Original Article

Clinical Analysis of Partial Epilepsy with Auras

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Abstract

Background: An aura is usually considered to be the initial clinical sign of a seizure. The types of abnormal neuron activities (i.e., localized and generalized firing) play an important role in the diagnosis of epilepsy. The goal of this study was to investigate the types of auras and its correlation with the localization and treatment of epilepsy.

Methods: The 426 epileptic patients with auras from a single center were reviewed with reference to International League Against Epilepsy (ILAE, 1981) classification; the clinical manifestations and incidence of auras were analyzed in this retrospective study, as well as the results of electroencephalogram (EEG), brain magnetic resonance imaging (MRI) and the treatment methods.

Results: Among the 426 epileptic patients, six different types of auras were defined, including autonomic auras, sensory auras, mental and affective auras, aura as vertigo, cognitive auras, and unspeakable feelings. Duration of auras ranged from 2 s to 7 min; the median duration of auras was 64.2 s. Abnormal EEG was observed in 297 (69.72%) patients. Moreover, abnormal brain MRI was observed in 125 (29.34%) patients. Nineteen (4.46%) epilepsy patients with auras underwent both surgeries and antiepileptic drugs (AEDs) while others were treated only with AEDs.

Conclusions: This study suggested that auras played an important role in the diagnosis, classification, and localization of epilepsy. Epileptic aura could help differentiate partial seizure from generalized seizure.

Key words: Aura; Diagnosis; Epilepsy; Treatment

Introduction

Epilepsy is the second most common cerebral disorder in China, with an incidence rate of 0.7%.[1] Appropriate treatment depends on a proper diagnosis of epilepsy (including classification and localization). Aura is a subjective ictal phenomenon that essentially comprises all experienced sensations in a patient and may precede an observable seizure.[2,3] It is a characteristic of partial epilepsy although some articles showed that auras might present in some patients with generalized epilepsy.[3] The type of aura occurring before a seizure experienced by some patients usually reflects the function of the part of the cerebral cortex in which the epileptic discharge initially occurs. The types of abnormal neuron activities (i.e., localized and generalized firing) play an important role in the diagnosis of epilepsy.[4,5] Varieties of studies on auras have been performed worldwide, but only with limited sample size. In this study, we summarized the incidences and clinical manifestations of different types of auras from 426 epileptic patients, which were collected from the Epilepsy Center of Peking University First Hospital and investigated its correlation with diagnosis and treatment of epilepsy.

Methods

This study included 426 epileptic patients with aura, who underwent electroencephalogram (EEG) evaluation in the Epilepsy Center of Peking University First Hospital from January 2012 to January 2015. Inclusion criteria were as follows: (1) patients aged from 18 years to 60 years and could provide the detailed medical history; (2) patients had a confirmed diagnosis of partial epilepsy; and (3) patients could

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be followed up for 12–18 months. Exclusion criteria were as follows: (1) severe psychiatric or behavioral diseases; (2) nonepileptic attacks; (3) patients could not receive brain magnetic resonance imaging (MRI) examination; and (4) inability to comply with the study. All of the patients involved in this study provided written informed consents. This study was approved by the Ethics Committee of Peking University First Hospital. Diagnosis and classification of epilepsy were evaluated by two neurologists based on the International League Against Epilepsy (ILAE, 1981) classification.

Clinical data of all patients were recorded by trained neurologists. Patients were screened by the same question: "Are there any subjective signs seconds or minutes right before the onset of your seizure?" Details of the signs were recorded from the patients with positive answer. In addition, all patients underwent routine EEG (with sphenoid electrodes) and brain MRI examinations. Patients were followed up for 18 months. For the first 12 months, patients were followed up through clinic visit every 3 months; then, patients were followed up through phone call every 3 months until July 2016.

Results

Clinical manifestations of auras

The mean age of these 426 epileptic patients was 28.5 ± 7.4 years old, and 229 (53.76%) were males. Six subgroups of auras were classified from these 426 epileptic patients according to the manifestations: (1) autonomic auras: 117 episodes of autonomic auras were identified, which were manifested by palpitation (57 episodes), gastrointestinal discomfort (58 episodes; i.e., nausea, regurgitation, hiccup, and abdominal discomfort), and suffocation (2 episodes); (2) sensory auras: sensory auras were manifested by visual, olfactory, gustatory, general somatosensory, and experiential symptoms. Ninety episodes of visual auras were identified, with manifestations of formed visual hallucination (19 episodes) and unformed visual hallucination (71 episodes). Ten episodes of olfactory auras were identified and were manifested by the unpleasant smell or indescribable but uncomfortable odor. Nine episodes of gustatory auras were identified and were manifested by bitter mouth (2 episodes) or unpleasant taste (7 episodes). Seventy-four episodes of general somatosensory auras were identified and were manifested by numbness, pain, or stiff of the head or limbs; (3) mental and affective auras: 77 episodes of mental and affective auras were identified, including feeling of fear (37 episodes), depressed mood (23 episodes), and experiential sensory (17 episodes); (4) vertigo: 13 episodes were identified, of which 10 episodes were accompanied by visual rotation, and 3 episodes were accompanied by auditory abnormalities (tinnitus, hearing noise, and loss of hearing); (5) cognitive auras: 13 episodes were identified, and were characterized by the feeling of strangeness to people, words, and well-known circumstances, incapacity to recall the name of a known person, or incapacity to understand the words seen; (6) unspeakable feeling/malaise: 23 episodes were identified, and were characterized by general malaise which could not be described in details [Figure 1].

Duration of auras

Duration of auras was defined from the beginning of auras to the onset of observable seizures. Duration of auras ranged from 2 s to 7 min; the median duration of auras was 64.2 s. No signs of continuous auras could be found in our epileptic patients.

Electroencephalogram and magnetic resonance imaging results

Among the 426 epileptic patients with auras, 297 (69.72%) patients had abnormalities in their corresponding EEG reports and 129 (30.28%) patients had normal EEGs [Table 1]. EEG abnormalities included epileptiform discharges (spike/sharp/poly-spike/poly-sharp and wave complex) and slowing waves. Different types of waves could be observed in one patient's EEG findings. Abnormal waves in EEG of patients with palpitation, gastrointestinal, or cognitive auras appeared more in temporal lobe. EEG abnormalities in patients with visual auras were often manifested in occipital and temporal lobe.

One hundred and twenty-five patients (29.34%) had abnormal MRI findings while other patients (301 patients, 70.66%) had normal neuroimaging results. Abnormal MRI findings included hippocampal sclerosis (76 patients), temporal cyst (31 patients), and local cortical dysplasia (18 patients, including 2 cases of frontal cortex, 5 cases of temporal cortex, 8 cases of parietal cortex, and 3 cases of occipital cortex). Most patients with hippocampal sclerosis had auras of gastrointestinal discomfort and visual auras. For patients with temporal cyst, 10 of them experienced aura of gastrointestinal discomfort [Figure 2].

Treatments

Among the 426 epileptic patients, 407 (95.54%) patients only received antiepileptic drugs (AEDs). Nineteen (4.46%)

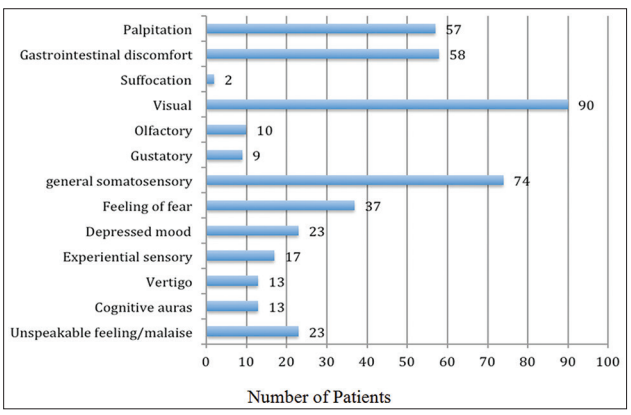

Figure 1: Clinical manifestations of the epileptic patients with auras.

Table 1: Area of abnormal electroencephalogram studies in 297 epileptic patients with auras, *n*

Manifestations of auras	Number of patients	Area of abnormal electroencephalogram waves				
		Frontal	Central	Parietal	Temporal	Occipital
Autonomic auras						
Palpitation	44	5	6	12	28	4
Gastrointestinal discomfort	49	3	9	4	36	4
Suffocation	1	0	0	0	1	0
Sensory auras						
Visual	64	2	10	8	11	48
Olfactory	3	2	2	2	3	1
Gustatory	2	1	0	1	2	1
General somatosensory	58	13	16	37	11	0
Mental and affective auras						
Feeling of fear	17	2	0	2	17	0
Depressed mood	12	2	2	3	12	0
Experiential sensory	11	1	2	2	11	0
Vertigo	11	2	2	9	2	2
Cognitive auras	9	4	1	1	7	0
Unspeakable feeling/malaise	16	2	3	3	11	2
Total	297	39	53	84	152	62

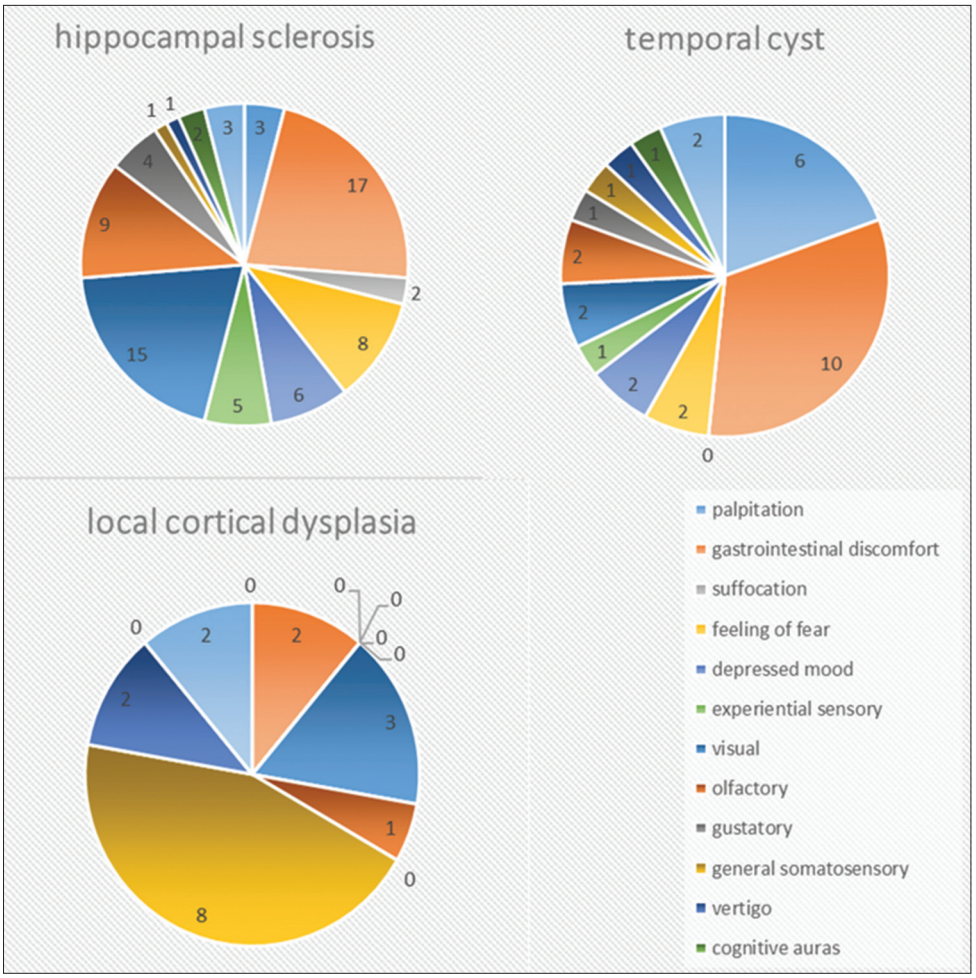

Figure 2: Abnormal brain magnetic resonance imaging in 125 epileptic patients with auras.

patients received both surgery and AEDs. Among 19 postoperative epileptic patients, 13 (68.42%) patients had class 1 outcome and 6 (31.58%) had class 3 or 4 outcomes based on Engel classification.

Discussion

Aura is a subjective ictal phenomenon which essentially comprises all experienced sensation and may precede an observable seizure in a given patient. An aura is a clinical sign of a seizure that occurs before alteration of consciousness, and most of the time, it can be recalled after the seizure. Typical auras include somatosensory, special sensory (visual, auditory), autonomic, and experiential symptoms, and last for very short time (seconds to minutes). The lateralization and localization of epilepsy mainly depend on the ictal symptoms of aura.[5,6]

In this study, male patients were slightly more than female patients. Six different types of auras could be identified from the 426 epileptic patients. The most frequent aura was autonomic aura (117/426, 27.46%), which was lower than previously reported.[7] Autonomic auras, especially the gastrointestinal discomfort, are suggestive of temporal lobe epilepsy, as observed in our study. Abdominal auras suggest ictal onset zone in anterior insular cortex, frontal operculum, or mesial temporal regions.[8] Among the six different sensory auras, the most common aura is visual auras, which suggest occipital or extra-occipital lobe onset.[9,10] Olfactory auras suggest that temporal regions are stimulated. Gustatory auras are suggestive of the origin areas of epileptogenic zone in the nondominant temporal lobe. The general somatosensory auras are often elicited from contralateral parietal lobe or temporal-parietal-occipital junction area. Experiential auras may be produced by the activation of the frontal lobe or temporoparietal junction areas.[11] Vertigo auras may be associated with the areas near the temporal lobe or parietal lobe. The unspeakable feelings (nonspecific auras) often have little localizing values. Auras can provide localizing value to the patients with epilepsy.[12]

The duration of an aura is quite short and may range from seconds up to minutes, most commonly <10 s.[6,13] Duration of auras in our 426 epileptic patients ranged from 2 s to 7 min. Some literature reported "aura continua", which lasted from hours to days.[13] Our epileptic patients, however, showed no signs of continuous auras. This might suggest that the prolonged sensory symptoms of auras were unusual in adult epileptic patients.

Among the 426 epileptic patients with auras, 297 (69.72%) patients had abnormal EEGs. This was slight higher than previously reported.[14-16] In our study, patients with auras of autonomic symptoms, such as palpitation and gastrointestinal discomfort, tended to have epileptiform discharges from the parietal, temporal, and central regions, which were consistent with the known functions of these areas. Previous study had shown that the abdominal auras may be associated with temporal lobe epilepsy.[17] We have found that our epileptic patients with abdominal auras might have abnormal discharges in the temporal lobe and central area, as well as in the frontal lobe and occipital lobe, but most likely in the temporal lobe. Our study showed that EEGs of patients with visual auras had abnormal discharges not only in the occipital lobe but also in the frontal and parietal lobes. This confirmed the findings from previous studies, which suggested that visual auras were suggestive of ictal onset from the occipital or temporal lobe.[11] As shown in Table 1, for epileptic patients with general somatosensory auras such as numbness in extremities, their EEGs findings suggested abnormal discharges in the parietal lobe. We also found abnormal discharges in the central region, frontal lobe, and temporal lobe in epileptic patients with this kind of auras. This was slightly different from what was reported by previous study,[18] which reported that somatosensory auras indicated ictal onset from anterior parietal region or the junction of temporal-parietal-occipital region. In our study, the patients who had vertigo aura showed epileptiform discharges frequently in the parietal lobe, suggesting that the vertigo aura may be associated with parietal lobe epilepsy. Our study also found that EEGs findings from our epileptic patients with auras might show epileptiform discharges from one single region such as temporal lobe, or from multiple regions simultaneously such as temporal and occipital lobes.

Abnormal neuroimaging findings were identified in 125 (29.34%) epileptic patients. Some researches showed that lesions could be identified by brain MRI in partial epilepsy patients, and previous studies also showed that tumors were the most common findings and hippocampal sclerosis was less common,[16,17,19] but our study showed that hippocampal sclerosis was the most common abnormality in epileptic patients with auras. Further studies are needed to verify these inconsistent findings in the future. Most of our epileptic patients received AEDs. Auras in combination with EEG and neuroimaging findings could help us better understand the etiology of the epilepsy and the localization of the seizure onset zone.[20]

There were some limitations in our study. First, this was a single-center study and our data may have certain limitations. A multicenter study with larger group of patients from different institutions or areas is needed to further evaluate types of auras and its correlation with the localization and treatment of epilepsy. Second, all of our patients were evaluated by scalp EEG, not by intracranial EEG, which made our conclusion less value.

In summary, our study suggested that auras played an important role in the diagnosis, classification, and localization of epilepsy. Epileptic aura could help differentiate partial seizure from generalized seizure. Therefore, we should pay attention to the location of clinical symptoms, especially the aura of patients with epilepsy.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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