COMPUTERIZED TOMOGRAPHY FINDINGS IN PATIENTS PRESENTING WITH HEAD INJURY IN CALABAR, NIGERIA

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"Since it is impossible to predict the CT scan findings understanding the mechanism of injury, CT scans should be made available in all hospitals to appropriately manage these patients."

ABSTRACT

Objective: The objective of this study was to define the injury types found intracranially when head trauma occurs and possibly predict the type of injury seen with the different mechanisms of injury.

Methods: We prospectively studied ninety-one patients presenting at the University of Calabar Teaching Hospital (UCTH) over twenty-four months (February 2011 to February 2013) with head injury. Their socio-demographics and clinical data as well as the CT findings were collected. Statistical analysis was done using stata 10, stat corp, Texas USA, 2007. Frequency tables, bar chats, histograms and chi-square were used to analyse the data.

Results: Ninety-one patients with head injury were seen. The age group of 20-29 and 40-49years were the commonest, median being twenty-nine years, interquartile range, 22-42years. Sixty four (70.3%) males, twenty seven (29.7%) females. The commonest mechanism of injury was RTA. Diffuse cerebral oedema, cerebral haemorrhage were the commonest brain events. No normal scan was seen. Skull fractures, especially comminuted ones were the commonest. CT findings in each case could not be predicted from the mechanism of injury.

Conclusion: This study reveals that a typical head injured patient in our locality is a male aged 20 – 29 years, involved in an RTA. Since it is impossible to predict the CT scan findings using the mechanism of injury, CT scans should be made available in all hospitals so as to appropriately manage these types of patients.

Keywords: Computerized Tomography, head trauma, Calabar, Nigeria.

INTRODUCTION

Trauma is the most common cause of death and permanent disability in the early decades of life, with neurological trauma causing the majority.[1] Cranial trauma is responsible for 150,000 hospital admissions per year in the United Kingdom, while in United State 500,000 new cases of head injury occur every year.[1] Local statistics for Nigeria are not available except for individual hospitals. About 118 consecutive head injuries was recorded in UCTH, Calabar per annum about six years ago.[2] This number has been gradually increasing due to increasing traffic in developing countries such as ours.[2]

Plain radiographic analysis of the skull has been shown by several publications not to be of much value. The logical approach would be that if there has been sufficient injury to necessitate examination, computerized tomography (CT) should be performed whether a fracture is seen on plain skull x-rays or not.[3]

The neuroradiology of trauma has undergone a dramatic change since the advent of CT scanning, which is regarded now as the primary method of assessing head injury, supplemented by a lateral radiograph of cervical spine.[4] Magnetic Resonance Imaging (MRI) is more sensitive in detecting intracerebral trauma and may even detect lesions earlier. However, it is less available than CT at this time in our region.

This study seeks to identify the incidence and types of intracranial injuries, especially those not detectable on plain radiography and relate them to the type of trauma, age and gender in the Calabar area.

MATERIALS AND METHODS

All patients presenting at the University of Calabar Teaching Hospital (UCTH) with head injury between February 2011 to February 2013 were recruited into the study. The UCTH is the only tertiary hospital in Calabar, south-south Nigeria and serves patients from all of Cross River State, parts of Akwa Ibom State of Nigeria and parts of neighbouring Cameroun.

The patients were screened by the neurosurgical team and, all those who clinically had head injury were included. Information obtained from each patient included age, gender and type of trauma.

The CT scans were carried out using a fourth generation GE CT machine with the following specifications; minimum kilovoltage 100, maximum kilovoltage 120, minimum miliamperage 100, maximum miliamperage 120, slice thickness 3mm from base of skull to the vertex. Images were reformatted in all cases for better analysis. The collected data was analyzed using stata 10, stat corp, Texas USA, 2007. Frequency tables, bar chats and histograms were used to analyse the data. Chi-square 'x' test was used to test significance of difference between proportions.

RESULTS

Ninety-one patients with head injury were seen within this period. Only eighty of these had their ages recorded. The age distribution of the subjects is shown in Table 1. The age range of 20-29 was the most represented group followed by 40-49 years. The median age was 29 years with the interquartile range of (22-42). Sixty-four (70.3%) of the subjects were males while twenty-seven (29.7%) were females. This gives a male to female ratio of (2.4:1) (p=0.004). Table 2 shows causes of head injury encountered. The commonest type of injury was road traffic accident (RTA) followed by domestic violence and gunshot injury. Fig. 1 shows types of skull fractures encountered with the comminuted fractures being by far the commonest encountered. Fig. 2 shows the type of cerebral events amongst the subjects with head trauma. Diffuse cerebral edema, cerebral hemorrhage and subdural hemorrhage were the commonest brain events seen. Obstructive pneumocephalus and carotico carvenous fistula were the least common. Table. 3 Show the association of mechanism of injury and type of intra cerebral events. No type of cerebral event could be significantly associated with type of trauma. Fig. 3 to 7, Illustrate typical intracerebral events seen on CT scan. These range from gun pellets seen within the scalp to different types of fractures and haemorrhages within the brain.

Table1. Age Distribution of subjects

Age group (years)	Frequency ***(n=91)***	Percentage
<20	18	19.8
20-29	27	29.7
30-39	16	17.6
40-49	20	22.0
>50	10	11.0
Median (IQR)	29	(22-42)

Table 2. Cause of head injury

Cause	No	M	F	Age distribution Mean ±SD	Percentage (%)
RTA*	70	52(74.3)	19(25.7)	33.1±17.0	76.9
Domestic violence	8	6(60.0)	4(40.0)	28.9±16.1	8.79
Gunshot injury	8	4(66.7)	2(33.3)	28.9±11.1	8.79
Fall from height	4	2(50.0)	2(50.0)	4.7±4.5	4.40
Worksite injury	1	1 (100)	0(0)	37	1.10

*RTA= Road traffic accident

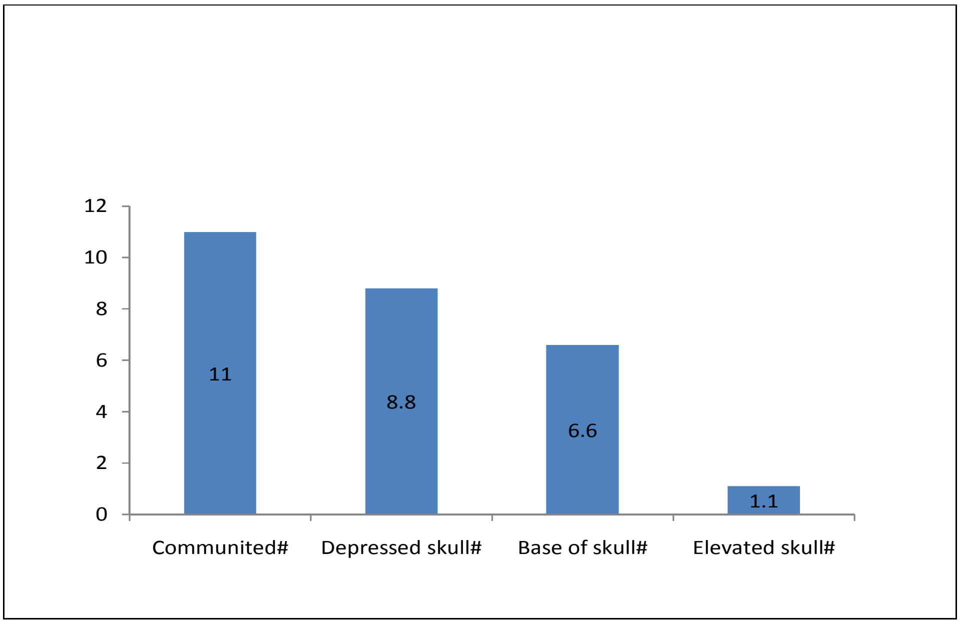

Figure 1. Types of fractures seen on CT scan.
#=Fracture

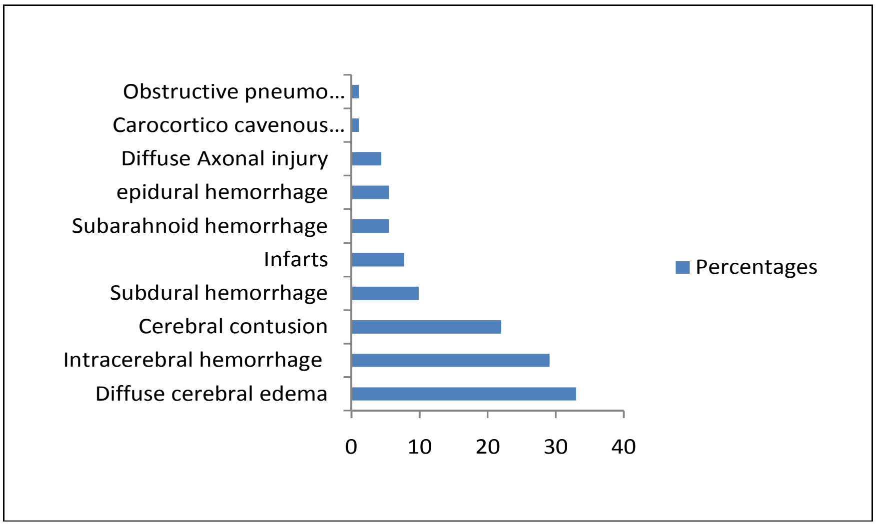

Figure 2. Types of cerebral events

Table 3. Association of mechanism of injury and type of cerebral events

	TYPE OF INJURY				
	RTA	**Assault**	**Gunshot injury**	**Falls**	**x^2 P-value**
	Freq.(%) **n=70**	**Freq.(%)** **n=11**	**Freq.(%)** **n=6**	**Freq.(%)** **n=4**	
Diffuse cerebral oedema					
Yes	23(32.9)	3(27.3)	2(33.3)	2(50.0)	
No	47(67.1)	8(72.7)	4(66.7)	2(50.0)	0.876
Cerebral contusion					
Yes	14(20.0)	2(18.2)	3(50.0)	1(25.0)	
No	56(80.0)	9(81.8)	3(50.0)	3(75.0)	0.388
Subdural haematoma					
Yes	6(8.60	2(18.2)	0(0)	1(25.0)	
No	64(91.4)	9(81.8)	69(100)	3(75.0)	0.446
Intracerebral haemorrhage					
Yes	18(25.7)	2(18.2)	1(16.7)	0(0)	
No	52(74.3)	9(81.8)	5(83.3)	4(100)	0.623

Fig 3. Non contrast axial image showing gunshot injury with gun pellets lodged within the soft tissue of the right parietal region.

Fig 4. Non contrast axial image showing an acute epidural hematoma in the left parietal region. There is secondary significant contra lateral midline shift and a left parietal fracture.

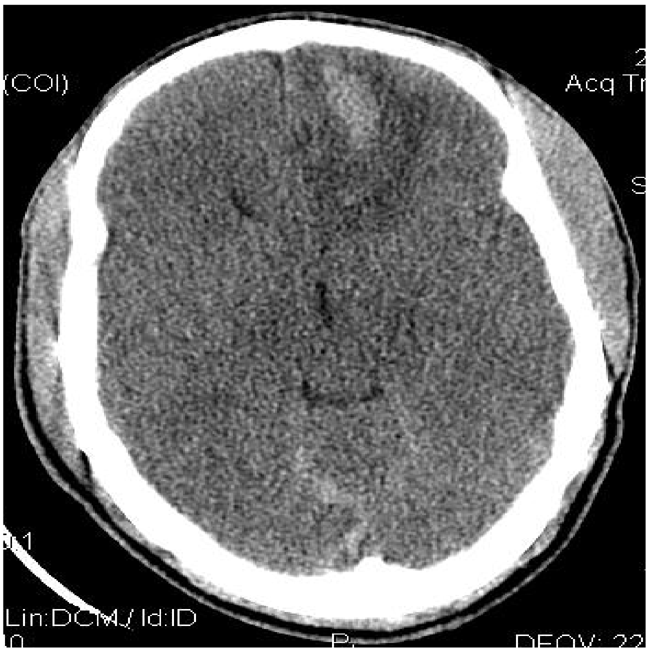

Fig 5.Non contrast axial image showing left frontal contusion with acute hemorrhage as well as subarachnoid hemorrhage noted within the falx cerebri

Fig 6. Non contrast axial image showing depressed skull fracture involving the left frontal bone with beam hardening artifacts

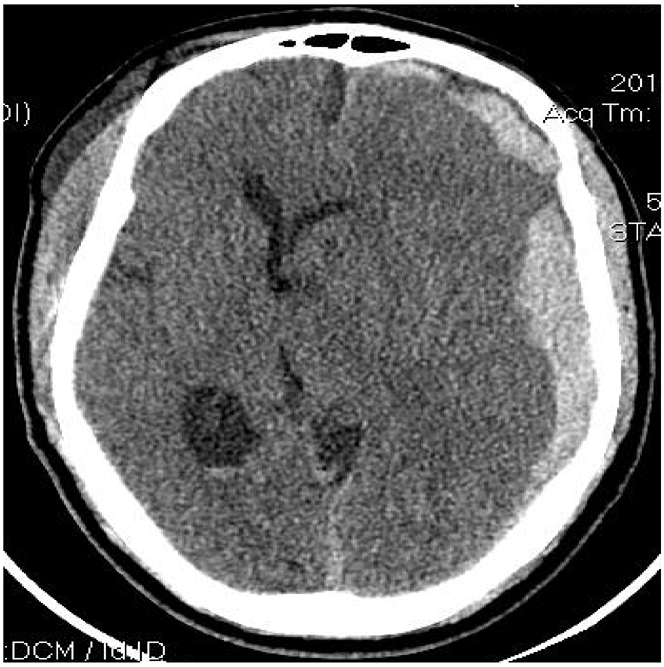

Fig 7. Non contrast axial image showing left sided acute subdural hematoma at the fronto-paretal region with contra lateral midline shift and intra ventricular haemorrhage

DISCUSSION

Head injury is a universal problem affecting relatively young people in general and male sex in particular.[5] Our study has shown that head injury was more common in the males with persons in the second to fourth decades of life most affected. These are the most active and productive age groups of our society and therefore more likely to be exposed to both occupational and social risks.

These findings were similar to findings seen elsewhere in the country. In a study conducted in east central Nigeria by Emejulu and Malomo[4], the most affected age groups were third, fourth and second decades of life with a male:female ratio of 3:5;1.2. In Benin-city, south-south Nigeria, Adeyekun et al[6] reported 21-30 years as the most frequently affected age group with male to female ratio of 4.3:1.

The study has also revealed that RTA is the commonest cause of head injury. This agrees with studies done elsewhere in the country[6] and an earlier study in Calabar.[2] On the other hand, a study done in northern Nigeria by Garba I et al[7] showed that the commonest mechanism of injury was assaults. It is generally believed that northern Nigeria where they did their work has a higher incidence of violence than the south. It is interesting to note that falls from height occurred mainly in infants and growing children. Other studies reported similar findings.[5,6,8]

The commonest cerebral events noted on CT scan were diffuse cerebral oedema, intra-cerebral haemorrhage, cerebral contusion and subdural haematoma. These findings agree with the findings in other parts of the country.[3,6] These brain injuries can cause mass effect on vascular structures leading to ischaemia and can impinge on other vital structures or herniations of different parts of the brain[9]. Hence their diagnosis must be made urgently to avoid fatality. Repeat imaging is indicated if changes in neurological status occur, which may occur in cases of haemorrhage and large contusions.[9,10] Contusions appear as low attenuation if haemorrhage is absent and mixed or high attenuation if haemorrhage is present. Subdural haematoma appear hyperdense within the first seven days, then isodense between 10-14days and thereafter appears hypodense as it becomes chronic. Epidural hematomas are commonly associated with fractures.[9,10]

It is worthy of note that no normal findings were recorded in our study quite the contrary to studies done elsewhere in Nigeria.[3,7] The explanation is likely that all patients in our study, though presented at the accident and emergency unit were further screened by the neurosurgery team and based on clinical presentation of significant head injury were recruited for the study. This also explains why the numbers of patients studied were fewer than in other studies. Fractures were also common findings in our study and various types were seen which included comminuted, depressed and base of skull fractures with the comminuted type being the commonest. Unfortunately, the type of brain injury could not be predicted from the mechanism of injury. This emphasizes the need for every facility that manages these type of patients to have a CT scan, particularly since the modalities of treatment differ and mismanagement could rapidly worsen the patient's condition and end in fatality.

CONCLUSION

This study has revealed that a typically head injured patient in Calabar and its environs is a male aged 20 – 29years, involved in an RTA, domestic violence or gunshot battle. CT scan findings encountered included diffuse cerebral edema, hemorrhages and contusions as well as skull fractures. Since our study showed that the type of injury cannot be accurately predicted from the mechanism of injury, CT scans should be made available in all hospitals in Nigeria.

Recommendation

In Nigeria, CT scan in most hospital is still a scarce resource. There is a need to develop and validate a simple set of clinical criteria for identifying patients with acute head injury who should undergo CT scanning. CT scan machines should be provided in all secondary, tertiary and private health facilities that manage such patients.

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REFERENCES

1. Zimmerman RA, Bilaniuk LT, Gennarelli T, Bruce D, Dolinskas C, Uzzell B., Cranial computed tomography in diagnosis and management of acute head trauma, AJR Am J Roentgenol. 1978; 131(1):27-34.
2. Ikpeme IA, Udosen AM, Ngim EN et al, Head Injury: Calabar Teaching Hospital experience. Nig J of Surg Sciences. 2007; 17(1): 14-21.
3. Ohaegbulam SC. The role of emergency radiographic examination of the skull in trauma. Ghan Med J 1977; 16:255-7
4. Emejulu JK, Malomo O. Head trauma in a newly established neurosurgical centre in Nigeria. East central Afr J Sur. 2008; 13:86-94.
5. Mebrahtu-Ghebrehiwet M, Quan L, Andebirhan T. The profile of CT scan findings in acute head trauma in Orotta Hospital, Asmara, Eritrea. Journal of the Eritrean Medical Association, 2009; 4(1): 5-8.
6. Adeyekun AA, EG Obi-Egbede Ejakpori EB et al. Computed tomography patterns in patients with head injury at the university of Benin Teaching Hospital, Niger J Clin Pract. 2013 Jan-Mar;16(1):19-22. doi: 10.4103/1119-3077.106717.
7. Garba I, Speelman A, Tabari AM. Mild Head Injury: Criteria for Computed Tomography Scan. Journal of Association of Radiographers of Nigeria, 2009; 23(7): 7-15.
8. Obajimi MO, Jomah KB, Brackohuapa W et al. Computed tomography features of head injury in Ghanaian children, Nig. J. of Surgical Research, 2002;4 (3-4):84-88.
9. Wolfgang Dahnert, Radiology Review Manual, 5th ed. Lippincott Williams & Wilkins, 2003, 288.
10. David Sutton, Text Book of Radiology and Imaging, Seventh edition. Churchhill Livingstone, 2003, 1621

Authors Contributions:

AAI:Made substantial contributions to conception and design, acquisition of data, drafting the article and revising it critically for intellectual content as well as final approval of the version to be published.

GI: Made substantial contributions to literature search, and in critically revising the article for intellectual content as well as final approval.

AOO: Made substantial contribution in literature search and data analysis, as well as critically revising the final version.

MON: Made substantial contribution to acquisition of data, concept and design as well as critically revising and approval of the final version for publication.

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