

Full Length Research Paper

An auditing of brain computed tomograms of cerebro-vascular accident patients in Douala, Cameroon

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Cerebro –vascular accident (CVA) is the sudden onset of focal neurological deficit resulting from brain infarction/ischaemia or vessel injury. It is a common debilitating ailment seen in hypertensive and diabetics patients. Differentiation of CVA sub-types is the bedrock of corresponding management. The aim of this work is to audit the brain computed tomograms of cerebro-vascular accident patients in Douala, Cameroon. A prospective study of brain computed tomograms (CT) of concurrent patients with provisional diagnosis of CVA was done. Study duration was 11 June, 2009 to 3 December, 2009. Shumadzu CT scan machine with continuous rotational system was used. It was conducted in Polyclinic Bonanjo, Douala. A total of 41 patients comprising 68.29% (n=28) males and 31.71% (n=13) females in the age range of 1-89 years and mean age of 44.5 years were evaluated for CVA. The number of CVA cases was 13.05% of all brain CT done in same period. Highest incidence of CVA was 24.39% in the 60-69 age range. 30 cases (73.17%) had obvious features of CVA, shared into haemorrhagic CVA (26.67%) and ischaemic (73.33%). The commonest regional localizations were parietal and frontal cerebral lobes. Cerebral atrophy was 11 cases (26.83% of all clinical diagnosed CVA). Ischaemic CVA is more common than haemorrhagic. The middle cerebral arteries followed by anterior cerebral artery are the commonest vascular territories affected.

Keywords: Cerebro-vascular accident, ischaemic, haemorrhagic, computed tomography.

INTRODUCTION

Cerebro-vascular accident (CVA) is a neurological deficit which results from sudden loss of blood circulation to an area of the brain. Transient ischaemic attack is a forerunner to CVA and is considered a mini-stroke since it usually lasts for a few minutes to few hours (Daffertshofer et al., 2004).

CVA is broadly classified as either haemorrhagic or ischaemic (Onwuchekwa and Onwuchekwa, 2008; Dahnert, 2007). The exact sub-type determines the type of treatment (Onwuchekwa and Onwuchekwa, 2008). CVA is the most common cause of disability in the world

among adults (Lyden, 2008). CVA is fast becoming a major cause of morbidity and mortality in Nigeria like in other developing countries (Komolafe, 2007). A survey in India with age standardization, using the US population as reference showed prevalence rate of 244-424 per 100,000 (Kumar et al., 2009). It remains one of the spectra of neurological disorders for which physicians are potentially able to completely reverse the disabling deficits (Lyden, 2008).

Computed tomography (CT) has been found to be a gold standard in differentiating the two sub-types of CVA viz haemorrhagic and ischaemic (Onwuchekwa and Onwuchekwa, 2008). But the salvageable ischaemic penumbra is best achieved with perfusion imaging of CT and Magnetic resonance imaging (MRI) (Provenzale, 2008).

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Table 1. Studied population.

Age(years)	Males	Females	Total
0-9	0	1	1
10-19	0	1	1
20-29	1	0	1
30-30	2	0	2
40-49	3	2	5
50-59	8	1	9
60-69	9	1	10
70-79	3	4	7
80-89	2	3	5
90-99	0	0	0
Total	28	13	41

Aim

This work aims to audit the brain computed tomographic pattern among cerebro-vascular accident patients in Douala, Cameroon with special reference to haemorrhagic or ischaemic subtypes.

MATERIALS AND METHODS

A prospective study of consecutive patients who came to the Department of Radiology, Polyclinic Bonanjo, Douala, Cameroon for brain CT was done. A strict inclusion criterion was a provisional diagnosis of CVA from a clinician. Study period was from 11 June, 2009 to 03 December, 2009. The clinical data of patient were obtained prior to brain CT examinations. CT examinations were performed using Shumadzu CT scan machine with continuous rotational system. Serial axial slices of the skull/brain using slice tissue thickness of 2 mm from the base of the skull and 5 mm above the sella turcica respectively were taken. Coronal and sagittal reconstructions were done when required for assessment of depth of intra-cranial bleed or infarction. Contrast images were performed when necessary using a bolus of 40-60 mls of non-ionic contrast medium (Iopamidol 300 mg Iodine per millimetre). Ethical review committee approval and patients' consents were requested for. Exclusion criteria include normal brain CT findings and poor quality images. Data were analysed using Excel software package.

RESULTS

A total number of 41 patients had positive CT findings. This constitutes 13.05% of all brain CTs done for any indications. Studied age range was 1-89 years. 28 males (68.29%) and 13 (31.71%) females had CVA CT features with male –female ratio of 2.15:1. The highest

number of CVA were 10 cases seen in 60-69 age range with incidence of 24.39% while the lowest incidence was 2.43% in 20-29.

30 brain CT had positive features of either haemorrhagic or ischaemic CVA. Eight of these cases (26.67%) had haemorrhagic sub-type and 22 cases (73.33%) were ischaemic subtype. In terms of regional localisation, haemorrhagic stroke commonest site was parietal 46.15% with right to left ratio of 5:1. Least site was temporal lobe (7.69%). In ischaemic subtype, the commonest site is also parietal lobe (23%) with right to left ratio of 1:2. Least is also the temporal lobe with 0%.

Mass effect and cerebral oedema were seen in all cases of haemorrhagic sub-type (Table 2) whereas cerebral atrophy was restricted to ischaemic cases (Table 3). Majority of the ischaemic type affected the deep white mater.

In haemorrhagic CVA, right cerebral hemisphere is more affected than left whereas left cerebral hemisphere is more affected than right in ischaemic CVA in this study.

5 cases of ischaemic sub-types had hemispherical involvement (Figure 1-3, Table 4).

11 patients constituting 26.83% of CVA cases had cerebral atrophy with male –female ratio of 1.75:1. Nine (81.81%) of these patients with cerebral atrophy were 50 years of age and above (Table 1).

DISCUSSION

A profound bias for ischaemic subtype of CVA (73.33% ischaemic and 26.67% haemorrhagic CVA) was seen in this study. This is corroborated by other studies showing same pattern of ischaemic predominance (Onwuchekwa and Onwuchekwa, 2008; Komolafe, 2007; Kehinde et al., 2006). This predominance might not be unconnected with multiple pathogenetic factors and synergy in ischaemic CVA. Ischaemic CVA is often due to diseased cerebral blood flow from extra-cranial embolism, intra-cranial thrombosis or flow disturbance. Whereas haemorrhagic

Table 2. Pattern of haemorrhagic CVA.

Age(Yrs)	Male	Female
0-9	0	0
10-19	0	0
20-20	0	0
30-39	1	0
40-49	2	0
50-59	4	0
60-69	0	1
70-79	0	0
80-89	0	0
90-99	0	0
TOTAL	7	1

Table 3. Pattern of ischaemic CVA.

Age(Years)	Males	Females
0-9	1	0
10-19	0	1
20-29	1	0
30-39	0	1
40-49	1	2
50-59	4	2
60-69	2	0
70-79	4	2
80-89	0	1
90-99	0	0
TOTAL	13	9

Table 4. Ischaemic cerebral localisation.

Frontal	5
Parietal	9
Temporal	0
Occipial	2
Basal ganglia	3
Brain stem	0
Hemispherical	5

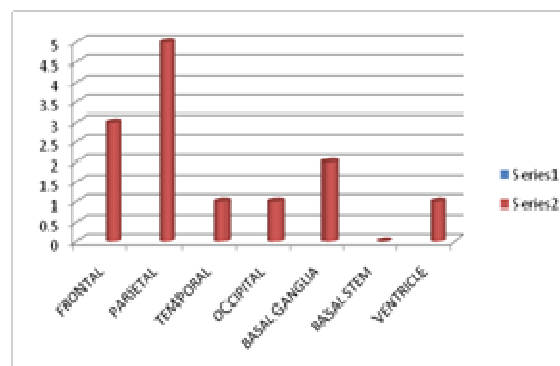


Figure 1. Chart of regional localisation of haemorrhagic CVA.

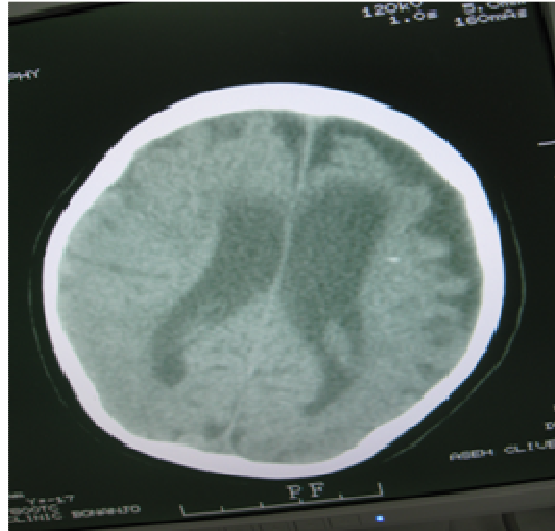


Figure 2. Axial cranio-cerebral CT at ventricular level. It shows left peri-ventricular hypointensity(Ischaemic CVA) with ipsilateral cerebral atrophy.

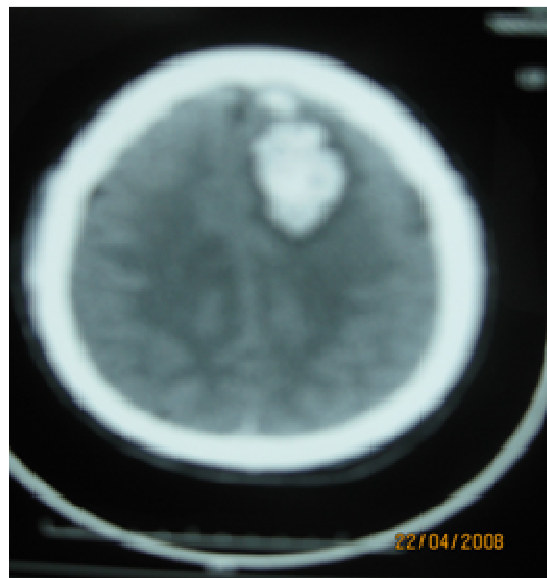


Figure 3. Axial supra-ventricular brain CT showing left frontal intracerebral haematoma(Haemorrhagic CVA) with focal vasogenic edema.

stroke is due to rupture of a vessel, aneurysm or hypertension. But this blood leak with vasogenic edema and coagulation necrosis of the brain will become a vicious cycle compromising cerebral blood flow with subsequent initiation of brain ischaemia (Cox, 2008). It is noteworthy that evaluation of aetiology of CVA and recurrence are outside the scope of this study. These are reserved for future studies to give further in-depth analysis of CVA in this part of the world. However, it is noteworthy that annual reported recurrence of CVA in

United States is 200,000-700,000 (Liao, 2007). Also 17% of CVA patients are likely to have a second episode within the next 5 years and recurrence rates are similar across sub-type (Hillen, 2003).

We acknowledge the snag of this study is the very short prospective study period and a consecutive small patient cohort analyzed. The exclusion of normal CT findings even with clinical provisional diagnosis of CVA from our analysis actually diluted our positive findings. This normalcy could well be false negatives since CT

sensitivity is only 48% on the day of ischaemic CVA ictus increasing to 59%, 1-2 days later; 66%, 7-10 days later and 74%, 10-11 days later [Dahnert, 2007]. CT as a result is relatively insensitive and non-specific in hyper-acute ischaemic infarction lasting less than 12 hours [Provenzale, 2008]. During this period, the ischaemic penumbra is still salvageable for better result [Provenzale, 2008]. In this situation, MRI with perfusion – diffusion weighting images becomes a replacement for CT giving a good correlations of the degree of neurological deficits [Provenzale, 2008]. The aforementioned CT sensitivity figures are however true only for the subtype of ischemic stroke as hemorrhage is very well displayed on the initial (1st day-CT scan).

In terms of regional localisation of both haemorrhagic and ischaemic CVA, the site of predilection was in the parietal lobe. The parietal lobe falls into the watershed area of the vascular territory of the anterior and middle cerebral arteries (Slater, ONLINE, Eisenberg, 2002). This explains the dominance of ischaemic CVA in the parietal lobe. Middle cerebral artery is by far the vessel most commonly affected by CVA (Slater, ONLINE). The result of this study with predominance of haemorrhages in parietal lobe is astonishing as the major site of hemorrhages in haemorrhagic CVA is usually the basal ganglia. Involvement of frontal and parietal lobes in CVA implies involvement of anterior and middle cerebral arteries (Slater, ONLINE).

Like other studies there is male preponderance in the incidence of CVA. CVA is also known to increase with age (Slater, ONLINE). This is understandable as there is increasing prevalence of arteriosclerosis with age, worse with male gender [Sethi et al., 2005]. Besides, both hypertension and diabetes mellitus which are harbinger of arteriosclerosis and major causes of CVA have increasing prevalence with age (Sethi et al., 2005). In our study, the highest population affected by CVA of any type were from 50 to 70 years. The peak of haemorrhagic stroke was in the 60-69 age range while ischaemic sub-type peaks at 70-79 years. 26.83% of our studied clinically diagnosed CVA patients had generalised cerebral atrophy instead of frank cerebral ischaemia or haemorrhages. This further diluted our recorded values. The cerebral atrophy is due to small vessel ischaemia with occlusion of perforating vessels (Runge, 1992). In our study most CVA lesions especially the ischaemic CVA extends into the deep white mater of the brain. This is due to common incidence of cerebral infarction from small vessel ischaemia. Deep white mater is supplied by end-on perforating vessels (Runge, 1992).

CONCLUSION

Ischaemic cerebro-vascular accident is more predominant than haemorrhagic CVA by a ratio of 2.75:1 in this study. Males are also more affected by CVA than females. The vascular territory most affected is the middle cerebral artery followed by anterior cerebral artery.

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