Semiology of epileptic seizures: Assiut University Hospital-based study

Amira Abdelmoneim Mohammed Mohammed Ashry, Hassan Mohammed Farwiz, Reda Badry Abdelrasoul

Department of Neuropsychiatry, Faculty of Medicine, Assiut University, Assiut, Egypt

Correspondence to Dr. Amira Abdelmoneim Mohammed Mohammed Ashry, BSC, 10 El-Gendi Street, Assiut, Egypt. Postal Code: 71511; Tel: 01008323208; e-mail: amiraashry89@yahoo.com

Received 17 April 2019
Revised 02 May 2019
Accepted 14 July 2019
Published 11 June 2021

Journal of Current Medical Research and Practice
2021, 6:128–133

Background
Epilepsy diagnosis is mainly clinical, as it depends on the detailed analysis of the seizure semiology. This study reviews the systematic way to describe and classify seizure semiology with the help of using electro-clinical methods for better diagnosis and to choose the most effective medical treatment.

Patients and methods
This study was conducted on 60 epileptic patients throughout the period from 1st of October 2016 to 31st of March 2017 in Assiut University Hospital. We excluded patients who lacked eye witness and who had seizures owing to metabolic causes. All patients were subjected to complete general and neurological examination, epilepsy sheet with detailed seizure semiology analysis, and electroencephalogram (EEG).

Results
Prodroma was found in 26 (43.3%) cases, and aura was recorded in 34 (56.7%) cases. Forty (66.7%) cases had automatism more in the form of picking cloths and unresponsiveness. Most cases (63.3%) reported loss of contact with surroundings and 28.3% lost their consciousness. Ipsiversive movement was recorded in 13.3% of cases, whole-body myoclonus was presented in 10% of cases, unilateral nonmarching sensory seizure in 3.3%, 23.3% presented with tonic seizure, and 16.7% with tonic–clonic seizure. Postictal amnesia was seen in 60% of cases, postictal confusion in 46.7%, and postictal Todd's paralysis in 6.7%. Distribution of epileptic activity in EEG was mostly in left fronto-temporal area (20%).

Conclusion
Clinical semiology is the starting point of understanding seizure disorder and making the diagnosis of epilepsy. The correlation between analysis of the development and sequence of semiologic features and EEG findings can identify the seizure initiation and propagation.

Keywords:
electroencephalogram, epilepsy, seizure, semiology

J Curr Med Res Pract 6:128–133

2357-0121

Introduction

Diagnosis of epilepsy is mainly clinical, as it depends on the detailed analysis of the seizure semiology provided by the patient and eye witness [1].

Observing seizure semiologic features that characterize partially originating seizures helps in lateralizing (left vs. right) and localizing (involved brain region) the seizure onset. Therefore, this information is vital for seizure classification [2].

Electroencephalogram (EEG) and neuroimaging are needed to identify focal physiological and pathological brain abnormalities [3–5]. The development of video-EEG monitoring has allowed careful correlation of semiologic features with simultaneous EEG recordings [6]. As a result, clinical semiology gained greater reliability in diagnosing specific seizure types and localizing their onset [7].

The objective of this study was to present a survey of important semiologic characteristics and EEG findings of various seizures, focusing on the approach to the electro-clinical diagnosis and localization of epileptic seizures among recruited epileptic patients of Assiut University Hospital in 6-month duration from either the outpatient clinic or the inpatient ward.

Patients and methods

This is an observational descriptive cross-sectional study. It was done throughout the period from 1st of October 2016 to 31st of March 2017. The study included 60 patients (33 males and 27 females), with mean age of 32.5 ± 15.4 years, who were either admitted in neurology inpatient ward or attending the outpatient

epilepsy clinic of Assiut University Hospital, Assiut, Egypt. All patients fulfilled the inclusion and the exclusion criteria.

Ethical approval

Before participation in the study, all patients provided fully informed written consent, and the local ethical committee of Assiut University had approved the experimental protocol.

Inclusion criteria

Any epileptic patients who presented with either monotype of seizure or multiple types of seizures were included. A patient is considered to have epilepsy if he or she fulfilled the operational definition proposed by International League Against Epilepsy [8].

Exclusion criteria

The following were the exclusion criteria:

(1) Patients who had seizures owing to any metabolic causes
(2) Patients without having a reliable relative that witnessed patient's seizure to give us a detailed seizure history
(3) Epileptic patients who refused participation in the study.

Methods

Each patient in the study was subjected to the following:

(1) General examination: temperature, blood pressure, pulse, heart, chest, and abdominal examination.
(2) Neurological examination:

Full neurological examination was done for the patients in our study.

The neurological examination assessed focal signs that might implicate or localize cerebral pathology.

Epilepsy sheet:

This sheet was reviewed by our department and places special emphasis on epilepsy, including personal history; onset, duration, and frequency of seizures; precipitating factors; etiological-related factors; family history; therapeutic history; degree of control; type of seizures; and detailed seizure description, which were taken from each patient in an individualized interview.

During history taking, it is worth remembering that each event may potentially have four stages: preictal, ictal onset (aura), ictus, and postictal.

(a) Preictal phase:

Asking about provoking or precipitating factors such as fever, illness, lack of sleep, lack of compliance, menstruation, and head injury should be done. However, this stage may also include symptoms that may last for an inordinate length of time, for example, tens of minutes, hours, or even, in some cases, days. These are referred to as prodromal symptoms and should not be confused with seizure onset.

(b) Ictal onset phase:

The history of any brief focal signs or symptoms (aura) at the beginning of the more dramatic seizure must be obtained, when in fact there is such an event. The patient usually refers to this part of the seizure as the 'warning.' Examples include headaches, behavioral irritability, and personality change.

(c) Ictal phase:

The ictus is usually associated with an alteration in consciousness. This alteration may be a loss of consciousness or simply an 'altered' state, which is characteristically seen in complex partial seizures (CPS) of temporal lobe origin. The alterations in the latter may interpret the patient's state as one of full consciousness, particularly when associated automatic behavior (automatisms) appears normal, or near normal. There are times refer to more than one seizure type, suggesting more than one seizure focus that are usually extensions of single seizure semiology.

(d) Postictal phase:

It may take the form of deficits of function. In a primary generalized seizure, for example, there may be a postictal deficit with localizing value. For example, postictal weakness (Todd's paresis) or visual deficits will point to involvement of the associated functional cortex in the contralateral hemisphere. Postictal dysphasia will suggest involvement of the dominant hemisphere.

Standard EEG:

EEG traces of all patients were visually and manually analyzed by two separate EEG expert readers in two different sessions, commenting on each EEG by filling a standard EEG report, which included background activities, focal changes, side of focal changes, site of focal changes, changes appeared with or without provocation, and finally the conclusion.

Statistical analysis test

Clinical data were collected, and descriptive analysis was done using SPSS, version 16 (copyright 2007 by SPSS Inc. , Chicago, United States of America).

Results

Prodroma and aura

A total of 26 (43.3%) patients had prodromal, of which 16.7% of patients witnessed behavioral changes, 13.3% had fatigue, and 6.7% had headache. Overall, 56.7% of cases witnessed ictal onset aura, 23.3% were with psychic aura, and 11.7% had abdominal aura (Table 1).

Automatism and consciousness

Forty cases experienced automatism more in the form of picking cloths and unresponsiveness, in equal percentages of 18.3%.

Fifty-five cases experienced impaired conscious level, where 38 (63.3%) cases lost contact with surroundings, and 17 (28.3%) cases lost their consciousness (Table 2).

Versive movement, myoclonus, and sensory seizure

Eight (13.3%) cases presented with ipsiversion, six (10%) cases with whole-body myoclonus, and 3.3% with unilateral nonmarching sensory seizures (Table 3).

Motor seizure

Fourteen (23.3%) cases presented with tonic seizure and 10 (16.7%) cases with tonic–clonic seizures.

Regarding side of motor seizure, 13 (21.7%) cases were presented bilaterally and eight (13.3%) cases were with marching course (Table 4).

Semiology for other items

During seizures, of 60 cases, ictal salivation and tongue biting was seen in 17 (28.3%) cases, ictal urination was in 11 (18.3%) cases, and eyeball up-rolling was seen in eight (18.3%) cases.

Postictal seizure semiology

A total of 36 (60%) cases had postictal amnesia, 33 (55%) cases had postictal sleep, 28 (46.7%) cases with postictal confusion, and only four (6.7%) cases had Todd's paralysis. No case had postictal hemianopia, aphasia, nose wiping, water drinking, or flat affect.

Electroencephalogram data

EEG data and localization of epileptic activity showed 56 (93.3%) cases had abnormal EEG, 39 (65%) cases with focal epileptic activity, eight (13.3%) cases with generalized epileptic activity, and only two (3.3%) cases with multifocal activity (Table 5).

Table 1 Preictal seizure semiology (prodroma) and ictal onset (aura)

	n (%)
Prodromal symptoms	
No prodroma	34 (56.7)
Headache	4 (6.7)
Light headedness	2 (3.3)
Behavioral changes	10 (16.7)
Gastric upset	2 (3.3)
Fatigue	8 (13.3)
Aura	
Auditory	1 (1.7)
Gustatory	5 (8.3)
Olfactory	2 (3.3)
Abdominal	7 (11.7)
Psychic	14 (23.3)
Mixed auras	5 (8.3)
No aura	26 (43.3)

Table 2 Ictal seizure semiology for automatism and consciousness

	n (%)
Automatism	
No automatism	20 (33.3)
Oral automatism	6 (10.0)
Picking at clothes	11 (18.3)
Dressing and undressing	5 (8.3)
Repeated tapping	1 (1.7)
Unresponsiveness	11 (18.3)
Pedaling	2 (3.3)
Ictal speech	4 (6.7)
Consciousness	
Conscious	5 (8.3)
Loss of conscious	17 (28.3)
Loss contact with surroundings	38 (63.3)

Distribution of epileptic activity

The distribution was left front-temporal in 12 (20%) cases, generalized in seven (11.7%) cases, and left posterior temporal in six (10%) cases (Fig. 1).

Seizure type

Among 60 cases, 40 (66.4%) cases had CPS, 10 (16.7%) cases with generalized tonic convulsions (GTC), eight (13.3%) cases with focal fits with secondary generalization, six (10%) cases with myoclonus, nine (15%) cases with multiple types of seizure, and each generalized tonic–clonic and simple partial seizure was seen only in three (5%) cases (Table 6).

Multiple seizure types were as follows: each 'CPS and myoclonus,' 'GTC and myoclonus,' and 'CPS and generalized tonic–clonic convulsion (GTCC)' represented 3.3%, whereas 'CPS and GTC,' 'GTC, myoclonus, and CPS,' and 'CPS and focal fits with secondary generalization' represented 1.7% (Fig. 2).

Table 3 Ictal seizure semiology for versive movement, myoclonus, and sensory seizure

	n (%)
Versive movement	
No	52 (86.7)
Ipsiversion	8 (13.3)
Myoclonic seizure	
Whole-body myoclonus	6 (10.0)
No	54 (90.0)
Sensory seizure	
Yes	2 (3.3)
No	58 (96.7)
Sensory seizure side	
Unilateral	2 (3.3)
Sensory seizure area	
Lt UL	2 (3.3)
Marching course	0 (0.0)

Lt, left; UL, upper limb.

Table 4 Ictal seizure semiology for motor seizure

	n (%)
Motor seizure	
No	36 (60.0)
Tonic	14 (23.3)
Tonic-clonic	10 (16.7)
Side	
Unilateral	3 (5.0)
Bilateral	13 (21.7)
Unilateral then bilateral	8 (13.3)
Area involved	
Rt UL, LL then Lt UL, LL	4 (6.6)
Both ULs, LLs	13 (21.7)
Lt UL, LL then Rt UL, LL	4 (6.7)
Rt UL, Rt mouth angle	3 (5.0)
Duration	
Few seconds	2 (3.3)
Few minutes	22 (36.7)
Marching	
Yes	8 (13.3)
No	52 (86.7)

LL, lower limb; Lt, left; Rt, right; UL, upper limb.

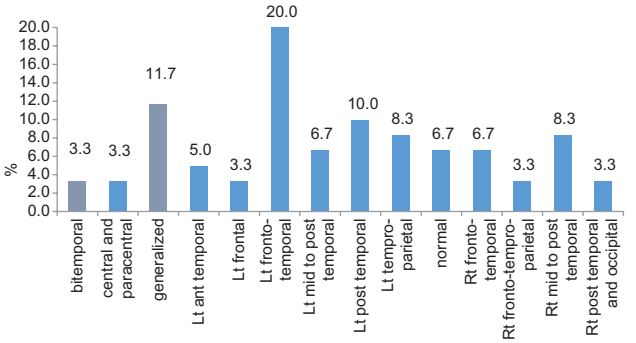
Discussion

This study was conducted in Assiut University Hospital to review the electro-clinical pattern of seizure semiology.

Preictal seizure semiology (prodroma) and ictal onset (aura)

Prodromal symptoms occurred in 43.3% of patients, of which, 16.7% described behavioral changes, 13.3% described sense of fatigue, 6.7% had headache, and 3.3% had light headedness as well as gastric upset. Our reported data were consistent with Scaramelli *et al.* [9] who found that prodromal symptoms were reported in 39 (39%) patients of their studied sample, and they reported occurrence of behavioral changes in 13% of patients, fatigue in 7% of patients, gastric upset in 3%, and headache in 2% [9]. Moreover, nearly similar findings were found by the study of Kotwas *et al.* [10] who reported the incidence of prodroma in 39% [10].

Figure 1



Distribution of epileptic activity.

Regarding aura, it was reported in approximately half (51.7%) of the patients among which 18.3% had psychic aura, 11.7% had abdominal aura, 8.3% for each gustatory and mixed auras, 3.3% had olfactory aura, and 1.7% had auditory aura. The previous results were not consistent with the results of the study of Nakken *et al.* [11] who found that aura occurs in 31% of the total sample (n = 1897), and 39% of those with active epilepsy (n = 765) had experienced an aura [11]. The difference in the results of this study can be explained by the small number of the studied sample size of our study and owing to different study design.

Ictal seizure semiology for automatism and consciousness

Approximately two-thirds of our studied sample experienced automatism in different forms; 18.3% were presented with picking at clothes as well as unresponsiveness to surrounding, 10% with oral smacking, 8.3% had dressing and undressing automatism, 6.7% had ictal speech, 3.3% had pedaling movements, and 1.7% had repeated hand tapping. The reported clinical pattern of automatism was consistent with Rásonyi *et al.* [12] who recorded that automatism occurred in 62% of the studied sample (n = 55) with about 13% with oral automatism, speech automatism in 9%, and manual automatism in 21% [12].

Regarding consciousness, impaired consciousness was reported in 91.6% of cases, among whom 63.3% experienced loss of contact with surrounding and 28.3% had complete loss of consciousness; only 8.3% were conscious. The reported data were partially consistent with the study by McPherson *et al.* [13] who reported minimal consciousness in complex partial and generalized tonic–clonic seizures. Testing was initiated in a total of 84 seizures (24 patients). It was concluded

Table 5 Electroencephalogram data

	n (%)
EEG	
Normal	4 (6.7)
Abnormal	56 (93.3)
EEG background	
Well organized	54 (90.0)
Poorly organized	2 (3.3)
Provocation	
With	7 (11.7)
Without	6 (10.0)
With and without	43 (71.7)
Wave pattern	
Sharp waves	1 (1.7)
Slow waves	8 (13.3)
Spike slow	17 (28.3)
Poly spikes	5 (8.3)
Irregular intermittent slowing	34 (56.7)
Sharp transients	4 (6.7)
Sharp slow	23 (38.3)
Localization of epileptic activity	
Focal	39 (65.0)
Generalized	8 (13.3)
Focal and generalized	7 (11.7)
Multifocal	2 (3.3)
Normal	4 (6.7)

EEG, electroencephalogram.

Table 6 Seizure type

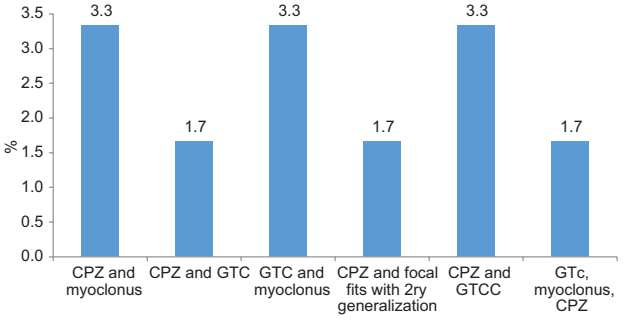
	n (%)
Complex partial seizure	40 (66.7)
Myoclonus	6 (10.0)
Generalized tonic convulsions	10 (16.7)
Generalized tonic-clonic convulsions	3 (5.0)
Generalized clonic convulsions	0 (0)
Atonic	0 (0)
Absence	0 (0)
Simple partial seizure	3 (5.0)
Focal fits with secondary generalization	8 (13.3)
Catamenial	3 (5.0)
Multiple types of seizures	9 (15.0)

that failure to respond questions and commands occurred in 40.4% of cases and minimal consciousness was seen in nearly 50% of CPS cases, and this was higher than GTCS cases [13].

Ictal seizure semiology

Our study reported motor seizure in 40% (of which tonic seizure was in 23.3% of cases and tonic–clonic seizure in 16.7%), versive seizure in 13.3% of cases, myoclonus in 10%, sensory seizure in 3.3%, ictal speech in 6.7%, ictal urination 18.3%, ictal eyes up rolling in 13.3%, and each ictal salivation and tongue biting in 28.3%. Our data were consistent with Manford *et al.* [14] who found that versive and postural fits occurred in 12.7% of cases sensory and clonic Jacksonian fits was reported in 6.25%, motor

Figure 2



Multiple seizure types. CPS, complex partial seizure; GTC, generalized tonic convulations; GTCC, generalized tonic–clonic convulations.

agitation in 2.2%, whereas motor fits in 78.7% of cases [14]. Moreover, the result was consistent with Barba *et al.* [15] who studied epilepsy in temporal lobe and temporal plus epilepsy and found that sensory fits were reported in 16.9%, visual 6.8%, auditory 3.4%, olfactory 1.7%, gustatory 5.1%, vestibular in 1.7%, emotional in 33.7%, psychic in 3.4%, salivation in 25.4%, urination in 0%, motor tonic 37.5%, motor clonic in 33.9%, automatism 42%, versive 35.6%, and confusion 40.7% [15].

Types of seizures

CPS was reported in 66.7% of cases, GTC in 16.7%, focal fits with secondary generalization in 13.3%, myoclonus in 10%, GTCC in 5%, simple partial seizure in 5%, and multiple types of seizures in 15%. Catamenial epilepsy was reported in 5% of cases. A population-based study in a Western European country reported that localization-related seizures represented 61.1% of cases and generalized seizures 30.9%, and also multiple seizure types were reported in 12% of patients. Predominant typical absence seizures were associated with generalized tonic–clonic seizures in 11 patients and with myoclonic seizures in 10 patients. Predominant GTC seizures were associated in five cases with absences and with myoclonic seizures in five other cases. The three types of seizures were observed in three patients [16]. Another comprehensive review about epidemiology of epilepsy in India by Sridharan [17] reported that CPS was found in 36% of cases, GTCC in 23%, myoclonus in 3%, simple partial seizure in 14%, and absence seizure in 6% [17]. Another Bangladeshi hospital study reported more than two-thirds of their sample study with focal epilepsy, whereas ~12.35%, with generalized epilepsy, and the rest of studied sample had other types of seizures [18]. The relative frequency of seizure type in these different studies could be attributed to study design and criteria of study sample for each.

Conclusion

Clinical semiology is the starting point of understanding a seizure disorder and making the diagnosis of epilepsy.

Sequencing and analysis of multiple semiologic features can distinguish the seizure initiation point and its propagation; this must be correlated with EEG for better results.

Obstacles and limitations

The main obstacle of the study was the dropout of positive detected cases owing to their refusal to participate in the study, or owing to they seek medical care without any relatives who can give us detailed history of patient's condition.

Seizure semiology is subjective, and there is significant inter-rater variability that may define symptoms and signs differently as previously reported [19].

False-positive information may be inadvertently given so the clinician needs using history taking skills in retrieving the additional information that would support the diagnosis or aid with lateralization.

Recommendations

For the future research in this field, we suggest to increase the sample size of patients and using video monitoring EEG to allow better analysis of their data and to have more reliable results.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1 Jan MM. Assessment of the utility of paediatric electroencephalography. Seizure 2002; 11:99–103.

2 Jan MM. The value of seizure semiology in lateralizing and localizing partially originating seizures. Neurosciences (Riyadh, Saudi Arabia) 2007; 12:185–190.

3 Jan MM. The value of postictal electroencephalogram in temporal lobe seizures. Ann Saudi Med 1999; 19:550–552.

4 Jan MM, Sadler M, Rahey SR. Lateralized postictal EEG delta predicts the side of seizure surgery in temporal lobe epilepsy. Epilepsia 2001; 42:402–405.

5 Jan M, Neville BG, Cox TC, Scott RC. Convulsive status epilepticus in children with intractable epilepsy is frequently focal in origin. Can J Neurol Sci 2002; 29:65–67.

6 Penry JK, Porter RJ, Dreifuss RE. Simultaneous recording of absence seizures with video tape and electroencephalography. A study of 374 seizures in 48 patients. Brain 1975; 98:427–440.

7 French JA, Williamson PD, Thadani VM, Darcey TM, Mattson RH, Spencer SS, *et al.* Characteristics of medial temporal lobe epilepsy: I. Results of history and physical examination. Ann Neurol 1993; 34:774–780.

8 Fisher RS, Acevedo C, Arzimanoglou A, Bogacz A, Cross JH, Elger CE, *et al.* ILAE official report: a practical clinical definition of epilepsy. Epilepsia 2014; 55:475–482.

9 Scaramelli A, Braga P, Avellanal A, Bogacz A, Camejo C, Rega I, *et al.* Prodromal symptoms in epileptic patients: clinical characterization of the pre-ictal phase. Seizure 2009; 18:246–250.

10 Kotwas I, McGonigal A, Trebuchon A, Bastien-Toniazzo M, Nagai Y, Bartolomei F, *et al.* Self-control of epileptic seizures by nonpharmacological strategies. Epilepsy Behav 2016; 55:157–164.

11 Nakken KO, Solaas MH, Kjeldsen MJ, Friis ML, Pellock JM, Corey LA. The occurrence and characteristics of auras in a large epilepsy cohort. Acta Neurol Scand 2009; 119:88–93.

12 Rásonyi G, Fogarasi A, Kelemen A, Janszky J, Halász P. Lateralizing value of postictal automatisms in temporal lobe epilepsy. Epilepsy Res 2006; 70:239–243.

13 McPherson A, Rojas L, Bauerschmidt A, Ezeani CC, Yang L, Motelow JE, *et al.* Testing for minimal consciousness in complex partial and generalized tonic-clonic seizures. Epilepsia 2012; 53:e180–e183.

14 Manford M, Fish DR, Shorvon SD. An analysis of clinical seizure patterns and their localizing value in frontal and temporal lobe epilepsies. Brain 1996; 119 (Part 1):17–40.

15 Barba C, Barbati G, Minotti L, Hoffmann D, Kahane P. Ictal clinical and scalp-EEG findings differentiating temporal lobe epilepsies from temporal 'plus' epilepsies. Brain 2007; 130 (Part 7):1957–1967.

16 Picot MC, Baldy-Moulinier M, Daurès J-P, Dujols P, Crespel A. The prevalence of epilepsy and pharmacoresistant epilepsy in adults: a population-based study in a Western European country. Epilepsia 2008; 49:1230–1238.

17 Sridharan R. Epidemiology of epilepsy. Curr Sci 2002; 82:664–670.

18 Hussain M, Al Masum Khan AFM, Nahidul Islam M, Ferdous Mian M, Bakhtiar Azam M, Chowdhury R. Different types of epilepsy based on clinical and electroencephalographic (EEG) findings: experience at referral neuroscience hospital in Bangladesh. J Natl Instit Neurosci Bangl 2018; 3:1.

19 Tufenkjian K, Luders HO. Seizure semiology: its value and limitations in localizing the epileptogenic zone. J Clin Neurol (Seoul, Korea) 2012; 8:243–250.