.	Hyper-dense	34
2.	Iso-dense	02
3.	Hypo-dense	02
4.	Layering	02
Sr. no.	Distribution	No of patients
1.	Frontal	10
2.	Temporal	04
3.	Parietal	12
4.	Fronto-parietal	08
5.	Temporo-parietal	04
6.	Parieto-occipital	02

Table-03: Outcome on the basis of Glasgow Coma Scale (GCS)

Sr. no.	GCS score	Survived	Death	Total (%)
1.	< 8	10	42	52 (80.7%)
2.	9-12	58	10	68 (14.70%)
3.	13-15	468	12	480 (02.5%)
	Total	536 (89.33%)	64 (10.66%)	600 (100%)

DISCUSSION

Craniocerebral injury or head injury remains the most common cause of death following trauma [3]. In developing countries, the incidence of traumatic brain injury is increasing as traffic increases, besides other confounding factors such as industrialization, falls etc[4,5] Radiographic examination of the skull is an essential part of management of head trauma[6], but its limitations in plain radiographs are now recognized even in diagnosis of skull fractures[7]. CT facilitates a comprehensive diagnosis and permits early and targeted intervention. In present study out of 600 CT scan patients male to female ratio was 4:1 and predominant age involved was 19 to 49 years (66.66%). In a study conducted by Ohanegbulam SC *et al*. [8] in Nigeria the male to female ratio was 3.5:1. This study also reported that 33.9% of the patients were in the third and fourth decades of life. Study of Onwuchekwa CR *et al*. [3] reported male to female ratio as 2.6:1.

In present study, the most common craniocerebral lesion detected on CT scan was oedema (36.3%) followed by fracture (24%) and contusion (24.0%). In contrast to findings of our study; Ohanegbulam SC *et al*. [8] reported cerebral contusion and odema (30.7%) as the most common CT findings due to head injury. Onwuchekwa CR *et al*. [3] reported cranial fractures in 28.06% (87) patients of head injury. Intracerebral haemorrhage was seen in 30 cases in our study. Onwuchekwa CR *et al*. [3] reported 83 cases of intracranial hemorrhage in his study; which was higher as compared to our findings. In present study 80.7% mortality was seen in patients whose GCS score was less than 8 and 14.70% and 2.5% mortality was seen in patients whose GCS score was 09-12 and 13-15

respectively. Study conducted by Ohanegbulam SC *et al*. [8] reported 11.1% as overall mortality at 1 month.

CONCLUSION

Present study concludes that computed tomography (CT) scan, plays a crucial role in evaluation of head injury. CT scan along with clinical evaluation and GCS could help in predicting the outcome of Craniocerebral trauma or head injury.

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