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A CLINICAL STUDY ON FOCAL SEIZURES- CORRELATION WITH EEG AND CT BRAIN

General Medicine

D. Madhusudhana M.D.;Assistant professor,Dept of General medicine, ACSR govt medical college,Nellore

D. R. Anusha* M.D. ;Assistant professor Dept of general medicine,ACSR Govt medical college,Nellore
*Corresponding Author

B. Sudarsi M.D.;Associate professor, Dept of general medicine ,ACSR govt medical college,Nellore

ABSTRACT

AIM AND OBJECTIVE OF THE STUDY: To study clinical profile and correlation of EEG (elecroencephalography) and CT(computed tomography) findings in patients with focal seizures.

MATERIALS AND METHODS: This is a cross sectional study done on 50 patients presenting with new onset focal seizures who were admitted in general wards of ACSR Government General Hospital, Nellore. Patients were evaluated with proper history and complete neurological examination. All are subjected to EEG and CT scan brain with and without contrast. EEG was recorded by using 21 electrodes according to 10-20 international system. Single recording of EEG was noted. Correlation between abnormal CT and EEG findings were studied in different age sub groups.

RESULTS: In the present study among all partial seizure types majority were focal seizures with intact awareness(54%).Significant neurological abnormalities were present in all focal seizures types and in all age subgroups(52%).Among causes of focal seizures commonest were calcified disc lesions(32%) and cysticercosis ring lesions (26%)in young and middle aged adults, where as brain tumor(11%) and cerebral infarcts(10%) were more common in elderly.

CONCLUSION: There is significant correlation between EEG and CT scan findings in diagnosis and localisation of focal seizures. Single recording of EEG has a low sensitivity in detecting epileptiform discharges. EEG is a better cost effective screening method in diagnosis of partial seizures. CT scan is mandatory in all cases of focal seizures to identify the cause of focal seizures, which is helpful in treating the underlying cause of focal seizures.

KEYWORDS

AIM OF THE STUDY

To study clinical profile and correlation of EEG and CT findings in patients with new onset focal seizures.

INTRODUCTION:

Focal seizures arise from a neuronal network either discretely localized within one cerebral hemisphere or more broadly distributed but still within the hemisphere. Classification emphasizes the effect of awareness (intact or impaired) and nature of onset (motor or non-motor). Focal seizures can also evolve into generalized seizures.

Focal Seizures With intact awareness; Focal seizures can have motor manifestations (such as tonic,clonic or myoclonic movements) or non-motor manifestations(such as sensory, autonomic or emotional symptoms) without impairment of awareness. The EEG recorded with scalp electrodes during the seizure (i.e., an ictal EEG) may show abnormal discharges in a very limited region over the appropriate area of cerebral cortex if the seizure focus involves the cerebral convexity.

Focal Seizures with impaired awareness: Focal seizures may also be accompanied by a transient impairment of the patient's ability to maintain normal contact with the environment. The patient is unable to respond appropriately to visual or verbal commands during the seizure and has impaired recollection or awareness of the ictal phase. The seizures frequently begin with an aura (i.e., a focal seizure without cognitive disturbance) that is stereotypic for the patient. The start of the ictal phase is often a sudden behavioral arrest or motionless stare, which marks the onset of the period of impaired awareness. The behavioral arrest is usually accompanied by *automatisms*, which are involuntary, automatic behaviors that have a wide range of manifestations. The range of potential clinical behaviors linked to focal seizures is so broad that extreme caution is advised before concluding that stereotypic episodes of bizarre or atypical behavior are not due to seizure activity. In such cases additional, detailed EEG studies may be helpful.

EVOLUTION OF FOCAL SEIZURES TO GENERALIZED SEIZURES

Focal seizures can spread to involve both cerebral hemispheres and produce a generalized seizure, usually of the tonic-clonic variety . This evolution is observed frequently following focal seizures arising from a focus in the frontal lobe, but may also be associated with focal seizures occurring elsewhere in the brain. A focal seizure that evolves into a generalized seizure is often difficult to distinguish from a primary generalized-onset tonic-clonic seizure, because bystanders tend to emphasize the more dramatic, generalized convulsive phase of the seizure and overlook the more subtle, focal symptoms present at onset. In some cases, the focal onset of the seizure becomes apparent only when a careful history identifies a preceding aura . Nonetheless, distinguishing between these two entities is extremely important, because there may be substantial differences in the evaluation and treatment of epilepsies associated with focal versus generalized seizures.[1]

The present study was done to evaluate the common causes for focal seizures admitting to our hospital and to evaluate CT and EEG findings.

MATERIALS AND METHODS

Materials :

50 patients presenting with new onset focal seizures who were admitted into general wards of ACSR Government General Hospital, Nellore were studied.

Inclusion Criteria:

All Patients above the age of 18 years with new onset focal seizures were included in this study.

Exclusion Criteria:

Patients on antiepileptic treatment were excluded from this study.
Patients with psychological disorders mimicking focal seizures were excluded after proper clinical evaluation. Patients with other involuntary movements were excluded.

METHODS :

All the patients were evaluated with proper history and complete neurological examination. patients were observed for various focal seizures types. patients with abnormal neurological findings were identified and noted. All are subjected to EEG and CT scan brain with and without contrast. EEG was recorded by using 21 electrodes according to 10-20 international system. EEG was recorded with special measures like sleep deprivation, with sleep, hyperventilation.

Single recording of EEG was noted. Correlation between abnormal CT and EEG findings were studied in different age sub groups.

OBSERVATION AND RESULTS

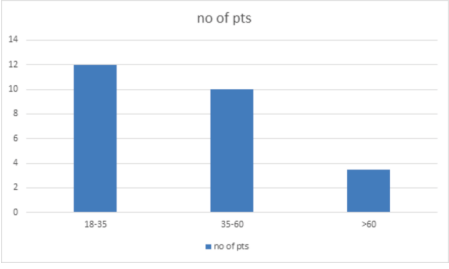
50 cases of focal seizures were included in this study. Out of these 30 (60%) patients were males and 20 (40%) were females.

Table – 1 Clinical focal Seizure Types According To Age Sub Groups

S. No.	Seizure Types	Number of patients in age sub groups (in years)			Total
		18-35	35-60	>60	
1.	Focal seizures with intact awarenesss	8	8	6	22
2.	Focal seizures with impaired awareness	2	8	0	10
3.	Focal seizures with intact awarenesss with secondary generation	10	2	0	12
4.	Focal seizures with impaired awareness with secondary generation	4	0	0	4
5.	Epilepsia partialis continua	2	0	0	2
	Total	**26**	**18**	**6**	**50**

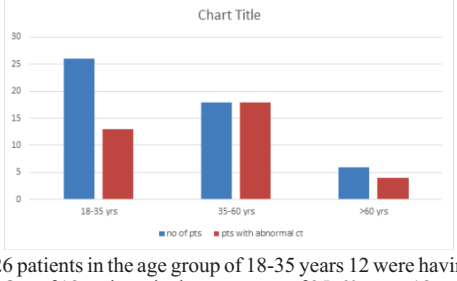
Out of 50 patients 52% were in the age group of 18-35 years, 36% were in the age group of 35-60 years, remaining 12% were in the age group of above 60 years as shown in table 1.

FIGURE – 1 Abnormal neurological examination according to age sub groups



Abnormal neurological findings were found in 12 patients in the age group of 18-35 years, 10 of patients in the group of 35-60 years, 4 patients in the age group of above 60 years as shown in figure 1.

figure 2 Age wise incidence of CT scan results



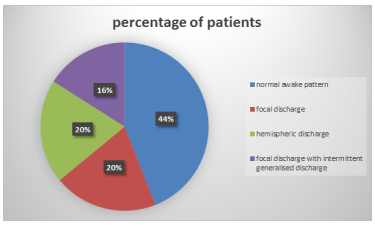
Out of 26 patients in the age group of 18-35 years 12 were having focal lesions. Out of 18 patients in the age group of 35-60 years 18 were focal lesions. Out of 6 patients in the age group of above 60 years, 4 patients had focal lesions.

Table – 2 CT Scan focal lesions according to etiology

S. No.	CT Diagnosis	No. of patients	Percentage
1.	Cysticercosis ring lesion	10	29
2.	Calcified disc lesion	12	35
3.	Tuberculous granuloma	3	9
4.	Brain tumor	3	9
5.	Vascular disease with infarcts	5	15
6.	Herpes encephalitic lesions	1	3
	Total	**34**	

Out of 38 patients with focal lesions, 35% were calcified disc lesions, 29% were cysticercosis ring lesions, 9% were tuberculous granulomas 9% were brain tumors, 15% were vascular disease with infarcts, 3% were herpes encephalitis infarcts as shown in table 2.

figure – 3 EEG results in focal seizures



Out of 50 patients 56% were epileptiform discharges, 44% were normal awake patterns as shown in figure 3.

Table – 4 Neurological findings and EEG Correlation

S. No.	CNS examination findings	Normal EEG		Epileptiform discharge	
		No. of patients	No. of patients	% of patients	No. of patients	% of patients
1.	Normal	24	6	12	18	36
2.	Abnormal	26	12	24	14	28

Out of 50 patients, 28% patients had both epilepetiform discharges and abnormal neurological findings, 12% had normal EEG and normal neurological findings as shown in table 4.

DISCUSSION :

A seizure can be defined as the occurrence of signs and/ or symptoms due to abnormal, excessive or synchronous neuronal activity in the brain. 'Epilepsy' is the tendency to have unprovoked seizures. The lifetime risk of seizure is about 5%, although incidence is highest at the extremes of age.[2]

In present study Focal seizures are more common in age group 18-35 years,Out of 50 patients most common type of seizures are focal seizures with intact awareness followed by focal seizures with intact awareness with secondary generalization.

In this study, 76% patients had abnormal focal lesions in CT scan, Compared to study done by Swaroopa deme et al[3] CT was found abnormal in 60 (40%) patients and in 62.6 % of patients in study done by daras et al[4].

In the present study highest percentage (100%)of CT abnormalities are found in focal seizures with impaired awareness compared to the study done by Swaroopa deme et al[3] CT scan abnormalities were highest in those with simple partial seizures 83.3 %(5 out of 6 cases).

In present study most common cause of focal lesions are calcified disc lesions and these lesions are common in age group of 35-60 years as compared to study done by Swaroopa deme et al [3]demonstrated calcified granuloma as the most common lesion i.e;44.8% (24 cases out of 60).Tuberculomas in 24% (16 cases out of 60). In study done by Bansal Be, et al. [5]and others in India, found tuberculomas in 39.5% of cases in their study of epilepsy. Next commonest lesion was cysticercosis, seen in 18.9 % (12 out of 60 cases), in 30 % in study done by Naidoo DV, et al. [6]and glioma in 5 % of cases, meningioma in 3.4%, metastasis in 1.7 %(1 in 60).Percentage of tumors in a study by Reinkainen, et al. [7] is 17% and 8.8 % by Haan J, et al. [8]

In present study Cysticercosis and tuberculomas were common in patients with age group of 28-35 ,Brain tumors are common in patients of 35-60 years age group,Vascular lesions i.e;infarcts were common in >60 years of age group.

In present study 56% of patients had epileptiform discharges in EEG.Compared to the study done by swaroopa deme et al [3], 45% (67 out of 150), Brechet R, et al.[9] in 65% of cases had abnormal EEG .

In the present study,by comparing EEG and neurological findings,Out of 50 patients, 28% patients had both epileptiform discharges and abnormal neurological findings, compared to the study of swaroopa deme et al[3] found 10 patients with abnormal neurological status, the EEG correlated with the neurological findings in 6 patients (60%) .

In present study a correlation was made between CT scan and clinical neurological findings.

48% patients had both abnormal neurological findings and focal lesions in CT scan brain, Compared to the study done by swaroopa deme et al[3] 80% of patients had lesions in CT and abnormal neurological findings, and 82 % in a study conducted by Ramirez-Larsepas, et al. [10]

In present study 36% had both epileptiform discharges and focal lesions in CT scan brain.40% patients had focal lesions in CT scan brain without epileptiform discharges.20% patients had epileptiform discharges without focal lesions in CT scan brain. Compared to the study done by Swaroopa deme et al[3] found , in 16 out of 26 patients (63.5%) had both epileptic foci in EEG and focal lesions in ct scan, 38.6% by Sorel, et al[11].

SUMMARY AND CONCLUSIONS

Among all partial seizure types majority were focal seizures with intact awareness(54%).

Significant neurological abnormalities were present in all focal seizures types and in all age subgroups.

Among causes of focal seizures commonest were calcified disc lesions and cysticercosis ring lesions in young and middle aged adults, where as brain tumor and cerebral infarcts were more common in elderly.

There is significant correlation between EEG and CT scan findings in diagnosis and lateralization of focal seizures.

Single recording of EEG has a low sensitivity in detecting epileptiform discharges. EEG is a better cost effective screening method in diagnosis of partial seizures.

CT scan is mandatory in all cases of focal seizures to identify the cause of focal seizures, which is helpful in treating the underlying cause of focal seizures.

REFERENCES

1. Daniel H.Lowenstein,seizures and epilepsy ,chapter 418 ,Harrisons principles of internal medicine ,20 th edition page no 3095—3096.
2. Davidson's principles and practice of medicine chapter 26,21 st edition,page 1167.
3. Deme S. A study of correlation of CT scan brain and EEG in epilepsy. IAIM, 2016; 3(10): 55-61.
4. Daras M, Tuchman AJ, Strobos RJ. Computed tomography in adult-onset epileptic seizures in a city hospital population. Clin Exp Neurol., 1987; 24: 159-67.
5. Bansal B.C., Dua A., Glklputa M.S. Appearing and disappearing C.T. Scan abnormalities in epilepsy in India an Enigma- Journal of neurology, Neuro Surgery and Psychiatry (J.C:jbb), 1989; 52(10): 1185-7.
6. Naidoo DV, Pammenter MD, Moosa A, van Dellen JR, Cosnett JE. Seventy black epileptics. Cysticercosis, computed tomography and electroencephalography. Epilepsia, 1987; 28(5): 519-22.
7. Reinikainen KJ, Keranen T, Lehtinen JM, Kalviainen R, Saari T, Reikkinen PJ. CT brain scan and EEG in the diagnosis of adult onset seizures. EEG EMG Z Elecktoenzephalogr Elektromyogr Verwandte Geb., 1976; 7(4): 189.
8. Haan J, Deppe A. Complex focal seizures: studies based on the cranial computer tomogram,clinical aspects and longitudinal EEG studies. S Afr Med J., 1987; 72(12): 837-38.
9. Brechet R, Sicard C, Giovon M, Cathala HP, Bories. Comparison of the EEG and computerized tomography findings in 500 patients hospitalized in the neurology clinic of the Salpetriere. J. Neurosurg., 1979; 50(3): 328-32.
10. Ramirez-Larsepas M, Cipolle R.J., Morillo L.R., et al. Value of C.T. Scan in the evaluation of adult patients after their first seizure. Ann Neurol, 1984; 15: 536- 543.
11. Sorel L, Rucquoy-Ponsar M, Harmant J. Electroencephalogram and CAT scan in 393 cases of epilepsy. Electroencephalogr Clin Neurophysiol., 1991; 79(2): 108-13.