

EEG FINDINGS IN POST STROKE SEIZURES: AN OBSERVATIONAL STUDY

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ABSTRACT

Objective: Stroke is an important cause of epilepsy especially in the elderly. We conducted an observational study in a tertiary referral center to describe different EEG findings in patients who developed seizures after stroke.

Methodology: We reviewed all EEGs that were performed for evaluation of seizures after stroke from January to December 2006 and retrospectively recorded demographic data, side of stroke, type of seizures and EEG findings. All this information was entered on a specially designed proforma.

Results: A total of 41 patients with post stroke seizures had EEG done at our laboratory that were reviewed and analyzed. Of these patients, 51.2% (n=21) were males (mean age 60.7; range 22-84 years) and 48.8% (n=20) were females (mean age 63; range 3-90 years). The commonest seizure semiology was generalized seizure in 56.1% (n=23), focal seizures in 36.6% (n=15) and focal with secondary generalization in 7.3% (n=3) patients. 51.2% (n=21) had right hemispheric involvement, 26.8% (n=11) had left hemispheric involvement and in 22% (n=9) patients side of stroke was not identified. The commonest EEG finding was generalized slow waves seen in 39.0% (n=16) patients. Other abnormalities found were focal slowing in 19.5% (n=8), focal sharp and slow waves in 9.8% (n=4), focal spikes & slow waves in 4.9% (n=2), focal sharp waves in 4.9% (n=2) of the patients. Focal spike waves in 2.4% (n=1) and PLEDS were seen in 2.4% (n=1) patients. 17.1% (n=7) patients had normal EEG.

Conclusions: Generalized seizures and generalized slowing on EEG were the commonest findings in our patients who developed seizures after stroke. The commonest epileptiform discharges were focal sharp and slow waves seen in 9.8% of patients with post stroke seizures.

KEYWORDS: Post stroke seizures, EEG, Seizures.

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INTRODUCTION

Seizures after stroke have been described more than a century ago by John Hughling Jackson.¹ Even today stroke has been considered as an important cause of epilepsy especially in elderly.²⁻⁴ The reported incidence of seizures varies from 2-33%.^{5,6} From a community based register, patient with a first ever stroke had a 2% risk of having a seizure at stroke onset and an 11% risk of having a later

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seizure in the first 5 years of follow up. Patients with intracerebral and subarachnoid hemorrhage were at higher risk of seizure after stroke.^{3,4} Post stroke seizures have been classified according to their temporal relationship with the onset of stroke as immediately after (within 24h), early and late onset. Early onset seizures have been defined as occurring within one week or two week after stroke. Late onset seizures occur one or two weeks after stroke.⁷ When seizures occur after stroke they greatly increase the morbidity and mortality and further impair an already comprised quality of life. Early-onset seizures have a poor prognosis with a high in-hospital mortality rate.⁸ EEG can be helpful in identifying seizures type and localization of epileptic focus. Also some patterns of EEG are predictive of patients who can develop late onset seizures. We conducted an observational study in a tertiary referral center to describe different EEG findings in patients who developed seizures after stroke.

METHODOLOGY

We reviewed all EEGs that were performed for evaluation of seizures after stroke from January to December 2006 and retrospectively recorded demographic data, side of stroke, type of seizures and EEG findings. All this information was entered on a specially designed proforma. EEG was done using Nicolet and Nihon Khoden digital EEG machines. EEG electrodes were placed according to the International 10-20% system. Activation procedures such as hyperventilation and photic stimulation were done.

RESULTS

A total of 41 patients with post stroke seizures had EEG done at our laboratory were reviewed and analyzed. Of these patients, 51.2% (n=21) were males, 48.8% (n=20) were females. Mean age was 61.8 years. 36.6% (n=15) patients were in awake state, 26.8% (n=11) were drowsy, 17.1% (n=7) were sedated, 4.9% (n=2) were semiconscious, 12.2% (n=5) were unconscious and 2.4% (n=1) was

in asleep state. The commonest seizure semiology was generalized seizure in 56.1% (n=23), focal seizure in 36.6% (n=15) and focal with secondary generalization in 7.3% (n=3) patients. 51.2% (n=21) patients had right hemispheric involvement, 26.8% (n=11) had left hemispheric involvement and in 22% (n=9) of the patients, side of stroke was not identified. Table-I.

The commonest EEG finding was generalized slow waves seen in 39.0% (n=16) patients. Other abnormalities found were focal slowing in 19.5% (n=8), focal sharp and slow waves in 9.8% (n=4), focal spikes & slow waves in 4.9% (n=2), focal sharp waves in 4.9% (n=2) of the patients. Focal spike waves in 2.4% (n=1) and PLEDS were seen in 2.4% (n=1) patients. 17.1% (n=7) patients had normal EEG. Fig-1.

Table-I: Demographic characteristics of patients

	No.	%
Mean Age in years		
Male	61.8	
Female	60.7	
Gender		
Male	21	51.2
Female	20	48.8
Seizure semiology		
Generalized	23	56.1
Focal	15	36.6
Focal with secondary generalization	3	7.3
State of the patient		
Awake	15	36.6
Drowsy	11	26.8
Sedated	7	17.1
Semiconscious	2	4.9
Asleep	5	12.2
Hemispheric involvement		
Right	21	51.2
Left	11	26.8
Not identified	9	22

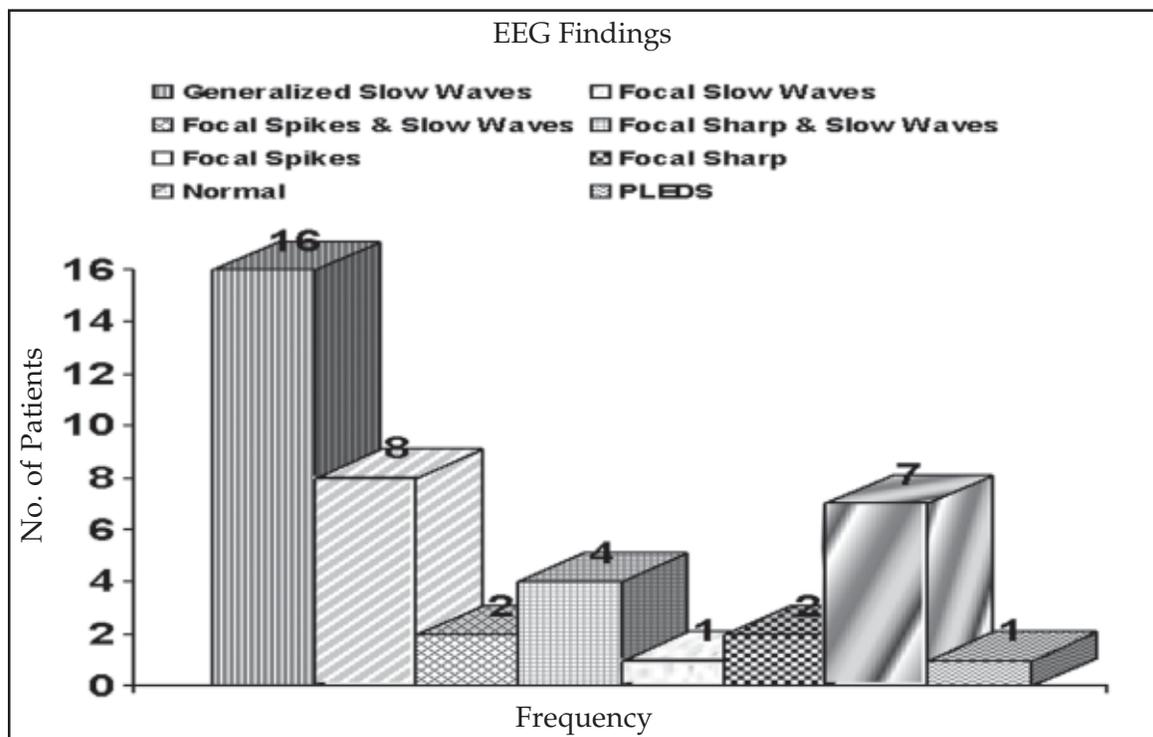


Figure-1: EEG findings

DISCUSSION

Despite their frequent occurrence especially in elderly age group, stroke related seizure is a topic that is mostly neglected. The most common seizure pattern seen in our cohort is generalized seizure in 56% followed by focal seizures in 36% of patients which is in contrast to what is reported by other authors.⁷⁻¹⁰ Only one study has reported increase incidence of generalized seizures.¹¹ This may be because the relatives do not notice the initial event or it was not properly mentioned in the files. Majority of our patients were elderly with mean age of 61 years similar to other studies.¹⁰ More than half of the patients had right hemispheric involvement.

The commonest EEG finding was generalized slow waves (39%) while focal slowing was seen in 19%. Focal sharp and slow waves were seen in 9.8%. This is similar to other studies.¹² The EEG findings also correlate with the seizure semiology that generalized seizures were more common in our cohort. Many studies have reported that periodic lateralizing epileptiform

discharges were associated with acute stroke and subsequent development of seizures.¹³ However in our cohort, PLEDS was seen in only one patient, that is similar to what is reported by Dhanuka and et al.¹⁴

Limitations of the study: There are shortcomings in our study because of its retrospective nature. Further large, prospective, population based studies are needed to answer many questions regarding post stroke seizures that are still unanswered like pathophysiology, epidemiology, risk factors and treatment of post stroke seizures.

CONCLUSIONS

Generalized seizures and generalized slowing on EEG were the commonest findings in our patients who developed seizures after stroke. The commonest epileptiform discharges were focal sharp and slow waves seen in 9.8% of patients with post stroke seizures. Large prospective, observational studies are needed to define prognostic factors for post stroke seizures in specific stroke subtypes.

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