Computed Tomographic Evaluation of Craniocerebral Trauma in Dhulikhel Hospital

Suwal S, Karki S, Mandal D, Poudel RC

Department of Radiodiagnosis and Imaging

Dhulikhel Hospital, Kathmandu University Hospital

Dhulikhel, Kavre, Nepal.

Corresponding Author

Sundar Suwal

Department of Radiodiagnosis and Imaging

Dhulikhel Hospital, Kathmandu University Hospital

Dhulikhel, Kavre, Nepal.

E-mail: s1suwal@gmail.com

Citation

Suwal S, Karki S, Mandal D, Poudel RC. Computed Tomographic Evaluation of Craniocerebral Trauma in Dhulikhel Hospital. *Kathmandu Univ Med J* 2017;57(1):70-3.

ABSTRACT

Background

Craniocerebral trauma is common health problem in emergency department of any hospital. CT is commonly indicated to to rule out any significant intracranial abnormalities in these patients, so that timely intervention of the significant intracranial pathologies can be done.

Objective

The study is done to evaluate CT findings of head injury patients in Dhulikhel Hospital.

Method

This prospective hospital based study was done in Department of Radiology of Dhulikhel Hospital in the period of January 2015 to December 2015. CT findings of the head trauma patients undergoing CT in the Department of Radiology were reviewed and analysed.

Result

The study was done in 484 patients, 165 female and 319 male patients. Mean age of the patients was 30.87 ± 19.25 years. Among them 205 patients showed abnormal CT findings, scalp injury being the commonest one, followed by skull fracture. 60 patients showed abnormal intracranial findings. There was significant correlation of skull fracture and abnormal intracranial findings in this study.

Conclusion

This study provided the normal and abnormal CT findings in head of the craniocerebral trauma patients in Dhulikhel Hospital. Abnormal CT findings were predominantly extra-cranial and were overlapping with intracranial abnormal findings.

KEY WORDS

CT, Craniocerebral trauma, skull fracture

INTRODUCTION

Craniocerebral trauma is a significant public health problem worldwide. Although most of the injuries are minor, some of the trauma victims require urgent management.[1] CT is preferred as first line imaging modality in acute head trauma in emergency department, as it is faster, and is superior to detect hemorrhages, which require emergency surgery.[1-3] Also it can accurately diagnose and localize cerebral contusion, edema and cranial fractures.[2,3]

Numerous studies have been reported worldwide regarding use of CT in head trauma. Zee and Yoshiro et al. emphasized CT as imaging modality of choice in evaluation of head trauma.[4,5] Maria et al. found CT superior over MRI in acute head trauma evaluation.[6] Smits et al. studied cost effectiveness of CT in minor head injury and justified routine use of CT in these cases.[7] Gupta et al. stated evidence of parenchymal damage on CT was predictive of poor outcome.[8] These all studies depict importance of CT in head trauma patients. However, in developing countries like Nepal, poverty, lack of health insurance, and less availability and affordability of investigations and treatment modalities affect the management of these trauma victims.[9]

This study was done to evaluate the CT features of craniocerebral trauma in patients managed at Dhulikhel hospital Emergency department. This study will help to identify the importance of this modality in the initial investigation and follow up of such cases.

METHODS

This study was hospital based prospective study conducted in Department of Radiology of Dhulikhel hospital. All the patients undergoing CT scan of head for head injury in this department in the period of January 2015 to December 2015 were included.

After ethical approval, CT images of all these patients were reviewed. Age and sex of the patients were noted. Findings seen in these CT images related to head injury were recorded and tabulated according to the types of the injury (soft tissue injury, skull fracture, extraparenchymal hemorrhage, Intraparenchymal hemorrhage/injury).

The data was analysed using SPSS (version 22). Frequencies and percentages of different variables used in the study were calculated. Chi square test was applied for association of skull fracture and intracranial abnormal findings.

RESULTS

Total 484 patients were included in the study, among them 165 were female and 319 were male (fig. 1). Age of the patients ranged from less than 1 year to 97 years, with mean age of 30.87 ± 19.25 years (table 1). Highest frequency of the trauma occurred in the age range of 21-30 years (21.1%). Most of the patients were of age < 40 years (72.9%).

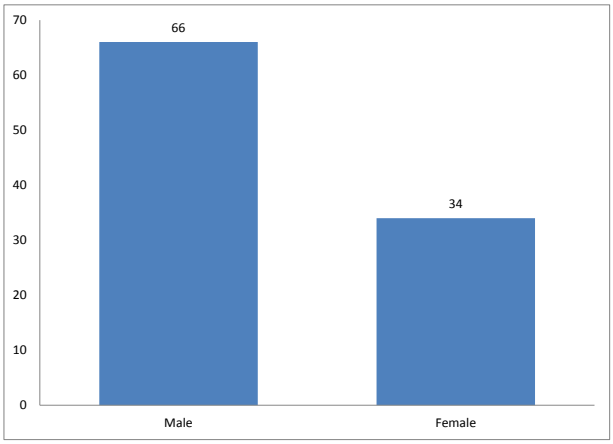

Figure 1. Distribution of head trauma patients in Dhulikhel Hospital based on sex (n= 484).

Table 1. Crosstabulation of age groups with normal and abnormal CT findings (n=484)

Age group (years)	Normal CT findings			Abnormal CT findings			Total
	Count	% within age group	% within normal CT findings	Count	% within age group	% within abnormal CT findings	
< 10	43	53.1	15.3	38	46.9	18.7	81
10-20	51	62.2	18.1	31	37.8	15.3	82
21-30	63	61.8	22.4	39	38.2	19.2	102
31-40	57	64.8	20.3	31	35.2	15.3	88
41-50	27	55.1	9.6	22	44.9	10.8	49
51-60	25	55.6	8.9	20	44.4	9.9	45
61-70	6	25	2.1	18	75	8.9	24
71-80	4	66.7	1.4	2	33.3	1	6
81-90	4	66.7	1.4	2	33.3	1	6
> 90	1	100	0.4	-	-	-	1

Out of 484 patients, 205 patients had various different lesions related to head trauma seen on CT scans (fig. 2). Soft tissue injury was the most common lesion (38.2%), followed by fracture (13.2%). Sixty patients showed abnormal intracranial findings with overlap of different pathologies in the same patient. Epidural hematoma

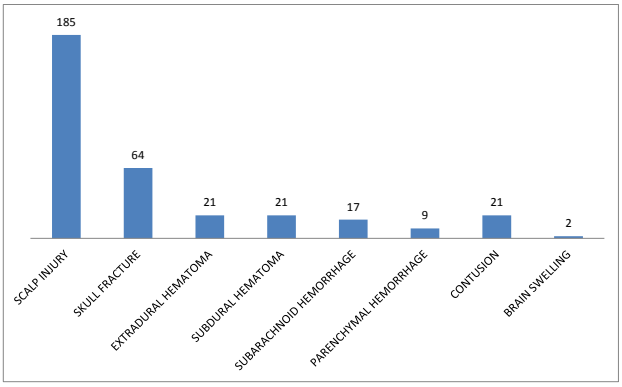

Figure 2. Distribution of head trauma patients in Dhulikhel Hospital based on sex (n= 484).

Figure 3. Acute extradural hematoma along right frontal lobe convexity and frontal region scalp injury.

Figure 5. Subarachnoid hemorrhage along right frontal convexity and subdural hematoma along left cerebral convexity.

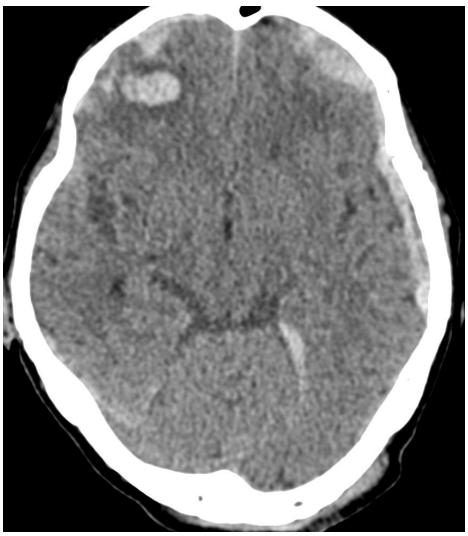

Figure 4. Right frontal lobe hematoma and left cerebral convexity subdural hematoma.

Figure 6. VRT image of skull showing fracture in right frontal bone.

and subdural hematoma were seen in 21 patients (10%), subarachnoid hematoma seen in 17 patients (8.2%), parenchymal hematoma seen in nine patients (4.4%), brain contusion seen in 21 patients (10%) and brain swelling seen in two patients (0.9%). There is significant correlation of scalp injury and skull fracture with intracranial abnormal findings ($p < 0.001$). However, among the individual intracranial abnormal findings, only extradural hematoma showed significant correlation with scalp injury and skull fracture.

DISCUSSION

Craniocerebral trauma is a major worldwide public health problem. Most common causes of these trauma include road traffic accident and fall injury.[10]

Cranial CT scan is frequently indicated radiological investigation to evaluate head injury in developed countries.[11] Stein and Ross reported high incidence of intracranial lesions (12.9%) in head injury, and recommended immediate and routine CT scan of head of all head injury patients with loss of consciousness, even if normal other physical findings.[12] In our study, 60 (12.4%) out of 424 patients undergoing head CT for head trauma showed intracranial lesions. Miller et al. and Jeret et al. found lower frequencies of intracranial lesions in head CT done for head injury (6-9%).[13,14]

Most common lesion type was soft tissue swelling in our study (185 cases – 38.2%), followed by skull fractures (64 cases – 13.2%). These findings are closer to the findings of study conducted by Bordignon and Arudha and Shackford et al. showing 14.3% and 19.3% of skull fractures respectively.[15,16] Soft tissue injury accounted for 34% of abnormal CT scans in the study conducted by Bordignon and Arudha.[15]

Intracranial bleeding accounted for 23.9% (49 cases) of all abnormal CT scans in our study, which is higher as compared to the study conducted by Bordignon and Arudha (4.1%) and Jeret et al. (10.4%).[14,15] Stein and Ross

also found similar lower incidence of intracranial bleeding (4.2%) in their study.[12] The lower incidence of intracranial bleed in those studies were due to inclusion of mild head injury cases only, however, we included all the cases of head injury in our study. There is significant correlation of skull fracture with intracranial bleed in our cases (25 out of 49 cases with intracranial bleed showed skull fracture). Stein and Ross also found similar results (7 out of 11 cases); however, Bordignon and Arudha found lesser incidence of skull fracture in cases with intracranial bleed (1 out of 21 cases).[12,15]

Cerebral contusions in our study (10%) were similar to the findings of Bordignon and Arudha. However, cerebral contusions were higher in other studies (25% and 26.8%).[11,12] We found brain swelling in two patients (0.9%) only, which is very less number as compared to study conducted by Stein and Ross (30.9%). Bordignon and Arudha, and Shackford found 7.5% and 5% of brain swelling in their studies.[10,15]

Significant correlations of the abnormal intracranial findings with scalp injury and skull fracture were seen in this study. 70% of the patients with abnormal intracranial findings showed scalp injury. 80% of patients without skull fracture did not show abnormal intracranial findings. These significant correlations between these entities give good reason for indicating CT of head in head trauma patients presenting with visible extracranial abnormalities. This can help us in timely intervention in significant abnormal intracranial abnormalities, which can reduce morbidity and mortality in these patients.

CONCLUSION

With this study we have profile of the head injury patients in Dhulikhel Hospital, reflecting almost similar picture of Dhulikhel city and nearby remote districts. Abnormal findings were predominantly extra-cranial and were overlapping with the intracranial abnormal findings. Significant abnormal findings in the CT scan of these patients justify use of CT scan in head trauma. Further studies are suggested for identifying risk factors and prognosis of abnormal CT findings in head trauma patients to optimize the use of CT in head trauma patients.

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