

Introduction

Epilepsy affects close to 2.5 to 3 million people. The majority of those patients suffer from temporal lobe epilepsy (TLE) associated with mesial temporal sclerosis (MTS). These patients often report a variety of sensations called auras prior to ictal events. In this study, we investigated how preoperative MRI and pathological findings relate to the different types of auras, and examine those auras for their predictive value of postsurgical outcome following anterior temporal lobectomy (ATL).

Methods

The records of patients who underwent ATL between 1993 and 2016 at our institution (n = 275) were retrospectively reviewed. Demographic and clinical variables were compared between aura types using ANOVA and logistic regression analysis. A multiple regression analysis was then conducted to determine which demographic and clinical variables predicted outcomes.

Table 1: Types of auras and their clinical presentation	
Epigastric	Upper abdominal sensation characterized by rising discomfort, emptiness, or tightness.
Mnemonic	Feelings of familiarity (déjà vu) and unfamiliarity (jamais vu).
Somatosensory	Tingling, numbness, shock-like sensations, pain, sense of movement, or a desire to move.
Cephalic	Lightheadedness or headaches.
Affective	Extreme feelings of emotion such as fear, depression, joy, or anger.
Gustatory	Bitter, salty, sweet, metallic, or acidic tastes.
Olfactory	Emergence of new odors, often unpleasant.
Visual	Hallucinations including flickering lights, spots in the visual field, or images not consistent with environment.
Auditory	Abnormal sounds such as buzzing, ringing, melodies, or voices.

Results

Two hundred and seventy five patients underwent ATL during the study period. 58% of our patient population reported being seizure free t most recent follow up and 66% managed to acheive Engel Class I. MRI findings consistent with MTS were seen in 53% of patients while 82% of patients had hippocampal MTS on pathology. 33% of our patient population experienced multiple auras.

Relationship Between Aura Type and Clinical Variables

- **Epigastric auras** were significant for having associations with female sex, MTS on preoperative MRI and pathology, pathology confined to the hippocampus and amygdala, a younger age at surgery, and a greater decrease in anti-epileptic drugs following ATL.
- **Mnemonic auras** did not have any significant associations with any of the measured clinical variables.
- **Somatosensory auras** had an association with MTS findings on pathology.
- **Cephalic auras** were significantly associated with partial complex seizures.
- **Affective auras** were seen more commonly in female patients and patients with nocturnal seizures.
- **Gustatory auras** had an associateion with pathology involving the amygdala as well as pathology in the temporal lobe, hippocampus, and amygdala, and an increase in anti-epileptic medications following ATL.
- **Olfactory auras** were associated with a history of depression and pathology involving the hippocampus and temporal lobe.
- **Visual auras** were associated with a greater number of preoperative anti-epileptic medicaitons.
- **Auditory auras** were significant for a lower number of anti-epileptic medications, a negative association with MTS on pathology, pathology sparing the hippocampus, and pathology confined to the temporal lobe.
- **No aura** cases had an increased incidence of patients with complex partial seizures, and MTS on pathology

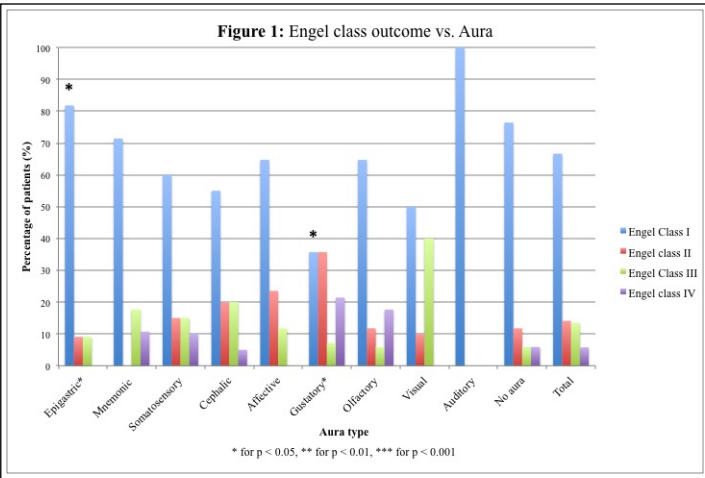


Table 2: Engel class I relationships			
	P value	Regression Coefficient	Standard Error
Gender (M = 1)	0.66	0.068	0.15
Age of surgery	0.0027**	-0.017	0.0057
Seizure frequency	0.94	0.00056	0.0076
History of depression	0.0027**	0.39	0.18
MTS on preoperative MRI	0.0029**	-0.48	0.16
MTS on pathology	0.82	0.047	0.2
History of febrile seizures	0.0059**	0.46	0.16
Epigastric Auras	0.036*	-0.41	0.19
Mnemonic Auras	0.4	0.17	0.19
Somatosensory Auras	0.39	0.2	0.23
Cephalic Auras	0.37	0.2	0.22
Affective Auras	0.77	-0.07	0.24
Gustatory Auras	0.045*	0.52	0.26
Olfactory Auras	0.75	-0.076	0.24
Visual Auras	0.057	0.6	0.31
Auditory Auras	0.071	-0.74	0.41
No aura	0.84	-0.052	0.26

\* for p < 0.05, \*\* for p < 0.01, \*\*\* for p < 0.001

Discussion

Epigastric auras, a preoperative finding of MTS, and an older age of surgery predicted better outcomes following ATL. Gustatory auras, depression as a comorbidity, and a history of febrile seizures predicted worse outcomes. The involvement of the temporal lobe, amygdala, and hippocampus associated with gustatory auras imply a diffuse underlying process. The relationship between olfactory auras and depression suggests an a connection between the neural networks behind these two processes. The confinement of auditory auras to the temporal lobe and negative correlation with hippocampal MTS on pathology suggests a more focal form of TLE that responds well to treatment. Auras hold important prognostic information regarding seizure localization and outcome and should be carefully considered as part of the preoperative workup.

Acknowledgements

This was a non funded study.