



Clinical profile, electro– Encephalographic and computerized tomography findings in partial seizures

Ram Narayan Mandal¹, Ajay Kumar Mishra¹, Elena Leonidovna Mandal², Margarita Ramovna Mandal³, Shambhu Kumar Sah⁴

¹ Associate Professor, Department of Internal Medicine, Janaki Medical College, Janakpur, Nepal

² Senior Consultant Neurologist, Department of Neurology, Center, Kadam Chowk, Janakpur, Nepal

³ Assistant Professor, Department of Dermato-Venerology, Order of the Red Banner of Labour Medical Institute named after S.I. Georgievsky, Republic of Cream, Russian Federation

⁴ Assistant Professor, Department of Radiology, Janaki Medical College, Janakpur, Nepal

Abstract

Objectives: 1. To study the clinical profile, EEG and CT scan abnormalities in partial seizures. 2. To establish, if possible, any correlation between clinical profile, EEG and CT scan findings.

Design: Prospective study of fifty (50) patients with partial seizures.

Setting: The Study was done at Janaki Medical College Teaching Hospital in the department of Internal Medicine.

Subjects: Patients (more than 10 years) with clinical evidence of partial seizure onset with or without secondary generalization and patients with generalized seizures from the onset who have an abnormal focus on EEG/CT scan were included. Patients with generalized seizures from the onset who have normal EEG/Ct scan were excluded.

Results: Male to female ratio was 3.5:1. Maximum incidence of onset of seizure (36%) was seen in second decade of life. In most of the patients, duration of illness was less than 6 months (82%) at the time of presentation and majority of patients came after 2-10 episodes of seizures. Family history of seizure was found in 12% of patients. Precipitation factors were noted in 20% of patients and mental upset being the most common precipitating factor accounting for 6% of patients. One female patient had first episode of seizure during pregnancy and for 2 others seizure got aggravated during menstruation. Simple partial seizure with secondary generalization was the commonest type (36%) of seizure. Post-ictal headache and confusion (52%) were the most common post-ictal symptoms.

EEG was abnormal in 46% of patients. Lateralized spikes/sharp and slow wave complexes was the most common (52%) form of epileptiform abnormalities.

CT scan abnormalities were detected in 74% of patients, which included ring or disc- enhancing lesion (60%), vascular (6%) and calcification (8%). CT scan abnormalities were common in elderly age group as compared to young (p value 0.1989) and seizure duration of less than 6 months as compare to longer seizure duration (p value 0.37121). CT scan abnormalities were detected in 42% of patients with normal EEG records and 32% of patients with abnormal EEG records. 14% of patients had abnormal EEG records but had normal CT scans. 16 out of 23 patients with EEG abnormalities had abnormal CT scan; while 21 CT scan abnormalities were detected out of 27 patients with normal EEG (p value 0.50935).

ELISA for cysticercosis was positive in 33.3% of patients with ring or disc-enhancing lesions in the CT scan. It was positive in 30.8% of patients with single lesion and 50% in multiple lesions.

Conclusion: CT scan is potentially convenient and safe technique that is valuable in the clinical investigation of patients with partial seizures, especially in patients with late - onset partial seizures and seizure duration of less than 6 months.

As patients with normal EEG are equally likely to have CT scan abnormalities compared to patients with abnormal EEG, CT scan should be advised for patients with partial seizures, regardless of whether or not there are abnormalities in the EEG.

Keywords: Partial seizure, EEG (Electroencephalography), CT scans (Computerized Tomography scans, (Ring or disc-enhancing lesions, Calcification, ELISA for cysticercosis

Introduction

Epilepsy in one of the common neurological disorders estimated to affect approximately 1% of the population [1]. It constitutes a major proportion of neurological disorders seen at hospitals of Nepal. In Nepal, it carries a social stigma. Some of the ancient people associated his so called "sacred disease" with devils and demons.

Aims and Objectives

1. To study the clinical profile, EEG and CT scan abnormalities in partial seizures.
2. To establish, if possible, any correlation between clinical profile, EEG and CT scan findings.

Materials and Methods

This prospective study on partial seizures includes 50 patients (age more than 10 years) seen in the Medical and Emergency Wards of Janaki Medical College and Teaching Hospital Ramdaiya Janakpur, Nepal. This study was carried out during the period of 01.03.2074 BS (15.06.2017 AD) to 31.02.2075 BS (14.06.2018 AD). The diagnosis was established by obtaining a thorough history and from a description of epileptic seizures from witness, excluding patients with syncope, hysterical fits and faints with indeterminate causes.

The seizures were classified according to the mode of onset as follows.

1. Partial seizures with elementary or complex symptomatology with or without secondary generalization.
2. Generalized seizures from the onset but have an abnormal focus on EEG/CT scan.
3. Generalized seizures from the onset and have a normal EEG/CT scan.

In the present study, cases under (i) and (ii) were included as cases of partial seizures. cases under column (iii) were not included at all.

Statistical Methods

Data were processed and tabulated by using computer software developed by WHO which is EPI-INFO-6. In data analysis p value was computed to conclude the results obtained.

Results

A) Sex incidence

Out of 50 patients studies the number of males were greater than that of females (M:F ratio being 3.5:1). 78% were male and 22% were female (char 1).

B) Age incidence

Majority of patients had onset of seizures in second decade of life (36%). There was progressive decline in incidence of epilepsy from second decade onward except a marginal increase in those above 50 years of age (Char 2).

C) Clinical seizure pattern

In the present study, 42(84%) patients had partial seizures and 8 (16%) patients had generalized seizures from the onset, but abnormal focus was demonstrated in EEG or in CT scan or in both. These 8 cases were also considered as those of partial seizures. Thus the present study deals with 50 patients of partial seizures (Char 3).

Of the 42 patients of partial seizures, 11(22%) had simple partial seizure with elementary symptomatology whereas complex partial seizure and secondary generalized seizures were seen in 13 (26%) and 18 (36%) patients respectively (Chart 4).

Out of 11 patients with simple partial seizures, a motor component was observed in 10 patients. All motor manifestation involved turning of head (27.3%), clonic movement of upper extremity (27.3%) and deviation of angle of mouth in 9.1% of patients. 3 (27.3%) patients had jacksonian march of motor activity spreading from hand to the ipsilateral half of facial and neck musculature. In only one patient (9.1%) of simple partial seizure, there was march of sensory symptoms; involving the spread of tingling sensation from the hand to the ipsilateral side of the face.

D) Post-ictal symptomatology

Twenty-one patients (42%) had not post-ictal symptoms. Post-ictal headache and confusion were most common symptoms and were found in 14(28%) and 12(24%) patients respectively. Post-ictal drowsiness was observed in 8% of cases and dreamy state as post-ictal symptomatology was seen also in 8% of cases. Todd's palsy was found in 4(8%) patients (Chart 5).

E) Electroencephalography

Out of 50 patients, normal record were obtained in 27(54%) patients. EEG abnormalities were found in 23(46%) patients. The sensitivity of EEG in diagnosing seizure disorder was about 46% in the present study. The EEG abnormalities included lateralized abnormal EEG records in 36% and generalized abnormalities in 8%. One patient (2%) had focal abnormalities with secondary generalization (Table 1). Various EEG abnormalities included lateralized spikes/sharp and slow wave complexes in 12(52%) patients, lateralized slow waves in 7 (30.4%) patients, generalized spikes/sharp wave complexes in 2(8.7%) patients and generalized slow waves in 2(8.7%) patients (Table 2). Lateralized spikes/sharp and slow waves was the most common abnormalities detected in EEG records.

F) CT scan results

Out of 50 patients, 13 (26%) had normal CT scan. Table 3 summarizes the CT scan results. 37 (74%) out of 50 patients cannot demonstrated CT scan abnormalities. The sensitivity of CT scan in demonstrating the significant intracranial pathology was 74% in the present study. 30 (60%) patients showed focal ring or disc - enhancing lesion with perilesional low attenuation. 4 (8%) patients showed calcification and 3 (6%) patients had vascular lesions, which included 2 cases of intracerebral haemorrhage and one case of cerebral infarction.

The relationship between the duration of the seizures at the time of examination and the CT findings, of 41 patients having seizures for less than 6 months duration, 32(78%) had abnormal CT scans. The commonest abnormality was a focal ring or disc-enhancing lesion in 28(68%) patients. Other abnormalities included 3 cases of calcification and one case of cerebral haemorrhage. Out of 2 patients having seizures for 6 months to 1 year, one (50%) patient showed CT scan abnormality and consisted of cerebral infarction. Out of 7 patients having seizure duration of more than 1 year, 4(57%) had abnormal CT scans. The commonest abnormality being ring or disc-enhancing lesion in 2(28.6%) patients and other abnormalities included one case of calcification and one case of cerebral haemorrhage. It is apparent from table 5 that longer the duration of seizure, lesser is the change to find abnormal CT scan. So there is not significant rise in the CT scan abnormalities as the duration of seizure increases beyond 6 months (p value 0.37121).

G) EEG and CT scan Correlation

Both EEG and CT scan were done in 50 patients. EEG and CT scan abnormalities were seen in 23(46%) and 37(74%) patients respectively, 6(12%) patients with normal EEG had normal CT scan. 7(14%) patients with abnormal EEG records had normal CT scan. 21(42%) patients with normal EEG records had abnormal CT scan. In 16(32%) patients both EEG and CT scan showed abnormalities (Table 4). CT scan showed abnormalities in 16 of the 23 patients with EEG abnormalities, while 21 CT scan abnormalities were detected out of 27 patients with normal EEG in the present study (p value 0.50935) [Table 5].

Discussion

This study was carried out in the Janaki Medical College and Teaching Hospital Ramdaiya, Janakpur, Nepal and included 50 patients of partial seizures who fulfilled the

clinical and/or EEG criteria proposed by International League against Epilepsy in 1981.

The overall preponderance of males over females was observed in this study (M: F ratio 3.5:1). RK Sureka in his study also found that the proportion of male subjects was more than female subjects (M: F ratio 2:1) [22]. The reason, why the male ratio is higher, is not clear. In our country an important factor could be that females get lesser attention and care (including medical care).

In the present study highest incidence was seen during second decade of life, 36% of the patients had onset of seizures during second decade of life, which is similar to the observation made by RK Sureka in his study [22]. But in National General Practice Study of Epilepsy 21% of patients had their onset of seizures in second decade of life [12]. There was progressive decline in the proportion of epilepsy from second decade onward in the present study, which is in consistency with the study of RK Sureka and National General Practice Study of Epilepsy.

Examination of the case histories of 50 patients in the present study revealed that 20% of cases had precipitating factors including excessive exertion, fever, photosensitive, alcohol intake and mental upset. Mental upset was on the most common precipitating factors in the present study accounting for about 6% of cases as compared to 16.6% in one study⁸¹. In one case out of 11 female cases (9.1%), first attack got precipitated in pregnancy and for another 2 female cases (18.2%) frequency of its got aggravated during menstruation.

It has been reported that about 10% of epileptic patients had their seizures precipitated during menstruation [46].

In the present study, the revised classification proposed by the International League against Epilepsy (1981) was used. The classification of epilepsy in different studies has been a great source of confusion. Some workers have adopted strictly clinical criteria for determining the type of seizures, where as others have also taken into account an abnormal EEG. Thus a clear-cut comparison between different studies is difficult.

In the present study 50 patients had partial seizures, which were subdivided into simple partial seizures, complex partial seizures and secondarily seizures. 22% of patients had simple partial seizures as compared to 22.5% reported by RK Sureka²². 24% had complex partial seizure as compared to 17.5% and 20% observed by RK Sureka and in National general Practice Study of Epilepsy¹² respectively.

The symptomatology in simple partial included turning of head in 27.3%, clonic movement of upper extremity in 27.3%, motor Jacksonian march in 27.3% and sensory Jacksonian march in 9.1% in the present study, as compared to 25.3%, 18.4, 10.3% and 3.3% respectively observed by Devinsky and colleagues in their study [5].

50 patients in the present study had their EEG records at least once. Abnormal EEG records were found in 46%. In one study about 56% abnormal EEG records were detected in partial seizures [51]. In National General Practice Study of Epilepsy focal EEG abnormalities were detected in only 19% cases of partial seizure [13]. The low yield of focal EEG abnormalities in National General Practice Study of Epilepsy was because the criteria for focal EEG abnormality were rigorous, with slow waves or other less specific abnormalities were excluded, unless accompanied by spikes or sharp waves. Higher number of normal EEG records in present study may be because in majority of our patients

EEG's were done only for a period of 30 to 45 minutes. Most of the patients were on anticonvulsant and EEG records were done about one month after the clinical seizures. Another factor for low incidence of EEG abnormalities was the non-utilization of the activation procedures other than hyperventilation and photic stimulation. Epileptiform activity is more likely to be increased up to 90% by the fourth EEG recording⁵⁵. The timing of EEG examination may influence this yield. The diagnostic yield is more with EEG done within 24 hours of a seizure than later records [21].

In the present study 74% of patients had abnormal CT scan result (sensitivity of CT scan being 74%). Various CT scan studies in partial seizures have show CT scan abnormalities ranging from 35% to 71% [62, 68-72].

In the present study the highest percentage (78%) of CT abnormalities was detected in patients who had seizures for less than 6 months duration. Similar observation was made by Mc Gahan et al [63], Guberman [71], Wadia et al [72], and Sethi et al [76]. The commonest abnormality was a focal ring or disc-enhancing lesion (68%). It is apparent from Table 5 that longer the duration of seizures, lesser is the chance to find an abnormal CT scans. So, there is no significant rise in the CT scan abnormalities as the duration of seizure increases beyond 6 months (p value 0.37121).

In the present study, the incidence of CT scan abnormalities increased after second decade onward and it was 100% after the age of 50 years. Mc Gahan et al found abnormal CT scans in 86% of epileptic patients over 65 years of age⁶³. Bogdanoff and colleagues also reported that the incidence of abnormal CT scans rises as the age of seizure onset increases [68]. There was not much difference in CT scan abnormalities between third, fourth and fifth decade, i.e. 82.4%, 80% and 75% respectively (p value 0.1989).

In this study 60% patients had focal ring or disc-enhancing lesions with or without perilesional hypodensity, as compared to 26% observed by Wadia et al [72] and 26.1% by Sethi and colleagues [76]. Ring or disc-enhancing lesions were found more commonly in those with seizures of less than 6 months duration in the present study as compared to the study of Wadia *et al*.

In the present study, all 30 cases of ring or disc-enhancing lesion on CT scan were subjected to immunodiagnosis of cysticercosis by enzyme linked immunosorbent assay (ELISA) system. Out of 30 cases with ring or disc-enhancing lesion on CT scan, only 10(33.3%) patients had positive results. ELISA was positive in 30.8% of patients with single ring or disc-enhancing lesion and was positive in 50% in patients with multiple lesions. In one Indian study, overall positivity of ELISA was 59.5% and the positivity for single lesion was 56.76% while positivity for multiple lesions was 80% [83]. Ramos and colleagues in their study found that the sensitivity and specificity of ELISA in diagnosing neurocysticercosis was 69% and 71% respectively [84]. In another study it ELISA showed 50% sensitivity and 70% specificity [85]. From the present study it can be concluded that serological test can be useful in diagnosing neurocysticercosis but a negative result does not exclude the diagnosis of neurocysticercosis.

Vascular lesions were present in 6% of cases as compared to 8% noted by Mc Gahan *et al* [63]. Vascular lesions were more common after the age of 40 years in the present study as compared to the study of Mc Gahan *et al*, in which vascular lesions were more common after the age of 45 years.

Calcification of unknown aetiology was observed in 4(8%) patients in the present study as compared to 2.5% noted by Loiseau et al in their study [70]. It could have been due to healed tuberculoma or calcified stage of neurocysticercosis. ELISA for cysticercosis in all 4 cases of calcification was negative in the present study.

Both EEG and CT scan were done in 50 patients in the present study. The CT scan and EEG abnormalities in the present study were 74% and 46% respectively as compared to 33% and 19% respectively in the National General Practice Study of Epilepsy [13]. So in the present study higher incidence of CT scan abnormalities were seen as compared to EEG abnormalities. In present study 42% of patients had normal EEG and abnormal CT scan which is similar to the observation made by Mc Gahan et al (42.7%) =. 32% of patients had abnormal EEG and CT scan as compared to 34% in the study of Bogdanoff and their colleagues⁶⁸. 14% of patients in the present study had abnormal EEG but normal

Summary and Conclusion

Fifty patients (age more than 10 years) of partial seizures were studied prospectively. All patients were subjected to detailed history, examination and baseline investigation. CT scan and EEG were done in all 50 patients.

The following conclusions were drawn:

1. The number of males was more common than that of the females (M: F 3.5:1).
2. Maximum incidence of onset of seizures was seen in second decade of life.
3. In most of the patients, duration of illness was less than 6 months (82%) at the time of examination and majority of patients came after 2-10 episodes of seizures.
4. In 12% of patients, there was positive family history.
5. Precipitating factors were detected in 20% of patients and mental upset being the most common precipitating factor.
6. Simple partial seizure with secondary generalization was the commonest type (36%) of seizure.
7. Post-ictal headache and confusion (52%) were the most common symptoms.
8. EEG was abnormal in 46% and lateralized spikes/sharp and slow wave complexes were the most common form of epileptiform abnormality.
9. CT scan was abnormal in 74% of cases, which included ring or disc-enhancing lesion (60%), vascular (6%) and calcification (8%).
10. CT scan abnormalities were commoner in elderly age group as compared to young and in seizure duration of less than 6 months as compared to longer seizure duration.
11. CT scan abnormalities were detected in 42% of patients with normal EEG and 32% of patients with abnormal EEG. 14% of patients had abnormal EEG but normal CT scan. Thus, the detection rate of focal abnormalities was higher with CT scan.
12. Patients with normal EEG are equally likely to have CT abnormalities as compared to patients with abnormal EEG.
13. ELISA for cysticercosis was positive in 33.3% of patients with ring or disc-enhancing lesion on CT scan. Positive in 33.8% in single lesion and 50% in multiple lesions.

Recommendation

- a. Computerized tomography is a potentially convenient and safe technique that is valuable in the investigation of the patients of partial seizures.
- b. Patients with late-onset partial seizures (particularly over 50 years old) and seizure duration of less than 6 months have a high probability for CT scan abnormalities.
- c. Patients with normal EEG however are equally likely to have CT abnormalities as compared to patients with abnormal EEG. So, the view is that CT scan should be advised for patients with partial seizures, regardless of whether or not there are abnormalities in the EEG.
- d. ELISA for cysticercosis in the patient with focal ring or disc-enhancing lesions in the CT scan can be useful in supporting the diagnosis of neurocysticercosis if positive but a negative result does not exclude the diagnosis of neurocysticercosis.

Results

The relevant results and statistical analysis of the study is given below in tabulated forms

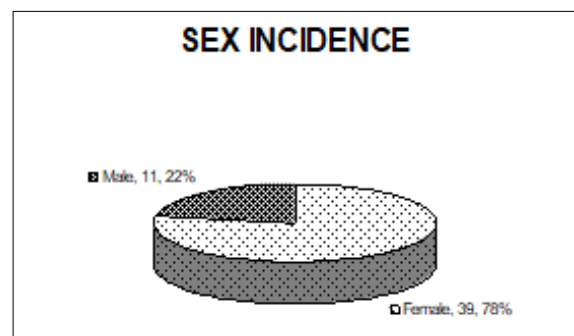


Chart: 1

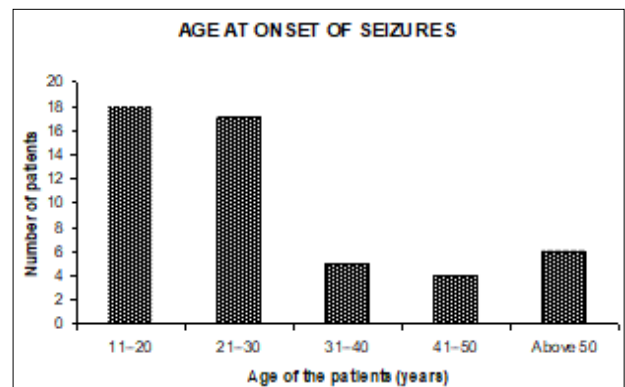


Chart: 2

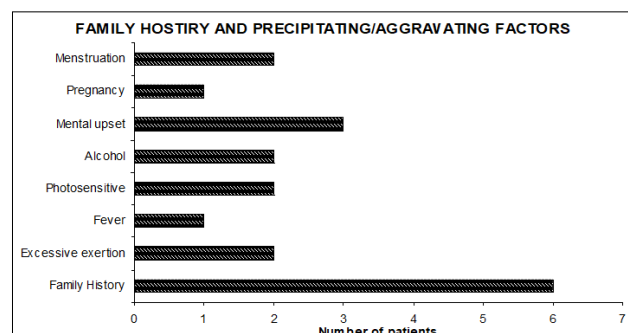


Chart: 3

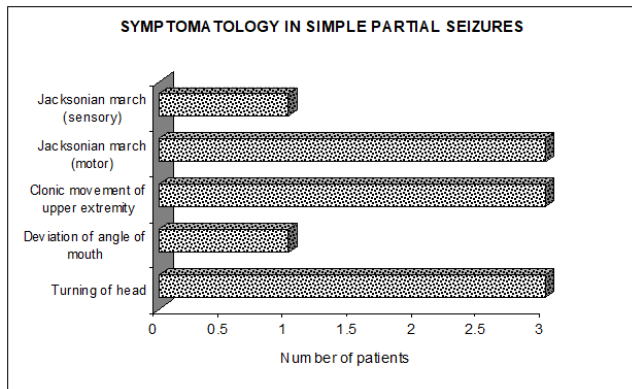


Chart: 4

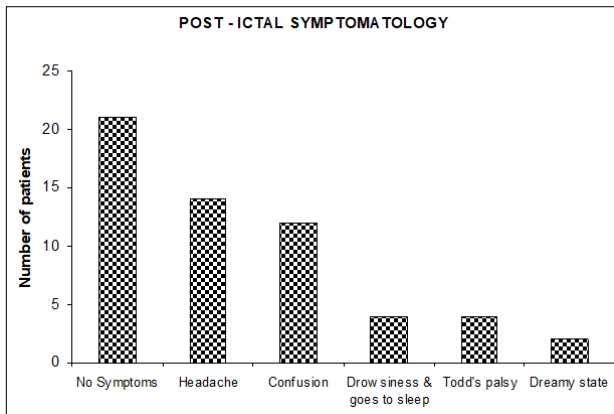


Chart: 5

Table 1: Inter - Ictal EEG Expression in Partial Seizures

EEG expression	No. of Patients	Percentage
Normal records	27	54
Abnormal records		
a. Lateralized EEG abnormalities	18	36
b. Generalized EEG abnormalities	4	8
c. Focal abnormalities with secondary generalization	1	2
Total	50	100

Table 2: Abnormalities in EEG Recordings

Abnormalities	No. of Patients	Percentage
Generalized slow waves	2	8.7
Generalized spikes/sharp & slow wave complex	2	8.7
Lateralized slow waves	7	30.4
Lateralized spikes/sharp & slow wave complexes	12	52.2
Total	23	100

Table 3: Results of CT Scan Head

Results of CT scan	No. of Patients	Percentage
Normal	13	26
Ring or disc - enhancing lesion	30	60
Calcification	4	8
Vascular		
a) Infarction	1	2
b) Haemorrhage	2	4
Total	50	100

Table 4: EEG And CT Scan Correlation (A) (n=50)

	No of patients	Percentage
Normal EEG and normal CT	6	12
Normal EEG and abnormal CT	21	42
Abnormal EEG and abnormal CT	16	32
Abnormal EEG and normal CT	7	14

Table 5: EEG And CT scan Correlation: (B) (n=50)

EES results	CT scan results	
	Abnormal	Normal
Abnormal (23)	16	7
Normal (27)	21	6
p value	0.50935	

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