COMPUTED TOMOGRAPHY FINDINGS IN HEAD TRAUMA IN SOKOTO (NORTH WESTERN NIGERIA)

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ABSTRACT

This retrospective study was carried out to present the pattern of injuries seen using computed tomography (CT scan) in head injured patients and to highlight the role, played by this modality of investigation in the management of these patients at the department of Radiology, Usman DanFodio University Teaching Hospital{UDUTH}, Sokoto, Nigeria, between September 2000 and September 2002.

Positive CT findings were noted in 58 patients (78.38%). Road traffic accident was found to be the most common cause of head injury with the highest incidence in males in the 30 39 year-old age group. However assault, as the aetiology of the head injury had the highest diagnostic yield (100%). Intracranial hemorrhage was the most frequent abnormality noted in 48.65%, followed by skull fracture in 29.73% of the patients. Less frequent findings like arterio venous fistula and intra ocular foreign body were also noted.

Computed tomography played a very important role in the management of these patients by providing a non invasive and accurate means of demonstrating both the immediate and delayed features of head injury.

INTRODUCTION

Head injuries represent a spectrum of clinical conditions involving the cranium, its covering and contents following trauma, which may be of minor or major degree [1]. The end result of head injury is damage to the underlying brain tissue through compression, torsion and shearing mechanisms involving the extra-axial, intra-axial and vascular compartments [2]. Bleeding into the sub or epidural spaces, constitute extra-axial head injuries and may be associated with dural tears leading to cerebro-spinal fluid leakage [3]. Intra axial injuries on the other hand include intracerebral hemorrhage, cerebral ischaemia and brain swelling, which constitute the major morbidity and mortality factors following head injuries [3].

Clinical management of neuro-trauma represents one of the most formidable and prevalent problems encountered in the modern day emergency room [4]. The primary objective of the diagnostic radiologist in neurotraumatology is to provide diagnostic information crucial to clinical management in order to limit morbidity and mortality [5]. The choice of investigation methods depends on local availability and this is particularly limited in medically disadvantaged countries. The emphasis worldwide is on CT scan as the principal method of investigating head trauma [4].

It is the aim of this study to describe the patterns of CT findings in head injured patients at Usman Dan Fodio University Teaching Hospital Sokoto (UDUTH), Northwestern Nigeria.

PATIENTS & METHODS

All patients with head injuries referred to the department of radiology UDUTH Sokoto between January 2000 and September 2002 were recruited for the study. The indications for the CT scan ranged from unconsciousness, deteriorating clinical state, recurrent headache, post traumatic seizures, bleeding from the ear or nose to any neurological deficit.

All brain scans were carried out by Siemens SOMATOM ART computed tomographic scanner. The slices were taken at 5mm slice thickness and interval in the posterior fossa and at 10mm in the remaining areas. Contrast medium administration was avoided in acute cases but utilized in chronic cases. The CT slices were analyzed in both bone and soft tissue windows respectively.

RESULTS

A total of 74 patients had cranial CT scan in this study. Their ages ranged from 3months to 75 years with mean age of 30.99 years as illustrated in Table 1. Sixty-two of the patients were males while 12 were females giving a male-female ratio of 5.2:1

The etiology of injuries is summarized in Table 2. Road Traffic Accidents (RTA) was the commonest cause of head injury accounting for 67.57% of all the cases. This was followed by assault 1.2% and then fall from height, accounting for 13.5%. One patient (1.35%) received a gored on the head by a ram, and another had history of the roof of a house falling on his head.

Table 3 shows that a patient is more likely to have a positive CT finding if the head injury was sustained from assault (100% positive finding) than road traffic accidents (78% positive yield).

The indications for CT scan ranged from unconsciousness to change in clinical state, neurological deficit, history of headache and bleeding from the orifices (ear or nose) History of Headache and bleeding from nose/ear as indications for the scan had the highest positive yield (100% each) as illustrated in table 4.

Table 5 shows the abnormal CT findings; intra-cranial hemorrhage being the most common finding (48.6% of the total population) with subdural and intra-cerebral hemorrhages having the same frequency. Some patients had more than one abnormal finding.

Table 6 shows the classification used for categorization based on extent of head injury. Combined injuries (Type 3) had the highest frequency (40.50%)

DISCUSSION

The advent of computed tomography (CT) has revolutionized assessment of the brain [1.] Its application in the management of head injuries is well documented [(2,6).]

The approximate male - female ratio observed in this study 5.2:1 correlates with previous studies on the same subject [7-10.] Road traffic accident (RTA) was also the most common cause of head injury in this study, accounting for 67.6% of the total population. The age group with the highest frequency of RTA was the 30-39 year-old age group. This may be attributable to more male drivers and motorcyclists, than female [1]

History of assault had the highest diagnostic yield (100%), with RTA having the second highest of 78%. This may probably be due to the fact that injuries following assault were directed and intentional as opposed to others that were accidental. This finding differs from previous studies [1,7] where RTA had the highest diagnostic yield.

The mainstay of radiological management of Head injuries is to minimize the morbidity and mortality related to this condition. It therefore means that patient selection has to be tailored in such a fashion that injuries would not be over looked while at the same time preventing unnecessary scans. The importance of CT scan can thus not be over emphasized [4.] In this study, bleeding from the nose/ear and history of headache following head injury as indications for CT scan, had the highest diagnostic yield (100% each). Neurological deficit following head injury had the next highest diagnostic yield (90%). This differs from previous studies [7.8] where history of headache following head injury had the highest diagnostic yield. This may be explained on the basis of timing of the examination i.e. if the examination is done too early the radiological picture may not have become apparent at that time.

The spectrum of injuries seen in this study is wide with intracranial hemorrhage being the most common abnormality. Both subdural and intracerebral hemorrhages are identifiable major killers in head injury [3]. Intracranial fresh

bleed and hematoma have similar high CT value comparable to that of bone attributable to the protein fraction of haemoglobin molecule. Following a clot liquefaction, organization and haemoglobin redistribution within two weeks of the bleed, the hematoma progresses to isodensity thereafter becoming hypodense relative to the surrounding brain tissue [11, 12]. Previous studies [13] have shown that subdural hemorrhage is the most common form of intra-cranial hemorrhage. This differs with the findings in this study where subdural and intracerebral hemorrhage occurred with the same frequency

Intracerebral hemorrhage is a more severe form of brain contusion resulting from shearing forces and leading to axonal tears. The blood vessels rupture typically manifesting either as instant hemorrhage at the time of injury or occurring in delayed form as a result of the contusion itself or due to resuscitation procedures [2]. Previous studies [1,14] have shown the incidence of intracerebral hemorrhage to be between 20-25% of the study population. In this study, the incidence is 22%.

Although magnetic resonance imaging (MRI) is reported to be twice as sensitive as CT in the detection of primary brain damage following acute head injury [15,16], it is noted that its use, in the management of such injuries is still limited, because of limited access to this facility and problems related to provision of life support systems in a magnetic field [2]. CT provides accurate non-invasive diagnosis of fractures, intracranial hemorrhage and after sequel of head injury like hydrocephalus and cerebral edema. Its unique ability to differentiate acute from chronic hemorrhage are also valuable tips for corrective surgery [7]

From this study it can be seen that the value of CT in the management of head injury cannot be over emphasized. Out of seventy-four patients scanned sixty-five (87.8%) had positive yield. However, despite the above advantages it should be done only when clinically indicated in order to reduce cost and unnecessary radiation to these patients.

Table1

Age distribution

Age grp	Freq	%
0-9	10	13.51%
10-19	11	14.86%
20-29	13	17.57%
30-39	17	22.97%
40-49	14	18.92%
50-59	4	5.41%
60-69	4	5.41%
70-79	1	1.35%
Total	**74**	**100%**

Table2

Age distribution and aetiology of head injury

Age grp (yrs)	RTA	Fall	Assault	Hit on the head by a ram	Collapsed Roof
0-9	7	3	-	-	-
10-19	7	2	2	-	-
20-29	7	-	5	-	-
30-39	14	-	3	-	-
40-49	10	3	1	-	-
50-59	4	-	-	-	-
60-69	1	2	-	1	1
70-79	-	-	-	1	-
Total	**50(67.6%)**	**10(13.5%)**	**12(16.2%)**	**2(.7%)**	

Table 3
Causes of head injury and CT findings

Cause	No	Positive CT Sean
RTA	50	39 (78%)
Fall	12	7 (58%)
Assault	12	12 (100%)
Others	1	Nil (0%)

Table 4
Indications for CT Sean and CT findings

Indications	No.	Positive CT findings (%)
Unconsciousness	24	19(79.2%)
Deteriorating clinical Status	6	5(83.3%)
Neurological deficit	20	18(90%)
History of headache	7	7(100%)
Seizures	7	6(85.7%)
Bleeding form the Nose/ear	5	5(100%)

Table 5
Spectrum of CT findings in head injury

Findings	Frequency	Total
Fractures		
‣Simple linear	14	
‣ Depressed	6	22
‣ Comminuted	2	
Intra-cranial hemorrhage		
‣ Epidural	4	
‣ Subdural	16	36
‣ Intra-cerebral	16	
Cerebral infarction	3	3
Cerebral infarction	7	7
Hydrocephalus	1	1
Intra-cranial foreign body (bullets)	5	5
Porencephalic cyst	4	4
Intra-cerebral abscess	4	4
Arterio-venous fistula	1	1
Aerocele	5	5
Intra-ocular foreign body	1	1
Haematoma in right maxillary sinus	3	3
Haematoma in ethmoidal sinus	2	2

Table 6
Extent of head injury

Type of head injury	Description	No,%
Type 1	Fracture alone	5(5.8%)
Type 2	Intracranial injury	28(37.8%)
Type 3	Combined 30 (40.5%).	

Figure 1 Cranial CT showing a depressed fracture of the left parietal bone

Figure 2 Cranial CT showing acute intracerebral hematoma in the right frontal lobe

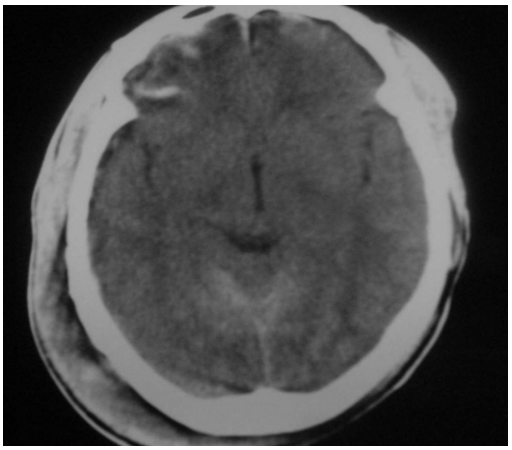


Figure 3 Cranial CT showing bilateral acute on chronic hematoma

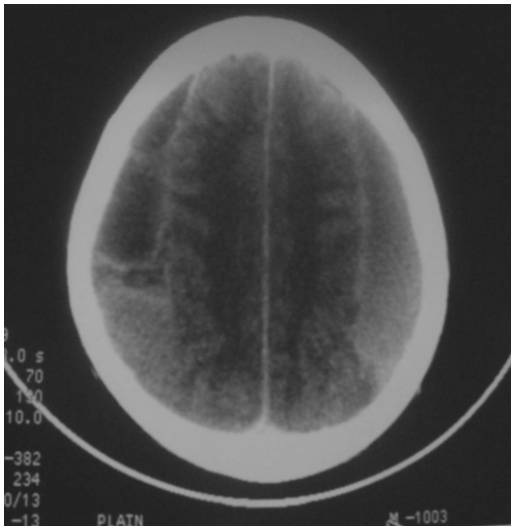
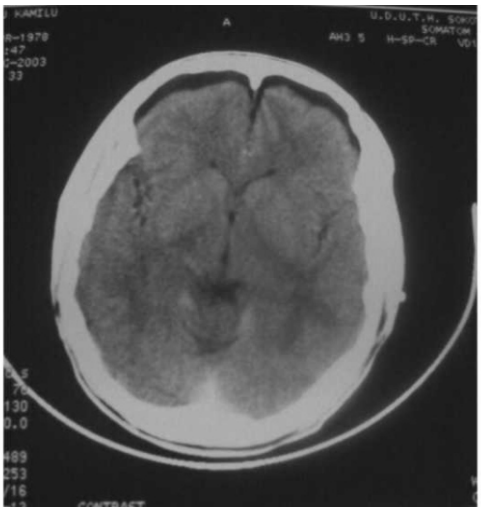


Figure 4 Cranial CT showing bilateral chronic subdural hematoma in the frontal areas



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