

The Relationship between Aura and Postoperative Outcomes of Epilepsy Surgery in Patients with Mesial Temporal Sclerosis

Abstract

Background: We conducted a study to evaluate the relationship between aura types and postoperative outcomes in patients with mesial temporal sclerosis (MTS) to predict the prognosis of patients, accordingly. **Materials and Methods:** In this cross-sectional study, 99 patients with MTS-temporal lobe epilepsy were enrolled based on inclusion and exclusion criteria. The types of aura were evaluated, and the outcomes were categorized according to the Engel scale. Preoperative and postoperative results of patients were compared and analyzed with the Kruskal–Wallis test. **Results:** About 73.7% of patients had seizure-free after their surgeries. The most of patients ($n = 81$) were in Class I of Evaluating Engel criteria. About 36.3% had not experienced any aura before their seizures, and among those with aura, the most prevalent aura was abdominal aura in 29 patients (29.3%) followed by other types of aura and affective aura. Most of the patients in Class I, II, III, and IV of Engel scale had an abdominal aura, without aura, effective aura, and abdominal aura, respectively, but this difference was not statistically significant ($P = 0.691$). **Conclusion:** According to this study, the type of aura cannot predict postoperative outcomes in MTS patients. More studies are needed to evaluate this relation in better-planned studies with greater sample size.

Keywords: Aura, mesial temporal sclerosis, temporal lobe epilepsy

Introduction

Epilepsy is one of the prevalent neurologic diseases with a prevalence of 5–10 cases in every 1000 peoples, and the mean prevalence of epilepsy worldwide is about 1%.^[1] Temporal lobe epilepsy (TLE), a symptomatic focal epilepsy with specific clinical features and electroencephalography patterns, is the most prevalent type of epilepsy in adults.^[2] Mesial temporal sclerosis (MTS) is the most common pathologic abnormality related to TLE.^[3] Despite appropriate development in treating epileptic patients, medical therapy in all epileptic patients had met failure in 30% of cases that considered them as drug-resistant patients.^[4] MTS patients have a poor prognosis for long-term medical therapy, and surgery is a favorable option in these patients.^[5,6] Although studies reported the success of surgery in MTS patients and reducing the number of epileptic episodes in recent years, this success was not improved, and some of the patients experienced episodes of seizures after surgery, which showed unsuccessful surgery treatment.^[7]

The aim of evaluating patients before surgery is to localize epileptogenic zone and the cortical area generating seizures, and there are no clinical data or diagnostic method for the identification of this location and extension of the epileptogenic zone.^[8] Therefore maybe multisource information from history, EEG, and imaging can be helpful.^[9] Aura is an ictal, subjective, and objective phenomenon that is before seizures. Aura is one of the main features of TLE special MTS.^[10,11] About 96% of patients with TLE experienced an aura before seizure episodes that are occurred some seconds before ictal unconsciousness, and the most prevalent type of aura in TLE patients is an abdominal aura.^[12] Recent studies reported that some types of auras had diagnostic value for localizing epileptogenic zone and predictive value for postoperative outcomes.^[8] One study on MTS patients who were a candidate for epileptic surgery demonstrated that the chance of being seizure-free was 65.1% in patients with abdominal auras and 43.3% in other types of auras.^[9]

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To our knowledge, there are limited studies that evaluated the predictive value of auras for the high prevalence of TLE and limited studies on MTS patients and the importance of identifying factors for predicting postoperative outcomes after epilepsy surgery. This study aimed to evaluate the relationship between preoperative auras and postoperative outcomes in patients with MTS who are a candidate for epilepsy surgery in Isfahan.

Materials and Methods

This study is a cross-sectional study conducted on MTS-TLE patients who underwent selective amygdalohippocampectomy in Kashani hospital in Isfahan University of Medical Science (IUMS) from 2007 to 2016. Inclusion criteria were as follows: (1) Confirmed diagnosis MTS-TLE, (2) Admitted in Kashani hospital for selective amygdalohippocampectomy from 2007 to 2016, (3) Having completed medical records, (4) Presence of informed consent on their medical records. If the patient's medical record was incomplete, the subject was excluded from the study.

All patients had a selective amygdalohippocampectomy and had a minimum of 1-year follow-up. Postsurgical outcomes of patients were evaluated based on the Engel Epilepsy Surgery Outcome Scale and categorized into four classes: Class I (Free of disabling seizure with four subgroups from A-D), Class II (Rare disabling seizures or almost seizure-free with 4 subgroups from A-D), Class III (worthwhile improvement with two subgroups from A-B), and Class IV (no worthwhile improvement with three subgroups from A-C).^[13]

Age, gender, marital status, education level, family history, age at seizure onset, seizure frequency, and type of aura were recorded based on patient's medical records, and for further evaluation, authors have visited patients in the clinic. Patients were followed at least 1 year after surgery. They were invited to the neurology clinic of Kashani hospital and evaluated for postoperative outcomes. Postoperative outcomes include the duration of being seizure-free and the class of Engel scale. Patient's auras were categorized into seven groups as followed: Abdominal aura (abdominal discomfort including nausea, emptiness, tightness, butterflies, pain, or hunger, sensation may rise to the chest or throat), auditory aura (buzzing, drumming sounds or single tones), affective aura (fear, anxiety, depression, joy, or anger), mnemonic aura (feeling of familiarity or unfamiliarity), other types of aura (sensory, visual, malaise, etc.), multiple types of aura and did not report an aura preceding their seizures.^[9]

Data from all patients were entered into the SPSS version 20 (SPSS corp., Chicago, IL, USA) and then analyzed. For reporting quantitative data mean and standard deviation and for reporting qualitative data number and percent were used. For comparing data between groups, the

Kruskal–Wallis test was used. A two-sided α level of 0.05 was used to assess statistical significance. This study was approved by the Regional Bioethics Committee of the IUMS.

Results

In this study, 99 patients with a mean age of 29.45 ± 9.14 years (ranged from 10 to 56) were evaluated that 46.5% ($n = 46$) were male. About 48.5% ($n = 48$) were married and 46.5% ($n = 46$) had educational level above diploma. Positive family history for epilepsy was seen in 5.05% ($n = 5$) of patients. The mean age of seizure onset was 9.45 ± 7.49 years (ranged from 1 to 31), and most of the patients (35.4%) had the onset of a seizure in the age between 5 and 10 years. Most of the patients (52.5%) had weekly seizures [Table 1].

The following patients showed that 73.7% ($n = 73$) of patients were seizure-free after their surgeries. Evaluating Engel criteria showed that most of the patients ($n = 81$) were in Class I of this scale [Table 2]. About 36.3% ($n = 36$) had not experienced any aura before their seizures, and among those with aura, the most prevalent aura was abdominal aura in 29 patients (29.3%) followed by affective aura in 9 patients (9.2%) and other types of aura in 25 patients (25.2%) [Table 3]. Most of the patients in Class I, II, III, and IV of Engel scale had an abdominal aura, without aura, affective aura, and abdominal aura, respectively, but this difference was not

Table 1: Gender, marital status, education level, age of seizure onset and seizure frequency in mesial temporal sclerosis patients

Variable	n (%)
Gender	
Male	46 (46.5)
Female	53 (53.5)
Marital status	
Married	48 (48.5)
Single	50 (50.5)
divorced	1 (1)
Education level	
Under diploma	53 (53.5)
Above diploma	46 (46.5)
Age of seizure onset	
Under 1 year	15 (15.2)
1–5 years	20 (20.3)
5–10 years	35 (35.4)
10–15 years	15 (15.1)
15–20 years	14 (14.1)
20–25 years	10 (10.1)
Above 25 years	5 (5)
Seizure frequency	
Daily	24 (24.2)
Weekly	52 (52.5)
Monthly	19 (19.2)
Seasonal	4 (4.1)

statistically [Table 4]. Kruskal–Wallis test showed an insignificant relation between types of aura and the number of seizures ($P = 0.691$).

Discussion

This study evaluated the relation between type of aura in MTS patients and postoperative outcomes. In this study,

Table 2: Engel classification in patients with mesial temporal sclerosis after the operation

Engel	n (%)	Total
Class I (free of disabling seizure)		
A	60 (60.6)	81 (81.5)
B	8 (8.1)	
C	3 (3)	
D	10 (10.1)	
Class II (rare disabling seizures or almost seizure free)		
A	6 (6.1)	12 (12.3)
B	3 (3)	
C	3 (3)	
D	0 (0)	
Class III (worthwhile improvement)		
A	4 (4)	4 (4.1)
B	0 (0)	
Class IV (no worthwhile improvement)		
A	2 (2)	2 (2.1)
B	0 (0)	
C	0 (0)	

Table 3: Type of aura distribution in patients with mesial temporal sclerosis

Type of aura	n (%)
Abdominal	29 (29.3)
Auditory	2 (2)
Affective	9 (9.2)
Mnemonic	2 (2)
Other types of aura	19 (19.2)
Multiple aura	2 (2)
No aura	36 (36.3)

there was no relation between types of aura and the Engel scale class after the operation.

Aura is a subjective and objective ictal phenomenon that precedes observable seizures.^[14] Evaluation of auras in seizures, particular focal seizures can be useful for localizing epileptogenic regions.^[14,15] In this study, the most prevalent aura in MTS patients was an abdominal aura (29.3%), which is likely similar to previous studies. The frequency of abdominal aura in TLE patients ranged from 18.5% to 67% in different studies.^[16,17] A study on 336 TLE patients revealed that 39% of patients had an abdominal aura, and this prevalence in MTS patients was 64%.^[14] One study on 237 MTS patients reported that 52% of patients had an abdominal aura, and abdominal aura is also prevalent in all TLE patients.^[9]

In this study, there was no significant relationship between the type of aura and the number of seizures after the operation. The findings of this study are in contrast with other similar studies. One study on 237 patients with MTS that evaluated the relation between type of auras and postoperative outcomes, reported that the chance of being seizure-free is higher in patients with abdominal aura.^[9] Another study on 58 patients with temporal lobectomy showed that patients with epigastric riding sensation had a remarkable chance for experiencing better postoperative outcomes.^[18] There is one study with a similar finding to our study that reported abdominal aura could not predict postoperative outcomes in TLE patients.^[19] Another study on 23 patients with TLE showed that there was no significant difference between patients who had or had not aura in postoperative outcomes.^[20]

According to the previous studies, the abdominal aura is the most prevalent type of aura in MTS patients, and the relation between the type of aura and the postoperative outcomes is controversial. Maybe these differences in studies' findings are due to different definitions that were used in different studies that may contribute to some discrepancies. Some studies consider purely epigastric or abdominal sensation as an abdominal aura, while others also consider throat and chest sensation as an abdominal aura.^[21,22] Sometimes, the abdominal aura is accompanied by fear, and groups of studies categorized this type of aura in the psychic or experimental aura.^[17]

Table 4: Aura distribution in different engel classes in patients with mesial temporal sclerosis

Engel class	Type of aura, n (%)							Total
	Abdominal	Auditory	Affective	Mnemonic	Other types of aura	Multiple auras	No aura	
Class I	25 (30.9)	2 (2.4)	4 (5)	1 (1.2)	18 (22.3)	1 (1.2)	30 (37)	81 (100)
Class II	3 (25)	0 (0)	3 (25)	0 (0)	1 (8.4)	1 (8.4)	4 (33.2)	12 (100)
Class III	0 (0)	0 (0)	2 (50)	1 (25)	0 (0)	0 (0)	1 (25)	4 (100)
Class IV	1 (50)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (50)	2 (100)
Total	29 (29.3)	2 (2)	9 (9.2)	2 (2)	19 (19.2)	2 (2)	36 (36.3)	99 (100)

Kruskal–Wallis test did not show a significant relationship between the type of aura and Engel classes ($P=0.691$)

This study had lots of strengths and limitations. One of the strengths of this study was evaluating patients with MTS. Most of the studies before on types of aura and postoperative outcomes were on TLE patients, and there are limited studies that evaluated only MTS patients. Another strength of this study is using Engel score for assessing postoperative outcomes that are more specific than asking patients about their number of seizures after the operation. All patients in this study were assessed by the same neurologist team and experienced the same operation in one operation center.

We recommend that researchers consider more follow-up duration with a larger number of patients in a multicentric platform of the study. Furthermore, designing a prospective study would be less biased and more controlled. Several factors can affect the outcome of a surgery that is not assessed in this study that can be excluded in a prospective study.

According to this study, the type of aura cannot predict postoperative outcomes in MTS patients. More studies are needed to evaluate this relation in better-planned studies with greater sample size.

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Conflicts of interest

There are no conflicts of interest.

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