Computerized Tomography Findings in Patients with Stroke in Ado-Ekiti, Southwestern Nigeria

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Abstract

Aim: *Stroke is a major cause of morbidity and mortality worldwide. Currently, non-contrast computerized tomography scan remains the primary imaging modality for the initial evaluation of patients with suspected stroke. This study aims to document the Computerized tomography (CT) findings, pattern and the demographic features of stroke in Ado-Ekiti, South-Western Nigeria.*

Materials and Methods: *We retrospectively reviewed CT findings of 56 patients with clinical diagnosis of stroke who presented at a private diagnostic facility in Ado-Ekiti over a period of 1 year. The demographic and clinical data as well as the CT findings were recorded. Evaluation was done by two consultant radiologists.Data analysis was performed using Statistical Packages for Social Sciences (SPSS) version 17.0.*

Results: *Out of the 56 patientsreviewed,35 (62.5%) were males while 21 (37.5%) were females. The ratio of male to female was 1.7:1. The mean age was 65.5 ±12.9 with a range of 42-95 years. More than two-third (76.8%) of all stroke occurred in patients above 60 years. Majority of the patients (76.8%) had ischaemic stroke. There is no statistically significant difference between male and female with ischaemic stroke p=>0.527. Less than one third (19.6%) had haemorrhagicwhile very few (3.6%) had combination of both haemorrhagic and ischaemic stroke*

Conclusion: *This study shows that Infarctive stroke is comoner than haemorrhagic in among the patients and majority occurred in the elderly patients. Computer Tomography is a very useful tool in making the diagnosis of stroke as well as differentiating haemorrhage from infarction which is helpful in the management of stroke patients.*

Keywords: *Computerized tomography, stroke, hemorrhage, infarction, Ado-Ekiti*

I. Introduction

Stroke is defined as a clinical syndrome consisting of rapidly developing clinical signs of focal or global disturbance of cerebral function lasting more than 24 hours or leading to death with no apparent cause other than a vascular origin.[1] Stroke is synonymous with the word "cerebrovascular disease (CVD)", and therefore, may be used interchangeably.

CVD is the most common cause of neurological morbidity and mortality in adults, [2] with ischemic stroke accounting for the majority of cases (80%) globally.[1] The onset of symptoms may be sudden, especially in the hemorrhagic type or gradual in the ischemic type.[3]

With advances in technology, imaging has become integral part of work-up for the evaluation and management of acute stroke patients.[4-6] The goal of early brain imaging in stroke is to exclude intracranial hemorrhage, identify ischemic change, and exclude stroke mimics. Imaging also allow assessment of the intracranial and extracranial vasculature and facilitates delineation of the status of cerebral perfusion. It also helps in demonstrating the infarct core, as well as the penumbra-the identification of which may aid future management.[1,7]

Computerized tomographic (CT) scanning is currently the gold standard imaging method in the examination of patients presenting to the emergency department with acute focal neurological deficit. This is because CT has certain advantages over other imaging modalities which include reliability in showing clear difference between cerebral infarction and hemorrhage as well as its relative availability.[7] These advantages of CT have changed the way CVD is managed globally. The availability and utilization of this imaging modality has significantly reduced mortality and morbidity from CVDs by way of prompt diagnosis, guided intervention, and follow-up.

The aim of this study is to document the CT scan findings in stroke patients in Ado-Ekiti and its environs, between May 2016 and June 2017. No documented evidence in literature exists for this environment.

The findings may assist physicians to better evaluate and manage patients with CVD in other to improve prognosis.

II. Materials and Methods

<45	1 (20.0)	3 (60.0)	1 (20.0)	5 (100)
45-60	5 (35.7)	9 (64.3)	0 (0.0)	14 (100)
>60	5 (13.5)	31 (83.8)	1 (2.7)	37 (100)

Brain CT images of 56 patients with a clinical diagnosis of stroke who were examinedbetween May 2016 to June 2017 were retrieved from the archives of a private diagnostic facility located at Ado-Ekiti. Spiral whole-brain CT examinations were carried out on a Siemens Somatom 16 helical multi-detector CT machine. The following protocols were used: axial sections parallel to the orbito-meatal (OM) line; for better visualization of the circle of Willis, 2-3 mm thickness sections of the sellar and suprasellar regions was adopted, while 5 mm sections was used for the remainder of the brain up to the vertex. No contrast was given to patients that presented within two weeks of onset of symptoms.

The images were reformatted for a better analysis. To improve sensitivity and specificity, variable window settings with window width of 20-80 Hounsfield units (HU) and window center of 20-35, were used during image evaluation as shown by Lev *et al.*,[8]

The following data were recorded which included patients' age, gender, duration of onset of symptoms, and clinical presentation.

The various findings on the CT scan images of each patient were retrieved from the archives and reviewed   by   at   least   two   radiologists. The CT images were evaluated for presence of hemorrhage; presence of infarction; site of hemorrhage or infarction and evidence of arterial thrombus. Intravenous contrast was given to patients with features suggesting mimics of CVD to confirm the diagnosis, hence were not included in the review.

Data analysis was performed using Statistical Packages for Social Sciences (SPSS) version 17.0. The data was summarized using frequencies, proportions and means while tables and charts were used to present the data.

III. Results

Fifty-six patients were reviewed within the period of which 35 (62.5%) were males while 21 (37.5%) were females, with a male to female ratio of 1.7:1. The age range was 42-95 years with a mean of 65.5 and standard deviation (SD) of 12.9, however, 37 (66.7%) patients were above 60 years of age table 1. There was a male predominance among 11(19.6%) patientsthat had haemorrhagic stroke as illustrated in table 2. Majority (76.8%) had infarctive stroke of which 26 (60.5%) were males while 17 (39.5%) were females. Only male (3.6%) patients were found to have the combination of both haemorrhagic and infarctive stroke. According to the distribution of the stroke; bilateral hemispheric involvement was the commonestin about a third of the patient while affectation of the right and left hemisphere were seen in 19.34% and 11.20% respectively figure 1. Figures 2 and 3 show images of haemorrhagic and infarctive strokes respectively.

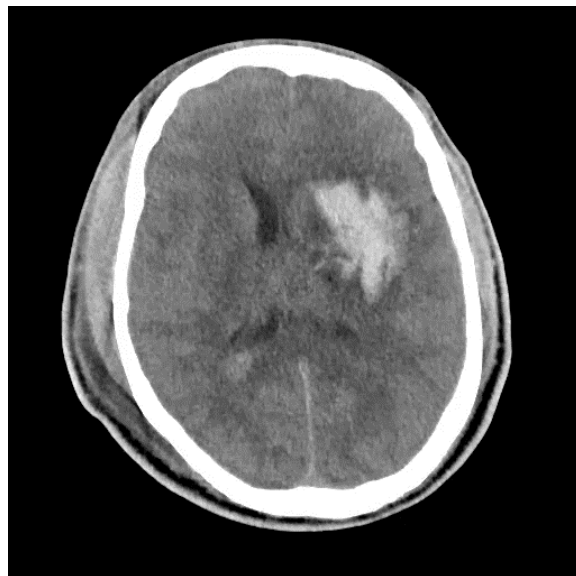**Table 1**. Age Distribution of the participants

Age (years)	N(%)
<45	5(8.9)
45-60	14(25.0)
>60	37(66.1)

Table 2: Distribution of stroke types according to age groups

Age	Haemorrhagic n(%)	Infarctive n(%)	Mixed n(%)	Total N(%)
<45	1 (20.0)	3 (60.0)	1 (20.0)	5 (100)
45-60	5 (35.7)	9 (64.3)	0 (0.0)	14 (100)
>60	5 (13.5)	31 (83.8)	1 (2.7)	37 (100)
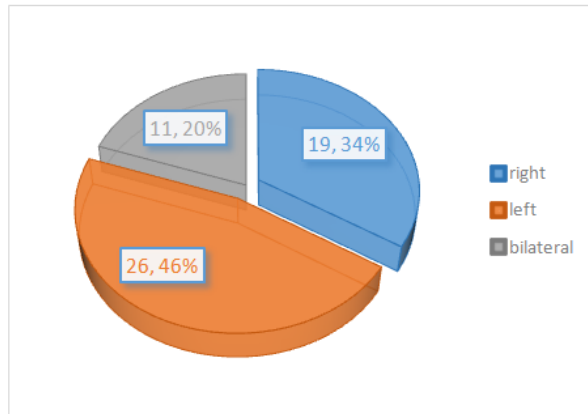
Figure 1: Pie chart showing hemispheric distribution of the CT findings.

Figure 2: Left hemispheric intracerebral haemorrhage of one of the patients.

Figure 3: Cerebral infarction affecting both front-parietal lobes

IV. Discussion

Rapid evaluation of stroke patients becomes necessary as the population and therapy options expand. One important aspect in the evaluation of stroke patients is imaging. Currently, non-contrast CT remains the primary imaging modality for the initial evaluation of patients with suspected stroke.[4] CT scan has been shown to be useful in identification of early features of stroke and most importantly will exclude lesions that might mimic stroke such as tumours[9]

The result of this review showed that majority (66.1%) of the strokes occurred in patients above 60 years of age. This is contrary to what was obtained in studies from the north eastern and south eastern Nigeria where it was reported that stroke was more common in patients younger than 65 years of age.[4,10,11] However, this result agrees with findings from advanced countries which documented that the burden of stroke is greatest in the elderly.[12] This is probably due to the fact that people from the South-western Nigeria have better access to education as compared to people from other regions of the country[13] therefore, are likely to be more conscious of their health.

This study also revealed that cerebral infarction constituted 76.8% of all cases of stroke while 19.6% had intracranial haemorrhage. This is in agreement with the results of previous studies from across Nigeria which reported a higher prevalence of ischaemic than haemorrhagic stroke.[4,11,14] We did not find any gender predilection across all age group in the prevalence of stroke. This is similar to the report of Eze et al[4] in the north-eastern part of Nigeria.

Haemorrhagic stroke was found to be commoner among the older age group. Eze et al[4] in Enugu, Southeast- Nigeria reported that haemorrhagic stroke was more common in patients between 60 and 90 years of age. This is however in contrast to the findings of Ikpeme et al [11]in Calabar , which showed that haemorrhagic stroke was more common in patients below 48 years of age. In that study, their findings was attributed to early exposure to smoking, sedentary lifestyles, smoking and alcohol by young males in Calabar Nigeria.

Iscaemic stroke was also found to be prevalent in patients above 45 years of age which is also similar to what was reported by Eze et al[4] who stated that isceamic stroke was seen in the 50-59 year age group.

Similar to the finding of Ikpeme et al[12] who reported only one case of subarachnoid hemorrhage among their 87 patients. They also documented more affectation of the left cerebral hemisphere than the right similar to our findings. Similarly, we dd not find subarachnoid haemorrhage in all our patients.

V. Conclusion

Although this is a review from a single centre,coupled with small sample size, the result cannot be generalized over the whole South-western Nigeria. However, this study has revealed that infarctive stroke is comoner than haemorrhagic stroke in Ado-Ekiti area and also shows that males are more affected than females. CT is a very useful tool in making quick and accurate diagnosis of stroke, differentiating haemorrhage from infarction in other to institute prompt and appropriate therapy for patients with stroke. This will help reduce the morbidity and mortallity that is usually associated with stroke.

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