COMPUTED TOMOGRAPHIC PATTERN IN PATIENTS WITH HEAD INJURIES FROM ROAD TRAFFIC ACCIDENTS SEEN IN UNIVERSITY COLLEGE HOSPITAL, IBADAN.

BY

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CERTIFICATION

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DEDICATION

This work is dedicated to the Almighty God, my teachers and my loving family.

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ABSTRACT

Background: Globally, the most common cause of head injury is road traffic accident. Computed Tomography (CT) scan is the gold standard in the diagnosis of patients with head injuries. This study assessed the CT pattern of injuries in patients with head injuries due to Road Traffic Accident (RTA) in Ibadan, Nigeria.

Materials and methods: The CT scan of 205 patients with head injuries following road traffic accident between January 2013 to January 2014 were reviewed. Patients' data were extracted from the records of head injured patients at the medical record department of the University College Hospital, Ibadan. Data recorded included patients age, sex, educational level, types of RTA, categories of road users and CT findings of head injury. Data were analyzed using descriptive Chi square test at 95% confidence interval.

Results: The mean age of the patients was 35.14 years. Generally, RTA patients were predominantly males (83.9%), with 83.8% and 84.0% of males involved in motorbike RTA (MBRTA) and motorvehicle RTA (MVRTA) respectively. Motorbike was the most common (63.4%) cause of RTA. The motorbike riders (55.4%) and motorvehicle drivers (50.0%) had more injuries than their corresponding passengers and pedestrians. Majority of the riders and drivers had low educational levels. Most patients had abnormal findings on CT scan (74.6%). Many patients had intracranial hematomas 57.6% while 42.7% of the patients had skull fractures. Mixed lesions (intracranial hematomas and skull fractures) were seen in 65.6% of Motorbike patients, and 53.2% of Motorvehicle patients. In all patients, temporal bone was the most common fractured skull bone. Chi-square test showed significant association between intracranial hematomas and skull fracture in the road traffic accident cases evaluated (P-value < 0.00). Significant association was also recorded between intracranial hematomas and skull fractures in patients involved in MBRTA (P value < 0.00).

Conclusion: Road traffic accident continues to be a public health problem in this environment. This study highlighted a high prevalence of head injury from road traffic accident especially in men between the ages of 21-40 years. The commonest cause of head injury was motorbike road traffic accident, with the highest incidence of injuries among the riders. Contusional hematoma was the commonest intracranial hematoma while temporal bone fracture was the commonest skull bone fracture. There is high tendency of sustaining both intracranial hematomas and skull fractures in RTAs, especially when caused by motorbike RTA. Continuous efforts should be made by government for the re-enactment of road traffic rules and regulations aimed at reducing head injuries from RTA.

CHAPTER ONE

INTRODUCTION

1.0 Background

Head injury refers to trauma to the head with injuries to the scalp, skull or brain (William, 2010). It can be open or closed head injury. In open head injury there is skull fracture and tear of the dura mater, while closed head injury there is traumatic brain injury, however the skull and dura mater remain intact (E-Medicine Health, 2013)

Generally, road traffic accident (RTA) is the commonest cause of head injury (Muhammad, 1990; Akang, 2002). In Nigeria, studies done in Ilorin and Enugu show RTA to be the commonest cause of head injury in Nigeria (Solagberu,2003; Ohaegbulam, 2003). Another study done in Ghana by Obajimi et al also found similar results(Obajimi et al, 2002). Other common causes of head injury are assault, falls, firearms, seizures and recreational accident (Janet, 1996; Segun, 2010)

Road traffic accident can be motorvehicular or may involve a motorcycle or pedestrian (MSCB Reference, 2014) Studies have shown that motorcycle RTA is the commonest RTA.(Solagberu 2003; Emejulu, 2010). However, a study done by in Ibadan showed motorvehicular RTA to have a greater proportion of RTA (Adeolu, 2005).

The injuries can be primary in which injuries occur at the time of injury or secondary which are complications of primary injury. Primary injuries include cranial bone fractures, intracranial hemorrhage, lacerations, contusions and penetrating wounds. Secondary injuries include cerebral edema, hydrocephalus and brain herniation (Segun, 2010). The clinical severity of head injury is classified based on Glasgow coma score (GCS) into mild (GCS 13-15), moderate (GCS 9-12), severe (GCS 3-8) (Asimor, 1979; Fischer, 2001)

Computed Tomography (CT) scan is the imaging standard for diagnosis of head injuries, especially in centers where it is available (Ogunseyinde, 1999; Adeyekun, 2013).CT utilizes x-ray which is a form of ionizing radiation. However, the amount of ionizing radiation used is within the permissible dose with low risk of development of malignancies (Bushberg, 2002) It is a cross sectional imaging, hence can accurately identify and localize possible pathologies like intracranial hemorrhages, cerebral contusion and edema. In addition, CT is fast, accurate and non-invasively reveals skull fractures and other soft tissue abnormalities (Adeyekun, 2013).

1.1 Problem statement

Generally, head injury is recognized as a major public health problem that is a frequent cause of death and disability in children and young adults in many developing countries like Nigeria (Asimor, 1979). Comparison of the rates of RTA in Nigeria with those of developed countries such as United kingdom, United states and Sweden as well as other developing countries such as Kenya and Tanzania showed that Nigeria has the highest mortality and morbidity rates due to RTA. A study done in Nnewi in 2009 found an incidence of 2,710 per 100,000 per year. This figure is higher than the figures in developed countries like United kingdom and United states with 453 and 394 per 100,000 per year respectively (Emejulu, 2010).

In this environment, the prevalence of head injuries from road traffic accidents had consistently risen over the decades. In addition, there has been increasing rate of commercial motorbike over the years, which some authors have attributed to job scarcity, and the ability of the motorbike to circumvent poor road networks (William, 2010). Unfortunately, many of these patients in numerous centers in Nigeria as well as other developing countries are still managed based on pre-CT Scan era protocols, resulting in high mortality and morbidity. The management of head injuries is challenging because of factors such as poverty, lack of medical insurance cover, availability and affordability of investigative and treatment modalities. The pitiable transport facilities and unavailability of ambulance services make the transfer of ill patients to other hospitals particularly difficult. Late presentation of patients for medical care is another contributory factor to increased mortality and morbidity in RTA.

In addition, some doctors fail to consider early referral of head injury patients for CT scan. Therefore, some patients who require imaging investigation are either managed blindly or do not present for CT scan. The reasons for these are because there are few CT scan centers and they are not easily accessible to many of these patients. Some people have the false impression that because CT scan is expensive, it is an avoidable financial burden to poor families. There is periodic clinical update programs conducted for doctors across the nation, some doctors in Nigeria are still not well familiar with CT scan facilities, and therefore lack adequate knowledge about the value of CT scanning in the management of head trauma.

Though Computed tomography is becoming increasingly available in many cities in Nigeria, it is still unavailable in many places where it is needed.

Against these socio-economic background, the aim of this study was to evaluate CT scan findings in head injury patients from road traffic accidents in the University College Hospital, Ibadan.

1.2 Justification

The increasing toll of road traffic accident deaths in Nigeria constitutes a public health problem which requires urgent attention. There has been upsurge of commercial motorbike related accidents in Nigeria over the last four decades. This may be a result of low socio-economic situations of this country.

However, the deaths and injuries from road traffic accidents are preventable and can be minimized in most cases especially if adequate preventive measures are taken. Hence, there is a need to reduce the morbidity and mortality from road traffic accidents, and improve survival among the victims by making early and accurate diagnosis of head injury from RTA.

In addition, identifying the risk factors for this problem may provide a clue to possible effective interventions. This entails the encouragement of more studies on different perspectives of management of head injuries in Nigeria.

Computed tomography scan is an excellent imaging method for demonstrating the head injury patterns. It is regarded as the gold standard for the diagnosis of head injury. The choice of computed tomographic scan as the imaging modality for diagnosing head injuries is influenced by its high yield and diversity of findings in RTA victims. Sadly, CT scanners are not widely available, only in big cities and teaching hospitals in Nigeria.

The result of this study will improve the knowledge about management of head injuries from road traffic accidents and the importance of computed tomographic scan in diagnosing head injuries. It will also guide policy makers on improving availability of CT scanners in general hospitals and private hospital where it will be easily accessible for the people that need it.

1.3 Aims and Objectives

General Objective

This study determined the Computed Tomographic scan pattern of head injuries from road traffic accident patients in University College Hospital, Ibadan. It evaluated the CT scan findings of cases of head trauma from RTA and correlated these findings with patients' clinical and demographic status.

Specific objectives

1. To describe the CT scan pattern of head injuries among RTA patients seen in University College Hospital, Ibadan.
2. To determine the proportion of intracranial hemorrhages in the cases with abnormal cranial CT scan.
3. To determine the relationship between the types of RTA and the CT scan patterns of head injuries.
4. To correlate the patients' socio-demographic characteristics with the CT scan findings.

CHAPTER TWO

LITERATURE REVIEW

2.0 Gross anatomy of the brain

The skull is a fusion of several flat bones held together by the cranial sutures. It has the thick outer table, the spongy diploe and a thinner inner table. The skull is further divided into the cranial vault and base of the skull. The cranial vault is made up of frontal, parietal, temporal and occipital bones while the base of the skull is formed majorly by occipital, sphenoid and temporal bones. The cranium and the periosteum encase the brain and its contained structures. The brain is covered by three membranes namely the pia, arachnoid and dura mater. The dura is the outermost covering and is attached to the periosteum of the calvarium. The space between the arachnoid and pia mater contains cerebrospinal fluid, and the pia being the innermost covering follows the gyri of the brain (Naheedy, 2003).

The cerebral hemispheres fill the cranial vault above the tentorium cerebella. Right and left hemispheres are connected by the corpus callosum and are otherwise partly separated by the inter-hemispheric fissure and falx cerebri. The cerebral hemisphere is made up of frontal, temporal, parietal and occipital lobes. These lobes are separated by fissures while the sulci are separated by gyri. The sylvian fissure separates the frontal lobe from the temporal lobe, the central (Rolandic) sulcus separates the frontal lobe from the parietal lobe and the parieto-occipital sulcus which lies on the medial surface of the hemispheres separates the parietal and occipital lobes (Ryan and McNicholas, 2004).

The brain is made up of grey and white matter. The white matter is formed by the axons of the neurons from the cerebral cortex and the basal ganglia. Some parts of the white matter connect the two hemispheres (inter-hemispheric commisures). The three types of fibre within the cerebral hemispheres are; commissural fibres which made up the corpus callosum connect corresponding areas of the two hemispheres, association (arcuate) fibres connect different parts of the cortex of the same hemisphere and the projection which made up the internal capsule connect the cortex to lower centers (Ryan, 2004).

The basal ganglia is a subcortical grey matter which is made up of: corpus callosum (caudate and lentiform nuclei), amygdaloid body and the claustrum. The structures around the third ventricle are the thalamus hypothalamus and pineal gland. Together with the habenula these form the diencephalon. The brainstem connects the cerebral hemispheres with the spinal cord and extends from just above the tentorial hiatus to just below the foramen magnum. It has three parts; from superior to inferior, the midbrain, the pons and the medulla (Ryan, 2004).

The cerebellum lies in the posterior fossa. It is separated from the occipital lobe by the tentorium and from the pons and midbrain by the fourth ventricle. It is connected to the brainstem by three pairs of cerebellar peduncles: superior peduncle to the midbrain, the middle peduncle to the pons and the inferior peduncle to the medulla (Naheedy, 2003; Ryan, 2004).

There are four ventricles within the brain that contain cerebrospinal fluid producing choroid plexi. Two lateral ventricles are connected to the third ventricle via the midline foramen of Monro. The third ventricle is situated between the two thalami and is connected via the cerebral aqueduct to the fourth ventricle which is located in the posterior fossa between the pons and the cerebellum. The fourth ventricle drains via the foramina of Luschka and Magendie to the cisterna magna (Sherman, 1986).

These are some areas where the subarachnoid space is expanded to form deep spaces called cisterns. These cisterns are named according to nearby structures and include the cistern magna or cerebello-medullary cistern, suprasella cistern and pericallosal cistern (Sherman, 1986).

The brain derives its blood supply from the internal carotid arteries and the two vertebral arteries. Anastomoses exist between the internal and external carotid arteries but little or no blood supply to the brain is derived from the latter artery. The internal carotid artery terminates by dividing into anterior and middle cerebral arteries. The posterior cerebral artery is a terminal branch of the basilar artery. These three arteries form the circle of Willis. There are large low pressure veins within the folds of the dura called venous sinuses. They receive blood from the brain and the skull (diploic veins) and communicate with veins of the scalp and face (emissary veins). They are the superior sagittal sinus, inferior sagittal sinus, transverse sinus, sigmoid sinus, cavernous sinus, superior petrosal sinus and inferior petrosal sinus (Hayman 1981).

2.1 Computed Tomographic anatomy of the brain

Familiarity with normal brain anatomy on Computed Tomogram is essential for identification, characterization and localization of abnormalities.

An axial section through the temporal lobes, pons and the posterior fossa, (Figure 1) shows the temporal lobes in the middle cranial fossa and sometimes the temporal horns of the lateral ventricle may be seen within them. In the posterior fossa the pons lies anteriorly in the midline with the pontine cistern separating it from the clivus. The cerebellum occupies the remainder of the posterior fossa.

An axial section through the third ventricle, thalami and the internal capsule (Figure 2) show the brain surrounded by the frontal bone anteriorly, the temporal and parietal bones laterally and the occipital bone posteriorly. In the anterior part, the frontal horns of the lateral ventricles are seen close to the midline separated by the thin septum pellucidum. The lateral wall of the frontal horn is formed by the caudate nucleus. The trigone of the body of the lateral ventricles are seen posteriorly. The third ventricle is seen as a narrow slit like structure starting anteriorly just behind the frontal horns of the lateral ventricle. The upper part of the quadrigeminal cistern is seen with the posterior ends of the internal cerebral veins uniting here to form the great cerebral vein.

The anterior part of this section is occupied mostly by the frontal lobes which are separated by the inter-hemispheric fissure and and falx cerebri. The middle third contains the basal ganglia, thalamus, internal capsule, head of caudate nucleus, frontal horns of both lateral ventricles and the anterior limb of the internal capsule. The thalami lie on either side of the third ventricle and medial to the posterior limb of the internal capsule. The lentiform nucleus lies lateral to the internal capsule with the globus pallidus situated medially and the putamen laterally.

The posterior one third of this section is occupied by the posterior part of the temporal lobes and the occipital lobes. A small portion of the vermis and the superior vermian cistern can be seen in the midline between the leaves of the tentorium (Naheedy, 2004).

2.2 Prevalence of head injuries from Road Traffic Accidents.

Head injury is trauma or injury to the head and it is defined by loss of consciousness, amnesia or disorientation in a patient who is conscious (Stiell, 2002). Common mechanisms of injury are road traffic accidents, physical assaults, stab injury to the head, industrial accidents, sporting activities and falls from heights (Murshid, 1998; Thanni, 2003).

Head injury is an important cause of mortality worldwide (Akang, 2002). It is a major cause of disability and death in different countries (Alissa, 2003). The world health organization (WHO) report of the year 2004 on Road Traffic Accidents (RTA) showed that head injury from RTA leads to high morbidity and mortality in developing countries such as Africa, Latin America and Asia when compared to their counterparts in the developed world (Peden, 2004). Similar WHO report on Road Traffic Injury Prevention (RTIP) showed that RTA accounts for about 1.2 million deaths and 50 million injuries yearly (Peden, 2004). A study on road traffic injuries in developing countries by Odero et al in Kenyatta showed that nearly three quarter of RTA deaths occur in developing countries (Odero, 1997). The study in Ibadan noted that the incidence of head injury in Nigeria is not fully determined because of lack of national epidemiological database (Adeolu, 2005).

Several studies on head injuries that were done in Nigeria reported RTA as the commonest cause of head injury (Akang, 2002; Thanni, 2003; Ohaegbulam, 2011; Adeyekun, 2012). Similar study in Ghana reported RTA as the commonest cause of head injury in Ghanians (Obajimi, 2002). A study done in kenya showed that out of 192 head injury patients recruited, 51.2% were due to RTA (Martin et al, 2013). These reports are similar to the reports in countries outside Africa. A study done in Brazil on correlation between GCS and CT findings in head injury using 102 patients showed the common causes of head injury were in descending order: automobile accidents (52.9%), falls (20.6%), pedestrian injuries (10.8%), falls to the ground (7.8%) and physical assault (6.9%) (Stein, 1992; Morgado, 2011). Another study done in Iran using 432 patients also showed the causes of head injuries in similar order: car accidents (72.9%), violence (20.8%) and falls (6.7%) (Farshcian, 2012)

A study done Ibadan on aetiology of head injury in South West Nigeria involving 1541 patients that presented at the Accident and Emergency Department of UCH, Ibadan, showed that motor vehicular accident (MVA) - both passenger and pedestrian, and fall were the leading aetiological factors, accounting for 73.4% and 16.4%, respectively (Adeolu, 2005) However, similar study done in Ilorin showed motorbike (rider and passenger) to be the leading aetiological factors (Solagberu. 2006) Another study done in Ibadan on CT assessment of cranial and midfacial fractures in RTA patients reported that motorvehicle was the most common cause of RTA (66.9%). More passengers were involved in the motorvehicle (87.3%) and motorcycle (52.0%) accidents than their corresponding drivers. In this study, majority of the patients involved in pedestrian RTA were motorvehicle victims (93.3%) (Adeyinka, 2012).

In all ages, the incidence of head injury is higher in males than females (Ogunseyinde, 1999; Akang, 2002; Solagberu, 2003; Ohaegbulam, 2003; Adeolu, 2005; Adeyekun, 2013). A study done by in Lagos reported that the most vulnerable sex and age groups to head injury are men between 21 and 40years representing 35.4% of cases (Arogundade, 2000).

The study done in Ibadan showed the peak age of the patients to be between 30-39 years. Study done in Enugu showed a male to female ratio of 3.5:1. The same study showed that 33.9% of the patients were in the third and fourth decades of life (Ohaegbulam, 2011). A study in Benin showed the modal age group to be 21-30 years with male to female ratio of 4.3:1 (Adeyekun, 2012). Study by Gupta PK et al on CT scan findings of 382 head injury patients showed that the common age group was between 20-50 years (70.9%) and less than 13% were elderly (<60years). In this study males had higher incidence than females (Gupta, 2001) Similar studies in Brazil and Iran showed the mean age to be 25 + 5 (SD) years and 37.77 + 18.69 years respectively, with prevalence of male patients. However, a similar study done in Cameroun showed that the highest incidence of head injuries from RTA was in the 50-59 age group. The same study also showed that there was no sex difference in the population studied (Uduma, 2011).

Head injuries remain the leading cause of death in children and in young adults. In a study in Ghana, out of 41 children with head injury, the incidence of head injury was highest in the ages ranging from 5 to 9 years (Obajimi, 2002)

2.3 Computed tomographic scan findings in head injuries from Road Traffic Accidents

Extracranial radiological manifestations of head injury may include soft tissue swelling of the scalp, fractures which may be depressed, linear or stellate and may involve the vault, base of the skull, sinuses and orbits. Foreign bodies such as pieces of glass, metals, fragments etc can also be seen on CT scan in patients with head injuries (Obajimi, 2004). Intracranial manifestations include hematomas such as subdural, epidural, subarachnoid, intraventricular, intracerebral, cerebral contusion which could be hemorrhagic contusion, diffuse brain damage manifesting as multiple petechial hemorrhages, edema, aeroceles, pneumocephalus, intraparenchymal foreign bodies (Eze, 2011; Adeyinka, 2012).

A study done in Ibadan on CT scan evaluation of 236 head injury patients who had road traffic accident showed that 15.7% of these patients had normal findings on CT scan while 84.3% had abnormal CT scan findings (Adeyinka, 2012). Similar study done in Benin using 61 patients showed normal CT findings of 10 (5.1%) in these patients (Eze, 2011) However, the study done in Cameroun on accounting of pathology on head of RTA patients in Douala, using 94 patients showed the highest percentage of cases to be normal (Uduma, 2011)

A study done in India on CT scan findings in head injury patients from RTA in which 382 patients were studied revealed skull fractures 62.04%), intra-cerebral hematoma (46.33%), epidural hematoma (30.36%), subdural hematoma (19.37%), subarachnoid hematoma (28.79%), diffuse axonal injury, brain swelling and edema (63.35%), midline shift (24.34%), pneumocranium (12.04%) and intra-ventricular hemorrhage (10.73%) (Gupta, 2001) while another study showed 21 (34.4%) skull fractures , 21 (34.4%) intra-cerebral haemorrhage , 19 (31.2%) brain contusion , 18 (29.5%) paranasal sinus collection, 11 (18.0%) cerebral oedema, 10 (16.4%) subdural haematoma and 5 (8.2%) epidural haematoma (Eze, 2011). Over 80% of the subdural and epidural haematomas were associated with skull fractures. The study in Ibadan reported that majority of the patients with non-osseous findings were in the motor vehicle accident road user category 63.6%. Intracranial bleed 31.7% was the commonest non-osseous findings followed by soft tissue swelling 22.1% and then paranasal hematoma 20.1%. The incidence of cranial 68.9% and mid-facial 67.5% fractures was higher in the motor vehicle accidents. Generally, in all the categories of road users with cranial fractures, the temporal bone was the commonest fracture site 31.1%, while the occipital bone is the least frequent fracture site 10.3%. However, in the motor vehicle accident category, frontal bone is the most frequently involved fracture site75.8%, while the temporal bone was the commonest site for fractures in the motorbike accident category 21.6% and Pedestrian motorbike accounted for 13.5% accidents (Adeyinka, 2012).

2.4 Correlation of CT scan findings with clinical severity of head injuries using the Glasgow Coma Score (GCS)

The study done in Kenya showed that most RTA victims with head injury had moderate head injury (GCS score 9-13) (50.5%). In this study, the most common CT scan finding was Scalp injury (9.21%), followed by linear skull fracture (9.07%) and diffuse cerebral edema (8.64%). Also in this study, patients with moderate and severe head injuries of GCS 9-13 and < 8 respectively had severer CT scan findings such as Intraventricular hemorrhages and diffuse axonal injury (Martin, 2013). A study by Yates showed that nearly 11% were moderate to severe head injury, implying that mild head injury (89.1%) was the most common type and males were found to be at a higher risk for moderate to severe head injury than females (Yates, 2006)

2.5 Computed Tomography as the Gold standard in diagnosis of head injury from road traffic accidents.

Computed tomography is the modality of choice in evaluation of head injury (Valadka, 1993). CT gives rapid and accurate diagnosis of damages in the head from a simple lesions to more serious lesions such as intracranial hematoma, hemorrhage, and brain contusions (Obajimi, 2002).

The emergence of CT scanning in medicine in 1970s has brought many benefits to patients. Quick diagnosis of ongoing intracranial damage and the possible neurosurgical intervention afterward is the key to overcome life threatening events in head injured patients (Shoar, 2006) CT scan with multiplanar reformatted (MPR) and 3-Dimensional images allows good visualization of the brain and related structures. A study done on CT evaluation of trauma patients in Ibadan showed that CT offers excellent method of investigating head injury patients because it demonstrates intracranial or cerebral lesions which might be missed if CT is not done (Ogunseyinde, 1999).

A study done in Benin concluded that CT plays a very significant role in management of head injured patients and should be preferred as first line investigative modality (Adeyekun, 2012). Also, CT imaging time is faster making it very useful when dealing with severe injuries/emergencies. On brain window images the grey mater appears hyperdense (HU 35-45) compared to the white mater (HU 22-32). Blood vessels are isodense to the brain, with contrast administration they appear hyperdense to the brain. The bone is hyperdense (HU +1000) and shows smooth outline (Bushberg, 2002). Additional information can be obtained from CT scan by the use of contrast media (Tsai, 1978) Application of contrast media is most helpful in diagnosis of isodense subdural hematomas and contusions, as these lesions do not enhance postcontrast (Dublin, 1977).

CHAPTER THREE

METHODOLOGY

3.0 Study Area:

The study was carried out at the Computed Tomography suite in the Radiology department of University College Hospital (UCH), Ibadan, Oyo state. The radiology department is large department with two hundred and twenty medical and non-medical staff. This department is linked to all the clinics in the hospital, helping patients in diagnosis of their ailments. The UCH. Ibadan is one of the major referral centers for head injury patients in the southwestern region of Nigeria. It serves road traffic accident victims from different parts of the country. The University College Hospital, Ibadan is a tertiary hospital situated at the end of the busy Lagos-Ibadan dual carriage road. It has a large fifty bedded ward Accident and Emergency section that care for victims of road traffic accident.

3.1 Study Design:

This was a retrospective descriptive study design.

3.2 Study Population: The study population was all patients with head injury from RTA that had cranial CT scan done in the UCH. Ibadan.

Inclusion criteria : The inclusion criteria was all RTA patients with head injury who had cranial CT scan done in Radiology Dept. UCH, from the period of January 2013 to January 2014.

Exclusion criteria : The exclusion criteria was patients data that did not fit into the inclusion criteria.

3.3 Sampling strategy:

Total sampling strategy was used, all patients' data that fitted into the inclusion criteria were abstracted into the study.

3.4 Study instrument:

The proforma was used to collect the demographic and clinical data of the victims of RTA as well as radiological data from the CT scanner. The proforma was designed by the investigator. It contained details of the circumstances surrounding the accident and the findings on CT scan of the patients.

3.5 Study variables:

The Independent variable was type of vehicles. This was in two groups; Motorvehicle and Motorcycle.

The dependent variables were type of head injuries which had two groups namely (1) intracranial hemorrhages such as cerebral contusions, subdural, epidural, intraventricular, subarachnoid, cerebellar and brainstem hemorrhages and (2) skull fractures.

3.6 Data collection:

All CT images were obtained using a helical technique with a 64 slice multi detector Toshiba Aquillion CT scanner. The scanning parameters for unenhanced CT were 120KV minimum 512 X 512 matrix and 15cm field of view. Scan duration was about 5-10 minutes for all cases. Scans were taken from the posterior margin of the first cervical vertebral body and extended up to the vertex, with a 3mm section thickness through the base of skull and 7mm up to the vertex. To obtain maximal imaging acquisition, examination was tailored to the specific clinical indications in order to clearly demonstrate the injuries. Axial non-contrast images were acquired in all patients while coronal images were acquired where necessary. Only non-contrast images were acquired in order not to mask any features of acute trauma. The acquisition volume for the axial images was angled parallel to the superior orbitomeatal line to avoid irradiating the orbits. Coronal images were taken with the patient in a prone position and images are acquired in the anterior-posterior direction.

Comprehensive patient clinical data regarding age, sex, type and circumstances of injury were obtained from the patient case files by the investigator, over a period of one year between 1st of January 2013 and 1st of January 2014 using a proforma.

3.7 Data analysis:

The data was analyzed using Statistical Package for Social Sciences (SPSS version 16.0 Inc. Chicago Illinois). Relationship was obtained with chi-square tests at 95% confidence interval. There were significant relationships when P-value was less than or equal to 0.05 at 95% confidence interval. Frequency tables and proportions were used for data summarization and presentation of qualitative data. The Glasgow Coma Score (GCS) was used to determine the level of consciousness of the patients, it is one of the most common tools used by trauma care providers as it enables the graduation of head injury severity using simple observations rather than invasive or specialist techniques. According to the GCS, traumatic brain injuries are classified mild (3-8), moderate (9-12) or severe (13-15). This scoring system is composed of three tests which are eye opening, verbal response and best motor response . The eye opening has four grades, the verbal response has five grades while the motor response has six grades. The three values separately as well as their sum are considered. These grades are assigned according to the level of consciousness of the patients. The lowest possible GCS is three (deep coma) while the highest is 15 (fully awake).

3.8 Ethical considerations:

All the road traffic accident victims' information collected for the purpose of this study were given code numbers and no names were recorded. The data were safely kept in a personal computer system which was locked with a secret code.

3.9 Definition of terms:

Driver motorvehicle road traffic accident – Road users who are driving motors vehicle that involve RTA.

Passenger motorvehicle road traffic accident – Road users who are passengers inside the vehicle that involve in RTA

Comprehensive patient clinical data regarding age, sex, type and circumstances of injury were obtained from the patient case files by the investigator, over a period of one year between 1st of January 2013 and 1st of January 2014 using a proforma.

3.7 Data analysis:

The data was analyzed using Statistical Package for Social Sciences (SPSS version 16.0 Inc. Chicago Illinois). Relationship was obtained with chi-square tests at 95% confidence interval. There were significant relationships when P-value was less than or equal to 0.05 at 95% confidence interval. Frequency tables and proportions were used for data summarization and presentation of qualitative data. The Glasgow Coma Score (GCS) was used to determine the level of consciousness of the patients, it is one of the most common tools used by trauma care providers as it enables the graduation of head injury severity using simple observations rather than invasive or specialist techniques. According to the GCS, traumatic brain injuries are classified mild (3-8), moderate (9-12) or severe (13-15). This scoring system is composed of three tests which are eye opening, verbal response and best motor response . The eye opening has four grades, the verbal response has five grades while the motor response has six grades. The three values separately as well as their sum are considered. These grades are assigned according to the level of consciousness of the patients. The lowest possible GCS is three (deep coma) while the highest is 15 (fully awake).

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Driver motorvehicle road traffic accident – Road users who are driving motors vehicle that involve RTA.

Passenger motorvehicle road traffic accident – Road users who are passengers inside the vehicle that involve in RTA.

Pedestrian motorvehicle road traffic accident – Road users who area knocked down by a motorvehicle.

Rider motorbike road traffic accident – Road users who are driving motorbike that involve in RTA.

Passenger motorbike road traffic accident – Road users who are passengers of motorbike that involve in RTA.

Pedestrian motorbike road traffic accident – Road users who are knocked down by a motorbike.

Computed Tomography scan – Specialized tomographic x-ray machine used for diagnosing patients' injuries.

CHAPTER FOUR

RESULTS

4.0 Socio demographic characteristics of head injury patients from road traffic accidents.

A total of 205 patients who sustained head injuries following road traffic accidents and had cranial CT scan done between June 2013 to June 2014 were studied. They comprised of 172 (83.9%) males and 23 (16.1%) females with a male to female ratio of 7.5:1. The ages ranged between 3-81 years with a median of 32.0. Majority of the patients in this study were found in the first six decades of life with a decline in occurrence above 60 years. The most common cause of head injury in this study was motorbike road traffic accident (MBRTA) accounting for more than half of the injuries 63.4%, while motorvehicle road traffic accident (MVRTA) accounted for 36.6%, as shown in table 4.1 below.

Table 4.1: Socio demographic characteristics of the patients.

Characteristics	Frequency	Percentage (%)
Age group(years)		
<20	45	22.0
20-29	37	18.0
30-39	41	20.0
40-49	32	15.6
50-59	20	9.8
60+	30	14.6
Sex		
Male	172	16.1
Female	33	83.9
Highest Educational level		
Primary	43	21.0
Secondary	83	40.5
Tertiary	79	38.5
Types of RTA		
MVRTA	75	36.6

MBRTA	130	63.4
Total	**205**	**100.0**

Table 4.2: Age-Sex distribution of type of head injury patients based on type of vehicle.

Variables	**MVRTA** n(%)	**MBRTA** n(%)
Age group(years)		
<20	15(20.0)	30(23.1)
20-39	30(40.0)	48(36.9)
40-59	19(25.3)	33(25.4)
60+	11(14.7)	19(14.6)
Sex		
Male	63(84.0)	109(83.8)
Female	12(16.0)	21(16.2)
Road User		
Driver/Rider	35(46.7)	72(55.4)
Passenger	26(34.7)	33(25.4)
Pedestrian	14(18.7)	25(19.2)
Total	**75(100.0)**	**130(100.0)**

Table 4.2 shows the age – sex frequency distribution pattern of head injured patients from road traffic accidents. These patients were predominantly males in this study. In the MBRTA type there were more males (83.8%) than females likewise in the MVRTA type (84.0%). Majority of the MBRTA injured patients were in the 21-40 years age group (55.6%) and are all of them were males. In the MVRTA category, majority (57.6%) were in the 21-40 years age group, and were mostly males.

Table 4.2 also shows categorization of types of road traffic accident into MBRTA and MVRTA and road users into rider/driver, passenger and pedestrian. More (50%) drivers were involved in the MVRTA than passengers (18.9%). There were more riders (55.4%) involved in the MBRTA than their passengers (25.4%). Both driver MVRTA and rider MBRTA patients were predominantly males. There were more pedestrian MBRTA patients (19.2%) than pedestrian MVRTA patients (18.7%), and were mostly males. It is worth noting that there is no female in the motorbike rider group.

4.1: Evaluation of educational levels of the different road users.

Table 4.3 shows the educational levels of the different road users groups within the types of RTA. Generally, many of the patients had at least secondary education. Most of the motorbike riders had only primary education (81.9%), while few of these riders had had secondary education (9.7%) and had tertiary education (8.3%). Among the MVRTA patients, 40% of the drivers had primary education and 40% also had secondary education while 20% of them had tertiary education.

Table 4.3: Association between cause of injury and educational level of the road users

Variables	Educational level			Total	P-value
	Primary	Secondary	Tertiary		
MBRTA/MVRTA					
Rider	12(11.2)	50(46.7)	45(42.1)	107	
Passenger	18(31.0)	18(31.0)	22(37.9)	58	0.01
Pedestrian	13(32.5)	15(37.5)	12(30.0)	40	
MBRTA					
Rider	9(12.5)	31(43.1)	32(44.4)	72	
Passenger	6(18.2)	15(45.5)	12(36.4)	33	0.05
Pedestrian	10(40.0)	9(36.0)	6(24.0)	25	
MVRTA					
Rider	3(8.6)	19(54.3)	13(37.1)	35	

Passenger	13(46.2)	2(11.5)	11(42.3)	26	0.00
Pedestrian	5(21.4)	6(42.9)	4(35.7)	15	

4.2: Computed Tomography scan findings of the patients.

Out of the 205 road traffic accident patients evaluated, abnormal cranial CT scan findings were recorded in 74.6% patients, while normal findings were seen in 25.4% of the RTA patients.

4.3 Evaluation of the occurrence of intracranial hematomas and skull fractures in different types of road traffic accident

In table 4.4, it was shown that in all the head injury patients evaluated in this study, intracranial hematoma (57.6%) was commoner than skull fracture (42.7%). Specifically, in the MBRTA category, out of a total of 130 patients, 89 (68.5%) had intracranial hematoma. Out of these patients with intracranial hematoma, 58 (65.2%) had associated skull fracture, while 31 (34.8%) had only intracranial hematoma. Also in this category, there were more patients with intracranial hematoma (68.5%) than skull fracture (42.7%). In the MVRTA category, there were a total of 75 patients, 62.7% of these patients had intracranial hematoma. Out of the patients with intracranial hematoma, 53.2% had associated skull fracture, while 46.8% had only intracranial hematoma. There were more patients with intracranial hematoma (62.7%) than skull fracture (42.7%).

Table 4.4: Association between Intracranial hematoma and skull fracture in the types of road traffic accidents.

INTRACRANIAL HEMATOMA	SKULL FRACTURE Present	SKULL FRACTURE Absent	Total	χ2-value, P-value
MBRTA/MVRTA				
Present	83(61.0)	53(39.0)	136	
Absent	17(24.6)	52(75.4)	69	24.26,< 0.00
Total	100(48.8)	105(51.2)	205	
MBRTA				
Present	58(65.2)	31(34.8)	89	18.71,< 0.00
Absent	10(24.4)	31(75.6)	41	
Total	68(52.3)	62(47.7)	130	
MVRTA				
Present	25(53.2)	22(46.8)	47	
Absent	7(25.0)	21(75.0)	28	5.70,< 0.02
Total	32(42.7)	43(57.3)	75	

4.4 Intracranial hematomas in patients with head injuries from road traffic accident

Table 4.5 shows that in the MBRTA type of RTA, there were different forms of intracranial hematoma, many of which were mixed lesions seen in a single patient. The highest incidence of intracranial hematomas were seen in the rider motorbike patients 139 (70.6%), followed by pedestrians 42 (21.3%) and passengers 16 (8.1%). The most common form of intracranial hematoma among MBRTA patients was contusional hematoma 51 (25.9%) which was observed more in the motorbike riders 38 (27.3%), and least observed among the passenger motorbike patients 3 (18.8%). The remaining intracranial hematomas in order of deceasing frequency are; subdural 41 (20.8%), subarachnoid 26 (13.2%), intracerebral hematoma 24 (12.2%), epidural 22 (11.2%), intraventricular 18 (9.1%), intracerebellar 6 (3.1%), pons 5 (2.5%) and midbrain 4 (2.0%).

There were less intracranial hematomas in the MVRTA patients 100 (33.7%) when compared with the MBRTA patients 197 (66.3%). The highest incidence of intracranial hematomas was among the drivers 54 (54.0%), followed by the passengers 27 (27%) and pedestrians 19 (19%). The most common intracranial hematoma was contusional hematoma 31 (31%) which was observed in the motorvehicle drivers 17 (54.8%) and least observed in the pedestrians 6 (19.4%). The remaining intracranial hematomas in order of decreasing frequency are; subdural 18%, subarachnoid 17%, intraventricular 11%, intracerebral 10%, epidural 7%, cerebellar 3%, midbrain 2% and pons 1%.

Among MBRTA patients, intracerebral hematoma were more associated with skull fractures when compared with other intracranial hematomas. Among MVRTA patients, subdural and epidural were mostly associated with skull fractures than other intracranial hematomas.

Table 4.5: Association among forms of intracranial hematomas with types of RTA

Forms of Intracranial hematoma	Types of RTA		Total	P-value
	MBRTA	MVRTA		
Contusion	55(42.3)	31(41.3)	86	0.89
Cerebral	24(81.5)	10(13.3)	34	0.34
Subarachroid	26(20.0)	17(22.7)	43	0.65
Intravent	18(13.8)	11(14.4)	29	0.87
Subdural	41(31.5)	18(24.0)	59	025
Extradural	22(16.9)	7(9.3)	29	0.13
Cerebellar	6(4.6)	3(4.0)	9	0.83
Brainstem	4(3.2)	2(2.7)	6	0.84
Total	130	75	205	

4.5 Skull fractures in the road user categories.

In table 4.6, it was observed that the incidence of cranial bone fractures was higher in the MBRTA patients than in the MVRTA patients. In both types of RTA, cranial bone fractures were commoner (63.6%) in the motorbike riders and motorvehicle drivers (47.8%).

Generally, in all RTA patients who had cranial bone fractures in this study, the temporal bone was the commonest (20.5%) fracture site, while the frontal bone was the least (1.5%) common. Among the MBRTA patients, the temporal bone was the most (23.1%) fractured bone with the highest incidence among the motorbike riders. Also among the MVRTA patients, the temporal bone was the most often fractured bone. The highest incidence among the motorvehicle drivers.

Table 4.6 : Distribution of skull fractures among types of road users

Variables	Skull fractures				
	Frontal	Parietal	Occipital	Temporal	Total
MBRTA/MVRTA					
Rider & Driver	0(0.0)	11(10.3)	9(8.4)	24(22.4)	107
Passenger	1(1.7)	4(6.9)	1(1.7)	9(15.5)	58
Pedestrian	2(5.0)	5(12.5)	2(5.0)	9(22.5)	40
MBRTA					
Rider	0(0.0)	8(11.1)	7(9.7)	18(25.0)	72
Passenger	0(0.0)	3(9.1)	0(0.0)	6(18.2)	33
Pedestrian	1(4.0)	3(12.0)	2(8.0)	6(24.0)	25
MVRTA					
Driver	0(0.0)	3(8.6)	2(5.7)	6(17.1)	35
Passenger	1(3.8)	1(3.8)	1(3.8)	4(15.4)	26
Pedestrian	1(7.1)	2(14.3)	0(0.0)	2(14.3)	14

The proportion of skull base fractures in the types of RTA showed that fracture of the base of the skull was seen more among MBRTA patients (67.1%) than MVRTA patients (32.9%) that were observed in this study.

4.6 Comparing CT scan findings with the clinical severity of head injury using Glasgow Coma Score (GCS).

Table 4.7 shows severity of head injuries using GCS and their correlations with the types of road users. Among the MBRTA patients, there were generally more patients with moderate (42.3%) than mild (37.7%) and severe (19.2%). Moderate head injury also predominated in the rider (50.0%) and pedestrian (52.0%) MBRTA patients, while mild head injury predominated in the passengers (75.8%). In the MVRTA patients, there were generally more (45.3%) mild head injury than moderate (33.3%) and severe 21.3% head injuries. Mild head injury also predominated among the drivers, passengers and pedestrians.

Table 4.7: Severity of head injury using Glasgow Coma Score in RTA patients

Variables	Glasgow coma score			Total	P-value
	Mild	Moderate	Severe		
MBRTA/MVRTA					
Rider	28(26.2)	48(44.9)	31(29.0)	107	
Passenger	40(69.0)	13(22.4)	5(8.6)	58	0.00
Pedestrian	16(40.0)	19(47.5)	5(12.5)	40	
MBRTA					
Rider	15(20.8)	36(50.0)	21(29.2)	72	
Passenger	25(75.8)	6(18.2)	2(6.1)	33	0.00
Pedestrian	10(40.0)	13(52.0)	2(8.0)	25	
MVRTA					
Rider	13(37.1)	12(34.3)	10(28.6)	35	
Passenger	15(57.7)	8(30.8)	3(11.5)	26	0.47
Pedestrian	6(42.9)	5(35.7)	3(21.4)	14	

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	Mild	Moderate	Severe		
MBRTA/MVRTA					
Rider	28(26.2)	48(44.9)	31(29.0)	107	
Passenger	40(69.0)	13(22.4)	5(8.6)	58	0.00
Pedestrian	16(40.0)	19(47.5)	5(12.5)	40	
MBRTA					
Rider	15(20.8)	36(50.0)	21(29.2)	72	
Passenger	25(75.8)	6(18.2)	2(6.1)	33	0.00
Pedestrian	10(40.0)	13(52.0)	2(8.0)	25	
MVRTA					
Rider	13(37.1)	12(34.3)	10(28.6)	35	
Passenger	15(57.7)	8(30.8)	3(11.5)	26	0.47
Pedestrian	6(42.9)	5(35.7)	3(21.4)	14	

DISCUSSION

Head injury from road traffic accidents is an important cause of morbidity and mortality in developing countries such as Africa, Latin America and Asia when compared to their counterparts in the developed world (Peden, 2004). Findings from several studies on head injuries that were done in Nigeria and other parts of the world showed road traffic accident to be the commonest cause (Stein, 1992; Akang, 2002; Morgado, 2011; Ohaegbulam, 2011; Martin, 2013; Adeyekun 2013).

5.0 Socio-demographic characteristics of road traffic accidents patients.

In this study, the commonest cause of head injury was motorbike road traffic accident, of which motorbike riders had the highest frequency of head injuries. This is similar to the study done in Ilorin which showed motorbike to be the leading aetiological factor of head injury(Solagberu, 2006). Some studies done in Ibadan however showed motorvehicle road traffic accident to be the commonest cause of road traffic accident (Adeolu, 2005; Adeyinka, 2012). It may be that motorbikes are few in these studies or there is enforcement of traffic rules e.g use of helmet in the population studied.

In this study, most motorbike riders had primary education, many were also commercial riders. The motorvehicle drivers were better educated. The high incidence of road traffic accident in the motorbike riders group may be because of their poor knowledge of road signs and their low educational status. In addition, failure to use preventive gadgets like helmets and the bad state of the roads may be contributory.

The patients were predominantly males in both the motorbike RTA and motorvehicle RTA groups because males are more adventurous than females. Also because females tend to be more careful when driving vehicles.The highest incidence occurred in the age range 21 and 40 years. Similar trend was documented by several authors (Ogunseyinde, 1999; Arogundade, 2000; Akang, 2002; Bordignon, 2002; Adeyekun, 2013). The high incidence of head injury in the 21-40 years age group found in this study and other reported studies (Ohaegbulam, 2011; Adeyekun, 2013) may be due to the youthful exuberant in this age group. In Ibadan, a study recorded higher number of males than females i.e 402 males and 127 females. Similar observation was made in Lagos, when it was documented that 32 (66.7%) of RTA victims were males and 16 (33.3%) were females (Arogundade, 2000). Similar studies in India and

Cameroun also documented higher involvement of males in RTA (Gupta, 2001; Uduma, 2011). In our study, it is worth noting that there was no female rider among the motorbike riders. All these reports as in our present study all support the fact that males more often sustain head injuries from road traffic accidents. The predominance of males may be due to their more involvement in driving motorvehicles and motorcycling in Nigeria. Also may be due to males' nature of not being as calm as females.

5.1 Pattern of head injuries on Cranial Computed Tomography

In this study, abnormal CT scan findings were seen in 74.6% of the patients. This figure is in consonance with values of 74%, 61%, 80% and 84.3% for abnormal CT scan findings from previous studies on head injuries (Ogunseyinde, 1999; Ohaegbulam, 2011; Adeyinka, 2012; Adeyekun, 2013). However, a study in Cameroun reported the highest normal CT scan findings in RTA patients, this could be false positive result since CT scan has a reduced sensitivity in detecting diffuse axonal injuries and cerebral concussions (Uduma, 2011). The abnormal CT scan findings in the our patients were: fractures, contusional hematoma, intracerebral hematoma, subarachnoid hematoma, intraventricular hematoma, cerebellar hematoma, brainstem hematoma, subdural and epidural hematomas. In this study, these abnormal CT scan findings were commoner in the second to the fourth decades of life, supporting the report from Lagos (Arogundade 2000).

5.2 Proportion of intracranial hematomas of the patients that had abnormal CT scan findings.

This study showed intracranial hematoma was commoner than skull fractures. Some authors in Benin (Eze, 2011; Adeyekun 2013) also reported lower prevalence of skull fractures in their respective studies. Studies conducted in Ibadan (Ogunseyinde, 1999; Akang, 2002) reported 17.4% and 38.2% of intracranial hematomas respectively. A higher figure, 62% was recorded in a study in India (Gupta, 2001). A lower figure of 10.4% has been reported in a study in Lagos (Arogundade, 2000).

Contusional hematoma was the commonest intracranial hematoma in this study, followed by subdural hematoma in both motorbike road traffic accident patients and motorvehicle road traffic accident patients. Some authors have reported subdural hematoma as the commonest hematoma (Ogunseyinde, 1999; Arogundade, 2000) while some other authors have reported epidural hematoma as the commonest intracranial hematoma in their studies (Stein, 1992; Obajimi, 2002). In a study in Iran, subarachnoid hematoma was reported as the commonest intracranial hematoma (Bordignon, 2002). Contusional hematoma featured prominently in this present study which agrees with a report from Ibadan where contusional hematoma occurred in 22.1% of their cases (Akang, 2002). Among the motorbike road traffic accident patients in this study, intracerebral hematoma was the most common intracranial hematoma that was associated with skull fractures. Subdural and epidural hematomas were mostly associated with skull fractures among the motorvehicle road traffic accident patients. This is in consonance with a report from Ibadan (Ogunseyinde, 1999) that showed fracture were observed more in patients with intracerebral hematoma than subdural hematoma and other intracranial hematomas. In addition, a study reported that out of 11 cases with intracerebral hematoma, 7 cases were associated with skull fractures (Bordignon, 2002). A study done in Ibadan showed that most of subdural and epidural hematomas were associated with skull fractures 80% (Adeyinka, 2012), this is in consonance with our findings for the motorvehicle road traffic accident patients. These CT scan findings clinically implies that intracranial hematomas such as epidural and subdural are commonly associated with skull fractures, hence should be carefully looked for in patients with skull fractures.

The commonest cranial bone fracture in this study was the temporal bone, 30% was observed among the motorbike road traffic patients and 12% among the motorvehicle road traffic accident patients. This is in concordance with another report of a study conducted in Ibadan by which showed temporal bone 31.1% as the commonest cranial bone fracture (Adeyinka, 2012).

It is important to note that the differences in CT scan findings in intracranial hematoma and skull fractures by the different authors may have been due to the differences in patients selection, severity of head injury and interval between the accidents and carrying out the CT scan.

5.3 Correlation of the severity of head injury using the Glasgow coma score with the types of road traffic accident patients.

There were more patients with moderate head injury(GCS 9-12) than mild head injury (GCS 13-15) and severe head injury(GCS 3-8) among the motorbike road traffic accident patients in this study. Mild head injury was however more among the motorvehicle road traffic accident patients. Study done by Martin et al showed that most, 50.5% of the road traffic accident patients with head injury have moderate head injury(Martin, 2013). However, another study observed that nearly 11% of the road traffic accident patients were moderate to severe, implying that mild head injury 89% was the most common type seen in his study(Yates, 2006). This clinically implies that there is increased severity of head injury in victims of motorbike accident than motorvehicle accidents. Increased mild head injury as seen in the motorvehicle accidents connotes a better prognosis in the management of these head injured patients.

5.4 Public health significance of this study

This study shows the magnitude of the health burden posed by road traffic accidents to the society. Head injury was an important injury caused by RTA among other injuries. The youths which constitute the productive age group of the society were mostly vulnerable to this menace as seen in this study. Males were more involved in RTA than females because of their adventurous nature. All these findings corroborated what have been reported by other studies, which connote that road traffic accident is a global burden, but worse in developing countries like Nigeria.

Motorbike accident was the commonest type of road traffic accident in this study and the road user category most affected were the motorbike riders. These riders had low educational levels, many of which may not be accustomed with the traffic rules and regulations.

Significantly, there were more abnormal CT scan findings in the RTA patients in this study, as were also seen in other previous studies. This implies high possibility of morbidity and mortality for every incidence of road traffic accident. This study evaluated the various lesions from RTA and their association with one another. It was also shown that victims with low Glasgow Coma Score are likely to have severe head injury findings. Most of the lesions from head injuries are mixed implying a longer hospital stay for the victims. This constitutes an economic and social burden for the victims' families and other care givers.

This study demonstrated the importance of CT scan in diagnosing head injury. However, CT scan is relatively costly and unevenly distributed in the country. Most victims of RTA are indigents who may not be able to afford the cost of this investigation.

5.5 Limitations of the study.

The retrospective nature of the study limited the completeness of the information available for retrieval in the case notes. Demographic details of some patients could not be analyzed due to inaccurate records. Some patients could not be included in this study because their case files were missing. These limitations were ameliorated because the sample size for this study was calculated using an attrition rate of 10%. Despite these limitations, we were able to get more than the minimum sample size that was calculated.

CONCLUSION

This study highlighted a high prevalence of head injury from road traffic accident especially in men between the ages of 21-40 years. The commonest cause of head injury was motorbike road traffic accident, with the highest incidence among the riders. There were different types of intracranial injuries such as skull fractures and intracranial hematomas in the CT scan findings of road traffic accident victims. These injuries were more in the motorbike riders and motorvehicle drivers. Contusional hematoma was the commonest intracranial hematoma while temporal bone fracture was the commonest skull bone fracture.

Using the Glasgow coma score for clinical severity of injuries showed that moderate head injuries were commoner in motorbike RTA victims, while mild head injuries were commoner in motorvehicle RTA victims. The high yield and diversity of CT scan findings in head injured patients justifies CT scan as the appropriate and the standard diagnostic tool for the management of head injured patients from road traffic accident.

RECOMMENDATIONS

In view of the findings from this study, I will like to make the following recommendations:

1. Continuous efforts should be made by government for the re-enactment of laws aimed at reduction of head injuries from RTA.

2. Appropriate authorities should re-enforce the universal usage of seat belts and helmets, and monitor the effects of compliance.

3. Policy makers should ban use of commercial motorbikes on our major roads.

4. Efforts should be made by government, corporate organizations and individuals to procure more CT scanners for diagnosis of head injuries.

5. Research on the different ways of managing head injuries should be encouraged at all levels. Results of such studies should be disseminated appropriately to the policy makers.

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APPENDIX 1

DATA SHEET

TITLE: computed tomographic patterns of head injuries in road traffic accident patients seen in University College Hospital, Ibadan.

SECTION A: BIODATA

1. Age in years: ....
2. Sex (M) (F)
3. Nationality/Tribe: ....
4. Marital status: (a) Single (b) Married (c) Divorced (d) Widow
5. Highest level of education ....
6. Occupation ....

SECTION B : TYPES OF RTA

(a). Motorbike RTA

(b). Vehicular RTA

(c). Pedestrian RTA

SECTION C: EVENTS OF INJURY

1. Date of injury: ....
2. Time at presentation to the nearest health facility ....
3. Type of health facility (source of referral) (a) Primary (b) Secondary (c) Tertiary
4. Number of hours/days between injury and presentation in UCH. Ibadan ------------
5. Mode of transportation to the hospital (a) Ambulance (b) Bus (c) Car (d) Motor Bike

SECTION D: IS THERE ANY OF THE FOLLOWING?

1. Loss of consciousness (A) Yes (B) No

If yes, please answer the following questions

Immediate but recovered after .... minutes Immediate and sustained

Delayed (Please state time elapsed before patient lost consciousness ....hours/days)

2. Bleeding from craniofacial orifices (a) Yes (b) No
3. Facial asymmetry (Facial nerve palsy) (a) Yes (b) No

SECTION E: FEATURES OF HEAD INJURY ON CT SCAN

(i) Cerebral contusion (a) Yes (b) No

(ii) Cerebral concussion (a) Yes (b) No

(iii) Intracerebral hemorrhage (a) Yes (b) No

(iv) Intraventricular hemorrhage (a) Yes (b) No

(v) Extradural hemorrhage (a) Yes (b) No

(vi) Subdural hemorrhage (a) Yes (b) No

(vii) Subarachnoid hemorrhage (a) Yes (b) No

(viii) Cerebellar hemorrhage (a) Yes (b) No

(ix) Brainstem hemorrhage (a) midbrain (b) pons (c) medulla

(x) Skull fractures:

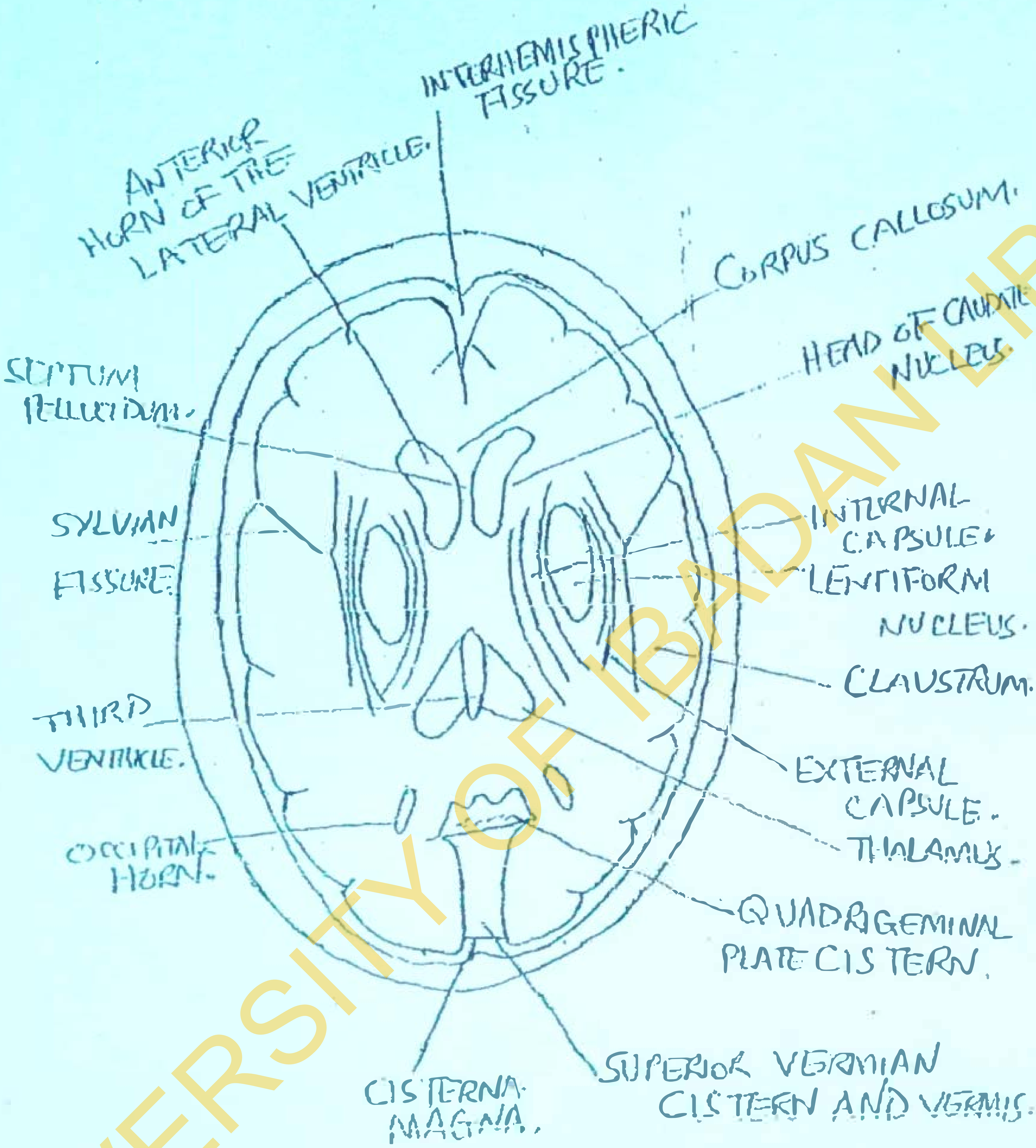
(a) Frontal (b) Sphenoid (c) Ethmoid (d) Occipital (e)Temporal

(xi) Incidental findings

(a) Intracranial tumors ....

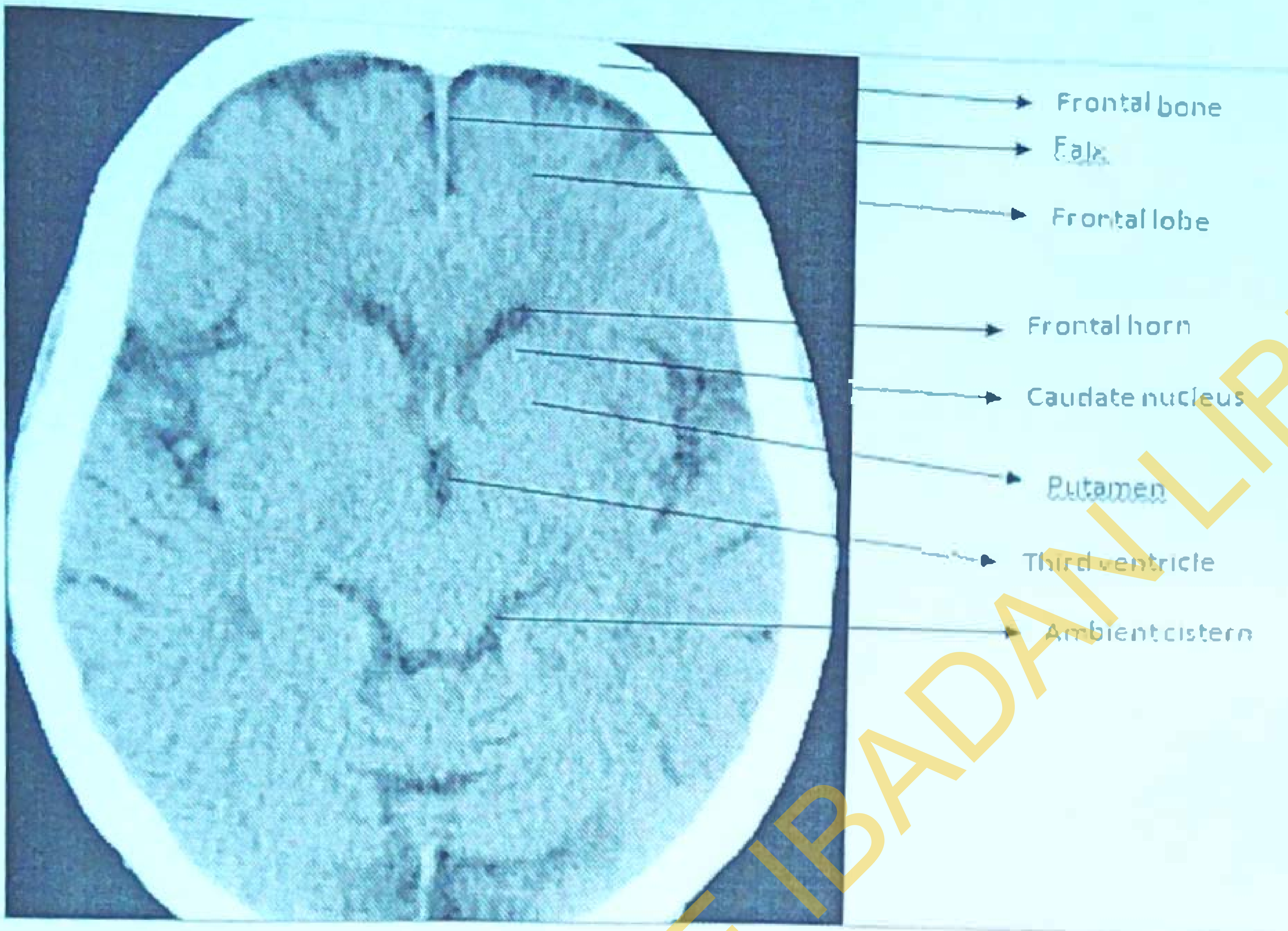
(b) Bony lesions e.g Fibrous dysplasia ....

APPENDIX 2



Axial section through the lateral ventricles.

APPENDIX 3



Axial noncontrast CT image of the brain at the level of the third ventricle