IMAGING MEDICINE

COMPUTERIZED TOMOGRAPHIC FINDINGS IN EPILEPTICS: THE NORTH WESTERN NIGERIA EXPERIENCE

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SUMMARY
AIMS: To evaluate CT findings in Epilepsy patients

METHODS: We evaluated CT findings in 95 Nigerians aged 15 years and above who suffer from epilepsy to determine factors associated with positive yield for judicious utilisation of CT.

RESULTS: There were 60 males and 35 females with a mean age of 32 years (SD- 16.4 years). The CT was normal in 50 subjects (52.6%). The commonest CT abnormality was cortical atrophy encountered in 20 subjects (21.1%). The other abnormalities were space occupying lesions (18) vascular lesions (7).

CONCLUSION: The presence of CT abnormality had significant statistical association with neurological deficits, partial seizures and EEG abnormalities. The decision on when to request CT scan in epileptics could therefore be influenced by these findings.

KEY WORDS: Epilepsy, Computerized tomography, Northern Nigeria.

INTRODUCTION

Epilepsy is a very common neurological disorder in both hospital and community based study in Nigeria. Prevalence of as high as 37 cases per 1000 inhabitants was obtained in a rural community[2]. The presence of underlying lesion tends to be associated with poor control thus worsening the morbidity of this condition. The detection and management of such lesions is therefore important for the control of seizures and overall improvement of quality of life. Neuroimaging makes non-invasive detection of the underlying causes of epilepsy possible. In the developed countries, virtually all patients undergo tomographic scan (CT)[3]. In addition, more advanced and expensive investigations are also done, such as magnetic resonance imaging (MRI), positron emission tomography (PET), single photon emission tomography (SPET) and more recently, magneto encephalography in some centres [4-6].

In the developing countries however, facilities for investigating epileptics are limited. There are few reports of CT findings in Nigerian epileptics because the facility is still limited to only a few tertiary health institutions. Judicious use is essential bearing in mind cost benefit in view the prevailing harsh economic conditions.

This communication investigated the factors associated with positive yield in the subjects who have undergone the procedure.

MATERIALS AND METHODS

The study took place at the Aminu Kano Teaching Hospital (AKTH) Kano in North Western Nigeria. AKTH is a Tertiary health Institution. It attracts referrals from the neighbouring, secondary and Tertiary health institutions for the CT facility.

The subjects comprised all epileptics aged 15 years and above who were seen in the adult neurology clinics and who could afford the cost of the procedure. Non-Nigerians, those with acute symptomatic seizures and subjects with single seizures were excluded. The consecutive subjects had CT done between January 2000 and December 2001. All subjects gave informed consent for inclusion in the study. The subjects must have had at least 2 stereotyped episodes of non provoked seizures characterised by focal or generalised convulsed seizures, loss of consciousness or periods of altered awareness associated with special sensory, somatosensory, psychic, autonomic symptoms and/or

automatism. The attacks must be corroborated by an eye-witness.

Complete physical and neurological examination was carried out in each case with careful documentation of abnormalities. Interictal electroencephalography (EEG) was carried out using the SLE-Neurotravel 16 channel EEG machine. Standard scalp electrode placement was used. The minimum recording time was 30 minutes including 5 minutes of hyperventilation and photic stimulation. Sleep studies and deprivation were not done.

Each EEG was interpreted by the Neurologist. EEG abnormalities comprising spikes, polyspikes, sharp waves, spike and wave complexes were classified as epileptiform pattern. We excluded muscle artefacts, evoked vertex sharp waves, and paroxysmal patterns of doubtful significance. Normal records were so classified.

The seizures were classified using the criteria of the international classification of Epileptic seizures and this involved the history and EEG findings. Only subjects who had both EEG and CT done were thus classified.

CT (plain and with contrast enhancement) was done in the radiology department using the somatom ART siemens with the normal protocols of 5 10mm cuts from the base to the vertex. Both the pre and Post contrast films were interpreted by the radiologist. The films showing hyperdence and hypodense lesions or ventricular size changes were regarded as abnormal while those without lesions were classified as normal.

The abnormal films were divided into space occupying lesions (SOL), vascular lesions (infarcts, aneurysms, arterio-venous malformations). Angiography was not done.

DATAANALYSIS

The age and sex distribution was determined by frequency counts and the mean age at onset was calculated. The frequencies CT abnormalities detected against the seizure types, physical signs and EEG findings were determined, and tested for association using the chi-square test. CT was used as gold standard for the presence of structural abnormalities probability tables values less than 0.05 were regarded as statistically significant.

RESULTS

A total of 95 subjects who had CT done for seizure disorders during the study period fulfilled the study criteria. The subjects comprised of 60 males and 35 females (M:F ratio of 1.7:1) with a mean age of 32 years (SD = 16.4 years).

CT scan was normal in 50 subjects (52.6%). The commonest abnormality was cortical atrophy encountered in 20 subjects (21.1%). Space occupying lesions and vascular lesions were found in 18, and 7 subjects respectively.

Table 1 shows the distribution of CT findings in each age group. Neurological deficits were present in 22 subjects and in a large majority, comprised of hemiparesis with cranial neuropathy. All the subjects with deficits had abnormal CT scans the most frequent being space occupying lesions as shown in Table 2.

In 20 subjects, CT showed abnormality although the subjects had no neurologic deficit. These were mainly subjects with cortical atrophy. This was usually associated with long duration of seizures (17 cases) and epilepsy following head trauma (3 cases). There was a significant association of abnormal CT scan in the presence of neurological deficit ($x^2 = 32.4$ $P<0.0001$). Sixty five subjects were classifiable because they had EEG done. Forty (61.5%) of them were classified as partial and the secondarily generalised variety predominated. Twenty subjects (30.7%) had generalised seizures and were mainly of the tonic-clonic variety. Five subjects were unclassifiable.

Table 3 shows the distribution of CT abnormalities by seizure type. Eighteen (90%) of the 20 subjects with generalised seizures as against 15 (37.5%) of the 40 with partial seizures had normal CT scans. The difference was statistically significant ($P<0.003$).

Table 4 shows the distribution of EEG and CT findings. Normal CT was reported in 60% of the subjects with epileptiform pattern while the frequency of SOL was highest in those with slowing. All the 20 subjects with normal EEG had normal CT scans while 30 subjects had both EEG and CT abnormalities. In the remaining 15 subjects, the CT was normal although EEG was abnormal. There was a statistically significant association between CT and EEG findings ($P<0.0025$).

TABLE 1: DISTRIBUTION OF CT FINDINGS BY AGE GROUP

AGE GROUP (YRS)	CT FINDING				TOTAL (%)
	NORMAL	ATROPHY	SOL	VASCULAR	
15 - 24	10	5	2	2	19 (20)
25 - 34	12	3	3	1	19 (20)
35 - 44	16	8	5	2	31 (32.6)
45 - 54	8	2	5	1	16 (16.8)
55 - 64	3	1	2	1	7 (7.4)
5+	1	1	1	-	3 (3.3)
TOTAL	50	20	18	7	95 (99.9)

TABLE 2: CORRELATION OF CT FINDINGS AND NEUROLOGIC DEFICITS

NEUROLOGIC DEFICITS	CT FINDING				TOTAL
	NORMAL	ATROPHY	SOL	VASCULAR	
PRESENT	-	2	15	5	22
ABSENT	51	20	-	2	73
TOTAL	51	22	15	7	95

TABLE 3: DISTRIBUTION OF CT ABNORMALITIES BY CLASSIFIABLE SEIZURE TYPE.

SEIZURE TYPE	CT ABNORMALITIES				TOTAL
	NORMAL	ATROPHY	SOL	VASCULAR	
SIMPLE PARTIAL	2	1	1	1	5
COMPLEX PARTIAL	5	4	4	2	15
SECONDARY GENERALISED	10	2	2	3	20
TONIC-CLONIC	9	5	4	1	19
ABSENCE	1	-	-	-	-
MYOCLONIC	-	-	-	-	-
UNCLASSIFIED	3	2	-	-	5
TOTAL	28	12	14	7	65

TABLE 4: CT CORRELATE OF ABNORMALITIES

EEG FINDINGS	CT FINDING				TOTAL
	NORMAL	ATROPHY	SOL	VASCULAR	
NORMAL	20	-	-	-	20
EPILEPTIFORM	15	5	8	2	30
SLOWING	5	6	3	1	15
TOTAL	40	11	11	3	65

DISCUSSION

CT is an expensive procedure and beyond the means of many epileptics who appear to be more in the lower socio-economic class[8]. The results of this study should therefore be interpreted with caution because of this selection bias for those who could afford the procedure. Secondly, those with severe and more embarrassing attacks as with the tonic-clonic seizures are more readily to accept to have an expensive investigation like the CT done. It therefore makes it difficult to generalise our findings to all epileptics.

The percentage of CT abnormalities we found in this study (47.4%) is within the range of 30 to 60% reported by other workers and the preponderance of atrophic lesions agrees with other workers[9-11]. However the proportion with tumours (19%) is higher than the frequency of 8 10% reported by other workers [9-12]. This may partly reflect the selection and referral biases alluded to, and can partly be explained by the fact that we studied subjects older than 15 years in whom the frequency of abnormalities might be higher[12]. The association of atrophic lesions with uncountrolled seizure attacks and head trauma would suggest neuronal loss or contusion respectively with replacement gliosis which is known to be epileptogenic[13]. This may be one of the underlying mechanisms for seizure recurrence. Cortical atrophy could also be an age related phenomenon especially when found in elderly subjects. In a large proportion of cases with cortical atrophy, neurological deficit may be absent.

Our finding of more lesions in cases with partial seizures than generalised seizures agrees with the findings of others[9,13]. The frequency of abnormalities appears to be more in those with simple partial seizures. Our data suggest that CT scan would be indicated in the presence of neurologic deficit as SOL or vascular lesion may likely be the cause. In the absence of neurologic deficit, CT was likely to be normal but cortical atrophy could be encountered in some cases especially when seizures are of long duration, uncontrolled or follow head trauma.

The decision to request for CT scan could also be based on EEG findings especially of slow waves which, in agreement with others, is commonly associated with SOL[10] whereas a normal EEG was likely to be associated with normal CT scan.

CONCLUSION

Our results suggest that CT scan would be indicated in subjects with partial seizures in the presence of neurologic deficit like pyramidal weakness and cranial neuropathy, and when there is slowing on EEG. Other tests like MRI, PET, SPECT and metabolic studies could assist in delineating the cause of seizures. Most of these are however not available in most developing countries and as a result, detection of structural lesions have to be based on CT findings.

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